



CLARE INSTRUMENTS LTD

Power Tool
A255 Series II
& Appliance Tester

INSTRUCTION MANUAL



INDEX

It is strongly recommended that all sections of this Manual are read and fully understood by all those intending to carry out or supervise any activity involved in Electrical Safety Testing using this test instrument.

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INTRODUCTION

REASONS FOR TESTING

Under the requirements of the Health and Safety at Work Acts it is the responsibility of the 'supplier' of electrical equipment to ensure that it is electrically safe. The 'supplier' can be the Manufacturer, the Importer or the Hirer and by inference the Repairer.

Manufacturers and Importers generally satisfy their obligations by ensuring conformity to the relevant safety standards prior to placing the equipment on the market and have little or no further interest in the continuing in-service maintenance and routine testing of the product other than in responding to customer feed-back or enquiry.

The Hire Industry however must ensure compliance with the safety regulations each and every time a power tool or appliance is hired out.

Repairers of power tools and appliances also have statutory obligations to ensure that the repaired item complies fully with original manufacturers specifications and the relevant standards.

As well as being aware of the legal requirements it also helps to appreciate the reasons for testing if there is a clear understanding of how construction methods and test requirements aim to provide 'Electrical Safety' –

METHODS OF CONSTRUCTION FOR ELECTRICAL SAFETY

To provide the user with protection against electric shock general methods of construction must ensure firstly that all 'live' parts are insulated and secondly that should this basic insulation fail the 'live' parts are prevented from creating a hazard to the user.

This second level of protection is achieved either by 'earthing' all accessible conductive surfaces or by providing 'double insulation' in the form of a second insulating layer or by reinforcing the primary insulation layer.

Earthed equipment is referred to as **Class I** and earthing is achieved by connecting all accessible conductive surfaces (the tool body or outer casing and associated fixings etc) to the supply earth via a low impedance protective conductor, then if any 'live' part comes into contact with these surfaces the hazardous current is drawn harmlessly to earth through the protective conductor rather than through the person holding the tool. The protective conductor is the green/yellow 'earth' wire in standard 3 core mains supply leads.

Double Insulated equipment is referred to as **Class II**. All accessible conductive surfaces are additionally insulated from internal 'live' parts and components. No 'earth' wire is present in the supply lead. All such equipment is clearly identified by a prominent square within a square symbol. 

TEST REQUIREMENTS TO DETERMINE ELECTRICAL SAFETY

The most appropriate way of verifying Electrical Safety is to carry out a series of routine Safety Tests that both reflect those tests used in the manufacturing process and, particularly in the Hire Industry, take into account the effects of normal wear and tear.

Visual Inspection

It is important when carrying out routine testing to first check for signs of undue wear and tear by a thorough visual inspection – a nick in the supply cable or a cracked casing etc can easily lead to hazardous situations when the power tool or appliance is in use.



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Electrical Safety

The tests to verify satisfactory 'earth bonding' and insulation levels will depend on –

- a) the basic construction of the tool –
Class I/Earthed or Class II/Double Insulated

and

- b) the original standard that it was manufactured to –
the most common British Standards relating to equipment used in the Hire Industry being BS2769 for hand held power tools and BS3456 for general appliances, however clear guidance should be sought from the manufacturer, or importer, to determine the appropriate requirements.

Earth Bond Continuity

Most type testing standards, including those referred to above, require that the earth bond resistance, between all accessible conductive surfaces and the 'earthing' terminal within the tool, does not exceed 0.1 ohm and that compliance should be checked by resistance measurement using a test current equal to 1.5 times the rated current or to 25A, whichever is the greater, from an a.c. voltage source not exceeding 12V.

In practice, routine testing will also include the supply lead and the measurement will be made between the earth pin of the supply plug and exposed metal (conductive) surfaces on the tool.

Although most tools will still meet the 0.1 ohm limit an earth bond resistance not exceeding 0.3 ohms is acceptable when supply leads up to 5 metres in length are included. This figure can be further increased by 0.1 ohm for each additional 5 metres of supply lead length.

NOTE Where exposed metal parts cannot be seen to form a continuous surface with all other exposed metal, such as a metal grille in a plastic housing or a remote switch panel, OR where moving guards or detachable accessories are also made of metal, measurements must be taken from all such surfaces back to the Earth pin of the plugtop.

Electrical Insulation

To check the insulation, between the 'live' conductors (Line and Neutral) and all exposed metal surfaces, a high voltage a.c. Flash Test is applied. The voltage will be dependent on the construction class of the tool or appliance –

1250V for standard Class I (Earthed) tools and appliances

3000V for routine testing of Class II (double insulated) equipment

3750V for Class II equipment following repair or reconditioning operations

Under normal conditions the permissible leakage current at the appropriate Flash Test voltage should not exceed 5mA.

Some Class I equipment may suffer from the effects of high capacitive leakages associated with exceptionally long supply leads or certain methods of suppression filtering, or a combination of the two, under these conditions a reduced test voltage of 500V or an increased leakage level of up to 10mA may be permissible – if in doubt advice must be sought from the tool manufacturer.

NOTES

All safety tests must be carried out with the supply switch of the tool or appliance in the ON position to ensure that all 'live' parts are included when checking insulation.



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Some specialised equipment with heavy duty motors etc. may employ contactor or relay start switching techniques, therefore to apply a satisfactory insulation (flash) test through such devices the contacts must be held closed by some, safe, manual means – the advice of the manufacturer must be sought on the non-hazardous way to achieve this.

Some 'trigger' operated equipment may require the switch to be temporarily held in the ON position with insulating tape or string – under no circumstances should it be held in by hand,

FLASH TESTING IS EXTREMELY HAZARDOUS.

Remember to release the supply switch when testing is complete.

Multi-function tools and appliances must be FULLY tested with supply and function switches set for each operating mode.

Functional Operation

Having established that the tool or appliance offers adequate protection to the user it is also necessary to ensure that it operates correctly in all available modes.

Although many tools and appliances can be seen to be working correctly, in that they turn in the right direction or blow and suck when required etc. such visual checks do not always tell the full story or give any indication of impending failure. It is therefore recommended that measurements are also made to determine the load currents of each function to check that they are within the normal operating limits.

For motor driven tools, such as drills, saws and angle grinders etc., the current measurement is usually taken with the tool running in an 'off-load' condition. This will generally give load current readings significantly lower than that shown on the equipment rating plate, which is the maximum 'on-load' current.

The advice of the equipment manufacturer should be sought for meaningful current values for all functions including 'off-load' running. The manufacturer can also sometimes provide useful tips and hints as to the probable causes for out-of-limit readings.

A satisfactory 'load test', as well as showing that the tool runs or operates, also acts to validate the preceding Flash Test by proving that the supply switch was ON and the circuit complete.

Safety Test Records

Compliance with the safety regulations requires not only the verification of electrical safety of a piece of equipment but also the recording of test results, and corrective measures, to provide a traceable history of equipment worthiness.

CLARE have developed a comprehensive **TEST LOG** system for just such a purpose.

It provides full recording facilities for all equipment details, enabling the appropriate test routine to be determined, and detailed Test Reports that are used both as check lists to a structured test routine and for establishing a clear and concise Safety Test history.

With its easy to follow format, it provides an invaluable reference to equipment status and is therefore suitable for most industrial/workplace applications where routine testing to a regular schedule is required.

Where intensive, even daily, testing is carried out alternative or expanded recording systems may be desirable.

The Hire Association Europe, for example, advises its members to also use a two-part labelling system for point of hire applications.



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The CLARE A255 Series II

DESCRIPTION

This instrument is specifically designed to provide a quick and simple means of verifying the electrical safety and operational functioning of most commonly found Class I (Earthed) and Class II (Double Insulated) power tools and appliances.

With the inclusion of Test Sockets for both standard 240V/13Amp (BS 1363A) and industrial 110V/16Amp (BS 4343) connectors the instrument is ideally suited to the test routine practiced by the Hire Industry.

Appliances fitted with other plug styles can be readily accommodated by using suitable adaptors.

Accessories supplied with the instrument include a Continuity Probe – to aid appliance fault investigation, two Appliance Fault Simulators – for verifying the integrity of the fault detection circuitry, and a Record of Calibration booklet.

CONTROLS AND INDICATORS

The following section acts as a guide to the instrument and to provide familiarisation with each of the controls and associated functions.

Supply Input the standard **Series II** instrument is fitted with a 13A (BS 1363A) plug for connection to a 240V a.c. Earthed supply. The plug top fuse should be rated at 13A.

The '**Universal**' model can also be connected to 110V a.c. supplies using the adaptor supplied. Specialised internal circuitry automatically detects which supply voltage is present.

NOTE When connected to a 110V supply the Load Test supply output is restricted to the 110V socket, although both sockets can still be used for applying Safety Tests.

Supply Switch this is a miniature circuit breaker (mcb) device and gives additional protection to the instrument circuitry, especially that of the Load Test supply output.

To switch ON the instrument firmly depress the green button, to switch OFF depress the red button.

Supply Lamps this group of lamps, 2 amber and 1 red, are used to indicate the condition of the incoming supply.

It is important that the external supply circuit is correctly wired and provides a sound Earth connection for this instrument.

Both amber lamps must be ON when the instrument is switched ON.

If either lamp fails to glow OR if the red FAULT lamp is ON there is likely to be a connection fault on the supply circuit – such as reversed polarity of Line and Neutral or no Earth connection at the supply socket.

Disconnect this instrument immediately and have the supply fault investigated and corrected, by qualified personnel, before re-using the suspect socket for either this instrument or any other tool or appliance.

Safety Test Selector this rotary switch should be set to the position appropriate to the tool or appliance being tested. It should be left in the selected position for the entire test sequence – including the Load Test.

For **Class I** (Earthed) appliances set to position –

- A 0.1 ohm Earth/1250V Flash Test – for normal equipment
- B 0.5 ohm Earth/1250V Flash Test – for long leaded equipment
- C 0.5 ohm Earth/500V Flash Test – for heavily suppressed equipment



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For **Class II** (Double Insulated) appliances use positions –

D 3000V Flash Test – for routine testing

E 3750V Flash Test – for repaired or reconditioned tools

Always set the selector to position **F** (STANDBY) before connecting or disconnecting appliances to the test sockets or when the instrument is not in use.

Safety Test Buttons these momentary action push-buttons are used to apply the selected Safety Test.

The white TEST button is depressed to apply the test.

The adjacent red 10mA button is used to increase the tripping threshold, of the 1250V Flash Test applied to Earthed appliances, from the nominal 5mA level to 10mA. This button must be depressed and held BEFORE the TEST button is depressed.

This feature permits re-testing of those appliances that fail the normal test due to the effects of high capacitive leakage associated with long supply leads or suppression filters.

This test presents an increased hazard and therefore an internal buzzer has been incorporated to act as an additional warning whenever it is applied.

DO NOT TOUCH THE APPLIANCE WHILE A TEST IS BEING APPLIED.

Test Result Indicators these lamps will glow to indicate the result of the test applied, the Earth test Pass or Fail lamps are only operative when applying tests A, B or C.

A Flash Test failure is also indicated by the high pitched, panel mounted, audible warning device.

NOTE When applying a Double Insulated test via the Flash Probe a PASS indication only shows that no fault was found at the point of application of the probe.

Test Sockets the two sockets fitted as standard permit connection of both 110V and 240V appliances.

Both can be used for applying the selected Safety Test but when a Load Test is applied the voltage output will be commensurate with the appropriate socket ie. 110V from the upper 16A/BS 4343 socket and 240V from the lower 13A/BS 1363A socket.

Refer also to the notes under Supply Input for the 'Universal' model.

Sockets Energised Lamp this comes on whenever a Flash Test or Load Test voltage appears at the Test Sockets.

If it comes on at any other time an internal fault, associated with the output switching circuitry has developed – the instrument must be withdrawn from service immediately for investigation and correction by qualified personnel.

Load Test Buttons this pair of momentary action push-buttons are used when applying a Load Test.

The lower 15A button applies the test and the current drawn by the appliance is displayed on the upper scale of the meter.

The 1.5A button is used to change the meter range from 15A full-scale to 1.5A full-scale. It is only operative when the 15A button is already depressed.

The deep shroud on the 15A button is purposely used to reduce any risk of accidental operation of the Load Test.



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Load Current/Continuity Resistance Meter this analogue meter is dual scaled to display the Load Test current and the Continuity Resistance of the earth path when an Earthed appliance test is applied.

This latter feature is useful for determining Earth fault causes or for indicating a possible degradation of the earth path should consecutive test routines on the same appliance show any appreciable reading differences.

It can also be used, with the Continuity Probe, to check suspected open-circuits within the supply lead or appliance itself.

Set Inf. Control this potentiometer is used to set-up the Continuity Resistance measurement circuit prior to testing.

To do this first ensure that no appliance is connected to the instrument and that the green clip lead is unconnected.

Switch ON the instrument, select test A and depress the TEST button – now adjust the Set Inf. control until the meter pointer indicates INF. on the Continuity Resistance scale.

Earth Return Clip Lead this green clip lead is used to complete the Earth circuit test path, it is not required when testing Double Insulated appliances.

Attach the clip to clean, exposed metal on the appliance to be tested. A sound connection is important – if the exposed metal is painted or tarnished the connection point must be cleaned or scraped to reveal clean bare metal.

An unsound connection may give rise to high current sparks when the test is applied and may also affect measurement accuracy.

Flash Test Probe this high voltage safety probe is used when applying the Flash Test to Double Insulated appliances.

The test tip, which is exposed by depressing the red actuator on the probe handle, should be applied to any exposed metal on the appliance and to casing joints, particularly around hand grips, switches and cable entries. The high voltage is only applied when the TEST button is depressed.

Tiny sparks and a light crackling sound may be observed when applying the test tip. This is quite normal at such high voltage levels and should not be confused with a flash-over, which, if it occurs, will be clearly indicated by the Flash Fault lamp and alarm.



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APPLIANCE TEST PROCEDURES

PRECAUTIONARY MEASURES

Appliance testing, by its very nature, can be hazardous and various common sense precautions must be observed.

NEVER COME INTO BODILY CONTACT WITH AN APPLIANCE BEING TESTED.

Ensure that the person responsible for testing is competent and fully trained in both the general principles of Safety Testing and the correct use of the required test instruments, or is closely supervised by someone of the required competence.

Ensure that the 'test area' is clearly defined and offers limited access to persons other than the 'tester'. At the same time it is advisable to have somebody else in the near vicinity who can give assistance should anything go wrong.

Ensure adequate warning to others that testing is in progress.

It is recommended that the supply sockets in workshops and especially those used in any 'test area' are protected by an Earth Leakage Circuit Breaker.

Ensure that the appliance to be tested is on an insulated worksurface – **NEVER USE A METAL BENCH** – a robust wooden bench with a securely fitted rubberised worktop is best. Larger equipment should be stood on rubber matting.

Arrange the test bench so that test instrument controls can be operated without having to reach over or lean across the tool or appliance during testing. This is particularly important when testing motorised equipment such as drills and lawn mowers etc.

Never leave an appliance connected to the tester when unattended.

Always check that the intended test is suitable for the appliance – if the Class II (Double Insulated) symbol is not clearly visible the appliance must be assumed to be of Class I (Earthed) construction.

Some 'electronic' equipment may not be constructed to withstand the high current 'earth bond' or high voltage 'flash' tests applied by this instrument.

IF IN DOUBT refer to the appliance manufacturers recommendations or seek qualified advice.

Always follow the routine of Visual Inspection, then the appropriate Safety Test, then a Function and Load Test.

If ANY test failure occurs ensure that the appliance is **FULLY** re-tested when the indicated fault has been rectified.

VISUAL INSPECTION

Before applying the Earth Bonding and Insulation tests a thorough visual inspection of the appliance must be carried out. This may well form the greater part – 75% or more – of any test routine.

Casing

Check for signs of undue wear, cracks or dents, missing components such as guards, covers or hand grips etc.

Ensure that all screws and catches are present and secure.

Check for evidence of excessive dirt build-up, especially in and around any ventilation slots.

Also ensure that all movable guards operate smoothly.

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Supply Lead

Check for any signs of damage or fraying along the entire length. This should also include any extension lead that may be regularly used with the appliance.

Ensure that any cable entry or connector is sound and secure.

Plugs and Fuses

Thoroughly check plug tops for damage and ensure that all wires are correctly connected.

Ensure that cable grips and strain relief bushes are properly secure.

Check that the correctly rated fuses are fitted – even a 5A fuse fitted in place of a recommended 3A fuse may give rise to a potentially dangerous fault condition.

Switches and Function Selectors

Ensure that all switches, including rotary selector devices, operate smoothly and in the expected manner.

Set supply switches to the ON position in preparation for the Safety Test. Multi-function appliances, such as a two heat/two speed heater, will require testing in each operating mode.

NOTE Any fault or irregularity highlighted by the visual inspection must be corrected before electrical testing is carried out.

ELECTRICAL SAFETY VERIFICATION

Earthed Appliances

All safety tests must be carried out with the supply switch of the tool or appliance in the ON position to ensure that all 'live' parts are included when checking insulation – refer also to the NOTES in the Test Requirements section.

REMEMBER – SAFETY TESTING CAN BE HAZARDOUS.

Procedure

Connect the test instrument to an Earthed supply and switch ON.

Set the Test Selector to position F – STANDBY.

Connect the appliance to be tested into the appropriate 110V or 240V socket. Ensure that appliance switches are ON.

Attach the green clip lead from the instrument to clean exposed metal on the appliance. Good connections are essential for accurate measurement and to prevent any high current sparks occurring when the TEST button is depressed.

DO NOT TOUCH THE APPLIANCE AGAIN UNTIL THE TEST IS COMPLETED.

Select test A, B or C to suit the appliance test requirement.

Depress and hold the TEST button for 5 seconds whilst observing the TEST RESULT lamps.

Select test **A B** or **C** to suit the appliance – refer to the Safety Test Selector section under Controls and Indicators.



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Depress and hold the TEST button for 5 seconds whilst observing the TEST RESULT lamps.

The Earth Test will show a FAIL for a short while and then change over to show an Earth PASS. As this happens the Flash Test will be automatically applied and the Flash PASS lamp will also come on – the electrical safety of the appliance is satisfactory.

WARNING The high Earth test current will cause a certain amount of self-heating, to both the appliance wiring and the test circuitry. To keep this within acceptable limits and prevent overheating, do not apply the test for more than 5 seconds and do not apply more than two tests in any one minute period.

NOTE Where exposed metal parts do not form part of a continuous surface with all other exposed metal the test must be repeated with the earth clip attached to each exposed metal surface in turn.

Fault Indications

If the Earth FAIL lamp remains on for the full 5 seconds the resistance of the Earth path is in excess of the 0.1 or 0.5 ohms pass level of the test selected – the actual value can be read from the Continuity Resistance scale of the meter.

The cause could be a broken earth wire, loose connections or corroded terminals.

NOTE If the Earth Test fails the Flash Test will not be applied since a satisfactory earth path is required for a meaningful Flash Test.

If the Flash FAIL lamp glows and the audible alarm sounds, one of the following conditions is indicated –

- the insulation is unsatisfactory, permitting a leakage current in excess of the nominal 5mA at test voltage;
- a flash-over has occurred between the Earth path and one or other of the Line and Neutral paths;
- the presence of a high leakage suppression filter or a high brightness neon in the supply circuit gives rise to a total leakage current in excess of the nominal 5mA at test voltage.

The appliance should be considered unsafe, clearly marked as such and withdrawn for full workshop investigation and repair. It must be FULLY re-tested following repair.

NOTE Tools and appliances that fall into category 'c' above and some heavy duty equipment, particularly the larger power tools such as 2500W angle grinders, may have inherently higher leakages which require a pass level of up to 10mA at test voltage.

If this is the case, and the manufacturer advises testing to this higher threshold, the 10mA Flash trip can be employed.

WARNING Testing in this 10mA mode increases the hazard to the operator, an internal buzzer will sound as an additional warning whenever this test is applied –

DO NOT TOUCH THE APPLIANCE.

To apply the Safety Test using the increased Flash Test threshold, first depress the red 10mA button and hold it in whilst also operating the white TEST button in the normal way.

Release both buttons at the end of the 5 second test period.

If the appliance still fails it must be considered unsafe. It should be clearly marked to show this and be withdrawn for full workshop investigation and repair. It must be FULLY re-tested again following repair.

APPLIANCE TEST PROCEDURES

Double Insulated Appliances

All tests must be carried out with the supply switch of the tool or appliance in the ON position to ensure that all 'live' parts are included when checking insulation – refer also to the NOTES in the Test Requirement section.

REMEMBER – SAFETY TESTING CAN BE HAZARDOUS.

Connect the instrument to an Earthed supply and switch ON.

Set the Test Selector to position F – STANDBY.

Connect the appliance to be tested into the appropriate 110V or 240V socket and ensure that appliance switches are ON.

Ensure that the appliance is secured and positioned so as to allow access to the various test points.

Select test D or E to suit the test requirement – refer to the Safety Test Selector section under Controls and Indicators.

**DO NOT ALLOW BODILY CONTACT WITH THE APPLIANCE, OR
ITS SUPPLY LEAD OR THE FLASH PROBE TIP,
WHEN THE FOLLOWING TEST IS BEING APPLIED.**

Depress and hold the TEST button and apply the Flash Probe tip to all exposed metal surfaces, including screw heads, and to casing joints especially those around switches and cable entries.

WARNING If it becomes necessary to move the appliance during testing for easier access to a test point –

REMOVE THE PROBE AND RELEASE THE TEST BUTTON FIRST.

Observe the TEST RESULT lamps, the Flash PASS lamp should be on, and remain on, to indicate that no flash-over has occurred at those points to which the probe tip is applied.

Fault Indication

If the Flash FAIL lamp and audible alarm come on, the insulation – between the Line or Neutral paths and the point of test – has failed to withstand the applied voltage.

The appliance must be considered unsafe. It should be clearly marked to show this and be withdrawn for full workshop investigation and repair. It must be FULLY re-tested following repair.

FUNCTION AND LOAD CURRENT MEASUREMENT

It is advisable to only apply a Load Test if the appliance has successfully undergone a Safety Test first.

All tests must be carried out with the supply switch of the tool or appliance in the ON position – refer also to the NOTES in the Test Requirements section.

REMEMBER – SAFETY TESTING CAN BE HAZARDOUS.



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Procedure

Ensure that the appliance is connected to the correct test socket to suit its 110V or 240V supply requirement.

Ensure that the test Selector is still set as required for the Safety Test. Ensure that the appliance is switched ON.

**ENSURE THAT THE APPLIANCE CANNOT MOVE AND IS ADEQUATELY GUARDED
TO PREVENT ANY HAZARD BEING CAUSED
BY OR TO MOVING PARTS OR HEATING ELEMENTS
DURING APPLICATION OF THE TEST SUPPLY VOLTAGE.**

Depress and hold the 15A Load Test button for 5 seconds, the appliance will now be energised and should operate in the expected manner, the current being drawn will be indicated on the LOAD CURRENT scale of the meter – this should be within the limits specified by the manufacturer.

Fault Indication

A zero current reading and non-operation of the appliance may indicate an open-circuit Line or Neutral path – check that the appliance is switched ON.

If it is ON there may be a break in the supply lead and if this is the case the previous Flash Test will be invalid – similarly if it is OFF it may well have been OFF during the Safety Tests, again creating an invalid Flash Test. In either case complete re-testing will be required once the problem has been resolved.

A current in excess of the manufacturer's specification may indicate, among other things, a short-circuit heating element, out of balance field coil windings, tight bearings or even a tight gear-train.

A really serious fault, such as a short circuit, will trip the SUPPLY mcb on the instrument and may even blow supply fuses. Disconnect the appliance before re-setting the mcb and check fuses if the SUPPLY Lamps now fail to operate.

NOTE It has been noticed, when testing 110V Isolating Transformers, that the Supply mcb sometimes trips when there is no fault present. This can be due to high in-rush currents when switch-on occurs at a peak mains cycle. It may therefore be necessary to have several attempts at applying the Load Test to such equipment by resetting the mcb and trying again.

All faults must be investigated and corrected by qualified personnel and the tool or appliance FULLY re-tested.

CONTINUITY FAULT CHECKING

Where an open-circuit is suspected from the results of a Safety or Load test this instrument can be used, with the aid of the Continuity Probe provided, to determine if the fault is in the supply lead or within the appliance itself.

Ensure that the appliance is completely disconnected.

Expose the supply lead input terminals on the appliance and set any supply switches to OFF.

Connect the Continuity Probe into the lower – 13A/240V – Test Socket and set the selector to test C.

Attach the green clip lead from the instrument to the plugtop pin of the suspect wire and apply the Continuity Probe to the corresponding input terminal in the appliance.

NOTE Good connections are essential for accurate measurement and to prevent any high current sparks occurring when the TEST button is depressed.



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Depress the TEST button and read the resistance value of the wire being measured from the Continuity Resistance scale of the meter.

This value will be dependent on the length and ohmic constant of the wire in question –

e.g. a 5 metre length of 1.0mm² wire with an ohmic constant of approximately 0.02 ohms per metre should give a reading of about 0.1 ohms.

A reading that is much higher than the expected value may be caused by a partially broken wire or corroded or loose connections.

A full-scale or INF. reading indicates an open-circuit. To check that this is not caused by cross wiring in the supply lead leave the clip lead attached to the plugtop pin, move the probe to each of the other input terminals and re-test each in turn. If an INF. reading is again indicated then suspect the first wire. If however a different reading is obtained then suspect incorrect wiring between the plugtop and the input terminals.

If the supply lead checks out as satisfactory then the fault must be internal and an alternative test method must be adopted – the high current generated by this test may damage sensitive components and even the more robust components may have sufficiently high resistance themselves that only misleading INF. readings can be obtained.

INSTRUMENT INTEGRITY

CALIBRATION

Regulatory authorities require that test instruments are re-calibrated at least annually. CLARE offer a full calibration service for this instrument, although any other suitably approved test establishment can be used.

OPERATIONAL CHECKS

As well as the instrument undergoing annual, or more frequent, re-calibration by qualified personnel

THE USER MUST CHECK THE SAFETY TEST CIRCUITS AT REGULAR INTERVALS TO DETERMINE THEIR OPERATIONAL INTEGRITY

The A255 is supplied with a FAULT SIMULATOR (model Y250) specifically for this purpose. The device is designed for direct plug-in connection to the lower – 13A/240V – Test Socket and, by following the simple routines below, can be used to check both Earthed Appliance tests and Double Insulated appliance tests. It is recommended that such operational checks are carried out at least weekly, if not daily.

Check Procedure – Earthed Appliance Tests

Connect and set-up the Appliance Tester in the normal way and then plug the Y250 into the 13A test socket on the instrument.

Attach the Earth Return clip lead, from the tester, across BOTH of the brass tags on the simulator so that they are shorted together – NOTE: Do not permanently short these tags by bending them together or creating a soldered link.

Select tests A, B and C in turn and apply a normal 3 second TEST at each – release the test button between each test. The Test Result lamps must indicate in the following sequence:-

Test A	Earth FAIL only
Test B	Earth PASS and Flash FAIL
Test C	Earth PASS and Flash PASS

During the above checks the Earth Continuity Resistance meter will indicate a value of approximately 0.2 ohms.

Check Procedure – Double Insulated Appliance Tests

Disconnect and stow away the Earth Return clip lead. Bring out the Flash Probe in readiness for the next check.

Select Test D, depress the TEST button and apply the tip of the Flash Probe to the plastic body of the simulator.

The Flash **PASS** lamp must remain on.

Apply the tip of the Flash Probe to the exposed metal in the small hole marked HT PROBE on the simulator.

The Flash **FAIL** lamp must come on and the audible alarm must sound.

If the Appliance Tester does not operate as detailed above it must be withdrawn from service for thorough investigation and correction by qualified personnel.

NOTE The Y250 must be kept with the instrument at all times and be included in the full calibration programme.



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APPENDIX

USEFUL REFERENCE MATERIAL

The following short list of British Standards, Legislative Documents and Guidance Notes is intended as a pointer to reference material that will assist in a greater understanding of the whys and wherefores of Electrical Safety Testing.

References made to such documents within this Manual are for guidance and illustration only and as such are generalised interpretations of the spirit of the various regulations. If any conflict arises from the text of this Manual then the relevant Standards or Legislation must take precedence.

Statutory Legislation –

The Health and Safety At Work Act 1974	ISBN 0 10 543774 3
The Electricity at Work Regulation 1989	ISBN 0 11 096635 X
The Plugs and Sockets (Safety) Regulation 1987	ISBN 0 11 076603 2

Health and Safety Executive Guidance Notes –

GS 27	Protection Against Electric Shock
GS 38	Electrical Test Equipment
HS(G) 13	Electrical Testing
HS(R) 25	Memorandum on the Electricity at Work Regulations 1989
PM 32	The Safe Use of Portable Electrical Apparatus

British Standards –

BS 2754	Construction of electrical equipment for protection against electric shock.
BS 2769	Hand-held electric motor-operated tools.
BS 3456	Safety of Household and similar electrical appliance.

The British Standards Institute publishes an extensive list of other standards relevant to electrical equipment under the designation SL 26.

Certain trade organisations and manufacturers also publish useful 'how to' guides and 'Codes of Practice' with particular emphasis on their member or customer requirements or product line.

USEFUL ADDRESSES

British Standards Institute	2 Park Street, LONDON W1A 2BS 071 629 9000
Health and Safety Executive	Magdalen House, Stanley Precinct, Bootle, MERSEYSIDE L20 3QZ 051 051 4000
H.M. Stationery Office	PO Box 276, LONDON SW8 5DT 071 873 0011
Hire Association Europe	133 Tame Road, Witton, BIRMINGHAM B6 7DG 021 326 6677

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