



RJL Systems introduces Segmental BIA

QUANTUM V SEGMENTAL BIA

Bioelectrical Impedance Analyzer

USER'S MANUAL



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About Us – RJL Systems

RJL SYSTEMS WAS THE FIRST COMPANY TO DEVELOP THE USE OF BIOELECTRICAL IMPEDANCE ANALYSIS (BIA) TO ASSESS HUMAN BODY COMPOSITION BY ENGINEERING THE “GOLD STANDARD” OF BIA INSTRUMENTS IN 1981. RJL ANALYZERS PROVIDE BIA MEASUREMENTS FOR USERS AROUND THE WORLD – THEY ARE RECOGNIZED AS “RESEARCH QUALITY” BECAUSE OF THEIR REPUTATION FOR ACCURACY AND RELIABILITY.

RJL has registered patents on our instruments, trademarks, and copyrights on our software and papers. Customers are buying products directly from the company that develops, engineers, and manufactures the analyzers – NOT a third party vendor or distributor.

RJL’s Quantum Analyzers have FDA clearance as a Class II medical device for safe use on the human body to collect BIA data. RJL is registered with the FDA as a Medical Device Manufacturer (Registration No. 1831675). The Quantum V Segmental BIA System and accompanying software are marketed under the following FDA clearances: K830292C, K862383, and K070999.

RJL Systems is registered as an ISO-13485 2016 compliant company.

RJL instruments go through a rigorous testing, calibration and inspection process that complies with ISO standards. Conformity of products and services to International Standards provides assurance about overall product quality, safety, reliability and accuracy

Any questions or technical support needed regarding our products will be handled by the professionals who designed and built the analyzers, and the related software

The Company’s 30+ years of engineering expertise and knowledge in BIA science make it uniquely qualified to provide custom-made instruments of any size or scope

If you sign up for the e-mail newsletter (via website), you will receive information on interesting new developments in the field of BIA science and/or RJL products (www.rjlsystems.com).

All RJL products come with a warranty and continued technical and product support.

Quantum V Segmental BIA System Kit Contents



- Quantum V Segmental BIA Analyzer
- Two subject cables with protective pouch
- Test resistor and capacitor network
- Four (4) Zip Lock Packs of electrodes (800 total electrodes) 100 tests
- Quantum V Segmental BIA User's Manual and video (thumb drive)
- BC (Body Composition) Software and User's Manual (thumb drive)
- Carrying Case as shown



Overview of the Quantum V Segmental BIA

The Quantum V Segmental BIA provides quantitative regional body composition assessments that are similar to those produced by Dual-energy X-ray Absorptiometry (DXA) scanners. This is performed by using eight hand and foot electrodes (left and right side) with the subject in a supine position and measuring 13 resistance and reactance regions on the human body. The comparative characteristics of segmental body composition assessments are highly significant, as segmental muscle atrophy and hypertrophy can be clearly illustrated by analyzing and comparing collected data as a comparative percentage or change over time.

Health care professionals such as physicians who are interested in regional muscle wasting will find the Quantum V Segmental BIA a valuable tool. In addition, physical therapists, sport medicine trainers and nutritionists can monitor and track their patient's progress and health improvements on specific regions of the body.

The Quantum V Segmental BIA uses an eight lead 12-channel multiplexer to quickly measure resistance and reactance values from each arm, leg and right and left torso, including the upper and lower regions of the human body in less than 20 seconds. The repeatability and accuracy of the resistance and reactance measurements allow the smallest changes to be recorded with 0.1 ohms of resolution. The phase angle of these regions is also illustrated.

A unique and patented feature of the RJL Systems segmental BIA instrument is that the sum of the lean soft tissue (LST) or fat mass is equal to the whole body LST or fat assessment. This is similar to the sum of the DEXA measurements that approximates to body weight.

The Quantum V Segmental BIA built-in firmware automatically handles selecting eight leads (eight electrodes), scanning multiple zones and calibrating each zone, making the device exceptionally easy to operate. The 13-zone resistance and reactance data is date & time stamped and saved on the unit, where more than 2,000 records can be stored for downloading to a computer using the built-in Bluetooth or USB port - standard on all Quantum V BIA products.

The Quantum V Segmental BIA is a highly effective, easy to use, Class II medical device that can quickly and accurately measure segments and total body composition that health care professionals can use to chart their patients' health goals and progress.

The Quantum V Segmental BIA

The Quantum V Segmental BIA with its internal multiplexer creates multi-zone calibrated segmental measurements that are scanned in 20 seconds. The internal firmware automatically handles selecting leads and scanning the 13 zones. The time stamped resistance and reactance data is saved in the nonvolatile ECC memory where more than 2,000 records can be saved. A segmental scan is started by pushing the ON button or by selecting a sampling time interval that can range from seconds to hours. If the interval is more than 1 minute the instrument will automatically turn off and wake up at the specified time. This greatly improves battery life for a long term observation (months).

The BC (Body Comp) software application will retrieve the BIA segmental data from the instrument using the USB connection. It stores not only the BIA data, but height, weight, age, and gender - all the information needed to develop a model for estimating segmental body composition and creating a report.

The investigator can view the BIA and body composition history of an individual and export the results to a CSV-formatted spreadsheet file that can be read by applications such as Excel.

What is measured and saved for analysis (13 zones, 26 data points)

- | | | | |
|----|--------------------------------|----|-------------------------------|
| 1 | Right Body resistance | 2 | Right Body reactance |
| 3 | Left Body resistance | 4 | Left Body reactance |
| 5 | Lower Body resistance | 6 | Lower Body reactance |
| 7 | Upper Body resistance | 8 | Upper Body reactance |
| 9 | Right Arm resistance | 10 | Right Arm reactance |
| 11 | Left Arm resistance | 12 | Left Arm reactance |
| 13 | Right Leg resistance | 14 | Right Leg reactance |
| 15 | Left Leg resistance | 16 | Left Leg reactance |
| 17 | Right Torso resistance | 18 | Right Torso reactance |
| 19 | Left Torso resistance | 20 | Left Torso reactance |
| 21 | Transverse RA -> LL resistance | 22 | Transverse RA -> LL reactance |
| 23 | Transverse LA -> RL resistance | 24 | Transverse LA -> RL reactance |
| 25 | Whole Body resistance | 26 | Whole Body reactance |

BC Whole Body software is included

Notice in the table above that the right side of the body is measured [1, 2]. This measurement is the same as a whole body resistance and reactance taken with traditional RJL Systems body composition products (Quantum IV, Quantum II and Quantum X). This right side measurement is also continuously displayed on the LCD display when a segmental measurement is not being taken and can be entered into BC Whole Body software. The entry into the whole body application is manual and cannot be retrieved from the Quantum V USB port. Since there are only two values that must be entered, this is a minor inconvenience. A license key to the BC Whole Body application is included with purchase of a Quantum V Segmental BIA. The software and manual are also included on a thumb drive with the instrument.

Charts and graphs:

There are pie and bar charts in BC 4.x whole body software including historical graphing of most body composition parameters (lean and fat mass, etc). There are no charts or graphs at this time in our segmental BIA software. There is, however, an export function that will export an individual patient or an entire database available in the segmental BIA software product. All regional body composition values including regional resistance and reactance values can be exported as a CSV file. This file is read by most spread sheet programs including Excel and Libre office. Graphs and charts can then be made using spread sheet graphic tools. Also the segmental BIA instrument can be used with BC 4.x whole body software (charts and graphs) or segmental Quantum V software. When using with BC 4.x only the right body connector is used.

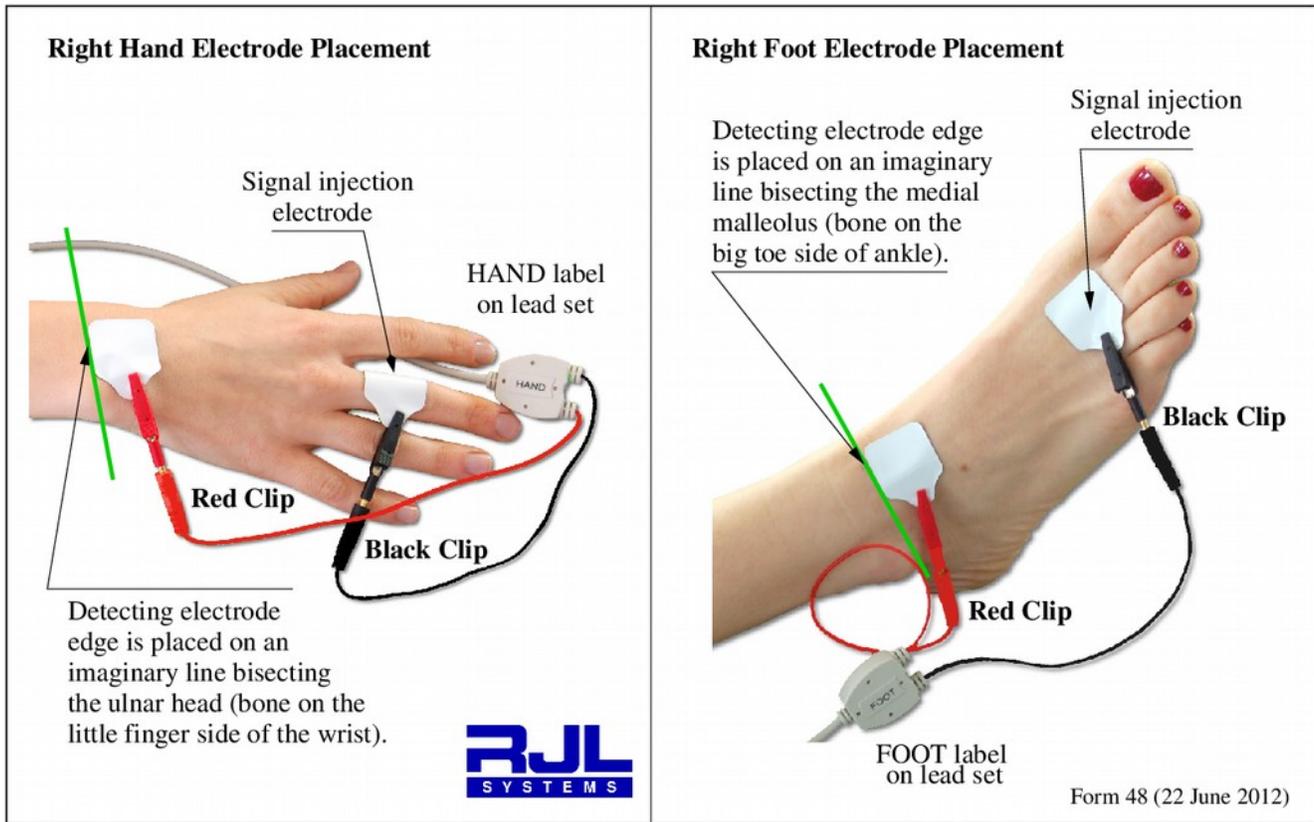
As mentioned, one feature of the segmental BIA product is that the sum of the points equals the whole (whole body). Therefore, a right and left body pie chart could easily be made that contains the percent of each arm and leg including the right or left torso. This is planned for the near future. There are also other developments in progress to improve the usefulness of the segmental BIA product. Any customer input is appreciated.

Reproducibility

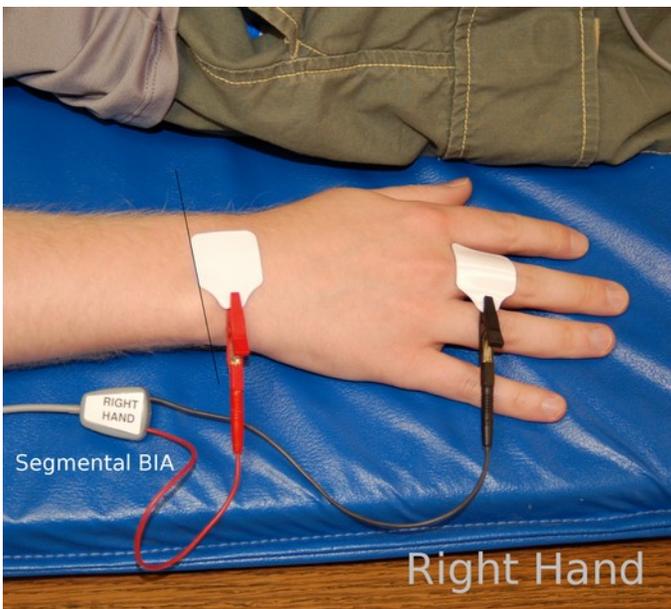
When the subject is in a supine position and measured with a calibrated and portable segmental BIA instrument repeatable measurement can be made. Accurate electrode placement is important when assessing changes of lean soft tissue (LST) in appendicular body segments. This is especially important with the detecting electrodes that bisect the ulnar head (bone on the little finger side of the wrist) and the medial malleolus (bone on the big toe side of ankle).

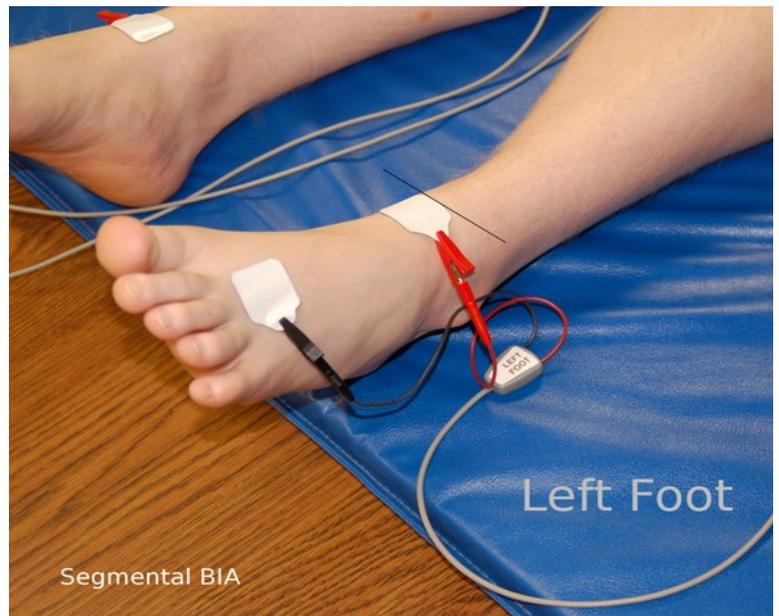
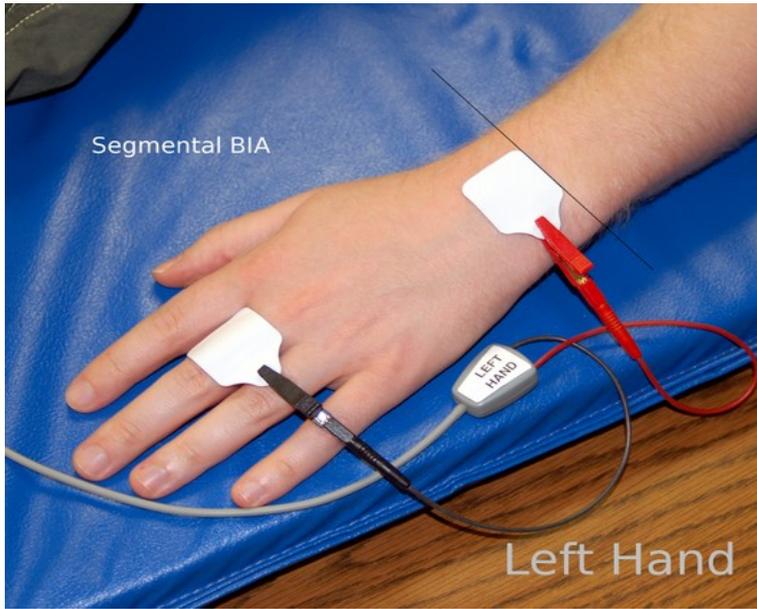
Eight Electrode Placement

A segmental BIA test is done with eight (8) electrodes attached to the right and left hand and foot, as shown below, when the subject is laying in a supine position. The source and detecting electrodes must follow the description below for the right and left hand and foot.



Form 48 (22 June 2012)





Subject connected with all eight leads lying in a supine position



The two lead sets are pushed into the connector on the rear of the Quantum V



Connect the USB cable to the USB PORT on the back of the Quantum V to a laptop computer with the Segmental BIA application installed



Pre-testing protocol for the subject

- Explain testing procedures to the subject and address any questions or concerns prior to testing.
- Name, gender, age, height, weight, and side of body being tested should be recorded. If exceptions to Testing Protocol are evident (i.e. subject tested sitting up due to wheelchair use) record the exception in the database record in the comment field, and test that individual in consistent manner every time.
- Testing area should be comfortable and free of drafts.
- The subject should, ideally, be tested laying down.
- The exam table surface must be non-conductive (not metal) and be large enough for the person to lay down flat, legs not in contact with each other, and the arms at approximately a 30 degree angle to the body.
- The legs should be separated and the arm being tested should be away from the body. The goal is to avoid skin-to-skin contact between the thighs and between the arm and the body. If this cannot be achieved, use clean, dry towels or sheets to provide a non-conductive barrier.
- The subject should not be damp from sweating, have a fever, be in shock or feel cold/chilled.
- Wipe area where electrodes will be placed with an alcohol swab if lotion has been used, or subject has very dry/oily skin. Use of alcohol skin swabs is recommended at electrode sites for general hygiene purposes as well.
- The subject should avoid moving during testing.
- If testing is being done at regular intervals with the same subject, always ask subject if any changes have occurred, such as pregnancy or surgical implants, or if there have been any significant changes of their daily routine, especially compared to the date of the previous test.
- Strenuous exercise or saunas within 8 hours of testing is not recommended, as both activities can affect hydration levels.
- Refrain from drinking alcohol for 12 hours prior to testing (also a hydration issue).
- Jewelry on the arms, ankles, and body (i.e. bracelets, watches, dangling necklaces and chains) should be removed from side being tested. Earrings and rings are okay to leave on.
- Shoes, socks (or nylons) on the side used for testing should be removed.
- **Eating food or drinking fluids prior to testing will *not* affect the test results if taken in moderate amounts.**

Performing the Segmental BIA test

1. Attach the electrodes as illustrated above – place the clips of the cables on the non-adhesive TAB of the electrode.
2. Attach the subject cables to the back of Analyzer.

Helpful hint: The red clips are always placed “closest to the heart”.

- | | | |
|---------------------|------------------------------|---------------------------|
| ◆ HAND leads | black clip/ on finger | red clip/ at wrist |
| ◆ FOOT leads | black clip/ by toe | red clip/ at ankle |

1. Ask subject being tested to remain motionless while testing is done.
2. Turn the Analyzer “ON”.
3. Once the values have stabilized, push the ON button again and the analyzer will scan all 13 zones and save the time stamped values in local non-volatile memory. The scanning can also be done with the Segmental BIA software application. The UP and DOWN arrow keys are not used.
4. Detach the clips, and gently remove the electrodes - being careful to not injure the skin .
5. Use the Segmenal BIA software for analysis and printing reports.

Please note: If test results seem unusual or inaccurate, refer to Troublshooting Guide or call RJL Systems Technical Support for assistance.

ON/OFF buttons



Pressing the on button:

- Turns the analyzer “ON”. The rechargeable Lithium Ion battery is now powering the instrument.
- Pushing the ON button will start a new scan of all 13 segmental zones and save the time stamped values in local non-volatile memory at the record location on the LCD screen. The record number is associated with the subject name and demographics. Make sure you record the record number.

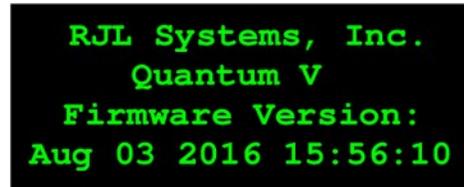
Pressing the off button:

- Disconnects the Lithium Ion battery from the instrument.
- If cables are disconnected from the electrodes on the subject or the test resistor, the analyzer will also automatically turn itself off with a 10 second count down.

Understanding the display screens

About:

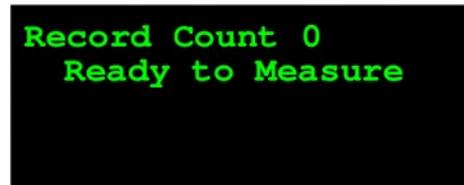
When the Quantum V Segmental BIA is turned ON, this screen will appear for a few seconds. The screen displays the name of the analyzer and the version of the firmware program running on it. If you ever have to call for support, you will be asked for this information. This screen is displayed only for a few seconds before displaying the BIA readings. You may press ON to go to the main menu, instead.



```
RJL Systems, Inc.  
Quantum V  
Firmware Version:  
Aug 03 2016 15:56:10
```

Ready to scan 13 zones:

After a few seconds, the analyzer will switch to the ready to scan screen. The number of time stamped records saved in the analyzers memory is displayed. These records can be downloaded later. Once the subject leads are connected, the ON button is pressed to start a scan of all 13 zones.



```
Record Count 0  
Ready to Measure
```

Right Body Values:

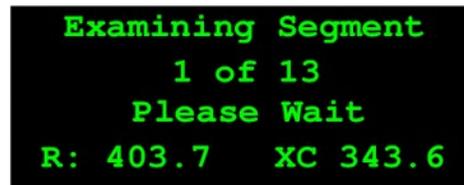
When both the four right body and four left body leads are connected to the subject the values of the right body are displayed. These values are the same as other RJL BIA analyzers (right body measurement). The Quantum V is now ready to start a segmental BIA scan initiated either with the ON button or the segmental BIA software application (get values). If BC4 is used manually copy the resistance and reactance values to the application input, since they are the same as using a Quantum IV.



```
Resistance: 403.8  
Reactance: 343.6  
Impedance: 520.2  
Phase Angle: 40.4
```

Scanning 13 zones:

Once a scan is started, the resistance and reactance values of each zone are displayed with their zone number. It requires about 1 second for each zone to scan or 13 seconds for a complete scan.



```
Examining Segment  
1 of 13  
Please Wait  
R: 403.7 XC 343.6
```

Finished Scanning:

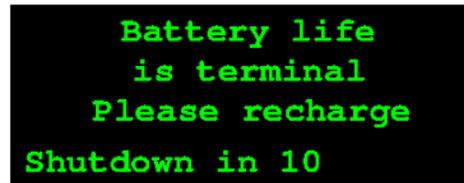
When scanning is complete the date and time are displayed with the scan record number. All 13 zones with the displayed time stamp are saved. The Quantum V can hold thousands of records in non-volatile memory that will last many years.



```
2019-08-19 14:22:30  
  
Saved No 3
```

Low Battery:

The Quantum V uses two Lithium Ion Batteries that can run for more than seven hours continuously. This means that a single charge will last for hundreds of tests. However, when the battery is low this message will appear.



```
Battery life  
is terminal  
Please recharge  
Shutdown in 10
```

Proper care of the analyzer and cables

RJL analyzers are built to last. Many RJL instruments built over 20 years ago are still being used today. The instruments we design and build are subjected to our rigorous quality assurance testing procedures. Like all sensitive electronic instruments, proper care and handling will minimize the risk of damage.

Batteries

1) If battery is low, the analyzer will display a message for 10 seconds and turn itself off.

Cleaning & sanitizing analyzer & cables

- 1) Make a solution of one part Hydrogen Peroxide to four parts water. Dampen a clean cloth with the solution and *gently* wipe the cables and the exterior of Analyzer's plastic casing as needed.
- 2) Never immerse cables or Analyzer into any liquid cleaning solution or use "spray on" cleaners
- 3) If an environmental hazardous material incident occurs, "Haz-Mat Protocol" at the site would determine exposure levels and if sterilizing all surfaces is mandated. There is no known method of adequately sterilizing the cables or Analyzer that would not cause damage to the units.

Disassembly of the analyzer – Never remove the protective plastic enclosure of the Analyzer. Doing so can damage the static-sensitive electronic components inside and **will cause calibration issues**.

Handling - Handle the Analyzer carefully. The Analyzer can be damaged by rough handling (i.e. shaking or being dropped). The cables can be damaged if stepped on, crushed, tied in knots, pulled on, etc. Always use caution when connecting and disconnecting them. Never try to "yank" the cables off the back of the Analyzer, always disconnect them by grasping and pulling on the connector that attaches the cables to the back of the unit. Do not use rubber bands to gather up the cables; keep them loosely coiled in the protective pouch provided.

Liquids - Keep liquids away from the Analyzer – spills or immersion in fluids can permanently damage the sensitive electronic components. Damage by immersion in liquids is NOT covered by warranty.

Storing - For optimum protection, store the equipment in the carrying case provided by RJL.

Temperature - If the Analyzer is exposed to cold temperature and brought into a warmer temperature, allow any condensation on the instrument to dry before testing. As a general rule, exposure to cold or hot temperatures does not cause damage or erratic test results - however, condensation can impair testing performance.

Testing the analyzer and cables - Test the equipment occasionally.

Transporting/shipping- The RJL carrying case was designed to protect the Analyzers and accessories while being transported or shipped. If the equipment is being shipped, pack the carrying case in an appropriate shipping container, mailing labels may not adhere well to the textured plastic surface of the case.

Subject cables information

Attaching and disconnecting the cables

Always grasp the plastic connector hood to connect AND disconnect cables from the Quantum V Segmental BIA to avoid damage to the cable's internal wires.

Why is testing subject cables important?

- Subject cables will last a long time if used and stored properly – testing assures they are in good condition.
- Damaged cables can cause erratic test results, resistance and reactance numbers that don't look "right" or are "jumping around".
- If the wires inside the cables are broken, they can not be fixed. The cables will need to be replaced.
- Test Resistors are supplied with every Analyzer - cables can be tested before BIA testing is done.
- RJL Systems will supply additional Test Resistors at no charge other than a shipping fee.
- Replacement cables can be purchased from RJL and shipped via "overnight" delivery if necessary. It is a good idea to purchase a spare set of subject cables and keep them in storage to prevent damaged cables from making the analyzer unusable.

How do I avoid damaging the cables?

- Handle cables gently! Don't fold them, use rubber bands around them, tie them in knots, step on them, roll over them with furniture, pull on them, etc.
- Store them loosely coiled in the protective zippered pouch provided in the Analyzer kit.
- Disconnect the cables from the analyzer by gently pulling on the connector that plugs into the analyzer. Do not pull on the cables themselves.
- Do not immerse the cables in liquids - if electrode residue or other grime accumulates on the cables or clips, clean them with a cloth moistened with rubbing alcohol. For general cleaning, we recommend a solution of (1) part hydrogen peroxide to (4) parts water. Dip a clean cloth into the solution and gently swipe the cables and clean the clips.

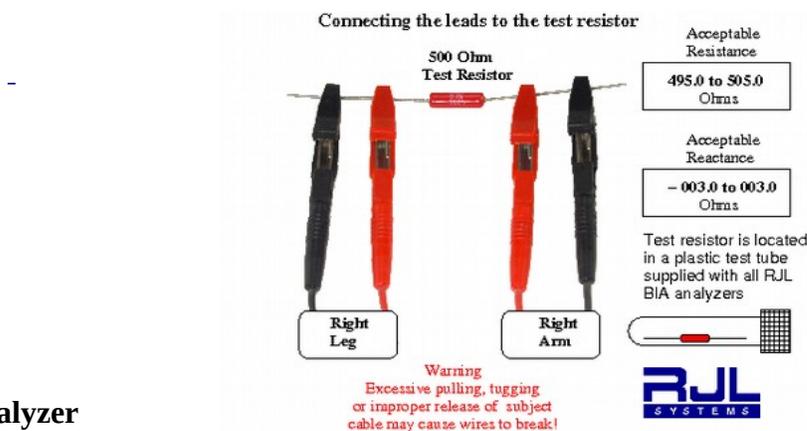
How often should cables be tested?

- If testing protocols do not dictate how often testing needs to be done in order to validate BIA data, testing intervals can depend on numerous factors. As a practical guideline, test the cables if they were possibly subjected to improper handling, were stored away, or exterior damage to cable or clips is evident.
- If there is a heavy testing period scheduled, i.e. a health fair, research study, or if instruments will be used while traveling, it is a good idea to test the cables in advance so if needed, new ones can be ordered and received in a timely manner.
- If different technicians use the same analyzer, it is a good idea to test them often.
- Testing does not damage the analyzer or cables, test the cables as often as needed.

Using the test resistor to check the analyzer and cables

1. Connect the cables to analyzer & test resistor

1. Turn the analyzer “ON” and allow a few seconds for it to initialize. If the battery is low, a message will display and the analyzer will turn itself off after 10 seconds.
2. Attach the cables to the analyzer.
3. Remove the test resistor from its protective storage tube.
4. The test resistor looks like a capsule with a wire coming out of each end. Connect the two clips from cables tagged as “HAND” to one side of wire (doesn’t matter which side) with red clip next to the resistor as shown on diagram below
5. Connect the two clips from cables tagged as “FOOT” to the wire on other side of the resistor, with red clip next to the resistor
6. Do NOT hold the test resistor during testing, lay it on flat surface or hold the leads and let the test resistor dangle, instead.



2. Test the analyzer

Resistance measurement..... acceptable range is 495.0 to 505.0 ohms (500.0 is ideal)

Reactance measurement..... acceptable range is -003.0 to 003.0 ohms (0 Is ideal)

Readings within these ranges indicate the Analyzer is in good working order.

3. Test the cables

Leave all clips attached to the test resistor and set the analyzer down. Flex the cables (almost any type of “flexing movement” of the cable will work) starting at one end of the cable, continuing along the entire length of the cable. While doing this, watch the **Resistance** value on the display.

No changes in the readings.....Cables are in good working order.

Slight changes: (within ± 2 ohms):.....Cables are acceptable for testing.

Major changes: (exceeding ± 2 ohms):.....Cables are indicating problems (broken wires, etc) and should be replaced. Contact RJL Systems to order a new set.

If either test fails, or you have questions about the results, please call RJL Systems Technical Support. Note: Have your readings available or be prepared to run the test(s) again while an RJL technician is assisting you on the phone.

Preparation for subject testing

(What to discuss with subject prior to testing)

Subjects who do not adhere to the pre-testing protocols

Failure to adhere to the pre-testing protocols described on page 11 could alter the way the body interacts with the electrical signal of the BIA. This could alter the body's resistance and reactance, which would result in altered body composition estimates produced by the software. If an individual is unable to adhere to the pre-testing protocols, they should be measured as consistently as possible from test to test. If they always do the same things before being tested, they should have the same effects on the body's electrical properties. As a result, while all of the estimated results would be offset from their actual values, the amount of offset should be consistent. This means that you would still be able to track upward and downward trends in their body composition.

Pregnancy

The FDA recommends against BIA testing on pregnant women because any possible effects on the fetus are still unknown by the FDA at this time. In addition, BIA testing would not be able to distinguish between the mother, fetus and amniotic fluids.

Implanted electronic devices

Testing should be avoided on a subject with implanted electronic devices such as pacemakers or cardiac defibrillator (ICD's). BIA Analyzers introduce a small amount of alternating (AC) current into the body that may interfere with such devices.

Metal surgical implants

Test results may not be accurate on subjects with surgically implanted metals such as pins, rods, or joint replacements. If these metals are present on only one side of the body, use the other side when testing.

Amputated limbs

BIA testing on subjects with amputated limbs may be performed if amputation is on one side of the body - use the other side for testing. The prediction equations used by the BC software assume that the person has not had either an arm or leg amputated. Expect the possibility the data cannot be accurately analyzed using BC software.

Diagnostics/treatments

BIA testing is not intended to diagnose a disease or treat a medical condition.

Risk of electrical shock

Subject will not feel an "electrical shock" when tested, the amount of current is very small. RJL Analyzers have isolation transformers that prevent any harmful current from being exposed to the subject while being tested.

Testing - how long it takes

Depending on the proficiency of the technician, the actual test can take less than a minute. BIA analysis can be performed and results printed out afterwards if technician has access to computer and printer.

Troubleshooting Guide

Possible causes of strange test results or erratic resistance/reactance display:

- Malfunctioning analyzer or broken/damaged subject cables (see “Using the Test Resistor to Test Analyzer/Cables”).
- Expired electrodes. RJL electrodes have an average shelf life of approximately 15 months. Check expiration date on the back of the packaging. If electrodes are gooey from heat exposure, dry, or smell “funny” do not use them! They can cause unusual readings if not adhering to skin properly.
- Cable clips placed on electrodes incorrectly or in reversed order see “Performing the BIA Test”.
- Do not reuse electrodes. Discard the used electrodes after each test.

Equipment issues:

- Analyzer keeps shutting itself off. Most likely, the battery is weak and needs re-charging. The analyzer will shut itself off after 10 seconds if battery is low. The analyzer will also turn itself off if the idle timeout is exceeded.

Testing protocol:

- Subject is laying on a conductive (metal) table while testing see “Pre-Testing Protocols”.
- Subject has very dry/oily skin or has used lotion where electrodes are placed. Use an alcohol swab to clean the area(s), let dry, and use fresh electrodes
- Technician did not get accurate pre-test information from the subject or neglected to ask about issues that may affect testing, like metal implants

Subjects:

- Subject did not follow pre-testing protocol and/or subject did not provide accurate information to technician see “Pre-Testing Protocols
- Testing when the protocols have not been followed can cause inaccuracies in the estimated body composition results. However, if the deviations from the protocol are going to be consistent with every test, the impact of those deviations will be consistent as well.

Data entry errors:

- Gender entered incorrectly – male vs. female
- Numbers transposed – 158 vs. 185
- Height entered as feet and inches, instead of actual inches – 5’6”, listed as 56” instead of 66”
- Height or weight entered as “English” units when the software is set is for “Metric” – or vice versa
- Testing results for an individual entered in incorrect existing “similar name” patient record
- Cannot find prior test record for subject – check if record is in a different database if multiple databases are set up. Also check for misspellings of the subject's name.
- Wrong equation set used – i.e. pediatric equations used on an adult.

RJL Warranty information

RJL warrants its Bioelectrical Impedance Equipment against defects in materials and workmanship for a period of twelve (12) months from the date of shipment if the Equipment is in the possession of the original user and has been subject to normal operating conditions. RJL will, at its option, repair or replace FOB its factory in Clinton Township, Michigan, any Equipment which, upon its examination, is determined to be defective in workmanship or materials. RJL's determination shall be final. RJL assumes no responsibility for reimbursing Customer for repair or replacement costs incurred without RJL's prior authorization.

RJL warrants that its Software will conform to its Software description applicable at the time of order for a period of twelve months from the date of shipment, if the Software is in the possession of the original user and has been subject to normal operating conditions. RJL will, at its option, confirm or replace FOB its factory in Clinton Township, Michigan, the Software that, upon its examination, is determined to be defective. RJL's determination shall be final. In the event RJL shall give written notice to Customer of any updated or revised software material and Customer fails to forthwith use the same, RJL shall be released from any and all liability related to or resulting from Customer's disregard of such notice.

THE WARRANTIES STATED HEREIN ARE EXCLUSIVE AND COMPRISE RJL'S SOLE AND ENTIRE WARRANTY OBLIGATIONS AND LIABILITITES IN CONNECTION WITH THE EQUIPMENT AND SOFTWARE SOLD AND LICENSED HEREUNDER, AND ARE IN LIEU OF AND EXCULDE ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, ARISING BY OPERATION OF LAW OR OTHERWISE, INCLUDING, BUT NOT LIMITED TO, WARRANTIES OR MERCHANT ABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Limitation of liability

RJL SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL, ECONOMIC OR CONSEQUENTIAL DAMAGES ARISING OUT OF ANY BREACH OR WARRANTY, EXPRESSED OR IMPLIED. CUSTOMER'S SOLE REMEDY FOR ANY SUCH BREACH OF WARRANTY SHALL BE THE REPAIR OR REPLACEMENT OF THE EQUIPMENT OR SOFTWARE.

How to make a warranty claim:

The customer should notify RJL of a warranty claim at (800) 528-4513. Please provide the model and serial numbers of the unit, date of purchase, warranty period, and description of the defect. If RJL requests, the Customer will, at its own expense, deliver the equipment in appropriately protective packing to RJL Systems. RJL Systems will pay for the return shipping expense

What is not covered:

Accessories are not covered under this warranty. Warranty terms do not apply if repairs/replacement are needed due to customer using the device improperly, physical damage caused by neglect/abuse, or if instrument is disassembled by the customer.

For Analyzers not purchased directly from RJL Systems, contact your service provider for further information.

If the Analyzer is not working properly, please contact RJL Systems Service Department for assistance before shipping the unit back for diagnostic evaluation.

If problem cannot be resolved over the phone, a Return Merchandise Authorization (RMA) number will be issued.

If repair is needed:

RJL Systems requires that an RMA # be issued prior to shipping a unit to us for diagnostic evaluation. RJL Systems cannot assume any responsibility for instruments sent without prior authorization.

Customer is responsible for all shipping costs – including insurance if desired - both to and from RJL Systems.

If the Analyzer is a discontinued model, RJL Systems will advise if repair parts for the unit can still be obtained and at what cost

After RJL Systems receives and performs a diagnostic evaluation on the unit, we will contact the customer with a repair estimate (labor and parts) before proceeding with service. The customer must agree to these costs before any work begins

Cost of the repair service must be paid in full before the unit is shipped back to the customer

If repairing the Analyzer is not cost-effective, RJL Systems will provide assistance with selecting a new unit if customer wishes to purchase a replacement

RJL Systems' Service policy guarantees the repair for up to one year.

Shipping instructions

Write the RMA number on the outside of the shipping box

ALWAYS include the subject cables with the shipment so entire system can be evaluated.

Place the Analyzer in its protective carrying case, and then pack it into a shipping container. Shipping labels may not adhere well to the textured plastic surface of the carrying case

We suggest placing identifying papers (letterhead, business card etc) inside the case with the instrument. This will ensure that the shipper can trace the origin of the package in the rare instance that damage to the container or it's shipping label occurs

APPENDIX