



ULTRASOUND TRANSDUCER LEAKAGE TESTER



ULT-2000 SERIES

USER MANUAL

**BC BIOMEDICAL
ULT-2000 SERIES
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WARNING - USERS

The ULT-2000 Testers are for use by skilled technical personnel only.

WARNING - USE

The ULT-2000 Testers are intended for testing only and they should never be used in diagnostics, treatment or any other capacity where they would come in contact with a patient.

WARNING - MODIFICATIONS

The ULT-2000 Testers are intended for use within the published specifications. Any application beyond these specifications or any unauthorized user modifications may result in hazards or improper operation.

WARNING - CONNECTIONS

All connections to patients must be removed before connecting the Device Under Test (DUT) to the Tester. A serious hazard may occur if the patient is connected when testing with the Tester.

Do not connect any leads from the patient directly to the Tester or DUT.

WARNING – POWER ADAPTOR

Unplug the Power Adaptor before cleaning the surface of the Tester.

WARNING - LIQUIDS

Do not submerge or spill liquids on the Tester. Do not operate the Tester if internal components not intended for use with fluids may have been exposed to fluid, as the internal leakage may have caused corrosion and be a potential hazard.

WARNING

High Voltages are generated when running electrical leakage tests.

Do not touch any surface that is in contact with the Tester, including the ultrasound transducer and the adapter.

Do not touch the liquid in the test basin, as it is at an electrical potential that is equal to the “challenge” voltage being used to perform the electrical safety test.

CAUTION - SERVICE

The ULT-2000 Testers are intended to be serviced only by authorized service personnel.

Troubleshooting and service procedures should only be performed by qualified technical personnel.

CAUTION - ENVIRONMENT

The ULT-2000 Testers are intended to function between 15 and 30 °C.

Exposure to temperatures outside this range can adversely affect the performance of the Tester.

CAUTION - CLEANING

Do not immerse. The Tester should be cleaned by wiping gently with a damp, lint-free cloth.

A mild detergent can be used if desired.

CAUTION - INSPECTION

The ULT-2000 Testers should be inspected before each use for wear and the Tester should be serviced if any parts are in question.

NOTICE – SYMBOLS

Symbol

Description



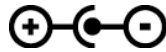
Caution

(Consult Manual for Further Information)



Electrical Caution

(Consult Manual for Further Information)



Center Negative



Direct Current

NOTICE – ABBREVIATIONS

Amps	Amperes
c	centi- (10^{-2})
C	Celsius
CF	Crest Factor
°	degree
DFA	Digital Fast Acquisition
DUT	Device Under Test
hrs	hours
Hz	hertz
k	kilo- (10^3)
kg	kilograms
kHz	kilohertz
lbs	pounds
L1, L2, L3	Location 1, 2, 3
M	Mega- (10^6)
MHz	Megahertz
μ	micro- (10^{-6})
μ A	microampere
m	milli- (10^{-3})
mA	milliampere
mHz	millihertz
mm	millimeter
ms	millisecond
mV	millivolts
Ω	ohm
PC	Personal Computer
Pk	peak
RF	Radio Frequency
RMS	Root Mean Square
US	United States
V	volt

NOTICE – DISCLAIMER

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NOTICE – CONTACT INFORMATION

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<p style="text-align: center;">BC BIOMEDICAL ULT-2000 SERIES ULTRASOUND TRANSDUCER LEAKAGE TESTER</p>
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The Model ULT-2000 Series is a family of Microprocessor based, Ultrasound Transducer Leakage Testers. The ULT-2010 measures both the conductivity of the cleaning medium and the leakage current of the ultrasound transducer. The ULT-2020 offers a Meter mode and a Datalog.

The following are highlights of some of the main features:

ULT-2010 (BASIC FEATURES):

- LARGE GRAPHICS DISPLAY WITH CURSOR SELECTION OF OPTIONS AND SETUP OF PARAMETERS
- USER-SELECTABLE CHALLENGE (TEST) VOLTAGE (90 TO 275 VAC)
- USER SELECTABLE CHALLENGE (TEST) FREQUENCY (50 OR 60 HZ)
- USER-SELECTABLE TEST LIMITS BY ULTRASOUND TRANSDUCER MANUFACTURER AND MODEL
- 1% FS MEASUREMENT ACCURACY
- AUTO RANGING WITH 10, 250, OR 500 μ A FS
- AUTOMATIC INTERNAL SELF TEST
- SINGLE BUTTON PRESS FOR FULL SYSTEM TEST
- SIMPLE GO-NOGO MODE – FOR NON-TECHNICAL USERS
- ANALYTICAL MODE – FOR TECHNICAL USERS
- DIGITAL CALIBRATION – NO POTS TO TURN
- USER-SELECTABLE DISPLAY OPTIONS
- BATTERY LIFE DISPLAY (0 to 100%)
- PROGRAMMABLE BACKLIGHT TIMER
- CONTRAST IS SOFTWARE ADJUSTABLE
- FLASH UPGRADEABLE FIRMWARE
- RS232 & PC SOFTWARE
- SERIAL PRINTER OUTPUT WITH PROGRAMMABLE USER HEADER
- REAL TIME CLOCK
- COMPATIBLE WITH DALE[®] TECHNOLOGY DALE800[®] AND FLUKE[®] BIOMEDICAL ULT-800[®] ULTRASOUND TRANSDUCER ADAPTERS AND DUAL CONDUCTIVITY PROBES

ULT-2020 (METER, DATALOG)

HAS ALL THE BASIC MODEL FEATURES PLUS:

- METER MODE FOR EXTENDED MEASUREMENT PERIODS
- PROGRAMMABLE METER CHALLENGE VOLTAGE AND FREQUENCY
- PROGRAMMABLE METER TIMER
- DATALOG WITH STORAGE OF 99 TEST RECORDS

OPTIONAL ACCESSORIES:

BC20 - 21103	BATTERY ELIMINATOR (US Version)
BC20 - 21101	BATTERY ELIMINATOR (Euro Version)
BC20 - 41337	RS232 COMMUNICATIONS CABLE (7 Pin Mini-Din to DB 9 F)
BC20 - 41339	COMMUNICATION CABLE ADAPTER (USB to DB9 M) (For use with BC20-41337)
BC20 - 30106	BC BIOMEDICAL SMALL SOFT SIDED CARRYING CASE
ULT-PC-10	DUAL CONDUCTIVITY PROBE (Short)
ULT-PC-20	DUAL CONDUCTIVITY PROBE (Long)
BC20 - 42200	CIDEX [®] COMPATIBILITY TRAY
BC20 - 42300	EXTERNAL PRINTER
BC20 - 42310	PACKAGE OF 5 ROLLS OF PAPER FOR BC20 – 42300

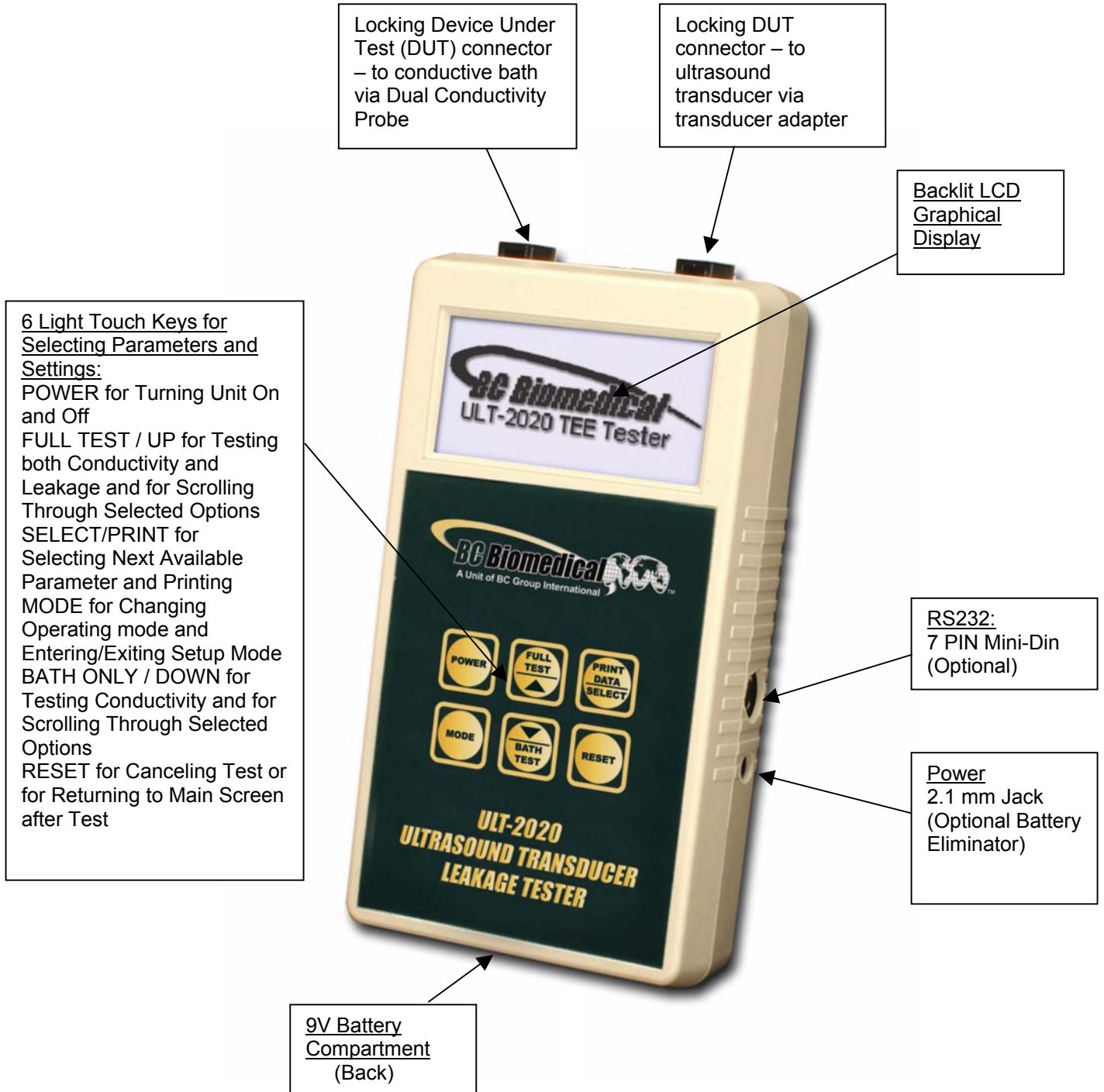
ULTRASOUND TRANSDUCER ADAPTERS:

ULT-PA-11	SONOSITE TEE TRANSDUCER ADAPTER (For use with all Sonosite transducers – including Tee)
ULT-PA-10	ULTRASOUND TRANSDUCER ADAPTER – ACUSON (For use with Acuson/Siemens 8v5, 15l8w, v5m, 3v2c transducers)
ULT-PA-12	ULTRASOUND TRANSDUCER ADAPTER – ACUSON (For use with Acuson/Siemens 260-pin transducers)
ULT-PA-13	ULTRASOUND TRANSDUCER ADAPTER – ACUSON (For use with Acuson/Siemens 156-pin and v510b transducers, as well as, ATL UM4, UM9 and ATL 5MHz bi plane)
ULT-PA-14	ULTRASOUND TRANSDUCER ADAPTER – ATL/PHILIPS (For use with ATL C9-5 curved array; ATL I7-4 linear array; ATL UM9HDI; ATL HDJ 3000, 3500, 5000; ATL MPT74)
ULT-PA-15	ULTRASOUND TRANSDUCER ADAPTER – GE LOGIQ (For use with GE Logiq transducers 3, 5, 7, 9 and GE Vivid transducers 3, 5, 7, 6T, 9T)
ULT-PA-16	ULTRASOUND TRANSDUCER ADAPTER – GE LOGIQ (For use with GE Logiq and GE P9603AU transducers)
ULT-PA-17	ULTRASOUND TRANSDUCER ADAPTER – PHILIPS (For use with Ie33/iU22)
ULT-PA-18	ULTRASOUND TRANSDUCER ADAPTER – PHILIPS/HP (For use with Philips/HP 4500 and Sonos 5500/7500 transducers)

For compatibility with specific manufacturer and model ultrasound transducers, please contact BC Group International and request the most recent copy of the ULT-2000 Ultrasound Transducer and Adapter Compatibility chart. There may be additional adapters available that are not on the above list. The above list is accurate as of the date of this User Manual revision.

OVERVIEW

This section looks at the physical layout of the ULT-2000 Series and gives descriptions of the elements that are present.



KEYS

Six tactile-touch keys with audio feedback are provided for system operation:



– This key turns the unit off and on. The unit will initiate with the Main Screen .



– When not in SETUP mode, this key will initiate the Full System Test, which includes both a bath conductivity test and a transducer electrical leakage test. When in the SETUP mode, this key will scroll up through the available settings.



– When not in SETUP mode, this key will initiate a conductivity test of the conductive liquid medium in the bath. When in the SETUP mode, this key will scroll down through the available settings.



– When not in the SETUP mode, this key will print the latest test results to the serial port. When in the SETUP mode, this key will select the next available parameter.




– When not in SETUP mode, this key is used to Reset the system to the main screen.

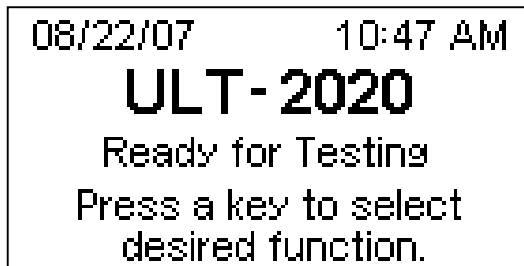



- This key toggles the unit into and out of the system modes. Depressing this key will toggle from the Main screen to the Meter Screen (ULT-2020 Only) and then to the Datalog Screen (ULT-2020 only).

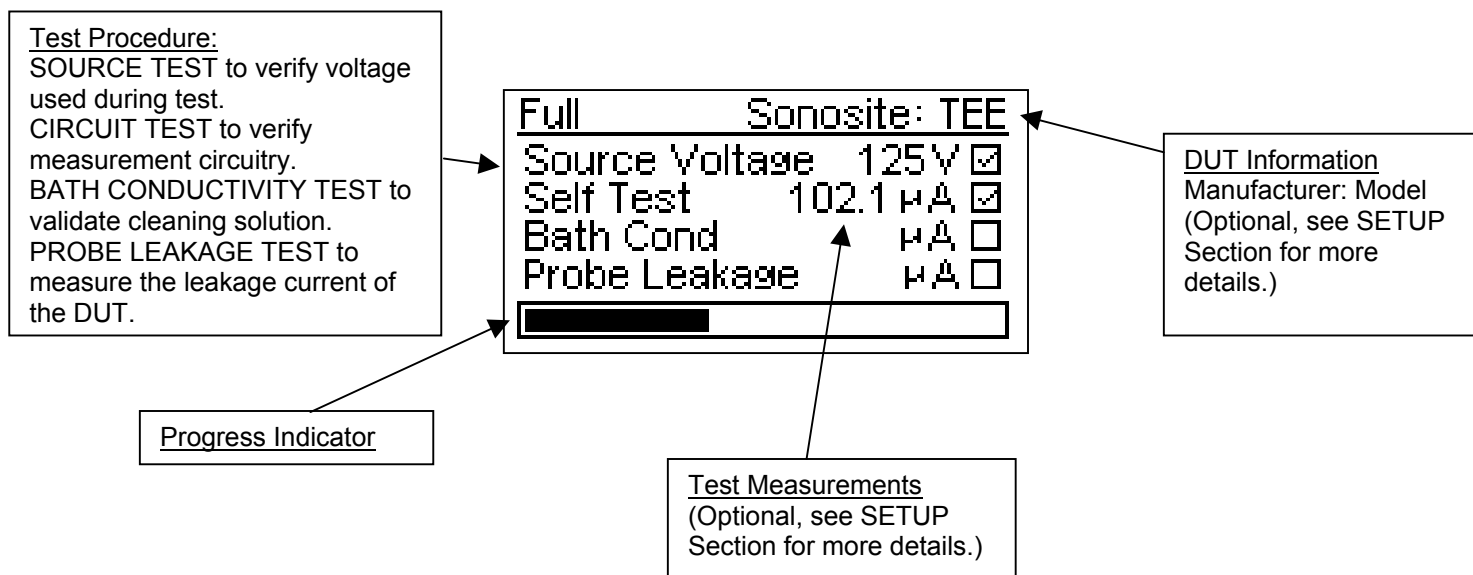
Depressing and holding this key will allow entry to the SETUP mode where the configuration can be viewed and adjusted. When in the SETUP mode, this key will exit the SETUP mode and return to the previously viewed screen. This will also save the system settings to the internal EEPROM memory so they will be retained even with the power turned off or battery removed


SCREENS

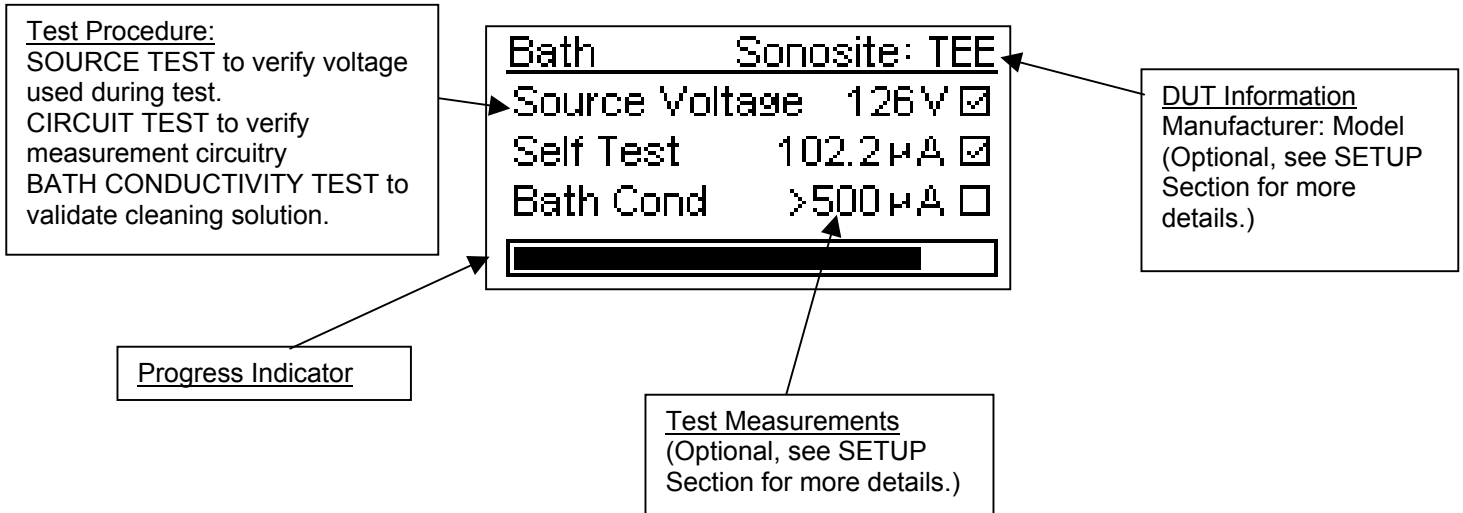
MAIN SCREEN – The main screen indicates to the user that the ULT-2000 Series unit is initialized and ready for testing. This screen is loaded after power-up initialization and can be shown by pressing the  key after a test is complete.



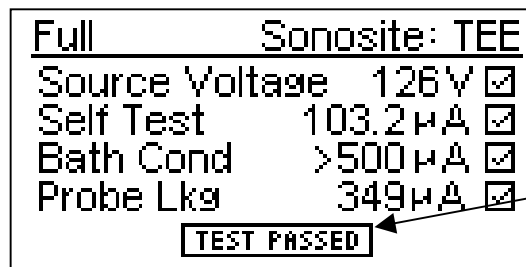
FULL TEST SCREEN – This screen is accessed by pressing the  button. The FULL TEST consists of a Self Test, Bath Conductivity Test and a Probe Leakage Test. The Self Test ensures that the ULT-2000 is working properly before checking the Device Under Test (DUT). The Bath Conductivity Test ensures that the test fluid has proper conductivity. The Probe Leakage Test measures the leakage current of the DUT.



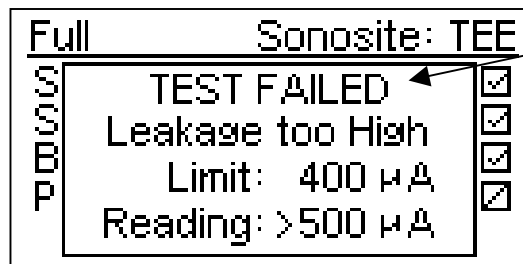
BATH ONLY SCREEN – This mode is used when preparing the bath solution. This screen is accessed by pressing the  button. The BATH TEST consists of a Self-Test and a Bath Conductivity Test. The Self Test ensures that the ULT-2000 Series unit is working properly before checking the DUT. The Bath Conductivity test ensures that the test fluid has the proper level of electrical conductivity needed for a good electrical leakage test.





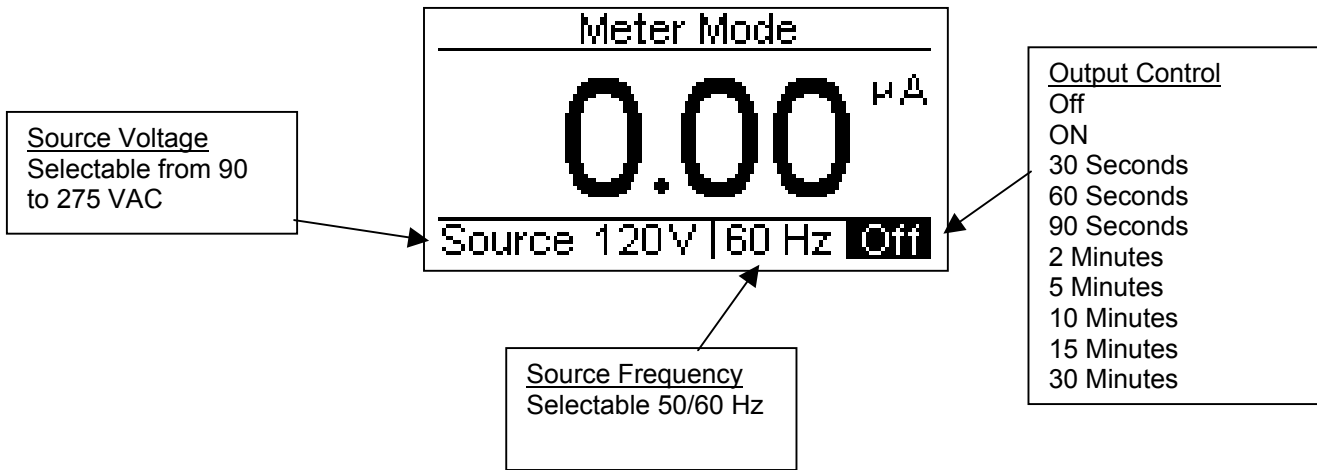
TEST MESSAGES – If a test passes, the progress bar indicator will change to indicate that the DUT passed the limits selected in the SETUP menu.



If a test fails, the screen will change to indicate what portion of the test failed.






METER SCREEN (ULT-2020 ONLY) – The meter screen allows for extended leakage current measurements. This helps in troubleshooting ultrasound probes. This screen is accessed by pressing the  key. The test voltage, frequency, and output control are selected by pressing the  key.

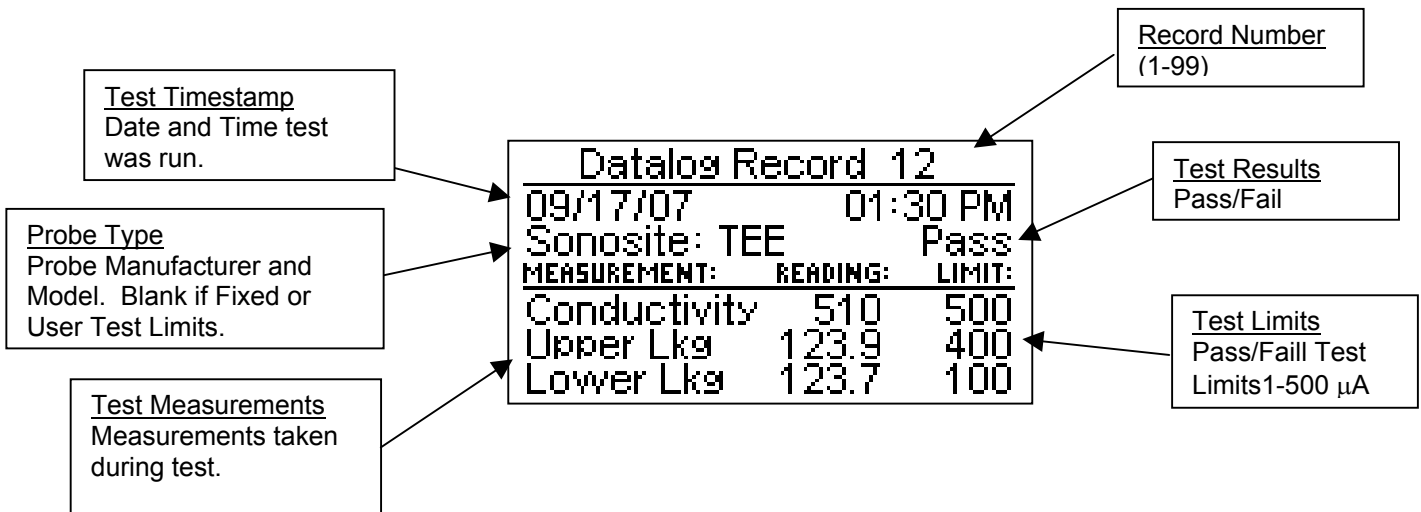


DATALOG SCREEN (ULT-2020 ONLY) – The Datalog screen shows the test results

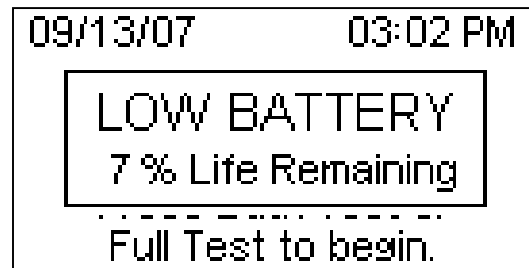
for up to 99 test records. The datalog includes a Time/Date Stamp, the Test Type, Pass/Fail, Test Measurements, and Test Limits. This screen is accessed by pressing

the  key. In this screen, the  arrows are used to scroll through the test records.

The  key is used to print the displayed record to the serial printer.



LOW BATTERY – When the battery life reaches 10 percent, the LOW BATTERY message box will be displayed.





BATTERY ELIMINATOR – A 2.1 mm jack is provided for the optional 9 VDC Battery Eliminator (BC20-21100, BC20-21101) that may be used for continuous run applications. It bypasses the internal battery when plugged in.




NOTE: The unit is shipped with the battery installed. To ensure that the battery is fresh when received, there is a red plug in the Power Input jack. This plug must be removed before use.




SETUP

The SETUP Mode allows the user to adjust the configuration of the meter. The Setup screen can be entered by depressing and holding using the  key until the Access code screen appears (5 sec). The  arrows are then used to enter the access code.



When the access code is displayed, the  key is then depressed again to gain access to the SETUP mode. The parameters can be changed by using the  key to scroll down through the list and highlight the line and the  arrows to toggle the available options.



The Setup screen can be exited using the  key.

The following is a typical screen for the System Configuration and a table of the available setting options with a brief description of each Parameter.

System Configuration	
1) Test Mode	Numerical
2) Test Limits	Manuf Deflt
3) DUT Manuf	Sonosite
4) DUT Model	TEE
5) Test Voltage	125 V

System Setup Configuration		
Parameter	Description	Range
Test Mode	Determines whether the test measurements (actual test readings) are shown in the test screen, or if the unit will simply give a PASS or FAIL result. The Default setting is Numerical.	PASS/FAIL or Numerical
Test Limits	Determines the settings for the test limits. Fixed limits are set by the factory and cannot be adjusted. User limits are programmed by the User through a special access code. Manufacturer Default limits are suggested test settings by probe manufacturer and model. Custom limits are a set of settings by probe manufacturer and model programmed by the user with a PC configuration program.	Fixed, User, Manuf Deflt, or Custom
DUT Manuf	Selects the DUT manufacturer. NOTE: Only available when Test Limits is set to Manufacturer Default or Custom.	User Defined
DUT Model	Selects the DUT Model. NOTE: Only available when Test Limits is set to Manufacturer Default or Custom.	User Defined
Test Voltage	Displays the source “challenge” voltage to be used during the Test. The Fixed setting is 120 volts, as normally used in North America.	90-275 VAC (Read Only)
Frequency	Displays the Frequency of the source “challenge” voltage. The Fixed setting is 60 Hz, as set for use in North America.	50 or 60 Hz (Read Only)
Cond Limit	Displays the test limit for Bath Conductivity Test. The measured leakage must be higher than this value to pass and confirm that the Bath Solution is a valid media for the Leakage Test. This setting is for display only and cannot be modified.	500 μ A (Read Only)
Lkg Upper Limit	Displays the upper test limit for Transducer Leakage Current Test. The measured Leakage Current must be lower than this value to pass. The Fixed setting is 100 μ A	1-500 μ A (Read Only)
Lkg Lower Limit	Displays the lower test limit for Transducer Leakage Current Test. The measured Leakage Current must be higher than this value to pass. The Fixed setting is 40 μ A	1-500 μ A (Read Only)
Setup Clock	Pressing the Up arrow while this parameter is selected displays the Clock Configuration screen where the Date and Time are configured.	Press UP
Clear Datalog	Pressing the Up arrow while this parameter is selected will erase the test records stored in the Datalog (ULT-2020 Only)	Press UP
Battery Life	Displays current life of the battery. At 10%, a warning screen will appear.	0-100% (Read Only)
Contrast Adjust	Sets the contrast of the display screen. The Default setting is 15.	0-20
Backlight (Sec)	Off – Always off 1-30 sec – The elapsed time after which the backlight will automatically turn off. ON – Always ON. The Default setting is 30 seconds.	Off, 1-30 sec, ON

System Setup Configuration		
Parameter	Description	Range
Auto Off Timer (Min)	<p>Determines the period of inactivity before the meter is turned OFF. A timer is started when the meter is turned ON and is reset each time a key is pressed. When the timer reaches the value set in this parameter, the power is automatically turned OFF. The Default setting Is 15 minutes.</p> <p>(NOTE: Setting this parameter to 0 disables the Auto Off timer.)</p> <p>(NOTE: Running from line power disables the Auto Off Timer.)</p>	0-30 Minutes
Access Code	<p>Sets the required code entry to gain access to the Setup Menu. If this parameter is set to Zero, the Access Code feature is disabled and the user will gain direct access to the Setup Menu.</p>	0-9999
Software	Displays current software program.	(Read Only)

The following is a typical screen for the User Test Configuration and a table of the available setting options with a brief description of each Parameter.

User Test Configuration	
1) Test Voltage	120 V
2) Frequency	60 Hz
3) Lkg Upper Limit	100 μ A
4) Lkg Lower Limit	40 μ A
5) Access Code	2

User Test Configuration		
Parameter	Description	Range
Test Voltage	Determines the source “challenge” voltage to be used during the Test when the Test Limits setting is set to User.	90-275 VAC
Frequency	Determines the Frequency of the source “challenge” voltage when the Test Limits setting is set to User.	50 or 60 Hz
Lkg Upper Limit	Determines the upper test limit for Transducer Leakage Current Test when the Test Limits setting is set to User. The measured Leakage Current must be lower than this value to pass.	1-500 μ A
Lkg Lower Limit	Determines the lower test limit for Transducer Leakage Current Test when the Test Limits setting is set to User. The measured Leakage Current must be higher than this value to pass.	1-500 μ A
Access Code	Sets the required code entry to gain access to the User Test Configuration Menu. If this parameter is set to Zero, the Access Code feature is disabled and the user will gain direct access to this Menu.	0-9999

OPERATION

GENERAL OPERATING OVERVIEW

The ULT-2000 is designed to test the electrical safety of all types of diagnostic ultrasound transducers, independent of the ultrasound machines on which they are typically used. Although the ULT-2000 can be used on virtually any type of ultrasound transducer, it is especially recommended in the testing of TEE (Transesophageal Echocardiography) transducers prior to each use, as recommended by many TEE ultrasound manufacturers. The ULT-2000 tests the integrity of the outer insulation barrier of the transducer as well as the capacitive leakage currents that exist. Due to the proximity of the TEE transducer to the human heart during normal operation in a patient procedure, abnormally elevated electrical leakage currents can be hazardous to the patient, and could induce microshock, resulting in cardiac fibrillation. It is therefore vital to routinely test TEE (and other types of) ultrasound transducers prior to their use on a patient.

All ultrasound transducers have inherent electrical leakage characteristics, and the manufacturers of these transducers have carefully tested and documented these characteristic leakages. These transducers each have characteristic minimum and maximum leakage currents and associated PASS/FAIL limits as prescribed by the manufacturer. These are different than the acceptable electrical leakage current limits for the actual ultrasound machines. The ULT-2000 is the only battery-operated handheld tester on the market today that tests according to these established protocols, which have been adopted by diagnostic ultrasound manufacturers. It tests both the high and low limit thresholds for electrical leakage currents.

Typical electrical safety (leakage) testing of the diagnostic ultrasound transducer should occur as part of the routine cleaning and disinfecting activity that is undertaken between patient ultrasound scanning procedures. The ultrasound transducer (see Item 5 in Figure 1) is immersed in a basin (see Item 4 in Figure 1) that contains a suitable electrically conductive liquid (see Item 7 in Figure 1). This liquid can be the liquid cleaning and disinfecting agent if it is suitably conductive to electrical current flow. Cidex[®] is a typically used disinfecting agent for cleaning ultrasound transducers and is suitably electrically conductive for performing electrical safety tests on transducers.

The ultrasound transducer is immersed in this conductive medium and the electrical connector of the transducer (see Item 6 in Figure 1) is attached to a suitable adapter (see Item 3 in Figure 1) for that particular manufacturer and model transducer. This creates one electrical “pole” for the test. The transducer adapter is then attached to the ULT-2000 as shown in Figure 1. A special conductive probe (see Item 2 in Figure 1) is then attached to the ULT-2000. This probe is immersed in the basin of conductive liquid. The setup is now complete for the testing of the transducer.

During testing, the transducer is subjected to a user selectable “challenge” voltage. This voltage is typically set to the normal operating voltage level of the ultrasound machine that the transducer is normally used with. In North America, this “challenge voltage” is typically set to 120 VAC @ 60 Hz. For countries where the normal operating voltage is 230 VAC, the challenge voltage can be set to this level, at either 50 or 60 Hz, as appropriate.

The first part of an actual ultrasound transducer electrical safety testing procedure is to test the conductivity of the liquid medium in the test basin. The ULT-2000 accomplishes this test quite easily, and reports either a simple PASS/FAIL or the actual numerical conductivity of the medium (according to the user-selectable setup of the unit). If the conductivity of the liquid medium is insufficient to perform a valid electrical leakage current test, the ULT-2000 will report this and will not allow the leakage current test to be performed. If the conductivity test is satisfactory, the ULT-2000 will proceed to the electrical leakage test. Again, the results of the test will be reported as either a simple PASS/FAIL, or the actual leakage current values will be displayed.

The operating “mode” may be easily set by the user. Items such as high and low limits, conductivity PASS/FAIL limit, challenge voltage, challenge voltage frequency, etc. can also be set by the user. See the details in the preceding section on familiarizing yourself with the ULT-2000 functions and controls.

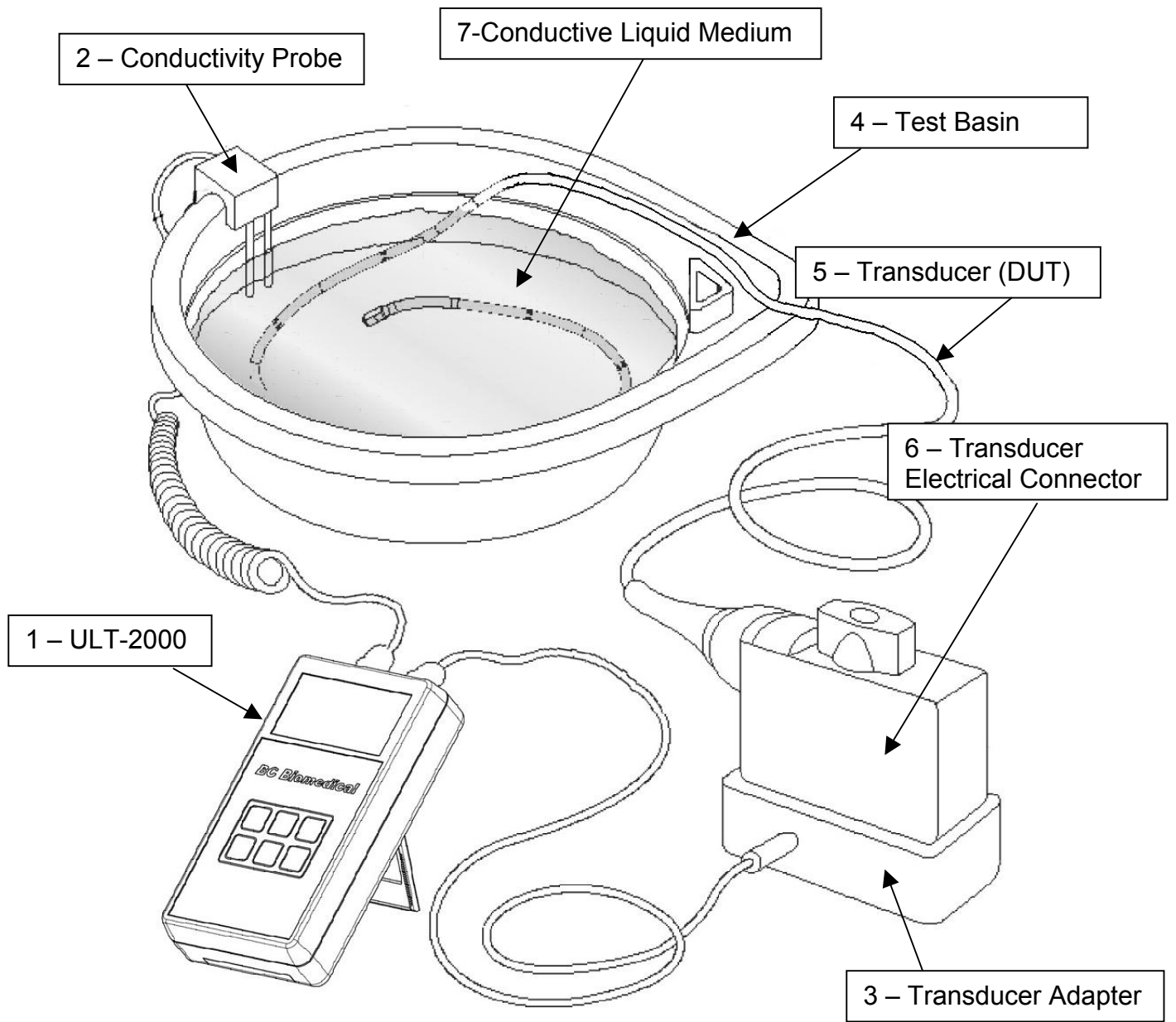


Figure 1
Typical Test Setup for ULT-2000

SELF TEST

The ULT-2000 performs an internal self test in two steps prior to doing either a Bath or Transducer Test.

Voltage Source Test - The first step is to read the actual high voltage (challenge voltage) that will be used during the testing to ensure that it is within range. If it is not, an alarm is activated and the test is halted.

Circuit Test - The second step checks the Leakage Measuring Circuitry. A relay switches in a dummy internal load. The challenge voltage is then applied to this load. The unit must correctly read the known leakage current. If it is not read correctly, an alarm is activated and the test is halted.

ITEMS REQUIRED FOR TESTING THE ULTRASOUND TRANSDUCERS

The following is the minimal equipment needed to test the electrical safety of the ultrasound transducers:

- 1) ULT-2000 Ultrasound Electrical Transducer Electrical Leakage Tester
- 2) Dual Conductivity Probe (Item # ULT-PC-10)
- 3) Ultrasound Transducer Adapter (See list on page 4)
- 4) Test Basin
- 5) Conductive liquid medium (Cidex[®] is an excellent medium for use, as it is sufficiently electrically conductive to support electrical leakage testing)

MANUAL REVISIONS

<u>Revision #</u>	<u>Program #</u>	<u>Revisions Made</u>
Rev 01	DT7331CA	Origination
Rev 02	DT7331CA	Miscellaneous Edits
Rev 03	DT7331CA	Adapters Updated
Rev 04	DT7331CB	ULT-2010 and ULT-2020 Added

LIMITED WARRANTY

WARRANTY: BC GROUP INTERNATIONAL, INC. WARRANTS ITS NEW PRODUCTS TO BE FREE FROM DEFECTS IN MATERIALS AND WORKMANSHIP UNDER THE SERVICE FOR WHICH THEY ARE INTENDED. THIS WARRANTY IS EFFECTIVE FOR TWELVE MONTHS FROM THE DATE OF SHIPMENT.

EXCLUSIONS: THIS WARRANTY IS **IN LIEU OF** ANY OTHER WARRANTY EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF **MERCHANTABILITY** OR FITNESS FOR A PARTICULAR PURPOSE.


BC GROUP INTERNATIONAL, INC. IS NOT LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES.

NO PERSON OTHER THAN AN OFFICER IS AUTHORIZED TO GIVE ANY OTHER WARRANTY OR ASSUME ANY LIABILITY.

REMEDIES: THE PURCHASER'S SOLE AND EXCLUSIVE REMEDY SHALL BE: (1) THE REPAIR OR REPLACEMENT OF DEFECTIVE PARTS OR PRODUCTS, WITHOUT CHARGE. (2) AT THE OPTION OF **BC GROUP INTERNATIONAL, INC.**, THE REFUND OF THE PURCHASE PRICE.

SPECIFICATIONS

SOURCE VOLTAGE	90 - 275 VAC, +/- 1% FS
LEAKAGE CURRENT	0.50 - 10.00 μ A, +/- 1% FS 10.0 - 250.0 μ A, +/- 1% FS 250 - 500 μ A, +/- 1% FS
CONDUCTIVITY CURRENT	.5 - 500 μ A, +/- 1% FS

DISPLAY	LCD Graphical 128 X 64 Pixels
SETUP MEMORY	EEPROM, All Parameters
MEMORY RETENTION	10 Years w/o Power
OPERATING RANGE	15 to 30 Degrees C
STORAGE RANGE	-40 to 60 Degrees C
CONSTRUCTION	Enclosure - ABS Plastic Face - Lexan, Back Printed
SIZE	7.09 x 3.94 x 1.56 inches 180 x 100 x 40 mm (HxWxD)
WEIGHT	\leq 1.1 lbs. (0.675 kg)
CONNECTIONS	Power - 2.1 mm Center Negative
POWER	LINE: 10VDC, Center Negative BATTERY: 9V Lithium
POWER CONSUMPTION	ON: less than 300 mA OFF: less than 60 μ A
BATTERY LIFE	CONTINUOUS: 20 hrs. OFF: 12 months
BATTERY ELIMINATOR (OPTIONAL)	BC20 - 21100 -- US BC20 - 21101 -- Euro 10V, 300 mA DC 

NOTES