

Proven Performers

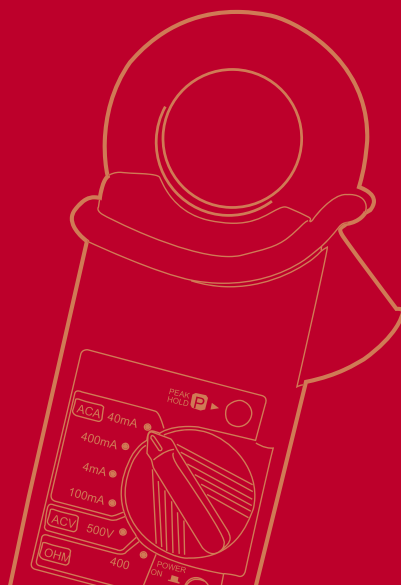


**TESTING & MEASURING
INSTRUMENTS**



**Proven performers that
leave nothing to chance**

Proven Performers





TESTING & MEASURING INSTRUMENTS

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SELF REGULATION MEANS PUTTING YOUR

TESTING & MEASURING INSTRUMENTS

One of the most significant changes to the Australian and New Zealand electrical industry is the introduction of self testing of electrical installations.

While some Australian states are moving in this direction faster than others, it is expected to be only a matter of time before self regulation is adopted Australia wide.

In New Zealand, self regulation is already in place in all regions.

With self regulation putting the responsibility of correctly wiring and testing electrical installations on to you, the electrical contractor, it's vital that you use only the highest quality testing and measuring instruments available.

Clipsal pioneered the development and technology of RCDs in Australia in the 1970s and since that time has been Australia's leader in this field.

With such extensive expertise in this area, you can also rely on Clipsal for Testing and Measuring Instruments that accurately measure and confirm the performance of RCDs.

Clipsal offers the following types of RCD Testing and Measuring Instruments:

The top of the range 486CD and highly respected 486D RCD Testers provide digital read-outs of the tripping time of RCDs under test conditions, while the 488 RCD Sensitivity Tester allows for the test injection of predetermined leakage current.



TRUST IN THE MOST PRECISE INSTRUMENTS



Also included are the 491, a 1000V Insulation and Continuity Tester, and the 489D, a Digital Universal Clamp Meter which can also be used to read residual currents.

Manufactured to exacting standards, Clipsal Testing and Measuring Instruments include many features that ensure accuracy, reliability and ease of use.

Calibrating Your Test Equipment

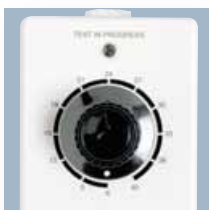
In addition to using the most reliable test instruments available, recent legislative changes in some Australian states make it essential that the calibration of your instruments is maintained on a regular basis.

International Testing and Certification Services (ITACS), a NATA registered test laboratory, provides a Calibration Service that calibrates your instruments and provides a Calibration Report in the form required and accepted by the Regulatory Authorities.

ITACS offers this service to the electrical industry throughout Australia. Please refer to page 15 for more information.

Calibrating Report

In line with moves towards mandatory testing and calibration of test instruments, all Clipsal Test Instruments are now available with an ITACS Calibration Report for a small additional charge. Add "C" to existing Catalogue Number.



491 INSULATION AND CONTINUITY TESTER

The primary test instrument for any electrical testing and measuring is an Insulation and Continuity Tester, and the Clipsal 491 is perfect for these applications.

The 491 has three insulation resistance scales and can test at up to 1000V d.c. in line with the requirements of AS 3000 Clause 1.5.2.1.

Two continuity ranges and a battery check facility are also provided.

The 491 incorporates a large, easy to read, analogue display, with a back lit function for testing in dimly lit areas. The lock-on feature of the 'press to test' button allows hands free operation.

Insulation and Continuity Testers are not designed to be used on energised circuits, but the 491 has several safety features that help protect the unit. On the insulation resistance ranges, these include a visual and audible warning to indicate that the leads have been connected to a live circuit.

The continuity ranges are fuse protected, with a spare fuse included.



Accuracy can be maintained with the movement zero adjustment. The zero ohms adjustment can be used to offset any lead resistance in the measurement circuit.

The Clipsal 491 is supplied with batteries, test leads and pouch, shoulder strap and a robust carry case.

Features

- 3 insulation test voltages
- 2 continuity ranges

- Easy to read expanded analogue scale
- Back lit function
- Robust impact resistant carry case/housing
- Audible and visual live circuit warning
- Front panel ohms zero adjustment
- Fuse protected in continuity ranges
- Lock on feature for hands free operation (including back light).
- Supplied with shoulder strap, test leads, pouch, batteries and spare fuse.

Specifications

Insulation Test Voltages			
Test Voltage	250V	500V	1000V
Measuring Range	0 - 100 Megohms	0 - 200 Megohms	0 - 400 Megohms
Mid Scale Value	1 Megohm	2 Megohms	4 Megohms
Maximum Output Voltage On Open Circuit	250V d.c. + 10%	500V d.c. + 10%	1000V d.c. + 10%
Minimum Output Voltage	250V d.c. (@ 0.25 Megohms)	500V d.c. (@ 0.5 Megohms)	1000V d.c. (@ 1 Megohm)
Output Short Circuit Current	Approximately 1.3mA across range		
Output Current	1mA d.c. min @0.25 Megohms	1mA d.c. min.@ 0.5 Megohms	1mA d.c. min.@ 1 Megohm
Accuracy	± 5% of value @ 0.05 - 10 Megohms	± 5% of value @ 0.1 - 20 Megohms	+/-5% of value @ 0.2 - 40 Megohms
	± 7% of scale length at ranges other than those listed.		
Standards			
	IEC61010-1: 1995 Safety requirements for electrical equipment for measurement, control, and laboratory - Overvoltage category 3, working voltage 1000V pollution Degree 2.		
Continuity Test Ranges			
Measuring Ranges	0 - 2 Ohms and 0 - 20 Ohms		
Output Voltage On Open Circuit	4 - 9V d.c.		
Output Short Circuit Current	200mA min.		
Accuracy	± 3% of scale		
Power Supply			
	6 x 1.5V batteries - type R-6, AA or equivalent - GP15A GP Batteries		
Typical Number of Tests (Battery Life)			
	250V range 2,000 times approx. 500V range 1,300 times approx. 1000V range 350 times approx.		
Operating Voltage for Warning Lamp and Buzzer			
	60V a.c./d.c. to 600V a.c./d.c.		
Dimensions			
	170 (L) x 115 (W) x 85 (D)mm approx.		
Total Weight			
	1kg		

489D UNIVERSAL CLAMP METER WITH RESIDUAL CURRENT MEASUREMENT

A recent inclusion in our range of testing and measuring instruments is the 489D Universal Clamp Meter, the ideal every day instrument for anyone involved in the electrical industry.

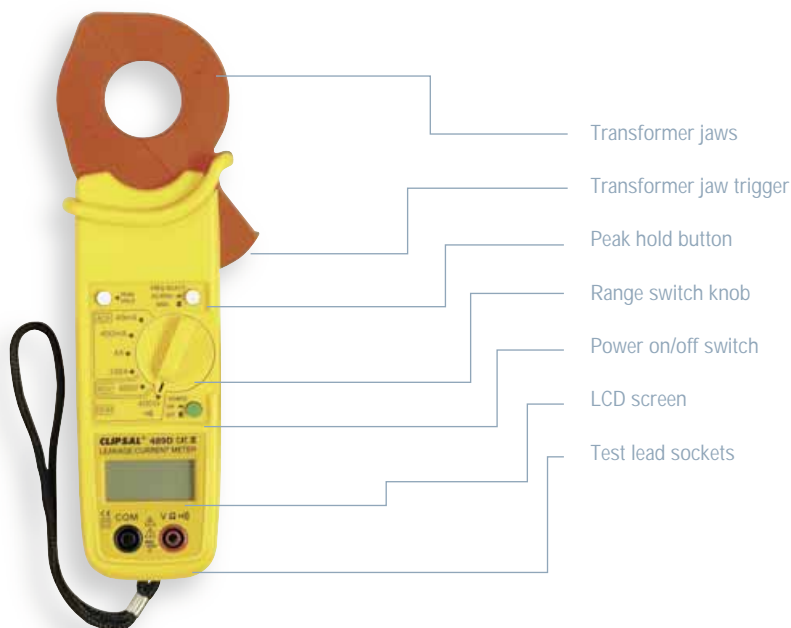
Features include current ranges from 40mA to 100 Amp., AC voltage capacity up to 500 volts and a 400 ohm resistance range is a buzzer which sounds when resistance is less than 50 ohms.

The LCD screen displays measurement unit and functions, as well as overload, low battery warning and peak hold 'on' indicators.

The 489D can clamp conductors up to 35mm in diameter.

Also included is a peak hold facility for taking readings in awkward situations, a swivel wrist strap, test leads and a sturdy carry case.

While its most popular function is as a general purpose meter, the Clipsal 489D is particularly suitable for detecting and locating earth leakage faults in installations and appliances.



By clamping both the Active and Neutral conductors, the meter displays the residual current (or leakage current) of the circuit.

The 40mA scale displays currents to a resolution of 0.1 milliamps and is ideally suited to this purpose.

The 489D is supplied with a Clipsal 461 Appliance Test Adaptor for testing appliances for leakage current.

Features

- Four AC current ranges
- Voltage measurement up to 500V a.c.
- 400 ohm resistance range with additional buzzer indication below 50 ohms
- Peak Hold facility for awkward situations
- Swivel wrist band
- Suitable for cables up to 35mm in diameter
- Supplied with a Clipsal 461 Appliance Test adaptor for appliance testing
- Includes test leads and sturdy carry case.

Specifications		
AC Current Range		
Range	Resolution	Overload Protection
40mA	0.01mA	1A
400mA	0.1mA	10A
4A	1mA	100A
100A	0.1A	500A
Accuracy 40Hz - 1kHz	± (1.5% + 2 digits) Note: The 40mA range is very sensitive and may not give a zero reading with no current flowing in this circuit. This is normal.	
AC Voltage Range		
Range	Resolution	Overload Protection
500V	1 Volt	1000V d.c. 750V a.c.
Accuracy - 50Hz - 500Hz	± (1.5% + 5 digits)	
Input Impedance	10 Megohms	
Resistance Range		
Range	Resolution	Overload Protection
400 Ohm	0.1 Ohm	500V a.c. or d.c.
Accuracy	± (1.2% + 3 digits)	
Maximum Open Voltage	3.3 Volts	
Audible Indication	Buzzer sounds if resistance is less than 50 Ohms	
Display	3½ digit LCD display with decimal point, measurement units, overload, low battery and peak hold 'on' indicators.	
Sampling Time	2.5 times per second	
Operating Temperature	-10°C to +50°C (less than 80% humidity)	
Power Supply	9V d.c. G1604A or equivalent	
Battery Life	200 hrs	
Dimensions	221 (L) x 62 (W) x 35 (D)mm	
Weight	342g	
Accessories	Carry case, test lead set, battery and Clipsal Appliance Test Adaptor	
Standards	IEC61010-1: 1995 Safety requirements for electrical equipment for measurement, control, and laboratory - Overvoltage category 3, 600Vac pollution Degree 2, Class 2.	

484D EARTH LOOP TESTER

The Clipsal Earth Loop Tester makes it easy to confirm fault loop impedance as required by AS/NZS3000.2000. (Clause 1.7.4.3.3). Simply plug it in and press the button. It offers precise readings without calculations or guesswork.

Features

- Neon indicators confirm circuit conditions
- Precise and easy to read digital readout
- 3 test ranges
- Test button with lock down facility for hands free testing
- Resolution down to 0.01Ω
- Automatic lock out if test register overheats
- Robust construction
- Carry strap



Press test button

Three neon check for correct wiring

Rotary switch to set loop impedance ranges

Specifications

Loop Impedance Ranges	20/200/2000Ω
Loop Impedance Accuracy	± 2% ± 2dgt at 1Ω on 20Ω range
Lowest Resolution	0.01Ω
AC Test Current	25A nominal at 20Ω range
AC Test Period	20ms
Operating Voltage	220V ± 10%, 50Hz
Withstand Voltage	3000V AC for 1 minute
Fuse Protection	HRC Ceramic fuses
Dimensions	175(L) x 115(W) x 86(D)mm
Weight	440g approx.
Accessories	Test Lead with plug Pouch for test leads. Shoulder Pad Instruction Manual.

Standards

IEC61010-1: 1995 Safety requirements for electrical equipment for measurement, control, and laboratory Overvoltage category 3, working voltage 300V pollution Degree 2.

486AD10/20 486AD32/50 THREE PHASE TEST ADAPTORS - SUIT 486D TESTERS

With RCDs now common in the workplace, testing is essential to maintain a safe working environment. The Three Phase Adaptor allows testing of three phase RCD outlets without disconnection or alterations. It is designed to be used with the Clipsal 486D tester (not suitable for the 486CD).

To use, simply plug the adaptor into the outlet to be tested. Then plug the 486D into the adaptor. This is much faster and safer than using probes. A selector switch also allows testing for fault operation on each individual phase.

Features

486AD10/20

- Adaptor for 10 and 20A three phase outlets

486AD32/50

- Adaptor for 32, 40 and 50A three phase outlets



Plug in 486D RCD Tester

Rotary switch to set Phase to test

Plug in adaptor into fixed outlet

486CD MICROPROCESSOR CONTROLLED RCD TESTER

The 486CD is one of the most sophisticated and accurate instruments available for measuring the tripping time of RCDs.

The secret to this accuracy is the microprocessor control.

Unlike most other testing instruments, the test currents of the 486CD are not affected by variations in the supply voltage.

The constant current circuitry ensures accurate and consistent measurements, even when the supply voltage fluctuates by up to $\pm 10\%$.

The other key difference between the Clipsal 486CD and most other instruments is the DC test facility.

With the widespread use of electronic equipment, many faults that occur in commercial and industrial installations have a DC component.

Different types of RCDs perform differently under these circumstances, and it is essential, particularly in specialised environments, such as patient treatment areas and laboratories, that the performance of the RCD under DC conditions can be accurately assessed.

Other features include six trip current settings, a selector switch for testing either the positive or negative half cycle, indicator lights for checking polarity, an easy to read LCD display, and a data hold facility for hands free operation.

The 486 CD comes in a robust carry case and includes test leads.

Features

- Microprocessor controlled for highest accuracy and reliability
- D.C. test facility
- Tripping ranges from 10mA to 1000mA
- Zero cross circuitry permits testing starting either half cycle
- Easy to read LCD display
- Measures tripping times up to 2000ms (200ms at x5)
- Data hold facility for hands free operation
- Indicators for checking wiring
- Robust carry case
- Test plug and 1.5 metre lead



Press test button with lock down feature

Rotary switch to select RCD 'Test Current' ranges

Three neon lamps check for correct wiring

Digital read-out tripping time

Rotary switch to multiply basic RCD 'Test Current' ranges

Zero cross circuitry selector switch

Specifications

Trip Current Settings	10, 20, 30, 100, 500 & 1000mA
Test Functions	x $\frac{1}{2}$, x1, *x5, d.c.
Fault Trip Time	2000ms (200ms at x5)
Operating Voltage	220 - 260V
Maximum Input Voltage	370V peak
Power Consumption	Less than 2W
A.C. Current Test (accuracy)	
x $\frac{1}{2}$ x1 x5 }	+0, -5% of test current at 240V $\pm 2.5\%$ of test current at 240V
D.C. Current Test (pulsed)	
Test Current (half wave)	Half wave of 1.4 x test current $\pm 2.5\%$ of test current at 240V
DC Bias Current	$\pm 6\text{mA} \pm 3\%$ at 240V
Trip Time	Less than $\pm (0.6\% \pm 2 \text{ digits of reading})$
Display Hold Time	Greater than 10s on loss of power
Over Range Indication	'1' or '↑' in display
Over Temperature Indication	'1' and '↓' in display
Operating Temperature Range	0°C - 40°C
Storage Temperature Range	-20°C - + 60°C
Operating Humidity	85% maximum
Storage Humidity	85% maximum
Dimensions	175 (L) x 115 (W) x 85.7 (D)mm approx
Weight	440g approx.
Accessories	Test plug and 1.5 metre lead. Carry pouch for leads

* Does not include 1000mA range.

Standards

IEC61010-1: 1995 Safety requirements for electrical equipment for measurement control, and laboratory. Overvoltage category 3, working voltage 300V pollution Degree 2.

486D DIGITAL READ-OUT RCD TESTER

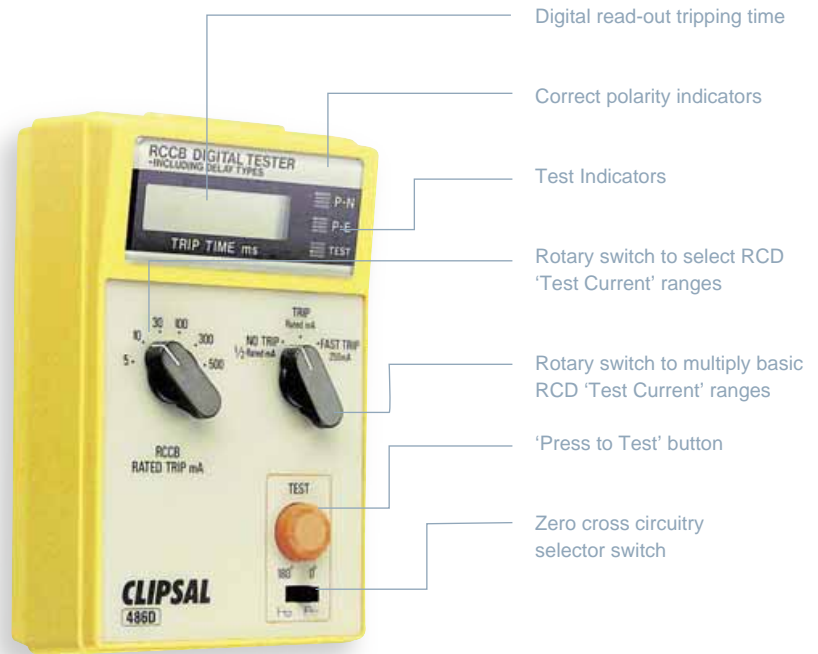
An economical alternative to the 486CD for every day installations is the 486D.

This unit incorporates six trip current settings, a selector switch for testing either the positive or negative half cycle, indicator lights for checking polarity, an easy to read LCD display, and a data hold facility for hands free operation.

The 486D is supplied in a robust carry case with a test plug and lead.

Features

- Tripping ranges from 10mA to 1000mA
- Zero crossing circuitry permits testing on either half cycle
- Easy to read LCD display
- Measures tripping times up to 200ms
- Data hold facility for hands free operation
- Indicators for checking wiring
- Test plug with 1.5 metre lead
- Robust carry case



Digital read-out tripping time

Correct polarity indicators

Test Indicators

Rotary switch to select RCD 'Test Current' ranges

Rotary switch to multiply basic RCD 'Test Current' ranges

'Press to Test' button

Zero cross circuitry selector switch

Specifications	
Trip Current Settings	5, 10, 30, 100, 300 & 500mA
Test Current	
No Trip Test	50% of RCD trip current selected
Trip Test	100% of RCD trip current selected
Fast Trip Test	250mA regardless of RCD trip current selected
Fault Trip Time	2000ms (40ms for fast trip)
Operational Voltage	240V a.c. \pm 10% 50/60Hz
Accuracy	
Test Current	\pm 3% at 240V a.c. \pm 0%
Test Current Duration	2000ms \pm 5% for trip and no trip tests
With Limiter	40ms \pm 5% for fast trip test
Trip Time	\pm (2% reading + 3 digits)
Dimensions	140 (L) x 90 (W) x 20 (D) mm
Operating Temperature Range	0°C - 40°C
Weight	350g approx.
Accessories	
Included	Test plug with 1.5 metre lead. Carrying case. Instructional manual.
Optional	Kit with 1.5m lead and alligator clips for direct connection to breaker terminals, etc. (Cat. No. 486LK).
Note: If testing delay action breakers on the 300mA or 500mA ranges, it is advisable to allow a cooling time of approximately 20 seconds between tests.	

While the 486CD and 486D test that RCDs perform to the Standard, the 488, with its ability to inject a range of predetermined leakages, can be a valuable tool when fault finding in RCD circuits.

Simply plug the 488 into the circuit under test, set the dial to the lowest current setting and switch on the outlet.

Every two seconds the 488 will inject pulses of the selected leakage current to earth, indicated by the neon.

The leakage current setting can be stepped up between pulses until the RCD trips. The setting, at this point, is the nominal sensitivity of the particular circuit.

The RCD itself can then be tested in the same way with the circuit disconnected.

If the sensitivity reading of the RCD alone is higher than the result obtained from the circuit, it indicates that there is an active to earth leakage path in the circuit or in an appliance connected during the test.

If the sensitivity reading of the RCD alone is lower than the result obtained from the circuit, it may indicate that there is a neutral to earth bond in the circuit or in an appliance connected during the test.

The earth path can then be located using a Clipsal 489D Universal Clamp Tester or 491 Insulation and Continuity Tester.

Note:

AS 3190 requires factory settings to be between 15mA and 30mA for a 30mA device. Clipsal 30mA RCDs are typically set to activate between 20mA and 25mA.

Features

- Twelve nominal leakage settings
- Pulsed leakage injection
- 'Test in Progress' indicator
- Test plug and one metre lead.



Test in Progress indicator

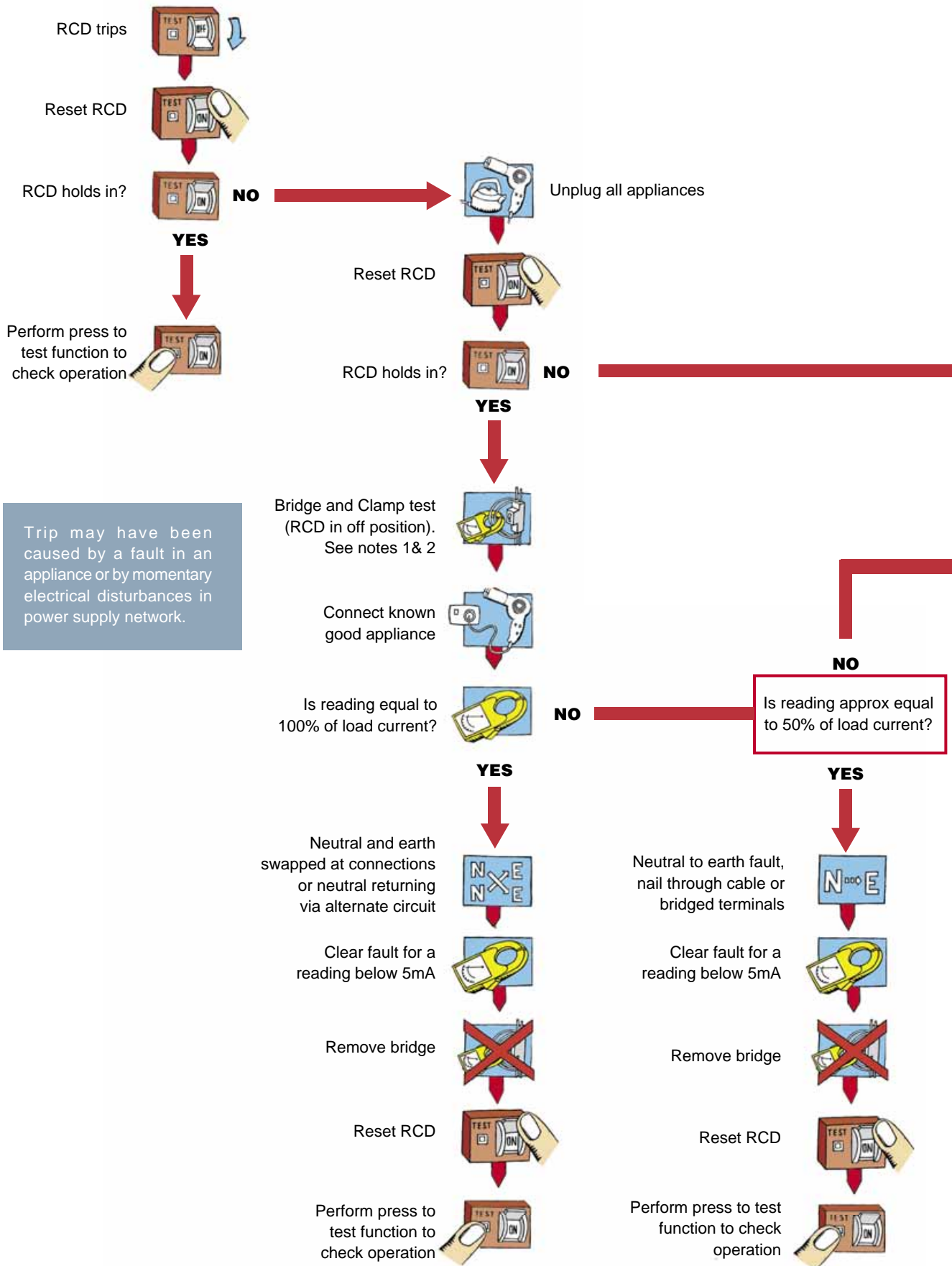
Rotary switch to select RCD test ranges

Specifications

Operating Voltage	240V a.c ± 20% 50/60Hz
Nominal Leakage Current	6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36 & 40mA
*Settings at 240V	
Duration of Leakage Current Pulse	Between 100 and 400ms
Time Between Leakage Current Pulses	Between 1 and 3 seconds
Dimensions	155 (L) x 81 (W) x 72 (H) mm
Test Lead	1 metre lead with rewirable 3 pin plug

* Leakage currents will vary in proportion to the Operating Voltage.

ELECTRICIANS'/CONTRACTORS ON SITE FAULT FINDING GUIDE



Trip may have been caused by a fault in an appliance or by momentary electrical disturbances in power supply network.

Remember to test regularly

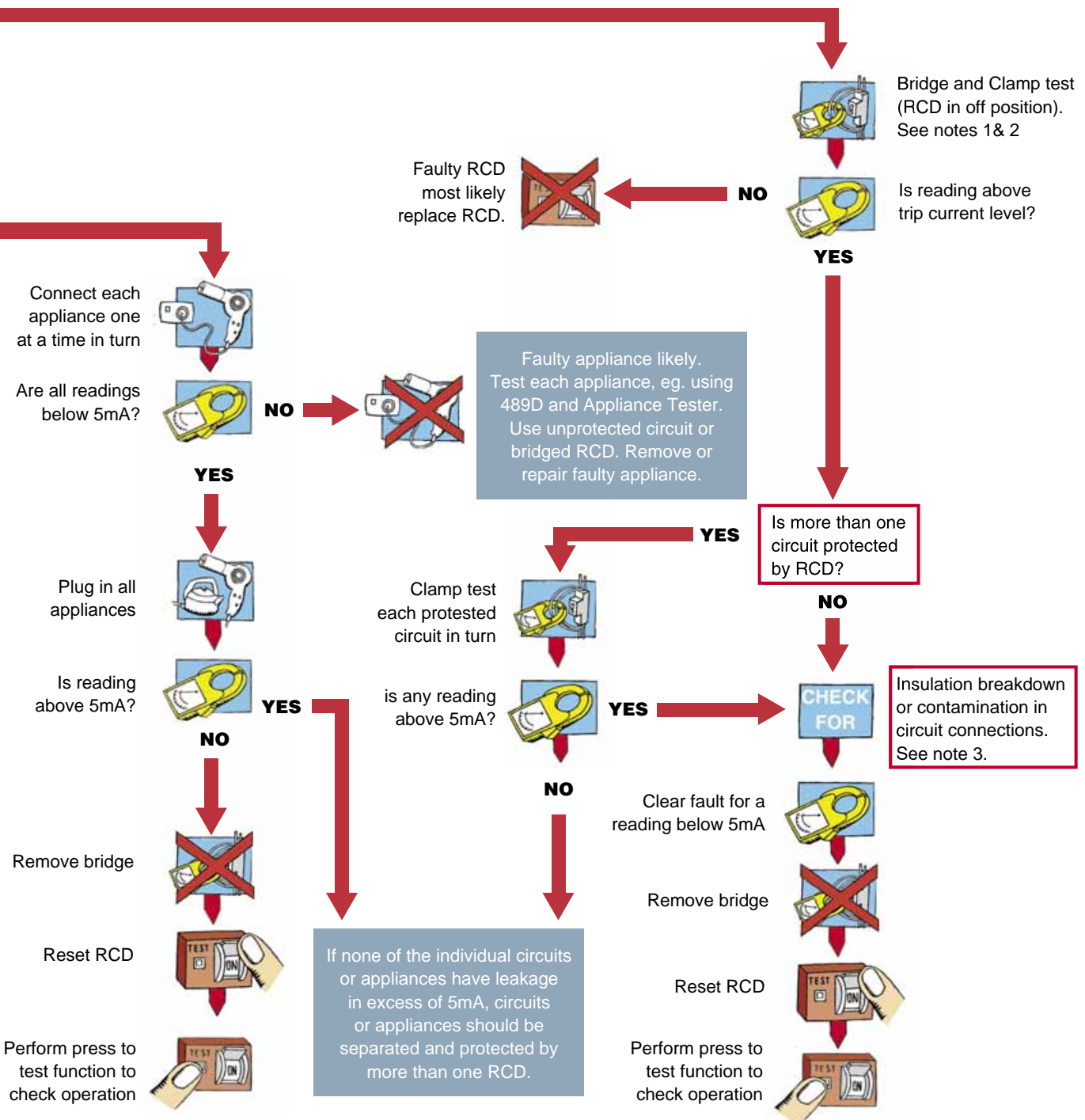
RCDs should be tested monthly by operating their inbuilt test button. You should remind the householder of this.

When you arrive at a customer's house, talk to them and find out what they were doing when the RCD tripped.

NOTE 1: Bridging of combination RCDs with overcurrent protection, negates that function and may result in fusing the main fuse with faulty wiring. Note that in these instances, fault currents could be significantly higher and suitable precautions should be taken.

NOTE 2: Under no circumstances should the press to test function be utilised while an RCD is bridged.

NOTE 3: Insulation breakdown could be alternatively identified by the Clipsal 491 Insulation Tester.



ITACS[®]

For Measuring the Accuracy of Electrical Instrument

Established in 1980, International Testing and Certification Services (ITACS) is a NATA Registered Electrotechnical Testing facility.

Third party assessment by NATA has established the laboratory's independence from any manufacturers with regard to impartiality and technical competence of testing.

The laboratory's compliance with ISO Guide 25 (SA HB 18.25) General Requirements for the competence of Calibration and Testing Laboratories, also ensures against improper influences on results of examinations and tests.

ISO Guide 25 incorporates the requirements of quality management system in accordance with ISO 9002.

ITACS provides an electrical instrument calibration service for electrical workers and contractors.

Laboratory staff comprise of engineers and technicians who have many years of experience in calibration.

Self regulation has led to the introduction of a new audit process for electrical workers. During this audit, it is necessary to produce evidence that electrical instruments have been calibrated and the accuracy of meter reading has been checked.

Quality Assurance

The calibration services and test reports we provide have results traceable to National Standards in accord with some States legislation. In addition, they satisfy the calibration and traceability required by AS 9000 series for Quality Assurance.

ITACS Calibration Services provides:

- Calibration of electrical instruments used by electricians, covering most popular brands, including
 - Multimeters (digital and analogue)
 - Insulation Testers
 - Continuity Testers
 - RCD Testers
 - Clamp Meters (digital and analogue)
 - Other instruments on request
- ITACS does not provide an instrument repair service. A nominal fee is charged for instruments found during the calibration process not to be in proper working order.



Calibration Capabilities

d.c. voltmeters	0 - 1000V
a.c. voltmeters	0 - 1000V (50Hz - 20kHz)
d.c. ammeters	0 - 20A 20 - 1000A*
a.c. ammeters	0 - 20A (50Hz - 5kHz) 20 - 1000A* (50kHz)
Ohmmeters	0 - 400M Ω and applied voltage up to 1000V (inc. Megohmmeters)
Time measuring	Pulseband 0.30ms to 1999.9ms
*multiple turns	



ITACS

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NATA REG. 1700

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clipsal.com/wat_lib_pdf.cfm

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