



# DPOAE TEOAE DEVICE



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CORTI  
**SERVICE MANUAL**

**Title:** GSI Corti™ OAE Instrument Service Manual

**EC | REP**

Grason-Stadler (GSI)  
c/o DGS Diagnostic A/S  
Audiometer Alle 1,  
5500 Middelfart  
Denmark

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**Compliance**

The CE 0123 mark identifies compliance with the Medical Device Directive 93/42/EEC. Grason-Stadler is an ISO 13485 certified corporation.



**Caution:** US Federal law restricts this device to sale by or on the order of a physician or licensed hearing care professional.

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## Foreword

Service on the GSI Corti must be performed by a technician qualified by Grason-Stadler, Inc. (GSI). The warranty will be voided if the instrument or the probe is disassembled by non-qualified personnel. Use of unauthorized replacement parts will void the warranty. All parts used for repair or replacement must be original factory parts or those specified otherwise in this manual. In order to maintain the quality operation of the instrument, the procedures used for testing or repair must be performed exactly as described in this manual.

Please verify on a regular basis that the service manual being used is the most current revision available. If problems are encountered that are not described in this manual the device must be returned to Grason-Stadler, Inc.

All repairs returned to GSI must be accompanied by appropriate customer and product documentation such as the Service / Repair Request Form.

## Precautions

### Warning – Electrostatic Sensitive Device



The internal components of the Corti Instrument are ESD sensitive. Proper handling is required. The instrument should only be opened and serviced at an ESD safe workstation.

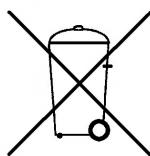
### Warning – Battery Safety



This instrument contains a rechargeable lithium-ion battery. Batteries may explode or cause burns, if disassembled, crushed or exposed to fire or high temperatures.

**Replace battery only with the STK number listed in this document.**

### Recycling / Disposal



Many local laws and regulations require special procedures to recycle or dispose of electrical equipment-related waste including lithium-ion batteries, printed circuit boards, electronic components, wiring and other elements of electronic devices. Follow all your respective local laws and regulations for the proper disposal of lithium-ion batteries and any other parts of this system.

### Electrical Safety, EMC and Associated Standards

UL 60601-1: Medical Electrical Equipment, Part 1 General Requirements for Safety

IEC/EN 60601-1: Medical Electrical Equipment, Part 1 General Requirements for Safety

CAN/CSA-C22.2 No. 60601-1: Medical Electrical Equipment, Part 1 General Requirements for Safety Electrical Equipment for Laboratory Use

IEC/EN 60601-1-1: Collateral Standard, Safety Requirements for Medical Electrical Systems

IEC/EN 60601-1-2: Medical Electrical Equipment, Part 1 - Electromagnetic Compatibility - Requirements and Tests

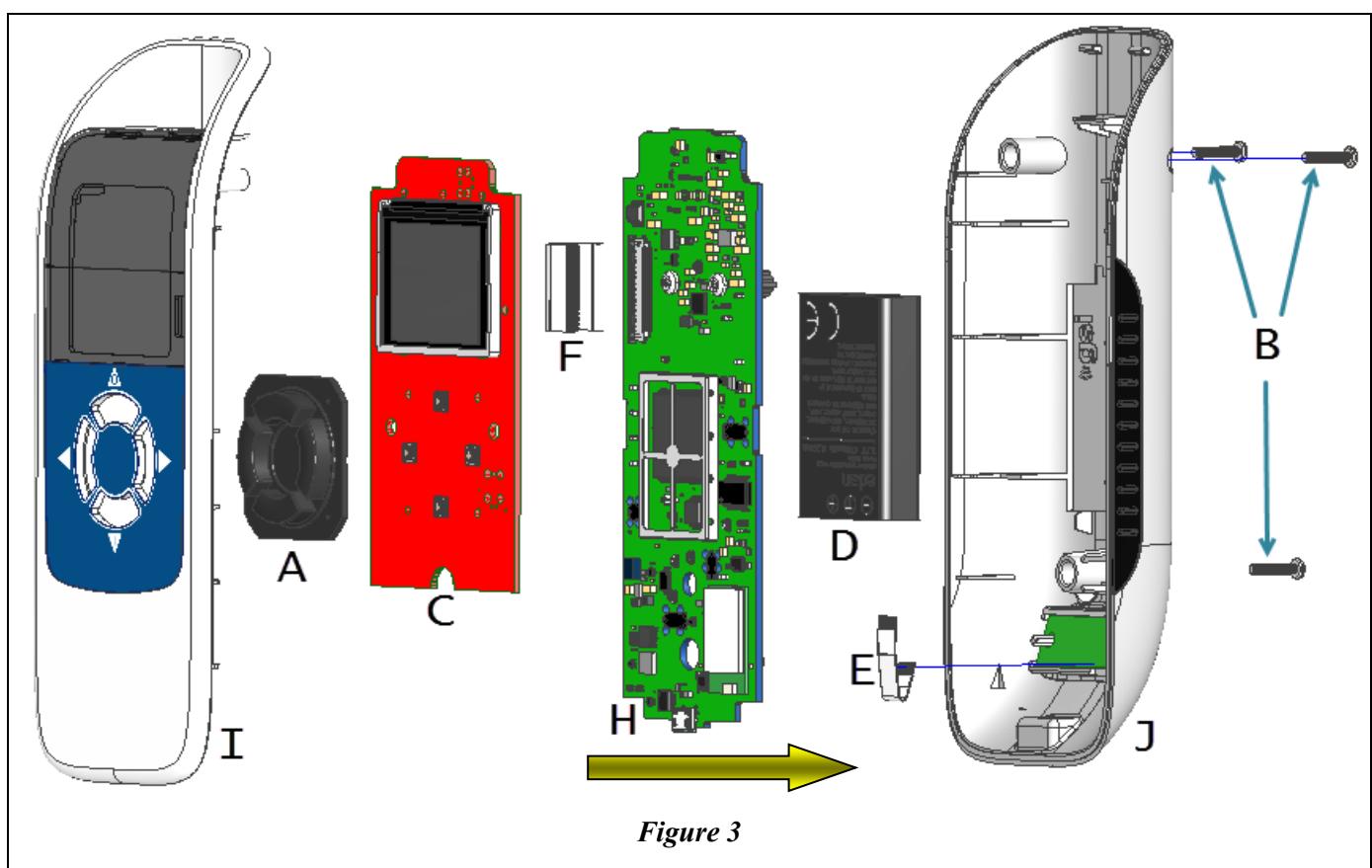
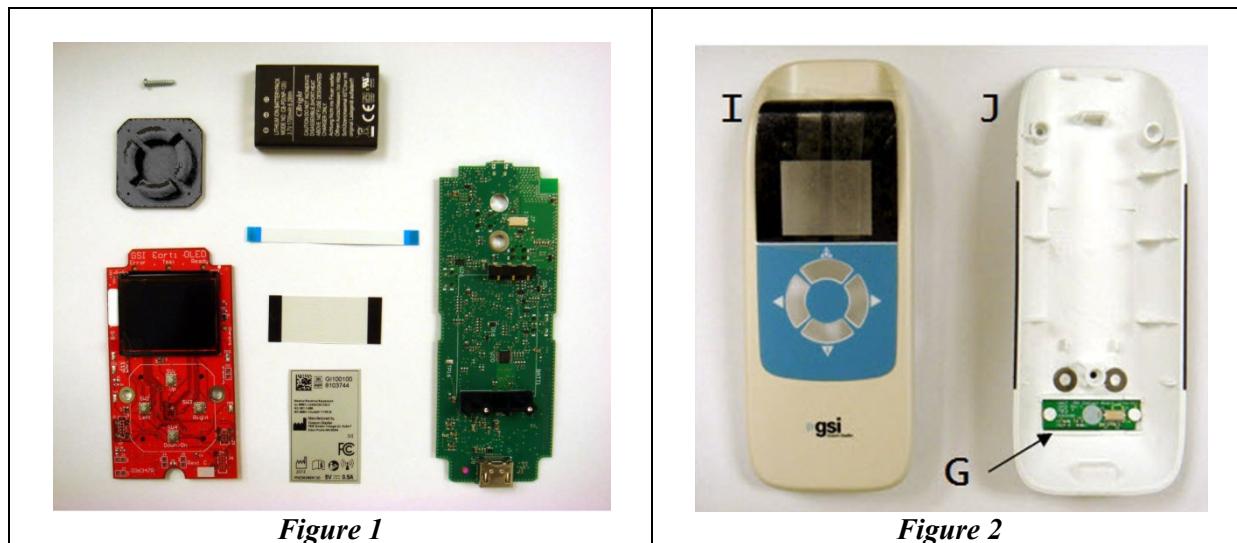
Essential Requirements of the current European Union Medical Device Directive 93/42/EEC

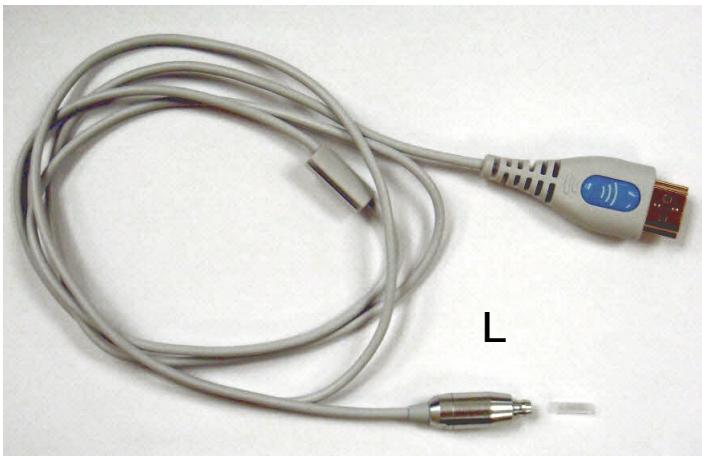
RoHS (Restriction of the use of certain Hazardous Substance)

## Component Listing and Location Views

Not all of the parts listed below are available to field service locations due to the complexity of some service processes and their required test capabilities. Any parts used to service a GSI Corti system must be obtained from the manufacturer or a manufacturer approved vendor. Use of unapproved parts will void the instrument warranty and may yield an instrument that does not meet the requirements for acceptable service.

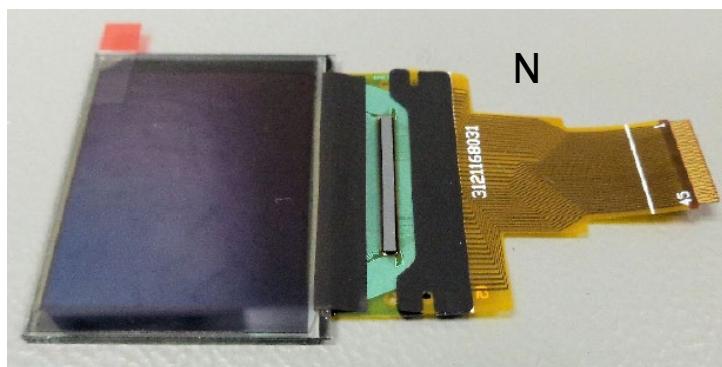
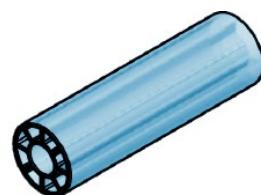
Item	STK	QTY	Part	Part Description
A	8104851	1	Switch Keypad for GSI Instrument	Keypad
B	8104852	3	Screw, M2.5 x 12 mm, Torx T8 head	Housing Screw
C	8104853	1	PC Board User Interface for GSI Instrument with color display	UI Board with display
D	8104854	1	Battery NP120 3.7V 1700 mAh UL RoHS Li-Ion	Li-Ion Battery
E	8104855	1	Ribbon Cable 76 mm	12-Pin Ribbon Cable (main to contact board)
F	8104856	1	Ribbon Cable 30 mm	40-Pin Ribbon Cable (main to UI board)
G	8104857	1	No part number (location reference only)	Contact Board
H	8104858	1	PC Board Primary for GSI Instrument with battery retainer	Main Board Assembly
I	8104859	1	Housing Top Assembly for GSI Instrument with overlay and lens RoHS PC/ABS	Top Housing, overlay and lens
J	8104860	1	Housing Bottom Assembly for GSI Instrument with side grips, contact board PCB and washers RoHS PC/ABS	Bottom Housing with contact board
K	8105203	1	Label for GSI Instrument Serial number and bar code UL	Instrument Serial Label
L	8103763	1	GSI Instrument Micro-Probe	Micro-Probe
M	8104159	1	Probe Tube, bag of 100	Probe Tube
N	8516541	1	OLED Display with ribbon	OLED Display with ribbon cable
O	8515473	1	PSU 5V, USB Micro-B	Power Supply (not pictured)





*Probe Tube (enlarged)*

M



*Figure 4*

## Instrument Troubleshooting

1. During operation the battery CHARGE indicator repeats two fast blinks followed by a pause.
  - This indicates a low-battery condition. Recharge the battery by connecting the Micro-USB port on the bottom of the instrument to the GSI approved power supply or to a computer using the supplied USB-A to Micro-USB cable. For more details regarding the CHARGE indicator illumination states refer to the “Battery Charging” section of the User Manual.
2. The battery CHARGE indicator continuously blinks fast.
  - Disconnect unit from Micro-USB and turn unit off. Reconnect the Micro-USB and continue normal charging phase.
  - If fast blinking persists, replace the Battery (see Service Procedures and use Part 8104854).
3. The battery CHARGE indicator does not illuminate during the charging phase.
  - The USB-A-to-Micro-USB cable may have failed. Replace the cable.
  - Only use a GSI approved power supply. If one is not available then connect to a PC USB for charging.
  - If CHARGE indicator still does not illuminate then change the Main Board Assembly (see Service Procedures and use Part 8104858).
4. Battery is not charging.
  - The battery finishes charging but does not hold a charge. Replace the Battery (see Service Procedures and use Part 8104854)
  - The battery never finishes charging. Replace the Battery (see Service Procedures and use Part 8104854).
  - The CHARGE indicator continuously blinks fast. Replace the Battery (see Service Procedures and use Part 8104854).
5. Instrument does not keep time or date correctly.
  - Recharge the battery by connecting the Micro-USB port on the bottom of the instrument to the GSI approved power supply or to a computer using the supplied USB-A to Micro-USB cable. When fully charged, set the current time and date. Turn off the instrument for about 5 minutes and then turn it back on. If the time has not advanced then change the Main Board Assembly (see Service Procedures using Part 8104858).
  - If battery is not holding charge replace the Battery (see Service Procedures using Part 8104854).

6. Display does not work correctly.

- Recharge the battery by connecting the Micro-USB port on the bottom of the instrument to the GSI approved power supply or to a computer using the supplied USB-A to Micro-USB cable. When fully charged check the display again.
- If neither the LED, nor the LCD functions, then change the UI Board or OLED Display.
- If the problem persists after changing the UI Board Assembly the problem could be the 40 Pin Ribbon Cable (see Service Procedures and use Part 8104856).

7. Buttons do not activate instrument correctly.

- Recharge the battery and verify the problem.
- If key presses are still not registering correctly then several causes should be investigated in the following suggested order:
  - UI Board Assembly (Part 8104853)
  - 40 Pin Ribbon Cable (Part 8104856)
  - Main Board Assembly (Part 8104858)

8. Instrument does not turn on.

- Recharge the battery and verify the problem.
- If the instrument still does not turn on then several causes should be investigated in the following suggested order:
  - Battery (Part 8104854)
  - Main Board Assembly (Part 8104858)
  - 40 Pin Ribbon Cable (Part 8104856)
  - UI Board Assembly (Part 8104853)

9. Instrument does not auto-start.

- Check to make sure the probe tip is installed properly. Reference “Probe Tube Replacement” in the User Manual and replace the Probe Tube if damaged (Part 8104159).
- Listen for the auto-start tones being emitted from the probe. If the tones are not present or the sound level is low, the probe tip could be impeded. Replace the Probe Tube (Part 8104159).
- If the instrument still does not auto-start then the microphone or probe cable is defective and the Probe will have to be replaced (Part 8103763).

10. Instrument does not print.

- a. Printer is not responding.
  - Bluetooth pairing may have been lost.
  - Perform the “Bluetooth Device Pairing” procedure outlined in the User Manual.
  - Exchange the printer with another printer to dismiss any printer related problem.

- If the instrument still does not communicate, change the Main Board Assembly (see Service Procedures and use Part 8104858).
  - b. Printer prints erroneous characters.
    - Cycle power on the printer and perform the “Bluetooth Device Pairing” procedure outlined in the User Manual.
    - Exchange the printer with another printer to dismiss any printer related problem.
    - If it is determined that the printer is the problem it may need a firmware update.
11. Broken or damaged case parts.
- Change the Top Housing Assembly or the Bottom Housing and Bottom Sticker (Parts 8104859, 8104860 and 8105203).
12. Probe does not function properly.
- Turn off the instrument, disconnect the probe and inspect the HDMI-style connector for wear or damage. If the cable or connector is damaged then replace the Probe (Part 8103763).
  - If the probe connector is damaged it is possible that an “Attach Probe” message will be generated when attempting to start a test. The probe is not serviceable and will have to be replaced (Part 8103763).
  - The probe tube may have cerumen or other debris impeding the sound channels. Replace the Probe Tube (Part 8104159).
  - Hold the probe tube near your ear and listen for the tones during the autostart phase of the test sequence. If no tones are heard or they are intermittent when flexing the probe cable, replace the Probe tube (Part 8104159).

# Service Procedures

The following procedures explain how to open and service the handheld instrument. The service procedures should only be completed when recommended by the troubleshooting section above. The tools required are listed below. Proper ESD protection must be used when servicing internal components. When the handheld unit has been opened for servicing or the probe has been replaced, testing and calibration procedures must be performed to verify proper operation. The proper torque settings for the screws are listed in the table below.

## Recommended Tools

Torque Limiting Screwdriver with #8 TORX bit

Tweezers

ESD protected work area

## Torque Settings

SCREW TYPE	LOCATION USED	TORQUE RANGE
M2.5 mm x 12 mm, Torx T8 head	Handheld Housing	4.1 lbf-in to 4.8 lbf-in .46 N·m to .54 N·m



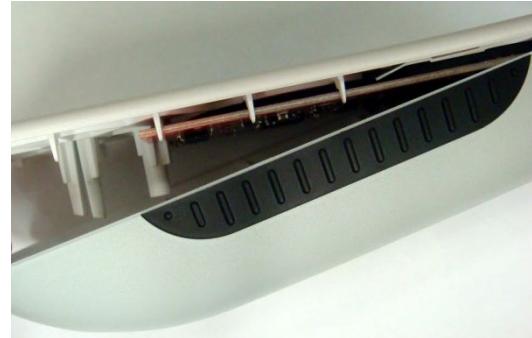
## Service Procedure 1 - Instrument Disassembly

This procedure describes a complete disassembly of the handheld instrument. Part references are shown in Page 6 of this document.

1. Remove the three T8 M2.5 mm x 12 mm Torx head screws (Item B) from the bottom housing (Item J).



2. Begin to open the top and bottom housing (Items I and J) from the end of the unit where the micro USB is located.

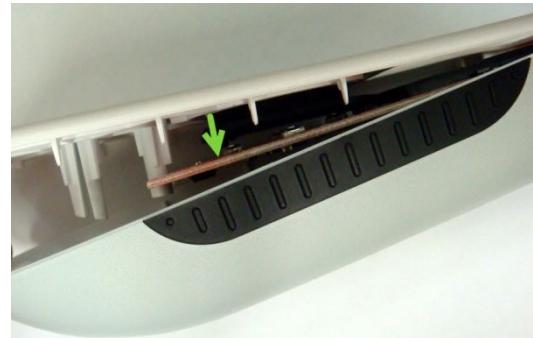


3. Move the UI board with display (Item C) away from the top housing (Item I).

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**NOTE:** The UI board has a firm fit in the top housing.

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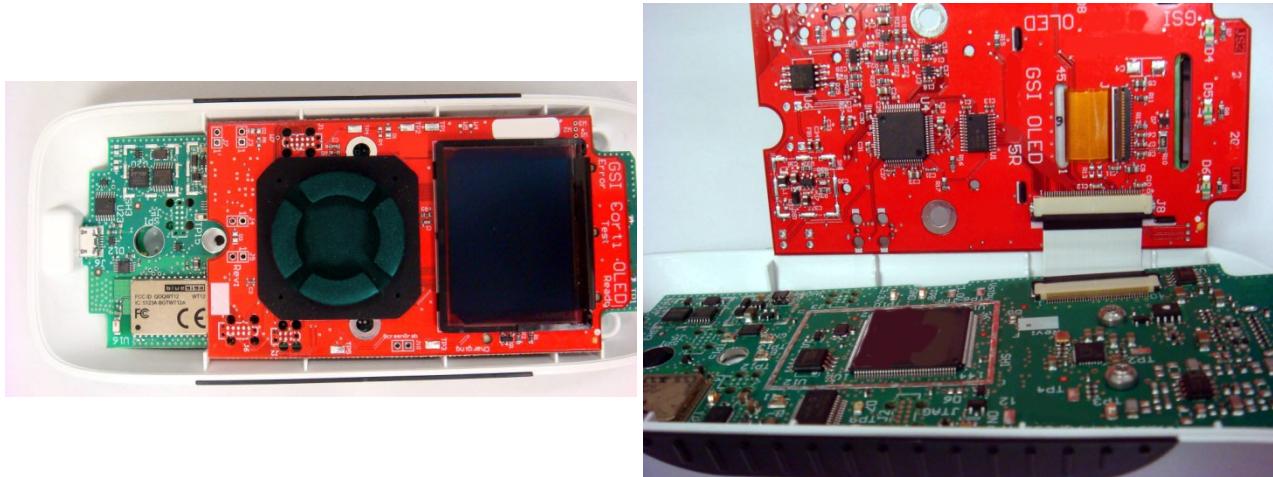
4. Continue to separate the top and bottom housing (Items I and J).

**NOTE:** The end of the housings, where the remote probe attaches, has a latching feature (in the housing). This latching feature holds the housing together even when the housing screws are removed. Constant separating force and a bit of manipulation will allow the latch to separate.



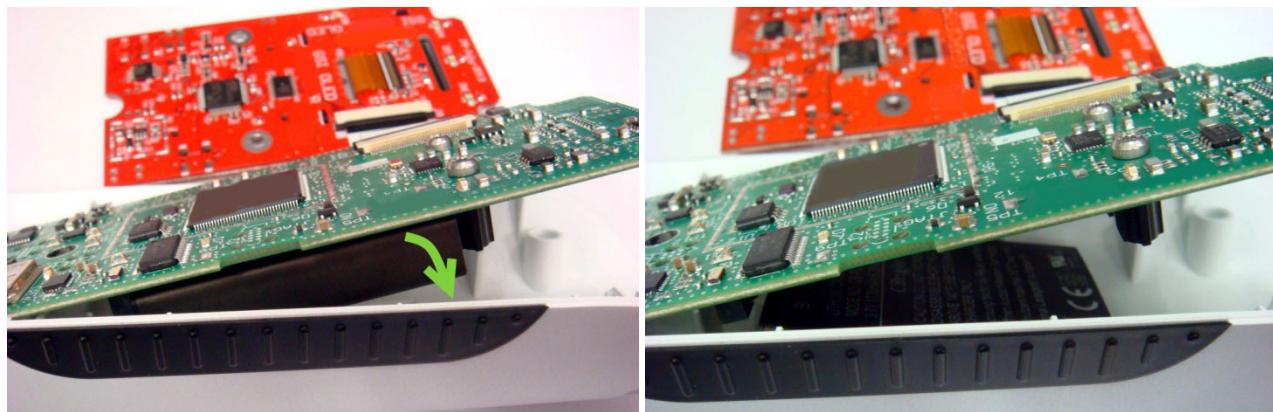
5. Fold the UI board with display (Item C) away from the main board assembly (Item H).

**NOTE:** The boards need to be separated to prevent shorting while removing the battery in next step. Do NOT disconnect the UI board with display before disengaging the battery.

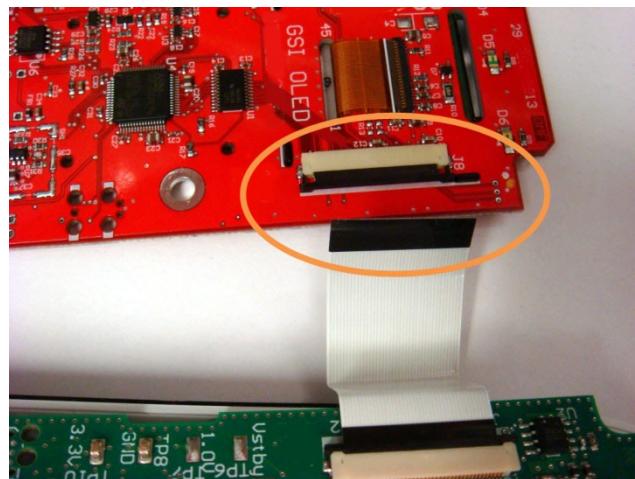


6. Disconnect the battery (Item D) from the main board assembly (Item H).

**NOTE:** The main board has a firm fit in the bottom housing. Starting from the front of the main board, where the remote probe connects, lift the board while gently splaying the bottom housing to release the hold on the board. Lifting the board from the locating ribs/posts allows access so that the battery can be released from the retainer and contacts.



7. Disconnect the UI board with display (Item C) from the 40-pin ribbon cable (Item F).



8. Separate the main board (Item H) from the bottom housing (Item J).

---

**NOTE:** The main board has been partially released from the locating ribs/posts in Step 6. The micro-USB connector is engaged at the back end of the bottom housing and requires a firm pull to disengage.

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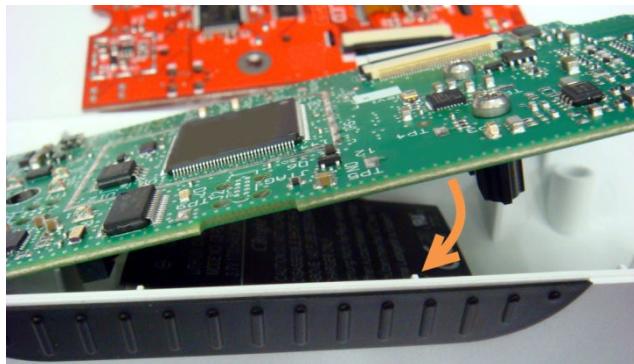
9. Separate the 12-pin ribbon cable (Item E) from the main board (Item H).



10. Separate the 12-pin ribbon cable (Item E) from the contact board (Item G).
11. Finally, separate the 40-pin ribbon cable (Item F) from the main board assembly (Item H).

## Service Procedure 2 - Component Replacement Guide

*When performing any servicing that involves board replacement or repositioning of the 40-pin ribbon cable (item F), disengage the battery to prevent damage to the battery or other components*



### Top Housing Replacement

1. Disengage the battery before disconnecting the 40-pin ribbon cable. (Service Procedure 1 - Steps 1 to 6.)
2. Remove the UI Board with display from the top housing and install the new top housing.

---

**NOTE:** The switch keypad is positioned over the board switches. The corners of the switch pad have retention pins that insert in complimentary holes located on the UI board.

---

### Bottom Housing Replacement

1. Disengage the battery before disconnecting the 40-pin ribbon cable. (Service Procedure 1 - Steps 1 to 6.)
2. Replace the bottom housing.

---

**NOTE:** This process nearly requires a complete disassembly. If the 40-pin ribbon cable was not removed during disassembly be sure to check for proper seating of the cable at the UI board and main board connectors as it may shift during handling.

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3. Place the new serial label onto the back housing.

---

**NOTE:** It is not advised to remove the old serial label and reuse it. Use a new label to ensure the integrity of the adhesion to the back of the housing.

---

### Main Board Replacement

1. Disengage the battery before disconnecting the 40-pin ribbon cable. (Service Procedure - 1 Steps 1 to 6.)
2. Replace the Main Board.

**NOTE:** As with replacing the bottom housing, this process nearly requires a complete disassembly. Replace any ribbon cable(s), if damaged.

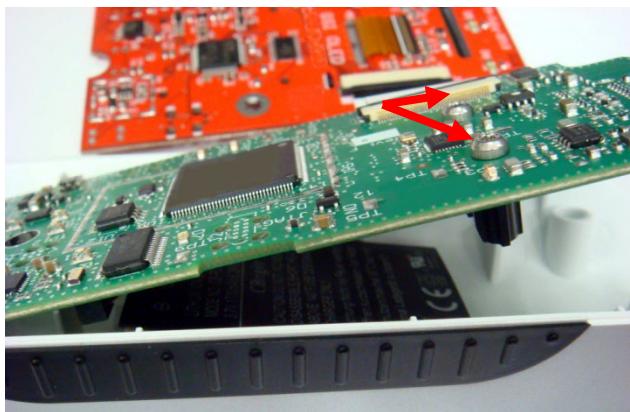
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## Battery Replacement

1. Replace the Li-Ion battery only with the STK number listed in this document.

**NOTE:** The battery contacts must line up with the 3-pin connector on the board and seat between the 3-pin connector and the battery retainer mounted on the main PCB. It is also recommended to slightly loosen mounting brackets to avoid breaking solder contacts when placing replacement battery into place.

---



2. Properly recycle/dispose of the old battery.

## Contact Board Replacement

1. Disengage the battery before disconnecting the 40-pin ribbon cable. (Service Procedure 1 - Steps 1 to 6.)
2. Replace the bottom housing.

**NOTE:** The contact board is integrated in the bottom housing and is not separately replaceable. Replace the 12-pin ribbon cable if it is damaged.

---

3. Place new serial label onto back housing.

**NOTE:** It is not advised to remove the old serial label and reuse it. Use a new label to ensure the integrity of the adhesion to the back of the housing.

---

## UI Board Replacement

1. Disengage the battery before disconnecting the 40-pin ribbon cable. (Service Procedure 1 - Steps 1 to 6.)
2. Replace the UI board.

---

**NOTE:** The switch keypad is positioned over the board switches. The corners of the switch pad have retention pins that insert in complimentary holes located on the UI board.

---

3. Replace the 40-pin ribbon cable if it is damaged.

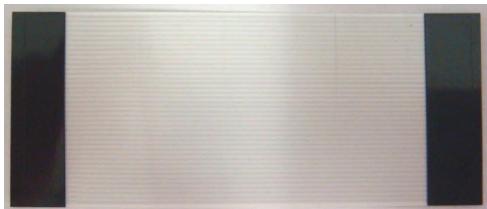
## Service Procedure 3 - Instrument Assembly

1. Connect the UI board with display (Item C) to the main board assembly (Item H) using the 40-pin ribbon cable (Item F) as shown in figure below.

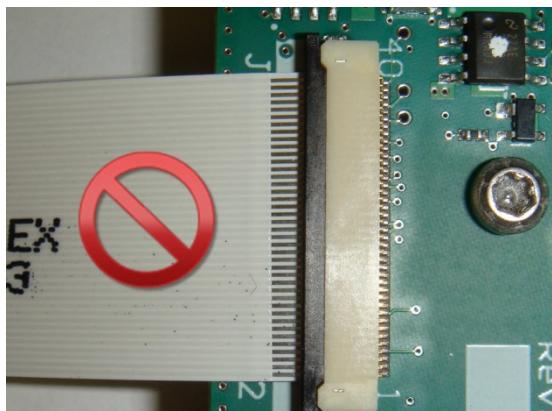
**NOTE:** The 40-pin ribbon cable has a contact side and a stiffener side of the ribbon (the stiffener color may vary; black is shown below). The stiffener side must be facing up; away from the main board assembly and away from the UI board.



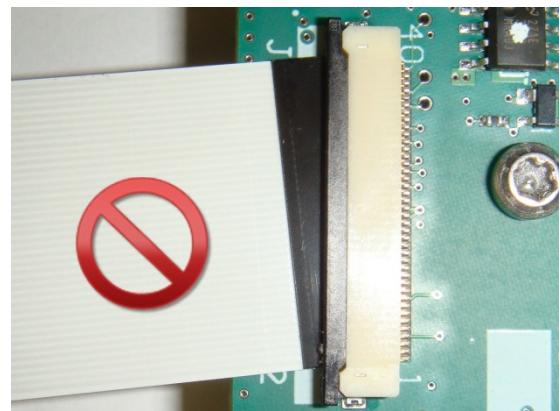
*Contact side – this side against PC board*



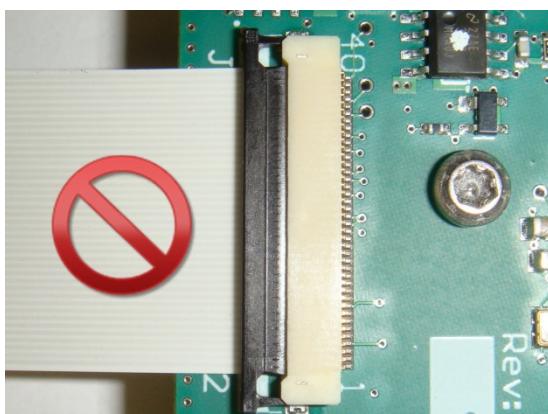
*Stiffener side – this side away from PC board*



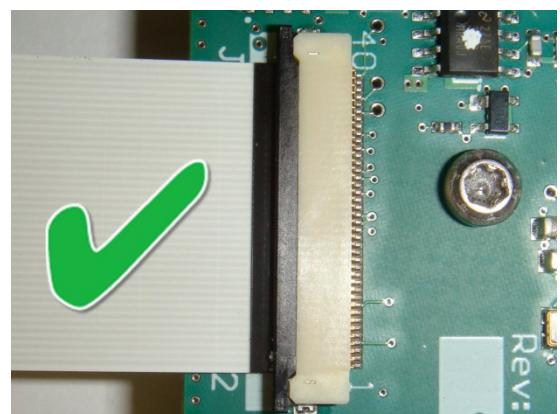
*Contact side up - INCORRECT*



*Ribbon seating is bad - INCORRECT*

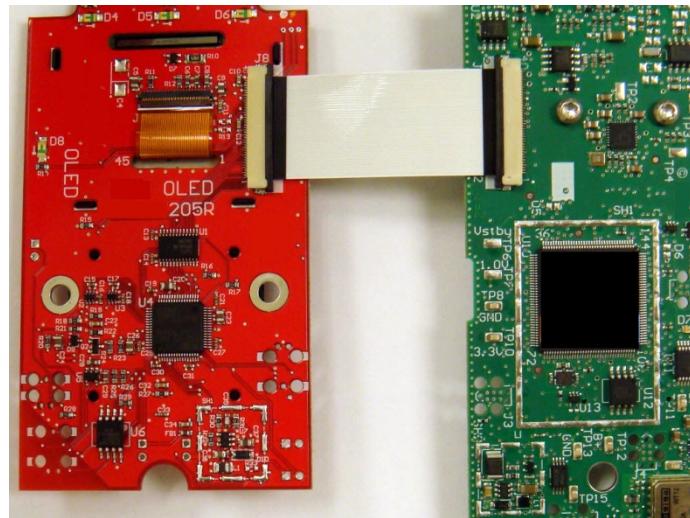


*Connector lock is open - INCORRECT*



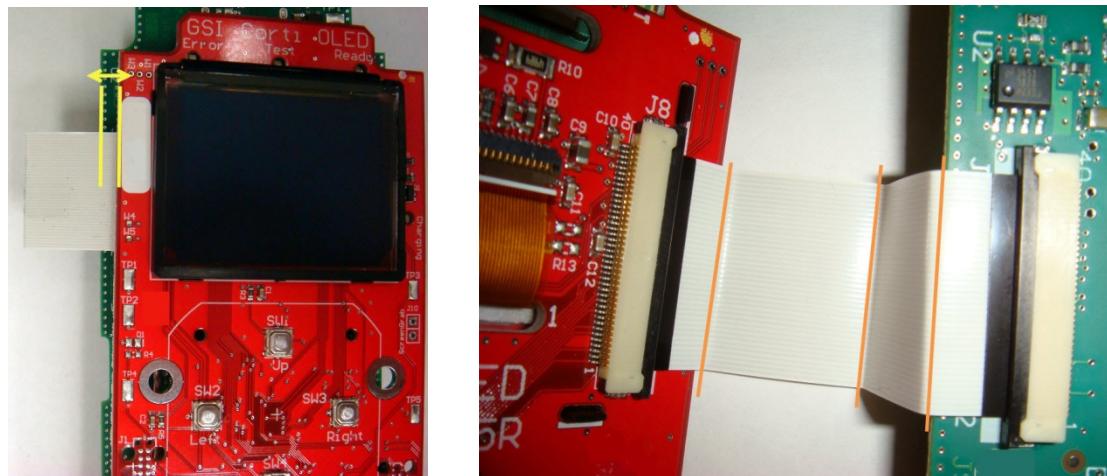
*Stiffener side up - CORRECT*

**UI board with display (Item C) and main board assembly (Item H) correctly connected using 40 pin ribbon cable (Item F)**



2. Bend the 40-pin ribbon cable in 3 places as shown in the figures below.

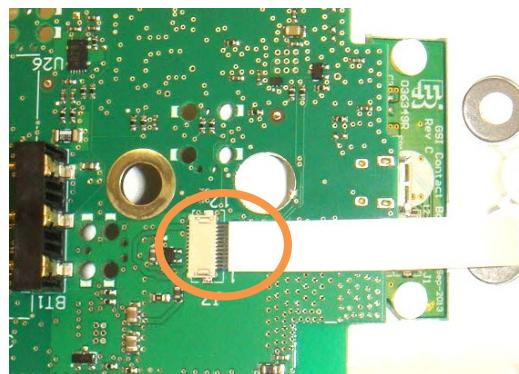
**NOTE:** First, bend the cable right of center so that the UI board with display is positioned 1/8" (3 mm) right of the main board assembly. The subsequent 2 bends are at the edges of the boards.



3. Connect the 12-pin ribbon cable (Item E) to the contact board (Item G) with the stiffener facing up.



4. Connect the other end of the 12-pin ribbon cable (Item E) to main board assembly (Item H) with the contacts facing up (stiffener side against circuit board).



5. Insert the Li-Ion battery (Item D) onto the main board assembly (Item H) by aligning the battery terminals with the battery contacts and seating the battery between the battery contacts and the battery retainer.

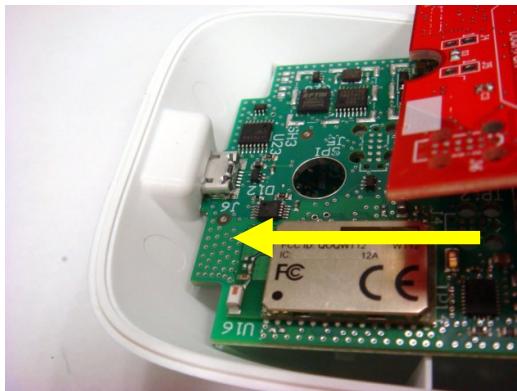


6. Install the main board assembly (Item H) in the bottom housing (Item J).

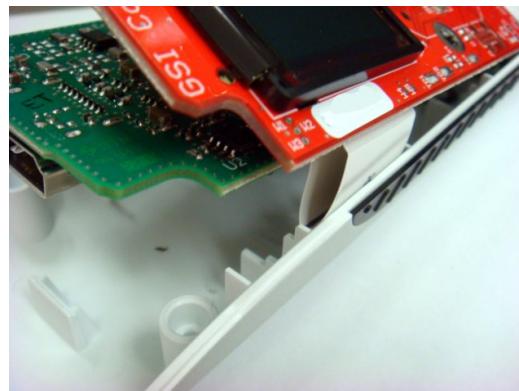
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**NOTE:** The main board has a firm fit in the bottom housing. Starting from the end of the main board, where the micro-USB is located, and align the USB socket with the accommodating hole in the bottom housing. While gently splaying the bottom housing, apply a firm push to the board to engage the micro USB in the bottom housing. The board should now seat flat against the locating ribs/posts in the bottom housing.

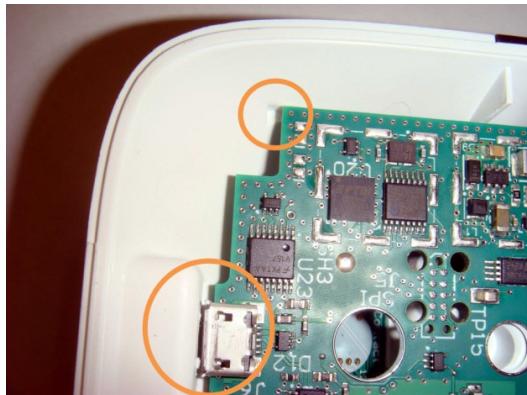
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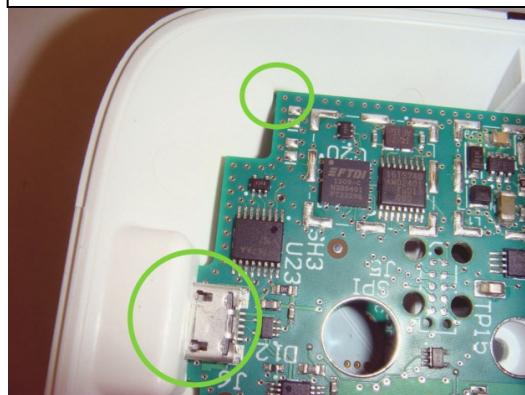
**Carefully Seat the UI Board  
***CORRECT*****



**Guide the 40-pin ribbon cable in the  
edge of bottom housing as board is  
seated - ***CORRECT*****



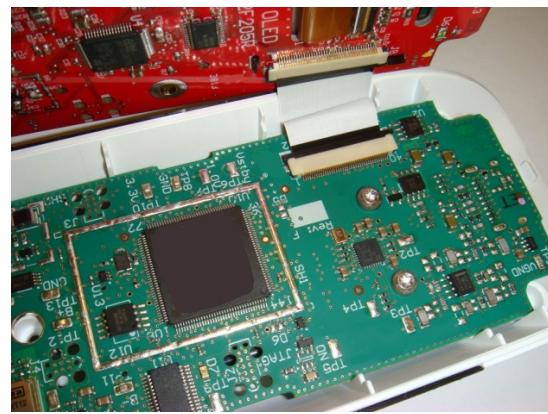
**Board is not fully seated against corner  
guide and micro-USB is not engaged in  
housing - ***INCORRECT*****



**Board is against corner guide and  
micro-USB is engaged in housing -  
***CORRECT*****



**Locating ribs/posts in bottom housing  
(and top housing) help to hold circuit  
boards in place**



**Board is seated flat against locating rib  
***CORRECT*****

7. Align and seat the UI board with display (Item C) in the bottom housing.

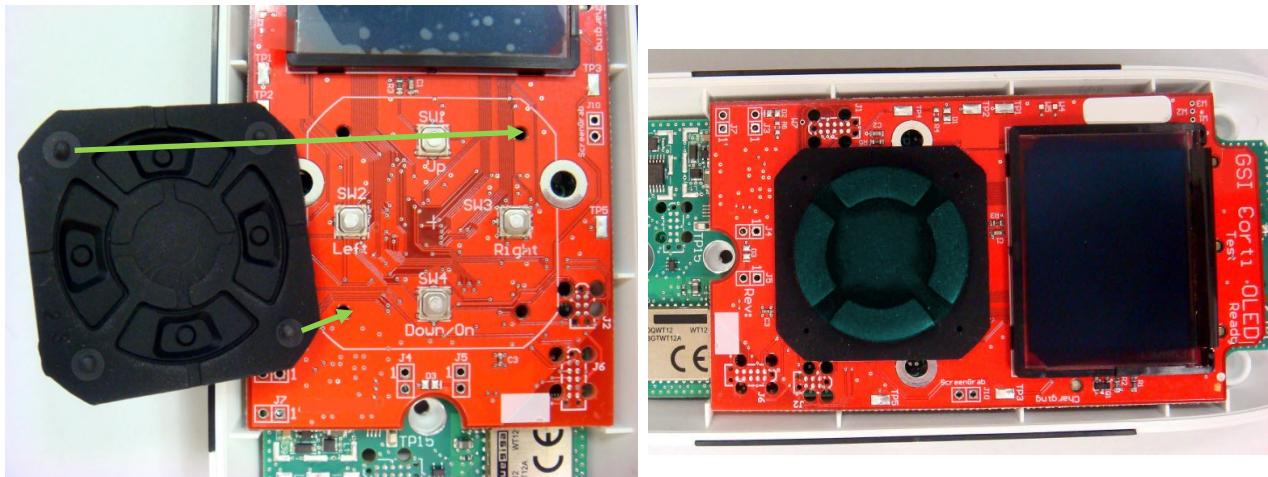
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**NOTE:** The housing has locating ribs for the display board. The board should seat flat on these ribs. The 40-pin flex cable may need to be guided deeper into the edge of the bottom housing to create a flat seat.

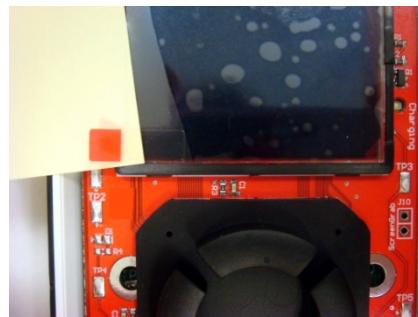
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8. Align the guide pins on the switch keypad (Item A) with holes on the UI board (Item C) and place keypad onto board over the switches.



9. Remove the protective film on the display.



10. Combine top housing (Item I) with bottom housing (Item J).

---

**NOTE:** The top and bottom housings have a latching feature at the end where the remote probe attaches. This latching feature holds the housing together even when the housing screws are removed. Start by aligning the top housing keypad holes with the keypad. Slowly press the top and bottom housings together. When aligned, the end of the housings where the remote probe attaches should be pressed together until the housing latches snap in place.

---



**Top and bottom housings are aligned  
but not snapped together**



**When the  
housings latch  
together there  
should be a  
tight, even seam  
around the end**

11. Secure the top and bottom housings by installing three T8 M2.5 mm x 12 mm Torx head screws (Item B).



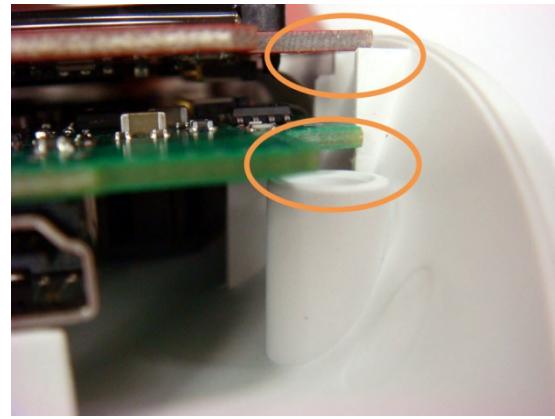
---

**NOTE:** If the top and bottom housings have an excessive gap at the seam then it is possible that the main board assembly (Item H) was not properly seated in Step 6. Check that the main board assembly is seated against the corner guide in the bottom housing and that the micro USB is engaged in the housing opening (see figures in Step 6). See figures below for additional information.

---



*Excess gap at seam - **INCORRECT***



*Both boards not seated on locating  
ribs/posts - **INCORRECT***



*Both boards are seated correctly on the  
locating ribs/posts - **CORRECT***

## Test Procedures

The following test procedures explain how to test for normal operation of the instrument with the probe. These procedures must be completed after any servicing of the instrument or probe replacement. These procedures must be performed in a quiet environment (less than 60 dBA) due to the low level of the measurements to be made. The test procedures must be performed exactly as outlined and with the exact same equipment which is listed below. If there is any question on the validity of the function of any instrument, document the service procedures performed and return the instrument to GSI for repair.

### Equipment Required

- Brüel & Kjaer Sound Level Calibrator Type 4231 (4231 calibrator)
- Brüel & Kjaer UC 0210 ½" Microphone Adapter Insert (UC 0210 adapter)
- G.R.A.S. RA-0045 IEC 60318-4 (formerly IEC-60711) type Occluded Ear Simulator (with Type 40AG ½" pressure microphone)
- 8105113 G.R.A.S. coupler adaptor for 036 Series probes (available from your distributor partners)
- Computer with a Communication or USB port, running MS Windows OS (Min. Pentium processor, WIN XP, Screen resolution 800x600 or 1024x768)
- **OPTIONAL:** USB Communication Cable (8011241) – Type A, Male to Type B, Male

### Prepare Software

- Install OAE Software Test Suite (Appendix B)

### Prepare Hardware

- Obtain Handheld(s) and/or External Probe(s) instruments
- Install the appropriate probe tip adapter on the GRAS RA0045 Coupler (*See Figure 1.2*)
- **OPTIONAL:** Attach appropriate cradle to a USB or serial port on the computer.
- Insert the probe tip of the handheld instrument or external probe into the coupler adapter until it stops (*See Figure 1.3*).
- Place the instrument into Diagnostic Mode before the beginning of any automated test. (Refer to the appropriate Calibration Manual for instructions)

---

**NOTE:** The Device Under Test (DUT) microphone(s) MUST be in calibration (Refer to the appropriate Calibration Manual).

---

### Approved Coupler and Coupling Method

#### *Stainless Steel Probe Tip Adapter Attachment*

1. Remove the locking nut from the GRAS Occluded Ear Simulator (*See Figure 1.1* below).
2. Place the appropriate coupler adapter for the specific product line on top of the GRAS Occluded Ear Simulator (*See Figure 1.2* below).
3. Slide the locking nut over the coupler adapter and tighten, finger tight, enough to create a seal.

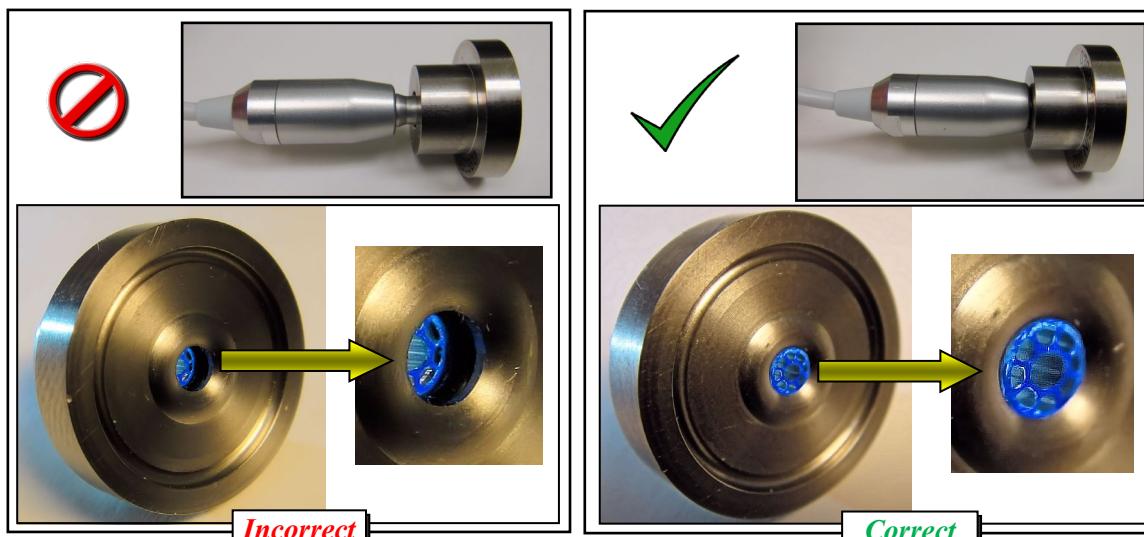


**Figure 1.1.** G.R.A.S. Occluded Ear Simulator



**Figure 1.2.** GSI Corti OES Stainless Steel PTA Attachment

Insert the probe with probe tube into the 8105113 coupler adaptor until the probe snaps into the adaptor (an o-ring in the adaptor will firmly hold the probe in place when properly inserted). Reference the *Figure 1.3* below for an example of proper and improper probe-to-coupler adaptor insertion.

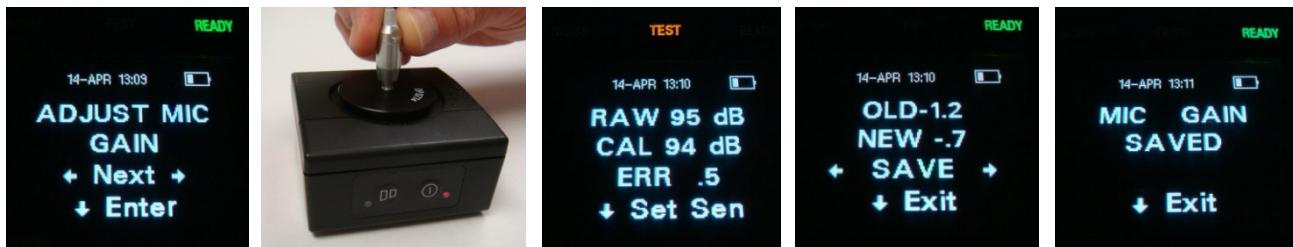


**Figure 1.3.** G.R.A.S. Occluded Ear Simulator

## Microphone Sensitivity Calibration

*This procedure is used to calibrate the microphone sensitivity at 94 dB SPL produced by the B&K 4231 calibrator.*

The external probe retains an offset value in EEPROM. This allows external probes to be shared or exchanged at will between host handheld instruments with no re-calibration required.



- Step 1)** Always attach the probe before turning the instrument on. Place the instrument in diagnostic mode by following the instructions given in *Appendix A: Navigation to Diagnostic Mode*. Once you see the "REMOTE PROGRAM" screen press the right arrow until the "ADJUST MIC GAIN" screen appears (see figures above).
- Step 2)** Press the down arrow to enter the calibration mode. Turn on the sound level calibrator and allow it time to settle per the manufacturer instruction. Insert the probe tip into the 1/8" insert of the sound level calibrator until it stops and hold it there during the calibration process. (see figure above) The display on the instrument will indicate three different readings. The RAW reading is the actual un-calibrated reading that the instrument is measuring. The CAL reading is what the instrument should display after the calibration factor is applied, hence this value should always be 94 dB in a calibrated 94 dB SPL sound level calibrator. The ERR reading is the calibration factor that the instrument uses to obtain the correct reading (this is the offset value stored in EEPROM in the probe).
- Step 3)** Hold the unit stable for a moment and press the down arrow key to set the sensitivity. The next screen will display the old and the new calibration factors.
- Step 4)** Press either the left or right arrow keys to save the calibration factor. If the next screen displays "MIC GAIN SAVED", then press the down arrow to get back into the diagnostic programs menu. The ERR reading must be in the range of +/- 3dB, if the reading is out of this range, then the screen will display "Mic Failed". If this occurs repeat steps 1 through 4. If the ERR reading is still out of range, then the probe may need servicing. Document the condition and contact an authorized service provider for recommendations.
- Step 5)** Repeat steps 1 through 4 to check the calibration setting. If the displayed level is within a fraction of a dB of the calibrator output, press the down arrow key to exit the test. If the instrument does not display a stable reading, repeat steps 1 through 5 with a different calibrator. If the problem persists, the instrument needs to be serviced.

## Computer Automated Channel Frequency and Intensity Verification with a G.R.A.S. RA0045 OES

*This procedure is used to determine whether the frequency response is within the specifications using a computer automated method.*

When executed correctly, the DPOAE and TEOAE based software programs will take control of the connected handheld instrument, perform multiple tests and return a result page with pass/fail flags for each of four test types. All four test types must result in a “PASS” in order for the Device Under Test to be considered to have passed this stage of testing.

## System Parameters

### Set System Date

*This procedure is used to set the system date for the base unit.*

Before calibrating the remote probe, the system date will need to be set and saved to the probe using the SET DATE function

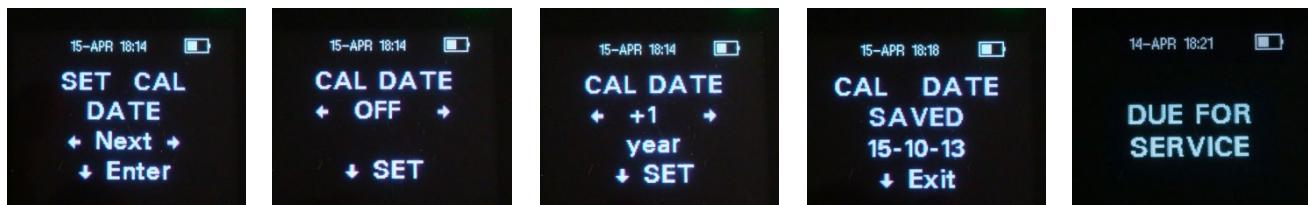


- Step 1)** Attach the probe before turning the instrument on. Power on the unit by pressing the power button. Press the down arrow twice and you see the date and time displayed. Press the down arrow to select “CHANGE” (see figures above).
- Step 2)** The first choice is the “—Month—”. Select the left or right arrows to scroll through the months until you reach the present calendar month. When a choice is made, press the down arrow to SET the month. The “CAL DATE SAVED” screen will appear and the down arrow can again be selected to Exit this mode.
- Step 3)** The second choice is the “—Day—”. Select the left or right arrows to scroll through the days until you reach the present calendar day. When a choice is made, press the down arrow to SET the day.
- Step 4)** The third choice is the “—Year—”. Select the left or right arrows to scroll through the years until you reach the present calendar year. When a choice is made, press the down arrow to SET the year.
- Step 5)** The fourth choice will prompt the user for the time setting by prompting with “—Hour—”. Select the left or right arrows to reach the correct hour. Press the down arrow to set the Minute. Select the left or right arrows to reach the correct minute. Press the down arrow to return to the main menu screen.

## Set Calibration Date

*This procedure is used to set the calibration due-date for the remote probe.*

After calibrating the remote probe a calibration due-date can be specified and saved to the probe using the SET CAL DATE function.



- Step 6** Attach the probe before turning the instrument on. Place the instrument in diagnostic mode by following the instructions given in *Appendix A: Navigation to Diagnostic Mode*. Once you see the “REMOTE PROGRAM” screen press the right arrow until the "SET CAL DATE" screen appears (see figures above).
- Step 7** Press the down arrow to enter the “CAL DATE” mode. The left and right arrows will scroll through the 4 ranges: 6 months, 1 year, 18 months and 2 years. When a choice is made press the down arrow to SET the date. The “CAL DATE SAVED” screen will appear and the down arrow can again be selected to Exit this mode.

**NOTE:**

- 1.) The choice “OFF” can be selected to disable the calibration due-date checking function.
- 2.) The instrument will display a “DUE FOR SERVICE” screen daily after the due-date until the calibration date is reset.
- 3.) A “PROBE READ FAILURE” screen will appear when setting the calibration date if there is a problem accessing the probe. Check the probe connection to the instrument and repeat the process at Step 1. If the problem persists, the instrument needs to be serviced.



## Printer Pairing (Optional)

*This procedure is used to pair the MPT-II printer to the base unit when a printer is included in the order.*





- Step 1)** Ensure the printer has paper loaded (preferably a spare roll used for test purposes). Power on the printer by pressing and holding the power button. The green “power on” light should be illuminated.
- Step 2)** Turn on the base unit. Then, Press the down arrow twice, you will see the date and time displayed. Press and hold the down arrow until the green “Ready” light turns ‘Off’ and the “New BT Device” is displayed.
- Step 3)** Select the left or right arrow to initiate the “Discover” feature to search for nearby active Bluetooth devices. Scroll through the devices until you find the printer (PRT-XX-XX). If you receive “BT ERROR” display, repeat the procedure (sometimes it requires two attempts).
- Step 4)** Once connected to the printer, select the up arrow until “Printing Test” displays and test print begins. Verify that the two Serial numbers at the top of the printout match those of the Base unit and Probe. If the base unit prompts an error that no test data exists, then attach an eartip and run a quick test to generate the needed test data to enable the print test. Remove the eartip only (probe tube remains attached to the probe).

## Test Procedure 1 - DPOAE Test

### DPOAE Testing

**NOTE:** Run the DP test prior to the TE test. The system may freeze when running a DP test right after a TE test. If this happens, connect the base unit, via USB to a computer and reboot the instrument.

### Start Test

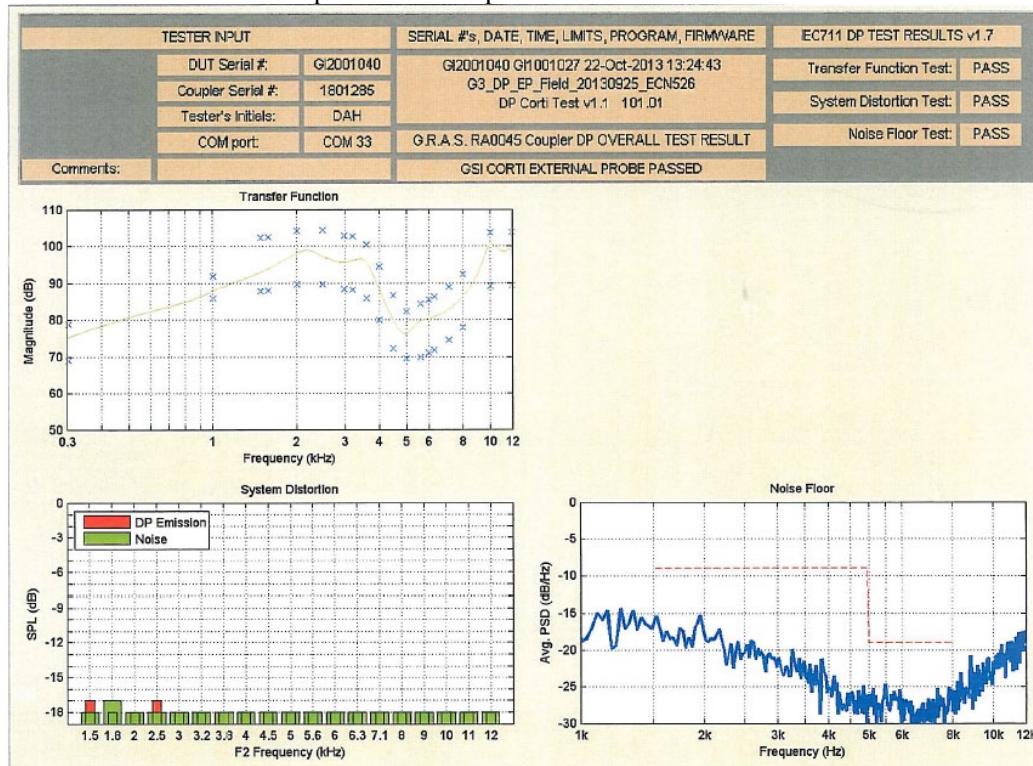
#### *External Probes*

- Step 1)** Attach the device under test probe to the handheld instrument through the use of the appropriate connector. Place the handheld instrument onto the cradle and turn it on.
- Step 2)** Place the mouse over the rectangle labeled “Start” and left-click the button.
- Step 3)** Once the test sequence has started, the space beneath the “Test Progress Bar” will indicate the time remaining.

**NOTE:** Consider impact of using base unit on the cradle during Diagnostic Mode

### Review Results

- Step 1)** When the test finishes you may view or print the test by pressing the respective button (See Figure 7.1).
- Step 2)** Refer to the test progress bar to see the final result of the tests performed on the device under test. If the DUT failed, refer to the test window for more information.
- Step 3)** If the results are not within the allowable range document the condition and return to an authorized service provider for repair.



**Figure 7.1.** DPOAE Test Printout Example

## Cleanup

### External Probe

- Step 1)** Turn off the handheld instrument. Remove the device under test probe from the handheld instrument.
- Step 2)** Repeat all steps in Section 6, Step 1, for any additional instruments to be DPOAE tested.

## TEOAE Testing

### Prepare Software

- Step 1)** Select an appropriate device, and under the test menu select TE Test (See Figure B10).
- Step 2)** If the DUT has an external probe, a field for the Serial Number will appear, otherwise skip this step. Place the mouse pointer over the white rectangle next to the text labeled "Enter Serial Number:", left-click and a blinking cursor will appear in the box. Key in the DUT serial number.

- Step 3)** Place the mouse pointer over the white rectangle next to the text labeled “*Enter Tester Initials:*”, left-click and a blinking cursor will appear in the box. Key in your initials.
- Step 4)** Locate a label by the name, “*DUT COM Port:*” To the right is a dropdown box filled with serial port(s) retrieved from the device manager. Select the appropriate serial communication port for which your hardware was configured.
- Step 5)** Place the mouse pointer over the white rectangle next to the text labeled, “*Coupler Serial #:*”, left-click, and a blinking cursor will appear in the box. Key in the coupler serial number.
- Step 6)** Place the mouse pointer over the white rectangle next to the text labeled, “*Adapter Serial #:*”, left-click, and a blinking cursor will appear in the box. Key in the probe tip adapter serial number.

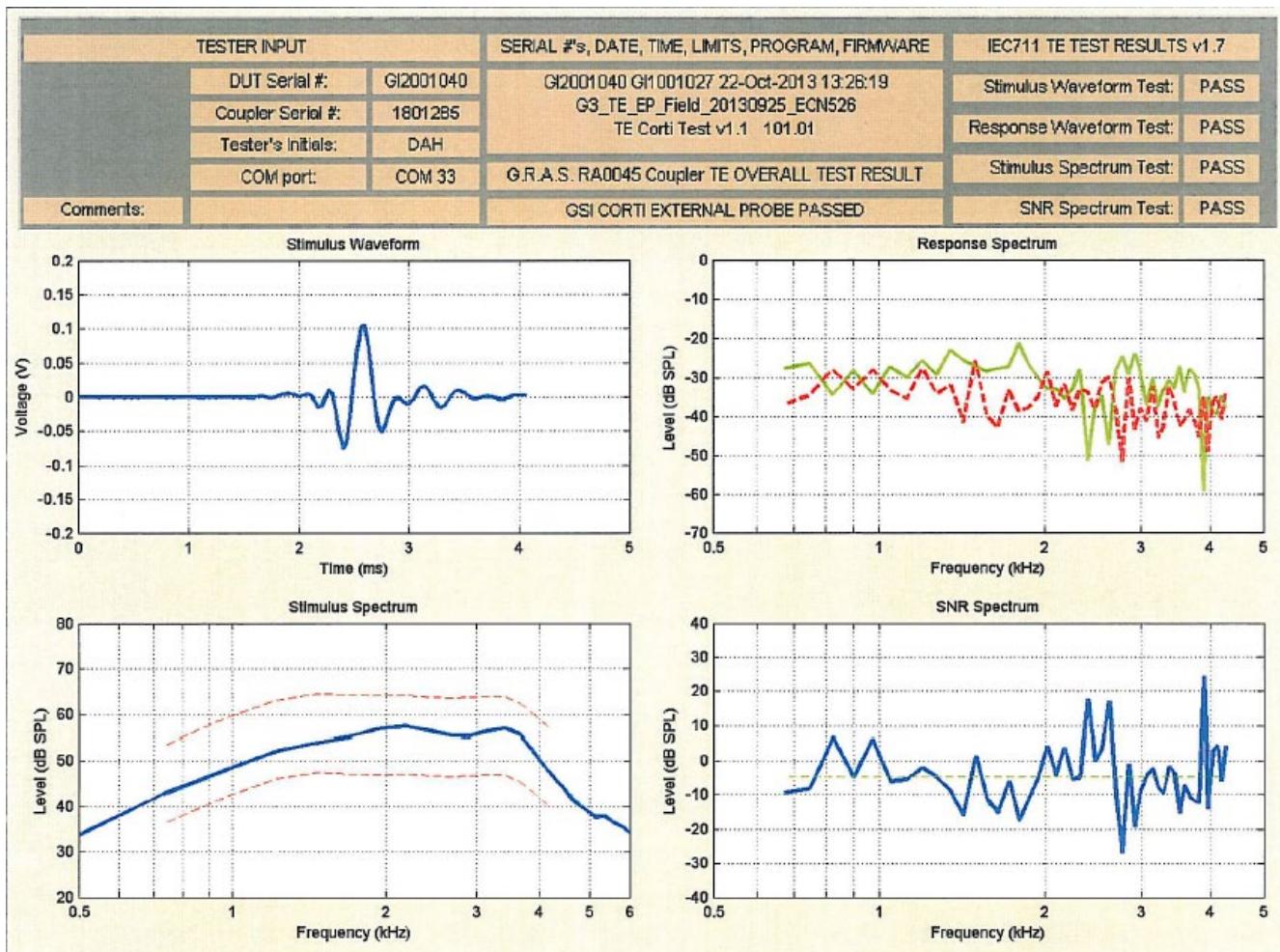
## Start Test

### *External Probes*

- Step 1)** Attach the device under test probe to the handheld instrument through the use of the appropriate connector. Place the handheld instrument onto the cradle and turn it on.
- Step 2)** Place the mouse over the rectangle labeled “**Start**” and left-click the button.
- Step 3)** Once the test sequence has started, the space beneath the “**Test Progress Bar**” will indicate the appropriate time until finished.

## Review Results

- Step 1)** When the test finishes you may view or print the test by pressing the respective button (*See Figure 11.1*).
- Step 2)** Refer to the test progress bar to see the final result of the tests performed on the device under test. If the DUT failed refer to the test window for more information.
- Step 3)** If the results are not within the allowable range document the condition and return to an authorized service provider for repair.

**Figure 11.1.** TEOAE Test Printout Example

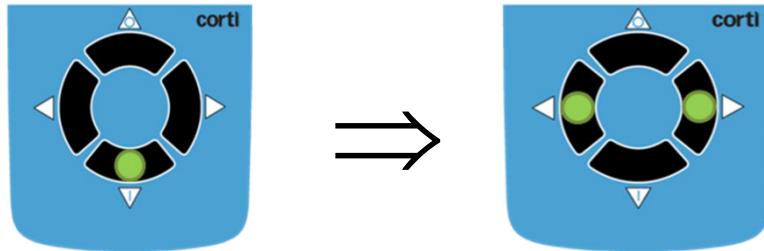
## Cleanup

### External Probe

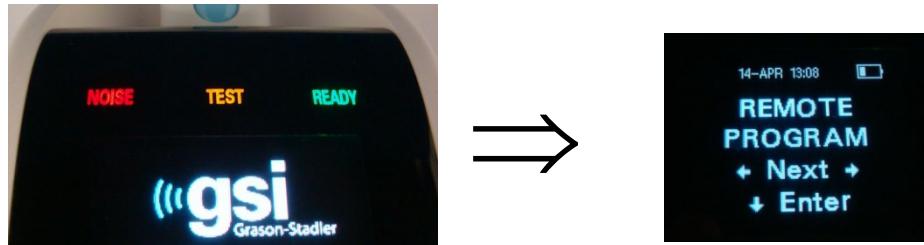
- Step 1)** Turn off the handheld instrument. Remove the device under test probe from the handheld instrument.
- Step 2)** Repeat all steps in Section 10, Step 1, for any additional instruments to be TEOAE tested.

## Appendix A – Navigation to Diagnostic Mode

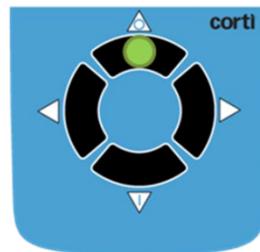
- Step 1)** Always attach the probe before turning the instrument on. Place the instrument in diagnostic mode by pressing the down arrow key, and then immediately press and hold the left and right arrow keys.



- Step 2)** If the key sequence was performed correctly the “NOISE”, “TEST” and “READY” LED’s will simultaneously illuminate. After releasing the keys, the LCD screen should display the “Diagnostic Test Programs” for a brief moment and then “REMOTE PROGRAM”.



- Step 3)** If this message does not appear, turn the unit off by pressing the up arrow and repeat the key sequence



## Appendix B – Install OAE Software Test Suite

**NOTE:** If this is not the first time running the software, skip to ‘Test Suite Overview’.

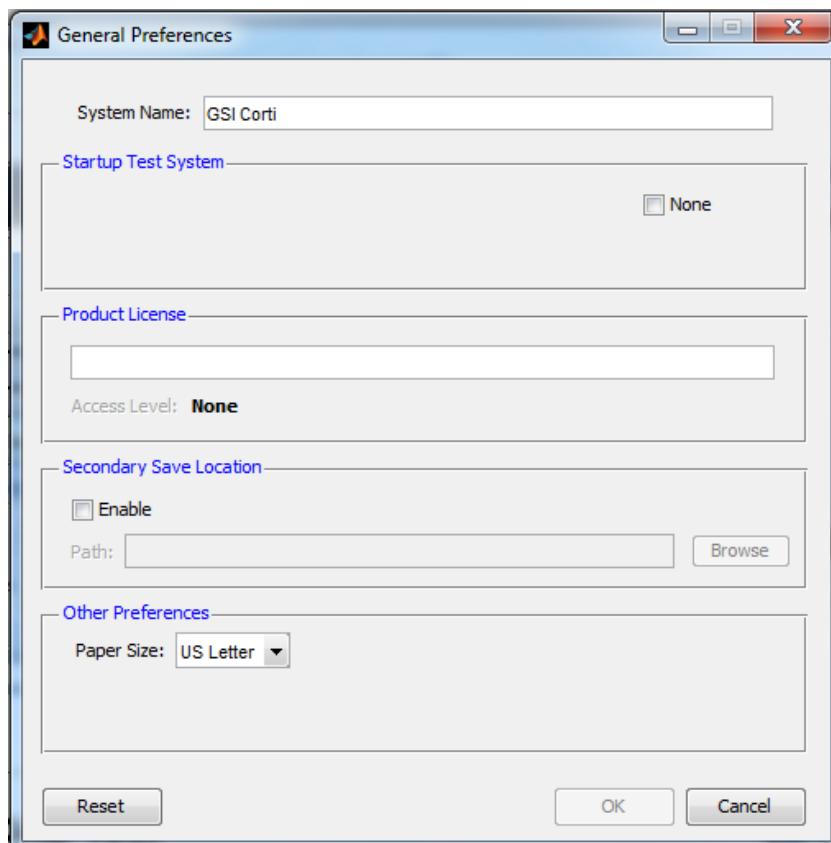
Open the “OAE Test Suite” software suite by any standard means. The OAE Test Suite GUI (Graphical User Interface) named “**OAE Test Suite**” will appear in a new window (see *Figure B8* below).



### System Initialization

These instructions are used to guide you through the initialization process to make the utility geared to your equipment.

1. Execute the OAE Test Suite by any standard means. For the initial startup the general preferences page will be displayed in order to configure the utility (*See Figure B1*).



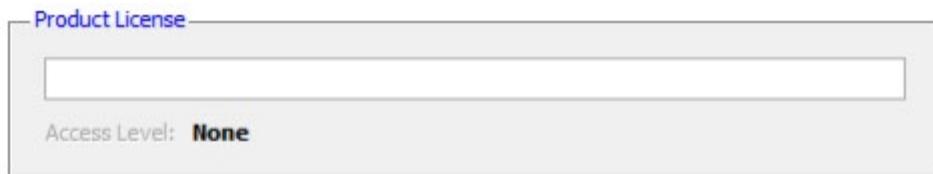
**Figure B1:** General Preferences

2. The System Name field allows you to set a specific location of the test system. Enter the test location by using the editable field (*See Figure B2*). [Enter “GSI Corti” or “WA OAE”, etc. depending upon system configuration used]

System Name:

**Figure B2:** System Name

3. Enter the Product License Key in order to gain access to the automated tests related to each specific product (*See Figure B3*). You can obtain a license key through your distributor service provider.



**Figure B3:** Product License

4. The Startup Test System allows you to set the utility to a specific product line. Select the standard test system by selecting the checkbox corresponding to the product license that was entered in step 3 (above). (GSI Corti or Welch Allyn) (*See Figure B4*).

**NOTE:** this can be subsequently updated by selecting Tools -> Preferences menu of the OAE Test Suite interface.

---



**Figure B4:** Startup Test System

5. The Secondary Save Location allows you to set up a secondary save location for the data files to be stored. To enable this feature, select the “Enable” checkbox. Either type in the full path to the folder you would like to direct the saved files or click “Browse” and navigate to the specific folder (*See Figure B5*).



**Figure B5:** Secondary Save Location

6. The default paper size is set to ‘US Letter’ but may be changed to ‘A4’ (*See Figure B6*).



**Figure B6:** Other Preferences

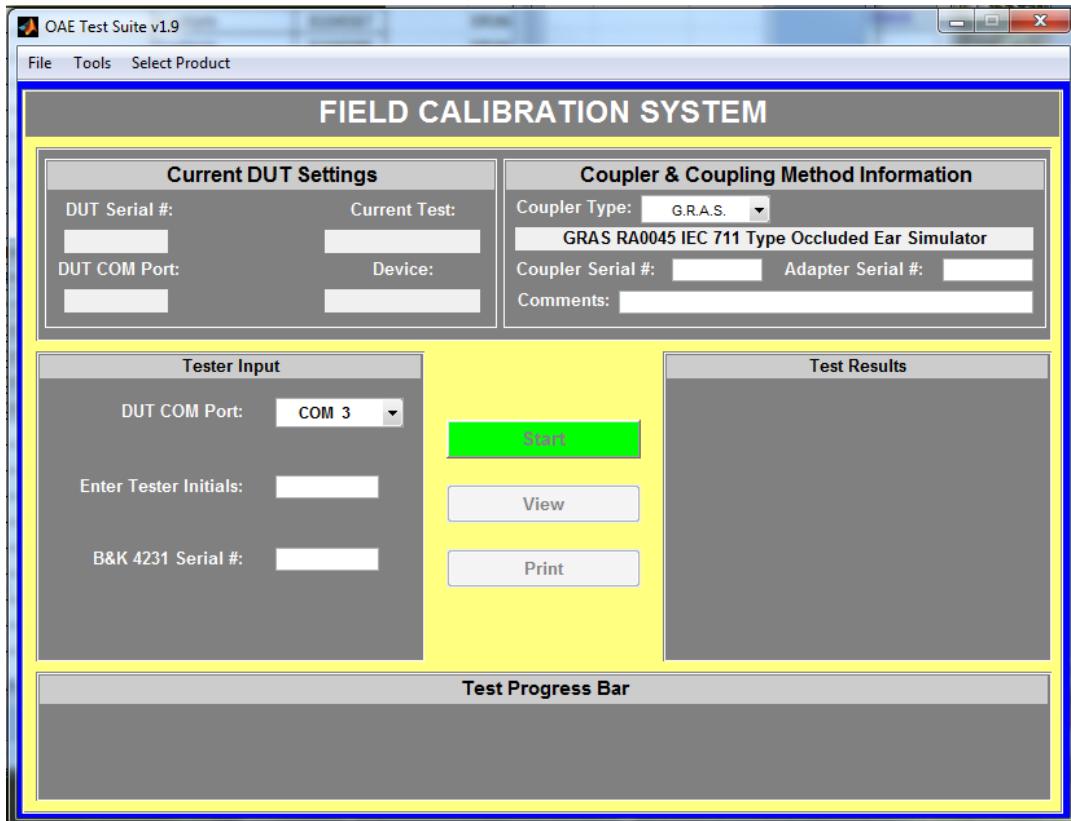
- Once finished, click “OK” in order to save the changes made. This will allow the utility to startup using the features selected in this section.

## Test Suite Overview

### Product Selection

To change the product line without going back to the system initialization page, click the product name (that was chosen during the initialization phase) under the menu and select a product.

### Test Selection

**Figure B7:** OAE Test Suite Startup Window

- Select the device to test by clicking the “Select Product” button on the menu (Figure B9. A test menu will appear on the menu to show the available automated test the device many be assessed under.

GSIWelch Allyn**Figure B8:** Product Selection**ER36 Series OAE Screener Test Selection Menu (GSI, Welch Allyn)**

<u>Device Select</u>	<u>Test Select</u>	<u>Brief Description</u>
<b>Handheld Instrument</b>	<p>Select Product Handheld Tests</p> <p>TF Test Ctrl+Q DP Test Ctrl+D</p>	<ul style="list-style-type: none"> <li>• Transfer Function (Distributor Only)</li> <li>• DPOAE (Distributor Only)</li> </ul>
<b>External Probe</b>	<p>Select Product External Probe Tests</p> <p>TF Test Ctrl+Q DP Test Ctrl+D TE Test Ctrl+T</p>	<ul style="list-style-type: none"> <li>• Transfer Function</li> <li>• DPOAE</li> <li>• TEOAE</li> </ul>

**Figure B9:** Test Selection

**NOTE:** Each of these programs can run by selecting the test or the key combination located next to the test name.

## Coupler & Coupling Method

**Coupler & Coupling Method Information**

Coupler Type:	G.R.A.S. <input type="button" value="▼"/>
<b>GRAS RA0045 IEC 711 Type Occluded Ear Simulator</b>	
Coupler Serial #:	<input type="text"/>
Adapter Serial #:	<input type="text"/>
Comments:	<input type="text"/>

**Figure B10:** Coupling Information

1. **Coupler Type:** This refers to the occluded ear simulator the instrument is attached to. The test selection will automatically change based on test type. The default is the RA0045 Type OES.
2. **Coupler Serial #:** This field is used to record the serial number of the RA0045 Type OES. This field is required before the beginning of any test and can be saved using the general preferences feature.
3. **Adapter Serial #:** This field is used to record the serial number of the ER034729R Probe Tip Adapter. This field is required before the beginning of any test and can be saved using the general preferences feature.
4. **Comments:** This field is used for any additional comments for the testing process as appropriate. This field will also be displayed on the printout of any test.