

# INSTRUCTION MANUAL

Quality and reliability is our tradition

**DISTRIBUTOR**

92-1496

01-8

## **ROBIN ELECTRONICS LIMITED**

Precision Center  
Dwight Road, Watford, Herts  
WD18 9UA, England

☎ Sales Order Line 01923 218744  
☎ Administration Line 01923 232000  
Fax 01923 218898

---

DIGITAL INSULATION-CONTINUITY TESTER

---

**MODEL KMP**  
**3010DL, 3050DL, 3075DL**

**ROBIN**

## Contents

Safety. ....	1
Specification .....	3
Features and Principles of Measurement. ....	6
Instrument Layout .....	8
The Nature of Insulation Resistance .....	12
Preparation for Measurement .....	15
Insulation Resistance Testing .....	16
Continuity Testing .....	17
Battery and Fuse Replacement .....	18
Servicing&Calibration .....	19

## 1. A Word About Safety

Electricity can cause severe injuries even with low voltages or currents.

Therefore it is extremely important that you read the following information before using this Insulation Tester.

- 1.1** This instrument must only be used by a competent trained person and in strict accordance with the instructions. Robin Electronics will not accept liability for any damage or injury caused by misuse or non-compliance with instructions or safety procedures.
- 1.2** This instrument must not be used on live circuits. Ensure all circuits are de-energised before testing.
- 1.3** Never open the instrument case except for battery or fuse replacement.
- 1.4** Always inspect your Insulation Tester and test leads before use for any sign of abnormality or damage. If any abnormal conditions exist (broken test leads, cracked case, display faulty, inconsistent reading - etc) do not attempt to take any measurements. Return to Robin Electronics for rectification.
- 1.5** Never replace the protective fuse inside the instrument with any other than the specified or approved equal (0.5A/600V) fast acting ceramic to IEC 127.
- 1.6** This meter has been designed with your safety in mind. However, no design can completely protect against incorrect use. Electrical circuits can be dangerous and/or lethal when a lack of caution or poor safety practice is used. Use caution in the presence of voltages above 50V as these pose a shock hazard.
- 1.7** Pay attention to cautions and warnings which will inform you of potentially dangerous procedures.
- 1.8** Model KMP3010DL has a live circuit warning bleeper. If it is connected to a live circuit a rapid pulsating beep will be emitted. Do not press the test button and immediately disconnect the instrument from the circuit. Models KMP 3050DL and KMP 3075DL also have the same warning circuits but in addition, will display the value of external AC voltage along with a flashing symbol (⚡). The tone of the beep will be lower if there are no batteries in the instrument.
- 1.9** Never assume an installation circuit is not live. Confirm it is de - energised before commencing testing.

- 1.10** Replace worn and/or damaged leads with new ones approved by Robin Electronics immediately.
- 1.11** It is essential to understand and follow the safety rules contained in this manual. They must always be observed when using the instrument.
- 1.12** If at anytime during testing there is a momentary degradation of reading, this may be due to excessive transients or discharges on the system or local area. Should this be observed, the test should be repeated to obtain a correct reading. If in doubt always contact Robin Electronics.
- 1.13** Warning

This product is an insulation/continuity tester and is designed for use on de-energised systems. It incorporates voltage warning circuits in case of accidental connection to an AC voltage. On no account should the product be used to measure voltage. Voltages should be measured with a dedicated voltage measuring instrument and it is recommended that fused test leads are always used for personal safety when measuring such voltages especially on high energy circuits.

**Note:** This product is supplied with SL20 unfused leads.

These can be converted to fully fused types by attaching the optional SL40 fused module.

- 1.14** Users of this equipment and their employers are reminded that Health and Safety Legislation require them to carry out valid risk assessments of all electrical work so as to identify potential sources of electrical danger and risk of electrical injury such as from inadvertent short circuit. Where the assessments show that the risk is significant then the use of fused test leads constructed in accordance with the HSE guidance note GS38 Electrical Test Equipment for use by Electricians should be used.
- 1.15** Always keep your hands and fingers behind finger guards on test leads used with this instrument. For safety reasons always use the accessories approved by Robin. The use of other accessories is prohibited as they may not have the same safety features built in.

**Note:** Always auto null your test leads in the Trac mode (Model KMP3075) and not the Lok mode.

## 2. Specifications

### Insulation Resistance Measurement Specification

		KMP3050DL / KMP3075DL		
		KMP3010DL		
Test Voltage		250V	500V	1000V
Measuring Ranges		0 - 20M $\Omega$	0 - 20M $\Omega$	0 - 20M $\Omega$
		0 - 200M $\Omega$	0 - 200M $\Omega$	0 - 200M $\Omega$
		0 - 2000M $\Omega$	0 - 2000M $\Omega$	0 - 2000M $\Omega$
Nominal Output Voltage (U <sub>n</sub> )		250V dc min. at 0.25M $\Omega$	500V dc min. at 0.5M $\Omega$	1000V dc min. at 1M $\Omega$
Nominal Output Current (I <sub>n</sub> )		1mA dc min. at 0.25M $\Omega$	1mA dc min. at 0.5M $\Omega$	1mA dc min. at 1M $\Omega$
Intrinsic accuracy	20 M $\Omega$	$\pm(1.5\% \text{ rdg} + 5\text{dgt})$		
	200 M $\Omega$			
	2000 M $\Omega$	0 to 1G $\Omega$ 1G to 2G $\Omega$	$\pm(10\% \text{ rdg} + 3\text{dgt})$	$\pm(3\% \text{ rdg} + 3\text{dgt})$

### Continuity Resistance Measurement Specification

Measuring Ranges	0 - 20 $\Omega$	0 - 200 $\Omega$	0 - 2000 $\Omega$
Open circuit voltage (U <sub>q</sub> ) on the 20 $\Omega$ range	4 - 9V		
Nominal output current (I <sub>n</sub> ) on the 20 $\Omega$ range	200mA		
Intrinsic accuracy	$\pm(1.5\% \text{ rdg} + 5\text{dgt})$	$\pm(1.5\% \text{ rdg} + 3\text{dgt})$	

### Reference Conditions

- Ambient Temperature: 23  $\pm$  5°C
- Relative Humidity: 60  $\pm$  15%
- Supply Voltage: 9V
- Altitude: Less than 2000m

### Insulation Resistance Operating Error

Range	Operating Range Compliant with EN 61557-2 Operating Error
20M $\Omega$	0.2M $\Omega$ ~ 20M $\Omega$
200M $\Omega$	2M $\Omega$ ~ 200M $\Omega$
2000M $\Omega$	20M $\Omega$ ~ 1000M $\Omega$

### Continuity Resistance Operating Error

Range	Operating Range Compliant with EN 61557-4 Operating Error
20 $\Omega$	0.2 $\Omega$ ~ 20 $\Omega$
200 $\Omega$	10 $\Omega$ ~ 200 $\Omega$
2000 $\Omega$	100 $\Omega$ ~ 2000 $\Omega$

### The influencing variations used for calculating the Operating Error are:

- Operating Temperature: 0°C to 40°C
- Relative Humidity: 85% maximum
- Supply Voltage: 7V to 9V

### General Specification

- Storage Temperature: -10°C to 50°C
- Power Supply: 6 X 1.5 V batteries type R6 or equivalent
- Fuse (user replaceable): 500mA/600V fast acting ceramic
- Weight (minus batteries): KMP3010DL: 530 g  
KMP3050DL: 538 g  
KMP3075DL: 566 g

- Possible number of operations during battery life:  
When the following resistance is connected to a measuring terminal alternating between 5seconds loading and intervals of 25seconds, the number of measurements that it is possible to make, until the battery voltage falls 7.0V shall be:

250V Range 0.25M $\Omega$   
approx.1200 times or more

500V Range 0.5M $\Omega$   
approx.1200 times or more

1000V Range 1M $\Omega$   
approx.400 times or more

20 $\Omega$  Range 1 $\Omega$   
approx.300 times or more

### Applied Standards

- Operation: EN 61557-1/2/4
- Safety: EN61010 Cat.III 300V
- Protection: IEC60529 (IP40)

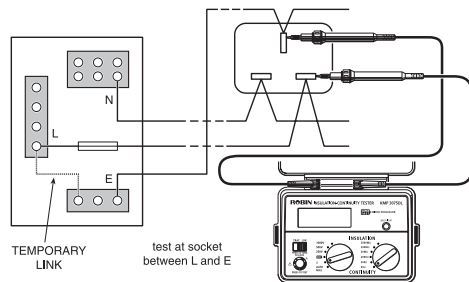
### Accessories

- SL20 Snap-Lok Test Leads
- Test Leads Pouch

### 3. Features and Principles of Measurement

#### 3.1 Features

- 3 1/2 Digit Microprocessor Controlled Insulation Tester
- Three Insulation test voltages 250V, 500V, 1000V (models KMP 3075DL, KMP 3050DL)
- Three continuity ranges, 20Ω, 200Ω and 2000Ω
- Trac-Lok and Backlight (Model KMP 3075DL)
- Three insulation resistance ranges 20MΩ, 200MΩ, 2000MΩ
- 200mA continuity short circuit test current
- 1mA test current at the minimum load on insulation ranges
- Bar graph indicates test voltage-rise and decay can be observed during insulation tests (Models KMP 3075DL and KMP 3050DL only)
- Warning of external voltage presence
- "Press to test" button with lock down feature  
Releasing the test button automatically discharges the capacitance of a circuit under test
- Auto null feature (Models KMP 3075DL and KMP 3050DL only)

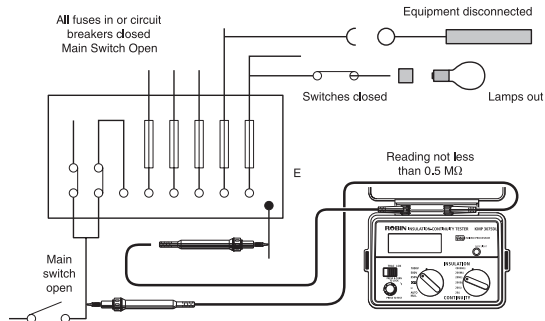


Typical arrangement for measuring the continuity of protective conductors. Before proceeding with tests conductors must be proved to be de-energised.

As an insulation tester the instrument is used to measure high values of resistance and hence the electrical quality of the insulating material within the circuit. Section 9 describes in more detail insulation measurement principles and potential sources of error.

#### 3.2 Principles of Measurement

An Insulation/Continuity Tester performs two basic functions. As a continuity tester the instrument can be used to measure low values of resistance between two points in an electrical circuit. In this mode the instrument acts as a low voltage current source. The resistance is calculated from the measurement of the voltage and current. Careful connection to the circuit under test is essential to avoid measurement errors. Circuits connected in parallel may also effect the accuracy of the measurement.



Note: Insulation testing must only be undertaken on de-energised circuits.

### 3. Instrument Layout

Fig.1

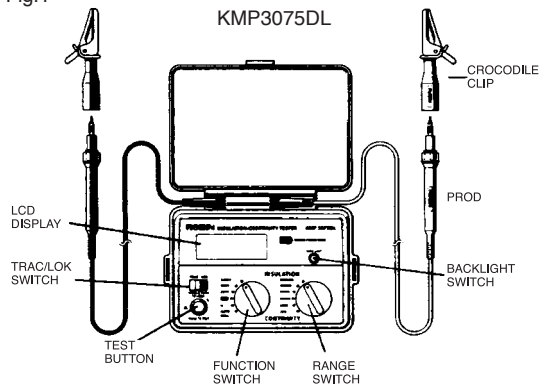


Fig.2

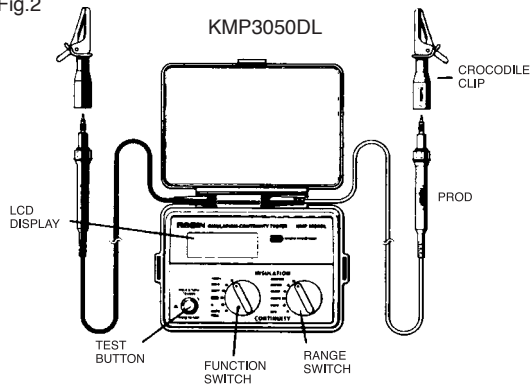


Fig.3

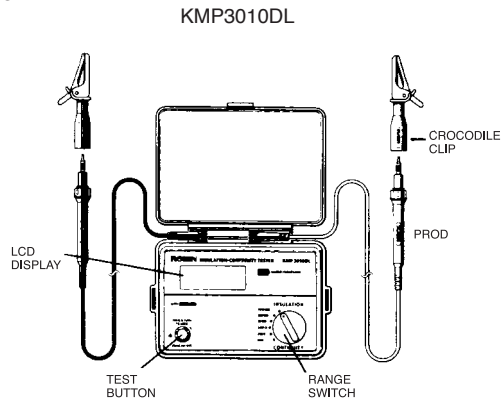


Fig.4

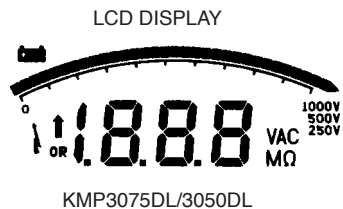


Fig.5



## 5. Functions

### 5.1 Trac-Lok Mode (Model KMP 3075DL)

Battery powered Insulation Testers have to transform a typically low DC voltage (9V) to a high voltage (500V/ 1000V). This puts an enormous drain on the batteries leading to a reduced operating life. With the advent of the 16th Edition Regulations and IEC Standards (IEC 364-6-61) a minimum 1mA current is now required on insulation tests and this means that more power is taken from the batteries.

Also, IEC Standards (IEC 364-6-61, HD 384) requires a test current of 200mA on the continuity ranges. The 16th edition guidance notes also specify minimum test currents and voltages. This again requires a very high output from the batteries.

Conventional Insulation Testers provide these test currents and voltages constantly for as long as the test button is depressed. Under constant use the batteries will soon fade especially if non-alkaline types are used. Robin have devised Trac-Lok circuits to conserve battery life on both Insulation and Continuity Testers. In Trac mode, the Insulation Tester behaves like ordinary testers. In Lok mode the test voltage is only generated for long enough to obtain a stable reading. It is then removed. This can be seen on the bar graph -at first the voltage rises, then a reading is obtained, then the bar graph decays to zero.

On the continuity/resistance ranges (20 $\Omega$ , 200 $\Omega$ , 2000 $\Omega$ ) the test current is removed once a stable reading is reached. There is no bar graph function on these ranges.

It is recommended that the Trac mode is used on circuits where capacitance is expected.

### 5.2 Bar Graph (Models KMP 3075DL and KMP 3050DL)

While conducting insulation resistance tests, the LCD will display the value of insulation resistance. The bar graph will display the DC test voltage present across the ends of the test leads. This means that the user can verify that the circuit is being stressed by the full DC test voltage (250V, 500V or 1000V).

For circuits that have a large capacitance the bar graph will rise more slowly than for those with low capacitance. When used in the Trac mode the bar graph will display the real time fluctuations in insulation test voltage and show breakdown. This can be used to indicate good and bad circuits as a rapidly fluctuating bar graph indicates unstable conditions.

### 5.3 Back Light (Model KMP 3075DL)

An Electroluminescent back light is provided to view the results in dimly lit areas.

### 5.4 Auto Null (models KMP 3075DL, KMP 3050DL)

When conducting continuity tests it is important to remember that the measured resistance includes the resistance of the test leads. An electronic leads null function is provided which automatically subtracts the test lead resistance before displaying the real continuity resistance value. A full description of how this feature can be used will be found in paragraph 10.2.

## 6. The Nature of Insulation Resistance

Live conductors are separated from each other and from earthed metal by insulation, which ensures that the current flowing between conductors and to earth is kept to an acceptably low level. In simple theory, insulation is perfect, so that its resistance is infinite and there is no current flow through it at all. In practice, there will always be a current between conductors and to earth. And this is known as leakage current. This current is made up of three components.

### 6.1 Capacitive Current

The insulation between conductors at different voltages behaves as the dielectric of a capacitor, the conductors behaving as the capacitor plates. When a direct voltage is applied to the conductors, charging current will flow to the system but will quickly die away (usually in much less than one second) as the effective capacitor becomes charged. If an alternating voltage is applied, there will be alternating charge and discharge currents so that there will be a continuous flow of alternating current to the conductors.

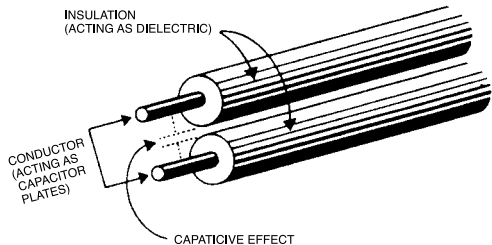


Fig.6

### 6.2 Conduction Current

The resistance of the insulation is not infinite, so a small current flows through it. Ohm's Law applies, so the leakage current can be found from:

$$\text{Leakage Current } (\mu\text{A}) = \frac{\text{applied voltage (V)}}{\text{insulation resistance (M}\Omega)}$$

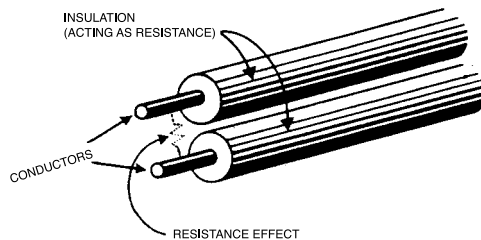


Fig.7

### 6.3 Surface Leakage Current

Where the insulation is removed, for connection of conductors and so on, current will flow across the surfaces between the bare conductors. If the surfaces are clean and dry, the amount of leakage current is very small indeed, but it may become significant in wet and dirty conditions.

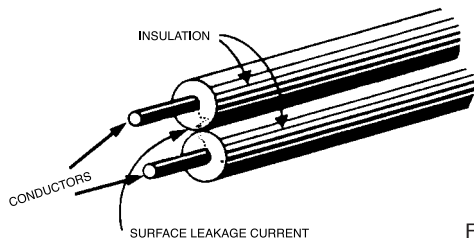


Fig.8



## 6.4 Total Leakage Current

The total leakage current is effectively the sum of the capacitive, conduction and surface leakage currents described above. Each current, and hence the total leakage current is affected by factors such as ambient temperature, conductor temperature, humidity and the applied level of voltage.

If a circuit is fed with an alternating voltage, the capacitive current (6.1) will always be present, and can never be eliminated. This is why direct voltage is applied to test insulation, the capacitive current quickly falling to zero so that it has no effect on the measurement. A high voltage is used because this will often break down poor insulation or surface leakage paths and thus show up insulation faults which would not be present at lower voltage levels. The insulation tester measures the applied voltage and the resulting leakage current flow, displaying the resistance which is obtained by an internal calculation based on Ohm's Law:

$$\text{Insulation Resistance (M}\Omega\text{)} = \frac{\text{Test Voltage (V)}}{\text{Leakage Current (}\mu\text{A)}}\text{}$$

As the effective capacitance of the system charges up, so the leakage current reduces. A steady insulation resistance reading indicates that the system capacitance is fully charged and that the capacitive component of current has fallen to zero. It should be noted that the system charges up to the test voltage used (250V, 500V, or 1000V). Thus, it can be dangerous for people or animals to make contact with an electrical installation which is under test. Even when the test voltage is removed, the wiring system may remain charged for a significant time unless steps are taken to provide a path for discharge current. All the testers in this range (KMP 3010DL, KMP 3050DL and KMP 3075DL) automatically connect a discharge resistor across the circuit when the test button is released to provide a path for discharge current.

If a wiring system is wet and/or dirty, the surface leakage component of test current will be high, giving a low insulation resistance reading. If an electrical installation is large, its individual circuit insulation resistances are all effectively connected in parallel, so that the total insulation resistance will be lower than that of each individual circuit. The greater the number of circuits connected, the lower will be the overall insulation resistance.

## 7. Models

### 7.1 KMP 3010DL

This is a single voltage (500V) Digital Insulation/Continuity Tester. A single rotary dial selects between 3 insulation resistance ranges and 3 continuity/resistance ranges.

### 7.2 KMP 3050DL

This is a triple voltage (250V, 500V, 1000V) Digital Insulation/Continuity Tester with auto null and bar graph.

### 7.3 KMP 3075DL

This has all the functions of the KMP 3050 and in addition has Trac-loc circuits and backlight display.

## 8. Preparation for Measurement

### 8.1 Before testing always check the following

The "battery low" indicator is not showing.  
There is no visual damage to the tester or test leads.  
Test Lead Continuity.  
Select the continuity function and 20 $\Omega$  range. Short the test leads together.  
An overrange (OR) indication will mean that the leads are faulty or instrument fuse is blown. (see fuse replacement section 12).

## 9. Insulation Resistance Testing

**Warning:** Insulation tests should be conducted on circuits that are de-energised. Ensure circuits are not live before commencing testing.

- 9.1 Select the required test voltage (250V, 500V or 1000V) by rotating the function dial. This is not required for model KMP 3010DL as it is a single 500V range tester.
- 9.2 Select the required range (20M $\Omega$ , 200M $\Omega$ , 2000M $\Omega$ ) by rotating the range selector.
- 9.3 Attach the test leads to the instrument and to the circuit to be tested. If the voltage warning bleeper sounds, do not press the test button and disconnect the instrument from the circuit. The circuit is live and should be de-energised before further testing. Models KMP 3050DL and KMP 3075DL also indicate the presence of external AC voltage on the LCD by showing a flashing symbol and the actual value of AC system voltage.
- 9.4 Select either Trac mode or Lok mode as required and press the test button.  
The value of insulation resistance in megohms will be displayed. The bar graph will display the insulation test voltage. If in Lok mode the bar graph will rise and then decay to zero with the insulation resistance reading remaining on the LCD for as long as the test button is depressed. The insulation test voltage is only applied for as long as indicated by the bar graph.

**Caution:** Never turn the function dial whilst the button is depressed. This may damage the instrument. Never touch the circuit under test during insulation testing.

When testing is complete ensure that the test button is released before the test leads are disconnected. This is because the system may be charged up and it must be allowed to discharge through the tester's internal discharge resistor.

For Models KMP 3050DL and KMP 3075DL (with bar graph) this discharge will be seen as a decaying bar graph.

## 10. Continuity Testing (Resistance Tests)

**Warning:** Ensure circuits are not live before commencing testing.

- 10.1 Select the continuity test by rotating the function dial. This is not required on model KMP 3010DL since it is a single range (500V) instrument.
- 10.2 Select the 20 $\Omega$  range by rotating the range selector and connect the test leads to the instrument. Short the tips of the leads. Press and hold down the test button by twisting it a quarter turn clockwise. The display will show the resistance of the test leads. This value should be noted and subtracted from continuity measurements if using model KMP 3010DL.  
Models KMP 3050DL and KMP 3075DL have an auto null function which enables the tester to automatically subtract this resistance before displaying the system continuity resistance. To enable this function, turn the function dial to the Auto null position whilst still pressing the test button and shorting the leads. Wait for the display to stabilise (at least 3 test bleeps)  
When this happens release the test button by turning it anti-clockwise and turn the function dial back to the continuity position. Whilst still shorting the test leads press the test button and ensure the display reads zero before proceeding. A flashing  $\Omega$  symbol on the display indicates that Autonull is on. Remember the auto null procedure has to be repeated if the tester function dial is switched to OFF or is rotated past the OFF position.
- 10.3 Connect the test leads to the circuit under test. Ensure the circuit is not live by checking that the live circuit bleeper does not sound. Models KMP 3050DL and KMP 3075DL will also indicate the value of external AC voltage (see section 9.3).
- 10.4 If the circuit is not live select either the Trac or Lok function and press the test button. Read the value of resistance from the LCD.

**Note:** On the 20 $\Omega$  range the end of test bleep has a lower tone for resistances less than approx. 5 $\Omega$ .

## 11. General

If at any time the display shows OR this means that the value being measured is greater than the range selected. Switch to a higher range in this case. The test button can be locked down for ease of use. Do not forget to release the test button first before disconnecting the test leads from the system otherwise the circuit may be left in a charged state. Model KMP 3075DL is provided with a back light. To switch on simply press the back light button. The back light will remain on for 40 seconds. Each Time the tester makes a measurement and updates the display end of test bleep will sound.

## 12. Battery and Fuse Replacement

**Caution:** Always disconnect the test leads from the instrument before attempting battery or fuse replacement.

### 12.1 Battery Replacement

When the LCD shows the low battery flag, the batteries need replacing. Six batteries (AA or equivalent) are required. Alkaline types are recommended. Open the battery compartment lid on the back of the instrument by unscrewing the metal screw. Detach the battery holster and replace all six batteries with new ones observing the correct polarity as marked on the holster. Close the battery compartment lid and replace the metal screw before using the tester.

### 12.2 Fuse Replacement

If the fuse has blown or is suspected of being faulty (see section 8.1) replace it using the recommended type or its approved equal-a quick blow ceramic fuse to IEC 127 is required. Open the battery compartment lid as per 12.1.

Remove the old fuse and replace with the new one. Screw the battery compartment lid back on before using the tester.

## 13. Servicing & Calibration

If this product needs cleaning use a damp cloth to wipe its surfaces. Do not use strong cleaning agents as these may damage the plastic surfaces. If this tester should fail to operate correctly, return to Robin Electronics marked for the attention of the Service Department, stating exact nature of fault. Make sure that:-

- Operating instructions have been followed
- Leads have been inspected
- Fuse has been checked
- Batteries have been checked
- The unit is returned with all accessory leads

Regular re-calibration is recommended for this instrument.

We recommend that with normal use this unit is calibrated at least once in every 12 month period. When the unit is due for re-calibration, return to Robin Electronics marked for the attention of the Calibration Department and be sure to include all accessory leads as they are part of the calibration procedure.

Robin reserve the right to change specifications and design without notice and without obligation.

## CASE, STRAP, SHOULDER-PAD AND TEST-LEAD POUCH ASSEMBLY

MEMO

Assemble the shoulder strap through the case lugs and the test-lead pouch in the following sequence:

