
ERT1557

Operating Instructions



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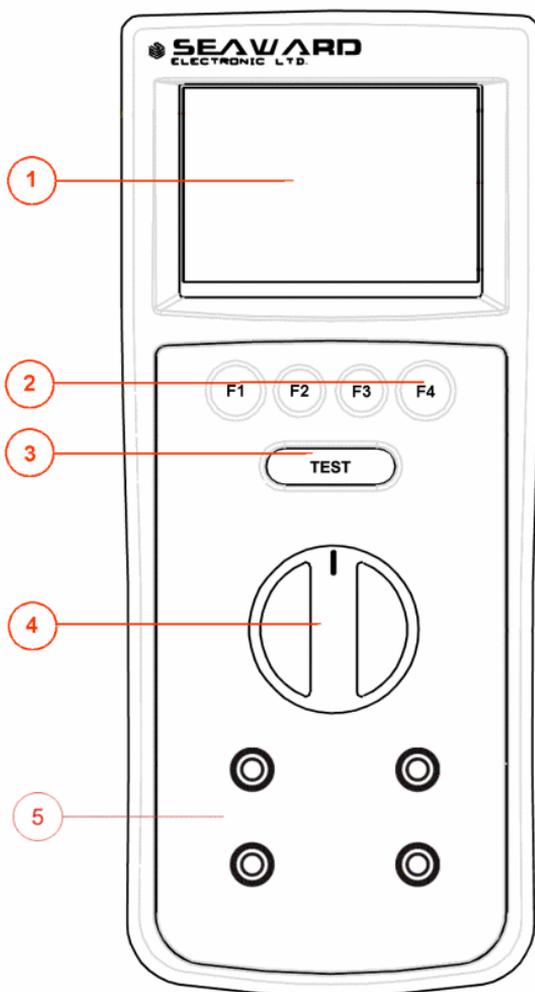


Figure 1 ERT 1557 Front View

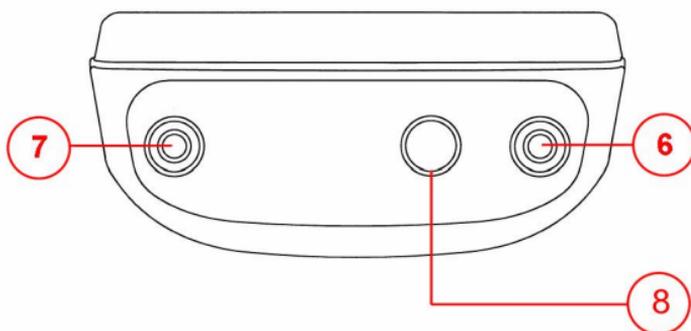


Figure 2 ERT 1557 End View

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Disposal of Old Product



This product has been designed and manufactured with high quality materials and components that can be recycled and reused.

When the crossed out wheeled bin symbol is attached to a product it means the product is covered by the European Directive 2002/96/EC.

Please familiarise yourself with the appropriate local separate collection system for electrical and electronic products.

Please dispose of this product according to local regulations. Do not dispose of this product along with normal waste material. The correct disposal of this product will help prevent potential negative consequences for the environment and human health.

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CERTIFICATE OF CONFORMITY

As the manufacturer of the apparatus listed, Seaward declare under our sole responsibility that the product:

ERT 1557

To which this declaration relates are in conformity with the relevant clauses of the following standard:

BS EN 61010-1:2001

Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements.

BS EN 61557-1, -5 :1997

Electrical safety in low voltage distribution systems up to 1000V a.c. and 1500V d.c. – Equipment for testing, measuring and monitoring of protective measures

BS EN 61326:1998

Electrical equipment for measurement, control and laboratory user-EMC Requirements

Performance: The instrument operates within specification when used under the conditions in the above standards EMC and Safety Standards.

The product identified above conforms to the requirements of Council Directive 89/336/EEC and 73/23 EEC.

Seaward Electronic Ltd is registered under BS EN ISO9001:2000 Certificate No: Q05356.

Introduction

The ERT 1557 is a fully featured earth resistance and soil resistivity tester, housed in a rugged PrimeTest series enclosure, and supplied complete with all necessary test leads and test spikes. The instrument will perform tests in accordance with BS7671 and IEC61557.

The instrument is capable of 2, 3 and 4 pole resistance measurement and earth resistance using a current clamp. Up to 500 measurements can be stored in memory, indexed via a simple reference numbering system. Results can be downloaded to PC.

1 User Notes

This instrument and its operating instructions are intended for use by adequately trained personnel.

The following symbols are used in these operating instructions and on the ERT 1557.



Warning of electrical danger!

Indicates instructions must be followed to avoid danger to persons.



Important, follow the documentation! This symbol indicates that the operating instructions must be adhered to in order to avoid danger.

2 Safety Notes

This ERT 1557 is fully compliant with the requirements of:

BS EN 61010-1: 2001.

BS EN 61557 part 1 and 5.

In order to ensure safe operation of this instrument, all notes and warnings in these instructions must be observed at all times.



The ERT 1557 has been designed to make measurements in a dry environment.



The ERT 1557 may be used to test circuits with a maximum overvoltage Category II, 300V AC/DC with reference to earth.



The ERT 1557 and all associated cables and leads must be checked for signs of damage before equipment is operated.

Where safe operation of the ERT 1557 is no longer possible it should be immediately shut down and secured to prevent accidental operation.

It must be assumed that safe operation is no longer possible:

- if the instrument or leads show visible signs of damage or
- the instrument does not function or
- after long periods of storage under adverse environmental conditions.



If the ERT 1557 is used in a manner not specified by this document then the protection provided by the equipment may be impaired.

3 Accessories

3.1 Standard Accessories

The ERT 1557 is supplied with the following items:

- 1 off ERT 1557 unit
- 1 off 5 m black test lead
- 1 off 20 m red test lead
- 1 off 5 m green test lead
- 1 off 20 m blue test lead
- 1 off USB to MiniDIN Lead Assembly
- 1 off Operating Instruction Manual
- 4 off test spikes

3.2 Optional Accessories

Current Clamp	Seaward Part No 278A923
Carry case	Seaward Part No 270A951



Do not open unit no serviceable parts

4 Unit Description

The ERT 1557 is a hand held, earth resistance tester. Tests are selected using the rotary switch.

4.1 Identifying parts of the unit

The numbering below refers to fig. 1 and fig. 2.

1. LCD Display
2. Function keys F1, F2, F3 and F4
3. TEST key
4. Rotary Switch
5. Test lead inputs Es, E, S and H
6. Current clamp input
7. Current clamp input
8. Data port

4.2 LCD display messages

Display	Meaning
>50k Ω	Result is above the measuring range for 2 and 3 point earth resistance
>2k Ω	Result is above the measuring range for current clamp earth resistance
>1999k Ω m	Result is above the measuring range for earth resistivity
▲	More than 20Veff noise present. The ERT 1557 is unable to make a measurement.
RP	The resistance between the Potential test spike and earth is too high.
RC	The resistance between the Current test spike and earth is too high.
No	Request cannot be executed e.g. result cannot be stored in a particular memory location or particular result cannot be recalled.
001	Memory location identifier
0.0.1	Measurement location identifier
Alternate E-ES/ES-S	The ES and E connections are reversed. Correct the problem to proceed
Stor	Storing result
RCL	Recalling result
Prt	Downloading data mode

Clr	Deleting a result from memory
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4.3 Keypad operation

Key	Function
F1	Increase numerical value
F4 + F1	Recall data from memory
F2	Decrease numerical value
F4 + F2	Save result to memory
F3	Select distance between test spikes.
F4 + F3	Clear memory
TEST	Start measurement

5 Using the ERT 1557

5.1 Power On

To turn the ERT 1557 on simply rotate the rotary switch to the required test type.

5.2 Battery Health Check

The ERT 1557 will automatically perform battery health checks prior to a test performing.

Note: When the battery symbol is flashing all tests will be inhibited and the batteries should be replaced as described in section 8.4.



Do not connect any voltage or power source to the current clamp inputs. Damage to the ERT 1557 will occur.

5.3 RA 3 Pole



Always ensure that the circuit under test is <math><30\text{Vrms}</math>.

5.3.1 Rotate the rotary switch until the RA 3pole test is selected.

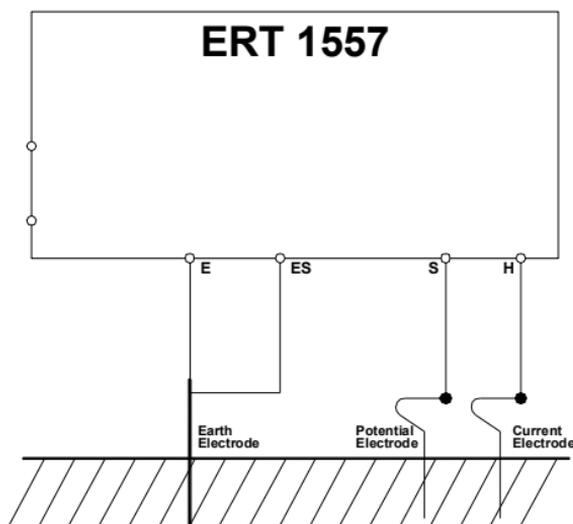


Figure 3

- 5.3.2 Connect the Es and E test leads to the test point.
- 5.3.3 Connect the H and S test leads to the 2 test spikes as shown in figure 3.
- 5.3.4 Press and release the TEST key. The measured resistance will appear on the LCD after a few seconds. To save the result, refer to section 6.2.

5.4 R_A Using current clamp



Always ensure that the circuit under test is $<30V_{rms}$.

- 5.4.1 Rotate the rotary switch until the R_A test is selected.
- 5.4.2 Connect the Es and E test leads to the test point.
- 5.4.3 Connect the H and S test leads to the 2 test spikes as shown in figure 4.

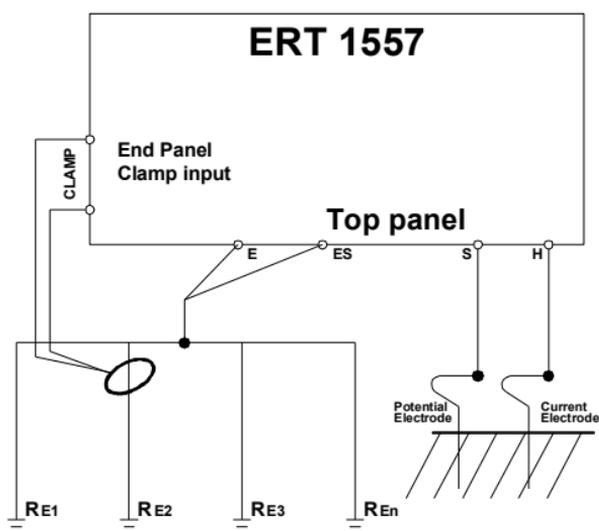


Figure 4

5.4.4 Press and release the TEST key. The measured resistance will appear on the LCD after a few seconds. To save the result, refer to section 6.2.

5.5 RA 4 Pole

5.5.1 Rotate the rotary switch until the R_A 4pole test is selected.

5.5.2 Connect the Es, E, H and S test leads to the test spikes.

5.5.3 Insert the test spikes into the ground in the order E, Es, S and H. Ensure the spikes are equi-spaced.

5.5.4 Input the appropriate distance between the test spikes into the ERT1557 by pressing the F3 (Distance) function key. Press F1 (Δ) or F2 (∇) function keys to either increment or decrement the distance, in metres.

5.5.5 To perform the soil resistivity test press and release the TEST function key.

5.5.6 The measured soil resistivity will appear on the LCD after a few seconds. To save the result, refer to section 6.2

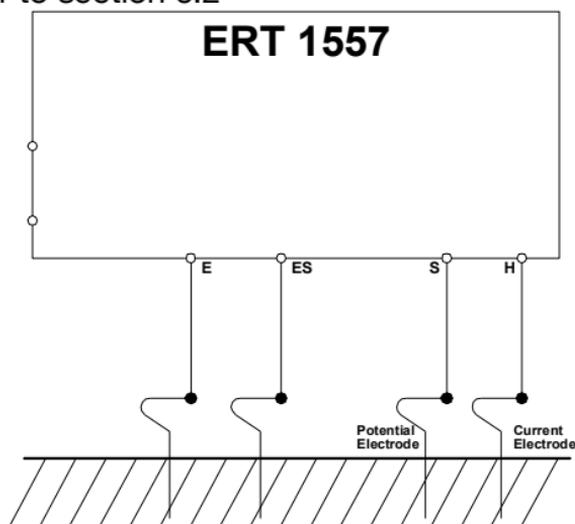


Figure 5

6 Memory Functions

6.1 Memory locations

All memory locations are allocated a unique index number that is comprised of an identification code, object identification number and measuring place.

Function code numbers are:-

- 1 = R_A Two-point & Three-point test
- 2 = R_A  Clamp System Earth Resistance test
- 3 = R_A Soil Resistivity test

Object identification numbers can be selected between **001** and **999**.

Measuring place can be selected between **0.0.1** and **9.9.9**.

6.2 Storing results

- 6.2.1. Begin test measurement, the value of the measured resistance is displayed on LCD.
- 6.2.2. To store the result displayed on the LCD press the F4 (shift) + F2 (save) function keys to enter the storage mode. As an indication the small object identification number is displayed on the LCD.
- 6.2.3. Press F1 (Δ) or F2 (∇) function keys to select the desired object identification number.
- 6.2.4. Press F4 (Shift) + F2 (∇) function keys once again to select the measuring place number.
- 6.2.5. Press F1 (Δ) or F2 (∇) function keys to select the desired measuring place.



Each test resistance result can only be stored once at any selected object identification number or measuring place. If an attempt is made to store a result in a location already utilised the LCD displays **no**.

- 6.2.6. Press F4 (Shift) + F2 (∇) function keys once again to save the test result under both the selected object identification number and measuring place. The LCD displays **Stor** on the viewing screen before storing the resistance value.

6.3 Recalling Results

- 6.3.1. To Recall a stored result press F4 (Shift) + F1 (Recall) function keys to enter recall mode. As an indication the small object identification number and **RCL** are displayed in the bottom right hand corner of the LCD.
- 6.3.2. Press F1 (Δ) or F2 (∇) function keys to select the desired object identification number.
- 6.3.3. Press (F4) Shift + F1 (Recall) function keys once again to select the measuring place field.
- 6.3.4. Press F4 (Shift) + F2 (∇) function keys once again to select the measuring place number.
- 6.3.5. Press (F4) Shift + F1 (Recall) function keys once again to recall the result at the selected memory location and identified by both the selected object code and measuring place number.
- 6.3.6. The LCD display firstly indicates the function test code for one second, **followed by the optional distance measurement (a requirement of the R_A  Clamp test)** followed by the stored earth resistance value.

- 6.3.7. If there are no stored results in the selected memory location then a message **no** is displayed on the LCD.
- 6.3.8. Repeat step 6.3.1 to recall results from other memory locations.

6.4 Erasing individual results

- 6.4.1. Press F4 (Shift) + F1 (Recall) function keys to enter recall mode. As an indication the small object identification number and **RCL** are displayed in the bottom right hand corner of the LCD.
- 6.4.2. Press F1 (Δ) or F2 (∇) function keys to select the desired object identification number.
- 6.4.3. Press (F4) Shift + F1 (Recall) function keys once again to select the measuring place field.
- 6.4.4. Press F4 (Shift) + F2 (∇) function keys once again to select the measuring place number.
- 6.4.5. Press F4 (Shift) +F3 (Distance) function keys to clear the displayed earth resistance. The LCD display will indicate **Clr**.
- 6.4.6. When an attempt is made to clear a memory location where no result is stored then the message **no** is displayed on the LCD.

6.5 Clearing all the memory

- 6.5.1. Select the rotary switch to Data Clear position.
- 6.5.2. Press F4 (Shift) +F3 (Distance) function keys to clear all memory locations. As an indication message **Clr** starts blinking on the LCD display.
- 6.5.3. Press F4 (Shift) +F3 (Distance) function keys once again to erase the whole memory. The LCD

display goes blank indicating that erasing of memory is in progress. Once the memory is erased a message **Clr** is indicated on the display.

7 Download Function

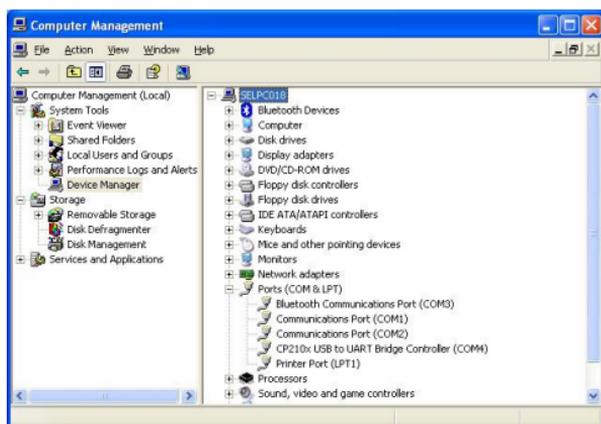
To download data the operator must connect the ERT1557 to a computer using the supplied USB to miniDin connector and the hyper terminal communications program supplied with the computer.



Always ensure that the USB cable assembly is not connected to a computer before performing any of the test functions available with an ERT 1557.

7.1 COM Port Identification

- 7.1.1 Identification of the COM port, utilised by the ERT1557, is dependent on the operating system used by that computer.
- 7.1.2 The following is a guide for a computer with an XP operating system and should be viewed for reference only where computers with alternative operating systems are employed.
- 7.1.3 Right click on the **My Computer** icon from the computer desktop menu. Select the **Manage** function from the displayed list.
- 7.1.4 Select **Device Manager** from the **Computer Management** pop up box. From the list of devices select **Ports (COM & LPT)**.



- 7.1.5 Identify the COM port associated with **CP210x USB to UART Bridge Controller**. This is COM4, in the example shown.

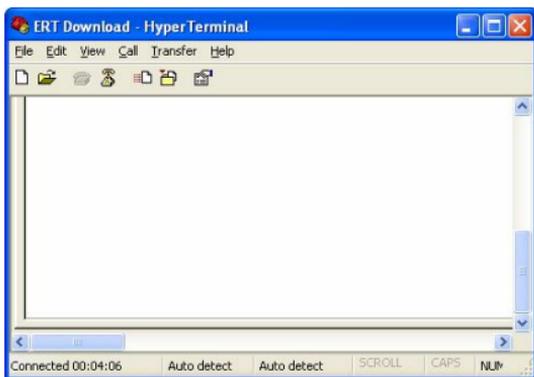
7.2 Hyper Terminal Setup Procedure

- 7.2.1. Install the USB driver provided as part of the supplied accessories on a PC (Depending on the computer operating system).
- 7.2.2 Some computer operating systems are not supplied with the hyper terminal program. In this case the program can be downloaded free from the internet.
- 7.2.2 Open the hyper terminal communications program on the PC (Path:-start / All Programs / Accessories / Communications / HyperTerminal).
- 7.2.3 Enter the name of the hyper terminal connection e.g. ERT Download. Click on the **OK** prompt softkey and select the appropriate COM port to which the USB is connected. Click on the **OK** prompt softkey.
- 7.2.4 Hyper Terminal configuration port settings are:-

Baud Rate	4800 Bps
No of Data bits	8
Parity	None
Stop bit	1
Flow Control	None

Click on the **OK** Prompt softkey.

- 7.2.5 The following screen is displayed on the PC monitor.

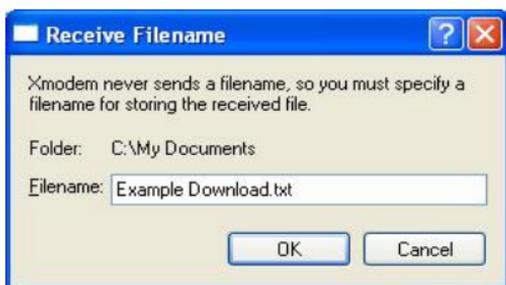


7.3 Download Data

- 7.3.1 Select the Data Send function on the rotary switch. As an indication **Prt** is displayed on the LCD display.
- 7.3.2 Select **Transfer** pull-down menu in the hyper terminal window. Select the **Receive File** option.
- 7.3.3 Using the **Browse** softkey select the destination folder where the data file in the ERT1557 can be stored. Use the **receiving protocol** drop-down box to select the Xmodem protocol from the available list.



- 7.3.4 Click on the **Receive** prompt softkey and enter a filename that the ERT1557 data will be stored within.



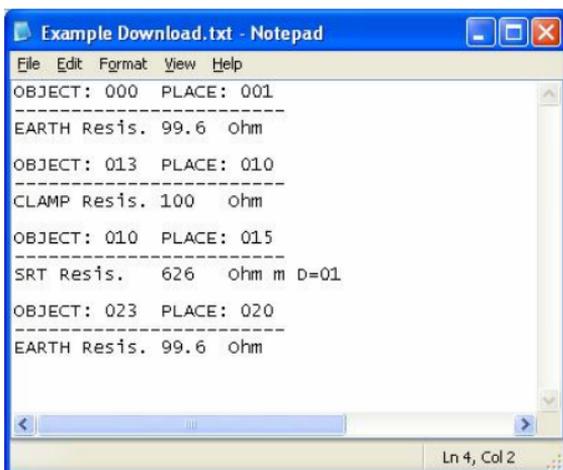
7.3.5 Press the TEST button on the ERT1557 then click on the **OK** prompt softkey. The data file from the ERT1557 is now downloaded to the previously specified file Example Download.txt.

7.3.6 The Xmodem window is displayed during downloading of data and closed on successful completion of the download function.

7.4 View Download Data

7.4.1 The operator can now access the data download file specified in 7.2.4.

7.4.2 The data is displayed in the format indicated below



7.4.3 Where **OBJ** and **PLACE** represent the object identification number and measuring place respectively. These identify the memory location where the result has been stored.

7.4.4 **Earth Resis** identifies the 2 and 3 point earth resistance test method.

7.4.5 **Clamp Resis** identifies the earth resistance clamp test method.

7.4.6. **SRT Resis** identifies the soil Resistivity test method.

7.4.7 Where **D** is the repeatable distance between all earth spikes in metres. E.g. **D = 01** specifies a distance of 1 metre.

8 Electrical Specifications

8.1 Earth Resistance Two/Three Pole Method

Display Range	0.00Ω to 50.0kΩ	
Measurement Ranges	0Ω - 19.99Ω 20Ω - 199.9Ω 200Ω - 199.9Ω 1.00KΩ - 9.99KΩ 10.0KΩ - 50.0KΩ	Resolution 0.01Ω Resolution 0.1Ω Resolution 1Ω Resolution 10Ω Resolution 100Ω
Accuracy	2% ± 2 counts from 0Ω - 999Ω 5% ± 2 counts from 1.00kΩ - 50.0kΩ	
Measuring frequency	125 Hz ± 1Hz	
Measuring current	<20mA effective	
Measuring voltage	<30V effective sine wave	
Distortion	Max 5V p-p / 50Hz	

8.2 Earth Resistance Current Clamp Method

Display Range	0.00Ω to 2.0kΩ	
Measurement Ranges	0.5Ω - 19.9Ω 20Ω - 999Ω 1.00Ω - 2.00kΩ	Resolution 0.1Ω Resolution 1Ω Resolution 10Ω
Accuracy	5% + 2 counts	
Measuring frequency	125 Hz ± 1Hz	
Measuring current	<20mA effective	
Measuring voltage	<30V effective sine wave	
Distortion	Max 5V p-p / 50Hz	
Note: the stated accuracy of the earth resistance current clamp method does not include errors introduced by the current clamp		

8.3 Specific Earth Resistance

Display Range	0.00 Ω m to 320k Ω m
Measurement Ranges	0 Ω m – 19.99 Ω m Resolution 0.01 Ω m 20 Ω m – 199.9 Ω m Resolution 0.1 Ω m 200 Ω m - 999 Ω m Resolution 1 Ω m 1.00k Ω m – 9.99k Ω m Resolution 10 Ω m 10.00k Ω m – 99.9k Ω m Resolution 100 Ω m 100k Ω m – 320k Ω m Resolution 1k Ω m
Accuracy	2% \pm 2 counts 0 Ω m – 6.3k Ω m 5% 6.3k Ω m – 320k Ω m
Measuring frequency	125 Hz \pm 1Hz
Measuring current	<20mA effective
Measuring voltage	<30V effective sine wave
Distortion	Max 5V p-p / 50Hz

9 Environmental Conditions

- 9.1 The ERT 1557 has been designed to perform tests and measurements in a dry environment.
- 9.2 Maximum barometric elevation for making measurements is 2000M.
- 9.3 Overvoltage category IEC 60664/IEC 61010, 300V Category II.
- 9.4 Pollution degree 2 according to IEC 61010-1.
- 9.5 Protective system IP40 according to IEC 60529.
- 9.6 Electromagnetic compatibility (EMC). Interference immunity and emitted interference conforming to IEC 61326-1.
- 9.7 Operating temperature range of 0°C to 40°C, without moisture condensation.
- 9.8 The ERT 1557 can be stored at any temperature in the range -25°C to +65°C (relative humidity up to 90%). The batteries should be taken out of the instrument for storage.
- 9.9 Operating Altitude 0 to 2000 metres

10 Maintenance

10.1 Securing the ERT 1557

Under certain conditions safe operation of the ERT 1557 can no longer be assumed:

- 10.1.1 Visible damage of the instrument case.
- 10.1.2 Incorrect measurement results.
- 10.1.3 Recognisable abuse to the instrument due to prolonged storage under improper conditions.
- 10.1.4 Recognisable abuse to the instrument due to extraordinary transportation stress.
- 10.1.5 Check the battery compartment for signs of battery electrolyte leakage.
- 10.1.6 In these cases, the ERT 1557 should be immediately switched off, disconnected from any test or measurement function and secured to prevent any further use.

10.2 Cleaning

- 10.2.1 Clean the external case of the ERT 1557 with a clean dry cloth.
- 10.2.1 Avoid using solvents and abrasive scouring agents to clean the external case of the ERT 1557.
- 10.2.3 Check the battery contacts and compartment are free of electrolytic contamination.
- 10.2.4 Any contamination of the battery contacts or compartment should be cleaned with a dry cloth.

10.3 Battery Replacement



Before opening the ERT1557 ensure that it is disconnected from all voltages! Electric shock danger!

- 10.3.1 Power the unit off by selecting the Off position on the rotary switch.
- 10.3.2 Disconnect all the test leads from the unit
- 10.3.3 Position the ERT 1557 face down and release the captive screw in the battery compartment cover.
- 10.3.4 Remove the battery compartment cover.
- 10.3.5 Remove the discharged batteries from the compartment.
- 10.3.6 Fit a new set of alkaline batteries.
- 10.3.7 Relocate the battery cover over the battery compartment and fasten in position with the battery cover captive screw.

10.4 Service and Calibration.

To maintain the specified accuracy of the measurement results, the instrument must be recalibrated at regular intervals by either the manufacturer or an authorised Seaward Service Agent. We recommend a recalibration period of one year.

10.5 Spare Parts.

	Seaward Part No.
Test Cable Kit	44B167
USB to MiniDIN Lead Assembly	362W505
Carrying Case	270A951

For Service and Calibration contact:

Service Department
Seaward Electronic
Bracken Hill
South West Industrial Estate
Peterlee
Co Durham SR8 2SW
England

Tel: 0191 5878739 / 0191 5878737

Email: service@seaward.co.uk

