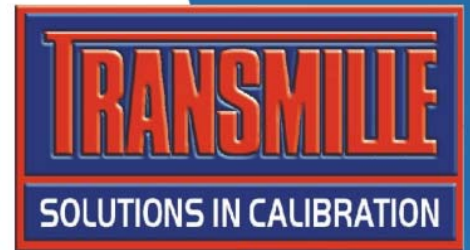


3200SERIES

ELECTRICAL TEST EQUIPMENT CALIBRATOR



THE METROLOGISTS CHOICE

FIVE CALIBRATORS IN ONE INSTRUMENT



3200SERIES

Electrical Test Equipment Calibrator

Operation Manual



IMPORTANT NOTICE

**THIS CALIBRATOR
WILL
REQUIRE AN
UNLOCK CODE
AFTER THE EVALUATION
PERIOD HAS EXPIRED.**

(60 Days after invoice date)

**AFTER THE EVALUATION PERIOD HAS EXPIRED THE
OPERATION OF THE CALIBRATOR IS LOCKED AND THE
DISPLAY SHOWS A NUMBER WHICH MUST BE QUOTED TO
TRANSMILLE TO RECEIVE THE UNLOCK CODE**

**THE UNLOCK CODE IS
AVAILABLE
FROM TRANSMILLE
ONLY AFTER PAYMENT
HAS BEEN RECEIVED.**

**(This code is only entered once in the life of the
instrument.)**

**Please contact Transmille or use the form in the
back of the manual to obtain the code.**

**Transmille Ltd.
Staplehurst , Kent.
Tel: 44 (0)1580 890700 : Fax 44(0)1580 890711
email:- sales@transmille.com**

DECLARATION OF CONFORMITY **CE**

Manufacturer's Name: Transmille Ltd.
Manufacturer's Address: Unit 4, Select Business Centre
 Lodge Road
 Staplehurst
 TN12 0QW

Declares, that the product

Product Name: Electrical Test Calibrator
Model Number: 3200
Product Options: This declaration covers all options of the above product(s)

Conforms with the following European Directives:

The product herewith complies with the requirements of the Low Voltage Directive 73/73EEC and the EMC Directive 89/336/EEC (including 93/68/EEC) and carries the CE Marking accordingly

Conforms with the following product standards:

EMC

Standard	Limit
IEC616326-1:1997+A1:1998 / EN 61326-1 EN55011:1991	:1997+A1:1998
IEC 61000-4-2:1995+A1:1998 / EN 61000-4-2:1995	Group 1 Class A
IEC 61000-4-3:1995 / EN 61000-4-3:1995	4kV CD, 8kV AD
IEC 61000-4-4:1995 / EN 61000-4-4:1995	3 V/m, 80-1000 MHz
IEC 61000-4-5:1995 / EN 61000-4-5:1995	0.5kV signal lines, 1kV power lines
IEC 61000-4-6:1996 / EN 61000-4-6:1996	0.5kV line-line, 1kV line-ground
IEC 61000-4-11:1994 / EN 61000-4-11:1994	3V, 0.15-80 MHz 1 cycle, 100% Dips: 30% 10ms; 60% 100ms Interrupt > 95% @ 5000ms

SAFETY

IEC 61010-1:1990+A1:1992+A2:1995 / EN 61010-1:1993+A2:1995

06/03/2006



Revision No: 1.1
Date 06/03/2006

Managing Director

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3200 Electrical Test Equipment Calibrator Introduction



The 3200 Electrical Test Equipment Calibrator is a breakthrough in electrical test equipment calibration providing a complete solution for testing :

- Insulation Testers
- RCD Testers
- LOOP Testers
- Portable Appliance Testers (PATs)

Extended Functionality

The 3200 Calibrator can be enhanced with options to provide high accuracy resistance, auto loop measurement and two external resistance inputs to extend the range of available resistors.

A complete electrical test equipment calibration solution from one instrument.

Designed to provide an accurate cost effective portable instrument for the calibration of Insulation testers, RCD testers, LOOP testers and PATs the 3200 calibrator can be combined with the ProCal Calibration System to allow automated calibration.

⚠ IMPORTANT OPERATIONAL NOTE 1

THE 3200 CALIBRATOR IS SUPPLIED IN ONE OF TWO VERSIONS :

- FOR USE ON UNPROTECTED SUPPLIES ONLY (NO RCD TRIP)
- FOR USE ON PROTECTED OR UNPROTECTED SUPPLIES

THE SUPPLIED CONFIGURATION IS RECORDED ON THE OPTIONS PANEL ON THE REAR OF THE INSTRUMENT – OPTION FITTED IS DEPENDANT ON REGION.

⚠ IMPORTANT OPERATIONAL NOTE 2

It is also necessary that for correct operation the Phase (Live) and Phase (Neutral) MUST be connected round the correct way (some plugs used in non-UK countries can be connected either way round, therefore this check is necessary). There should only be a small voltage between Phase (Neutral) and Phase (Earth).

Installation & Power Requirements for the 3200

Depending on configuration, the 3200 passes current down the Earth conductor when performing tests and therefore trip any protection device present - FOR THIS REASON IT IS ESSENTIAL THAT THE 3200 IS PROPERLY EARTHED.

It is also necessary that for correct operation the Phase (Live) and Phase (Neutral) MUST be connected round the correct way (some plugs used in non-UK countries can be connected either way round, therefore this check is necessary). There should only be a small voltage between Phase (Neutral) and Phase (Earth).

To keep the LOOP impedance value to a minimum, the mains input to the 3200 is of a direct cable type. This avoids any introduction of unnecessary impedance.

It is desirable that the 3200 is connected to a supply point with low LOOP impedance as this will limit the lowest value available LOOP impedance from the 3200 using as good a quality outlet (contact wise) as possible.

Designed for on use in the laboratory or portable on site calibration.

The 3200 calibrator is equally suitable for use in the standards laboratory or for on site calibration work. The Small footprint and low weight makes the 3200 calibrator ideal for on site calibration. The serial interface allows direct connection to a portable PC.

Retro fit options allows extra functions to be added as required.

Several internal retro fit options including auto loop, high accuracy resistance and external resistance input allow the user to select the most cost effective solution for the calibration work required at the time with the ability to add extra functions as required.

Serial Line RS232 Interface as standard.

All functions and outputs of the 3200 calibrator are fully programmable over the RS232 interface fitted as standard. The use of the RS232 interface saves the cost of fitting IEEE cards to the PC, and also allows easy connection to portable PC's, reducing the set up time for on site calibration.

Input / Output Connection

The input and output terminal configuration is designed to enable simple connection to a full range of instrumentation using the supplied adapter lead. Use of a dedicated input adapter lead allows resistance measurement functions such as LOOP testing to be calibrated to include residual values right up to the socket into which test equipment is plugged.

All outputs are isolated when not in use, with an LED indicator showing the active input / output terminal(s).

Preparing the calibrator for use.

Initial Inspection.

After shipment the calibrator should be inspected for any signs of external damage. Should external damage be found contact the carrier immediately. Do not connect a damaged instrument to the line power as this may result in internal damage. Please keep the original box which can be used when returning the calibrator for service and re-calibration.

Shipping Checklist

- 1 x Serial Communication lead (9 Way 'D' female to 9 Way 'D' male connectors)
- 1 x Operation manual (this document)
- 1 x PAT Test Lead

Lifting and carrying the calibrator

The calibrator can be carried easily by one person in any position by supporting from underneath (note : observe all normal practices for health and safety when carrying). A custom carry case with shoulder strap is available if the calibrator is to be regularly transported - see options list. The calibrator should always be placed down on a firm flat surface on its base feet. Standing the calibrator down on its back may cause damage. Avoid knocking or banging the calibrator and always place down smoothly.

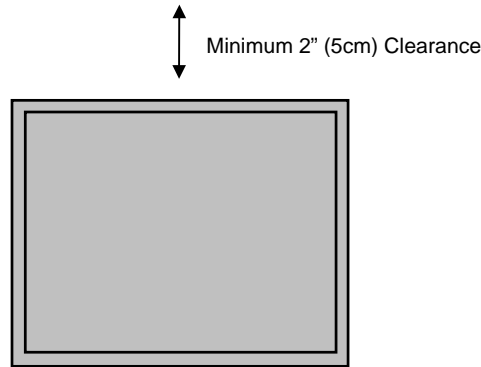


Warning

DO NOT DROP THE CALIBRATOR as this may cause internal damage.

Positioning the Calibrator.

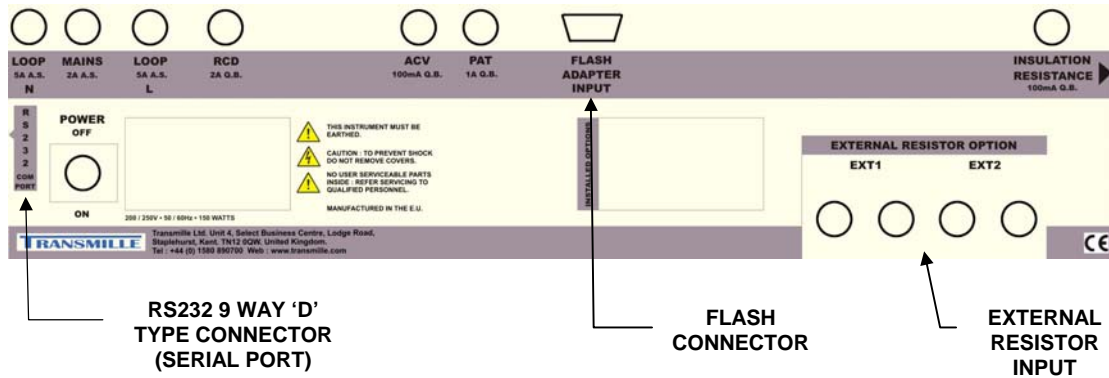
The calibrator can be used free standing on a bench or mounted in a standard 19" rack enclosure. The calibrator can be operated at any angle, the two front feet have tilt legs for bench operation. For all installations care must be taken not to cover the ventilation slots underneath. A 2" (5cm) space behind the instrument is also required for line and interface connections (See diagram) :



Rear Panel Connections and Fuses

Connections on the rear panel consist of a 9Pin Serial interface connector for the computer interface, this is optically isolated from the calibrator outputs.

Fuse holders for individual instrument types are accessible from the back of the calibrator. These are bayonet type fuse holders which allow a screwdriver to be used to turn the fuse carrier until it ‘pops’ out of the fuse holder body .The fuse carrier can then be withdrawn from the fuse holder body for inspection / replacement.



Fuse Description	Fuse Value
LOOP N (Neutral)	5A Anti Surge
MAINS	2A Anti Surge
LOOP L (Live)	5A Anti Surge
RCD	2A Quick Blow
ACV	100mA Quick Blow
PAT	100mA Quick Blow
INSULATION RESISTANCE	100mA Quick Blow

Setting and checking the Line Voltage.



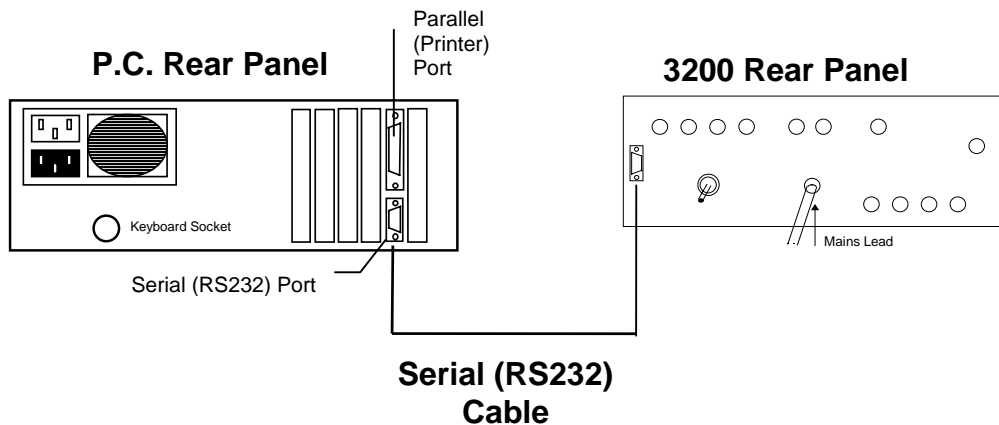
Warning

The line power cord must have an earth conductor to avoid risk of shock. This instrument must be correctly earthed.

The calibrator has been designed to work from either 100-120 Volt line supply or 200 - 240 Volt line supply. Check Supply voltage as marked on the rear panel before connecting to power line. Connecting the calibrator to the wrong supply will cause internal damage to the instrument. To Change the line voltage it is necessary to remove the rear panel and rewire the transformer. The calibrator will have been shipped wired for 110V operation for USA, 240V for Europe.

Connecting to a computer

If required a standard serial 9 pin cable may be used to connect the calibrator to a COM port on a PC. A Null modem cable is **not** needed.



Powering up the calibrator

After connecting line power the calibrator can be switched on with the line power switch above the mains inlet socket on the rear panel.

The front panel display will illuminate indicating power. The display will show program version number and after a short delay, during which time the processor performs a self test of the instrument, the display will show the default start-up display :

3200 CALIBRATOR Ver x.x
TRANSMILLE LTD.

The calibrator has been designed to be powered up continuously, automatically switching the display to power save mode after a pre-set period of time from the last command. In power save mode the display back light will turn off.

Output Connections



Warning - Risk of shock.

High voltages may be present on the output sockets.

Output sockets comprise of the following types :



IEC 3-Pin Socket :

For use with the supplied PAT test lead.



13A Socket (UK)* : For use directly with LOOP / RCD tester
or EURO Socket*
or Australian Socket*



4mm Safety Sockets: For connection to Insulation Testers

* Fitted depending on country

Operation

SAFETY WARNINGS



This instrument is capable of generating high voltages

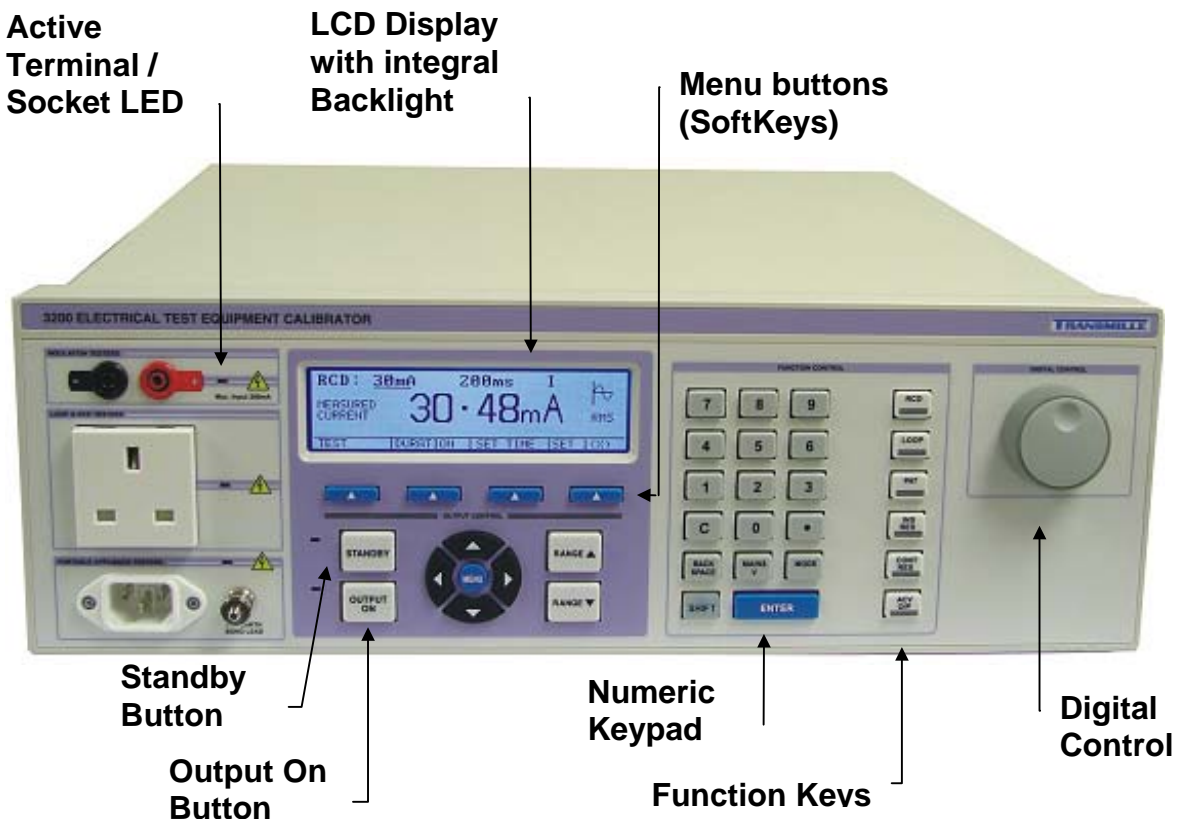


The information in this section is intended only for qualified personnel. The user must at all times be adequately protected from electric shock. Qualified personnel must ensure that operators of the equipment are adequately insulated from connection points.

A carry-case is available for regular transportation of the calibrator.

Introduction to Operation

All functions of the 3200 Calibrator can be controlled from the front panel or controlled remotely by a computer over the RS232 interface.



Front panel Keyboard

The front panel of the 3200 Calibrator utilises a high quality rubber switch panel with tactile feel buttons and integral display window. The front panel is therefore sealed against the ingress of moisture and dirt enabling the calibrator to be used in working environments without risk of dirt causing early failure of the operating buttons. The front panel can easily be wiped clean with a soft cloth. Care should be taken not to scratch the display window. All graphics are 'under printed' so that they will not wear off with use.

IMPORTANT NOTE

The front panel key buttons are for use with fingers only - do not press the key with hard or sharp objects e.g. Ball-point pens, pencils, screwdrivers etc. Repeated actions like this will almost certainly cause the keyboard to fail. (This will not be covered under warranty). Care should also be taken when transporting the instrument - do not leave test leads plugged in which may get squashed into the display area or keys which can also cause damage.

The Keyboard is divided into sections to allow rapid operation.

The Numeric section allowing values to be entered,

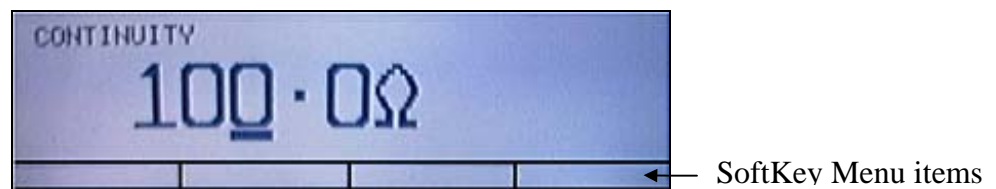
Functions keys for RCD, LOOP, PAT, Insulation Resistance, Continuity Resistance and ACV Output

Range up and range down keys allows range changing for the currently selected function

Left/right arrow keys select the digit to be controlled by the digital control knob.

Output on / Standby keys allow the calibrator output to be disconnected from the terminals. Led indicators are incorporated in these switches to clearly show the output status.

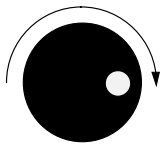
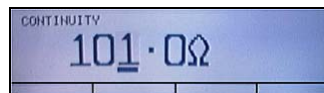
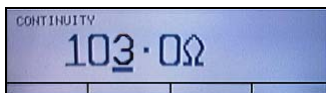
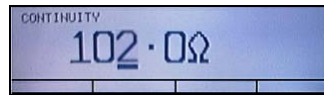
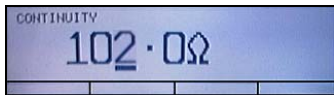
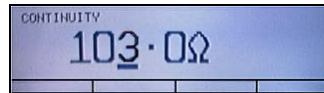
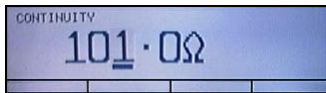
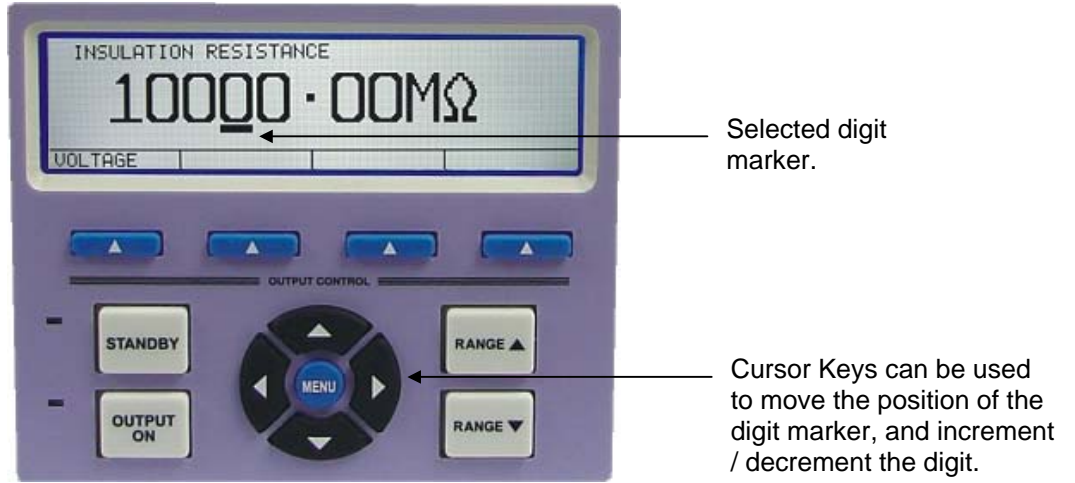
Graphic LCD Display



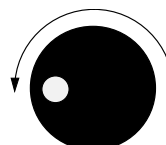
A back lit graphic LCD display shows the present setting and instrument status. The bottom line of the display is used to assign the function of the four 'soft (menu) keys' immediately under the display. The display utilises a back light which automatically turns off if no activity takes place. The back light turns on as soon as a key is pressed or a command is received.

Using the Digital Control

A digital Control allows selected digits on the display to be incremented (turning clockwise) or decremented (turning anti-clockwise).



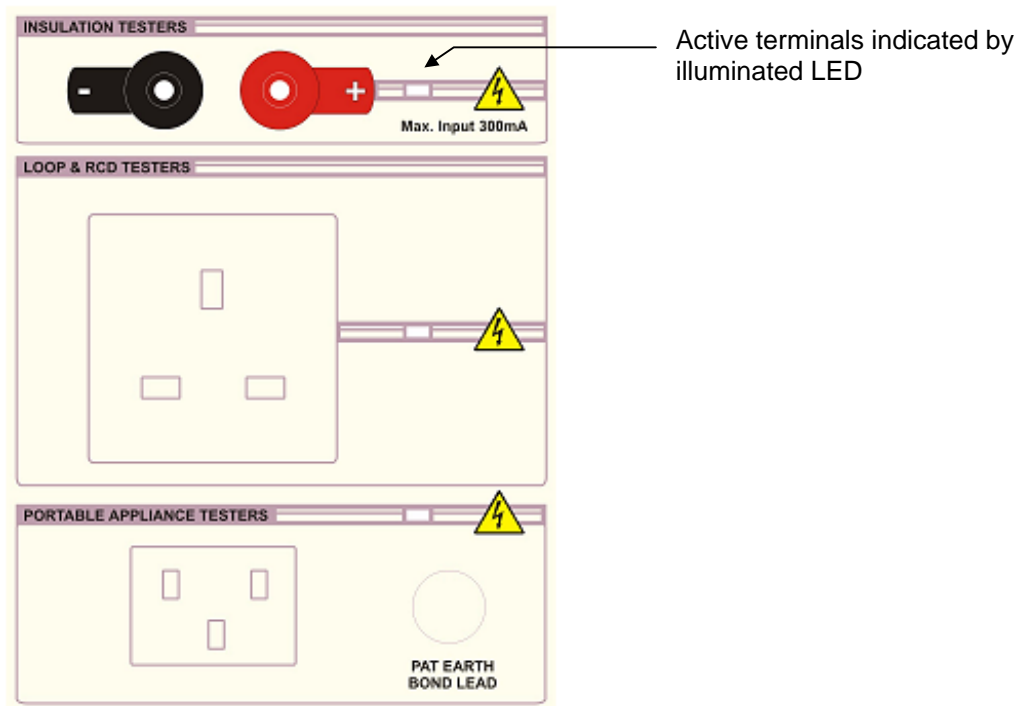
Clockwise Rotation
(Increment Digit)



Anti-Clockwise Rotation
(Decrement Digit)

Terminal status LEDs

LED's above the terminals indicate the active terminal.



PAT Test IEC Socket



WARNING
Dangerous voltage may be present on these terminals.

LOOP & RCD TEST Socket



WARNING
Dangerous voltage may be present on these terminals.

INSULATION TEST 4mm terminals



WARNING
Dangerous voltage may be present on these terminals.

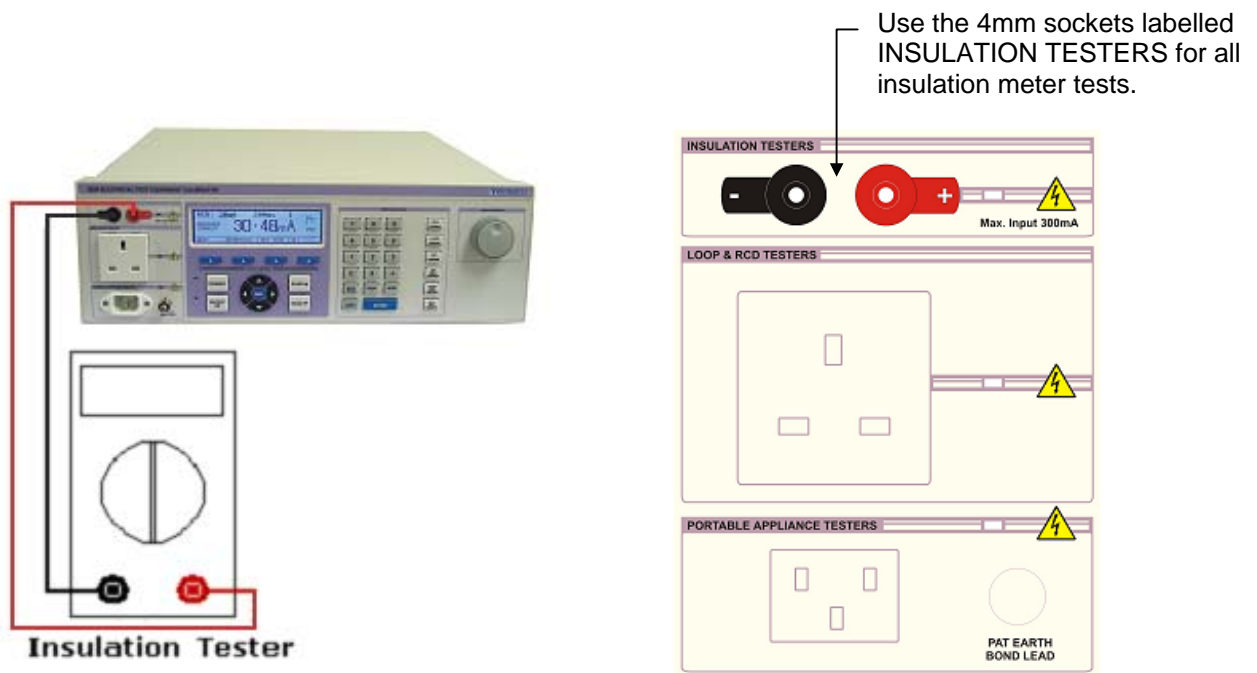
PAT GND Terminal Post

Calibrating Instruments Using the 3200

Calibrating Insulation Testers

The 3200 has five functions for calibrating insulation testers :

1. High value resistance output for insulation testing ($0\text{M}\Omega$ to $2,000\text{M}\Omega$)
2. Measurement of the insulation test voltage
3. Low value resistance for continuity testing (0.1Ω to 20.0Ω Variable, 100R & $1\text{k}\Omega$ Fixed Ranges)
4. Insulation test current measurement
5. A.C. voltage output at 100V , 200V , 240V , 300V and 400V



1. High Value Resistance for Insulation Testing

- Step 1** Select 'INS RES' from the function key section of the 3200 front panel
- Step 2** Connect the insulation tester to the Black & Red 4mm terminals.
- Step 3** Enter the required resistance in $\text{M}\Omega$ from $10\text{k}\Omega$ to $10,000\text{M}\Omega$ on the keyboard followed by Enter. An alternative way to select the required resistance is to use the digital Control to increment / decrement the digit indicated by the cursor. The Left and Right arrow keys allow the selected digit to be changed

2. Measuring Insulation Test Voltages & Current

Step 1

From the Insulation Resistance menu displayed on the 3200, select the **voltage** function using the 'SoftKey'.

INSULATION RESISTANCE			
100.00 MΩ			
VOLTAGE		BACK	16 th /17 th

Step 2

Select the required voltage range using either the digital Control or the up / down arrow keys. Ranges include 50V, 100V, 250V, 500V and 1000V. The impedance of each range is automatically set to give the correct load for 16th or 17th Edition as selected using the button (see test current below) at the applied nominal voltage range.

RANGE	INPUT IMPEDANCE	
	16 th Edition	17 th Edition
50V	50kOhm	100kOhm
100V	100kOhm	200kOhm
250V	250kOhm	500kOhm
500V	500kOhm	1MOhm
1000V	1MOhm	1MOhm

Step 3

Select the required measurement current using the SoftKeys.

The default setting for current load is 1mA nominal which is the correctly load/test current for the 16th Edition equipment - e.g. must be able to supply 1mA at the test voltage. Older insulation testers (15th Edition Reg.) only had to produce 0.5mA current at the test voltage. The 3200 should be set to 0.5mA current for these instruments. Very old tester's may only produce a very small current and the voltage will collapse under any load - these cannot be tested with the 3200.

TEST VOLTAGE - 1000V / 1mA			
UNDER-RANGE/POLARITY			
TEST CURRENT : 1.00mA			
		CURRENT	BACK

Step 4

Press the test button on the insulation tester to apply the insulation test voltage and read the voltage and current on the 3200 display.

To return from the Voltage measurement screen to the insulation resistance select the **Back** menu item using the Softkey.

If the voltage applied by the tester is less than 30% of the range or the polarity is incorrect, the display will show

UNDER-RANGE / POLARITY (note some tester's 'positive' red terminals are supplying negative voltage and need to have test leads reversed).

NOTE:- NEGATIVE INPUT OF 3200 (BLACK) IS CONNECTED TO SUPPLY EARTH.



Warning : The maximum input voltage is 1100 volts



The correct polarity must be applied to obtain a reading

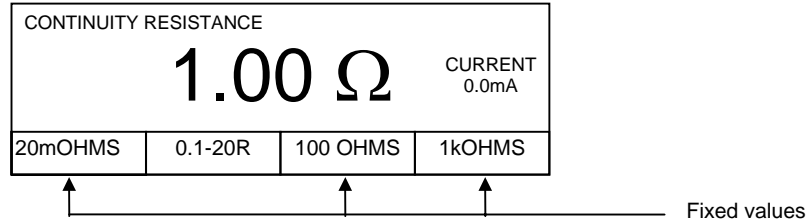


If tester does not operate correctly, carefully check rear panel fuses on 3200 and replace with the correct rating if required.

3. Low Value Resistance for Continuity Testing

Step 1 Connect the insulation tester to the Black & Red 4mm sockets.

Step 2 Select 'CONT RES' from the function key section of the 3200 front panel



Step 3 Select the required resistance in Ω from 20m Ω to 1k Ω on the 3200 keyboard followed by Enter, or by using the softkeys. An alternative way to select the required resistance is to use the digital Control to increment / decrement the digit indicated by the cursor. The Left and Right arrow keys allow the selected digit to be changed.

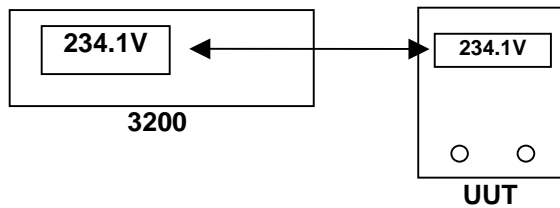
NOTE : 20m Ω , 100 Ω and 1k Ω are fixed values. 0.1 Ω to 20 Ω is a variable range

The measured current is also displayed when a resistance of 1 Ω is set..

4. A.C. Voltage Output

Notes on ACV Output

To provide the power necessary for some insulation testers, the AC output from the 3200 is derived from transformer tapplings. The output is *unregulated* and will vary with line voltage and loading. The actual output voltage at any time is measured and displayed by the 3200 which can be compared to the displayed value on the UUT.



Example
3200 set to 230V range, measures mains and displays a measured value of 234.1V. The UUT is compared to check its accuracy at this value.

Step 1 Connect the insulation tester to the Black & Red 4mm sockets.

Step 2 Select 'ACV O/P' from the function key section of the 3200 front panel

Step 3 Select the required voltage using either the range up / range down buttons or by incrementing / decrementing the range using the digital Control.

Step 4 Read the voltage displayed on the insulation tester meter.
and compare it with the value displayed on the 3200

Use the **Output Standby** and **Output On** buttons to control the output.

5. 5kV Insulation Tester Extension Adapter [OPTION]

This option allows the testing of Insulation Testers with test voltages up to 5kV and Insulation range up to 200GΩ.



The insulation tester must have a guard terminal for this adapter to function correctly

Step 1

Select 'INS RES' from the function key section of the 3200 front panel

Step 2

Connect the 5kV Adapter flying leads to the 3200 Insulation tester terminals (observing correct polarity)

Step 3

Connect the Insulation tester to the adapter box

Step 4

Calculate the value needed to be entered in order to give the required resistance (this will be 100th of the actual required resistance less the input impedance of the tester - typically 10MΩ, example to simulate 100GΩ select 990MΩ on the 3200)



In most cases it is not necessary to allow for the input impedance of the tester.

This value can be entered on the keyboard followed by Enter. An alternative way to select the required resistance is to use the digital Control to increment / decrement the digit indicated by the cursor. The Left and Right arrow keys allow the selected digit to be changed

Introduction to RCD Testers

Increasingly in modern installations, earth leakage circuit breakers are used to provide protection in addition to conventional fuses and circuit breakers. These devices are referred to by a variety of names including RCD (Residual Current Devices), RCCB (Residual Current Circuit Breaker), ELCB (Earth Leakage Circuit Breaker) and GFI (Ground Fault Interrupt).

The devices operate by sensing when the current in the phase and neutral conductors within an installation are not equal and opposite. Any imbalance would imply that an additional path existed for the current to flow, invariably through the earth due to excessive leakage and/or fault situation.

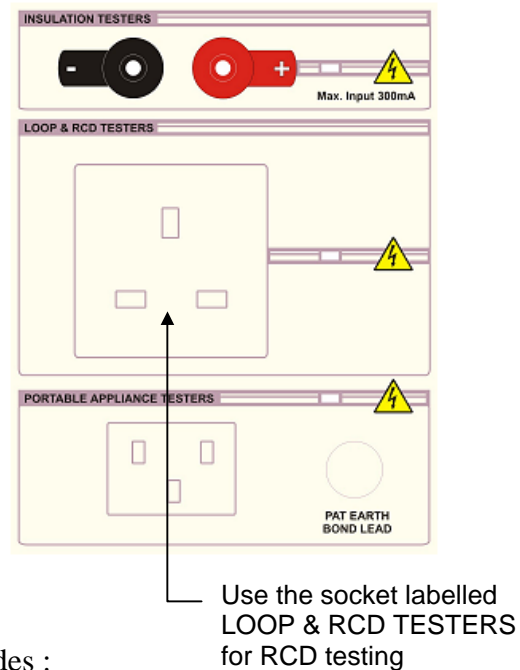
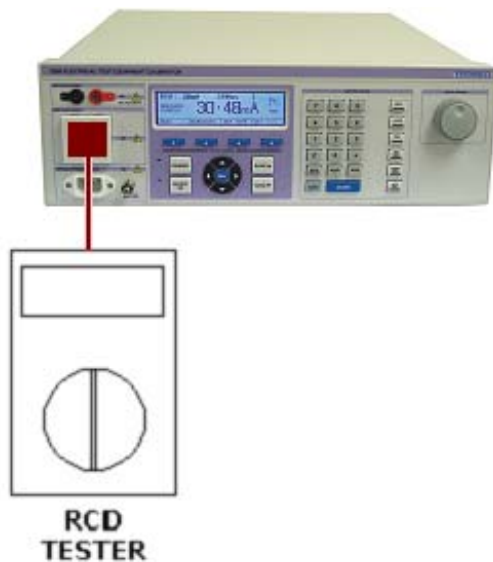
RCD testers are designed to simulate a range of fault currents, with restrictions on the duration of the fault current, and to time the operation of the device. This will indicate the ability of the RCD to interrupt a particular fault current within certain time limits to ensure protection against fire, damage and electrocution.

It is important to understand that an RCD tester does not generate the current, but acts as a resistor allowing current to flow from the live to earth, simulating a fault. The 3200 measures the current flowing back to earth.

Calibrating RCD Testers using the 3200

The 3200 has three functions which can be used for complete testing of an RCD tester:

1. RCD Current measurement
2. RCD Trip Time measurement
3. RCD Duration Measurement



The RCD testing function can use two different modes :

- **Zero Crossing Mode**
This allows timing to be started from the zero crossing preceding 75% of the trip value.
- **Immediate Mode**
This allows timing to be started immediately on detection of current greater than 5% of the trip value set.

1. RCD Current Measurements



Warning : Mains output is present during RCD testing



Some RCD testers may require a settling delay between the application of mains from the 3200 calibrator and pressing of the TEST button on the RCD tester. This may be indicated by a symbol on the display of the RCD tester.

Certain manufacturers RCD testers may also require the user to **keep the TEST button depressed** for the duration of the test.



The current measured by the 3200 is the true current drawn by the RCD tester with no allowance for the mains voltage at the time of test. Most RCD testers current specifications apply at a specific mains voltage and their current will be dependant upon mains voltage.

In this case a linear correction can be made to obtain the current at a specific mains voltage or the 3200 may be run from a variac (variable voltage transformer).

In practice, most manufacturers now specify the current at 230V. If these RCD testers are then tested at 240V they may well be out of specification.

If tester does not operate correctly, carefully check rear panel fuses on the 3200 and replace with the correct rating if required.

Step 1

Connect the RCD tester to the LOOP & RCD TESTER socket

Step 2

Select 'RCD' from the function key section of the 3200 front panel

Step 3

Using the 'SoftKey' beneath the **SET I (X)** menu item, select the required current mode (e.g. ½ I, I, 2I, 5I).

RCD :	<u>100mA</u>	200ms	I
Measured Current	0.0mA		
TEST	DURATION	SET TIME	SET I (X)

Step 4

Use the ‘SoftKey’ beneath the **SET TIME** menu item to select the time setting menu. Time values can be typed in using the keyboard or chosen from pre-set values using the range up / range down. buttons Use the **TIME MODE** menu item to select the timing mode (Immediate or Zero Crossing).
Select the **BACK** menu item to return to the main RCD test screen.

RCD : 100mA 200ms I			
TIMING MODE : ZERO CROSSING			
	TIME MODE		BACK

Step 5

Press the ‘SoftKey’ beneath the test menu item to begin the test.

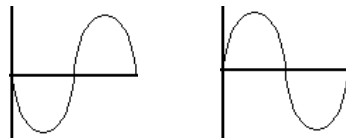
RCD : 100mA 200ms I			
Measured Current		0.0mA	
TEST	DURATION	SET TIME	SET I(X)

Step 6

Press the test button on the RCD tester to allow the 3200 to measure the current.

Step 7

Read the measured current from the display of the 3200.
The polarity and measurement technique will also be indicated on the 3200 screen.



Polarity

PEAK

RMS

Measurement Technique

2. RCD Trip Time Measurements



Warning : Mains output is present during RCD testing



Some RCD testers may require a settling delay between the application of mains from the 3200 calibrator and pressing of the TEST button on the RCD tester. This may be indicated by a symbol on the display of the RCD tester.

Certain manufacturers RCD testers may also require the user to **keep the TEST button depressed** for the duration of the test.

Step 1

Connect the RCD tester to the LOOP & RCD TESTER socket

Step 2

Select 'RCD' from the function key section of the 3200 front panel

Step 3

Using the 'SoftKey' beneath the **SET I (X)** menu item, select the required current mode (e.g. ½ I, I, 2I, 5I).

RCD : 100mA 200ms I			
Measured Current		0.0mA	
TEST	DURATION	SET TIME	SET I (X)

Step 4

Use the 'SoftKey' beneath the **SET TIME** menu item to select the time setting menu. Time values can be typed in using the keyboard or chosen from pre-set values using the range up / range down. Buttons Use the **TIME MODE** menu item to select the timing mode (Immediate or Zero Crossing).
Select the **BACK** menu item to return to the main RCD test screen.

RCD : 100mA 200ms I			
TIMING MODE : ZERO CROSSING			
	TIME MODE		BACK

Step 5

Press the 'SoftKey' beneath the test menu item to begin the test.

RCD : 100mA 200ms I			
Measured Current		0.0mA	
TEST	DURATION	SET TIME	SET I (X)

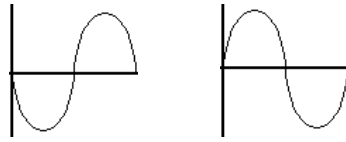
Step 6

Press the 'TEST' button on the RCD tester to allow the 3200 to output the current.

Step 7

Read the measured time from the display of the RCD tester.

The polarity and measurement technique will also be indicated on the 3200 screen.



Polarity

PEAK

RMS

*Measurement
Technique*

3. RCD Current Duration Measurements



To alter the current range for RCD duration tests, go back to the main RCD menu and select the current range using the RANGE UP / RANGE DOWN buttons or the digital Control.

Step 1

Connect the RCD tester to the LOOP & RCD TESTER socket

Step 2

Select 'RCD' from the function key section of the 3200 front panel

Step 3

Select 'DURATION' using the softkey button under the 3200 display.

RCD : <u>100mA</u> 200ms I			
Measured Current		0.0mA	
TEST	DURATION	SET TIME	SET I (X)

Step 4

Press the TEST button on the RCD tester to begin the test.

RCD : <u>100mA</u> 200ms I			
		0.0mA	
ABORT			

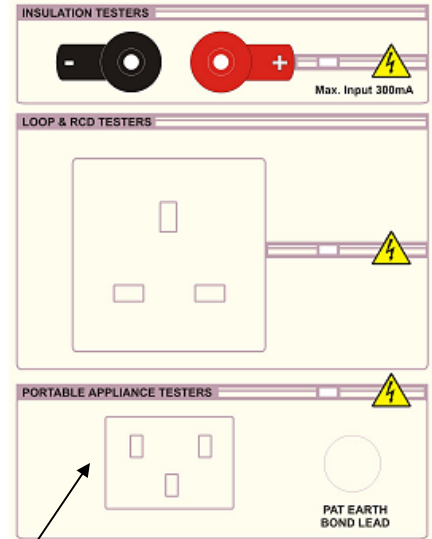
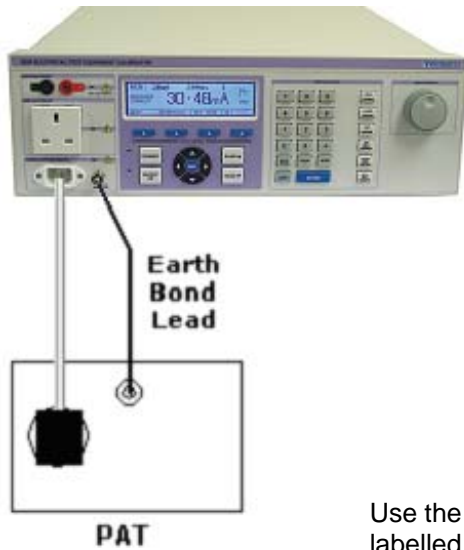
Step 5

On completion of the measurement, read the value displayed on the 3200 display

Calibrating Portable Appliance Testers (PATs)

The 3200 has six functions which can be used for testing of Portable Appliance Testers (PATs) :

1. Earth Bond Resistance measurement
2. Earth Bond Current measurements
3. Insulation testing
4. Load testing
5. Flash Testing
6. Leakage Testing



Use the IEC socket labelled PAT TESTERS for PAT testing


Use the PAT EARTH BOND LEAD terminal for earth bond current testing.

1. PAT : Earth Bond Resistance

Step 1

Connect the PAT tester to the PAT TEST IEC socket using using the test lead supplied.

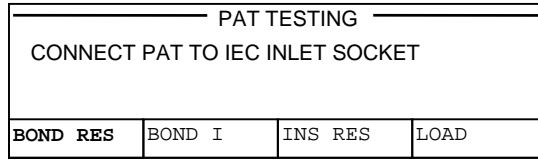
Connect the PAT tester earth lead to the PAT EARTH BOND LEAD terminal on the 3200 using the lead supplied with the PAT.

 *Clip onto the PAT EARTH BOND LEAD terminal with the large crocodile type clips commonly used by PAT manufacturers.*



Step 2 Select 'PAT' from the function key section of the 3200 front panel

Step 3 Using the 'SoftKeys' beneath the on-screen PAT menu, select **BOND RES**



Step 4 Select the required resistance value using either the range up / range down buttons or by incrementing / decrementing the range using the digital control. See 'Using the Digital Control' for more details.

Step 5 Press the test button on the PAT to begin testing.

Step 6 Read the measured resistance value from the display of the PAT.



Notes on the PAT Earth Bond Function

The 3200 uses a fixed set of resistors to produce the earth bond resistances. The value displayed by the 3200 is the measured value as determined during the calibration of the 3200. This calibrated value also includes the resistance of the PAT lead supplied with the 3200.

It is important that this supplied lead is used for all PAT earth bond testing.

2. PAT : Earth Bond Current

Step 1 Connect the PAT tester to the PAT TEST IEC socket using the test lead supplied.

Connect the PAT tester earth lead to the PAT EARTH BOND LEAD terminal on the 3200 using the lead supplied with the PAT.

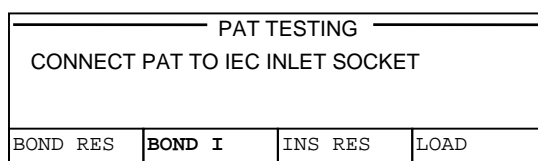


To clip onto the PAT EARTH BOND LEAD terminal with the large crocodile type clips commonly used by PAT manufacturers, simply unscrew the terminal and clip onto the post.



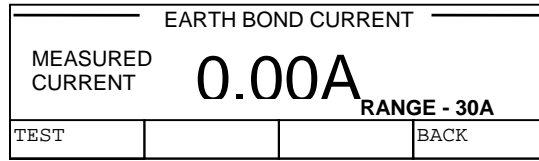
Step 2 Select 'PAT' from the function key section of the 3200 front panel

Step 3 Using the 'SoftKeys' beneath the on-screen PAT menu, select **BOND I**



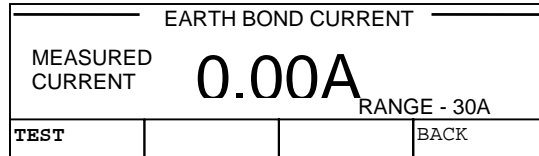
Step 4

Using the RANGE UP and RANGE DOWN buttons, select the required current range (100mA, 10A or 30A).



Step 5

Press the 'SoftKey' beneath the **TEST** menu item to allow the 3200 to begin detecting the PAT output current.



Step 6

Press the PAT 'TEST' button to output current from the PAT.

Step 7

After a short sampling period, read the measured current value from the display of the 3200.

3. PAT : Insulation Testing

Step 1

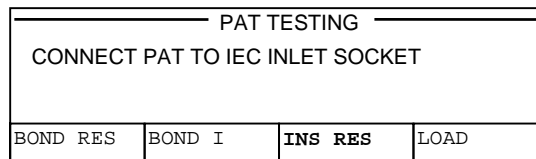
Connect the PAT tester to the PAT TEST IEC socket using the test lead supplied.

Step 2

Select 'PAT' from the function key section of the 3200 front panel

Step 3

Using the 'SoftKeys' beneath the on-screen PAT menu, select **INS RES**



Step 4

Enter the required resistance in MΩ from 0Ω to 10,000MΩ on the 3200 keyboard followed by Enter. An alternative way to select the required resistance is to use the digital Control to increment / decrement the digit indicated by the cursor. The Left and Right arrow keys allow the selected digit to be changed.

Step 5

Read the measured resistance value from the display of the PAT.

4. PAT : Load Testing

Step 1

Connect the PAT tester to the PAT TEST IEC socket using using the test lead supplied.

Step 2

Select 'PAT' from the function key section of the 3200 front panel

Step 3

Using the 'SoftKeys' beneath the on-screen PAT menu, select 'NEXT'

PAT TESTING			
CONNECT PAT TO IEC INLET SOCKET			
BOND RES	BOND I	INS RES	NEXT

Step 4

Using the 'SoftKeys' beneath the on-screen PAT menu, select 'LOAD'

PAT TESTING			
CONNECT PAT TO IEC INLET SOCKET			
LOAD	FLASH	LEAKAGE	BACK

Step 5

Using the 'SoftKeys' beneath the on-screen load menu, select the required mode :

PAT LOAD TESTS			
MODE : 0.13kVA LOAD			
0.13kVA	S/C	O/C	BACK

- 0.13kVA : 0.13kVA Load
- S/C : Short Circuit
- O/C : Open Circuit

Step 6

Read the value from the display of the PAT.

5. PAT : Flash Testing [OPTION]

The PAT Flash testing mode is an option which requires use of the PAT Flash adapter pod.

Step 1

Connect the Flash adapter pod to the 3200 back panel socket.

Step 2

Select 'PAT' from the function key section of the 3200 front panel

Step 3

Using the 'SoftKeys' beneath the on-screen PAT menu, select 'NEXT'

PAT TESTING			
CONNECT PAT TO IEC INLET SOCKET			
BOND RES	BOND I	INS RES	NEXT

Step 4

Using the 'SoftKeys' beneath the on-screen PAT menu, select 'FLASH'

PAT TESTING			
CONNECT PAT TO IEC INLET SOCKET			
LOAD	FLASH	LEAKAGE	BACK

Step 5

Using the 'SoftKeys' beneath the on-screen PAT menu, select Class 1 (1.5kV) or Class 2 (3kV) as required.
 The 'FLASH' Voltage generated by the PAT Tester can either be measured under a nominal 1mA load or measured as the 'open circuit' voltage. Use the soft (1mA Load) key to select required.

PAT : FLASH TESTING		CLASS 2	
0.00mA		0000V	
	CLASS 1	CLASS 2	BACK

- The Flash voltage for **CLASS 1** is measured between **LIVE** and **EARTH** on the IEC socket of the flash adapter.
- The Flash voltage for **CLASS 2** is measured between the **LIVE** of the IEC socket and the **3kV TEST POINT** of the flash adapter.

THE EARTH OF THE IEC SOCKET MUST BE LEFT OPEN CIRCUIT TO OBTAIN CORRECT READINGS FOR THIS TEST.

Step 6

Apply the Flash test voltage from the PAT under test.
 Read the voltage and current displayed on the 3200

  **Warning : High voltages are present during PAT Flash testing**

6. PAT : Leakage [OPTION]

Step 1

Connect the PAT tester to the PAT TEST IEC socket using using the test lead supplied.

Step 2

Select 'PAT' from the function key section of the 3200 front panel

Step 3

Using the 'SoftKeys' beneath the on-screen PAT menu, select 'NEXT'

PAT TESTING			
CONNECT PAT TO IEC INLET SOCKET			
BOND RES	BOND I	INS RES	NEXT

Step 4

Using the 'SoftKeys' beneath the on-screen PAT menu, select 'LEAKAGE'

PAT TESTING			
CONNECT PAT TO IEC INLET SOCKET			
LOAD	FLASH	LEAKAGE	BACK

Step 5

Using the 'SoftKeys' beneath the on-screen PAT menu, select the required. range

PAT : LEAKAGE			
LEAKAGE CURRENT		0.000mA	
Range : 240uA		PAT Voltage 0.7V	
LOAD	FLASH	LEAKAGE	BACK

Step 6

Set the PAT to leakage mode.
Read the leakage measurement from the 3200 display.

If tester does not operate correctly, carefully check rear panel fuses on the 3200 and replace with the correct rating if required.

Introduction to LOOP Testers

What is the loop ?

When an appliance is connected to the mains supply a circuit is made. It completes the loop current flow round the circuit loop from the power station in the live wire through the appliance and then back to the power station in the neutral wire. Voltage is dropped around the loop due to the resistance of the cables etc. in which the current is flowing.

What is the loop resistance ?

The resistance of the cables etc. connecting your appliance to the power station.

There are two loop's connecting to the power station

- 1: The Phase-live to Phase-neutral loop.
- 2: The Phase-live to earth loop

Normally current will flow round the live to neutral loop but in a fault condition current from the live could return to the power station through the EARTH conductor,

What is PSCC and why is loop resistance important?

Using ohms law the loop resistance will determine the maximum current that can possibly flow round a circuit, as an example if the loop resistance is 1 ohm and the supply voltage 230 Volts using ohms law where

$$\text{VOLTAGE} / \text{RESISTANCE} = \text{CURRENT}$$

$$(230 \text{ V} / 1\text{Ohm}) = 230 \text{ Amps}$$

It can be seen that the maximum current that could flow would be 230 Amps even if the appliance was a dead short circuit. It can be clearly seen that a fuse or protection device lower than 230 amps would be needed to protect this circuit. It should be noted that some testers take the lowest loop, either live/neutral or live/phase to calculate the PSCC while other will use only the live/earth loop resistance.

Why is it normal to get large variations in PSCC measurements ?

PSCC is calculated by dividing the mains voltage by loop by the loop resistance. Loop resistance's are often very low, 0.1 to 0.4 ohms and the accuracy, resolution & repeatability possible when measuring loop resistance will give rise to large variation in PSCC as the supply voltage is being divided by a number approaching zero.

Example

A 230 volt supply with loop resistance of **0.2ohms**

$$(230\text{V} / 0.2\text{ohm}) = \text{gives a PSCC of } 1150\text{Amps}$$

where if the loop resistance was only 0.05Ohms less at **0.15 ohms**

$$(230\text{V} / 0.15\text{ohms}) = \text{gives a PSCC of } 1533 \text{ Amps}$$

What is a Loop tester measuring

Loop testers measure the resistance in ohms of the mains supply at a power socket, most loop testers only measure the resistance of the live(Phase) to earth resistance, some testers can measure also the resistance of the live to neutral circuit. Some loop testers can also display the PSCC (Prospective Short circuit current) or sometimes called the PFC (Prospective fault current)

How do they work ?

Loop testers work by applying a heavy load, usually 23 amps for a short duration and measuring the drop in voltage when the load is applied, then using ohms law display the loop resistance.

What happens on an RCD protected circuit when using a loop tester ?

As the test current (23Amps) flows down the earth conductor any current RCD (Residual current breaker) in the circuit will trip out. To test loop impedance on protected circuits the breaker must either be temporally wired out or a loop tester with a ***no trip*** range must be used. On the 'No Trip' range the testers load current is much lower & only loads the supply for a very short periods of time so to prevent the RCD from operating. In this mode the tester will internally repeat the measurement several times and take an average. As a result the measurement takes longer and the measurement less accurate, especially if the supply is noisy. As any PSCC calculation is a reciprocal of the loop resistance (Volts/Resistance) error in the reading of resistance can make big differences in the PSCC value.

How do I Calibrate a Loop Testers

To calibrate a Loop tester first the loop impedance of the supply must be known, then several known values of resistance must be inserted in the loop to increase the loop resistance so the tester can be calibrated at several points. The resistance can either be in the live or earth return. (it is common practice to place the resistors in the earth return for safety reasons). The value displayed on the tester can then be compared to that of the known value of the resistor. plus the loop resistance of the supply. The 3200 has 8 calibrated resistance values which are non inductive and are able to withstand the 23 Amps needed.

How can I accurately measure the loop impedance of my Test Socket ?

Firstly it is important to define what is the test socket. This is the socket into which the **Instrument being calibrated will be directly plugged into**. This is not the same as the socket on the wall which then has an extension lead to run it down to the test bench first, remember every bit of cable, plug, fuse etc is adding resistance.



IMPORTANT SAFETY WARNING



THE FOLLOWING PROCEDURE MAKES CONNECTION DIRECTLY TO MAINS LINE VOLTAGES WHICH ARE UNPROTECTED BY AN RCD BREAKER - THERE IS EXTREME RISK OF ELECTRIC SHOCK UNLESS PROPER SAFETY PRECAUTIONS ARE TAKEN.

THIS PROCEDURE MUST ONLY BE PERFORMED BY QUALIFIED ENGINEERS.

Equipment Required.

Loop resistance can be measured using a DMM calibrated on AC volts, a DMM calibrated on AC amps and a load resistor, which can easily be switched on/off, capable of taking around 10amps for a minute without a large change in value, an electric kettle can be used if nothing else is available which will take the power.

Connections

First connect the amp meter in series with the load to enable measurement of the current taken by the load. Then connect both the switched load in series with the amp meter & the AC volts measuring DMM between the **live and earth** pins in a mains plug. (**NOTE Do not connect the load at the DMM terminals otherwise the resistance of the test leads will also be measured, both leads must go to the plug.**)

Measurement Method.

Insure all connections are insulated and the load is off.

Connect the measurement Plug in to the test socket.

- 1: Record the off load voltage measured by the DMM.
- 2: Switch on the load and record
- 3: The current taken by the load
- 4: The AC volts under load.

Repeat several times and calculate the average. Use the formula below to calculate loop resistance:-

$$\text{Loop resistance} = (\text{Off load Voltage} - \text{On load voltage}) / \text{Load Current in Amps}$$

When using the 3200 it is important to remember the test socket is the socket at the end of the adapter cable, **NOT THE RESISTANCE OF THE SOCKET INTO WHICH THE 3200 IS PLUGGED**. The loop value measured at this test socket can then be manually entered into the 3200 which will add this value to the calibrated values.

The AUTOLOOP option measures the loop resistance of the supply internally by performing automatically the procedure above, the internal load of the 3200 is approx 4 Amps and the on/off load voltage measurements are taken 32 times, with noisy readings caused by mains spikes etc being discarded. The 3200 then adds the supply loop value it has measured plus a small correction for the resistance of the test adaptor. (Note this is not the value of the socket the 3200 is plugged in to but the value at the test socket, which is always greater due to the resistance added by the 3200 wiring.)

How can I calibrate a Loop Tester at Zero

It is desirable when calibrating loop testers to calibrate at as near zero as possible. However practical limitations govern how low a value can be achieved.

NOTE It is not possible to get a calibration point lower than the resistance of the supply test socket itself. Typically the 3200 will add 0.15Ohms to the resistance of the socket which the 3200 is plugged into.

The lowest value will be obtained near where the supply enters the building. Remember every switch, fuse socket, even the 3200 will add resistance. If it is required to calibrate at values below that available from of the 3200 then a short length of extension cable of which the resistance of the live + earth conductors have been measured by a 4 wire DMM can be used.

Generally however it is not necessary to calibrate at values below a normal supply. If 3 points spread across the instruments range can be achieved and the linearity can be verified it can be assumed that the zero will be correct. (The manufactures would after all have verified that the design is linear on the lowest part of the scale.)

Other Problems with calibrating Loop testers.

Loop tester measure resistance down to milli ohm levels using two wire connection, it is well understood that connection/lead resistance etc at this level make a significant difference's.

The instrument specifications assume all nice new clean contacts in to tightly fitting sockets, and we all know plugs, sockets etc get dirty and worn. This obviously increases the resistance which can easily put the instrument out of spec.

It is very difficult to achieve reliable 2 wire connection when measuring milli ohms, simply plugging in and out can change a connection resistance by 100milli ohms so this is the first place to look. Also check the lead is the same as the lead supplied with the instrument, even the fuse will make a difference.

The 3200 is supplied with good quality sockets to help maintain a low contact resistance, also the mains lead is directly connected to avoid another possible problem. It is however to be expected that variation in the order of ten's of milli ohms will be present in two wire systems.

The other main problem with loop testers is they often fail short circuit resulting in a big bang when plugged in. The 3200 first checks the tester for this by checking the current flowing with 1kohm in the earth line before a full power test. If the 3200 detects a faulty instrument the test is automatically aborted.

Calibrating LOOP Testers using the 3200

Loop testing using the 3200 is performed using a fixed set of resistance ranges, with auto (optional extra) and manual loop measurement.

■ Auto Loop Measurement

NOTE : Auto loop measurement is an optional extra specified when a 3200 is ordered.

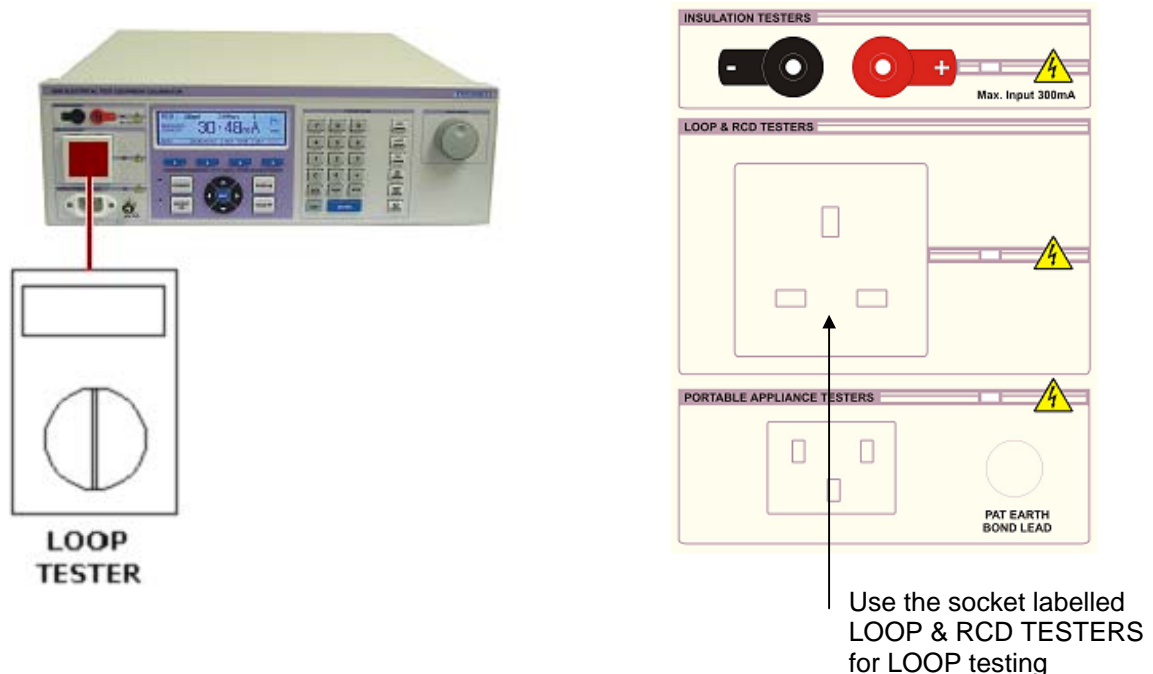
The auto loop measurement allows the 3200 to automatically measure the loop resistance of the mains supply to the 3200. **THE RESISTANCE MEASURED IS NOT THE RESISTANCE AT THE SOCKET INTO WHICH THE 3200 IS PLUGGED, BUT THE RESISTANCE AT THE TEST ADAPTER SOCKET INTO WHICH THE LOOP TESTER BEING CALIBRATED IS PLUGGED.** This measurement incorporates the resistance of the supplied adapter lead and the mains circuit to provide the value at the test socket.

The adapter lead is typically 23mOhms ± 3mOhms

The 3200 will then incorporate this value into its displayed loop resistance values.

■ Manual Loop Entry

This standard function allows the user to enter a loop resistance measurement manually by typing the figure in using the keyboard **NOTE THIS MUST BE THE VALUE OF THE LOOP RESISTANCE MEASURED AT THE TEST SOCKET.** The 3200 will then incorporate this value into its displayed loop resistance values.



Use the socket labelled
LOOP & RCD TESTERS
for LOOP testing

If tester does not operate correctly, carefully check rear panel fuses on the 3200 and replace with the correct rating if required.



When the TEST softkey is pressed on the 3200 front panel, the 3200 **pre-tests** the LOOP tester to detect faulty devices. Should a faulty device be detected the output will be automatically switched off and a fault message will be displayed on the 3200 display.

Step 1

Connect the LOOP tester to the LOOP & RCD TESTER socket

Step 2

Select 'LOOP' from the function key section of the 3200 front panel

Step 3

Use the 'SoftKeys' beneath the loop measurement modes to select the loop resistance measurement mode.

LOOP TESTING			
LOOP RESISTANCE	0.05Ω		
TEST	AUTO	MANUAL	

Step 4

Select the required resistance value using either the range up / range down buttons or by incrementing / decrementing the range using the digital Control. See 'Using the Digital Control' for more details.

Step 5

Press the 'TEST' softkey on the 3200 to apply mains to the LOOP tester

Step 6

Press the 'TEST' button on the LOOP tester to begin testing.

Step 7

Read the loop resistance from the display of the LOOP tester.



Notes on the LOOP Function

By incorporating the supply loop impedance into the displayed value, this allows direct comparison to the value displayed on the loop tester being calibrated. The resistance value displayed by the 3200 is comprised of the following :

1. The **measured value of the resistor** (as measured during 3200 calibration)
2. The **supply loop impedance**
(as measured and stored by the 3200 via the manual or auto loop function)

The loop impedance of a supply will change over time, therefore it is important that the loop impedance value is checked regularly by running the auto loop function or updating the manual loop resistance.

If the 3200 is moved to another location or plugged into a different socket, this will have an impact on the loop impedance – the auto loop function will need to be used or the specific socket's impedance measured and entered manually.

PSC (Prospective Short Circuit) Testing

Some LOOP / Installation testers have the capability to measure PSCC (Prospective Short Circuit Current) which is the largest Prospective Fault Current (PFC) which could flow.

This current is limited by the LOOP resistance of the circuit and can be calculated for either :

- Phase (Live) to Earth
- Phase (Live) to Phase (Neutral)

The more usual is Phase (Live) to Phase (Neutral)

The LOOP / Installation testers calculate this measurement from the measured LOOP resistance using the sum :

$$\text{PSCC} = \frac{\text{Nominal supply voltage}}{\text{LOOP Resistance}}$$

This function can be calibrated with the 3200 by using the LOOP function

The standard lead supplied with the 3200 will enable you to simulate Phase (Live) to Earth PSCC. If Phase (Live) to Phase (Neutral) PSCC testing is required, the lead detailed below will need to be made :



To calibrate, compare the reading obtained on the Installation tester with the value calculated from the formula above using the LOOP impedance displayed on the 3200.

Remote Programming

The RS232 interface

The calibrator can be fully controlled and calibrated via the bi-directional RS232 interface. The interface uses the standard 9 pin PC connector and a standard serial lead. The interface is fully optically isolated from the rest of the calibrator circuitry. Baud rate is fixed at 9600 baud, no parity and one stop bit which allows a complete output command to be sent in less than 20ms. The calibrator can send to the computer information about the output status, calibration factors, value of internal standards together with other information. The internal processor decodes the commands and returns control codes to verify the correct operation of that command. The calibrator can be sent individual commands directly from the Windows HYPER Terminal program, any basic or high level program or from the ProCal98 Calibration System.

Programming Commands

The 3200 is controlled by a set of simple high level commands.

Function	Command	Description
CONTINUITY TESTING	F1	Select the continuity function
	Sxx.xx	Set resistance value e.g. S12.3 for 12.3Ω
INSULATION TESTING	F2	Select the insulation function
	Sxxxx	Set resistance value e.g. S1000 for 1GΩ
INSULATION TEST VOLTAGE	F3	Select the insulation test voltage function
	R1	Set 50V range
	R2	Set 100V range
	R3	Set 250V range
	R4	Set 500V range
	R5	Set 1000V range
	L0	Set 1mA range
	L1	Set 500uA range
	T	Transmit measured values : Voltage in 100mV units : Current in 1uA units
INSULATION TESTER VOLTAGE MEASURE	F4	Select the insulation tester voltage measurement function
	R1	Set 100V range
	R2	Set 200V range
	R3	Set 240V range
	R4	Set 300V range
	R5	Set 400V range
		T

PAT : EARTH BOND RESISTANCE	F11	Select the insulation tester voltage measurement function
	R1	Set 0Ω range
	R2	Set 0.05Ω range
	R3	Set 0.1Ω range
	R4	Set 0.22Ω range
	R5	Set 0.33Ω range
	R6	Set 0.5Ω range
	R7	Set 1Ω range
	R8	Set 5Ω range
	R9	Set 10Ω range
	R10	Set 100Ω range
	R11	Set 1000Ω range
	R12	Set EXT 1 range
	R13	Set EXT 2 range
	T	Transmit output value in 1uΩ units.
	Zxxxxxx	Set calibration factor (1uΩ Units)

PAT : EARTH BOND CURRENT	F87	Select the PAT earth bond current menu
	R1	Set 100mA range
	R2	Set 10A range
	R3	Set 30A range
	F12	Start the PAT earth bond current test
	T	Transmit measured value in 1mA units.
	Zxxxxxx	Set calibration factor

PAT : INSULATION TESTING	F13	Select the PAT insulation testing function
	Sxxxx	Set resistance value e.g. S1000 for 1GΩ

PAT : LOAD TESTING	F14	Select the PAT load test function
	R1	Select 440Ω load between live and neutral
	R2	Select short circuit
	R3	Select open circuit

PAT : FLASH TESTING	F15	Select the PAT Flash testing function
	F58	Select the CLASS 1 [1.5kV] Flash test mode
	F59	Select the CLASS 2 [3kV] Flash test mode
	T	Transmit measured values Flash Current in 1uΩ units. Flash Voltage in 1V units

PAT : LEAKAGE TESTING	F16	Select the PAT leakage testing function
	R1	Set 240uA range
	R2	Set 1mA range
	R3	Set 3mA range
	T	Transmit measured value in 1uA units.

RCD	F85	Select the RCD trip current menu
	F86	Select the RCD trip time menu
	Sxxxx	Set trip current in mA or trip time in ms depending on menu displayed.
	F21	Start RCD test
	N	Send N0 to N3 for current multiplier N0 = 1/2 • N1=1x1 (default) • N2 = 1x2 • N3 = 1x5
	T	Transmit measured current in 10uA units
	F52	RCD timing mode menu
	N0	Zero crossing Mode
	N1	Immediate Mode
	A	Abort RCD test

RCD Internal Calibration Mode	F22	Set to RCD internal calibration mode
	Zxxxxxx	Set calibration factor (10uA Units)

RCD CURRENT DURATION	F85	Set to RCD internal calibration mode
	Sxxxx	Set trip current in mA
	F24	Start RCD current duration test
	T	Transmit current duration in 100us units
	A	Abort RCD current duration test

LOOP RESISTANCE	F31	Select the loop resistance function
	R1	Set 0Ω range
	R2	Set 0.05Ω range
	R3	Set 0.1Ω range
	R4	Set 0.22Ω range
	R5	Set 0.33Ω range
	R6	Set 0.5Ω range
	R7	Set 1Ω range
	R8	Set 5Ω range
	R9	Set 10Ω range
	R10	Set 100Ω range
	R11	Set 1000Ω range
	R12	Set EXT 1 range
	R13	Set EXT 2 range
	P	Switch on mains and start test (Incorporates pre-test for fault detection)
	T	Transmit output value (internal resistor value + loop resistance) in 1uΩ units (12 Chars) Transmit Mains Voltage in mV (12 Chars)
	F53	Command 3200 to measure its mains resistance
	F84	Select manual mains resistance menu
	Sx.xxx	Send manual mains resistance in ohms For use in conjunction with F84 command
	Zxxxxxx	Set calibration factor (uΩ)

MISCELLANEOUS COMMANDS	U	Transmit all calibration factors A1 to A20 : Insulation Test Voltage B21 to B40 : ACV Output C41 to C60 : Earth Bond Resistance D61 to D80 : Earth Bond Current E81 to E100 : RCD F101 to F120 : LOOP Resistance <u>G121 to G140: General</u> G121 : LOOP Resistance Load G122 : LOOP Resistance Voltage G123 : LOOP Resistance Offset G124 : RCD Relay Time G125 : Manual LOOP Offset G126 : Auto LOOP Offset G127 : Earth Bond Offset
	!	Reverse display mode
	&21xxxxxxxxxxxxx x	Store text string (16 chars max.)
	#	Display stored text string
	F80	Set 3200 back to main menu

Example command sequences

Note : A forward slash can be used to separate commands on a single line.

To set up the 3200 to Insulation mode, 1GΩ the following commands would be used :

F2/S1000	Set to 1GΩ Insulation
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To set up and execute a 10ms @ 100mA RCD test, the following commands would be used :

F85/S100	Set to 100mA trip current range
F86/S10	Set to 10ms trip time range
F21	Start test
T	Transmit measured current in 10uA units

To set up and execute a 10A PAT Earth Bond Current test, the following commands would be used :

F87/R2	Set to 10A earth bond current range
F12	Start test
T	Transmit measured current in 1mA units

Technical Description

General

The 3200 calibrator uses the latest in reference, resistor and processor technology designed to minimise cost and size yet maximise performance. The micro processor controls and monitors all functions of the calibrator. Calibration constants are held in non volatile memory allowing the calibration to be performed without removing the covers. There are no internal adjustments required in normal service.



Warning risk of shock



The line power cord must be disconnected before opening the instrument

The circuitry comprises of three printed circuit boards :

- Main PCB.
- Processor board
- Front Panel Display and keyboard control

Construction

The calibrator is constructed in a 3U 19" case. The calibrator is constructed is modular to allow easy of servicing.

Internal Fuses.

In normal operation these fuses should never need to be replaced.
Only under fault conditions will they require changing.

NOTE : To access these fuses it is necessary to dismantle the case which should only be carried out by an engineer. See removing top cover.



The line power cord must be disconnected before opening the instrument.

Internal fuses include :

± 12V Supply A/S 2Amp 20mm

Opening The Case



The line power cord must be disconnected before opening the instrument.

To gain access to the inside remove the six screws which hold the top cover in place. These are located on the underside edges of the 3200 calibrator. The two side screws on the plastic front panel must also be removed to allow the top cover to be slid back. Once these screws are removed, simply slide the top cover toward the rear of the instrument to remove.

Once the rear panel is removed the top or bottom cover can, if required, slide out allowing full access.

Access to Internal Fuses

After removing the top cover (see above) the fuses will be clearly visible.

PCB Removal (Not required to gain access to internal fuses).

The main PCB can only be removed from the front of the case by removing the front panel.

Processor Board

Plugs into the main PCB and controls all functions within the calibrator. The processor board is a complete working board containing RAM, PROM, Clock, Cal Ram, I/O and RS232. The processor also applies all calibration factors held in RAM. Cal Factors are stored twice to prevent errors. The processor runs a self test to detect malfunction and overloads.



Removal of the processor board may corrupt the calibration factors.

Calibration and Maintenance



The information in this section is intended only for qualified personnel. The user must at all times be adequately protected from electric shock.

General

The 3200 calibrator maintenance requirements are listed below. Please note that the calibrator **does not** require any regular internal servicing or adjustment.

- 1: Electrical Safety Checks on Line power lead and case
- 2: Cleaning the external case
- 3: Calibration and operation verifications

Electrical Safety Tests

These can be carried out as frequently as required. Only Earth bond can be tested as a class 1 standard. Insulation tests will fail due to the nature of the tests performed by the 3200. Flash testing is not recommended due to the possibility of damage to internal components.

Cleaning the external case

Use a damp cloth with a mild water based cleaner for the outside case and front panel. Do not use alcohol based cleaners or solvents and do not spill or allow liquid to enter the case.

Calibration Overview

The calibration of the 3200 calibrator can be performed covers on. Calibration factors for positive, negative and zero are store in non volatile memory for each range. Values for resistance will only need adjusting after repair.

Calibration can be carried out automatically via the RS232 interface if required. Adjustments to the calibration can only be made using the interface see remote commands section of this manual for details. A Calibration Control Panel (CCP) program is available from Transmille which allows full control and adjustment of the calibrator.

The recalibration of 3200 calibrator should be performed annually in a standards laboratory with the correct equipment. Adjustment should not be attempted without the required standards.

Before calibration it is important to have meet the conditions listed below

- 1: The correct environmental condition .
- 2: The calibrator must have fully warmed up and been allowed to stabilise for the correct period of time.
- 3: Operated from the correct line voltage.
- 4: To use the correct calibration equipment.
- 5: To have available the Correct Test leads required
- 6: To understand the required test specifications.
- 7: To operate the calibrator at all times within its load and voltage capabilities

COMPREHENSIVE CALIBRATION INSTRUCTIONS ARE AVAILABLE IN THE 3200 SERVICE MANUAL.

Guarantee and service

Transmille Ltd. guarantees this instrument to be free from defects under normal use and service for a period of 1 year from purchase. This guarantee applies only to the original purchaser and does not cover fuses, or any instrument which, in Transmille's opinion, has been modified, misused or subjected to abnormal handling or operating conditions.

Transmille's obligation under this guarantee is limited to replacement or repair of an instrument which is returned to Transmille within the warranty period. If Transmille determines that the fault has been caused by the purchaser, Transmille will contact the purchaser before proceeding with any repair.

To obtain repair under this guarantee the purchaser must send the instrument (carriage prepaid) and a description of the fault to Transmille at the address shown below. The instrument will be repaired at the factory and returned to the purchaser, carriage prepaid.

Note :

TRANSMILLE ASSUMES NO RESPONSIBILITY FOR DAMAGE IN TRANSIT

THIS GUARANTEE IS THE PURCHASER'S SOLE AND EXCLUSIVE GUARANTEE AND IS IN LEIU OF ANY OTHER GUARANTEE, EXPRESS OR IMPLIED. TRANSMILLE SHALL NOT BE LIABLE FOR ANY INCIDENTAL, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES OR LOSS.



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3200 Fax Back Form

Your 3200 Electrical Test Equipment Calibrator is fitted with a *security system* which requires a *security code* to be entered to allow continued operation of the unit beyond the 65 Day evaluation period.

Please complete the following details :

Company Name : _____

Contact Name : _____

Address : _____

Country : _____

Tel. : _____

Fax : _____

Instrument Model : 3200 Electrical Test Equipment Calibrator

Serial Number : _____

Please Fax This Form To : +44 (0) 1580 890711.

On receipt of this fax Transmille will, on receipt of payment for the calibrator, send details of the security code with details on how to enter this code.