ELECTRICAL SAFETY TESTER

MODEL ES-4920 BASIC

SERIAL/ITEM 533/nnn

OPERATING HANDBOOK

ISSUE 2, AUGUST 2003

PATENTS PENDING

DESIGNED AND MANUFACTURED IN AUSTRALIA

Est. 1968

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DESIGN TWO THOUSAND IS CERTIFIED TO ISO9001

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NOTES

- The ES-4920 is designed to be plugged directly into a power point (General Purpose Outlet (GPO), also called a Socket Outlet).

- Only use the supplied power cable. If it is damaged or lost, replace only with part number K3741 or manufacturer's equivalent.

- If the ES-4920 wiring indicator shows a fault, do not continue with any further tests until a qualified electrician has rectified the wiring fault.

- The tester may be used to test the wiring of extension leads, power boards and double adaptors but please be aware that the *LOAD TEST* will reveal voltage drop (or increased resistance) in thin gauge flex cables. Refer to a qualified electrician if necessary.

- The ES-4920 is a piece of electrical test equipment. It is not a consumer appliance intended to be plugged in and left running for extended periods.

- Although the ES-4920 is somewhat splash proof, do not subject or submerge the unit into any liquid.

- The ES-4920 may be configured and supplied with special leads for testing power points with different mains voltages & plug styles of other countries as an option.

- The ES-4920 has no user serviceable parts. To prevent electric shock, do not remove cover. Repair and calibration is to be performed by qualified personnel only.

Disclaimer:

- The manufacturer or distributor cannot accept responsibility for any unlikely damages or personal injury deemed to be as result of using the ES-4920 tester.
- The ES-4920 meets relevant safety standards. Independent testing by a NATA approved test house is a voluntary procedure for this type of test equipment, as outlined in the safety guidelines (revised January 2002) published by the Office of the Chief Electrical Inspector.

GENERAL DESCRIPTION

The Electrical Safety Tester, Model ES-4920, is deigned to measure and test the integrity of household and commercial building mains electrical circuits. It is a portable instrument typically used by electricians involved in the installation and maintenance of the electrical wiring and outlets.

Testing is so easily performed from the power point under test simply by plugging the unit in and pressing the required test button. The inbuilt LED (Light Emitting Diode) indicators then provide an immediate test result.

The **Power Point Tester** is ideal for testing new electrical installations prior to hand-over of compliance certificates. It is also the perfect test instrument for testing the wiring to power points in existing and older homes. Always of concern, old household and building wiring (whether it is visible or concealed) can be tested in seconds. It's that simple!

USAGE & BENEFITS

The **Power Point Tester** will test:

- Polarity and Earth connection – is the active and neutral wired correctly and is the earth at a safe potential?
- Supply voltage – is the mains supply within ± 5%, ± 10% or > ± 10% of the specified 240Vac? (Other voltages to order).
- Voltage drop under load – is there a faulty junction, a bad termination or is the cable run too long or of insufficient gauge? Can concealed wiring handle the load?
- Residual Current Device (Earth leakage detector or Safety switch) operation – does it really work at the power outlet?

Many people are afraid of electricity because it can't be seen but it can certainly bite! The main benefit of the ES-4920 is that it provides a straightforward **visual** indication of the condition of power outlets. It also offers cost savings by being quick and easy to use. And our ultimate aim is to reduce the incidence of electrocution or fire.

SAFETY

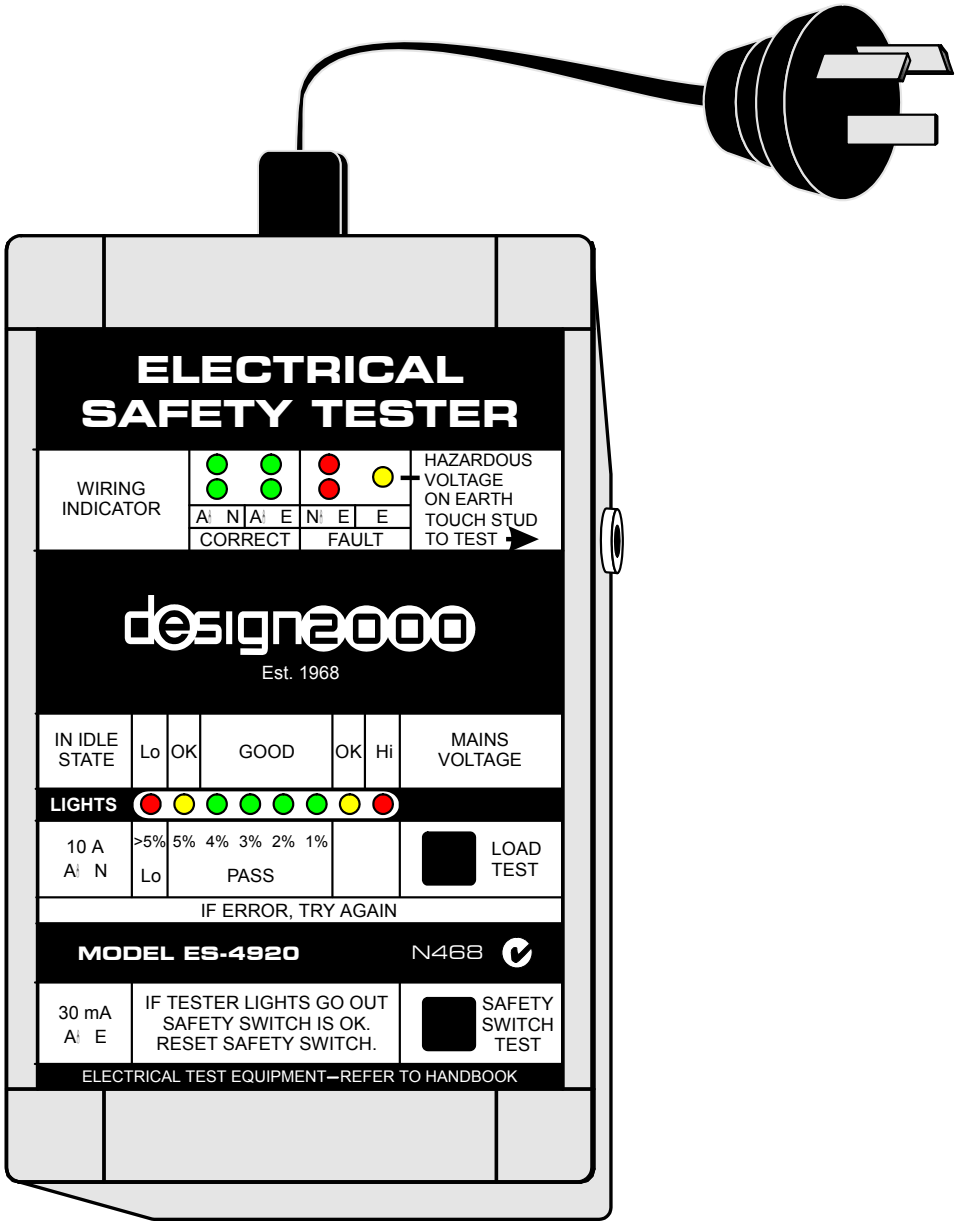
So safe to use, the Electrical Safety Tester can even be used by the homeowner to detect electrical faults (rectification must be carried out by a qualified electrician). This is an outstanding piece of test equipment providing peace of mind when it comes to the safety of electrical outlets.

The **Power Point Tester** is non-prescribed electrical equipment designed and built to comply with Australian Standards AS 3260, AS 3100, AS 3350.1 and AS 61010.1 for Electrical Safety.

N468

SYSTEM DESCRIPTION

The Electrical Safety Tester (***EST***), Model ES-4920, is a portable, handheld piece of test equipment capable of extensively testing a mains power outlet. It is fully self contained with an unpluggable power lead. The Electrical Safety Tester does not require routine calibration and there are no strict rules for use, however refer to the '*Notes*' section on page 1.



TESTS

The ES-4920 Tester is designed for easy operation:

- Green lights indicate GOOD or PASS
- Yellow lights indicate OK or PASS
- Red lights indicate Lo/Hi or FAIL.

This is about all the user needs to know, however the following descriptions go into more detail.

WIRING INDICATOR

This test is mandatory by nature. Wrong wires on the wrong terminals can spell disaster.

When plugged in the ***EST*** indicates the connection of active, neutral and earth - an indication of the wiring to the power point. If this shows a fault, do not proceed any further until the wiring fault has been rectified. Please note that without a separate ground reference it is not possible at this stage of testing to determine if the neutral and earth wires are transposed.

The most common wiring problems are:

Active and neutral reversed	A↔N green light ON, A↔E green light OFF and N↔E red light ON
No earth connection	A↔N green light ON, A↔E green light ON and N↔E red light ON

MAINS SUPPLY

Many appliances and other electrical equipment operate most efficiently when the correct mains voltage is available.

With the wiring OK, the ***EST*** continuously displays the mains supply voltage without applying an additional load. If any one of the green lights pulse, the mains voltage is within ± 5%, a good reading. If either of the yellow lights pulse, the mains voltage is within ± 10% indicating OK, still within recognized limits. If the right red light pulses, a *Hi* reading, the mains voltage is more than 10% above 240Vac. If the left red light pulses, a *Lo* reading, the mains voltage is more than 10% below 240Vac. Should either red light pulse (either *Hi* or *Lo*), the power outlet should then be tested again later with a meter. If the fault persists, it should be reported to the Power Company.

LOAD TEST

This is a critical test, often overlooked. Quite simply, a voltage drop in the mains supply when a load is applied directly indicates a resistance in the wiring. The higher the resistance, the greater the voltage drop which means *Lo* power and less current carrying capacity. Therefore wires can get warm or hot, faulty junctions and/or terminations can arc (yes, a potential fire hazard) and equipment will not run at full efficiency. The ***EST*** will reveal voltage drop/wire resistance problems at the press of a button.

While the ***EST*** indicates correct wiring and acceptable mains voltage, pressing the *LOAD* button places a momentary 10 Amp load across the active and neutral wires, like plugging in an element heater that draws lots of current. The ***EST*** measures the voltage under its defined load and then, with reference to the idle voltage, calculates the voltage drop. Each light on the ***EST*** now represents a 1% drop in voltage when the load was applied. It is recognized that up to a 5% drop in voltage under a 10 Amp load is OK. If one of the green lights illuminate, the current carrying capacity of electrical wiring to the power point is good and passes the test. If the yellow light illuminates, the current carrying capacity of electrical wiring to the power point is just OK but passes the test. Should the *Lo* red light on the left illuminate, there was a >5.1% drop in voltage. This indicates '*Lo*' current carrying capacity. If the left *Lo* red light flashes slowly for five seconds, the voltage drop reading was between 6.1 and 7%. If the left *Lo* red light flashes rapidly for five seconds, the voltage drop reading was >7.1%. If the *Hi* right red light flashes rapidly for five seconds, it was a false reading. Repeat the *LOAD* test, and if this persists, there is a problem possibly with a faulty junction, a bad termination or the cable run being too long or of insufficient gauge. Refer to a qualified electrician.

SAFETY SWITCH TEST

Also often overlooked or forgotten, Safety Switches (Earth Leakage detectors, or Residual Current devices) should be tested periodically to ensure their integrity and prevent them from 'freezing'. Most Safety Switches have an inbuilt test button, but the ***EST*** performs a genuine test at the actual power point. If you are the homeowner or tenant reading this, we recommend that you test and exercise your safety switches systematically using another event (eg. when you replace the batteries in your smoke detectors) as a reminder.

Pressing the Safety Switch Test button on the ***EST*** places a 30mA load between the active and earth wires. The lights quickly scroll from left to right and each light indicates 60 milliseconds of trip time (up to 300 ms is within spec.). When the Safety Switch trips, all lights on the ***EST*** will then go out. This indicates that the Safety Switch has worked and you will need to reset it at the switchboard/meter box. If the Lights on the ***EST*** scroll from left to right and then the right error light stays on for five seconds, the Safety Switch did not work or there is no Safety Switch installed. Refer this problem to a qualified electrician.

QUICK USER GUIDE

Note: If any of the following tests fail, stop and refer the problem to a qualified electrician for rectification.

1. Plug the ***EST*** into the power point to be tested.

2. Check that the *WIRING INDICATOR* lights are only green.

3. Check that the Mains supply voltage lights are pulsing green or yellow.

4. Press the *LOAD TEST* button and check that a single green or yellow light stays on for about five seconds.

5. Press the *SAFETY SWITCH TEST* button, and check that all indicator lights go out. Reset the Safety Switch at the switchboard/meter box.

6. Check that the ***EST*** indicator lights turn on again, then unplug the ***EST***.

The *EST* has verified that the Power point is OK to use.

- Fill out the attached checklist L25151 and file for future reference.

SPECIFICATIONS

Enclosure:	33070011, IP-65 rated.
Dimensions:	144mm x 90mm x 45mm (H x W x D)
Label:	Polycarbonate, automotive grade.
Operating Temperature Range:	-10 → 50 ° C ambient.
Storage Temperature Range:	-20 → 80 ° C ambient.
Humidity, Storage and Operating:	To 98% non condensing.
Mean Time Between Failure:	> 20 years.
Control Logic:	Motorola MC68HC705B16FN micro-controller, 15K bytes OTP EPROM, 352 bytes static RAM, 256 bytes EEPROM.
Indicators:	High intensity LEDs, Red, Amber (Yellow), Green. Neon hazard light.
Connector:	IEC.
Power lead	K3741. Other plugs to order.
Mains Supply Indicator: Hi Lo OK GOOD	 > 10% of nominal voltage. < 10% of nominal voltage. Within ± 10% of nominal voltage. Within ± 7% of nominal voltage.
Load Test Indicator: PASS OK Lo (Warning)	 ≤ 4% voltage drop referenced to idle voltage. ≤ 5% voltage drop referenced to idle voltage. > 5% voltage drop ('*Lo*' power) referenced to idle voltage.
Load Test:	10.9 A between active and neutral.
RCD Test:	30 mA between active and earth. Each LED that lights up = up to 60 ms of trip time.
Field Programming:	N/A.
Factory Programming:	Via Host Computer (RS232).
Power Requirement:	240V ac 50 Hz., ± 20% (other voltages to order).
Power Consumption:	10 mA (2W) nominal during idle.
Packed Weight:	350 gms.
Warranty:	Two years.
Electrical Safety Compliance (non-prescribed)	AS 3260, AS 3300, AS 3350.1.
ACMA Compliance:	Design Two Thousand Pty Ltd ACMA supplier Code N468.
EMC Compliance:	AS/NZS CISPR 22
Human Rights Australia:	Privacy Commissioner assent 89/328

Note: Specifications are subject to change without notice.

SERVICE INFORMATION

If problems are experienced with the operation of the ES-4920 Electrical Safety Tester, please call the Help Desk Number listed below before returning units to the factory for repair.

In most cases, problems can be diagnosed and rectified over the phone, avoiding unnecessary transportation and service costs.

HELP DESK NUMBER:

+61 3 9758 5933

WARRANTY

The equipment has a warranty against defects in material and workmanship for a period of two years from date of delivery into the customer's store. Within this period repairs, if necessary, are without charge for parts and labour.

Transport costs to the factory will be to the customer's account, and Design Two Thousand Pty Ltd will cover the return transport costs for warranty repairs. If units are sent to the factory and discovered to be 'No Fault Found', a service charge may apply and the return transport costs may be to the customer's account.

See 'SERVICE INFORMATION' above. In the explicit event of a malfunction, please send the unit, (along with an accurate fault report, contact name and number, and a return address) for repair to:

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ACMA SUPPLIER'S CODE: N468

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