

REVO TEST SYSTEM MANUAL V1.02



1999 PSION COMPUTERS PLC.

Introduction

To avoid the possibility of test equipment malfunction it must be used in a benign electromagnetic environment. Strong radiating devices, such as mobile phones, must not be used in the vicinity of the product as they may cause a temporary disturbance. This test equipment must be used in a static-free environment. Using static dissipative surfaces on the test bench below the equipment and ensuring that operators are discharged by means of static wristbands, prior to using the equipment, can provide such an environment. Static dissipative surfaces and wristbands can be obtained from your local component stockists.

Note; unlike earlier Psion products, the test system for Revo is not identical to the final test unit used in the manufacturing environment.

The Revo Test system has been designed specifically for service and repair of the product. The design process was driven by a need for a low cost, easy to use solution to the testing and configuration of products under repair, wherever possible, off the shelf items have been utilised.

The Revo Test System EEPROM overview

The series 5 and its derivatives' (Such as the Revo and Series 5mx) main PCB contain an EEPROM, known as E2 or the 'e squared' chip, this device is used to store certain configuration settings for the device's hardware.

Some of these options are hard coded during the manufacturing circuit and function testing, these settings cannot be changed and include part of the electronically stored version of the serial number.

For Revo the remaining settings are coded by a combination of built in tests and configuration routine (digitiser calibration and localisation parameters) and an additional application that runs on a Windows PC.

PCB spares are shipped in a generic form, the Test system can be used to 'localise' the PCB, carry across the electronic serial number and calibrate the digitiser.

Failure to correctly configure any Series 5 derivative with a new PCB can result in: -

- Digitiser drift.
- Incorrect keyboard driver selection.
- Incorrect language selection
- Failure to operate with incorrect language ROM.

And specifically with a standard Series 5;

- Running slower than expected.

Therefore it is essential to understand the use of the Revo test and config system in order to perform effective repairs. Also note that replacing the PCB can only be carried out if you follow the procedures explained in the revo service manual in conjunction with the reconfiguration instructions in this manual.

Commonly used abbreviations

Throughout this manual these abbreviations will be used

- UUT – **U**nit **U**nder **T**est (the machine you are testing.)
- LCD – **L**iquid **C**rystal **D**isplay.
- PCB – **P**rinted **C**ircuit **B**oard

Modes of Operation

There are two facilities that the system can provide.

Test routines allow verification of unit operation in accordance with design specification.

Configuration routines allow an operator to reconfigure revo to operate correctly in regards to language and keyboard selection and digitiser calibration. In addition the ability to transfer the electronically stored serial number to a new PCB after replacement.

Revo test tools

The revo test kit (part number 1079000101) contains additional hardware to enable you to perform some of the tests required to validate that revo is operating correctly.

The kit consists of

1. Jet Eye IrDA pod type no: ESI9680B
2. Loopback box for above with DC power input
3. RS232 loop back assembly
4. Standard Docking Cradle (2 off)
5. DC Jack lead for above
6. Digitiser calibration Fixture

The following items are required but not provided with the test kit.

7. Bench Supply with integral ammeter:

Suggested Model: TTI TS30V/2A series.

Farnell components Stock No: 666-830

8. DC Power Supply for IrDA:

Suggested Model: Regulated 9V 900mA.

Farnell components Stock No: 605-372

In addition you must download the **WWS revo EEPROM editor** from the closed website.

Detailed Self-Test Specification

The self-tests (also known as the built-in self-tests or BIST) reside within the product. These may be accessed when the product boots into 'test' mode. The following section outlines all tests included in BIST.

Note; Tests marked as "Manufacturing FTU only" are not for use in service and repair as they require an expensive and difficult to use industrial test unit which does not provide any additional functionality.

Use of Built in tests and testing tools

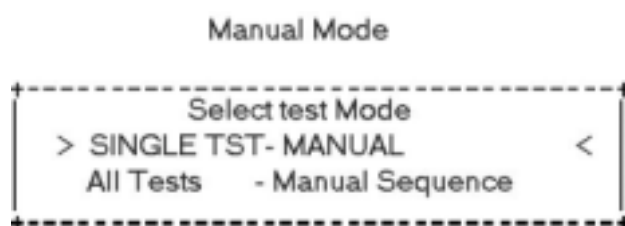
The revo service test and configuration system can be used in many ways. Compared to older test units that have been used for repair of Psion products it is low cost and very simple to use.

Designed with repair in mind this system consists of built in test software and some tools and testing devices. There is no test sequence that must be followed and any individual test can be carried out without needing to perform any other test. This allows service engineers to 'home in' on the reported unit problem and verify the fault very quickly before embarking on expensive investigative procedures involving stripping the unit.

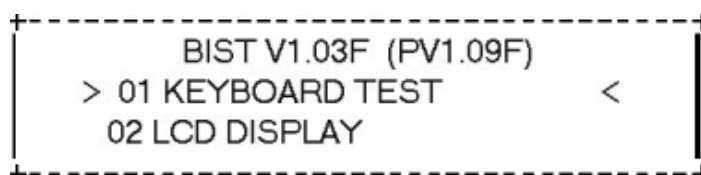
Some of the tests listed below require the use of additional tools, most of which are included in the revo service test kit. As most of these items are 'off the shelf' the ability to buy in extra tools for testing purposes has been provided. In fact there are only 3 items in the test toolkit that are custom built, and two of these items can be made by any competent service engineer. Only the digitiser calibration tool, one of the custom tools in the kit, requires specialist manufacturing techniques. This means that additional test equipment can be added to any service center at very low cost, even to one test kit per engineer.

BIST Menu

The main BIST menu is shown in the following illustration;



To access the individual tests select 'SINGLE TST- MANUAL' and press enter. You will now see a screen like this;



Select the test you wish to perform, press enter and follow the onscreen instructions where appropriate.

Tests.

Each of the following tests can be found in the BIST manual mode menu, pressing enter will activate the test.

NOTE; read the following descriptions carefully, some of the following tests are unsuitable for service use, and some tests require the use of additional tools.

In order to invoke the BIST (built in self-test) in manual mode, simultaneously press the “5”, “1”, “RIGHT ARROW” and “esc/on” keys after performing a soft reset.

Keyboard

Displays a keyboard map on the display. Press each key in turn. If no key is pressed within a time-out period (5 sec), fail with time-out error.

LCD Display

Displays a test pattern and waits for a key-press from the operator to return to the main menu.

Assess quality of screen image

LCD Contrast Max

Displays a test pattern at maximum contrast, wait, for a key-press from the operator to return to the main menu.

Assess quality of screen image, darker than normal.

LCD Contrast Min

Displays a test pattern at minimum contrast, waits for a key-press from the operator to return to the main menu.

Assess quality of screen image, lighter than normal.

Case switch

Checks state of case switch, display a message to the operator to close the UUT.

Check case switch state, ensure that an Open-Closed transition takes place. If no transition noted, time-out after 5 seconds.

Return “DATA” followed by case switch state.

Speaker Tone

Generates a tone on UUT’s speaker.

Assess quality of sound output.

Speaker DTMF

Generate DTMF sounds on UUT’s speaker.

Assess quality of sound output.

Enter standby

Enter standby mode.

ROM Checksum

Perform a checksum on the ROM.

Return “PASS” if ROM checksum OK.

Return “FAIL” if ROM fails checksum check + lower ROM checksum + upper ROM checksum.

e.g. “FAIL\r\n12345678ABCDEF12”

EEPROM Read

Read contents of the EEPROM. (64 Words).

Return “FAIL” if unable to read EEPROM.

Return “DATA” followed by contents of EEPROM.

e.g. “DATA\r\n 00h 83h 44h” (contents sent in binary format).

RS232 TX

Manufacturing FTU only

RS232 RX

Manufacturing FTU only

IrDA TX

Manufacturing FTU only

IrDA RX

Manufacturing FTU only

RS232 CTS/DSR/DCD

Manufacturing FTU only

RS232 RTS

Manufacturing FTU only

RS232 DTR

Manufacturing FTU only

RAM Write & verify

Allocate the largest possible block of RAM. Write a test pattern to the block, read and verify.

Return "PASS" on successful verification.

Return "FAIL" if unable to carry out verification.

Always return size of the allocated memory block.

e.g. "PASS\r\n08102022"

EEPROM Serial Number

Read contents of the EEPROM, convert into 17 character serial number.

Return "FAIL" if unable to read EEPROM.

Return "DATA" followed by 17 character serial number.

E.g. "DATA\r\nMA921A647024P150A" (serial number sent in ASCII format).

Handshake

Manufacturing FTU only

Machine information

Check RAM size. Check ROM size. Check that keyboard table exists. Check that language table exists. Determine language version. Check ROM version.

Results will be displayed on the screen.

Reset Machine

Perform a software reset of the machine.

EEPROM Write

Write 64 16bit words to the EEPROM.

Return "PASS" if successful.

Return "FAIL" if unable to write, or bad data is received.

EEPROM Localisation

Set Keyboard and Language localisation data in the EEPROM.

Return "PASS" if successful.

Return "FAIL" if unable to write, or bad data is received.

The table below shows the correct numbers to enter for each product variant.

Keyboard and language defaults to 0 in a language specific ROM.

For English ROMs use the following values to initiate the correct Language and Keyboard layout

There is an error in the EEprom editor and it will not display the correct language except for UK English.

Note: These values apply to Version 106(343) or 106(353)

UK	0	0
Nordic	1	1
USA	2	2

DC Jack detect

Detect status of DC jack.

Return "DATA" followed by state of DC jack.

"DATA\r\n1" DC Jack detected.

"DATA\r\n0" DC Jack not detected.

Display message

Manufacturing FTU only

Version

Returns the version of the current BIST DLL.

Inhibit charge

Activation this test forces revo out of fast charge and into top up charge mode.

Attach the unit to the metered power supply and instigate this test the current draw should drop to around 72 mA.

Hotsync Detect

Manufacturing FTU only

Battery Capacity

Measures battery capacity.

Return "DATA" followed by battery capacity in percentage.

e.g. "DATA\r\n00100"

Battery Charge/Discharge Cycle

Carry out battery charge/discharge cycle testing.

This is a very time consuming test and should only be carried out in cases where battery charge/discharge operation is suspected as the cause of a fault in the unit. Current measurements should be performed prior to this test and charging should be carried out using the metered power supply to verify correct current draw during the charging cycle.

Digitiser Read

Perform a raw read of the digitiser.

Returns "FAIL" on timeout or failure to read the digitiser.

Returns "DATA" on successful read of the digitiser followed by the raw digitiser keypresses.

e.g. "DATA\r\n02110:01201\r\n00124:02001\r\n" for 2 digitiser presses.

E2PROM Gas Gauge Read

Read the contents of the Gas Gauge (BQ2018) registers.

Returns "FAIL" on failure to read contents of gas gauge.

Returns "DATA" followed by 128 bytes of data on successful read of gas gauge.

RS232 Loopback

Before performing this test, attach the RS232 loopback box to the end of a docking station, and place the UUT on the docking station.

Send data out on Tx, try to read it in on Rx.

If successful then also check loopback of control lines

Returns FAIL if any lines fail loopback

Returns PASS if all lines are looped back

IrDA Loopback

Before performing this test, attach the IrDA loopback box to the end of a docking station, attach the IrDA power supply to the

IrDA loopback box and place the UUT on the docking station.

Send out data and try to read it back in

Returns FAIL if any lines fail loopback

Returns PASS if all lines are looped back

Digitiser Calibration

Before beginning this test/configuration routine the following points must be noted. This test has two modes, calibration and verification. Calibration will alter the E2 chip in the UUT and must be performed correctly. Failure to do so may result in digitiser problems. The calibration can be redone as many times as necessary.

Verification mode digitiser calibration may be used as a diagnostic tool.

This test requires the use of the digitiser calibration fixture, this should be placed on the UUT before instigating the test.

User input required

[MODE]:A/B (A is calibration mode (default), B is verification mode)

Display points to be prodded

Accept points if within acceptable range

Work out offsets and scales.

If calibration mode enabled :-

Display cross hair for comparison with calibration tool

Waits for space to be pressed for pass, or any other key to fail

PASS or FAIL User must decide if crosshair matches calibration tool. Pass modifies the digitiser calibration bit in the E squared.

Configuration Setup

Manufacturing FTU only



Attach the digitiser calibration fixture and operate digitiser calibration from the BIST manual mode menu.



Connect the RS232 loop back assembly to one end of the standard docking cradle. Activate the RS232 loopback test from the BIST manual mode menu.



Connect the Jet Eye IrDA pod to one side of the IrDA loopback box, connect the other side to the docking cradle. Insert the DC Power Supply, set to 6v, end pin +ve. Operate IrDA loopback test from BIST manual mode menu.



Bench Supply with integral ammeter and DC Jack lead.

Set to 6v 600mA, attach to either the docking cradle or directly to the unit. Measure charge current, use the inhibit charge test from BIST manual mode menu to force UUT into top up charged.

Current measurements

Apply 6v to the DC Jack input

Measure Fast Charge current (assumes Revo is in Standby, otherwise add 25mA)

	<i>Min</i>	<i>Max</i>
Fast Charge	450mA	520mA
Trickle Charge	20mA	30mA

On connecting to DC supply the machine ALWAYS goes into FAST charge. It will remain in this state until the battery reaches a certain charge. If it is already in this state it will take approx 5 mins to detect that it is already there. Usually a max time of 10 minutes.

After FAST charge it switches to TOP OFF and will remain in TOP OFF for 5hrs 20mins typical. Note it does not take this long to reach 100% from 84% charge. But it is in TOP OFF for 5hrs.

After 5hrs 20mins typical, it will switch to TRICKLE in which it will remain for ever if the DC stays connected forever.

NB: the Flashing ICON remains in the charge animation mode as long as the measured CHARGE current is greater than 15mA. Hence it only stops when in TRICKLE. NB: it can take a good minute for the measured CHARGE current to change as it is an AVERAGE of a number of readings.

The currents shown are difficult to state as max / mins. They are dependant upon the state of the battery within the unit. Guide lines are as follows.

1. Switching the unit ON will take approx 25-30mA more than when in STANDBY.
2. The docking station lead length causes a small volt drop when FAST charging (due to 0.5 AMP) and reduces the charge current by typically 30'ish mA. (That's what I've seen).
3. A completely flat battery may in FAST charge take 500mA (+ 30mA if ON) when initially charge. This would reduce within 5 minutes to typically 465'ish. A completely charged battery may take 410mA when in FAST charge.
4. Typical TOP OFF current is 70mA if ON, 40'ish if in Standby.

Built in self test manual mode menu tests

Overview

In order to invoke the BIST (built in self-test) in manual mode, simultaneously press the "5", "1", "RIGHT ARROW" and "esc/on" keys after performing a soft reset.

Test overview and numbering.

Test Number	Test Name	Used By
0	Keyboard Test	Manufacturing and Service
1	LCD Display	Manufacturing and Service
2	LCD Display (Max Contrast)	Manufacturing and Service
3	LCD Display (Min Contrast)	Manufacturing and Service
4	Case Switch	Manufacturing and Service
5	Speaker Tone	Manufacturing and Service
6	Speaker DTMF	Manufacturing and Service
7	Enter Standby	Manufacturing and Service
8	ROM Checksum	Manufacturing and Service
9	E2PROM Read	Manufacturing and Service
10	RS232 TX	Manufacturing only
11	RS232 RX	Manufacturing only
12	IrDA TX	Manufacturing only
13	IrDA RX	Manufacturing only
14	RS232 CTS/DSR/DCD	Manufacturing only
15	RS232 RTS	Manufacturing only
16	RS232 DTR	Manufacturing only
17	RAM Write & Verify	Manufacturing and Service
18	EEPROM Serial Number	Manufacturing and Service
19	Handshake	Manufacturing only
20	Machine Information	Manufacturing and Service
21	Reset	Manufacturing and Service
22	EEPROM Write	Manufacturing and Service
23	EEPROM Localise	Manufacturing and Service
24	DC Jack Detect	Manufacturing and Service
25	Display Message	Manufacturing only
26	Version	Manufacturing and Service
27	Inhibit Charge	Manufacturing and Service
28	Hotsync Detect	Manufacturing only
29	Battery Capacity	Manufacturing and Service
30	Battery Charge/Discharge Cycle	Manufacturing and Service
31	Digitiser Read	Manufacturing and Service
32	Gas Gauge Read	Manufacturing and Service
33	RS232 Loopback	Manufacturing and Service
34	IrDA Loopback	Manufacturing and Service
35	Digitiser Calibration	Manufacturing and Service
36	Configuration Setup	Manufacturing only