CLARE
INSTRUMENTS LTD.

Hipot & DC IR Tester
HAL Scan

OPERATING MANUAL

HAL

PASS

FAIL

START   RESET

—   H.T.   +
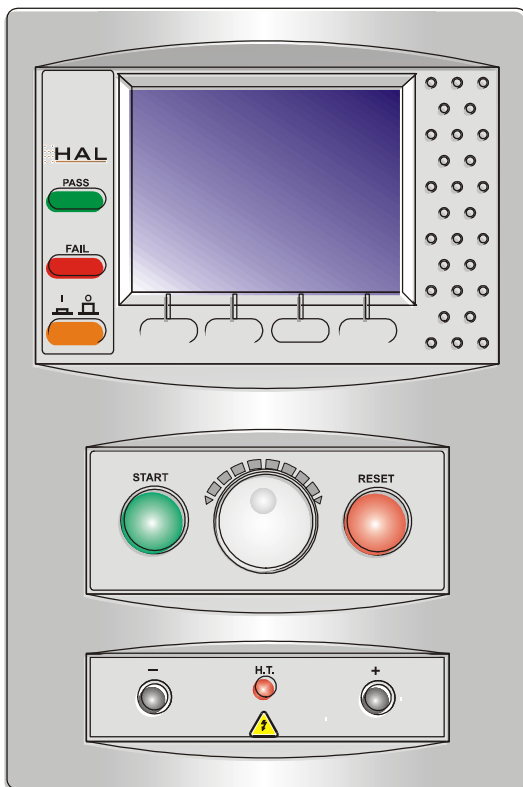
Sept 2004

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Issue 1.03

Software Version : CLAREH 14c

Limited Warranty & Limitation of Liability

Clare Instruments, guarantees this product for a period of one year. The period of warranty will be effective at the day of delivery.

In order to ensure the continued performance of this product Clare recommends that this tester be serviced and calibrated on an annual basis, by Clare Instruments. or any of Clare's authorised service centre using Clare's approved parts and components.

Any unauthorised modifications, tampering or physical damage sustained through negligent use or handling will void your warranty.

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Declaration of Conformity

for the

Clare Hal Scan Hi-Pot Tester

Manufactured by:

Clare Instruments, Dominion Way, Worthing. West Sussex. England
BN14 8NW

Millennium Statement

This product is Millennium compliant, and conforms fully to the
document BSI DISC PD2000-1.

Statement of Conformity

Based on test results using appropriate standards, the product is in
conformity with Electromagnetic Compatibility Directive 89/336/EEC and
Low Voltage Directive 73/23/EEC

Standards used:

EN 61010-1 (2001) Safety Requirements for Electrical Equipment for
Measurement, Control, and Laboratory Use

EN 61326: (1998) Class A. Electrical equipment for measurement,
control and laboratory use – EMC requirements

The tests have been performed in a typical configuration.

This Conformity is indicated by the symbol CE , i.e. "Conformité
Européenne

Before Starting

Upon receipt of your HiPot Tester: -

1.   Check that all the component parts are present:-

- HiPot Tester
- Instruction Manual

2.   Read the operating instructions fully before conducting any tests.

3.   Contact Clare Instruments if you need information on training for Electrical Safety Testing. Courses can be arranged at Clare, or at customer premises.

4.   Data may be lost or altered in virtually any electronic memory under certain circumstances. Therefore Clare Instruments assumes no responsibility for financial losses or claims due to data lost or otherwise rendered unusable whether as a result of abuse, improper use, defects, disregard of operating instructions or procedures, or any other allied causes.

5.   Clare Instruments reserve the right to update the software in instruments returned to them for repair or otherwise, without notifying the customer previously.

          Clare Instruments can be contacted at:

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                BN14 8NW
                Tel : +44 (0)1903 233314
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                info@clareinstruments.com

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
CE	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. <u>**Never**</u> touch the Product being tested, or the test leads, whilst a test is in progress. <u>**Never**</u> remove the metal enclosure and touch any internal components whilst the tester is turned ON.

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 (ground) connection.

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

Should the Tester behave abnormally do not continue with the testing. Disconnect immediately and contact Clare Instruments for servicing (see Chapter 5 - Maintaining the Tester).

Chapter 1 Introducing the Tester

Introduction

The Clare Hal Scan HiPot Tester is an extended product range which encapsulates not only all the benefits and versatility of the original Hal HiPot Tester but also includes more pairs of output test terminals to facilitate multi-channels/multi-points testing capability. This is a powerful tool to assist in the analysis of the safety of electrical and electronic equipment giving it the advantage of speed. A range of tests are provided, with innovative features to aid difficult test situations, which allow testing of a wide variety of equipment.

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

- Multi-voltage tester
- Multi-Channels output (5 isolated pairs output terminals)
- Stores up to 6000 results including details of Products, user, location, site, date and time in non-volatile flash memory.
- Highly accurate leakage and DC IR measurements.
- Large Full graphics display, Real-time clock
- Connects to PC, Barcode reader and printer
- Compatible with Clare's PATguard and other leading software packages.
- Software adjusted user-friendly interface for differing levels of expertise
- Fully automatic or manually settable test programmes
- Auto testcode monitoring & generation
- Uses fully Barcode reading for simple & easy tests initiation
- Fast Start-up
- Fully isolated test outputs, to comply with EN50191.

Your HiPot Tester

Your Hal-Scan Accessories

Item Number	Part
1	Supply Lead
2	HT Clip Lead (5 pairs)
3	Guard Plug

The Front Fascia
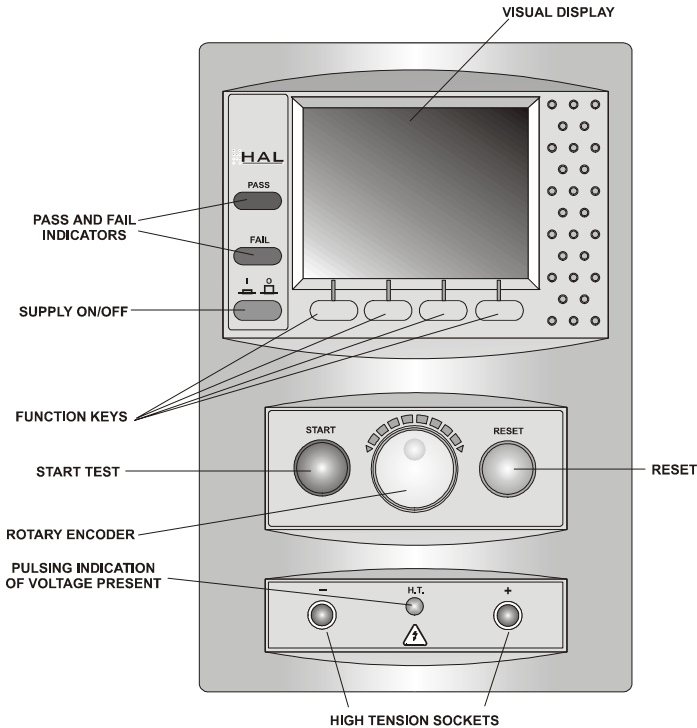
Note:

The -/+ HT sockets on the Front Fascia is the **Channel 1** output pair.

The user is provided with a 320 x 240 1/4 VGA Graphical Liquid Crystal Display (LCD). To the bottom of the screen are four function keys which allow the user fast access to options displayed on the Display

There is a rotary encoder used to navigate the menus.

Either side of the rotary encoder there is a green and red, start and stop button.

The Hal Scan also has the ability to use non-standard characters, which can be displayed by pressing the 'Symbols' key during text entry. Simply use the encoder to highlight the required character and press the Green button.

The Rear Panel
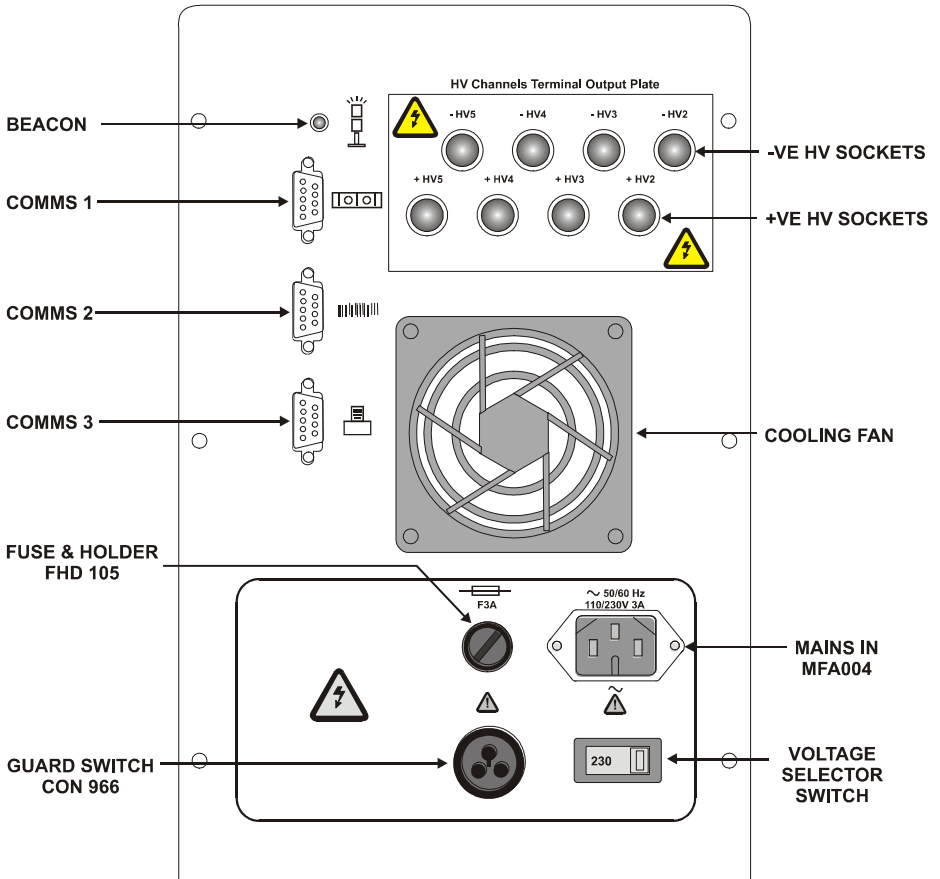
Beacon – For connection to external warning beacon (optional item)

Comms 1 – Communication port 1 for connection to a PC

Comms 2 - Communication port 2 for connection to a compatible

          Barcode reader or scanner.

Comms 3 - Communication port 3 for connection to a Printer

Definitions

Equipment Under Test	The electrical / electronic apparatus (EUT) which is the subject of testing.
Fast keys -	The keys with symbols to the bottom of the screen. These are used to select menu options displayed on the screen.
Tester -	The Clare Hal Scan HiPot tester.
Un-powered Tests -	The EUT is the subject of electrical tests using stimuli generated within the Tester. The EUT is not provided with mains power.
User -	The test technician using the Tester to perform tests on an EUT

Quick Reference

Editing the date in all modes

On delivery of the Tester it is necessary to ensure that the correct time and a date are stored. Once stored the time/date is retained in memory and does not need to be entered again. To edit the date: from the MAIN MENU select SETUP, select CHANGE DATE/TIME, use the cursor keys to highlight the digit to be changed. To store the changed date/time setting return to the MAIN MENU. The unit will then display the message STORING SYSTEM DATA.

NB: See Sections on How to use Setup for more detailed Instructions

Entering a User Name

On delivery of Tester it is necessary to ensure that a user name(s) is stored. To edit the user list: from the MAIN MENU select SETUP, select EDIT USER LIST / OPTIONS, use the encoder and select a name, a screen will appear "EDIT USER SETTINGS", press Green button, use the encoder to enter in the desired name and press GREEN BUTTON to return to the previous menu.

NB: See Sections on How to use Setup for more detailed Instructions

Editing User Level and Novice Mode

The Tester is delivered with a default setting of novice user level. To change this setting: from the MAIN MENU select SETUP, select EDIT USER LIST/OPTIONS, select USER(Name), select USER LEVEL, select the desired level by selecting either NOVICE or ADVANCED. To store the changed user level setting return to the MAIN MENU. The unit will then display the message STORING SYSTEM DATA.

Storing Product Test Results in Automatic mode

The Product Test Results will not be stored until the end of the test sequence and any COMMENTS menu (if it has been setup) will be appropriately acknowledged. The unit will then display the message STORING RESULTS. Your results have now been stored in memory. This will be confirmed when the next **Product** menu box appears.

Storing Product Test Results in Manual mode

The Product Test Results can be stored by selecting the 'Begin Product' field, when in Manual Mode. Enter a product number, either using the encoder or the barcode scanner, and select OK to start saving the results to that product name. The tester will store the results locally, but will not save these results to the results memory, until the 'End Product' field has been selected. The user will be prompted to enter a comment for the product to be stored.

Storing System Data

System Data consists of everything changed from within the SETUP MENU. To store the System Data return to the MAIN MENU from the SETUP MENU. The unit will then display the message STORING SYSTEM DATA. This will only be done if changes have been made; if no changes have been made then the system data will not be updated.

Waiting for a Yes/Cancel response

When you are prompted to respond with YES or CANCEL (NO) you must use the Fast keys under the display.

Using Symbols in Text Fields

Although there is an option to use non-ASCII symbols as Product numbers, Site & Location descriptions, User names and comments does not guarantee that your computer software will support them. If you are unsure avoid using symbols.

15 Digit Restriction

The maximum Product ID length is 15 characters while the maximum line for the comments is extended to 20 characters per line.

Setting up a Password

The Tester is delivered without any password set up. Therefore it is necessary to set in place an appropriate password for the protection of the System Setup. To do this select Setup from Main Menu, then select Change Password and you will be prompted for password entry. Also see section on Change Password for instructions.

Remember: Keep the password discreet for use with authorized users only. It may be useful to print the password in Barcode format for quick entry using the Barcode scanner.

Abbreviation used:

Press Green – denotes pressing the GREEN button

Press Red - denotes pressing the RED button

Chapter 2   Connecting the Tester

Connecting the tester

The Tester may be powered by either a 230V AC or a 115V AC supply (50/60 Hz). This is selected on the rear panel of the instrument.

The supply must include an earth connection (e.g. via a 3-pin plug).

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


```
HARDWARE VERSION: H1, S1.20, H1.18
SOFTWARE VERSION: CLAREH.12a
       CAPABILITIES: HI-POT,AC,DC,IR
```

Note

Current revision numbers are shown at the bottom of the screen.

The Tester will then display the Main Menu

Chapter 3   Using the Tester

Introduction

Once the start-up procedure of the Tester has been completed, the following screen will appear: -

```
-----MAIN MENU-----
      NEW TEST
  VIEW TEST RESULTS
  DOWNLOAD RESULTS
        SETUP
   MEMORY OPTIONS
    CHANGE USER
    CHANGE SITE
   CHANGE LOCATION
  BARCODE PRINTING
    REMOTE MODE
    ACCESSORIES


    USER: DEMO ADV
    SITE: CLARE INST.
  LOCATION: UK

Wednesday 17 April 2002  10:34

MANUAL     CHANGE      VIEW       NEW
MODE       USER        DATA       TEST
```
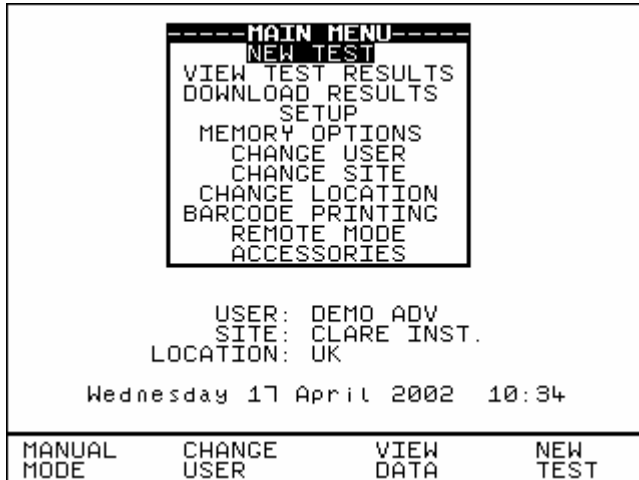
Navigation through the menus is by dedicated keys: -

Key	Function
Encoder clockwise	Cursor Right
	Cursor Down
Encoder anti-clock	Cursor Left
	Cursor Up
'Red' Button	No / Abort / move back through menu
'Green' Button	Yes/Start/Enter/Execute

There are also the four Fast keys under the LCD whose action will change depending on the function of the Tester at any particular point.

At every start-up the System Setup is Password Protected if a password has been set up. To select an option from the Main Menu, use the encoder or the relevant fast keys command. The selected option will be highlighted by a light-coloured bar. The highlighted selection is activated by pressing the Green button. Depending on current setup you may be prompted to enter in Password at certain stages of navigation or execution of commands. (**Important:** See notes on Restoring Password Protection)

To perform Automatic test select New Test and to conduct Manual Test select Manual Mode using the fast key button.

Also on the Main Menu screen the current details of the User, Site, Location and Date/Time will be displayed respectively.

If you need to change the current User, Site or Location name use the encoder to highlight CHANGE USER, CHANGE SITE or CHANGE LOCATION and press Green to select from the lists.

It should be worth knowing that a barcode scanner can be used optionally to the encoder for Quick entering of products, users, sites, locations, passwords and even comments in barcode format.

Note

The Date/Time will need to be updated only once and this will be retained in memory.

How to....

The remainder of this chapter has been sub-divided into sections to describe the Tester in terms of the essential functions to be performed. A summary is shown below: -

- How to perform Automatic tests
- How to use the Meter display
- How to view Test results
- How to perform Manual tests
- How to Download test results
- How to Print Barcode Labels and Testcodes
- How to use Set-up
- How to use the Memory
- How to change User
- How to change Site
- How to change Location
- How to use Help
- How to use a Barcode Scanner

Note

Default settings for User, Site, Location and Test Sequences are pre-loaded into the Tester. See 'How to change…' to select and change these settings and 'How to use Setup' to edit them.

How to perform Automatic Tests

⚠ **Warning**: To prevent any unwarranted safety hazards occurring during testing, ensure that the appropriate test conditions are set in accordance to requirements. Proper safety procedures must be in place before performing any Automatic test.

It is important to establish the setup of the current or default test settings in relation to the test conditions formatted. To check or edit these parameters select Setup and then System Configuration.

To perform automatic tests, press New Test fast key or use the encoder to highlight the New Test option on the Main Menu and press Green to display the following menu: -

```
-----PRODUCT------
▌


ABCDEFGHIJKLM█OPQRSTUVWXYZ
., 0123456789-_/  ↔ ←г ↵
abcdefghijklmnopqrstuvwxyz
```
| INSERT | ROTATE CURSOR | SYMBOLS | DELETE |

Use the encoder or a compatible Barcode Reader to enter a Product Number. When using the encoder press the Insert key to enter each character.

Note

See Chapter 4 for tips on using barcodes.

Depending on the System Configuration setup and Test type setup different prompt responses may be displayed e.g. Enter Password, Select Test options lists etc.

Once the Product data is entered press Green to display the test Meter screen. Now activate the appropriate **Test Start Conditions** and the test will begin. (See instructions on icons for Start conditions).

⚠️ **Warning**: When the test condition is set to 'No Start Condition' it will go straight to the test if the Guard switch is closed.

See relevant chapters on **How to**… for detailed instructions to select from change lists and refer sub-sections on **How to use Setup** to edit these fields.

When entering Setup or other Password protected Options Menus you may be prompted to enter your Password. You can use the Barcode Scanner to enter in your authorized password or use the encoder and Insert key to enter it manually.

Once the password is accepted this will unlock all protection to any edit setup fields and including the Password Protection Options formatted in the System Configuration.

Caution: It is recommended to reactivate the Restore Password Protection mode at the Main Menu each time after completing any Password access Editing menus or Setup changes.

Test Settings

The user has the ability to: -

- Set a specific test sequence by selecting DEFAULT SEQUENCE

- Allow use of TESTCODES to determine the test to be carried out

- Use any preprogrammed sequences for specific EUTS, e.g. Toaster

Selecting either of the first two options allows settings to be altered. See Default Sequence & Testcodes Sequence for instructions to edit test sequence variables.

Selecting any of the remaining 20 options (preprogrammed test settings created by user) allows the user to commence immediately with that test. This will also bring up the test meter screen.

```
-SELECT TEST SETTINGS-
 DEFAULT SEQUENCE
 USE TESTCODES
 DFLT AC HIPOT
 DFLT DC IR
 DFLT ARC
 CLARE INST.
 KETTLE II
 TEST 123
 TOASTER
 HAL H101
 DRILL TYP5
 TEST ABORT 1
 TEST ABORT 2
 ↓VARIABLE VOLTS    ↓

    DFLT        MAIN      USE
    SEQ         MENU      TCODES
```

Use the encoder to highlight a Test Sequence Setting and press the green button to select the desired option.

Default Sequence

When you first enter this menu all of the previous values are displayed and one of the field descriptions is highlighted.

```
--------DEFAULT SEQUENCE EDITOR--------
Z17ICHC0751 2.0S→2.50kV 0.00mA
 50Hz HIPOT  10S       1.00mA
        ↓   2.0S→0.00kV 12345
Z0000000000
        SKIP
        ↑↓
Z0000000000
        SKIP
        ↑↓
Z0000000000
        SKIP
        ↑↓
Z0000000000
        SKIP
         ↑
                    OK


--------------------------------------
         PREVIOUS     ROTATE      NEXT
  OK     FIELD        FIELD       FIELD
```

Use the encoder highlight a field to be changed and press the **Rotate Field** fast key to activate the encoder. Rotate Field will be highlighted. Turning the encoder will now cycle through all the available values for the field. To accept desired value press Rotate Field again to deactivate encoder for further field value change (highlight deselected). Again use encoder (or press **Next** or **Previous Field** fast key) to move cursor to navigate through to other fields including the three icons fields (see test icon descriptions) for any other changes. Repeat process of 'select/deselect' the Rotate Field key & turning encoder to search for values needed until all desired fields are changed to the user's requirements. Press **OK** and a message "storing system data" will be displayed. And depending on the test conditions the test will begin with the Meter screen displayed.

Description of Fields setting and Icons for Test Start conditions:

The first field (1st column from left) displays the **testcode** for the test. The test type (eg. 50Hz HiPot) is shown directly below it. The tests sequence (indicated by the downward arrows) may hold up to 5 unique tests. To add a second testcode for example; highlight **SKIP**, press **Rotate Field**, turn encoder to select values and de-press **Rotate Field**

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to accept option. Follow through the arrows to add/delete/edit any levels of testcodes sequence if necessary.

The second column holds the **test** ramp profile **time** (3 fields) for completing a level of test sequence:

> Time up or Ramp Time (to terminal voltage)
> Time Hold (for the test at terminal voltage)
> Time Down (for final terminal voltage)

The third column indicates the **terminal voltage** (corresponds to Time up) that the test should ramp to after the ramp up time is reached, and the second voltage (corresponds to Time Down) is the **final termination voltage** (usually 0.00KV). But this value can be selected to be "Maintained" to sustain the terminal voltage for execution to the next level of test sequence after the first test time sequence has completed. This is done by highlighting the Time Down, press Rotate Field and select "Maintained" using encoder.

The fourth column holds the **leakage limit** values, low (top) and high (bottom) respectively. A low value is used to ensure that the EUT is correctly connected.

Directly below the high leakage limit shows a consecutive of *integers* (**12345**) field option that represents the isolated -/+ HV channel pairs (output terminals) of the test terminal voltage being applied to respectively during any test. These output terminals could be pre-selected for test connection in any combination of ascending order,
eg. 123--, 1-3-5, -2-4-, --3--, 1---5, etc.
However using different configuration of test sequence levels will also provide any other test combinations required, eg. a 543 sequence will be ----5 for 1st level, ---4- for 2nd level, --3--for 3rd level and so on provided the test type sequence are configured properly.

To select these options, highlight an *integer* channel number and press Green (or repeatedly) to select/deselect the channels desired*.* Alternatively turning encoder whilst Rotate Field is highlighted will effect the same selection as well. To change the next *integer* field, deselect Rotate Field, use encoder or next/previous field keys and repeat process where necessary.

Notice that the 1st test sequence level will show the *integers* 12345 as default. It may be necessary to edit it for the desired output channels before initiating the test programmes. To select output channels for the next test sequence level you must first create (add) the test sequence level, then bring cursor to highlight bottom of circular icon (the repeat loop, second from right), press **Green** once will display the *integers* field on that sequence level. Repeat process as previous page to select/deselect option for output channels.

Caution: It must be noted that only the integer(s) selected will conduct the test voltage(s), a blank ' – ' will be by-passed.

Next the lightning flash icon with a number denotes the **Arc level detection** for the test. A level of 1 is the most sensitive to arcs, with 9 the least sensitive, and X disables the feature.

The circular icon with a number in the centre denotes the number of **repeats** (loops) for the test. This icon can be joined to other levels of test sequence for different combinations of loops cycle for different unique test sequences, see e.g. next page.

```
-------DEFAULT SEQUENCE EDITOR--------
Z19IAC50J52 1.0S→2.50kV 0.00mA
 50Hz HIPOT 2.0S       5.0mA
        ↓ 0.5S→0.00kV 12345
Z2C04A50052 0.4S→3.20kV 0.00mA
 60Hz HIPOT 1.0S      10.0mA
        ↑↓ 0.5S→0.00kV 12345
Z0000000000
     SKIP
        ↑↓
Z0000000000
     SKIP
        ↑↓
Z0000000000
     SKIP
        ↑
            OK




  OK    PREVIOUS  ROTATE  NEXT
        FIELD     FIELD   FIELD
```

```
-------DEFAULT SEQUENCE EDITOR--------
Z19IAC50J52 1.0S→2.50kV 0.00mA
 50Hz HIPOT 2.0S       5.0mA
        ↓ 0.5S→0.00kV 12345
Z2C04A50050 0.4S→3.20kV 0.00mA
 60Hz HIPOT 1.0S      10.0mA
        ↑↓ 0.5S→0.00kV
Z0000000000
     SKIP
        ↑↓
Z0000000000
     SKIP
        ↑↓
Z0000000000
     SKIP
        ↑
            OK




  OK    PREVIOUS  ROTATE  NEXT
        FIELD     FIELD   FIELD
```

(Fig. A)   (Fig. B)

Fig. A shows that the first test sequence (50Hz HiPot test) will convene twice before going on to the second test sequence (60Hz HiPot test) for twice. Where as,

Fig. B shows that the first test sequence (50Hz HiPot test) will convene once then proceeds to second test sequence (60Hz HiPot test) once and then the process is repeat again once through.

Therefore you must take *caution* while selecting (linking) this test repeat loops especially when other levels of test sequence may not be of the same test type nature e.g. DC IR , DC HiPot etc. Proper test conditions **must** be set in place to dissociate or pause the different tests initiation for safety & product suitability checks.

The last icon denotes the **Start conditions** for the test. These can be as Fig.

1. Reset **Ext**ernal safety guard switch to 'Closed', followed by pressing **Green** to start each repeat of the test. (Start Ext+Green)

2. Reset **Ext**ernal safety guard switch to 'Closed', followed by pressing **Green** to start the test (1st loop). **No** subsequent pressing of Green button needed for each repeat tests. Any repeat loops will immediately convene whilst guard switch is closed. (Start Ext+Green) for 1st loop & (Start None) on any repeats.

3. Reset **Ext**ernal safety guard switch to 'Closed' to start test and each repeat of the test. (Start Ext)

4. Reset **Ext**ernal safety guard switch to 'Closed' to start the test cycle. **No** subsequent stimulus required for repeat test. Repeats will automatically be performed, whilst the safety guard is closed. (Start Ext) for 1st loop & (Start None) on any repeats

5. Press **Green** to start test and each repeat of the test. External safety guard switch must remain closed for test to begin. (Start   Green)

6. Press **Green** once to start test. **No** subsequent stimulus required for repeat test Any repeat test will be automatic. External safety guard switch must remain closed for test to begin. (Start   Green) for 1st loop & (Start   None) on any repeats.

7. **No** start stimulus required. The test begins immediately after the product data has been entered. This mode is usually a follow-on test from a previous test. Use this with caution. (Start   None) for all tests

Fig. 1   Fig. 2   Fig. 3   Fig. 4   Fig. 5   Fig. 6   Fig.7

Use Testcodes

This option bypasses the need to edit a specific test sequence, allowing direct entry of a Testcode through the barcode scanner. From the Select Test Setting menu choose Use Testcodes or press Use Tcodes fast key.

Use the encoder to highlight the Testcode sequence (up to 5 levels) to be changed and use a barcode scanner to enter in a new Testcode.

Press OK to accept & save Testcode option.

OR press the Red button to abort and return to the previous menu.

```
-------------ENTER TESTCODES-------------
Z10KADA01UU 1.0S→1.00kV 0.00mA
 50Hz HIPOT 3.0S        0.10mA   ↻(1)
       ↓    1.0S→0.00kV 1----       123
Z0000000000
       SKIP
       ↑↓
Z0000000000
       SKIP
       ↑↓
Z0000000000
       SKIP
       ↑↓
Z0000000000
       SKIP
       ↑
              OK

    OK     PREVIOUS              NEXT
           FIELD                 FIELD
```
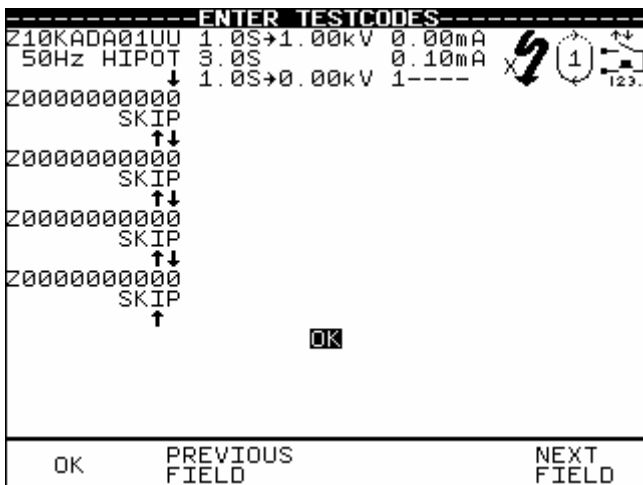
NB: The Testcode numbers can also be changed using the encoder. First highlight the testcode to be edited, press Green button to bring up the alpha-numeric options on the screen. Use Rotate cursor & Insert keys to enter any combination of testcodes sequence. However incorrect testcodes will be rejected and activate a warning. See Testcode tables for details.

Perform Test

Use the encoder to highlight the OK field and press Green to perform the test. Pressing the Red Button will return to the previous menu.

The screen will change to the Meter Display (see separate section - How to use the Meter Display for an explanation).

Note

Help screens may be displayed depending on the User Level set. It is possible to stop these appearing by altering the User Level. See EDIT USER LIST OPTIONS. Help can be displayed during any test by pressing the appropriately marked fast key.

All automatic mode test results are stored in memory.

If any test in the test sequence fails, then the test sequence is aborted and a fail message will be displayed with the alarm buzzer beeping continuously. Press Green to acknowledge the status. A Failure Options Menu can be configured or just a Failure Comments box option can be selected at the System configuration setup to indicate these modes.
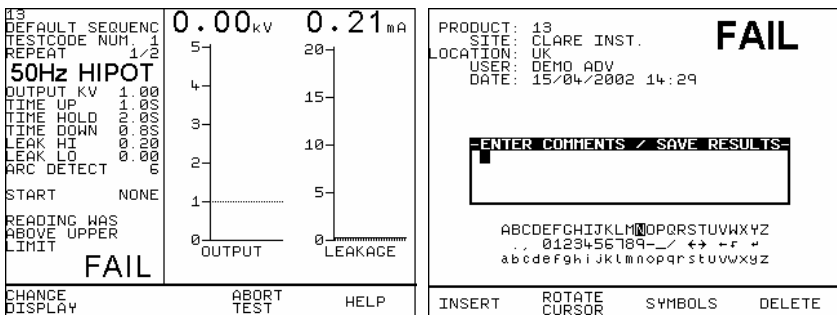
Fail Comments – Use encoder & Insert key to enter in any comments. To skip line or move to next line, highlight Rotate Cursor and turn encoder. Or use barcodes.

Enter Green button to store results/comments.

During an automatic test the user may choose to abort test by opening the Guard switch or pressing the Red button. See Abort action for detail.

However if an Abort warning signals during any test indicating an interruption detected due to **Overcurrent**, **Arc detected** or any other reason that causes a tester system fault the test will be aborted immediately with the buzzer beeping continuously until the Green or Reset button is pressed. Then the Abort Options box will show. Select **Abort Product** to exit from test programme. This will ensure No test results are stored against the product number. In any case **Do Not** press **Abort Test** as this will store an empty record to the product data memory.

```
ABC10000        0.00kV   0.02mA
DEFAULT SEQUENC
TESTCODE NUM. 1      5-        20-
REPEAT      1/1
50Hz HIPOT           4-        15-
OUTPUT KV   2.50
TIME UP     2.0S
TIME HOLD    10S     3-        10-
TIME DOWN   2.0S
LEAK HI      6.0
LEAK LO     0.00     2-         5-
ARC DETECT     0
START EXT+GREEN      1-
ABORTED - OVER       0-         0-
CURRENT              OUTPUT    LEAKAGE

CHANGE          ABORT
DISPLAY         TEST     HELP
```

```
        --ABORT OPTIONS---
          RESTART TEST
         RESTART PRODUCT
           ABORT TEST
          ABORT PRODUCT
         END CURRENT LOOP

RESTART   RESTART   ABORT   ABORT
TEST      PRODUCT   TEST    PRODUCT
```

Add Comments

```
PRODUCT: Bench Test
   SITE: Woods Way      PASS
LOCATION: R & D
   USER: J. Smith
   DATE: 10/09/2001 16:40

-ENTER COMMENTS / SAVE RESULTS-




ABCDEFGHIJKLMNOPQRSTUVWXYZ
.,  0123456789-_/  ↔  ←┌  ↵
abcdefghijklmnopqrstuvwxyz

INSERT   ROTATE    SYMBOLS   DELETE
         CURSOR
```

When a test has completed you can add/enter comments reference to the Product number. See system configuration setup to select this option. Use the encoder or barcode scanner to enter comments into the box. Select Rotate Cursor and turn encoder for a new line. To store the comments press Green. Your results and comments will now be stored.

Options after Test

The options menu is selected by entering 'After Test : **Menu'** in the System Configuration Setup. With this option the following screen is displayed when an Automatic sequence has been completed.

Use the cursor keys to highlight an option after test and press Green to select the desired option.

```
-------OPTIONS-------
       NEW  TEST
  REVIEW TEST RESULTS
DOWNLOAD TEST RESULTS
      MAIN MENU
```

```
NEW        REVIEW        MAIN        DOWNLOAD
TEST       RESULTS       MENU        RESULTS
```
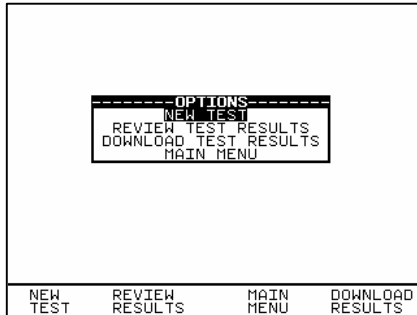
New Test

This is to perform a new test. Enter in the product number will begin the test.

Review Test Results

This option displays the results from the test in tabular form: -

```
PRODUCT: Kettle 1
   SITE: Woods Way
LOCATION: Production Ln 3  FAIL
   USER: DEMO ADV


TEST            OUTPUT   LIMIT   RESULT S

60Hz HIPOT      0.42kV           4.92mA F
```

```
PAGE       PAGE        MAIN       VIEW
UP         DOWN        MENU       COMMENTS
```

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Select View Comments fast key will display the comments stored.

Use the Red button to return to the previous menu.

Download Test Results

When selected a Download Options menu displayed will allow user to download, any results to a list, pass/fail labels or barcodes using a compatible printer - See section on How to download data for formatting information.
Press OK to start the download. The following message will be displayed.

DOWNLOADING DATA…

If there are problems downloading e.g. due to interfacing problems, then after a delay, the following error message appears: -

----------**WARNING**-----------
PRINTER TIMEOUT: NO PRINTER CONNECTED
PRESS START KEY TO CONTINUE

Press the Red Button to return to the previous menu.

Main Menu

Return to the Main Menu.

Abort Actions

During an Automatic test, opening the guard switch or pressing the Red Button stops the test in progress and displays the Abort options menu :-

```
--ABORT OPTIONS---
   RESTART TEST
RESTART PRODUCT
   ABORT TEST
  ABORT PRODUCT
END CURRENT LOOP
```

```
RESTART      RESTART       ABORT        ABORT
TEST         PRODUCT       TEST         PRODUCT
```
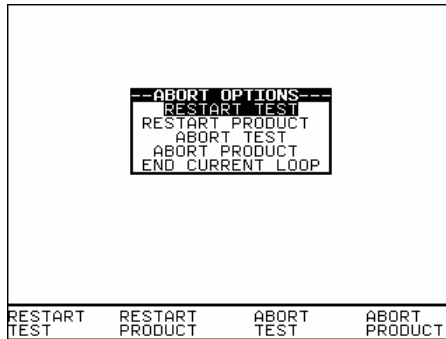
Use the fast key commands or the encoder to highlight an option following abort and press the green button to select the desired option.

Restart Test
Restart the current test.

Restart Product
Restart from the first test in the test sequence for the current Product.

Abort Test
Abort the test without storing a test result and select the next test. **Caution**: Depending on the test Start Conditions set pressing this key may immediately start the next test sequence **without warning**.

Important: Do not select or press this option if previously the test had been aborted automatically by the tester due to **Over Current** or **Arc detected** or any other fault condition.

Abort Product
Abort the test sequence and select a new Product.

End Current Loop
End the current test-loop and proceed to the next test sequence. May also mean end of current loop for the current channel if more channels are defined by the testcode, then the test loop will restart using the next channel.

How to use the Meter Display

The Meter screen is displayed prior to tests commencing in both Automatic Mode and Manual Mode (as shown below) : -
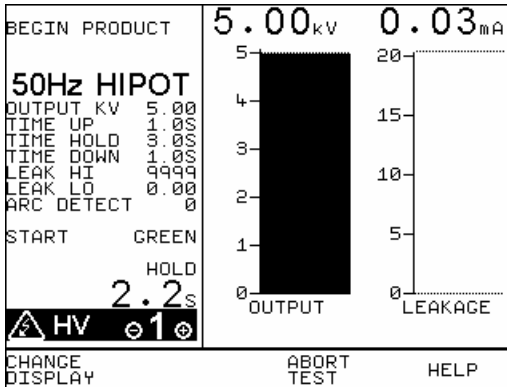
The screen can be considered as two panels, left and right. In the left panel the information is from top to bottom, as follows:

Begin product – this is displayed for manual mode only. If a product number entry is required select this to enter details and it will be displayed above this line. *Note:* Only those test results with product details entered are stored in memory.

For automatic mode the product number, test filename, testcode sequence number , and test repeats are displayed here instead.

Test type, in this case 50Hz AC HIPOT. This could be 60Hz AC Hipot, DC Hipot or DC IR.

Output kV – this is the target output voltage value to be reached after the ramp up period.

Time up – this can be set to a specific value using the encoder, or to be **Var**iable (i.e. no time limit set – test terminated by pressing Green or safety guard being released). When variable mode is selected, turn encoder to achieve the output voltage, then press Green to stop test.

Time hold - this can be set to a specific value using the encoder.

Time down - this can be set to a specific value using the encoder.

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Leak Hi – this is the upper limit for the leakage current.

Leak Lo – this is the lower limit for the leakage current. It is used to determine that a EUT is correctly connected.

Arc detect – this shows the level set for the detection of any arc that may occur in the EUT, during testing.

Start – shows the action needed to initiate the test sequence.   This refers to the usage of the **ext**ernal safety guard switch only, the **ext**ernal guard switch and the **Green** button or the **Green** button only.

Test status – here this shows that the test is in the hold phase. This part of the display is used to indicate what part of the test cycle is being performed.

Elapsed **test time** – this is shown below the test status.

HV icon – this is displayed to show that a voltage is being generated by the tester, and if connected, will appear at the EUT.

θ **1** ⊕ This denotes the active terminal output channel pairs selected.

The *right panel* of the display shows the output voltage and leakage current or insulation resistance, depending on which test is being applied.

The bar graphs are clearly marked, and include dashed lines to indicate the limit points. At the top of each bar graph there is a numerical display of the actual value.

Press Change Display - allows the right panel to be changed to display the readings via large high visibility DVM style displays, see below:
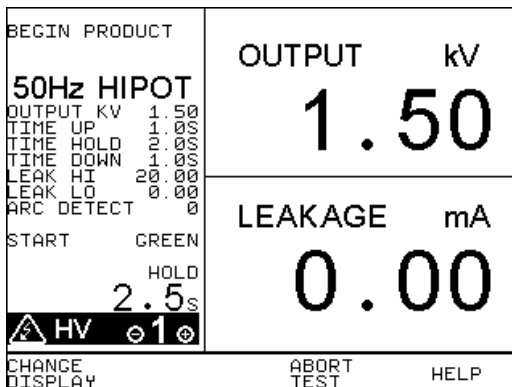
Sample Automatic Mode Meter Display

The screen will be similar to that for manual mode as described earlier. However there are a number of extra features denoted as follows:-

1st line (18) – Product number

2nd line (Toaster) - the Test type

3rd line denotes the Testcode Sequence number, in this case the test executed is of sequence level 1. A maximum of 5 sequence levels could be setup for different Testcodes.

4th line denotes the specific test of a repeat loop being done. Shown here 1/5 means 1st test of FIVE test loops being carried out. This corresponds to the circular icon with a number in the centre as mentioned in Default sequence description.

θ 1 ⊕ This denotes the active terminal output channel pairs that the test voltage will conducted to.
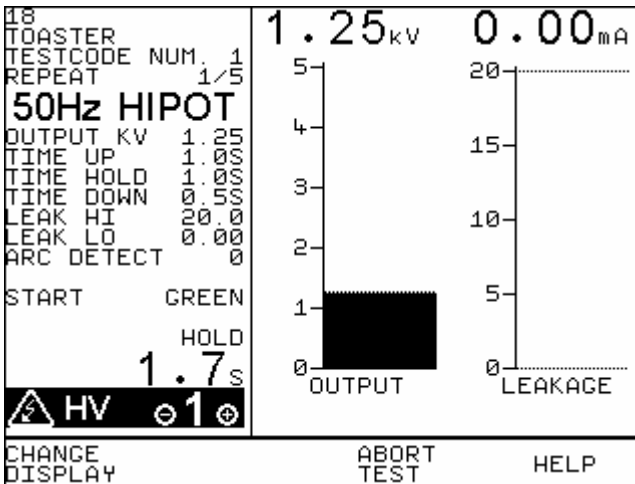
How to view (search) Test Results

To view test results stored in memory, press View Data fast key or use the encoder to highlight the View Test Results option on the Main Menu and press Green to display the following Search menu: -

```
------------SEARCH FOR DATA------------
          PRODUCT: ✳
             SITE: ✳
         LOCATION: ✳
             USER: ✳
      TEST STATUS: ✳
   STORAGE STATUS: NORMAL
        DATE FROM: 01/01/1900 00:00
          DATE TO: 10/09/2001 13:55

           START SEARCH



                        MAIN        START
                        MENU        SEARCH
```

Use the encoder to highlight the required search parameters and press Green to select the desired search field. A ' * ' denotes all product test results related to the field parameter. To get Quick search pressing Start Search now on the default screen without selecting any specifics will display all results in the memory. Use Page Up/Down to see the full list.

Search result through Product Number

Enter a *Product number* to search for the specific results. If the Product number field is left blank then the character ' * ' will be inserted as default, indicating to search for all of the Products. Press **Start Search** to begin. Alternatively use a Barcode scanner to enter a specific product number for the search and press Start Search. A search results will be displayed. A message No Records Found will be shown when products number is incorrect or when other fields data could not be matched. If unsure use ' * ' for the search.

Search result through Site Name

At the **Search For Data** menu highlight **Site** and press **Green** to display the site list. Highlight the Site name to which previously the products could have been tested on and press Select Site. Back at the search menu press **Start Search** to begin. A search results will be displayed.

```
---SITE LIST---
NEW...
EUROPE
CLARE INST.
SITE 3
SITE 4
SITE 5
SITE 6
SITE 7
SITE 8
SITE 9
SITE 10
SITE 11
SITE 12
↓SITE 13      ↓



SELECT
SITE
```
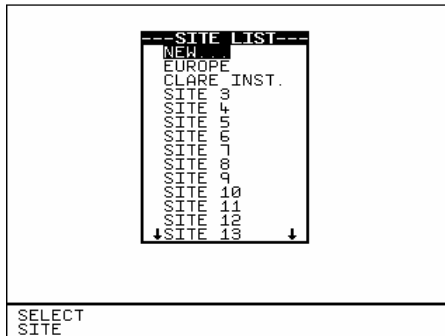
Search result through Location Name

At the **Search For Data** menu highlight Location and press Green to display the location list. Highlight the Location name to which previously the products could have been tested on and press Select Location. Back at the search menu press Start Search to begin. A search results will be displayed.

```
-LOCATION LIST-
NEW...
UK
USA
R & D
CLARE
LOC. 5
LOC. 6
LOC. 7
LOC. 8
LOC. 9
LOC. 10
LOC. 11
LOC. 12
↓LOC. 13↓



SELECT
LOCATION
```
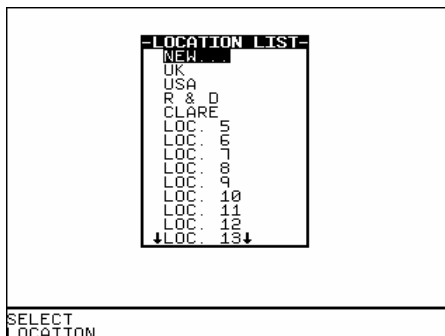
Search result through User Name

At the **Search For Data** menu highlight User and press Green to display the User list. Highlight the User name to which previously the products could have been tested on and press Select User. Back at the search menu press Start Search to begin. A search results will be displayed.
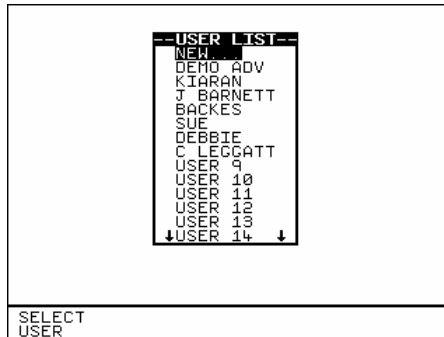
```
--USER LIST--
NEW...
DEMO ADV
KIARAN
J BARNETT
BACKES
SUE
DEBBIE
C LEGGATT
USER 9
USER 10
USER 11
USER 12
USER 13
↓USER 14    ↓
```
```
SELECT
USER
```

Test Status

When Test Status is highlighted use the Green button to select the option required, each time you press Green a different option will be displayed. This can be PASS, FAIL or '*' which indicates both.

Storage Status

When Storage Status is highlighted use the green button to select the option required, every time you press Green a different option will be displayed. This can be NORMAL status, DELETED status or '*' which indicates both.

Date From

This option allows the user to search for test results after the selected date. Use the cursor keys to highlight the digit to be changed. Use the encoder to change the value. Select OK to store the settings or press RED to abort them.

```
------DATE FROM-------
01/01/1900 00:00

    0123456789

Monday 1 January 1900  00:00


OK    ROTATE    ROTATE    NEXT
      CURSOR    FIELD     FIELD
```

Date To

This option allows the user to search for test results before the selected date. Use the encoder to highlight the digit to be changed. Use the encoder to change the value. Select OK to store the settings or press RED to abort them.

```
-------DATE TO--------
12/09/2001 14:11

    0123456789

Wednesday 12 September 2001  14:11


OK    ROTATE    ROTATE    NEXT
      CURSOR    FIELD     FIELD
```

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Start Search

After all the search parameters have been set, press Start Search to begin the search. It should be noted that unsure parameter should not be used otherwise this will corrupt the search matching process.

Search Result

When you select Start Search the following screen will be displayed. This screen indicates the Products that match the search criteria.

```
-------------SEARCH RESULTS-------------
 PRODUCT NO |   DATE    | SITE|STATUS
Bench Test   10/09/2001 Woods Way    P




  PAGE        PAGE                VIEW
  UP          DOWN      DELETE     COMMENTS
```

You can delete the highlighted Product by pressing the delete key.

Product Test Results

It is possible to view the results obtained for a certain Product by highlighting the Product number and pressing Green.

```
 PRODUCT: Kettle 1
    SITE: Woods Way
LOCATION: Production Ln 3  FAIL
    USER: DEMO ADV


TEST          OUTPUT   LIMIT  RESULT S

60Hz HIPOT     0.42kV          4.92mA F




  PAGE        PAGE      MAIN    VIEW
  UP          DOWN      MENU    COMMENTS
```

Pressing the View Comments fast key will display the Comments box. Use the Red button to return to the previous menu.

How to perform Manual Tests

Manual mode provides the user with direct access to the tests. In this mode individual tests can be selected and performed. Product numbers, sites, users and testcodes can still be assigned to Products if required; though this is not essential.

Entering Manual Mode

Use the fast key to select Manual Mode from the Main Menu.

The system will then display the meter screen and allow direct use of the default, or last selected test that was setup. The user may setup 10 unique configurations, and save these for later use. To operate the test the operator must follow the on-screen instruction; closure of the safety guard switch, followed by pressing Green. The test may be terminated at any time, either by pressing Red, or opening the safety guard.

Manual mode is primarily intended for use in evaluating EUTs in a laboratory environment, or for performing production line re-testing.

Note

To store tests in memory from Manual mode you must first select BEGIN PRODUCT, perform the tests required for the EUT. When you have completed the required tests select END PRODUCT, upon leaving this option the Hal Scan will now store the results. Note that the Enter Comments option is not displayed until there is something to store. Tests carried out without Product details being entered will not be stored
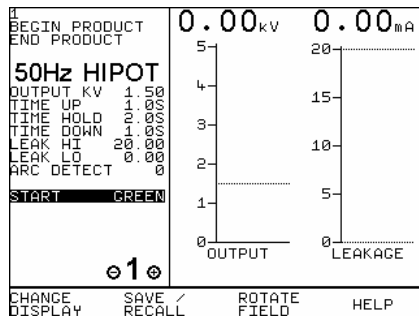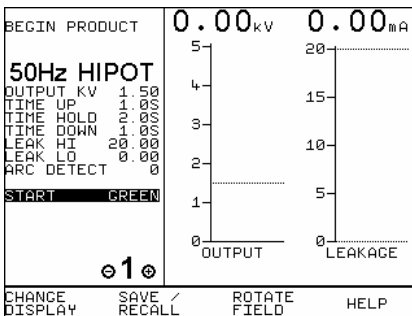
Create Product Number

This allows all manual tests performed to be stored against the Product number until the Product number is changed.

```
-----PRODUCT------
 1

ABCDEFGHIJKLMNOPQRSTUVWXYZ
., 0123456789-_/ ↔ ←г ↵
abcdefghijklmnopqrstuvwxyz

INSERT    ROTATE    SYMBOLS    DELETE
          CURSOR
```

Use the encoder or a compatible Barcode Reader to enter a Product Number. Use the encoder to select the 'BEGIN PRODUCT' field, then you will be presented with the screen above.

If you need to change the current User, Site or Location profile, return to Main Menu to select from the desire Change lists. Any test results saved against the current profiles will be stored in memory. Old results data will not be altered.

Note

Default settings for Sites and Test Sequences are pre-loaded into the Tester. See 'How to use Setup' to change these settings.

Use the encoder to enter comments into the comments box (4 lines of 20 characters). Press Green for a new line. To store the comments press the OK Fast key. Use the Red button if you do not want to store the comments.

Performing a Manual Test

After selecting the manual test display, you can set test parameters.

The user can change any individual field setting when the field is shown highlighted (use encoder to highlight any fields to be changed). Then press **Rotate Field** fast key (highlighted when selected), and use the encoder (to cycle through) to change the variable in the selected field. Before moving to next field you must deselect Rotate Field. Repeat process until all desired field settings are selected as required.

Now these manual test settings once fully selected can also be saved to a list of file names (max. of ten) which can be recalled for future tests. Press **Save** to save current setting to highlighted file or select a previously saved file by pressing **Recall** will bring those settings to the manual test display screen.
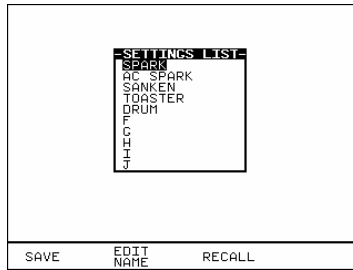
Use Edit Name key and the encoder to edit any file name if necessary.

To start the test, select (highlight) the 'START' field, close the safety guard and then press **Green**. Pressing Red or Abort Test fast key will abort the test at any time.

If User wish to print out the test results immediately after the test, pre-select the After Test : **Download** option at System Configuration setup. Alternatively any stored test results can be printed through the Download Results option at Main menu.

Note

In manual mode you will not get Abort Options, when Abort stimulus is initiated the test will simply stop and revert to the Meter display. The aborted test will not be stored.

If a Product Number has been created, the completed test result will be stored under the entered number.

Enter Comments/Save Results

When you have completed a test you can enter comments which will be referenced to the Product number. To write/store comments of any tests to memory choose Comments: **Always** at System configuration setup to display the Enter Comments box after each test. Alternatively you can choose to bring up the box **On Pass**, **On Failure** or **Never**. Use the encoder or barcode scanner to enter comments into the box. Select Rotate Cursor and turn encoder for a new line. To store the comments press Green. Your results and comments will now be stored.

```
PRODUCT: Bench Test          PASS
   SITE: Woods Way
LOCATION: R & D
   USER: J. Smith
   DATE: 10/09/2001 16:40


   -ENTER COMMENTS / SAVE RESULTS-
   ┌─────────────────────────────────┐
   │                                 │
   │                                 │
   │                                 │
   └─────────────────────────────────┘

      ABCDEFGHIJKLM█OPQRSTUVWXYZ
      ., 0123456789-_/ ↔ ←┌ ↵
      abcdefghijklmnopqrstuvwxyz

┌─────────┬─────────┬──────────┬─────────┐
│ INSERT  │ ROTATE  │ SYMBOLS  │ DELETE  │
│         │ CURSOR  │          │         │
└─────────┴─────────┴──────────┴─────────┘
```

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How to download Data (Results)

To download results stored in memory, use the encoder to highlight the Download Results option from the Main Menu and press Green to display the following menu: -

```
----------DOWNLOAD OPTIONS----------
          DESTINATION: ROLL PRINTER
   OUTPUT CONNECTION: RS232
           BAUD RATE: 9600

   DOWNLOAD FORMAT: PASS/FAIL LABELS

                   OK




          OK         MAIN      HELP
                     MENU
```

Use the encoder to highlight the required parameters. Use repeated presses of the green button to show the desired options for destination, output connection and baud rate.

Destination & Download Format

The destination field allows user to direct the download data to a PC, Z-modem, Generic printer or Roll printer. The download format shows the format choices available depending upon the destination option selected.

For downloading to a **PC** or **Z-Modem** the user has the option of sending data in :-

a SSS format – Clare's super system, compatible with Clare's PATGUARD software,

Certificate - downloads results in non-ASCII certificate format. These are done through COMMS 1.

For downloading to a **Generic printer** (A4) the user has the option of sending data as a *certificate*, a *list*, or as *pass/fail labels*.

In the *certificate* format the user has the option to produce one certificate per page or to produce continuous printouts.

For downloading to a compatible **Roll printer**, including 'till roll' and thermal printers the user has the option of sending data as a continuous *list* or as *pass/fail labels*. When using a thermal roll printer selecting:

- List will produce a print with the Product number, Site, Location, User, Testcodes used, Date & time of test done, Test type & its parameters, Overall Pass/Fail status

- Pass/fail labels will produce a print with the Product number, Date, User, Test status (pass or fail), Next Test due: blank space and Product barcode.

However, the restrictions of paper width means that Product numbers representing more than 12 digits cannot be printed and a numbered label will be printed instead. Testcodes over 12 and up to 15 digits can be accommodated since these are displayed as two lines.

All downloading to directly connected printers is through COMMS 3.

Use repeated presses of the Green button to show desired settings for download format. If appropriate the option field will illuminate.

When the download options are as you wish Press the **OK** fast key to display the following menu: -

```
--------SEARCH FOR DOWNLOAD DATA--------
            PRODUCT: *
               SITE: *
           LOCATION: *
               USER: *
        TEST STATUS: *
     STORAGE STATUS: NORMAL
          DATE FROM: 01/01/1900 00:00
            DATE TO: 10/09/2001 16:00

            START SEARCH


                          MAIN      START
                          MENU      SEARCH
```
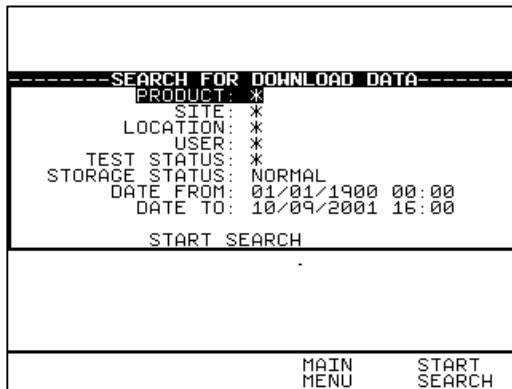
Use the cursor keys to highlight the required search parameters and press Green to select the desired options list. **Caution**: See Printing Notes before initiating any Start Search.

Product Number

When prompted enter a Product number to search for specific results. If the Product number field is left blank then the character '*' will be inserted, indicating to search for all of the Products. See Fig. 8

Site Name

Use the encoder to highlight a Site name and press Green to select the desired option. Select '*' if you wish your search to include all of the sites. Select 'Other' to search for a Site not in the list (this can happen if a Site Name has been modified during testing). If you select 'other' you are prompted to enter a site name. See Fig. 9

Location Name

Use the encoder to highlight a Location name and press Green to select the desired option. Select '*' if you wish your search to include all of the names. Select 'Other' to search for a Location not in the list (this can happen if a Location name has been modified during testing)'. If you select 'other' you are prompted to enter a location name. See Fig. 10

User Name

Use the encoder to highlight a User name and press Green to select the desired option. Select 'All' if you wish your search to include all of the names. Select 'Other' to search for a User not in the list (this can happen if a User name has been modified during testing). If you select 'other' you are prompted to enter a user name. See Fig.11

Test Status

When Test Status is highlighted use the Green button to select the option required, each time you press Green a different option will be displayed. This can be PASS, FAIL or '*' which indicates both.

Storage Status

When Storage Status is highlighted use the Green button to select the option required, each time you press Green a different option will be displayed. This can be NORMAL, DELETED or '*' which indicates both.
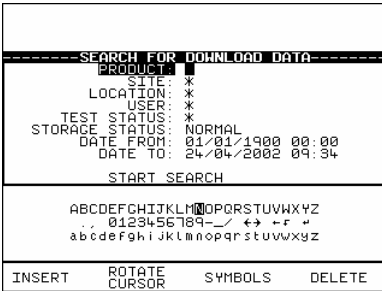
Fig. 8
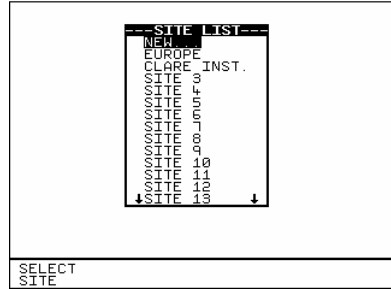
Fig. 9
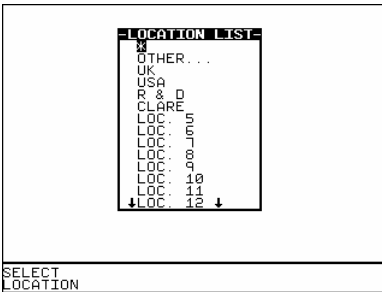
Fig.10
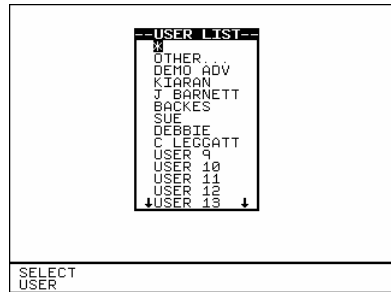
Fig. 11

Printing NOTES

When in Download data mode, do not enter the character '*' for **all** the six fields otherwise this would download (print out) **all** the products results for **all** the parameters indicated. Once printing started this will not stop until all printing is completed.

If you need to search and view the list of test results for reminder, exit from this Search for Download Data mode and use View Test Results at the Main menu before re-entering this mode for printing.

Date From

This option allows the user to search for test results after the selected date. Use the encoder to highlight the digit to be changed. Use the encoder to change the value. Select OK to store the settings or CANCEL to abort them.

```
------DATE FROM------
01/01/1900 00:00

0123456789

Monday 1 January 1900  00:00


OK      ROTATE    ROTATE     NEXT
        CURSOR    FIELD      FIELD
```

Date To

This option allows the user to search for test results before the selected date. Use the encoder to highlight the digit to be changed. Use the encoder to change the value. Select OK to store the settings or CANCEL to abort them.

```
-------DATE TO-------
12/09/2001 14:11

0123456789

Wednesday 12 September 2001  14:11


OK      ROTATE    ROTATE     NEXT
        CURSOR    FIELD      FIELD
```

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Search

After all the search parameters have been set, connect the appropriate printer or device. Press START SEARCH key or highlight START SEARCH & press GREEN to initiate search and download process.

If there are problems downloading e.g. due to interfacing problems, then after a short delay, the following error message appears: -

----------**WARNING**-----------
PRINTER TIMEOUT: NO PRINTER CONNECTED PRESS START KEY TO CONTINUE

Press the red button to return to the search menu. On completion of successful downloading, the tester returns to the search for results menu. The user can then conduct on other search or press the red button to return to the main menu.

To print Barcode Pass/Fail Labels

In order to print barcode pass/fail labels the tests results required must be already stored in memory. Otherwise it is necessary to carry out an actual test first (see how to perform automatic tests). After a test is completed and the results stored in memory it is possible to download results to a thermal printer and print the pass/fail labels (see how to download results).

Note

Restrictions of paper width on certain printer means that Barcode representing more than 12 digits cannot be printed and a numbered label will be printed instead.

The print format options available are dependent upon the specific printer chosen. See Chapter 4 on Tips to configure the printer.

How to print Barcode Labels and Testcodes

The Hal is capable of printing barcode labels in conjunction with a compatible thermal printer (see chapter 6 for Accessories).

To print barcode labels for User, Site, Location, Testcode, Product & Test Type select **Barcode Printing** at Main menu and press Green to display the option list (Fig. 12). Highlight the desired option and press Green will bring up a selection list. Highlight option then press **Print Barcode** to print.

```
---BARCODE PRINTING---
       USER LIST
       SITE LIST
     LOCATION LIST
     TESTCODE LIST
  PRODUCT & TEST TYPE




                   MAIN
                   MENU
```

Fig. 12

To print barcode testcodes

For example from the select test settings menu (Fig. 13) highlight the desired test e.g. DFLT AC HIPOT. Attach the compatible printer to the port and press PRINT BARCODE fast key on the display to initiate printing. A warning will be displayed if there is no printer connection or a connection problem has occurred (see Chapter 4 on Tips & Trouble Shooting). Fig. 13

```
-SELECT TEST SETTINGS-
 DFLT AC HIPOT
 DFLT DC IR
 DFLT ARC
 CLARE INST.
 KETTLE II
 TEST 123
 TOASTER
 HAL H101
 DRILL TYP5
 TEST ABORT 1
 TEST ABORT 2
 VARIABLE VOLTS
 ?
↓?                    ↓


PRINT
BARCODE
```
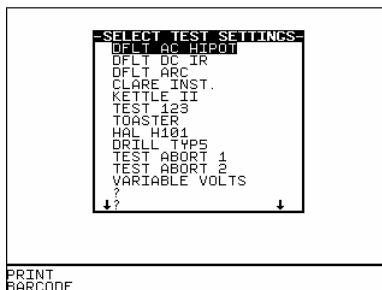
To print barcode Product & Test Type

From the Barcode print menu select **Product & Test Type**, press Green
to display the product & test type window. A default product number
(representing 12 characters) will be shown in highlight. Press Green to
enter the editor to **Insert** the correct product details (up to 15
characters). This option will just print out the barcode and number for the
Product only when OK key is pressed. However to print Product number
& Test type to be tested, enter details of product first as described then
highlight Test type and press Green to display the test settings list.
Highlight test type and press SELECT TEST and this displays the data
selected as shown in Fig. 14. Notice that the **Numbers of labels** can
also be selected for the printing process. Press **OK** key to confirm
printing. *Note: Clare's TSP400 printer will print product number with up
to 15 characters.*

```
---------PRODUCT & TEST TYPE---------
           PRODUCT: ABC-000-0001
         TEST TYPE: DFLT AC HIPOT
     NUM. OF LABELS: 1
                    OK




                OK                    NO TEST
                                      TYPE
```
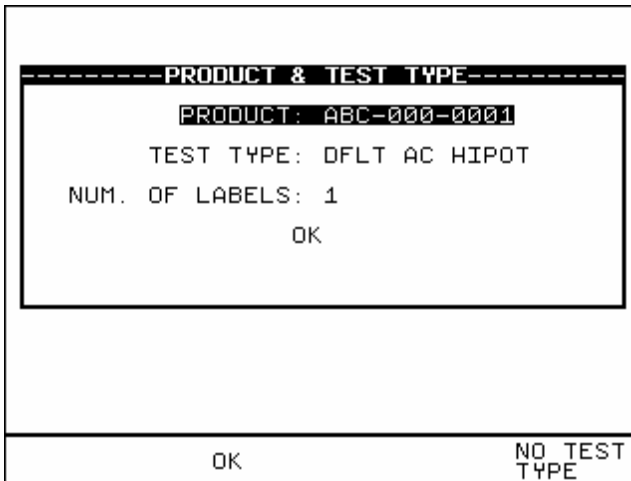
How to use Setup

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

```
-----------SETUP-----------
     EDIT TEST SETTINGS
EDIT USER LIST / OPTIONS
     EDIT SITE LIST
    EDIT LOCATION LIST
   EDIT PHONE BOOK LIST
    CHANGE DATE / TIME
  SYSTEM CONFIGURATION
    CHANGE PASSWORD
     SET BRIGHTNESS
    FACTORY SETTINGS


        USER: DEMO ADV

  Monday 10 September 2001  13:54


 SITE       USER       MAIN      DATE &
 LIST       LIST       MENU      TIME
```
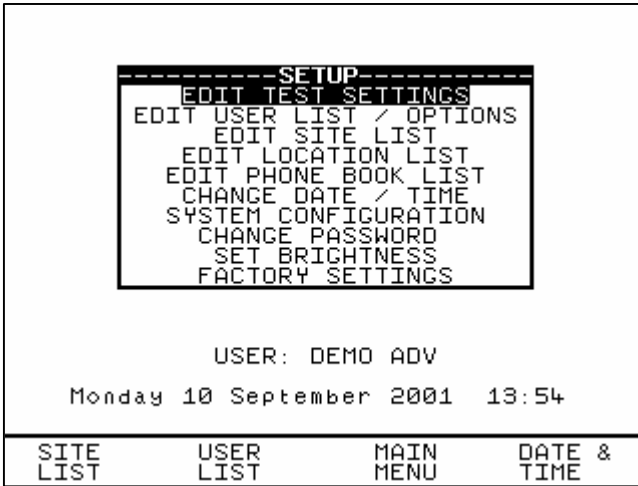
From this menu you can change the way the Tester will operate and also change user levels and sites. Use the encoder to highlight a function and press Green to select the desired option.

Edit Test Settings

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

Also see Change Password.

```
-SELECT TEST SETTINGS-
DFLT AC HIPOT
DFLT DC IR
DFLT ARC
?
?
?
?
?
?
?
?
?
?
↓?                        ↓


              MAIN      COPY
              MENU      SEQUENCE
```
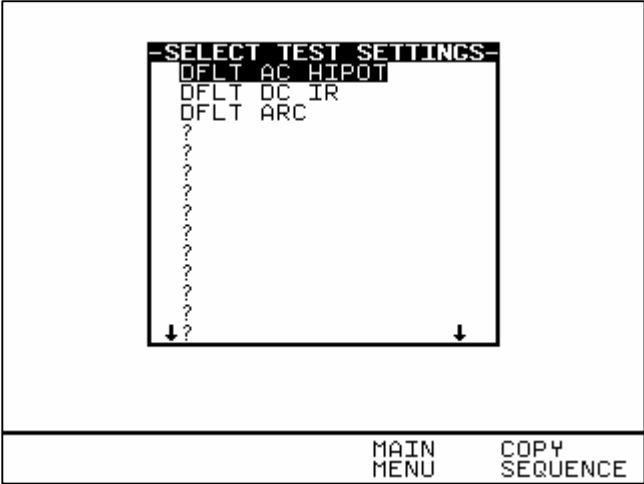
Use the encoder to highlight a Test Setting and press Green to enter the Test Settings Editor: -

Test Settings Editor

The Test Settings Editor allows the test sequence for the selected test to be examined and changed if required: -.

```
----------TEST SETTINGS EDITOR----------
Z17ICHC0751 2.0S→2.50kV 0.00mA
 50Hz HIPOT   10S       1.00mA  5    1
          ↓  2.0S→0.00kV 12345       123..
Z0000000000
       SKIP ↑↓
Z0000000000
       SKIP ↑↓
Z0000000000
       SKIP ↑↓
Z0000000000
       SKIP ↑
     NAME:  DFLT AC HIPOT
          PRINT TESTCODES
               OK

┌─────────┬───────────┬──────────┬──────────┐
│   OK    │ PREVIOUS  │  ROTATE  │   NEXT   │
│         │  FIELD    │  FIELD   │  FIELD   │
```
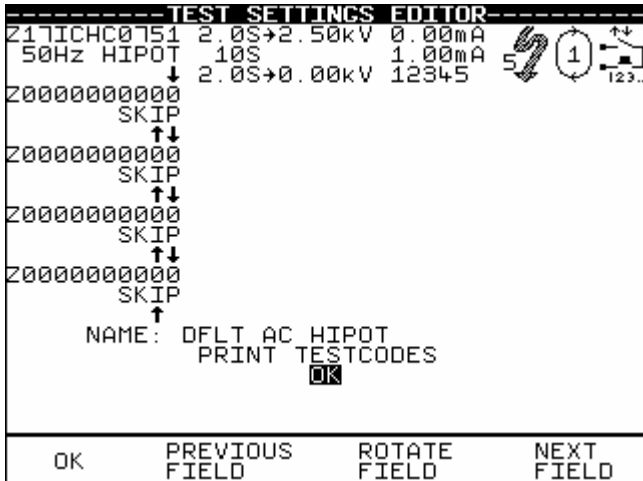
Use the encoder to highlight a field to be changed and press Green to select the desired option. Use the fast key to highlight the desired field, and the encoder to cycle through the range of permissible values for the test parameter. Use the fast key to enter the value. To exit this editing phase, select the OK fast key. Changes will be stored to the system. These fields have been described in detail under the Default Test Settings section.

Name:

Each Sequence is given a name (this case DFLT AC HIPOT); this is to help the user when selecting Sequences during automatic testing. When Name is highlighted press Green, then use the encoder to enter a new name for the Test Sequence (of up to 15 characters) and press Green again to confirm.

Test Parameter Fields

By selecting one of the test parameter fields from the Test Settings Editor, the encoder will cycle through all the available values for the test parameter.

Use the Green button to save the settings and return to the Test Settings Editor. Pressing Red will abort changes made to the settings and return to the Test Settings Editor.

Testcodes

Use the encoder and Green button to select one of the Testcode fields.

A Testcode can be entered manually or through a compatible barcode scanner, reader or wand (see How to use a Barcode Scanner).

Store Settings

Use the encoder to highlight the OK field and press Green to save the settings and return to the previous menu. Pressing Red will abort all of the changes made and return to the previous menu.

Print Testcodes

The testcodes can be printed (using a compatible printer - see Chapter 6).

Use the Green button to start the print. The following message will be displayed: -

> PRINTING TESTCODES
> WORKING….

On completion of downloading, the Test Settings Editor menu is displayed.

If there are problems downloading e.g. due to interfacing problems, then after a delay, the following error message appears: -

| ----------WARNING----------- |
| PRINTER TIMEOUT: NO PRINTER CONNECTED |
| PRESS START KEY TO CONTINUE |

Press Red to return to the Test Settings Editor menu.

Edit User List / Options

```
     --USER LIST--
     DEMO NOVCE
     DEMO ADV
     J. Smith
     USER 4
     USER 5
     USER 6
     USER 7
     USER 8
     USER 9
     USER 10
     USER 11
     USER 12
     USER 13
   ↓USER 14     ↓


              MAIN      USER
              MENU      SETTINGS
```
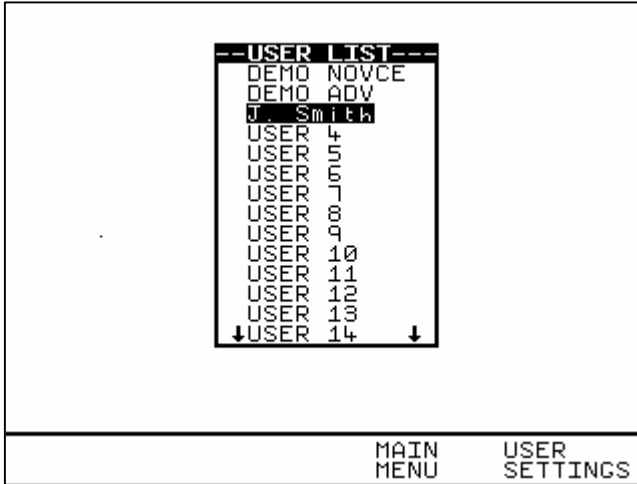
Note

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 memory.

Edit User Name

Select **Setup** from Main Menu. The setup screen will be displayed. Select **User list** using fast key or highlight **Edit User List/Options** and press Green to enter. Use the encoder to highlight a user name and press **User settings** fast key or press Green to select the desired option. You will be prompted to edit the current user settings. Highlight setting fields with cursor and press **Green to enter editing**. **Insert** fields as required using fast key. Then press **Green** followed by **Red** to accept new user name. Pressing **Red** during any changes will abort Edit mode.

```
--------EDIT USER SETTINGS--------
              NAME:  J. Smith
        USER LEVEL:  ADVANCED
           STARTUP:  MANUAL MODE
 BEEP ON KEY PRESS:  NO
     BEEP ON TESTS:  YES
 BEEP ON BARCODES:   YES
   BEEP ON WARNING:  YES

                  OK



         OK
```

The settings can be customized as follows for each user requirement.

Name

Highlight user name and press Green to enter field variables editor. Use the cursor key to highlight character and press **Insert** to select each desired option. Then press Green to accept changes.

User Level

Use the cursor key to highlight user level and press Green to select the desired option:

Novice - Selects the user level as a regular user. This provides an average level of help information and additional warnings and prompts.

Advanced - Selects the user level as an advanced user. This provides a minimum level of help information and additional warnings and prompts.

Startup Mode

Use the encoder to highlight a test mode on startup and press Green to select the desired option.

Main Menu (Automatic Mode)

The Tester will start up in Automatic Mode, with the Tester displaying the Main Menu.

Manual Mode

The Tester will start up in Manual Mode, with the Tester displaying the Manual Test Selection Menu.

Beep on Key Press

Use the encoder to highlight a buzzer option and press Green to select the Yes/No option. If **Yes** is selected this option will beep each time a key is pressed.

Beep on Tests

Use the encoder to highlight a buzzer option and press Green to select the Yes/No option. If **Yes** is selected this option will beep whenever the High Voltage Test in progress icon is displayed or when a test has failed.

Beep on Barcodes

Use the encoder to highlight a buzzer option and press Green to select the Yes/No option. If **Yes** is selected this option will beep whenever a barcode has been received.

Beep on Warning

Use the encoder to highlight a buzzer option and press Green to select the Yes/No option. If **Yes** is selected this option will beep whenever a warning message is displayed to alert user.

Saving User Settings

After all changes have been made to the **Edit User Settings**, press OK fast key to save these user settings. Then press Red to move back to Setup screen.
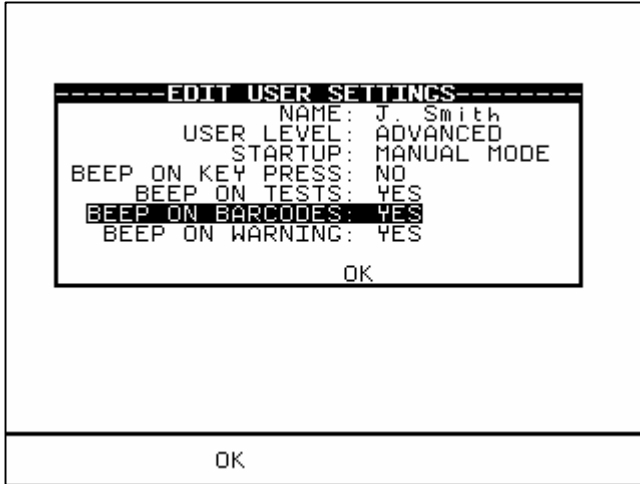
Edit Site List

Note

If you change the name of the site during testing all of the previous tests will still be referenced to the old site name; this gives unlimited amounts of sites within memory.

Edit Site Name

Select **Setup** from Main Menu. The setup screen will be displayed. Select **Site list** using fast key or highlight **Edit Site List** and press Green to enter. Use the encoder to highlight a site name and press **Edit Name** fast key or press Green to select the desired option. You will be prompted to edit the existing site name. Select data fields with cursor and press **Insert** key as required. Then press **Green** followed by **Red** to accept new site name. Pressing **Red** during any changes will abort Edit mode.

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Edit Location List

Note

If you change the name of the location during testing all of the previous tests will still be referenced to the old location name; this gives unlimited amounts of locations within memory.

Edit Location Name
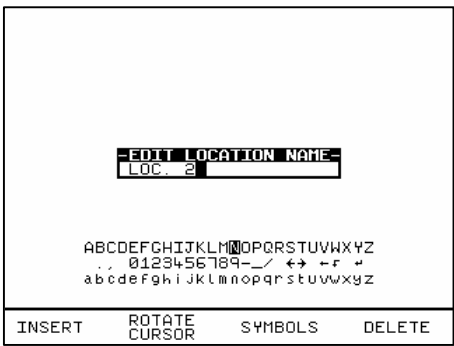
Select **Setup** from Main Menu. The setup screen will be displayed. Select **Edit Location List** and press Green to enter. Use the encoder to highlight a location name and press **Edit Name** fast key or press Green to select the desired option. You will be prompted to edit the existing location name. Select data fields with cursor and press **Insert** key as required. Then press **Green** followed by **Red** to accept new location name. Pressing **Red** during any changes will abort Edit mode.

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Change Date / Time

This option allows the user to change the Date and Time. Use **Rotate Cursor** (to select or deselect cursor tracking) and use encoder to move to desired fields for edition. Then select **Rotate Field** and use the encoder (to cycle through) to change the value of the field. Repeat above process until all fields have been changed. Select **OK** to store the new settings or press Red to cancel or abort changes. To update the new setting you must return to the MAIN MENU.

```
       --SET DATE AND TIME---
        10/09/2001 14:33


            0123456789


    Monday 10 September 2001  14:33



               ROTATE      ROTATE      NEXT
     OK         CURSOR      FIELD       FIELD
```
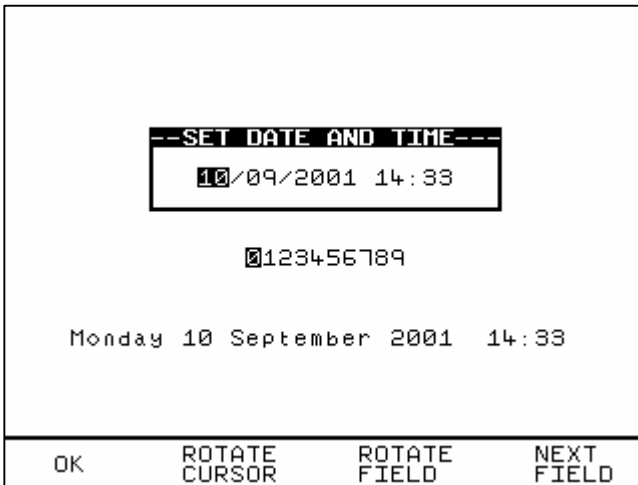
System Configuration

The Test Settings are included to cover the wide range of options that may be country or company specific.

```
--------SYSTEM CONFIGURATION--------
  PRODUCT NUMBER: INCREMENT LAST
ON TEST FAILURE: END PRODUCT
      TEST TYPE: FIXED
                 TEST 123
       COMMENTS: ALWAYS
     AFTER TEST: DOWNLOAD, NEW TEST
                 CONFIGURE
    DATE FORMAT: MM/DD/YYYY

             ROLL PRINTER
     PASSWORD PROTECTION OPTIONS

                  OK


                              MAIN
             OK               MENU
```

How to edit System Configuration

To edit any of the above fields, highlight a field to be changed, press Green (or press Green repeatedly for the options). When all fields have been satisfactorily selected press OK to store changes to memory.

Product Number : (Three options selectable)

• Increment Last

This option allows the tester to proceed to the next product ID (incremented by one) each time a test has completed.

• Repeat Last

This allows the test to be repeated on the previous product ID (same ID)

• Blank

This will bring up a blank Product ID after each test. The user will need to enter in any intended product ID again to proceed.

On Test Failure: (Two options)

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- Failure Menu

This gives user the option of having a menu for a failure within an automatic test sequence. The menu will give user the option of retrying a failed test (Restart Test), revise Product detail (Restart Product), end the test (End Product) and aborting the test on the product (Abort Product).

- End Product

This will just end the test sequence immediately once Failure is detected.

Test Type : (Three options)

- Any

This gives user the option of selecting from a test setting list each time before any test is instigated.

- Barcode only

This option allows user to scan in a Barcode representation of any test setting using a Barcode scanner.

- Fixed
  testName (selected from test setting list e.g. Test 123)

This option allows user to keep to only one test setting for every test.
To change to a different test setting, select Setup & System Configuration and then highlight testName, press Green. Select a new testName from test setting list.
Otherwise select one of the two options above for more flexibility.

Comments:

- Never
  This will not allow any comments recording after each test.
- Always
  This will always allow user to enter comments after each test.
- On Pass
  This will allow user to enter comments only when a test has Passed.
- On Failure
  This will allow user to enter comments only when a test has Failed.

After Test:

- Menu (Options)
  This allows user to have the options to select New Test, Review test results, Download test results or return to Main Menu after each test.

- New Test
  This option allows user to progress to the 'Next' (new) product test.
  However the 'next' product ID details displayed after each test will

depend on the Product Number options selected. See product number options.

- Download, New Test
  Configure – Highlight this to select Download Options (Sends test results on to a Roll Printer choice, PC or Z-modem medium). This will allow user to download the test results to any of the above options before proceeding to next test.

Date Format:
This allows user to select the date convention to be used
(i.e. DD/MM/YYYY or MM/DD/YYYY)

Roll Printer: (TSP 400 or REF 283A954)

This allows the user to define the thermal printer to be used with the Hal. Clare's recommended option is "TSP400". Option selected must match with the printer connected especially for Barcodes printing. See Accessories at Main Menu.

Password Protection Options

This allows the user to password protect a list of selectable options. An existing password must be set-up before this option can be used. To select option highlight the field , press Green to effect 'lock or unlock' of password protection on the field options. Press OK to save format.

```
--PASSWORD PROTECTION OPTIONS--
                DATE AND TIME:  🔓
   EDIT USER LIST / OPTIONS:    🔒
    EDIT SITE/LOCATION LIST:    🔒
       EDIT PHONE BOOK LIST:    🔒
                CHANGE USER:  🔓
      CHANGE SITE/LOCATION:  🔓
                MANUAL MODE:  🔓
                REMOTE MODE:    🔒
           DOWNLOAD RESULTS:    🔒
       CLEAR RESULTS MEMORY:    🔒
        CLEAR UPLOAD MEMORY:    🔒
   PRINT BARCODE FROM A LIST:  🔓

                    OK
```

OK
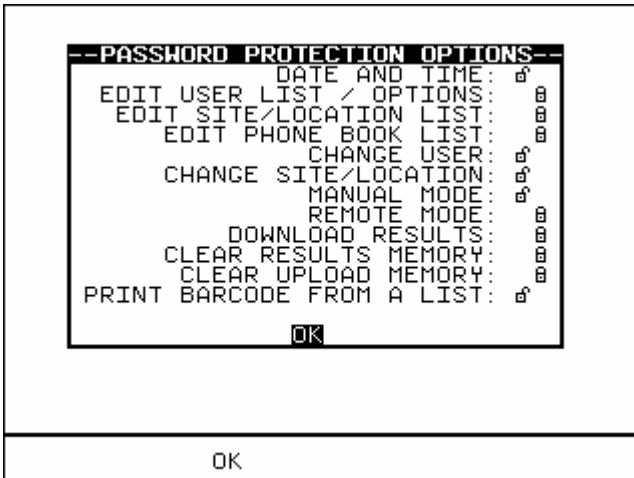
'Locked' field denotes that it will be password protected. Invoking any of those settings/options editor menu will required password to access. 'Unlocked' field denotes otherwise.

Change Password

It is possible to Password protect the Test Sequence Editor and the Country Settings.

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. A warning will show that no password is in place.

Set Brightness

You can now set the Brightness of the display. Use the encoder 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 Hal to the settings that were configured from new. This option will first ask you if you are sure, select Yes to reset or press

CANCEL to Abort.

How to use the Memory

To use the memory tests and functions, use the encoder to highlight the Memory Options option on the Main Menu and press Green to display the following menu: -

```
----MEMORY OPTIONS-----
VIEW MEMORY CAPACITY
 PERFORM MEMORY TEST
DELETE SINGLE PRODUCT
CLEAR RESULTS MEMORY
 CLEAR UPLOAD MEMORY




CLR PDCT   MEMORY      MAIN     MEMORY
MEMORY     TEST        MENU     CAPACITY
```
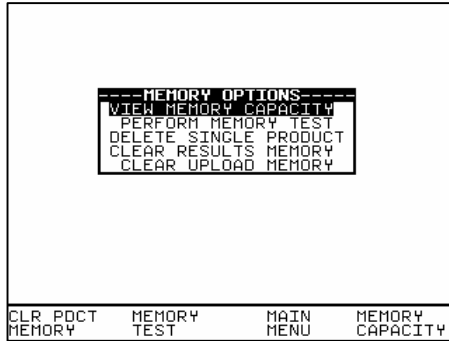
Use the encoder to highlight a test or function and press Green to select the desired option.

View Memory Capacity

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: -

```
--------AVAILABLE MEMORY--------
              99%




                    MAIN
                    MENU
```

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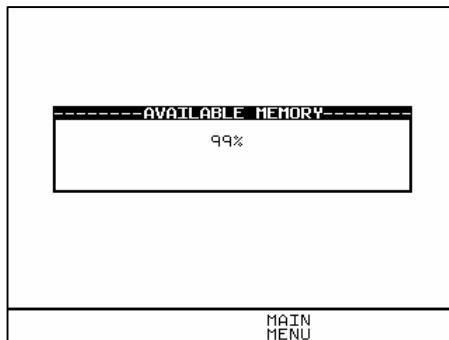
Perform Memory Test

Once the 'Perform memory test' option is highlighted press Green.

The memory test checks all of the Product results against their checksums. If the test result is a pass then no action is taken. If any tests fail then the Memory checksum requires updating. Use the encoder and press Green to choose an action if corrupted tests are found.

Note

The memory checksum is the sum of all of the memory excluding display data, registers and deleted tests.

```
---------MEMORY TEST---------
    MEMORY TEST SUCCESSFUL
      RECORDS FOUND:  4




                      MAIN
                      MENU
```
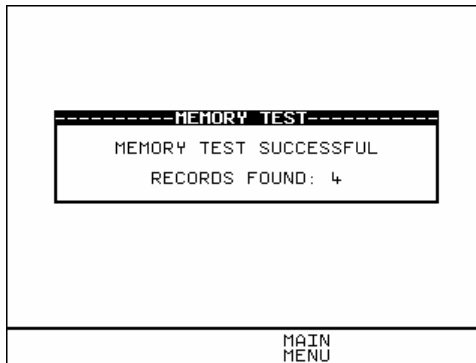
Delete Single Product

Enter the Product number to delete a single Product and press Green.

A warning 'Are You Sure?' prompt box will appear. Press **CANCEL** fast key to abort and return to the previous menu or press **Yes** fast key to perform the delete operation and return to the previous menu.

```
            ─DELETE SINGLE PRODUCT─
            │NNNN                   │




       ABCDEFGHIJKLMNOPQRSTUVWXYZ
       ., 0123456789-_/ ↔ ←┌ ↵
       abcdefghijklmnopqrstuvwxyz

 ┌─────────┬─────────┬──────────┬─────────┐
 │ INSERT  │ ROTATE  │ SYMBOLS  │ DELETE  │
 │         │ CURSOR  │          │         │
```

Note:

Deleting Products in this way will delete all of the matched Products across all of the Sites and Locations.

When a single Product is deleted it is not removed from memory but hidden from the user. This test is still resident in memory and is taking up memory space, this test can be reviewed / downloaded at a later date. Since the test is still resident in memory the View Memory Capacity figure may seem false. I.e. whilst you may think you have no results stored and the View Memory Capacity indicates there are results stored, previously deleted Products are resident in memory. In this situation to remove all resident tests select clear results memory.

Clear Results Memory

This option will delete (permanently) **all** the test results of **all** Products tested and currently stored in memory and should be used with **CAUTION**!

A warning 'Are You Sure?' prompt will appear. Press the **CANCEL** (NO) fast key to return to the previous menu or press the **YES** fast key to perform the delete (Clearing) operation and return to the previous menu.

Note

It is recommended that the memory Results should be Downloaded to other retrievable form or format before embarking on clearing them from the system memory. This Deletion is Permanent.

To ensure unauthorized tempering this Option must always be password protected for access.

Clear Upload Memory

This option will delete all of the Product codes that have been uploaded from an external computer and should be used with **CAUTION**!

Note

Users will be asked whether they are sure about performing this action.

A warning 'Are You Sure?' prompt will appear. Press the **CANCEL** 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.
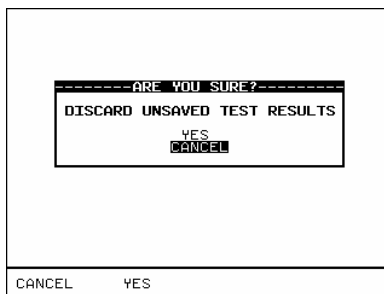
How to Change User Name

At the Main Menu screen select **Change User** and press Green (or press **Change User** fast key). Use the encoder to highlight a user name and press **Select User** fast key or press Green to select desired option. Selected option will be automatically updated. For a user not found in list, select **New** from list and you will be prompted to enter name of the new user. Press **Insert** to accept each data field entered and then press green button to accept new User name. The total number of users available in list is 20.

```
        --USER LIST--
        NEW...
        DEMO ADV
        KIARAN
        J BARNETT
        BACKES
        SUE
        DEBBIE
        C LEGGATT
        USER 9
        USER 10
        USER 11
        USER 12
        USER 13
       ↓USER 14    ↓


  SELECT
  USER
```
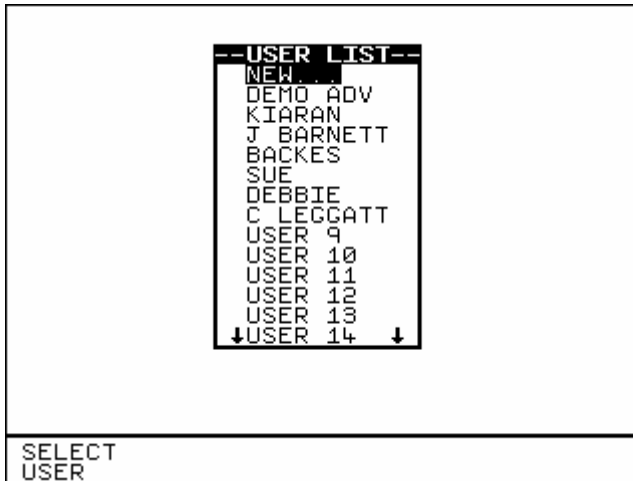
Edit User Name

To edit User name see sections on How to use Setup & Edit User list.

How to Change Site Name

At the Main Menu screen select **Change Site** and press Green. Use the encoder to highlight a site name and press **Select Site** fast key or press Green to select desired site. Selected option will be automatically updated. For a site not found in list, select **New** from list and you will be prompted to enter name of the new site. Press **Insert** to accept each data field entered and press Green to accept New site name. The total number of sites available in list is 20.

```
        ---SITE LIST---
        NEW....
        EUROPE
        CLARE INST.
        SITE 3
        SITE 4
        SITE 5
        SITE 6
        SITE 7
        SITE 8
        SITE 9
        SITE 10
        SITE 11
        SITE 12
      ↓SITE 13        ↓


   SELECT
   SITE
```
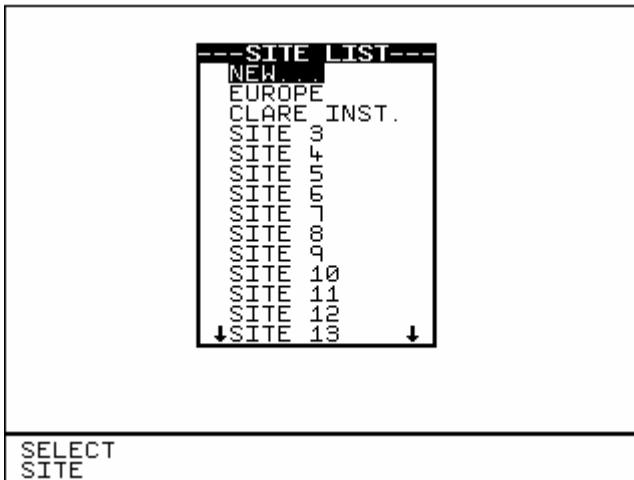
Edit Site Name

To edit Site name see sections on How to use Setup & Edit Site list.

How to Change Location Name

At the Main Menu screen select **Change Location** and press Green. Use the encoder to highlight a location name and press **Select Location** fast key or press Green to accept desired location. Selected option will be automatically updated. For a location not found in list, select **New** from list and you will be prompted to enter name of the new location. Press **Insert** to accept each data field entered and press green to accept New location name. The total number of locations available in list is 50.

```
               -LOCATION LIST-
                NEW...
                UK
                USA
                R & D
                CLARE
                LOC.  5
                LOC.  6
                LOC.  7
                LOC.  8
                LOC.  9
                LOC.  10
                LOC.  11
                LOC.  12
               ↓LOC.  13↓

   SELECT
   LOCATION
```
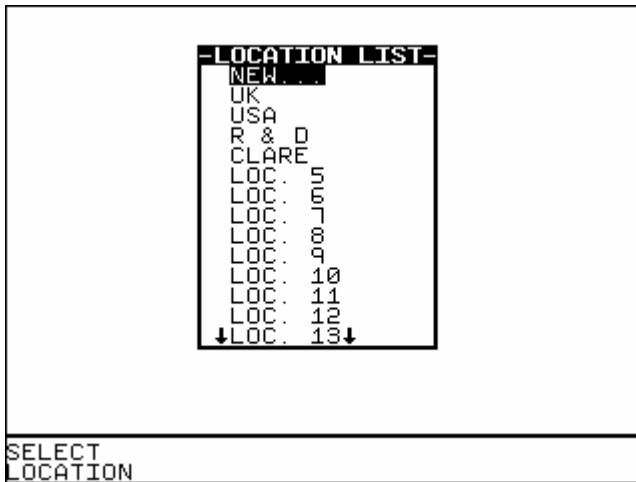
Edit Location Name

To edit Location name see sections on How to use Setup & Edit Location list.

How to use Help

The Tester is provided with an on-line help function, which can be called up at during the test screens by pressing the Help fast key.

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

Help provided to the User

The Help function provides the following information: -
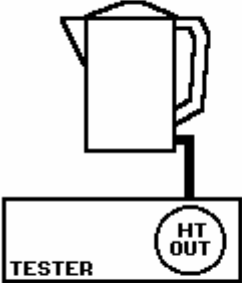
Description of Test

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 the connect the Tester to the EUT is included. An example for the Insulation test is shown below: -


```
        HELP ON 50Hz HIPOT (2/3)

              HOW TO PERFORM TESTS

              FOR ALL PRODUCTS
              1 CONNECT THE PRODUCT
                TO THE HAL HIPOT
                TESTER.
              2 IN MANUAL MODE SET
                ALL THE PARAMETERS
                REQUIRED.
              3 START THE TEST.

         HT
         OUT
TESTER


PREVIOUS      NEXT                  EXIT
PAGE          PAGE                  HELP
```

A description of how to connect the test leads and perform the test is provided in a step-by-step format.

Note:

This topic will cover one or two pages depending on the connection options available (Insulation and Hipot can be Class 1 or Class 2).   Each connection option will have a new page of information.

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.

The effect of User Levels during Test Sequences

There are two possible user levels: Novice, and Advanced.

Note

The user level for a new user is set to Novice.

Novice User Level

When the user level is set to Novice Level, the help information is displayed before every new test

Press the Green button key to continue the sequence.

Advanced User Level

When the user level is set to Advanced Level, no help information will be shown before a test. Use the Help/Information key for help information if required at any time.

Chapter 4   Tips & Troubleshooting

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.

Temperature monitoring

The tester is provided with temperature monitoring facilities to ensure that prolonged tests do not overheat sensitive components. If, during testing a 'Over temperature' warning is displayed, switch off any EUT, and allow the tester to cool. This is provided to allow the EUT to be switched off in a controlled way.

Barcodes

Barcode Scanner Specification

The Hal Scan Tester can be used with barcodes and barcode scanners, readers or wands. These connect to the serial (RS232) connector. The required 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 can be scanned at the following points: -

- Entering a Testcode as part of an Automatic Test or Test Setting Editor

- Selecting Test type

- Entering Product number, changing User, Site or Location

- Entering Comments and where text is needed.

Interfacing

The Tester provides three interfacing ports: -

For connection to a PC, printer or Barcode Reader

To avoid any problems during download, ensure that leads are undamaged and correctly wired.

The Connector pin-outs for Serial ports are shown below: -

Parallel - The Hal Scan features a serial port. However a serial to parallel adapter is available to allow interface with parallel ports. See accessories in Chapter 6.

Downloading to Computer Software

Serial Port

The serial port uses a standard 9-way D-type connector
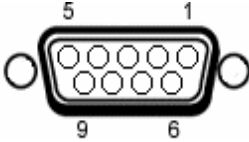
Pin	Description
1.	N.C.
2.	RX
3.	TX
4.	DTR
5.	0V
6.	N.C.
7.	0V
8.	N.C.
9.	+5V

Baud Rate: 9600, 19200, 28800 (selectable)

Start Bits: 2

Data Bits   8

Stop Bits: 2

Parity: None

Inter-character Delay: 20ms

Quick Reference for Printer Configure & Setup

Connections for STAR TSP400 Printer

For connection to the HAL SCAN

9-way D plug for connection to HAL		25-way D plug for connection to TSP400 printer	
RxD (input)	2	2	TxD (output)
TxD (output)	3	3	RxD (input)
Ext GND (screen)	5	1 7	Frame Ground (screen) Signal GND (screen)
DSR (input)	4	20	DTR (output)

For connection to a PC

9-way D socket for connection to PC serial port		25-way D plug for connection to TSP400 printer	
Frame Ground (screen)	1	1	Frame Ground (screen)
RxD (input)	2	2	TxD (output)
TxD (output)	3	3	RxD (input)
Signal GND	5	7	Signal GND
DSR (input) and CTS (input)	6 8	20	DTR (output)

STAR TSP400 print modes when used with the HAL SCAN

The TSP400 can be configured for page mode or line mode. Although these settings could be changed by the software, either a power on-off or software reset cycle would be required to effect the changes. A software reset causes a self-test print to be produced.

It is therefore necessary to manually configure the printer for 'page mode with top of form enabled' when printing labels, and 'line mode with top of form disabled' when printing lists. How to do this using the printer's front panel is documented in the printer's user's manual, but a brief summary is in the following table:

Labels (with black alignment marks)	Paper roll (continuous)
• Turn off printer. • Hold down ON-LINE and FEED buttons. • Turn on printer and wait for 'NO PAPER' indication. Release ON-LINE and FEED buttons. • Press FEED button once. The TSP400 should beep twice indicating that 'top of form' is enabled.	• Turn off printer. • Hold down ON-LINE and FEED buttons. • Turn on printer and wait for 'NO PAPER' indication. Release ON-LINE and FEED buttons. • Press ON-LINE button once. The TSP400 should beep once indicating that 'top of form' is disabled.
• Turn off printer. • Hold down ON-LINE button. • Turn on printer and wait for 'ERROR' indication. • Release ON-LINE button. • Press ON-LINE button once. The TSP400 should beep once indicating that 'page mode' is selected.	• Turn off printer. • Hold down ON-LINE button. • Turn on printer and wait for 'ERROR' indication. • Release ON-LINE button. • Press FEED button once. The TSP400 should beep twice indicating that 'line mode' is selected.
• Turn off printer. • Insert label stock. • Turn on printer.	• Turn off printer. • Insert paper roll. • Turn on printer.

Chapter 5   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 socket 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 its reliability.

If the Tester is subject to condensation, allow the Tester too 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 authorized 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 instrument to: -

> Clare Instruments.
> Dominion Way
> Worthing
> West Sussex
> UK
> BN14 8NW
> Tel: +44 (0)1903 233314
> Fax: +44 (0)1903 216089
> info@clareinstruments.com

Chapter 6   Accessories

Standard Accessories

Accessory	Part Number
IEC Mains Lead (U.K.)	39044
IEC Mains Lead (U.S.A)	48329
Manual	H1021

Optional Accessories

NB: * denotes item recommended by Clare Instruments

Accessory	Part Number
Hipot Probe + lead	03918/2
Hipot Clip (Std. Black)+ lead	H5003
Hipot Clip (Red) + lead	H5003/R
Hand Held Guard Switch	DCS317
Calibration Checkbox	V242
Barcode Scanner	283A922
Thermal Label Printer (TSP400)*	PLS001
Thermal Label Printer (Martel)	283A954
Thermal Printer Labels for TSP400	LPG001
Thermal Printer Labels for Martel	283A304
Product Number Labels (250)	194A307
Test Code Labels (240)	194A308
Serial-Printer Lead (9-25way)	H-5013
Serial to Parallel adapter	270A954
Serial-PC Download Lead (9-9 way)	H-5014
Serial-PC Download Lead (9-25way)	194A920
Pass Labels (500)	91B038
Status Beacon (mains cord 230/110V)	H – 5017*

Chapter 7   Specifications

Input Rating

Supply Voltage	selectable 115V/230V a.c. RMS
Frequency	50/60 Hz
Fuse	3 amps 250V

Insulation Test

Test Voltage	250V, 500V or 1000V d.c
Trip Current	11mA dc Maximum
Accuracy	250Vdc : 0.03MΩ - 200MΩ, $\pm$ 5% $\pm$ 5 digits of reading
	> 200MΩ unspecified
	500Vdc : 0.03MΩ - 500MΩ, $\pm$ 5% $\pm$ 5 digits of reading
	> 500MΩ unspecified
	1000Vdc : 0.03MΩ - 700MΩ, $\pm$ 5% $\pm$ 5 digits of reading
	700.1MΩ - 1000MΩ, $\pm$ 10% $\pm$ 5 digits of reading
Display Resolution	0.01 MΩ (<100 MΩ)
	0.1MΩ (>100 MΩ)
Pass Level	0.01MΩ - 1000MΩ Selectable

AC HiPot Test

Test Voltage Range	0.10 – 5.00kV (Programmable)
Frequency	50 or 60 Hz (Independent of Supply)
Voltage Selection Resolution	10V/Step
Voltage Accuracy	+/- 1% +/- 2 digits of Reading

Leakage

Maximum Output Current	20mA @ 5kV

Display Current Range	0.01 – 20.00mA
Display Current Resolution	0.01mA
Pass Level	0.01 – 20.00mA Selectable

DC HiPot Test

Test Voltage Range	0.10 – 6.00kV (Programmable)
Frequency	50 or 60 Hz (Independent of Supply)
Output Voltage Ripple	<5% @ 6kV
Voltage Selection Resolution	10V/Step
Voltage Accuracy	+/- 1% +/- 3 digits of Reading

Leakage

Maximum Output Current	10mA @ 6kV
Display Current Range	0.01 – 10.00mA
Display Current Resolution	0.01mA
Pass Levels	0.01mA – 10.00mA Selectable

Arc Detection

Levels	9 Selectable Settings (or Disabled)

Mechanical

Size	370mm x 300mm x 204mm
Weight	12kg

Environmental

Operating	0ºC to 40ºC (non condensing)
Storage	-10ºC to 50ºC (non condensing)
Maximum R.H	90%

Appendix A Purpose of Tests

Insulation Test

 Warning

1000V, 500 V, and 250 V 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 HV DC voltage is applied between the earth pin and both the live and neutral pins of the Product mains supply plug. The Tester displays the resistance measured and allows the user to confirm sufficient insulation exists.

For a products that incorporates 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.

Hipot Test

 Warning

5000V a.c./6000V d.c. Test voltage

This test is used to determine that the insulation is of sufficient strength to prevent breakdown, particularly where high transient voltages are likely. This test can be omitted when testing equipment with component whose voltage withstand rating is insufficient to accommodate the test without damage. This is especially true of IT equipment.

For Class I Products, a nominal test voltage of 1.5kV AC RMS is applied between the earth pin, and both the live and neutral pins of the Product mains supply plug

For Class II Products, a nominal voltage of 3kV AC RMS is applied between the Hipot probe tip and the live and neutral pins of the Product mains supply plug.

Appendix B   Reference

Factory-set Test Sequences

1. Name - Default AC Hipot
    Rise Time – 2.0 s
    Hold Time – 10 s
    Fall Time – 2.0 s
    Output Voltage 2.5 kV a.c.
    Low Trip Level – 7.0 mA
    High Trip Level – 10.0 mA
    Arc Detection Setting – Level 5
    Number of Tests – 1
    Start Conditions – External Guard + START Button

2. Name - Default DC Hipot
    Rise Time – 2.0 s
    Hold Time – 2.0 s
    Fall Time – 2.0 s
    Output Voltage 0.5 kV d.c.
    Low Trip Level – 7.0 mA
    High Trip Level – 10.0 mA
    Arc Detection Setting – Level 5
    Number of Tests – 1
    Start Conditions – External Guard + START Button

Testcode Tables

Clare's Testcodes are an 11-character string where each character is in the ASCII range '0' to '9' and 'A' to 'Z'. The character count starts from left to right. The example below shows Z as digit 1 or (character no. 1) and the integer 1 as digit 2 (character no. 2) and so on.

e.g.   Z1234567890

Digit 1 (Character 1) – Testcode Type

Digit 1 associates the testcode with Clare Instruments Ltd. Equipment

	Digit 1 : Testcode Type
'Z'	Clare Instruments Ltd. Testcode

Digit 2 – Test Type

Digit 2 represents the **type of test** to be performed. It also *encodes* the status of Hal Scan **channel 1** – only relevant if the testcodes is at the top of a loop. If no channels are explicitly encoded for use then channel 1 will be used.

	Digit 2 : Test Type	
	Hal Scan Channel 1	
Test Type	**Use Channel 1**	**Do Not Use Channel 1**
Skip	'0'	'G'
AC Hipot 50Hz	'1'	'H'
AC Hipot 60Hz	'2'	'I'
DC Hipot	'3'	'J'
DC IR	'4'	'K'
Spares (respectively)	'5, 6, 7, 8 & 9'	'L, M, N, O & P'
Spares (respectively)	'A, B, C, D, E & F'	'Q, R, S, T, U & V'

Digit 3 – Start Conditions & Base Target Voltage

Digit 3 is a combination of the start conditions for the test and the base target voltage (to which the value encoded in digit 4 is added).

Digit 3				
Start Conditions	**Base Target Voltage**			
	0.0kV	1.6kV	3.2kV	4.8kV
Reset **Ext**. Guard Switch, opened then closed followed by **Green** (START) button to start test and each repeat of test. (All loops)	'0'	'7'	'E'	'L'
Reset **Ext**. Guard Switch, opened then closed followed by **Green** (START) button to start 1st test. Repeat test loops will convene whilst Guard switch is closed.	'1'	'8'	'F'	'M'
Reset **Ext**. Guard Switch, opened then closed to start test and each repeat of test. (All loops)	'2'	'9'	'G'	'N'
Reset **Ext**. Guard Switch, opened then closed to start 1st test. Repeat test loops will convene whilst Guard switch is closed.	'3'	'A'	'H'	'O'
Press **Green** (START) Button to start test and each repeat of test. Guard switch must be closed throughout the tests. (All loops)	'4'	'B'	'I'	'P'
Press **Green** (START) Button to start 1st test. Repeat test loops will follow. Guard switch must be closed throughout any tests.	'5'	'C'	'J'	'Q'
None. Test starts without any activity on Ext. Guard switch or Green button. Guard switch must be closed throughout any tests.	'6'	'D'	'K'	'R'

Note that no test will be started unless the guard switch is closed, and any test in progress is automatically and immediately terminated if the guard switch is opened during a test. Where the external guard switch appears as part of the start conditions it implies that the GUI will wait for the guard switch to be open for 500ms and then remain closed for at least 500ms before the test will be started (or before the START key will be enabled, if required).

Digit 4 – Target Voltage Offset

Digit 4 represents the output voltage offset to be added to the base target voltage. The target voltage is achieved at the end of the 'Ramp to Target' time and is maintained during the 'Hold' time. During VARIABLE Tests (digit 5 = 'Z' the target voltage is used as the maximum possible output voltage, helping prevent damaging or dangerous voltages being applied to the device under test.

Digit 4 : Target Voltage Offset	
'0'	0.00kV
'1'	0.05kV
'2'	0.10kV
'3'	0.15kV
'4'	0.20kV
'5'	0.25kV
'6'	0.30kV
'7'	0.35kV
'8'	0.40kV
'9'	0.45kV
'A'	0.50kV
'B'	0.55kV
'C'	0.60kV
'D'	0.65kV
'E'	0.70kV
'F'	0.75kV
'G'	0.80kV
'H'	0.85kV
'I'	0.90kV
'J'	0.95kV
'K'	1.00kV
'L'	1.05kV
'M'	1.10kV
'N'	1.15kV
'O'	1.20kV
'P'	1.25kV
'Q'	1.30kV

'R'	1.35kV
'S'	1.40kV
'T'	1.45kV
'U'	1.50kV
'V'	1.55kV

Note that Not all combinations of 'Base Target Voltage' and 'Target Offset Voltage' are valid. AC Hipot Tests have a 0.1 - 5.00kV range, while DC Hipot tests have a 0.1 - 6.00kV range and DC IR Tests have discrete output voltages of 0.25kV, 0.5kV and 1.0 kV.

 HAL Scan test code editor will not generate invalid combinations and all invalid entries or invalid scanned testcodes will be rejected.

A 0.00kV output voltage is intended to be used as a 'rest' period between other tests in a sequence. Such sequences may be linked or repeated (See digit 11).

Digit 5 – Ramp to Target Time

Digit 6 – Hold Time

Digit 7 – Ramp to Zero Time

Digits 5, 6 and 7 represent times during which the out voltage is ramped to the target voltage, held at the target voltage and finally ramped down to zero. All the times are in seconds.

	Digit 5 **Ramp to Target Time (seconds)**	**Digit 6** **Hold Time (seconds)**	**Digit 7** **Ramp to Zero Time (seconds)**
'0'	0.0	0.0	0.0
'1'	0.1	0.1	0.1
'2'	0.2	0.2	0.2
'3'	0.3	0.3	0.3
'4'	0.4	0.4	0.4

'5'	0.5	0.5	0.5
'6'	0.6	0.6	0.6
'7'	0.7	0.7	0.7
'8'	0.8	0.8	0.8
'9'	0.9	0.9	0.9
'A'	1.0	1.0	1.0
'B'	1.5	1.5	1.5
'C'	2.0	2.0	2.0
'D'	3.0	3.0	3.0
'E'	4.0	4.0	4.0
'F'	5.0	5.0	5.0
'G'	7.5	7.5	7.5
'H'	10.0	10.0	10.0
'I'	15.0	15.0	15.0
'J'	20.0	20.0	20.0
'K'	30.0	30.0	30.0
'L'	45.0	45.0	45.0
'M'	60.0	60.0	60.0
'N'	90.0	90.0	90.0
'O'	120.0	120.0	120.0
'P'	150.0	150.0	150.0
'Q'	180.0	180.0	180.0
'R'	240.0	240.0	240.0
'S'	300.0	300.0	300.0
'T -Y'	Not Used	Not Used	Not Used
'Z'	Specifies the output voltage is VARIABLE up to the target voltage using the rotary encoder. Initial value is 0.00kV, digits 6 is ignored whilst digit 7 is acted upon once user ends the variable voltage phase (by pressing Start button).	Specifies an infinite duration hold time, until the test is terminated.	The current output voltage is used as the start value for the next 'ramp to target' at the beginning of the next test. " Maintained "

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Digit 8 – Lower Trip Limit

Digit 9 – Upper Trip Limit

Digits 8 and 9 represent the lower and upper trip limits respectively.

		D 8	D 9		D 8	D 9		D 8	D 9
		AC Hipot			DC Hipot			DC IR	
		Lo	Hi		Lo	Hi		Lo	Hi
'0'		0.0mA	INF		0.0mA	INF		0.0MΩ	INF
'1'		0.10mA			0.10mA			1.00MΩ	
'2'		0.20mA			0.20mA			1.25MΩ	
'3'		0.30mA			0.30mA			1.50MΩ	
'4'		0.40mA			0.40mA			1.75MΩ	
'5'		0.50mA			0.50mA			2.00MΩ	
'6'		0.75mA			0.75mA			2.25MΩ	
'7'		1.00mA			1.00mA			2.50MΩ	
'8'		1.25mA			1.25mA			2.75MΩ	
'9'		1.50mA			1.50mA			3.0MΩ	
'A'		1.75mA			1.75mA			3.5MΩ	
'B'		2.00mA			2.00mA			4.0MΩ	
'C'		2.25mA			2.25mA			4.5MΩ	
'D'		2.50mA			2.50mA			5.0MΩ	
'E'		2.75mA			2.75mA			5.5MΩ	
'F'		3.00mA			3.00mA			6.0MΩ	
'G'		3.50mA			3.50mA			6.5MΩ	
'H'		4.00mA			4.00mA			7.0MΩ	
'I'		4.50mA			4.50mA			7.5MΩ	
'J'		5.00mA			5.00mA			8.0MΩ	
'K'		6.00mA			6.00mA			9.0MΩ	
'L'		7.00mA			7.00mA			10.0MΩ	
'M'		8.00mA			8.00mA			12.5MΩ	
'N'		9.00mA			9.00mA			15MΩ	
'O'		10.00mA			10.00mA			20MΩ	
'P'		12.50mA			N/A			30MΩ	
'Q'		15.00mA			N/A			40MΩ	
'R'		17.50mA			N/A			50MΩ	
'S'		20.00mA			N/A			75MΩ	

'T'		N/A		N/A		100MΩ
'U'		N/A		N/A		200MΩ
'V'		N/A		N/A		500MΩ
'W'		N/A		N/A		750MΩ
'X'		N/A		N/A		1000MΩ

Digit 10 – Arc Detection Level

Digit 10 represents a level of arcing detection, which will terminate the current test sequence when selected arc level is reached.

Digit 10 also encodes the status of Hal Scan channels 2 and 3 – only relevant if the testcode is at the top of a loop. If no channels are explicitly encoded for use then channel 1 will be used.

Digit 10					
Arc Detection levels		**Hal Scan Channels 2 and 3**			
		2 & 3	**3 only**	**2 only**	neither
X	Off / Disabled	'0'	'A'	'K'	'U'
1	Most sensitive setting. All arcs terminate test	'1'	'B'	'L'	'V'
2		'2'	'C'	'M'	'W'
3		'3'	'D'	'N'	'X'
4		'4'	'E'	'O'	'Y'
5	Medium sensitivity	'5'	'F'	'P'	'Z'
6		'6'	'G'	'Q'	'+'
7		'7'	'H'	'R'	'-'
8		'8'	'I'	'S'	'%'
9	Least sensitivity. Only high energy arcs terminate test	'9'	'J'	'T'	'$'

Digit 11 – Loops to Perform

Digit 11 represents the number of times a test or linked sequence should be performed.
The user may use the red STOP key before or during a test and from the 'abort options menu' elect to move to the next test or the next test after a linked sequence of tests if a smaller number of loops is required. The STOP button will also terminate an unlimited number of loop tests.

The value of '0' indicates that a test is a 'follow-on' test and forms part of a linked sequence. The linked sequence begins with a testcode that has a non-zero loops value and ends when the subsequent level is undefined ('skip' or no more testcodes) or when the next testcode has a non-zero loops value. A linked sequence is performed the number of times specified by the first test in the sequence.
Digit 11 also encodes the status of Hal Scan channels 4 and 5 – only relevant if the testcodes is at the top of a loop. If no channels are explicitly encoded for use then channel 1 will be used.

Digit 11			
Loops to perform	**Hal Scan Channels 4 and 5**		
	4 & 5	**5 only**	**4 only**	neither
Follow on test	'0'	'A'	'K'	'U'
1	'1'	'B'	'L'	'V'
2	'2'	'C'	'M'	'W'
3	'3'	'D'	'N'	'X'
4	'4'	'E'	'O'	'Y'
5	'5'	'F'	'P'	'Z'
10	'6'	'G'	'Q'	'+'
15	'7'	'H'	'R'	'-'
20	'8'	'I'	'S'	'%'
Unlimited (UL)	'9'	'J'	'T'	'$'

Note Follow-On Test - A value of '0' in the first testcode is inappropriate and interpreted as '1'

Addendum Appendix

How to upload test setting details from your PC to your Hal Scan tester

To upload test setting details to the Hal Scan memory first connect the serial port of the tester to the appropriate port on your PC using a serial-download lead (9-9way or 9-25 Way).   Please see the optional accessories section of this manual for part numbers.

From the main menu on the tester use the cursor keys to select REMOTE MODE, the tester is now ready to accept download data. Follow the instructions supplied with your software to communicate with the tester. Once the communication is in progress the tester will show a count of tests being transferred. The software and Hal Scan will display a message to say that the transfer is completed. Once completed press the ABORT key and return to the MAIN MENU. Disconnect the serial download lead and the Hal Scan can be used as normal.