KEWTECH

Portable Appliance Tester KT75
OPERATORS MANUAL

KEWTECH

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1.0 Introduction

Under the 1989 Electricity at Work Regulations employers are required to maintain the portable appliances in use on their premises. Your portable appliance tester (PAT) has been designed to help you carry out and record all the necessary tests required.

Your PAT is a dual voltage instrument which will self calibrate itself to either 230V or 110V 50 or 60Hz. Your PAT has a number of unique features including the ability to be programmed to recognise any 10 digit barcode as an auto test type. Your PAT has the capacity to store up to 1800 test result records in its on-board memory which can be later downloaded to your data management software.

2.0 Safety

Your PAT has been designed to the requirements of EN 61010-1, Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory use. This manual contains information and warnings which must be heeded to ensure user safety during operation. It is therefore important that this manual is read before proceeding with any tests.

Your PAT carries out a number of electrical tests which could be potentially hazardous to the user. These tests must be performed by suitably trained personnel.

To ensure repeatable accuracy, your PAT should be returned on a regular basis for calibration. If the PAT behaves abnormally (e.g. faulty display) do not use and contact your supplier for servicing. This instrument should be operated strictly in accordance with the instructions supplied. No liability is accepted for any losses as a result of misuse in the course of operation.

WARNINGS

• There are no serviceable parts contained within you PAT and under no circumstances should you attempt any repair or modification.
• Do not touch the appliance whilst carrying out insulation or flash tests.
• Ensure the earth clip is securely connected to the appliance during the earth bond test.
• Ensure the appliance is suitably positioned during the load test when the appliance will be energised. For example drills will operate during load/leakage tests.
• If in any doubt regarding the tests requirements for the appliance always refer back to the manufacturer of the appliance under inspection/test.
• To ensure continued correct operation, the PAT should be periodically calibrated.
• For flash test, use only the flash probe provided and ensure that it is always connected correctly during ANY flash testing.
• Always download results stored in the PAT memory on a daily basis to your printer or your data management software. The downloaded results should be checked before clearing the PAT memory. No liability is accepted for any loss of data whatever the cause.
• Do not connect your PAT to the mains supply via the IEC lead connection.

3.0 FEATURES

3.1 Alpha Numeric Keypad

Your PAT is equipped with a user friendly alpha numeric keypad. The keypad is used to access the PAT's functions and test sequences and to enter appliance information.

3.2 Expert Mode

For users who are fully familiar with the requirements and techniques of appliance testing and the operation of the PAT, Expert Mode is provided. This mode allows the user to use modified AUTO test sequences and change test times to speed up testing. All non essential on-screen instructions are also removed.

3.3 Dual Voltage Operation

The PAT will accept either a 110V or 230V, 50Hz or 60Hz mains input.

Note: The PAT will conduct a run\leakage test at the **power up mains voltage.** Therefore, to perform a run test on a 110V appliance (e.g. 110V drills) the PAT must be powered up from a 110V mains supply (or centre tapped transformer). All other tests may be performed at either power up mains voltage (i.e. only run test, also called the load test, is affected).

When powered up from 230V, only the 230V socket is energised at 230V during the run test.

WARNING
Ensure that the correct voltage source and socket are being used before carrying out a run test to avoid the possibility of damage to the appliance.

3.4 Help Facility

A dedicated help facility is provided for the users convenience. At any given point the help function can be selected by pressing the HELP button. The help message will inform the user of the options available at the point when help was selected. To view the complete message, the YES/CONTinue button should be repeatedly pressed until the message 'end of help' is displayed. To exit help at any point press the NO button.

3.5 Fuse check

For situations where the integrity of an appliance's fuse is in doubt the PAT provides front panel 'Fuse Check' contacts. Simply touch the end caps of the fuse to be tested onto the contacts. A buzzer will indicate whether there is continuity through the fuse. It is not therefore necessary to carry a continuity tester as well as the PAT.

3.6 Bar Code Scanner (optional)

The optional bar code scanner simply connects to the serial port and can be used to read portable appliance bar codes. The bar codes can automatically inform your PAT of the appliance number, and the automatic test sequence to be performed.

3.7 Data Management Software (optional)

Your PAT will download appliance test results directly to a PC that has been pre-loaded with suitable data management software. The download format has been designed to be simple and compatible with most data management packages. Consult your supplier if you are in doubt about the compatibility of any particular data management software.

3.8 Printer (optional)

Stored results can be also be downloaded directly to a compatible serial printer via the serial interface. This can give an instant printout of test results and work carried out.

3.9 Labels (optional)

 A comprehensive range of appliance labels are available for use in conjunction with the PAT .

4.0 Available Tests

Listed are the full range of tests which your PAT is capable of undertaking.

Visual

The visual check will determine whether the appliance is of a sound construction and not obviously physically damaged. Except when in Expert Mode the PAT will prompt the user to check critical areas of the appliance's construction - its case, cable and plug.

Earth Bond Test

The earth bond test will verify that the protective earth point of connection to the appliance's chassis is sound. The test can be performed at 100mA, 10A or 25A depending on the type of equipment under test - e.g. 100mA for business equipment.

During the test the PAT applies a low voltage signal between the earth pin and the chassis of the appliance.

P-N Fuse Continuity

The PAT will verify the fuse and lead continuity by applying a low voltage signal across the appliance's phase and neutral pins. The pass/fail point is set to a high resistance to allow continuity to be checked even if the appliance has electronic input circuits. This test must be conducted with the appliance switch in the ON position.

Appliances with a very high phase-neutral resistance may fail this test although they are not faulty. Such appliances include those with electronically controlled on/off switches (e.g. some types of drill), appliances with a high inductance (since the test is conducted with a low ac voltage) and low power soldering irons. For these appliances the fuse test is not appropriate and should be omitted. The fuse continuity may be checked by powering the appliance up during a run test.

Note: The purpose of the fuse test is to check that the fuse is not blown or phase/neutral conductors are not open circuit as this may not be evident from a visual inspection.

This test will also verify the polarity of the Phase Neutral connections of an IEC lead or extension lead are correct.

Insulation

The insulation test will establish the value of the appliance's insulation resistance. Normally the insulation test is conducted at 500V d.c. which is applied between the appliance's phase & neutral pins and earth pin for class I appliances and between phase & neutral pins and the PAT earth clip for class II appliances.

For sensitive appliances that may be damaged by a 500V insulation test the PAT provides an additional test voltage of 250V d.c.

Flash Test

The soundness of insulation can be verified by applying a high voltage - 3kV for class II appliances - between the outer casing and the P+N Pins of the appliance. For class I appliances voltage is applied between P+N and E at the socket and is set at 1.5 kV.

Run/Leakage Test (also called a load test)

During the run/leakage test full mains voltage is applied for a short period to determine that the kVA rating of the appliance is within its specification. The PAT will then further test the insulation by measuring the earth leakage current. This test is carried out to test for insulation faults which may not have been apparent during passive testing.

During a run test, before full mains voltage is applied, a pretest is conducted at low ac voltage to determine whether an excess current will flow if full mains is applied. This is a safety check. However, some appliances with an inductance (e.g. large motor vacuum cleaners) may fail the pretest because the pretest voltage sees a low phase-neutral impedance. If you are sure the appliance will power up correctly then under these conditions you may bypass the pretest - IF IN DOUBT DO NOT BYPASS THE PRETEST.

5.0 How to use the PAT

5.1 Initial Setup

In order for the PAT to be able to download test results correctly to your data management software some initial information must be entered into the tester. Before carrying out any tests make sure you enter:-

i) The **SITE** reference for the site on which the tests are to be carried out. (See SITE in section 5.5)
ii) The **DATE** on which the tests are being carried out. (See DATE in section 5.4)
iii) The **Data Download Configuration** that is required for your data management software. (See Configure download in section 5.9 viii)

5.2 Power Up

Using the mains input lead connect the PAT to either a 110V or 230Va.c. supply. On power up the PAT will go through a self check procedure and automatically calibrate itself to the input voltage.

During the self test procedure the PAT display will show:-

- the data download configuration to which the tester is set,
- the input voltage selection that has been made.
- whether Expert Mode is selected.

Check these settings to ensure that they are as you require.

If an alternative Earth Bond lead has been nulled when the tester was last used you will also be asked if you wish to revert to use of the calibrated Earth Bond lead supplied with the unit or retain the null value of the alternative lead.

Following the self check procedure the PAT will display the main menu

Main menu

> ### Select a FUNCTION or
> ### use the HELP key

To return to the main menu at any point during the operation press RESET.
From the main menu it is possible to select 1 of 6 functions

DATE	SITE	RESULT
PROG	AUTO	MAN

5.3 Using the Alpha Numeric Keypad

All of the PAT's controls and functions are accessed by using the alpha numeric keypad. Appliance descriptions and notes etc. can be made up from any combination of letters and numbers to a maximum of 10 characters.

The key functions are as follows:

Navigation keys

No   Press to give a negative response to question shown on the display or to go back a stage in the sequence.

     During a manual test, pressing this key will abort the test.

Yes/Cont   Press to give a positive response to questions shown on the display or to continue through a sequence when the ↵ symbol is shown on the display screen.

     During a manual test pressing this key will shorten the test time.

Go   Press to initiate a test when instructed on the display screen.

Function selection.

Date   Set up date for inclusion with test result records.

Site   Set up the Site Name for inclusion in the result records.

Result   View, Print or Download result records.

Prog   Modify the test sequence and test values for programmed Automatic Tests or set up other tester system functions.

Auto   Perform an automatic test sequence on the appliance under test.

Man   Perform a manual test sequence on the appliance under test.

Test parameters.

Time   In Programme mode modify the test time.

Tests   In Programme mode modify the number tests of each type.

Test Level   In Programme or Manual modes select the test current or voltage level.

Class   In Programme or Manual mode select the Class of the appliance under test.

Pass Level   In Programme or Manual mode select the pass level for a test.

General keys.

Reset   Press this key to terminate any test function being performed and to
             start operation from the 'Select Mode or Function' initial state.

Help   Pressing this key will change the display to show any Help information
             available for the function being performed.

Text data entry

When the display is waiting for entry of text e.g. for an appliance description, site
name etc the central 11 keys on the keyboard allow numbers or letters to be entered.

Some entries are numeric only. Where letters are also allowed pressing a key once
will cause the first value shown on the key to be displayed. Pressing again, quickly
(within a time of approximately 1 second), will change the character displayed to the
next value shown on the key. Subsequent presses each separated by less than a
second will increment around all of the characters available via that key. Any key
press of the same key greater than 1 second after the previous or pressing of
another key will be recognised as the character to be shown in the next display
position.

If a mistake is made the key labelled ← will delete the last character entered onto the
display.

When the PAT is waiting for a number or letter input a bar code wand or scanner can
be used to scan these details via a bar code label rather than using the keypad.

For some inputs such as Test Type (Code) or Appliance Description the tester will
display the previous entry to avoid the requirement to re-enter the information. This
entry can be accepted by pressing the YES/Cont key. Pressing NO will clear the
display ready for a new manual or bar code scanner entry. Pressing an
alpha/numeric key or reading a bar code will also clear the screen and in addition
display the value entered.

5.4 DATE – setting the date

This function will allow the user to program the date and must be selected at the start
of each new day. Once set, all results stored in PAT's memory will be recorded
against the set date.

To set, press the DATE key:

PAT display

Change Date?

dd/mm/yyyy
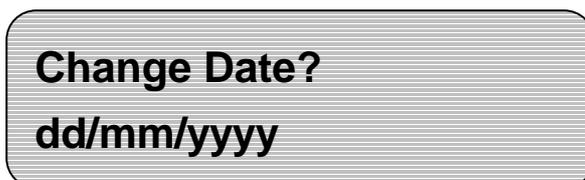
The second line above gives the current data programmed into the PAT. Press YES to continue with a date change.

PAT display

```
┌─────────────────────────────┐
│                             │
│  ENTER DATE                 │
│                             │
│  ../../..                   │
│                             │
└─────────────────────────────┘
```

Enter the date in the format requested. Press the YES key to continue.
Note: You must set the correct date every day, as the date does not increment itself.

Dates can be entered with either a 2 digit or 4 digit year. 2 digit years less than 91 will be interpreted as in the 21st century.

5.5 SITE – entering the site name

This function allows entry of a site name to which all subsequent test results are assigned. This data **must** be set prior to testing on a new site. If no new site is set, then all subsequent results will be stored in the last site entered. **Note** - it is not possible to change the site name for results that have been previously stored. It is the responsibility of the person conducting tests to ensure the correct site reference has been entered if results are to be stored correctly.
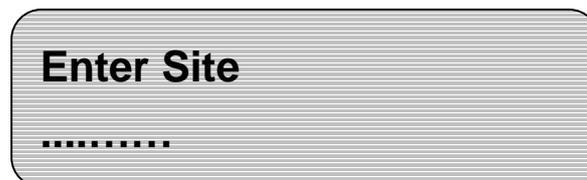
To set, press the SITE key:

PAT display

```
┌─────────────────────────────┐
│                             │
│  Change Site?               │
│                             │
│  ..........                 │
│                             │
└─────────────────────────────┘
```

The second line of the display shows the current site name. Press YES to continue entering a new site name.

PAT display

```
┌─────────────────────────────┐
│                             │
│  Enter Site                 │
│                             │
│  ..........                 │
│                             │
└─────────────────────────────┘
```

Enter the site reference number or name. This can also be entered using the barcode wand. Press the YES key to continue.

5.6 AUTO – carrying out automatic test sequences

The AUTO function allows you to carry out test sequences that have been pre-programmed in the PAT's memory. The PAT has 10 factory set auto test sequences suitable for carrying out the majority of tests for various portable appliances. The user can also program new test sequences (see section 5.9). Tests and pass levels are:-

Test type '11' - class I appliances
Visual check
25A earth bond test   0.10 ohm
P-N Fuse continuity test   39 kohm approx.
Insulation test 500V   1 Mohm
Load test   3.2 kVA
Earth leakage test   0.8 mA

Test type '12' - class I appliances (with Flash test)
Visual check
25A earth bond test   0.10 ohm
P-N Fuse continuity test   39 kohm approx.
Insulation test 500V   1 Mohm
Load test   3.2 kVA
Earth leakage test   0.8 mA
Flash test   1.0 mA

Test type '13' - class I appliances (Business equipment)
Visual check
100mA earth bond test   0.10 ohm
P-N Fuse continuity test   39 kohm approx.
Insulation test   1 Mohm
Load test   3.2 kVA
Earth leakage test   0.8 mA

Test type '21' - class II appliances
Visual check
P-N Fuse continuity test   39 kohm approx.
Insulation test   2 Mohm
Load test   3.2 kVA
Earth leakage test   0.8 mA

Test type '22' - class II appliances (with Flash)
Visual check
P-N Fuse continuity test   39 kohm approx.
Insulation test   2 Mohm
Flash test   1.0 mA
Load test   3.2 kVA
Earth leakage test   0.8 mA

Test type '31' - IEC Lead Test
Visual check
25A earth bond test   0.10 ohm
P-N continuity/polarity test 39 kohm approx.
Insulation test   2 Mohm

Test type '32' – Extension Lead Test
(Use an IEC lead to connect from an extension lead outlet socket to the PAT IEC test socket)
Visual check
25A earth bond test   0.50 ohm
P-N continuity/polarity test   39 kohm approx.
Insulation test   2 Mohm

Test type '41' - class I appliances as test sequence 11 but without the PN Fuse continuity test. (For appliances with high impedance P-N circuits)

Test type '42' - class I appliances as test sequence 12 but without the PN Fuse continuity test. (For appliances with high impedance P-N circuits)

Test type '51' - class II appliances as test sequence 21 but without the PN Fuse continuity test. (For appliances with high impedance P-N circuits)

Carrying out an automatic test sequence

From the main menu press the AUTO key

PAT display

> **Enter Appliance No.**
>
> **..........**

Enter the appliance number using the keypad or bar code scanner and press the YES key

PAT display

> **Enter description?**
>
> **..........**

Enter the appliance description and press the YES key

PAT display

> **Enter location?**
>
> ....

Enter the appliance location within the site and press the YES key

PAT display

> **Enter test interval?**
>
> ....

Enter the required interval between tests for the appliance and press the YES key

NOTE – The appliance description, location and test interval are not used for PowerPAT Plus data management software. The appliance information is entered using codes in the NOTE field prior to results record storage (see below). The above displays are therefore not shown.

PAT display

> **Enter Test Type**
>
> ....

Enter the required AUTO test code and press the YES key - you must enter either a factory set test code or a custom test code previously loaded. See section 5.9.

The PAT will then ask you to verify that the information entered is correct, press YES if you wish to continue (to amend the details if they appear incorrect press NO, this will return you to the first screen).

The PAT will automatically begin the test sequence selected.

PAT display

> **Visual check**
>
> **Plug OK?**

You must respond Yes or NO

PAT display

> **Visual check**
>
> **Lead OK?**

Press YES or NO

PAT display

> **Visual check**
>
> **Case OK?**
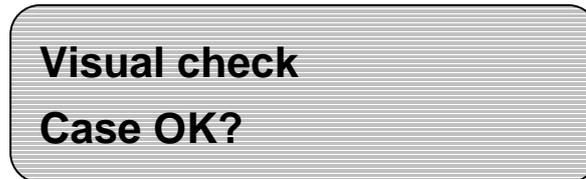
Press YES or NO

The PAT will then continue to guide you through each test requesting manual intervention where necessary.

Before the PAT begins the load test, a warning will appear and the GO key will need to be pressed before power is applied to the appliance under test. The appliance will be energised and will therefore operate - be careful. This warning will also appear before the flash test as high test voltages are present (3000V a.c. or 1500V a.c. depending on the test selected).
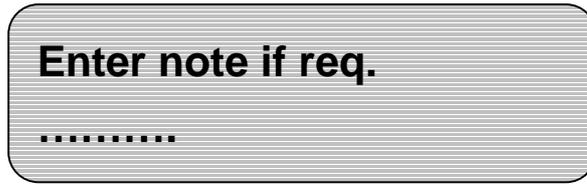
After the test sequence is complete you can store the test results. The PAT can store up to 1800 test results in its memory. However, it is strongly recommended that data is downloaded daily.

PAT display

> **Store results?**
>
> **Appl ………..**
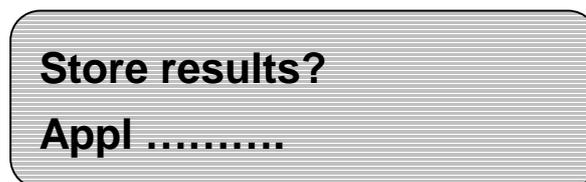
Press YES to store data

PAT display

```
╭─────────────────────────────╮
│                             │
│   Enter note if req.        │
│                             │
│   ...........               │
│                             │
╰─────────────────────────────╯
```

At this point the PAT will allow you to record a note against the appliance tested. This Note field can be used to store any action codes relating to the appliance that you have defined for use with your data management software. Special codes are defined for appliance description, location and test interval for use with the PowerPat Plus software. These codes should be entered into this note field.

Enter a note or leave blank then press YES to continue. The PAT will store the results and indicate the amount of memory left.

Press YES to move back to the first AUTO display and to continue with the next appliance.

Should the appliance fail any of the tests the PAT will ask you whether you wish to repeat the test, press NO if you do not wish to repeat the test. After failing a test the PAT will skip the remaining tests and take you to the end of the test sequence and ask whether you wish to store the result.

If at any point you wish to abort a test press the NO or RESET keys.

On completion of testing, press the RESET KEY to return to the main menu.

5.7 RESULT – displaying and downloading results

The result function allows you to review and manage the test results saved in the PAT's internal memory. The options provided are:

i)   **Display** - this will allow you to review selected test results on the PAT's display.
ii)   **Print** - using a serial printer this function can be used to generate printed test results.
iii)   **Download** - selected records can be downloaded to data management software via the serial port.
iv)   **Clear stored records–** the results store can be cleared after the results have been downloaded or printed.
v)   **Delete last record** – individual result records can be deleted starting at the last record stored.

The options are presented in turn on the PAT's screen, pressing NO as each option is presented will skip to the next option. Press YES to select the option displayed.

i) Display

PAT display

> # Display stored
> # records?

Press the YES key to select this option (or the NO key to skip to the next option).

PAT display

> # Start at record?
> #   ….1

Use the numeric keys to enter the 1st record you wish to view and press YES

PAT display

> # End at record?
> #   …10

Use the numeric keys to enter the last record you wish to view and press YES. The display will prompt you with the first and last record.

PAT display

> # Press [GO] to start

The PAT will display the test number and the date performed. Press YES repeatedly to scroll through the recorded data. When the end of the data is reached the PAT will return to the "Display stored records" message. From this point you can repeat this procedure to review more results. If you have finished reviewing the results press RESET to return to the main menu.

It is also possible to display the result for an individual appliance. When the display shows "Start at Record ..1", press NO, the display will then show:-
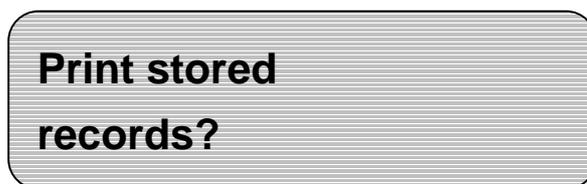
PAT display
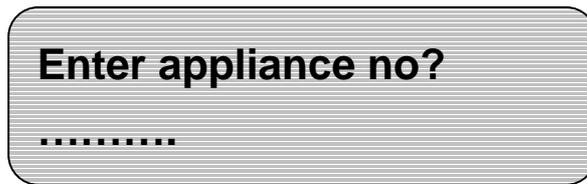
```
  Enter appliance no?

  ...........
```

Key in the appliance number for which you wish to display the results and press the YES key. The PAT will for search the results store for a record related to that appliance and if found display the record number and site name. If this is the correct appliance, press YES to continue and view the results. If you press NO at this point the search will continue looking for any further records for that appliance.

ii) Print

Connect your printer to the I/O port of the PAT (make sure your printer is ON LINE). Within the RESULT options:-
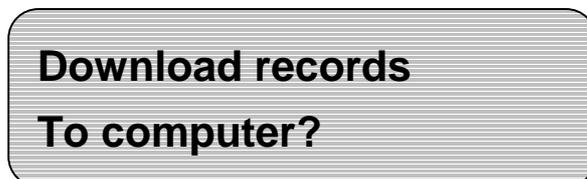
PAT display

```
  Print stored

  records?
```

Press the YES key

The options for printing the result records can be selected in the same manner as for the Display Records option.

iii) Download

PAT display

```
  Download records

  To computer?
```

Press the YES key

The Download results format used by the PAT will depend on the selections made in Programme Mode (See 5.9 below). Make sure that the selection suitable for your data management software has been made prior to testing, storing results and attempting to download the results.

The options for downloading the result records can be selected in the same manner as for the Display Record option.

iv) Clear Stored Records

This function allows all records in the results store to be erased. Make sure that all records have been downloaded correctly before clearing the store. **IT IS NOT POSSIBLE TO RECOVER THE RECORDS ONCE THE STORE HAS BEEN CLEARED.**

To select this function, go through the result options until you reach the display

PAT display

```
Clear stored
records?
```

Press the YES key and follow the on screen instructions to clear the store.

v) Delete Last Record

If a result record is incorrect or has been duplicated it can be deleted from the results store providing it is the last entry in the store. If in doubt, use the 'Display Stored Record' function to check the record before deleting it. . **IT IS NOT POSSIBLE TO RECOVER THE RECORD ONCE IT HAS BEEN DELETED.**

To select this function, go through the result options until you reach the display

PAT display

```
DELETE LAST record?
```
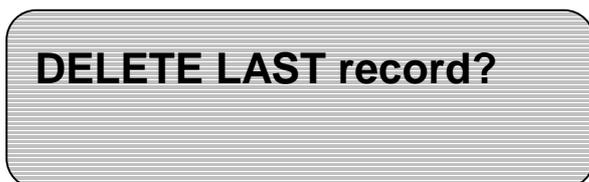
Press the YES key and follow the on screen instructions to delete the record.

5.8 MAN – manual test mode.

For the vast majority of testing the manual function need not be used. The manual function allows you to carry out any test in any order and is designed for applications where the sequence of tests continually changes, or where one particular test must be repeated several times in a row.

WARNING

This function should only be used by competent persons who are familiar with the requirements of the types of test suitable for portable appliances. It is potentially hazardous for both user and appliance should the wrong type of tests be undertaken or if testing is carried out in an incorrect sequence.

Carrying out a manual test

Connect the appliance to the relevant socket on the PAT's front panel. From the main menu press the MAN key.

PAT display

```
   Visual?
```

This is not strictly a test but allows the operator to enter a confirmation that the visual checks have been carried out on the appliance and that the result was acceptable. This confirmation can be stored along with the other test results when the manual test sequence is completed. Downloaded results can therefore include this visual result.

If you wish to record the results of the visual inspection of the appliance press the YES key and follow the on-screen instructions. Otherwise press the NO key to skip to the next test option.

PAT display

```
   EARTH BOND?       25A
   Pass      < 0.1 Ohm
```
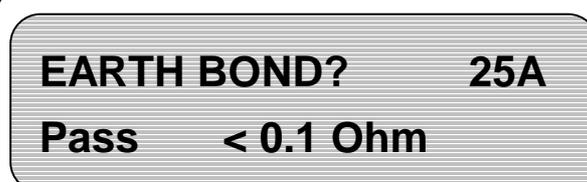
If you do not wish to carry out an Earth Bond test at this time press the NO key to advance to the next test option.

If an Earth Bond test is required, use the TEST LEVEL key to change the test current and the PASS LEVEL key to change the pass threshold.

Press the YES key to continue and follow the on-screen instructions to complete the test.

When the test finishes the results are displayed together with a Pass/Fail indication. Press YES/Cont to go back to the initial Earth Bond? test screen then press NO to move on to the next test.

PAT display

```
    FUSE TEST?
```
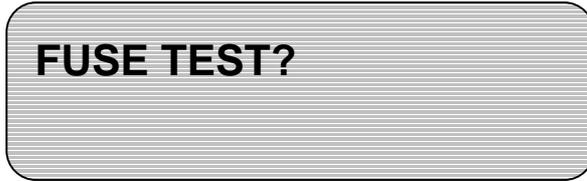
Press the YES key to carry out the test and follow the on-screen instructions to complete the test.

When the test finishes a Pass/Fail indication is displayed. Press YES/Cont to go back to the initial test screen.

If this test is not required, or after completing the test, press the NO key to move on to the next test.

PAT display

```
    INSULATION? 500V CII

    Pass   > 2.0 MOhm
```

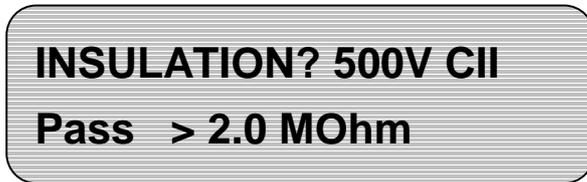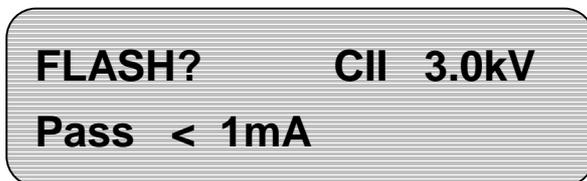As before if you do not wish to carry out this test press the NO key to skip to the next test.

Otherwise press the CLASS key to change the appliance insulation type, press the TEST LEVEL key to change from a 500V to 250V test (if it is considered that the appliance under test may be damaged by the 500V test) and press the PASS LEVEL key to change the pass threshold if required.

Press the YES key to continue with the test and follow the on-screen instructions to complete the test.

When the results and pass/fail indication are displayed press YES/Cont to go back to the initial test screen display then press the NO key to move on to the next test.

PAT display

```
    FLASH?         CII   3.0kV

    Pass   <  1mA
```

If you do not wish to carry out this test press the NO key to skip to the next test.

Press the CLASS key to change the appliance insulation type and press the PASS LEVEL key to change the pass level.

Press the YES key to continue with the test and follow the on-screen instructions to complete the test.

When the results and pass/fail indication are displayed press YES/Cont to go back to the initial test screen display then press the NO key to move on to the next test.

PAT display

```
 ┌─────────────────────────────────┐
 │                                 │
 │  RUN/LEAKAGE?                   │
 │                                 │
 │  Pass  <  3.2kVA                │
 │                                 │
 └─────────────────────────────────┘
```
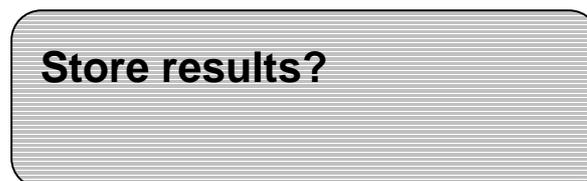
If you do not wish to carry out this test press the NO key to skip to the next test.

Press the PASS LEVEL key to change the power pass level. Press the YES key to display leakage current and use the PASS LEVEL key to alter the value if required.

To continue with the test, press the YES key and follow the on-screen instructions to complete the test.

When the results and pass/fail indication are displayed press YES/Cont to go back to the initial test screen display then press the NO key to move on to the next test.

PAT display

```
 ┌─────────────────────────────────┐
 │                                 │
 │    Store results?               │
 │                                 │
 │                                 │
 └─────────────────────────────────┘
```

This function allows the results record for the manual test carried out to be saved in the tester's results store. The PAT will store only the last result taken for each manual test since manual mode was selected.

Press YES to continue with the store function or use the NO key to return to the start of Manual mode.

Continuing through the store function, appliance information is entered to be stored with the results record. Information to be entered, as with AUTO mode, is as follows:-

1. Appliance no.
2. Appliance description
3. Appliance location
4. Appliance test interval
5. A Note

The appliance description, location and test interval should only be used if the data management software to which the results are to be downloaded can accept these values.

Only the appliance number is essential. Other values are optional and can be left blank or cleared if required.

Once this appliance information has been entered the PAT will store the results and indicate the amount of memory left.

WARNING

In the manual mode, if an appliance fails any of the tests the PAT will allow you to continue to carry out further tests. All users are advised that in the event of an appliance failing a test, corrective action should be taken before proceeding with further tests.

5.9 PROG – programming mode

This powerful mode allows you to program new automatic test sequences and to change other system functions.

This function should only be used by competent persons who are familiar with the functions of the PAT and the requirements of the tests suitable for portable appliances.

The options are:-

i) **Earth Bond Null** – Adjust the Earth Bond null value for alternative leads.
ii) **Expert Mode** – Enable or Disable Expert Mode.
iii) **Display/Modify/Set test** – Set up or modify automatic test sequences for use in AUTO mode.
iv) **Erase auto test** – Erase any of the user programmed auto test sequences.
v) **Print all auto tests** – Print all user programmed auto test sequences to a serial printer.
vi) **Change access code** – Modify the user access code.
vii) **Erase description** – Erase one of the user entered appliance descriptions.
viii) **Configure download** – Set up the download data format for specific data management software packages.

After selecting PROG mode go through the options by pressing NO to each option question. To use an option press the YES key when the option question is displayed.

i) Earth Bond Null

PAT display

```
Earth Bond Null?
```
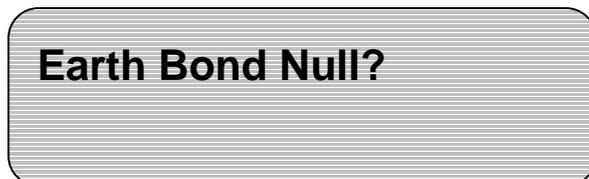
The PAT is supplied with the Earth Bond lead with which it was calibrated. This 'Null' function allows extended earth bond test leads to be used for non standard appliances. The resistance of the extended lead can be 'nulled out' from the earth bond measurement to make the stored appliance earth bond resistance test result valid.

When power is applied to the PAT the user is given the option to revert to the calibrated Earth Bond lead setting.

It should be noted that the Earth Bond test current will be reduced by the increased resistance of any extended lead.

To null an extended lead press the YES key at the above screen display. Connect the new lead between the Earth Bond lead 4mm socket on the tester front panel and the 'Null' terminal. Then follow the on screen instructions.

NOTE – All appliances should be disconnected from the tester 110V, 230V and IEC lead test sockets to ensure the validity of the null measurement.

ii) Expert Mode

PAT display

```
Expert mode is OFF
Turn it ON?
```
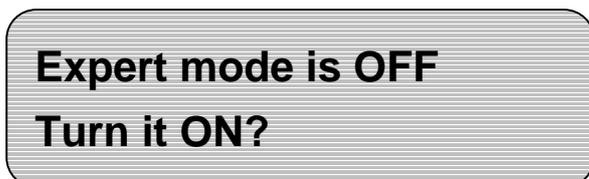
WARNING

Expert Mode should only be used by competent persons who are fully familiar with the requirements and techniques of appliance testing, and the operation of the PAT.

When in Expert Mode, the AUTO test sequence is abbreviated by removing all non essential screen prompts and key presses during the sequence. It is essential therefore that the user knows how the tester is to be used to ensure safe operation and valid testing.

Expert Mode also allows the test times to be varied in AUTO mode. Generally test times can be shortened to a minimum of 2 seconds if the user considers this length of test to be valid.

In Expert Mode with prompts removed and test times shortened, AUTO test sequences can be reduced to around half the time that is normally required.

To change the Expert Mode setting - at the above screen display press the YES key. To turn Expert Mode on it is necessary to enter the user access code before the change can be confirmed. To turn Expert Mode off the access code is not required so that a non expert user can easily disable the mode.

When power is applied to the tester the Expert Mode status (On or Off) is indicated during the power up sequence screen displays.

iii) Display/Modify/Set test

This option allows existing AUTO test sequences to be modified or new test sequences set up.

PAT display

**Display/Modify/Set
test?**
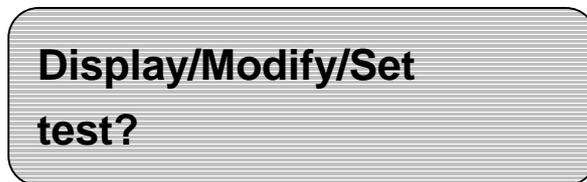
To select this option press the YES key at the above screen display.

PAT display

Load test type?

If you want to modify an existing test sequence press YES.

PAT display
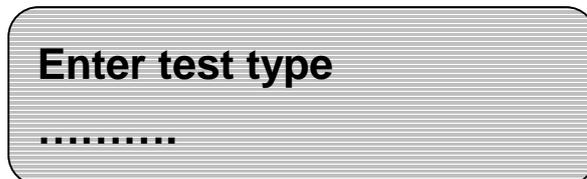
**Enter test type
………..**

Enter any existing test type using the keypad or barcode scanner and press YES to continue.

PAT display

> **TEST (Appliance)**

Use the TESTS key to toggle the test between that for an appliance or that for an IEC lead. When the test type is correct press YES.

Each test is then displayed in turn for modification if required.

PAT display

> **VISUAL   1**

PAT display

> **EARTH BOND 1   25A**
>
> **Pass   <   0.1 Ohm**

PAT display

> **FUSE   1**

PAT display

> **INSULATION 1 10S   I**
>
> **Pass   > 2.0 MOhm**

PAT display

> **FLASH   1 10S   I**
>
> **Pass   < 1 mA**

PAT display

> **RUN   1 10S**
>
> **Pass   < 3.2kVA**

PAT display

```
┌─────────────────────────────────┐
│                                 │
│  LEAKAGE                        │
│                                 │
│  Pass     <  0.3mA              │
│                                 │
└─────────────────────────────────┘
```
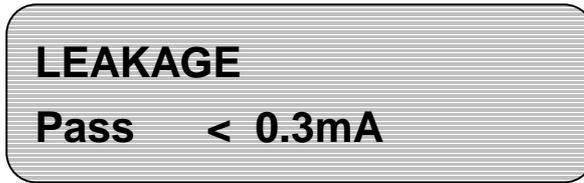
This last display is only shown if a Run test has been selected.

For each test use keys as follows to change the test parameters:-

Key	Function (some keys may not be applicable to particular tests)
YES	To step on to the next test in the sequence.
TESTS	Changes the number of tests of each type between S (skip), 1 (1 test), 3 (3 tests).
TEST LEVEL	Changes the test current or voltage e.g. the Earth Bond current or the Insulation voltage.
CLASS	Changes the insulation class e.g. for Insulation and Flash tests.
PASS LEVEL	Changes the pass/fail threshold for the test.
TIME	Changes the test time.

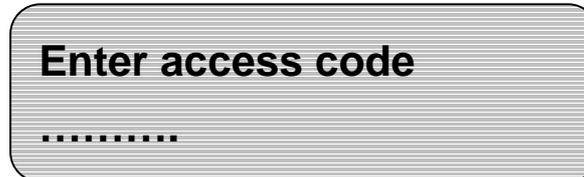Pressing NO at any point takes you back to the initial screen.

Stepping on from the last test in the sequence allows the new test sequence to be stored in the PAT's internal memory.

PAT display

```
┌─────────────────────────────────┐
│                                 │
│  Store test?                    │
│                                 │
│                                 │
└─────────────────────────────────┘
```

Press YES to continue and store the test sequence

PAT display

```
┌─────────────────────────────────┐
│                                 │
│  Enter access code              │
│                                 │
│  ..........                     │
│                                 │
└─────────────────────────────────┘
```

Only experienced users who understand the implications of changing the test sequences should have knowledge of the access code and be allowed to save new tests that can be called up in AUTO Mode.

To continue with storage of the new test sequence enter the access code and press YES to continue. The access code is factory set at 0000.

PAT display

> ## Enter type for test
>
> ....

Enter the required test code that you will use to call up this test in AUTO Mode, and press YES to continue. If you enter an existing user test type it will be erased and replaced by the test you have just set up, be careful! If required it is possible to overwrite the pre-programmed test types within the tester.

PAT display

> ## Stored test type
>
> ....

Press YES to return to the start of PROG Mode.
Alternatively press the RESET key to return to the main menu.

Reviewing a test sequence

The program mode can also be used for reviewing the contents of an automatic test sequence by entering the test type to be reviewed and using the sequence as above, pressing YES to step through the tests. When the PAT asks you whether you wish to store the results press the NO key.

iv) Erase auto test

PAT display

> ## ERASE AUTO test?
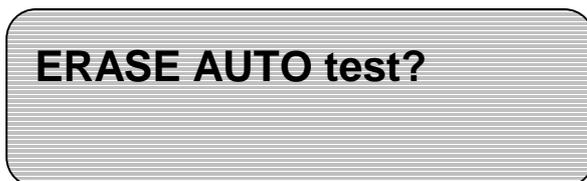
Press YES to continue with the erase function and follow the on-screen instructions. You will be asked to enter the number of the test type to be erased and enter the access code to verify that you have the authority to carry out this action.

Only test sequences that the user has programmed using the testers PROG Mode can be erased. The factory pre-programmed test sequences cannot be erased.
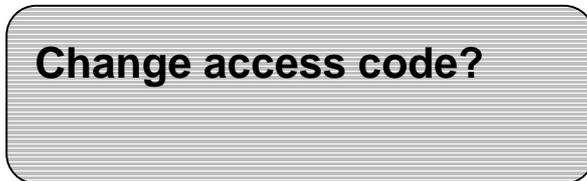
v) Print all auto tests

PAT display

```
    Print All AUTO

    tests?
```
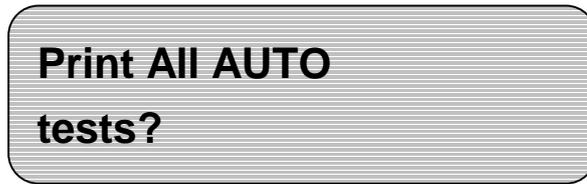
To list all user programmed (temporary) AUTO test sequences, connect a serial printer to the PAT's I/O port and press YES at the above screen display and follow the on-screen instructions.

vi) Change access code

PAT display

```
    Change access code?

```

The factory set access code is 0000. It is advisable to change this setting to to prevent unauthorised personnel changing programmed values. Keep a safe record of your personal access code.

From the above screen display press YES to continue and follow the on-screen instructions. Prior to entering a new code you will be asked to enter the existing access code.

vii) Erase description

PAT display

```
    Erase Description?
    ..........
```
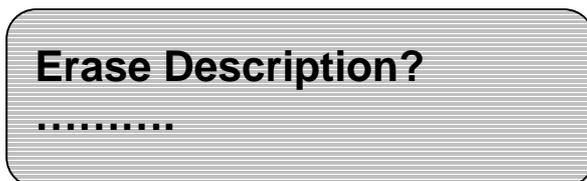
When appliance descriptions are entered into the tester they are stored to provide a 'type ahead' lookup making description entry easier for subsequent appliances of the same type. If incorrect descriptions are entered they can be erased using this function.

From the above screen display press YES. Stored descriptions will be presented in order, press NO to step through the descriptions. Press YES to erase a description and enter the access code to confirm your authority to carry out this action.

viii) Configure download

PAT display

```
┌─────────────────────────────────┐
│                                 │
│    Configure DOWNLOAD?          │
│                                 │
│                                 │
└─────────────────────────────────┘
```
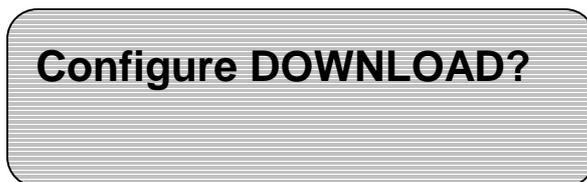
In order for test results to be suitable for download to your particular data management software package it is necessary to configure the PAT correctly. At the above screen display press YES. The first configuration option will be displayed. Use the NO key to step through the available options. When the option that matches the data management software that you intend to use is displayed press YES to select that option and configure the PAT correctly. If the data management software that you intend to use is not given as an option consult your supplier who will advise on the option that should be used.

5.10 IEC Lead Test

The IEC lead test is a pre-programmed automatic test sequence.

To test, plug the IEC lead's male and female connectors into the plug and socket arrangement on PAT's front panel. From the main menu press the AUTO key

Enter the identification number for the lead as the appliance number. Continue through the on-screen instructions until you reach entry of the test type.

PAT display

```
┌─────────────────────────────────┐
│                                 │
│   Enter test type               │
│                                 │
│   ……………                         │
└─────────────────────────────────┘
```

Enter the IEC lead test code and press the YES key

Continue to follow the on-screen instructions to carry out the test on the lead and store the results in the same way that you would for an appliance.

Extension leads can also be tested using the IEC test facilities of the PAT. Use an IEC lead to connect from a socket outlet on the extension lead under test to the IEC lead test connector on the PAT front panel. Then in AUTO mode use the pre-programmed extension lead test type.

WARNING - NEVER CONNECT THE PAT TO THE MAINS VIA THE IEC LEAD TEST SOCKET.

Specification

Earth Bond
Open circuit voltage	8V rms nom.
Current into 0.10 ohms	25A or 10A
Displayed values	0.00 to 1.99 Ohm, >2 Ohm
Accuracy	5% rdg ±2 digits, >1 Ohm 10% ±2 digits
Pass/Fail thresholds	0.1 to 0.9 Ohm (0.1 Ohm steps) , 2 Ohm
Test time	5s

Earth Bond – IT Equipment
Open circuit voltage	100mV nom.
Current into short circuit	100mA
Displayed values	0.00 to 1.99 Ohm, >2 Ohm
Accuracy	5% rdg ±2 digits, >1 Ohm 10% ±2 digits
Pass/Fail thresholds	0.1 to 0.9 Ohm (in 0.1 Ohm steps), >2 Ohm
Test time	5s

Lead/Fuse Continuity
Open circuit voltage	8V rms nom.
Displayed values	PASS/FAIL
Pass/Fail threshold	39 kOhm approx.
Test time	5s

PN-E Insulation
Test voltage into 0.5MOhm	250V or 500V dc (into 0.5Mohm load)
Displayed values	0.1 to 19.9 MOhm, >20 MOhm
Accuracy	500V - 5% rdg ±2 digits, >10MOhm 10% ±2 digits
Pass/Fail thresholds	0.2, 0.5, 1.0, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, MOhm
Test time	2s to 60s programmable, 10s default

Load/Leakage Tests
Pre-test
Open circuit voltage	8V rms nom.
Pass/Fail thresholds	230V: 8 kVA P-N; 110V: 3.6 kVA P-N

Run/leakage
Pass/Fail thresholds (load)	0.5, 1.0, 1.5, 1.8, 2.0, 2.5, 3.2, 4.0 kVA
Displayed values	0.1 to 3.9 kVA, >4 kVA
Accuracy	5% rdg ±2 digits
Pass/Fail thresholds (leak)	0.3, 0.8, 1.0, 2.0, 3.0, 9.0mA
Displayed values	0.1 to 9.9mA, >10mA
Accuracy	5% rdg ±2 digits
Test time	2s to 60s programmable, 10s default

Flash Test

Open circuit voltage	Class I: 1500V rms, Class II: 3000V rms
Current into short circuit	3mA
Displayed values	0.1 to 2.9mA, >3mA
Accuracy	5% rdg ±2 digits
Pass/Fail thresholds	1, 2, 3mA
Test time	2s to 60s programmable, 10s default

All values given are defined at nominal mains input.

I/O Port speed

Data download speed - 9600bps.
Printer serial port speed – 1200bps

Communication lead configuration
PAT to serial printer

PAT (9 pin)	printer (25 pin)
2	20
3	3
5	7

PAT to computer (25pin D connector)

PAT (9 pin)	computer (25 pin)
2	6, 5, 20
3	3
5	7

PAT to computer (9pin D connector)

PAT (9 pin)	computer (9 pin)
2	8, 6, 4
3	2
5	5

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