CRC®-55t Well Counter

OWNER'S MANUAL

Capintec, Inc.
Sales and Marketing
and Customer Support
6 Arrow Road
Ramsey, NJ 07446
Phone (800) ASK-4CRC
Fax (201) 825-1336

Capintec, Inc.
<u>Only</u> Authorized Service Center
620 Alpha Drive
Pittsburgh, PA 15238
Phone (800) 227-6832
Fax (412) 963-0610

An Eczacıbaşı-Monrol Company

TABLE OF CONTENTS

This page intentionally left blank.

PREFACE

GENERAL

Thank you for purchasing the Capintec, Inc. CRC®-55t Well Counter. Every effort has been made to insure that the information in this document is complete, accurate, and up-to-date. Capintec, Inc. assumes no responsibility for the results of errors beyond its control. Mention of products manufactured by other companies does not necessarily constitute endorsement by Capintec, Inc.

Please address any comments pertaining to this manual to:

> CAPINTEC, Inc.
> 620 Alpha Drive
> Pittsburgh, PA 15238
> Phone (412) 963-1988
> Fax (412) 963-0610

CRC®-55t and CII are registered trademarks of Capintec, Inc.

Note: Federal Law restricts this device to sale by or on the order of a physician, pharmacist or other licensed professional.

SYSTEM DESCRIPTION

The CRC®-55t Well Counter has the following capabilities:

- perform wipe tests,

- perform Lab Tests: Schilling, Plasma and RBC

MEDICAL EQUIPMENT SAFETY CLASSIFICATION

- CLASS I EQUIPMENT energized from an external power source.

- TYPE B EQUIPMENT with no applied parts to the patient.

- Ordinary EQUIPMENT without protection against the ingress of water or particulates (IP00).

- Suitable for CONTINUOUS OPERATION.

- NOT suitable for use in an OXYGEN or a FLAMMABLE ENVIRONMENT.

ELECTROMAGNETIC INTERFERENCE POTENTIAL

This equipment complies fully with interference immunity requirements of the standard IEC 60601-1-2 (2004): Medical Electrical Equipment – Part 1-2: General Requirements for Safety – Collateral Standard: Electromagnetic Compatibility – Requirements and Tests.

This equipment generates radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to nearby devices. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference, the user is encouraged to try to correct the interference by one of the following measures:

- Increase the separation between the equipment and the affected device.

- Plug the unit into an outlet on a circuit different from that which the affected device is connected.

If this fails to correct the problem, please contact Capintec's <u>only</u> Authorized Service Center.

IMPORTANT SAFETY INFORMATION

The CRC®-55t Well Counter has been carefully designed to give you years of safe and reliable performance. As with all electrical equipment, however, there are basic precautions you must observe to avoid injuring yourself, the patient or damaging the equipment.

- ***Follow*** the unpacking and assembly instructions document, and ***read*** this manual carefully before using this equipment. Be sure to save all provided documents for future reference.

- ***Understand all*** warning and caution labels as explained in CHAPTER 1: SAFETY before operating this equipment.

CHAPTER 1

SAFETY

GENERAL

These warnings and instructions for use form an integral part of the CRC®-55t Well Counter and must therefore be kept available for consultation at all times. Precise compliance with the instructions is an essential condition for normal use, correct application and thus safety of the user.

SYMBOL DEFINITIONS

⚡	Dangerous Voltage Present
⏚	Functional Earth Ground
	Date of Manufacture
CE0413	CE Mark
	Waste in Electrical and Electronic Equipment (WEEE) – This symbol indicates that the waste of electrical and electronic equipment must not be disposed as unsorted municipal waste and must be collected separately.
20	Environmentally Friendly Use Period (EFUP) – 20 years from the date of manufacture – Toxic or hazardous substances or elements contained in the unit will not leak or mutate under normal operating conditions resulting in any environmental pollution, bodily injury or damage to assets.

WARNING AND CAUTION LABELS

Located on the bottom of the Well Counter is a label (Figure 1-1) which pertains to the electrical safety of the Well Counter. It is necessary because of the high voltage present (600-1100 volts) on the inside of the Well Counter. A screwdriver is necessary to remove the cover.

<div align="center">

⚡ **CAUTION** ⚡
HIGH VOLTAGE

⚡ MISE EN GARDE ⚡
HAUTE TENSION

</div>

<div align="center">

Figure 1-1

</div>

CAUTIONS AND NOTES

⚠️ **CAUTION:** Only qualified/trained personnel should operate or service this unit.

⚠️ **CAUTION:** If the equipment is used in a manner not specified in this manual, the protection provided by the equipment may be impaired.

⚠️ **CAUTION:** Do not store high activity radioactive samples in the Well Counter. It was not designed to function as a long term storage vessel. Prolonged storage of high activity radioactive samples in the Well Counter may cause premature failure of the unit.

⚠️ **CAUTION:** High voltage is present inside the Well Counter (up to 1100 Volts). Due to the presence of this high voltage, opening the cover with the system plugged in may be hazardous. Refer all servicing to qualified personnel.

⚠️ **CAUTION:** No internal adjustments inside the Well Counter may be performed by the user within the conditions of the warranty. Due to the presence of high voltage, opening the cover with the system plugged in may be hazardous. Refer all servicing to qualified personnel.

⚠️ **CAUTION:** Never use the Well Counter without the well liner in place. Liners are inexpensive and easy to replace. A contaminated well is a very costly mistake. If the unit becomes contaminated, remove the liner and clean the unit as stated in CHAPTER 13: CLEANING AND MAINTENANCE, SECTION: CLEANING and DISINFECTING, Cleaning Instructions before operating.

⚠️ **CAUTION:** Care must be exercised when moving the instrument or when maintenance is performed. The shielded cylinder is heavy (6.9 kg or 15.2 lb.). It is essential to avoid mechanical shock or vibration of any kind.

⚠ **CAUTION:** It is desirable to leave the unit powered at all times in order to prevent moisture absorption and to maintain the stability of the instrument (especially if the instrument is subjected to high humidity or low temperature).

⚠ **CAUTION:** This equipment generates radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful Electromagnetic Interference (EMI) to nearby devices. However, there is no guarantee that interference will not occur in a particular installation.

⚠ **CAUTION:** The Well Counter contains lead. Appropriate caution should be taken if the interior of the unit is exposed. The unit should be disposed of in accordance with local and national regulations.

⚠ **CAUTION:** The user should always verify the validity of any measurement or test result in order to minimize measurement errors.

Note: *It is recommended that periodic (every five years) re-calibration of the unit be performed only by Capintec's Authorized Service Center (reference CHAPTER 13: CLEANING AND MAINTENANCE, SECTION: SERVICING) to guarantee that the instrument's high reliability is maintained).*

GENERAL SAFETY TIPS

- Unplug the equipment before cleaning it. Use only a damp cloth; do not use solvents or aerosol cleaners.

- To protect the equipment from overheating, do not use the equipment directly in front of a radiator or heat register.

- Do not use the equipment near water, or spill liquids of any kind into the equipment.

- To avoid damaging the cable, do not place anything on it or place it where it will be stepped on. If the cord becomes damaged, replace it immediately.

- Aside from the routine maintenance described in this manual, do not try to service this equipment yourself. Do not make any adjustments other than those outlined in this manual, as you may in-validate the calibration or cause damage requiring extensive repair work. Refer servicing to qualified service personnel.

This page intentionally left blank.

CHAPTER 2

FUNCTIONAL & TECHNICAL DESCRIPTION

INTENDED USE

The CRC®-55t Well Counter System is intended to be used by trained Nuclear Medicine Technologists and Physicians, for performing Wipe Tests, Schillings Test, Plasma Volume Test with I 125, RBC Volume Test with Cr51 and RBC Survival Test.

Also using the system are Health Physicists with expertise in nuclear medicine and radiation safety – typically used for assessing reproducibility of counting instruments with various Quality Assurance procedures (Chi-Square, MDA).

The CRC®-55t Well Counter System also performs Pulse Height Analysis, isotope identification, radioisotope decay corrections, efficiency calculations and maintains a database for storage and easy retrieval of patient demographic data and measurement results.

OPERATOR PROFILE

The operator profile for the Nuclear Medicine Technologists, Physicians and Health physicists is as follows:

- **Education:**
    - o Minimum: at least an Associate Degree
    - o No maximum

- **Knowledge:**
    - o Minimum: Understands the basic concepts of nuclear medicine.
    - o No maximum

- **Language Understanding:**
    - o English
    - o Other languages are available for instructions for use

- **Experience:**
    - o Minimum: Has minimum training or is under surveillance by a trained user.
    - o No maximum

OPERATOR TRAINING

This Owner's Manual contains all of the information required to operate the CRC®-55t Well Counter System.

FUNCTIONAL DESCRIPTION

The activity of the sample will be displayed with a proper unit when a sample of unknown strength (activity) of a known radioisotope is placed in the Well Counter and the correct efficiency is input or measured.

With its NaI drilled-well crystal detector, the Well Counter offers greater sensitivity and faster results than other wipe test monitors that use Geiger-Mueller (GM) tubes.

The microprocessor-controlled CRC®-55t has an automatic internal energy calibration feature, which permits self-calibration of the keV per channel ratio.

For isotopes that have a measured efficiency, the CRC®-55t will convert readings in cpm [counts per minute] to dpm [disintegrations per minute]. Most federal and state regulations require survey monitoring results in dpm.

The CRC®-55t contains gamma spectroscopy data for 76 nuclides and efficiencies for 11 nuclides. Reference the Appendix for a complete listing of the Well Counter nuclides included in the CRC®-55t memory.

Note: *The CRC®-55t Well Counter is not designed to provide conclusive identification of radionuclides in samples. The CRC®-55t Well Counter is designed to provide the first step for users who need to identify contaminants by narrowing down the possibilities of which isotopes are contained in wipe test samples.*

The CRC®-55t also provides a "Full Spectrum Efficiency" result for a wipe sample by grouping all 256 channels together as one open-energy window. This indicates whether a sample exceeds trigger levels, but does not help identify the contaminant.

POWER UP

When the instrument is first powered up, Figure 2-1 Startup Screen will appear.
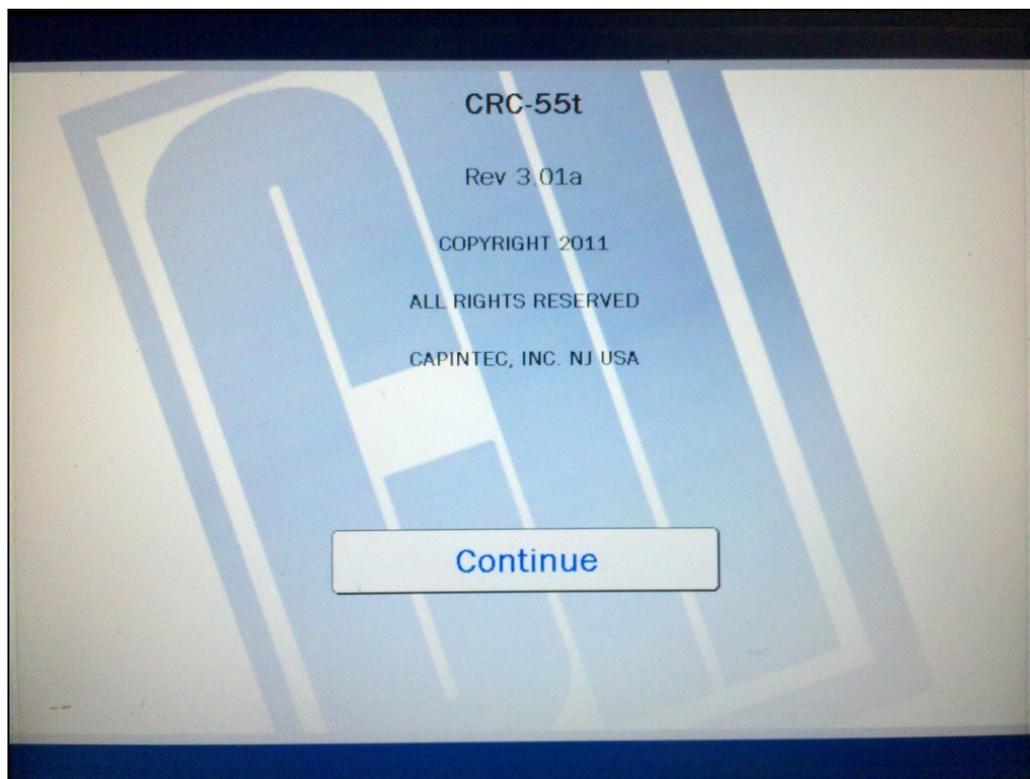
Figure 2-1 Startup Screen

Note: *The screen will display the revision level of the installed software.*

Note: *If the Security Status is set to Traditional, the* **CONTINUE** *button will be replaced with a Login button. The Login Screen will include input boxes which will enable the user to enter a User ID and a Password or to login as a guest. After logging in, the* **CONTINUE** *button will appear. Reference CHAPTER 4: SYSTEM SETUP, SECTION: SECURITY STATUS for more information.*

When the **CONTINUE** button is touched, Figure 2-2 Chamber Measurement Screen is displayed and the CRC®-55t begins measuring the activity in the Chamber.
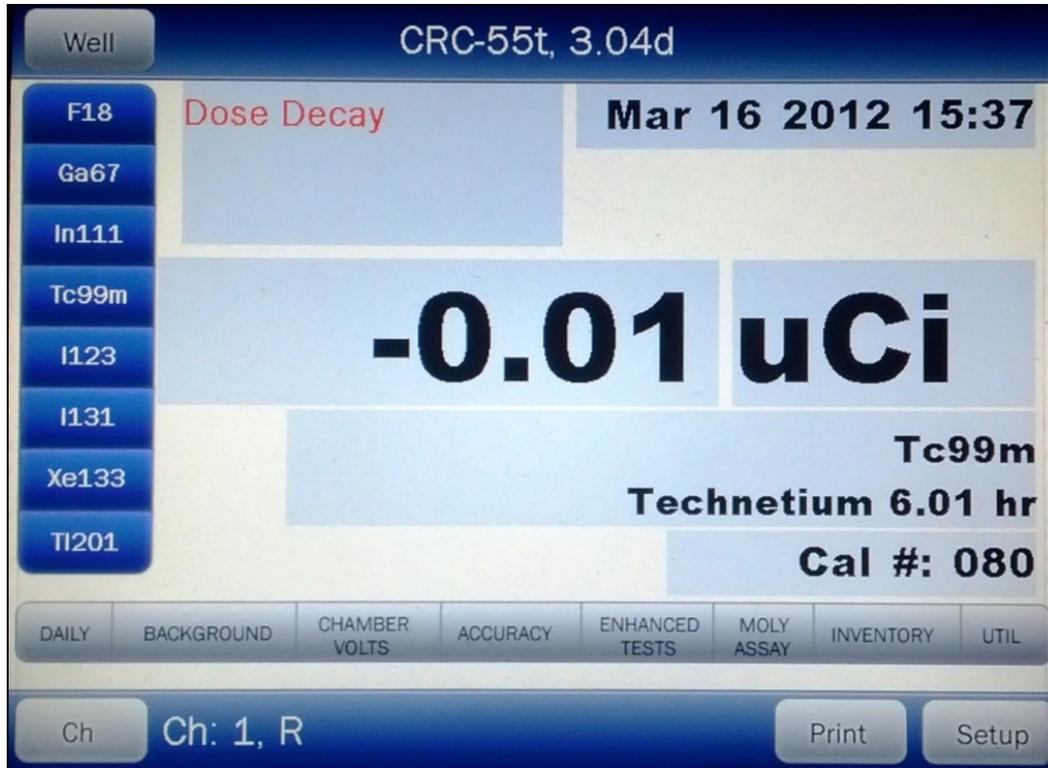
Figure 2-2 Chamber Measurement Screen

The CRC®-55t is now in Chamber mode. That is, it is ready to perform measurements using the Chamber. The **WELL** button is located in the upper left part of the Chamber Measurement screen.

Touching the **WELL** button will put the instrument in to Well mode. Figure 2-3 Well Counter Main Screen will appear, which means the system is ready to perform measurements using the Well Counter.

Figure 2-3 Well Counter Main Screen

Once the system is in Well mode, the **WELL** button will change to the **CH (CHAMBER)** button. Touching the **CH** button will put the instrument back in to Chamber mode, which means the system will be ready to perform measurements using the Chamber.

*Note: The **WELL** button will be displayed after connecting the Well Counter to the system.*

FUNCTIONS

The functions for the Well Counter are displayed on Figure 2-3 Well Counter Main Screen and relate only to the Well Counter. These consist of Measurements (Background, Wipes and General), Auto Calibration, Quality Assurance (System Test, MDA Test, and Chi Square Test), Reports, Lab Tests (Schilling, Plasma, RBC, RBC Survival) and Utilities (Ci-Bq Converter, Decay Calculator and Diagnostics).

Figure 2-4 illustrates the overall program flow of the CRC®-55t Well Counter.

Main Screen

- Measurement
- Auto Calibrate
- Lab Tests
- Quality Assurance
  - System Test
  - MDA Test
  - Chi Square Test
  - Setup
    - Password → Test Source
    - Efficiencies
    - User Nuclides
    - Wipe Tests
    - RBC Survival Normal Values
  - Schilling
  - Plasma
  - RBC
  - RBC Survival
- Measure Background
- Measure Wipes
- General Measurement
- Setup
  - Password
    - Setup Location
    - Edit Background Trigger
    - Edit Default Work Area Settings
    - Edit Default Unrestricted Area Settings
    - Edit Default Sealed Settings
    - Edit Default Package Settings
- Setup
  - **Setup Screen**
    Activity Unit (Ci/Bq)
    Date Format
    Printer
    USB PC Driver
    Display Sleep Timeout
    Display Sleep Brightness
    Display Brightness
    Volume
  - Advanced Detector — Password
  - Staff
  - Screen Calib
- Set Time (requires password)
- Reports
  - Auto Calibration Report
  - System Test Report
  - MDA Report
  - Chi Square Report
  - Wipe Report
  - Schilling Report
  - Plasma Report
  - RBC Report
  - RBC Survival Report
- Utility
  - Ci-Bq Converter
  - Decay Calculator
  - Diagnostics

Figure 2-4

Wipe Test

The Wipe Test measures radioactive contamination for nuclear medicine departments and laboratories, as mandated by state and federal radiation safety requirements.
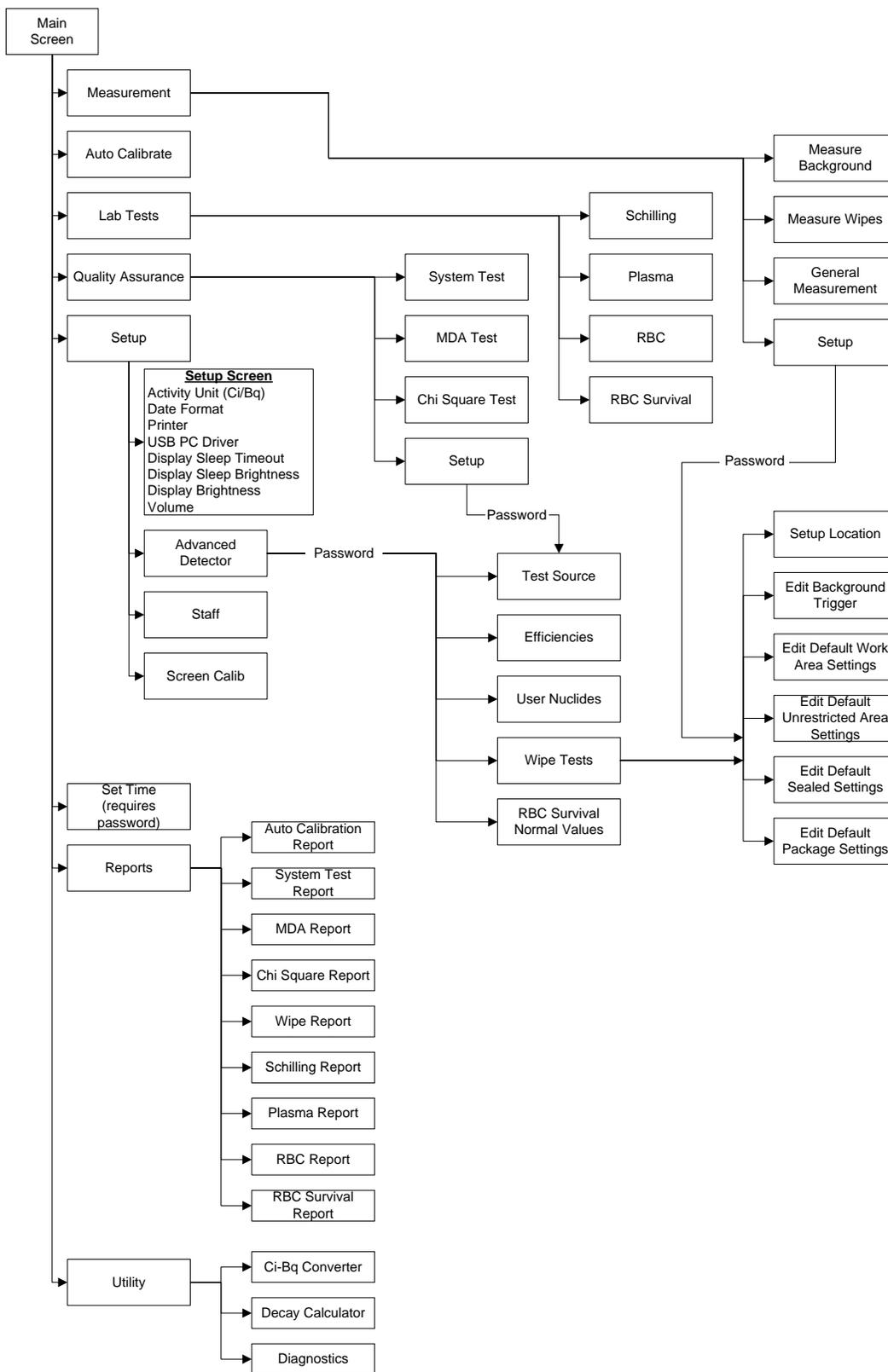
Lab Tests

Urine Test

Schilling Test

The Schilling Test utilizes Cobalt 57 labeled Vitamin B-12 and is used to determine B-12 deficiencies from either malabsorption, lack of intrinsic factor (pernicious anemia), or intraintestinal destruction. The test entails collection of urine for 24 or 48 hours after the oral administration of radioactive labeled vitamin B-12. The ratio of excreted to administered Co57 is calculated. If the initial results indicate a reduced amount of excreted vitamin, the test is repeated with a second sample of labeled B-12 and intrinsic factor. For Schilling Test I, abnormal results are generally less than 8%-10%. Normal range is generally 11% to 26%. For Schilling Test II, no change indicates malabsorption, while an improved percentage indicates pernicious anemia.

Blood Tests

Plasma Volume Test

Blood Volume determinations involving radioactive tagging are most frequently used in specific disease conditions when the hematocrit may not accurately estimate true blood volume. Such conditions include extensive trauma or burn patients, certain types of anemia, and polycythemia. Most frequently used radioactive tracers are protein labeled I-125 for plasma measurements and Cr51 tagged RBCs for red cell mass determinations.

RBC Volume Test

This test is used to determine red blood cell volume or mass and is most frequently used in specific disease conditions when the hematocrit may not accurately estimate true blood volume. In this test, Cr51 tagged RBCs are used as radioactive tracers for red cell mass determination.

RBC Survival Test

RBC survival determination involving radioactive tagging is most frequently used in diagnosis of hemolytic anemia. The CRC®-55t software and default counting parameters follow the testing protocol outlined in the Mallinckrodt RBC Survival Kit that utilizes Sodium Chromate Cr51 injections. The software standardizes the 24-hour sample to 100% survival, and automatically decay corrects each subsequent sample. This permits the user to measure each sample as soon as it is collected. For this reason, all sample volumes must be the same. Each sample must also have a hematocrit (HCT) entered. The subsequent samples are corrected for any differences in hematocrit.

TECHNICAL DESCRIPTION

Warm Up Period

Approximately 30 minutes should be allowed for the instrument to stabilize. While the instrument is warming up, it is strongly recommended that you become familiar with the CRC®-55t Well Counter.

Environment Requirements

Operational

The instrument should be located where the level of the background radiation is as low and as constant as possible.

The instrument should be located where the temperature is stable within a range of +50°F to +85°F (+10°C to +30°C) and the maximum relative humidity is 90% non-condensing to warrant maximum reliability and accuracy.

The instrument should be located where the barometric pressure is within a range of 27 – 31 inches of mercury (91 – 105 kilopascals).

Storage

The instrument should be stored where the temperature is stable and the range is from +39°F to +110°F (+4°C to +43°C) and the maximum relative humidity is 90% non-condensing to warrant maximum reliability.

The instrument should be stored where the barometric pressure is within a range of 15 – 33 inches of mercury (51 – 112 kilopascals).

⚠ **CAUTION:** If these environmental requirements are not followed, the instrument may display erroneous readings

Dimensions

Height .... 23.8cm ..... (9.38in.)
Diameter .... 15.2cm ..... (6in.)
Weight .... 6.9kg .... (15.2lb.)
Well Diameter .... 1.7cm .... (.67in.)
Well Depth .... 3.8cm .... (1.5in.)
Cable Length .... 2.7m .... (9ft.)

Performance

```
Type ..................................... Drilled-well crystal, NaI(Tl) scintillator
Crystal Dimensions ............... 3.8cm (1.5") × 4.4cm (1.75")
Shielding .............................. 1.3cm (0.5") lead
Cabling ................................. 2.75m (9 ft) interconnecting cable
Channels .............................. 256
Counting Rate ....................... 100,000 cps, max
```

Regulatory Listings

The CRC®-55t has been independently tested and is manufactured in compliance with the following Standards:

EMC

- European Union Norm EN 60601-1-2 (2004): Medical Electrical Equipment – Part 1-2: General Requirements for Safety – Collateral Standard: Electromagnetic Compatibility – Requirements and Tests

Electrical

- EN 61010-1: Safety requirements for electrical equipment for measurement, control, and laboratory use Part 1: general requirements

ETL Listed

- CAN/CSA C22.2 No. 61010-1:2004, 2nd Edition: Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use – Part 1: General Requirements
- CAN/CSA C22.2 No. 61010-2-101:04, 1st Edition: Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use – Particular requirements for in vitro diagnostic (IVD) medical equipment
- ANSI/UL 61010-1:2004, 2nd Edition: Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use – Part 1: General Requirements

This page intentionally left blank.

CHAPTER 3

GENERAL OPERATING INSTRUCTIONS

GENERAL

This section describes general operating procedures, the touch screen, and how to access all other tests and screens

WELL COUNTER MAIN SCREEN

The CRC®-55t Well Counter Main screen is shown below.

Figure 3-1 Well Counter Main Screen

General usage of touchable buttons is briefly described. Specific button usage will be given in the appropriate sections.

CH (CHAMBER) Button 1

When the instrument is first powered up, it is in Chamber mode. That is, it is ready to perform measurements using the Chamber.

The **WELL** button is located in the upper left part of the Chamber Measurement screen. Touching the **WELL** button will put the instrument in Well mode, which means it is ready to perform measurements using the Well Counter.

Once the system is in Well mode, the **WELL** button will change to the **CH (CHAMBER)** button. Touching the **CH** button will put the instrument back into Chamber mode, which means it will be ready to perform measurements using the Chamber.

MEASUREMENT Button 2

This button provides access to the Well Counter measurements. Touching this button provides access to the following functions: **MEASURE BACKGROUND**, **MEASURE WIPES** and **GENERAL MEASUREMENT**.

AUTO CALIBRATE Button 3

This button provides access to the Well Counter's automatic calibration measurement procedure.

QUALITY ASSURANCE Button 4

This button provides access to the Well Counter's Quality Assurance Tests module. Touching this button provides access to the following tests: **SYSTEM TEST**, **MDA TEST** and **CHI SQUARE TEST**.

REPORTS Button 5

This button provides access to the Well Counter's reports. Touching this button provides access to the following: **AUTO CALIBRATION REPORT**, **SYSTEM TEST REPORT**, **MDA REPORT**, **CHI SQUARE REPORT**, **WIPE REPORT**, **SCHILLING REPORT**, **PLASMA REPORT**, **RBC REPORT** and **RBC SURVIVAL REPORT**.

LAB TESTS Button 6

This button provides access to the Well Counter's Lab Tests module. Touching this button provides access to the following tests: **SCHILLING**, **PLASMA**, **RBC** and **RBC Survival**.

UTILITY Button 7

This button provides access to the Well Counter's utility functions. Touching this button provides access to the following: **CURIE/BECQUEREL CONVERTER**, **DECAY CALCULATOR** and **DIAGNOSTICS**.

Date/Time Button 8

Touching the date/time will display a screen allowing the setting of the current date/time. A password is required to change the date and/or time.

SETUP Button 9

The lower right part of the screen contains the **SETUP** button. This button allows for setting up the system for activity units, date format, type of printer, display adjustments, Staff Member setup and advanced Detector settings.

This page intentionally left blank.

CHAPTER 4

SYSTEM SETUP

GENERAL

Initial installation and checkout procedures are described in this section.

RECEIVING CONDITION EXAMINATION

Be sure to verify that the shipping carton is received in good condition, i.e., no damage should be visible and the box(es) should be dry and clean.

Should the instrument be received in a damaged condition, save the shipping container(s) and the packing material and request an immediate inspection by the carrier.

Capintec, Inc. is not responsible for the damage, which occurs during shipment but will make every effort to help obtain restitution from the carrier.

UNPACKING AND INSTALLATION

The instrument is packed and shipped as a complete unit. All the accessories are contained in the carton.

The instrument is shipped in a plastic bag in order to provide a dry and clean environment during shipment.

⚠ **CAUTION:**   Be sure the instrument has reached room temperature prior to opening the bag. (Leave the box in the room 24 hours before opening it.)

1. Remove all outer packing material and tapes. The shipping and packing material should be saved for future use.

2. The following equipment should be found upon unpacking:
    - Well Counter

    Note: If Test Sources are ordered, they will be shipped separately.

3. Be sure to remove all tape and protective material from the instrument prior to connecting to the Readout unit.
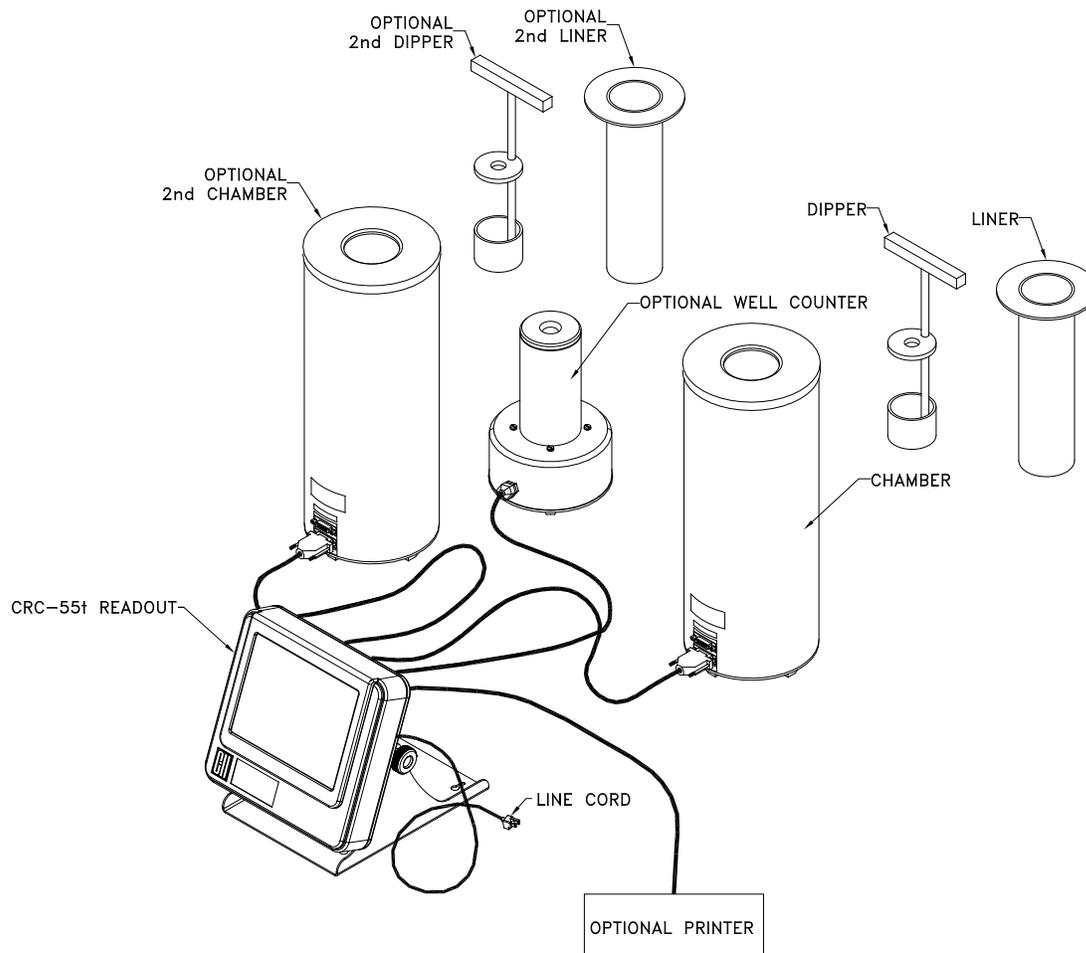

Figure 4-1 Complete System

4. Verify that all power switches (Readout and Printer) are in the "OFF" or "0" position.

   Note: *If using the Slip-Ticket printer, please unplug from AC Power.*

5. Connect the Well Counter Cable to the connector at the rear of the CRC®-55t Readout labeled "WELL COUNTER".

   Note: *To avoid damage, do not over-tighten the screws on the Cable connector. The screws should be finger-tightened only!*

ENVIRONMENT REQUIREMENTS

The instrument should be located where the level of the background radiation is as low and as constant as possible.

The instrument should be located where the temperature is stable within a range of +50°F to +85°F (+10°C to +30°C) and the maximum relative humidity is 90% non-condensing to warrant maximum reliability and accuracy.

The instrument should be located where the barometric pressure is within a range of 27 – 31 inches of mercury (91 – 105 kilopascals).

⚠ **CAUTION:** If these environmental requirements are not followed, the instrument may display erroneous readings.

GENERAL OPERATIONAL SETUP

There are several things that **must** be done before using the CRC®-55t Well Counter for the first time. The following briefly describes these steps:

- Select proper units: Ci or Bq. Although the system can be changed at any time, it is recommended that the system be set for the proper units prior to use to prevent confusion. (Reference the CRC®-55t Owner's Manual.)

- Enter Cs137 Test Source Data: The Test Source is used for the System Test. Reference CHAPTER 5: WELL COUNTER INITIALIZATION, SECTION: TEST SOURCE DATA.

- Perform Auto Calibration: The system must be calibrated before any measurements can be performed. Reference CHAPTER 8: WELL COUNTER TESTS, SECTION: AUTO CALIBRATE.

- Perform Efficiency measurements for nuclides: In order to select nuclides to look for in wipes, the efficiency of the desired nuclide must be input or measured. The system includes a default efficiency for Cs137. Reference CHAPTER 5: WELL COUNTER INITIALIZATION, SECTION: EFFICIENCY DATA.

ACCEPTANCE TESTING

The following tests should be performed prior to operational use of the unit.

Diagnostics Test

Reference CHAPTER 6: DIAGNOSTICS for instructions on how to perform this test.

Well Counter Test

Reference CHAPTER 8: WELL COUNTER TESTS for instructions on how to perform these tests.

SECURITY STATUS

The purpose of the Security Status is to prevent unauthorized personnel from viewing Patient Lab Test data and Staff members.

In order to set the Security Status, you must be logged in as *root*. Reference the Login in as *root* section on page 4-6.

The Security Status selections are:

- **Disable**.......... No password is required. Any user can access any part of the system including Protected Modules. This is the default setting when shipped from the factory.

- **Traditional** .... Login at power-up is required. Once logged in, the user can access the modules as per their Security Role (see below).

- **Enhanced** ..... Login is at each Protected Module (see below). All users must login for each of these modules and are logged-out when the module is exited. Login is required each time the module is accessed.

The following is a list of the Protected Modules that require a user to login if the Security Status is set to Enhanced:

- Lab Test Reports
- Staff

The following is a list of the available Security Roles for users:

- **Root** ....Root is a Super User and has complete access to all Protected Modules and all privileges.

- **Admin**......These are users that have administrator privileges. Admins must be added by the Root. These users can access all Protected Modules. They can also access and view all Staff Members. They can add and edit users without Admin privileges.

- **User**.........These are users that do not have administrator privileges. Users can be added by the Root or Admins. These users can access all Protected Modules. They cannot add or edit other users. They can edit their own passwords and names but cannot change their Security Role.

- **Guest**.......A guest cannot access any Protected Module.

Security Status and Staff Setup

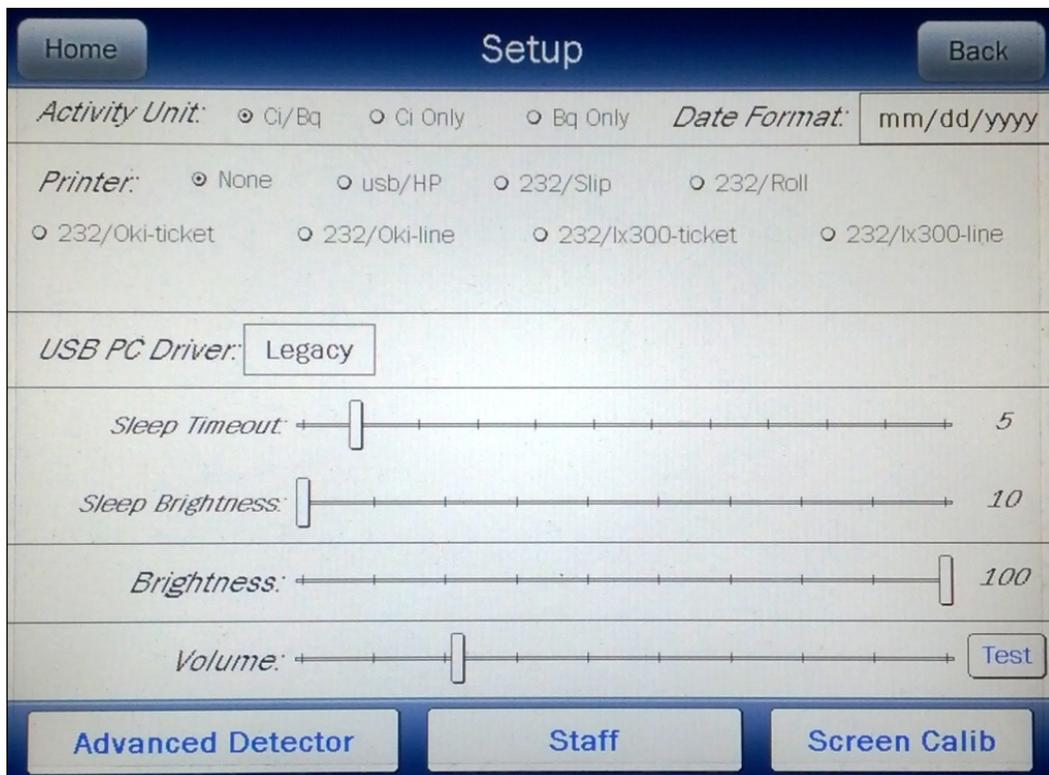From the Main Screen, touch the **SETUP** button. Figure 4-2 Setup Screen will appear.

Figure 4-2 Setup Screen

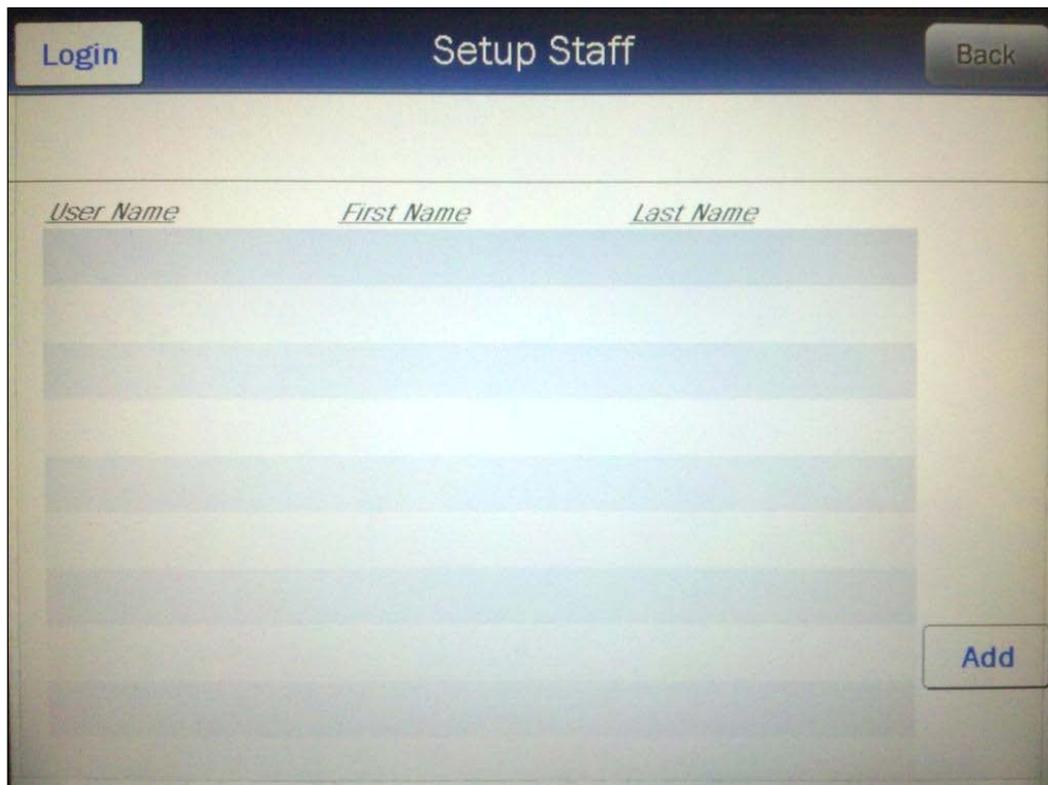From Figure 4-2 Setup Screen, touch the **STAFF** button. Figure 4-3 Setup Staff Screen will appear.

Figure 4-3 Setup Staff Screen

Login in as *root*

In order to set the Security Status and add users with Admin privileges, you must be logged in as *root*.

To log in as *root*, touch the **LOGIN** button. Figure 4-4 Login Screen will appear.
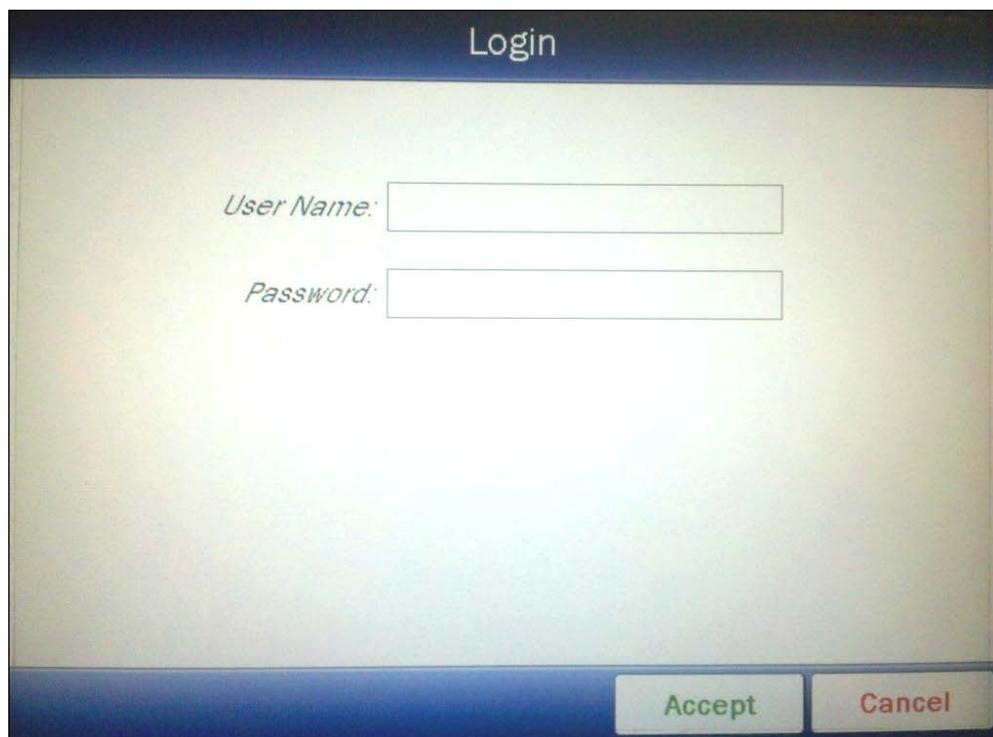
Figure 4-4 Login Screen

Touch the **User Name:** field box. Figure 4-5 Alphanumeric Keypad Screen will appear.
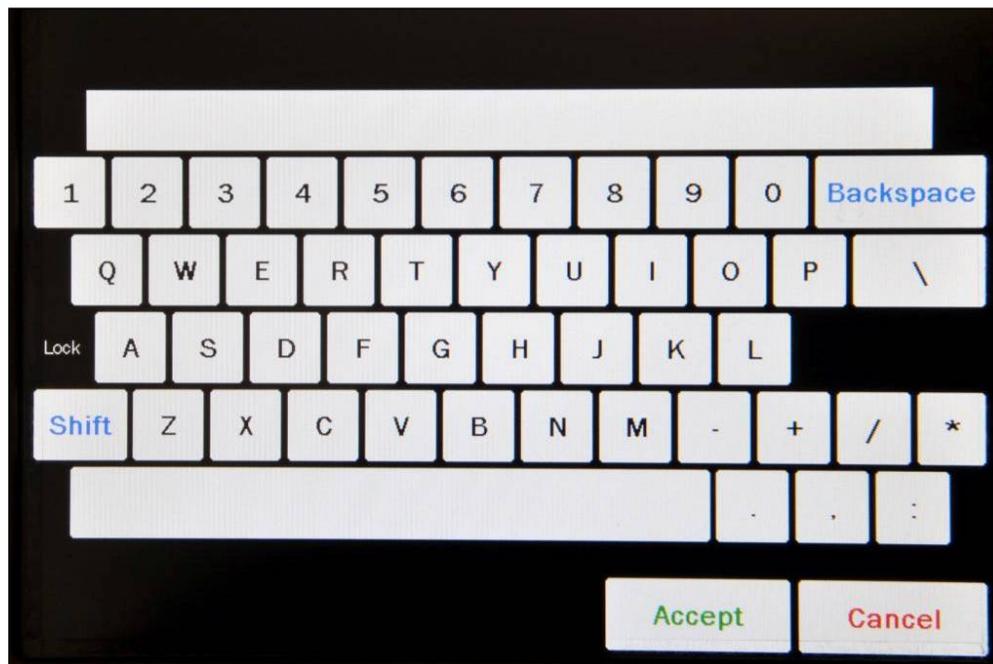

Figure 4-5 Alphanumeric Keypad Screen

Input root (all lower case letters) for the user name and touch the **ACCEPT** button. Figure 4-4 Login Screen will re-appear with the *User Name:* field box populated with "root".

To cancel inputting the user name and return to Figure 4-4 Login Screen, touch the **CANCEL** button.

Touch the *Password:* field box. Figure 4-5 Alphanumeric Keypad Screen will appear.

The default password for *root* is AlphaDrive (case sensitive). Only *root* can change this password.

Note: It is strongly recommended that the default password be changed.

Input AlphaDrive (case sensitive) for the password and touch the **ACCEPT** button. Figure 4-4 Login Screen will re-appear with the *Password:* field box populated with asterisks.

To cancel inputting the password and return to Figure 4-4 Login Screen, touch the **CANCEL** button.

Once both the *User Name:* and *Password:* field boxes are populated, touch the **ACCEPT** button to complete the *root* login process. Figure 4-6 Setup Staff Screen – root will appear.
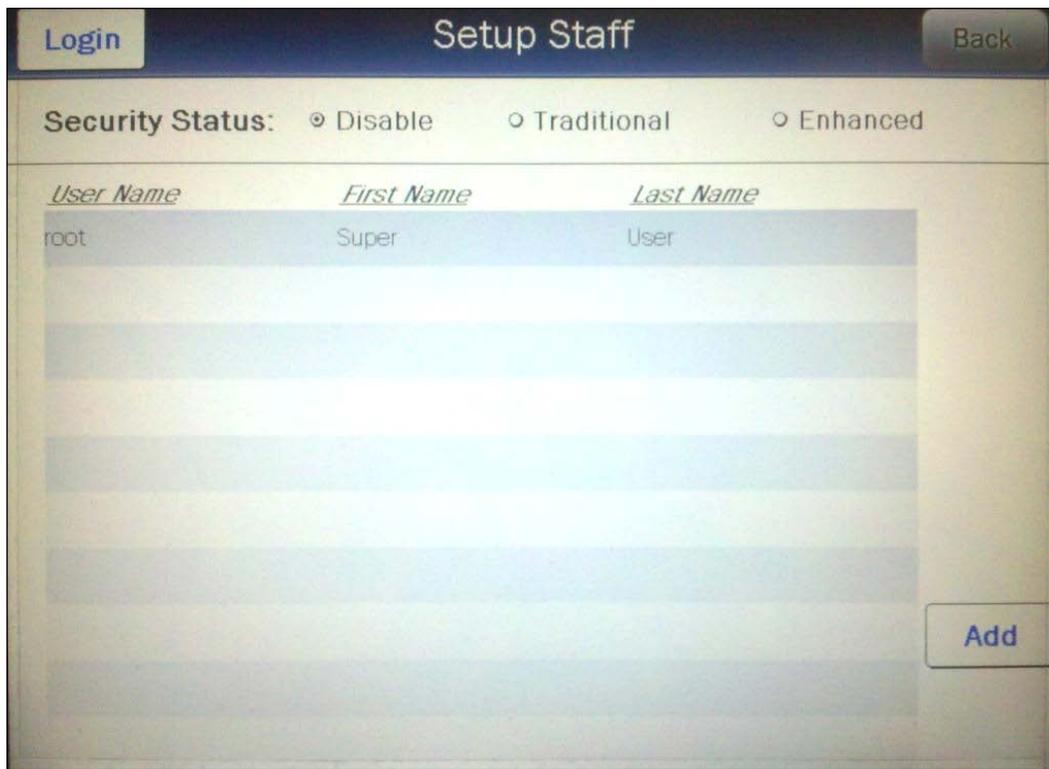
Figure 4-6 Setup Staff Screen – root

Change *root* Password

Note: It is strongly recommended that the default password be changed.

To change the default password for *root*, touch the *root* user name. The entire line *root* will become highlighted and an **EDIT** button will appear in the lower left portion of the screen as shown in Figure 4-7 Setup Staff Screen – root selected.
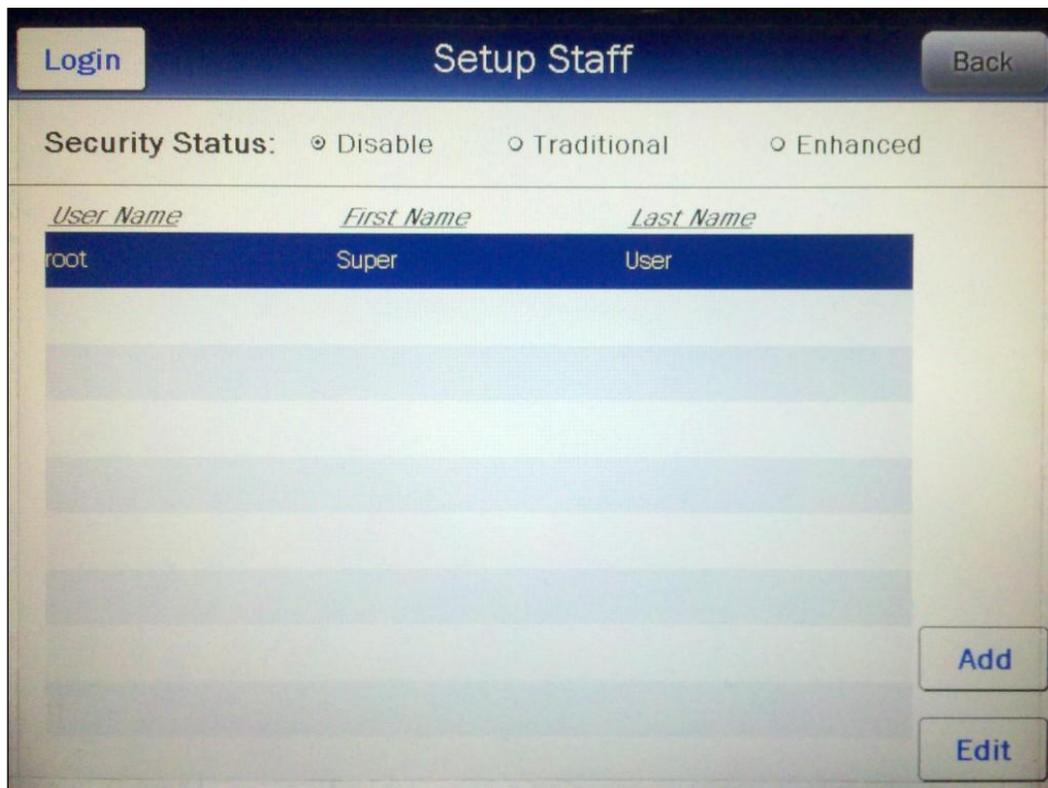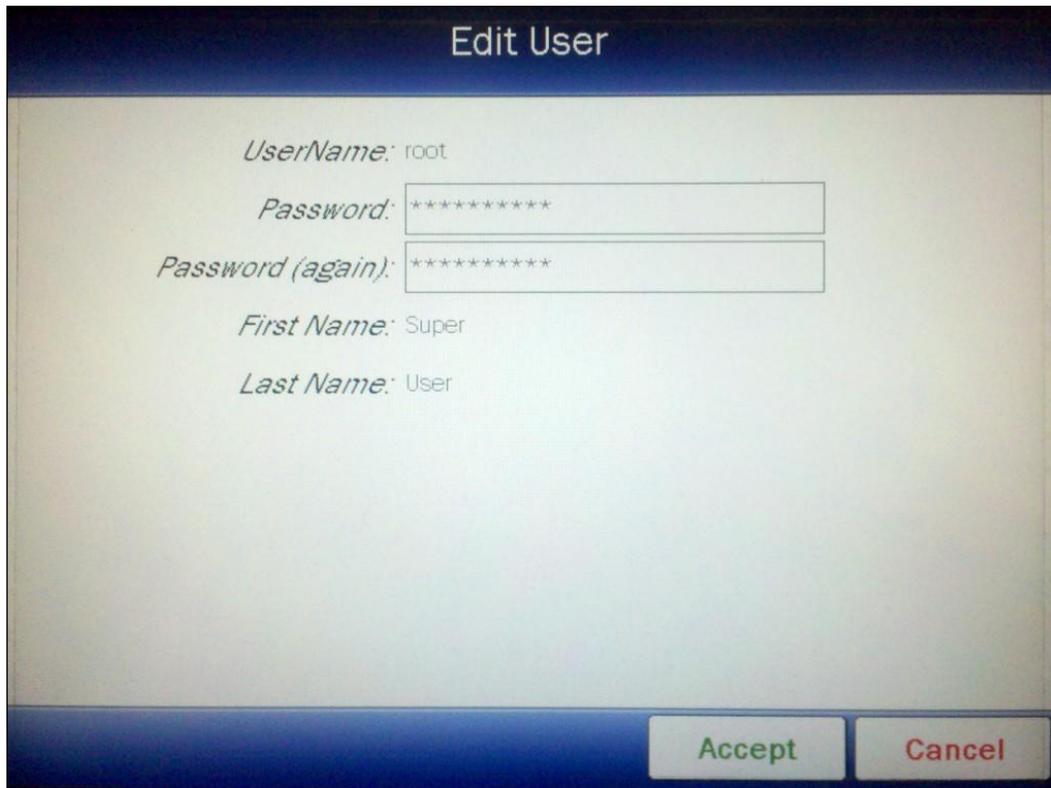
Figure 4-7 Setup Staff Screen – root selected

Touch the **EDIT** button to change the root password. Figure 4-8 Edit User Screen – root will appear

Figure 4-8 Edit User Screen – root

Note: *The **UserName:**, **First Name:** and **Last Name:** fields can not be edited for root.*

Touch the *Password:* field box. An alphanumeric keypad will appear. Input the desired password (case sensitive) and touch the **ACCEPT** button. Figure 4-8 Edit User Screen – root will re-appear with the *Password:* field box populated with asterisks. Allowable input is any combination of 13 alphanumeric characters maximum.

Touch the *Password (again):* field box. An alphanumeric keypad will appear. Input the same password (case sensitive) and touch the **ACCEPT** button. Figure 4-8 Edit User Screen – root will re-appear with the *Password (again):* field box populated with asterisks. Allowable input is any combination of 13 alphanumeric characters maximum.

To cancel changing the password and return to Figure 4-6 Setup Staff Screen – root, touch the **CANCEL** button.

To accept the password change and return to Figure 4-6 Setup Staff Screen – root, touch the **CANCEL** button. The new password will be saved.

Set Security Status

From Figure 4-6 Setup Staff Screen – root, set the desired Security Status by touching the radio button next to the preferred status.

Verify that the desired radio button is selected.

Touch the **BACK** button to save the changes and return to Figure 4-2 Setup Screen.

ADDING A USER

To add a User, touch the **ADD** button from Figure 4-3 Setup Staff Screen or Figure 4-6 Setup Staff Screen – root. If *root* is logged in, Figure 4-9 Add New User Screen – root will appear.
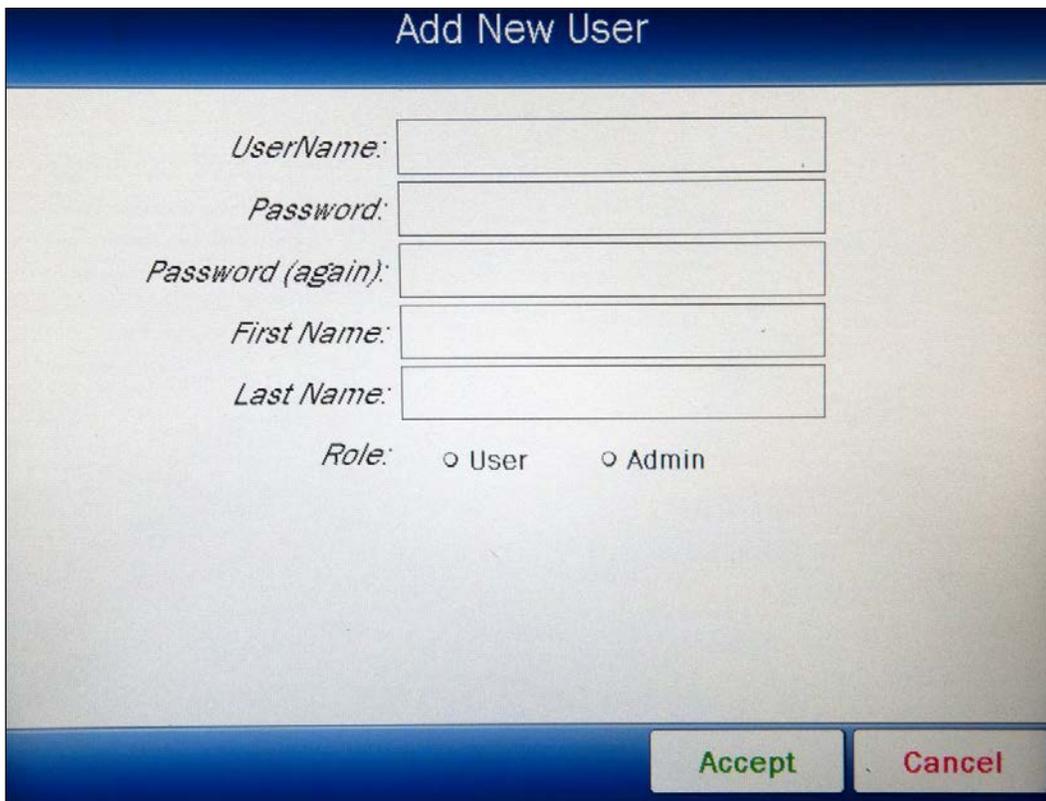

Figure 4-9 Add New User Screen – root

If a user with Admin privileges is logged in, Figure 4-10 Add New User Screen – Admin will appear.

Figure 4-10 Add New User Screen – Admin

If a user without Admin privileges is logged in, the **ADD** button will not be displayed.

*Note: All fields (**UserName:**, **Password:**, **Password (again):**, **First Name:**, **Last Name:**, **Role:**) for the user are required. UserName and Password are case sensitive.*

To input the information for the user, touch the field's box and input the appropriate data for the selected field as described in the following sections.

UserName Field

To input the User Name which will be used to log in, touch the *UserName:* field box. Figure 4-11 Alphanumeric Keypad Screen will appear.
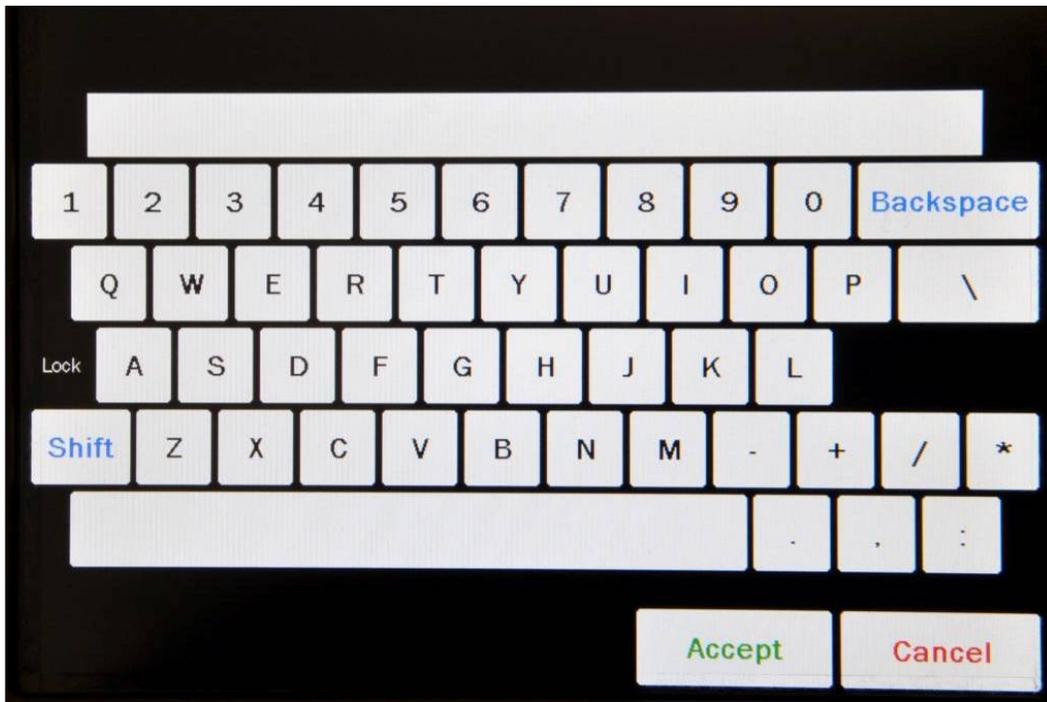
Figure 4-11 Alphanumeric Keypad Screen

Input the name of the user (case sensitive) and touch the **ACCEPT** button. The Add New User screen will re-appear with *UserName:* field box populated with the entered name. Allowable input is any combination of 13 alphanumeric characters maximum.

To cancel any changes and return to the Add New User screen, touch the **CANCEL** button.

Password Field

To input the Password which will be used to log in, touch the *Password:* field box. Figure 4-11 Alphanumeric Keypad Screen will appear.

Input the desired password (case sensitive) for the user and touch the **ACCEPT** button. The Add New User screen will re-appear with *Password:* field box populated with asterisks. Allowable input is any combination of 13 alphanumeric characters maximum.

To cancel any changes and return to the Add New User screen, touch the **CANCEL** button.

Password (again) Field

To verify the Password that was input, touch the *Password (again):* field box. Figure 4-11 Alphanumeric Keypad Screen will appear.

Input the same password (case sensitive) for the user and touch the **ACCEPT** button. The Add New User screen will re-appear with *Password:* field box populated with asterisks. Allowable input is any combination of 13 alphanumeric characters maximum.

To cancel any changes and return to the Add New User screen, touch the **CANCEL** button.

First Name Field

Note: The first and last name will be used for the BioAssay.

To input the First Name for the new user, touch the *First Name:* field box. Figure 4-11 Alphanumeric Keypad Screen will appear.

Input the desired first name for the user and touch the **ACCEPT** button. The Add New User screen will re-appear with *First Name:* field box populated with the entered name. Allowable input is any combination of 13 alphanumeric characters maximum.

To cancel any changes and return to the Add New User screen, touch the **CANCEL** button.

Last Name Field

Note: The first and last name will be used for the BioAssay.

To input the Last Name for the new user, touch the *Last Name:* field box. Figure 4-11 Alphanumeric Keypad Screen will appear.

Input the desired last name for the user and touch the **ACCEPT** button. The Add New User screen will re-appear with *Last Name:* field box populated with the entered name. Allowable input is any combination of 13 alphanumeric characters maximum.

To cancel any changes and return to the Add New User screen, touch the **CANCEL** button.

Role Field

To assign non-Admin privileges to the user, touch the **User** radio-button.

To assign Admin privileges to the user, touch the **Admin** radio-button.

Touch the **CANCEL** button to abort any changes. The Setup Staff screen will re-appear without saving the new user information.

Touch the **ACCEPT** button to save the new user information. The Setup Staff screen will re-appear with the added user shown in the list.

EDITING USER DATA

To edit user data, touch the desired user's name. The entire line will become highlighted and an **EDIT** button will appear in the lower left portion of the screen as shown in Figure 4-12 Setup Staff with Name Highlighted – root.
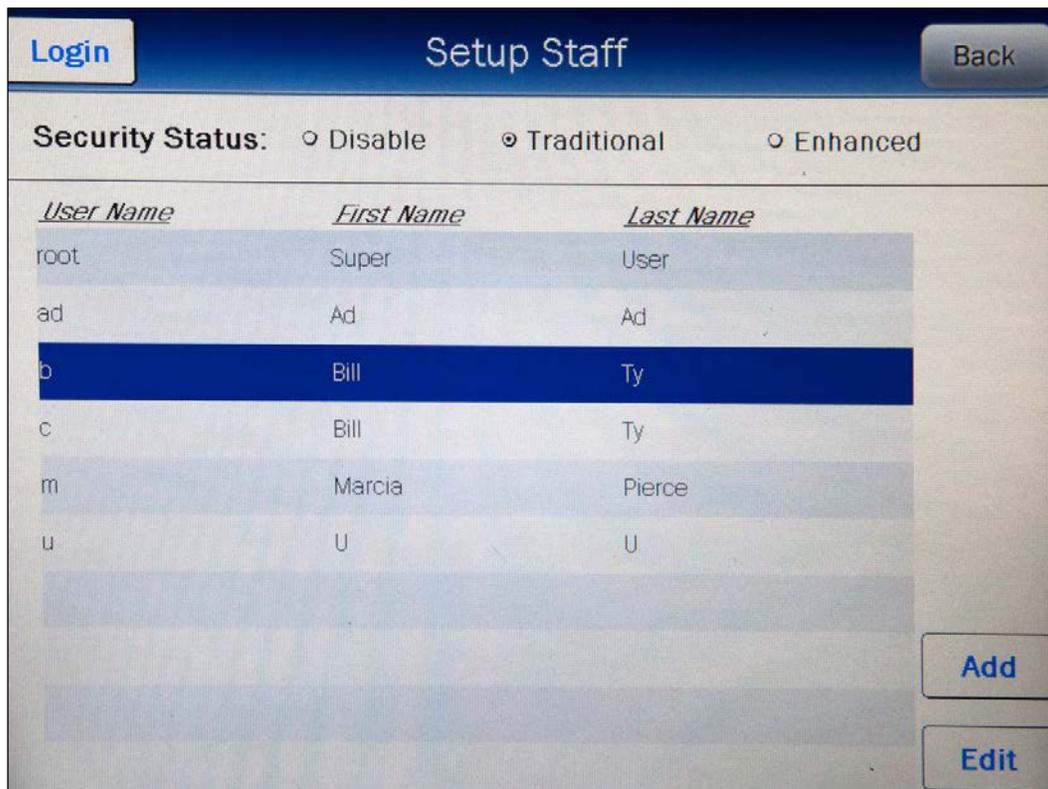

Figure 4-12 Setup Staff with Name Highlighted – root

Note: *If an Admin user is logged in, the first line (root-Super-User) will not be displayed. Only* root *can edit these data. If a non-Admin user is logged in, only that user's name will be displayed.*

Touch the **EDIT** button. Figure 4-13 Edit User Screen – root or Figure 4-14 Edit User Screen – Admin will appear.

Figure 4-13 Edit User Screen – root

Figure 4-14 Edit User Screen – Admin

The password, first name and last name can be changed. If *root* is logged in, the user's role can be changed. Reference the appropriate sections under ADDING A USER above for instructions for each field box.

Touch the **CANCEL** button to abort any changes. The Setup Staff screen will re-appear without saving the modified user information.

Touch the **ACCEPT** button to save the modified user information. The Setup Staff screen will re-appear.

Inactivating a User

Users can be inactivated. An inactivated user cannot log in. The user can always be re-activated.

When a user is inactivated, a line will appear through their name on the Staff Member list.

An Admin user can inactivate a non-admin user but not an admin user (including themselves).

To inactivate a user, from Figure 4-6 Setup Staff Screen – root, touch the desired user's name. The entire line will become highlighted and the **EDIT** button will appear in the lower left portion of the screen as shown in Figure 4-12 Setup Staff with Name Highlighted – root.

Touch the **EDIT** button. Figure 4-13 Edit User Screen – root or Figure 4-14 Edit User Screen – Admin will appear.

Touch the **Inactive** checkbox. A check mark will appear in the box.

Touch the **ACCEPT** button to save the modified user information. The Setup Staff screen will re-appear with a line will through the selected Staff Member's name.

Touch the **CANCEL** button to abort any changes. The Setup Staff screen will re-appear without saving the modified user information.

Reactivating a User

To reactivate a user, touch the checked **Inactive** checkbox. The check mark will disappear.

Touch the **ACCEPT** button to save the modified user information. The Setup Staff screen will re-appear.

Touch the **CANCEL** button to abort any changes. The Setup Staff screen will re-appear without saving the modified user information.

CHANGING USERS

When the Security Status is set to Traditional, the currently logged-in user can be changed from the either the Utility screen or the Setup Staff screen.

Utility Screen

From the Main screen, touch the **UTILITY** button. Figure 4-15 Utility Screen with Login Button will appear.

Figure 4-15 Utility Screen with Login Button

The currently logged-in user's name will be displayed in the lower right portion of the Utility screen next to the Login button.

To login as a different user, touch the **LOGIN** button. Figure 4-16 Login Screen with Guest button will appear.
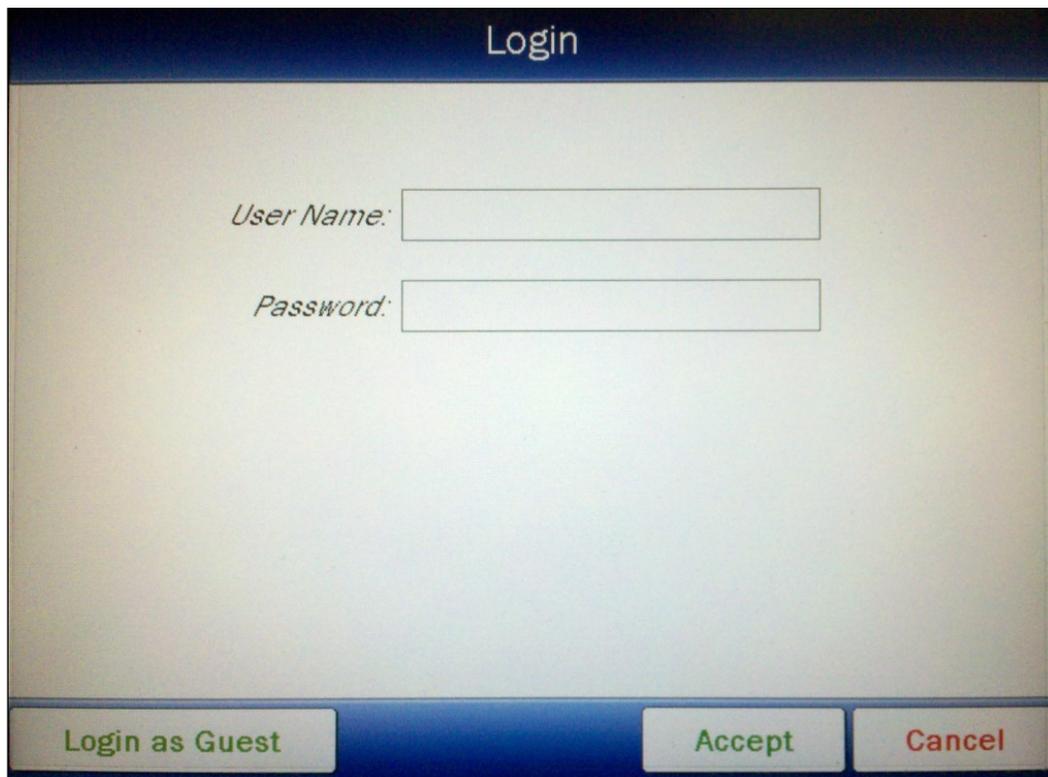
Figure 4-16 Login Screen with Guest button

To abort changing users, touch the **CANCEL** button. Figure 4-15 Utility Screen with Login Button will re-appear.

Touch the *User Name:* field box. An alphanumeric keypad will appear. Input the desired user's name (case sensitive) and touch the **ACCEPT** button. Figure 4-16 Login Screen with Guest button will re-appear with the *User Name:* field box populated with the entered user name.

To cancel inputting the user name and return to Figure 4-16 Login Screen with Guest button, touch the **CANCEL** button.

Touch the *Password:* field box. An alphanumeric keypad will appear. Input the desired user's password (case sensitive) and touch the **ACCEPT** button. Figure 4-16 Login Screen with Guest button will re-appear with the *Password:* field box populated with asterisks.

To cancel inputting the password and return to Figure 4-16 Login Screen with Guest button, touch the **CANCEL** button.

Once both the *User Name:* and *Password:* field boxes are populated, touch the **ACCEPT** button. Figure 4-15 Utility Screen with Login Button will re-appear with the new user's name displayed next to the Login button.

Setup Staff Screen

From the Main screen, touch the **SETUP** button. Figure 4-2 Setup Screen will appear.

From Figure 4-2 Setup Screen, touch the **STAFF** button. Figure 4-3 Setup Staff Screen will appear.

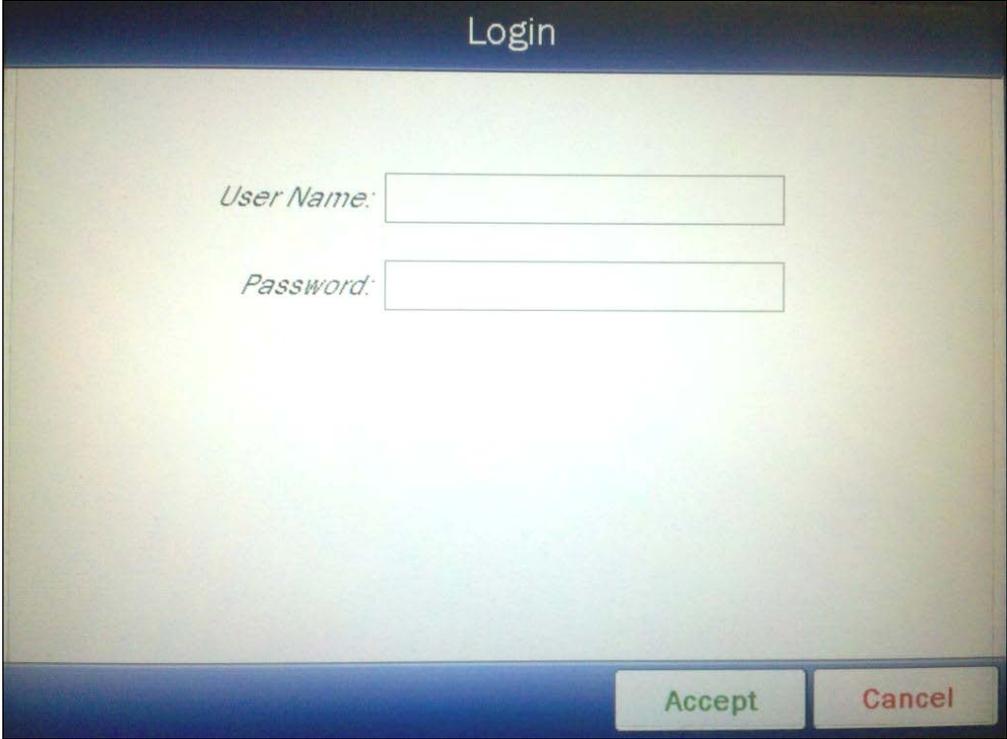To login as a different user, touch the **LOGIN** button. Figure 4-17 Login Screen will appear.

Figure 4-17 Login Screen

To abort changing users, touch the **CANCEL** button. Figure 4-3 Setup Staff Screen will re-appear.

Touch the *User Name:* field box. An alphanumeric keypad will appear. Input the desired user's name (case sensitive) and touch the **ACCEPT** button. Figure 4-17 Login Screen will re-appear with the *User Name:* field box populated with the entered user name.

To cancel inputting the user name and return to Figure 4-17 Login Screen, touch the **CANCEL** button.

Touch the *Password:* field box. An alphanumeric keypad will appear. Input the desired user's password (case sensitive) and touch the **ACCEPT** button. Figure 4-17 Login Screen will re-appear with the *Password:* field box populated with asterisks.

To cancel inputting the password and return to Figure 4-17 Login Screen, touch the **CANCEL** button.

Once both the *User Name:* and *Password:* field boxes are populated, touch the **ACCEPT** button. Figure 4-3 Setup Staff Screen will re-appear and the new user will be logged-in.

Guest Login

When the Security Status is set to Traditional, a user can log in as a Guest.

To log in as a Guest, touch the **UTILITY** button on the Main screen. Figure 4-15 Utility Screen with Login Button will appear.

Touch the **LOGIN** button. Figure 4-16 Login Screen with Guest button will appear.

Touch the **Login as Guest** button. Figure 4-15 Utility Screen with Login Button will re-appear with "Guest" displayed next to the Login button.

The user will now be logged in as a Guest and can perform all functions but cannot access the Lab Test Reports or the Staff Setup.

CHAPTER 5

WELL COUNTER INITIALIZATION

GENERAL

This section describes initialization and parameter setup for the Well Counter. This includes selecting nuclides for identification, inputting the Cs137 Test Source information, setting of trigger levels, setting nuclide efficiencies, setting user nuclides and setting wipe areas and locations.

To access Well Counter, touch the **WELL** button located in the upper left portion of the screen as shown in Figure 5-1 Chamber Measurement Screen.

Figure 5-1 Chamber Measurement Screen

Figure 5-2 Well Counter Main Screen will appear. The system is now Well mode, which means the system is ready to perform setup and measurements using the Well Counter.

Figure 5-2 Well Counter Main Screen

WELL COUNTER SETUP

To access the Well Counter setup, touch the **SETUP** button located in the lower right portion of Figure 5-2 Well Counter Main Screen. Figure 5-3 Setup Screen will appear.
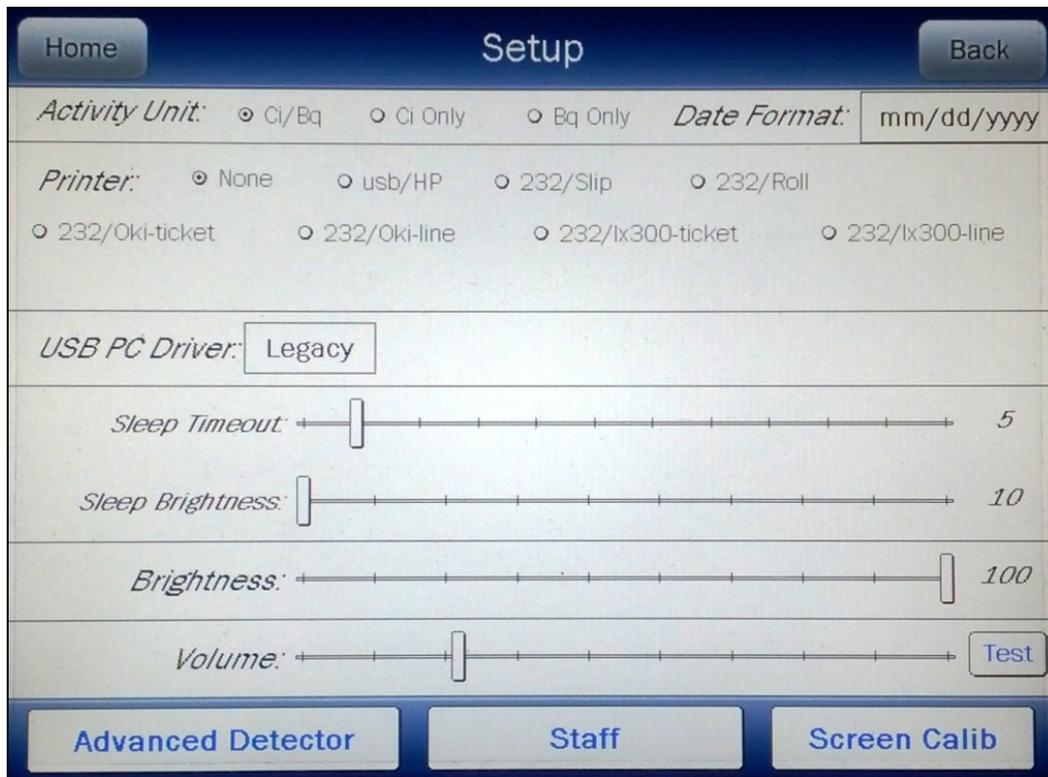
Figure 5-3 Setup Screen

From the Setup screen, touch the **ADVANCED DETECTOR** button. A numeric keypad will appear to allowing the user to input a 3-digit password as shown in Figure 5-4 Enter Password: Screen.
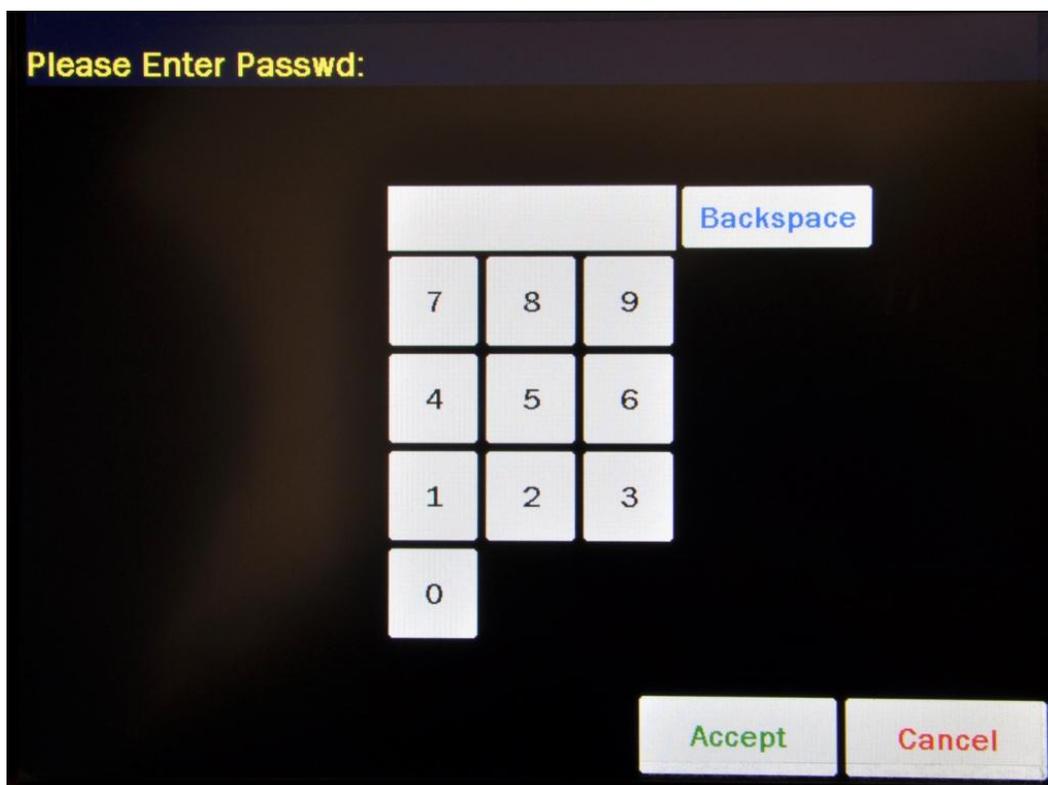
Figure 5-4 Enter Password: Screen

Input the password (the last 3 digits of the Readout serial number) by touching the appropriate numbers on the keypad. Touch the **ACCEPT** button to accept the password. Figure 5-5 Advanced Detector Setup Screen will appear.
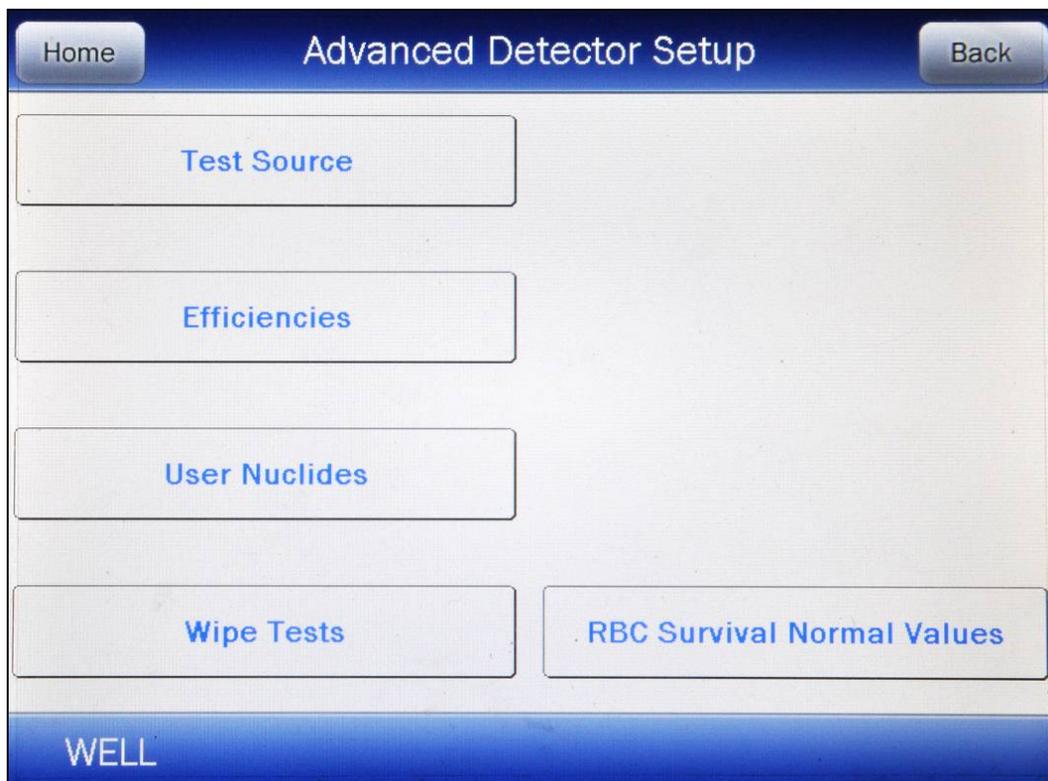
Figure 5-5 Advanced Detector Setup Screen

To exit Figure 5-5 Advanced Detector Setup Screen,

- touch the **BACK** button – Figure 5-3 Setup Screen will appear or
- touch the **HOME** button – Figure 5-2 Well Counter Main Screen will appear.

TEST SOURCE DATA

A Cs137 test source is used for performing the System Test. The test source data must be input before a System Test can be carried out.

When shipped from the factory, the CRC®-55tW does not have Cs137 Test Source data entered.

From Figure 5-5 Advanced Detector Setup Screen, touch the **TEST SOURCE** button. Figure 5-6 Test Source Setup Screen will appear. If a Test Source has been previously input, the data for the source will be displayed.
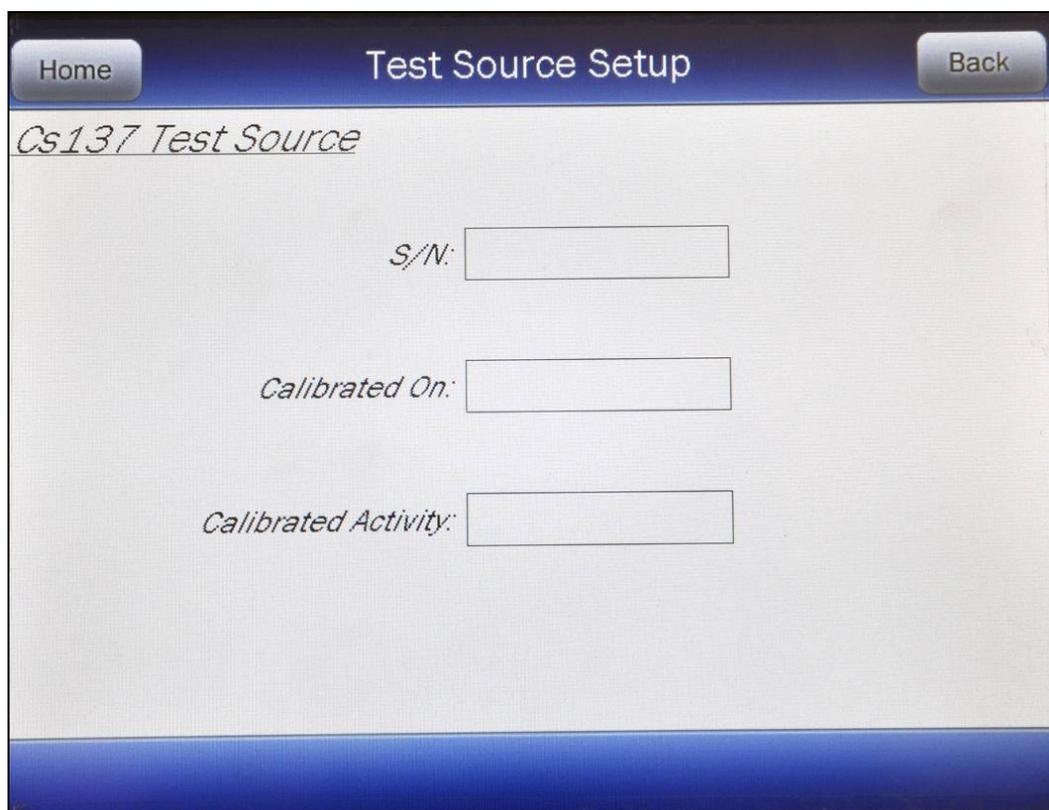
Figure 5-6 Test Source Setup Screen

Note: *All field boxes (**S/N:**, **Calibrated On:**, **Calibrated Activity:**) for the source must be completed before exiting the Test Source Setup screen or the entered information for the source will not be saved.*

To input (or change) information for the Cs137 Test Source, touch the field's box and input the appropriate data for the selected field as described in the following sections.

Serial Number (S/N) Field

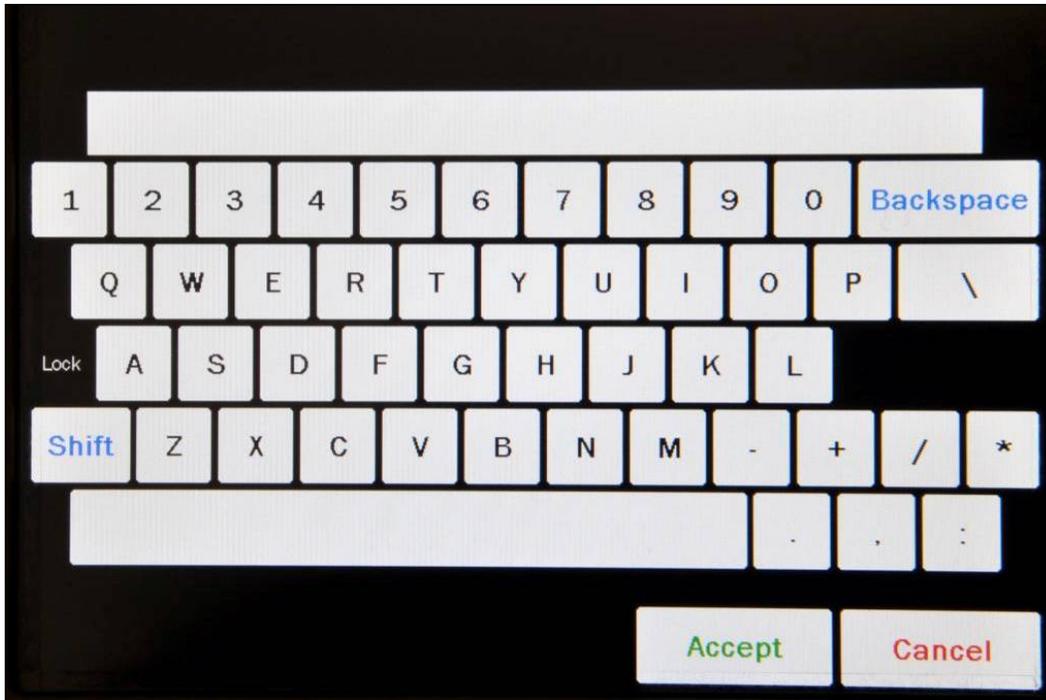For the Test Source Serial Number (*S/N:*) data, Figure 5-7 Enter Serial Number Screen will appear.

Figure 5-7 Enter Serial Number Screen

Input the serial number data of the Test Source and touch the **ACCEPT** button. Figure 5-6 Test Source Setup Screen will re-appear with *S/N:* field box populated with the entered serial number. The serial number can contain any combination of 10 alphanumeric characters maximum.

To cancel any changes and return to Figure 5-6 Test Source Setup Screen, touch the **CANCEL** button.

Calibrated On Field

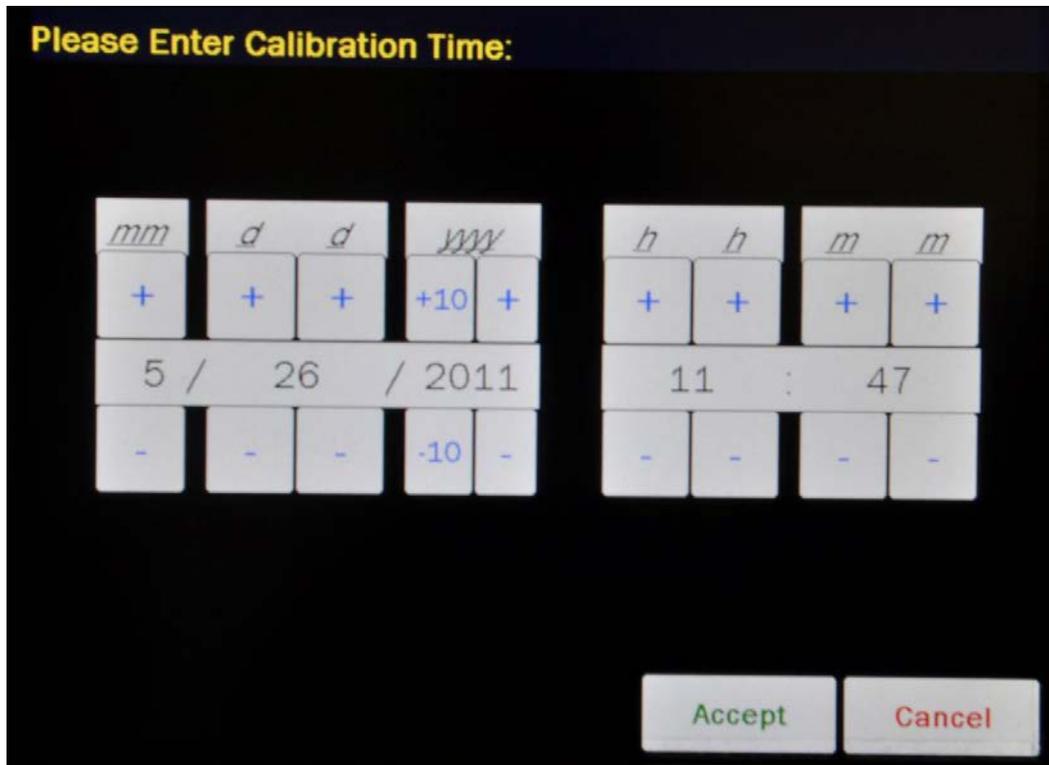For the Test Source calibration date, Figure 5-8 Date/Time Screen will appear.

Figure 5-8 Date/Time Screen

The screen displays the currently set date and time. Above and below each of the fields are **+** and **–** buttons, respectively. To adjust the displayed value for a specific field, touch the **+** button to increase the displayed value or the **–** button to decrease the displayed value.

For the year, **+10** and **-10** buttons are provided to quickly change the tens column of the years.

Adjust the displayed date and time to show the calibration date/time of the Test Source.

Touch the **ACCEPT** button to accept the set calibration date and time. Figure 5-6 Test Source Setup Screen will re-appear with *Calibrated On:* field box populated with the entered calibration date and time.

To cancel any changes and return to Figure 5-6 Test Source Setup Screen, touch the **CANCEL** button.

Calibrated Activity Field

For the Test Source Calibrated Activity data, Figure 5-9 Enter Activity Screen will appear.

Note: *The recommended calibrated activity is in the 0.1-1.0 µCi range. The calibrated activity must not be greater than 10.0 µCi (0.37 MBq).*
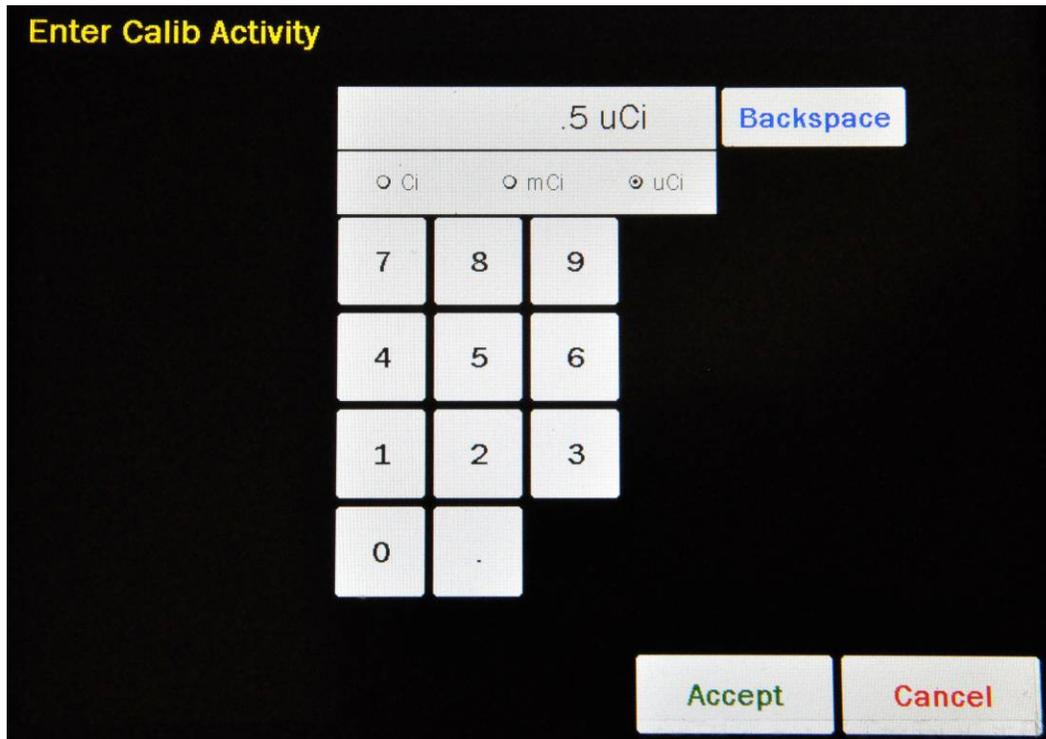

Figure 5-9 Enter Activity Screen

Input the activity value using the keypad and touch the appropriate radio button for the unit of measure of the Test Source.

Note: *The available units will change depending on which unit of measurement is in use on the Chamber Measurement screen. i.e. if set for Curies, the available units will be Ci, mCi and µCi; if set for Becquerels, the available units will be GBq, MBq and kBq.*

Touch the **ACCEPT** button. Figure 5-6 Test Source Setup Screen will re-appear with *Calibrated Activity:* field box populated with the entered activity.

To cancel any changes and return to Figure 5-6 Test Source Setup Screen, touch the **CANCEL** button.

Once all of the field boxes are filled-in, the screen will be similar to that shown in Figure 5-10 Test Source Setup Screen.

Figure 5-10 Test Source Setup Screen

To exit Figure 5-10 Test Source Setup Screen and save the Test Source data,

- touch the **BACK** button – Figure 5-5 Advanced Detector Setup Screen will appear or
- touch the **HOME** button – Figure 5-2 Well Counter Main Screen will appear.

EFFICIENCY DATA

Efficiency data are used to convert the observed counting rate to the activity value.

Efficiency is a measurement parameter that is defined as the ratio of detected counts (or counting rate) measured by the system to actual disintegrations (rate of decay). Efficiency can be defined as follows:

$$\% \text{ Efficiency} = \frac{\text{counts per minute} \times 100}{\text{disintegrations per minute}}$$

The efficiency of a nuclide depends upon the geometry, region of interest, energy, abundance and activity of the source as well as the type of detector system used to measure the source. For these reasons, efficiency values vary from one nuclide to another.

Efficiency data for 11 nuclides are built into the system. Reference the Appendix for a complete listing of the nuclides included in the CRC®-55t's memory.

Existing efficiencies may be changed and/or new ones may be added for nuclides which do not have any.

From Figure 5-5 Advanced Detector Setup Screen, touch the **EFFICIENCIES** button. Figure 5-11 Efficiencies Setup Screen will appear.

Figure 5-11 Efficiencies Setup Screen

To exit Figure 5-11 Efficiencies Setup Screen,

- touch the **BACK** button – Figure 5-5 Advanced Detector Setup Screen will appear or
- touch the **HOME** button – Figure 5-2 Well Counter Main Screen will appear.

Wipe Full Spectrum Efficiency

Besides the built-in and user added nuclides, there is also a Wipe Full Spectrum Efficiency. This is an artificial construct and corresponds to the counting rate in all the channels. The activity for the Wipe Full Spectrum Efficiency is only used for Wipe Tests.

This efficiency cannot be measured. The default value is 37.04%.

Note: A Wipe Full Spectrum Efficiency value must be entered in the setup at all times.

Full spectrum means the total number of counts detected in all of the MCA channels. This is the nominal value for Full Spectrum Efficiency for Tc99m when measured in a 1.5" × 1.75" drilled well detector.

The default value for Full Spectrum Efficiency can be changed as required. To change the Full Spectrum Efficiency, two methods are suggested:

1. Set the Full Spectrum Efficiency to the efficiency of the isotope that is used most frequently at your facility. For example, general nuclear medicine facilities use Tc99m most often, while nuclear cardiology facilities most frequently use Tl201. This method will provide an accurate value for most of the wipe tests measured.

2. Calculate the total spectrum efficiency for several isotopes most frequently used. Set the Full Spectrum Efficiency to the lowest efficiency. This will provide a conservative estimate for activity by overestimating the activity of most wipes.

   To calculate Full Spectrum Efficiency, first measure the nuclide in General Measurement mode. The total count rate will appear on the printout in units of cpm. Next convert the current activity of the nuclide measured in General Measurement into units of dpm. Remember that 1µCi = 2.22 x 10^6 dpm. Then calculate the Full Spectrum Efficiency.

$$\% \text{ Efficiency} = \frac{\text{counts per minute} \times 100}{\text{disintegrations per minute}}$$

To view or change this value, touch the **EDIT WIPE FULL SPECTRUM EFFICIENCY** button. The Edit Wipe Full Spectrum Efficiency screen will appear showing the currently set efficiency value.

If the current value is correct, touch the **CANCEL** button. Figure 5-11 Efficiencies Setup Screen will re-appear.

If the current value is not correct, touch the *Full Spectrum Efficiency:* field box.

The numeric keypad will appear. Input the desired efficiency value by touching the appropriate numbers on the keypad. Touch the **ACCEPT** button to accept the entered number. Touch the **CANCEL** button to abort any changes.

Note: The minimum Efficiency value is 0.001. The maximum Efficiency value is 99.999.

The Edit Wipe Full Spectrum Efficiency screen will re-appear showing the currently set efficiency value. Touch the **ACCEPT** button to accept the displayed value. Touch the **CANCEL** button to abort any changes. Figure 5-11 Efficiencies Setup Screen will re-appear.

Nuclide Efficiency

The CRC®-55t Well Counter measures efficiencies for a selected nuclide, which is used by the automatic peak finding program to provide both the identity and the activity of a peak identified in the Wipe Test program.

The nuclide is chosen from all nuclides in memory or from those added by the user.

Efficiencies may be input or measured. Examples shown are for Cs137.

Figure 5-11 Efficiencies Setup Screen displays a listing of nuclides stored in the calibrator's memory (both default and user added nuclides) – 10 at a time.

The nuclide list is in alphabetical order. The number of pages (or screens) will be shown in the upper right corner of the screen indicating the length of the list. To scroll through the list, touch the **DOWN ARROW** (▼) button . The next group of 10 nuclides will be displayed and the **UP ARROW** (▲) button will appear allowing the user to scroll up in the list.

To select a nuclide in the list, touch the desired nuclide. The entire line for the selected nuclide will become highlighted and an **EDIT** button will appear in the lower left portion of the screen. Touch the **EDIT** button to edit the efficiency and photopeaks for the highlighted nuclide.

If the selected nuclide does not have default values for any of the photopeaks, the screen will appear similar to that shown in Figure 5-12 Edit Efficiencies Screen – without Default Photopeaks.

If the selected nuclide does have default values for any of the photopeaks, the screen will appear similar to that shown in Figure 5-13 Edit Efficiencies Screen – with Default Photopeaks.
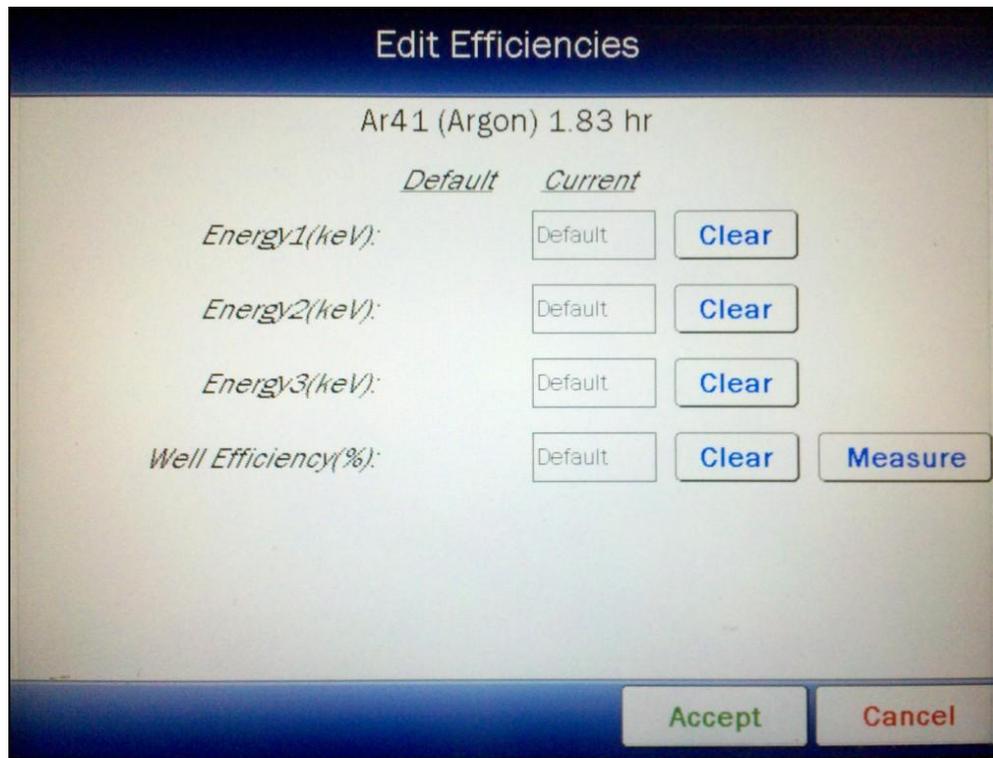
Figure 5-12 Edit Efficiencies Screen – without Default Photopeaks
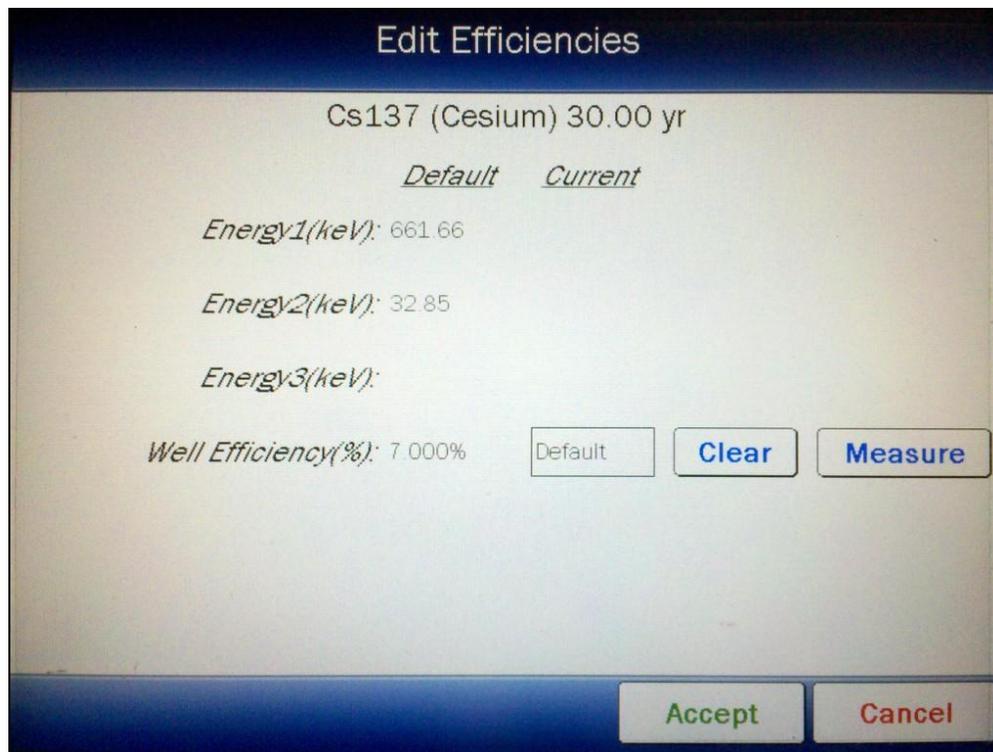

Figure 5-13 Edit Efficiencies Screen – with Default Photopeaks

Setting Photopeaks

If the selected nuclide does not have default values for any of the photopeaks, up to three photopeaks can be set. If the selected nuclide does have default values for any of the photopeaks, the photopeaks cannot be changed.

The peak efficiency is measured using only the counts recorded in the Region of Interest (ROI) that surrounds the primary photopeak (*Energy1(keV):*) and does not use total counts. This allows the peak finding program to better determine the activity of a nuclide when multiple peaks or nuclides are present.

The default and current keV of the photopeaks (*Energy#(keV:*)) for the selected nuclide are displayed. If the field box in the *__Current__* column displays "Default", then the keV value shown in the *__Default__* column will be used. If the field box in the *__Current__* column displays a value, then the value shown in the field box will be used.

To set a field box in the *__Current__* column back to the default keV value, touch the **CLEAR** button located next to the desired field box. The selected field box will now display "Default" indicating that the default keV value for that photopeak will be used.

To change the desired photopeak keV value, touch the corresponding *Energy#(keV):* field box. The numeric keypad will appear. Input the desired keV value by touching the appropriate numbers on the keypad. Touch the **ACCEPT** button to accept the entered value. Touch the **CANCEL** button to abort any changes.

Note: The minimum Energy keV value is 1.000. The maximum Energy keV value is 2000.000.

Input Efficiency

The default Well Efficiency for the selected nuclide is displayed. If the *Well Efficiency(%):* field box in the *__Current__* column displays "Default", then the efficiency value shown in the *__Default__* column will be used. If the field box in the *__Current__* column displays a value, then the value shown in the field box will be used.

To set the *Well Efficiency(%):* field box in the *__Current__* column back to the default value, touch the **CLEAR** button located next to the *Well Efficiency(%):* field box. The field box will now display "Default" indicating that the default efficiency value for the nuclide will be used.

To input a new efficiency value for the selected nuclide, touch the *Well Efficiency(%):* field box in the *__Current__* column.

The numeric keypad will appear. Input the desired efficiency value by touching the appropriate numbers on the keypad. Touch the **ACCEPT** button to accept the entered number. Touch the **CANCEL** button to abort any changes.

> ***Note:*** *The minimum Efficiency value is 0.001. The maximum Efficiency value is 99.999.*

Figure 5-12 Edit Efficiencies Screen – without Default Photopeaks or Figure 5-13 Edit Efficiencies Screen – with Default Photopeaks will re-appear showing the currently set efficiency value in the ***Well Efficiency(%):*** field box. Touch the **ACCEPT** button to accept the displayed value. Touch the **CANCEL** button to abort any changes. Figure 5-11 Efficiencies Setup Screen will re-appear.

Measure Efficiency

> ***Note:*** *The Well Counter must be calibrated and the background measured before measuring Efficiencies. (Reference CHAPTER 8: WELL COUNTER TESTS, SECTION: AUTO CALIBRATE). If Auto Calibration and the Background measurements have not been carried out for the current day, messages will be displayed informing that these measurements are expired and must be performed before an efficiency measurement can be performed. The procedures can be carried out from Figure 5-14 Measure Efficiency Screen by touching the buttons located on the lower portion of the screen. After each measurement is performed, the system will return to Figure 5-14 Measure Efficiency Screen.*

To measure the efficiency for the selected nuclide, touch the **MEASURE** button located next to the **CLEAR** button for ***Well Efficiency(%):*** as shown in Figure 5-12 Edit Efficiencies Screen – without Default Photopeaks or Figure 5-13 Edit Efficiencies Screen – with Default Photopeaks. Figure 5-14 Measure Efficiency Screen will appear.

Figure 5-14 Measure Efficiency Screen

To exit Figure 5-14 Measure Efficiency Screen, touch the **BACK** button. Figure 5-12 Edit Efficiencies Screen – without Default Photopeaks or Figure 5-13 Edit Efficiencies Screen – with Default Photopeaks will re-appear.

*Note: Both field boxes (**Source Calibrated On:, Source Activity:**) for the source must be completed before measuring efficiency.*

To input information for the nuclide being measured, touch the field's box and input the appropriate data for the selected field as described in the following sections.

Source Calibrated On Field

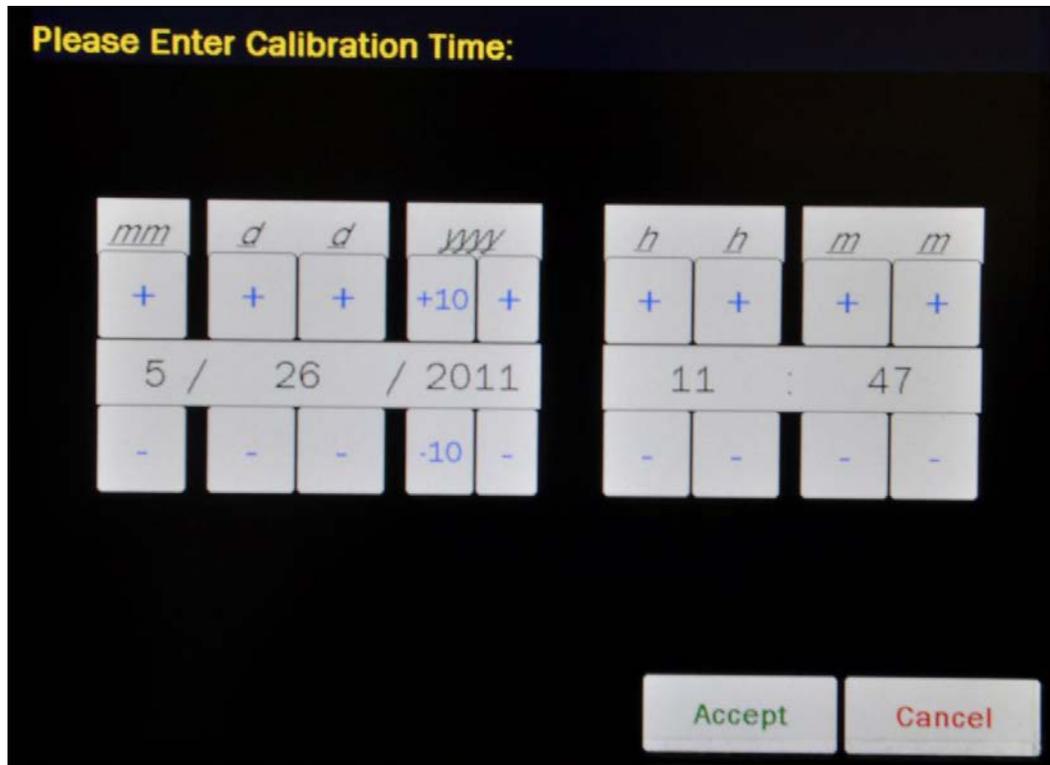For the source's calibration date, Figure 5-15 Date/Time Screen will appear.

Figure 5-15 Date/Time Screen

The screen displays the currently set date and time. Above and below each of the fields are **+** and **–** buttons, respectively. To adjust the displayed value for a specific field, touch the **+** button to increase the displayed value or the **–** button to decrease the displayed value.

For the year, **+10** and **-10** buttons are provided to quickly change the tens column of the years.

Adjust the displayed date and time to show the calibration date/time of the source.

Touch the **ACCEPT** button to accept the set calibration date and time. Figure 5-14 Measure Efficiency Screen will re-appear with the *Source Calibrated On:* field box populated with the entered calibration date and time.

To cancel any changes and return to Figure 5-14 Measure Efficiency Screen, touch the **CANCEL** button.

Source Activity Field

For the source's activity data, Figure 5-16 Enter Activity Screen will appear.

Figure 5-16 Enter Activity Screen

Input the source's calibrated activity value using the keypad and touch the appropriate radio button for the unit of measure of the source.

Note: *The available units will change depending on which unit of measurement is in use on the Chamber Measurement screen. i.e. if set for Curies, the available units will be Ci, mCi and µCi; if set for Becquerels, the available units will be GBq, MBq and kBq.*

Touch the **ACCEPT** button. Figure 5-14 Measure Efficiency Screen will appear with *Source Activity:* field box populated with the entered activity.

To cancel any changes and return to Figure 5-14 Measure Efficiency Screen, touch the **CANCEL** button.

Once both field boxes are filled-in, the screen will be similar to that shown below.

Figure 5-17 Measure Efficiency Screen

A **MEASURE SOURCE** button will appear below the *Source Activity:* field box.

Measuring the Source

Place the nuclide to be measured into the Well Counter and touch the **MEASURE SOURCE** button. The Source Measurement screen will appear. The screen will be similar that shown in Figure 5-18 Spectrum for Efficiency Screen will appear.
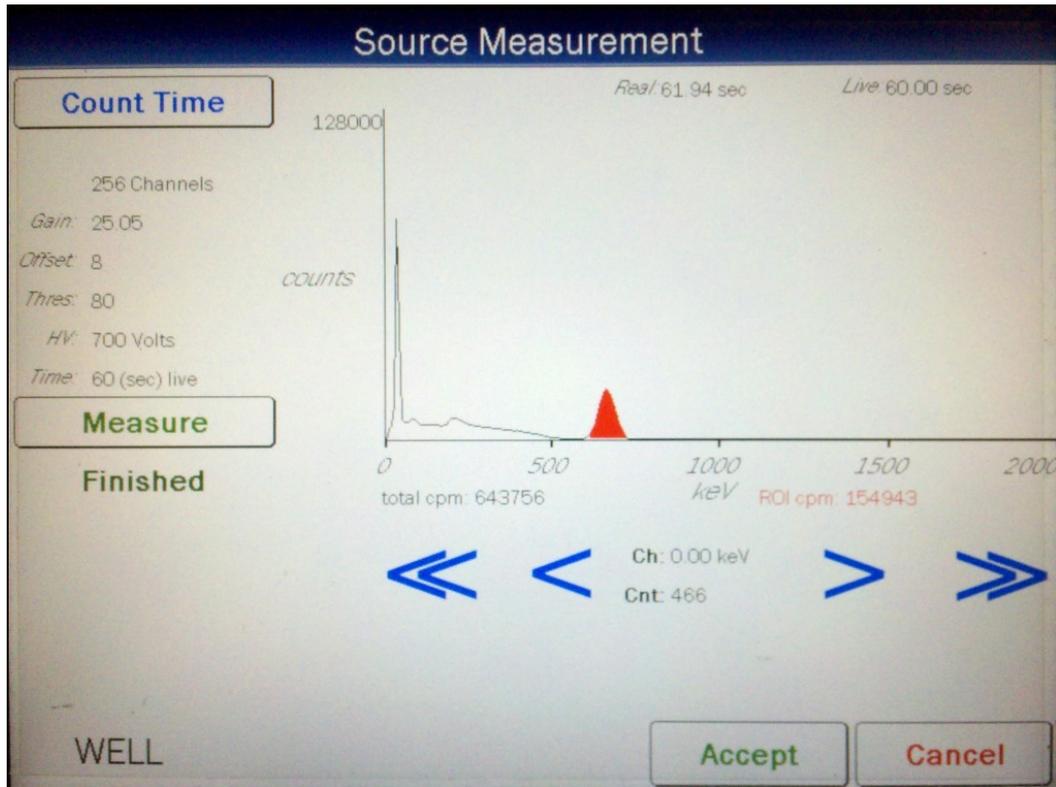

Figure 5-18 Spectrum for Efficiency Screen

To exit the Source Measurement screen, touch the **CANCEL** button – Figure 5-17 Measure Efficiency Screen will re-appear.

Verify that the time is set to a minimum of 60 seconds. If not, touch the **COUNT TIME** button. A numeric keypad will appear. Input the desired counting time by touching the appropriate numbers on the keypad. Touch the **ACCEPT** button to accept the entered number. Touch the **CANCEL** button to abort any changes.

Verify that the source to be measured is in the Well Counter and touch the **MEASURE** button. The system will begin measuring the source and a spectrum of the acquired source energies is shown. Also, the **MEASURE** button will be replaced with a **STOP** button. At any time during the measurement, touch the **STOP** button to stop the measurement.

Efficiency Results

When the specified counting time is completed, the message "FINISHED" will appear on the screen below the **MEASURE** button. The screen will appear similar to Figure 5-18 Spectrum for Efficiency Screen.

The primary photopeak ROI (*Energy1(keV)*) for the selected nuclide will be highlighted in red. The total spectrum counts per minute and the total ROI counts per minute are displayed below the spectrum.

To accept the results of the measurement, touch the **ACCEPT** button. The efficiency is calculated and the screen will appear similar to Figure 5-19 Measure Efficiency Results Screen.

To cancel the results of the measurement, touch the **CANCEL** button. Figure 5-17 Measure Efficiency Screen will re-appear without saving the measurement.

Figure 5-19 Measure Efficiency Results Screen

Print Results

If a printer is attached to the system, the test results can be printed by touching the **PRINT** button.

Re-measure

If the measured efficiency is not acceptable, touch the **MEASURE SOURCE** button to perform the efficiency measurement again.

Save Efficiency Measurement

If the measured efficiency is acceptable, touch the **SAVE EFFICIENCY** button. The screen appears similar to Figure 5-20 Edit Efficiencies Screen showing the *Well Efficiency(%):* field box populated with the measured efficiency value.

Figure 5-20 Edit Efficiencies Screen

Touch the **ACCEPT** button to accept the displayed value. Figure 5-11 Efficiencies Setup Screen will re-appear showing the new measured efficiency value.

Touch the **CANCEL** button to abort any changes. Figure 5-11 Efficiencies Setup Screen will re-appear showing the previous efficiency value.

USER NUCLIDES

In addition to the nuclides in the database, the user may add up to 10 additional nuclides.

From Figure 5-5 Advanced Detector Setup Screen, touch the **USER NUCLIDES** button. Figure 5-21 User Nuclides Setup Screen will appear. This screen is similar to Figure 5-11 Efficiencies Setup Screen.
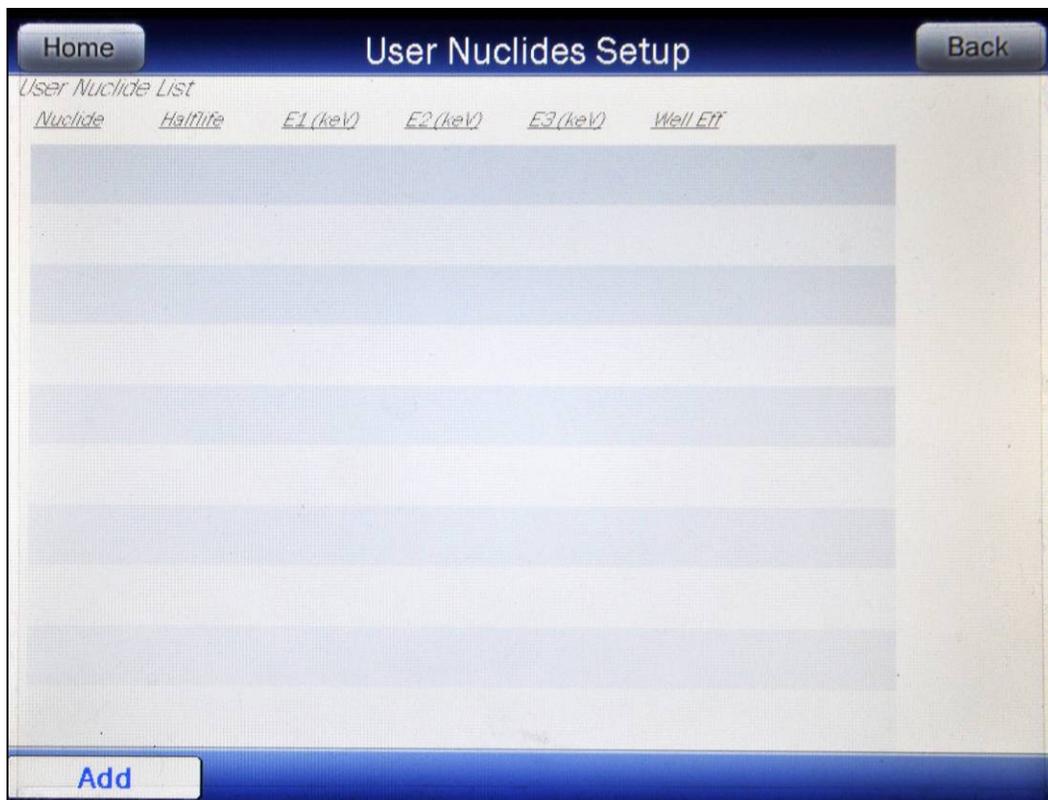

Figure 5-21 User Nuclides Setup Screen

Adding a User Nuclide

To add a user defined nuclide, touch the **ADD** button. Figure 5-22 Add User Nuclide Screen will appear.

Figure 5-22 Add User Nuclide Screen

The following field boxes for the nuclide must be completed before exiting the Add User Nuclide screen: **Nuclide:**, **Element:**, **Halflife:**, **Energy1(keV):** and **Well Efficiency(%):**.

To input information for the nuclide, touch the field's box and input the appropriate data for the selected field as described in the following sections.

Nuclide Field

The Nuclide field is required. For the Nuclide name (**Nuclide:**), the alphanumeric keypad will appear.

Input the name for the nuclide being added (e.g. Co56) and touch the **ACCEPT** button. Figure 5-22 Add User Nuclide Screen will re-appear with **Nuclide:** field box populated with the entered name. The name can contain any combination of 6 alphanumeric characters maximum.

To cancel any changes and return to Figure 5-22 Add User Nuclide Screen, touch the **CANCEL** button.

Element Field

The Element field is required. For the Element name (**Element:**), the alphanumeric keypad will appear.

Input the Element name for the nuclide being added (e.g. Cobalt) and touch the **ACCEPT** button. Figure 5-22 Add User Nuclide Screen will re-appear with **Element:** field box populated with the entered name. The Element name can contain any combination of 14 alphanumeric characters maximum.

To cancel any changes and return to Figure 5-22 Add User Nuclide Screen, touch the **CANCEL** button.

Halflife Field

The Halflife field is required. For the Half-life (**Halflife:**) data, the numeric keypad will appear along with radio buttons for the time (Year, Day, Hour, Minute, Second).

Input the half-life value using the keypad and touch the appropriate radio button for the time unit of measure of the nuclide being added and touch the **ACCEPT** button. Figure 5-22 Add User Nuclide Screen will re-appear with **Halflife:** field box populated with the entered value.

To cancel any changes and return to Figure 5-22 Add User Nuclide Screen, touch the **CANCEL** button.

Energy1(keV) Field

The Energy1(keV) field is required.

Energy1(keV) is the primary photopeak for the nuclide being added. The peak efficiency is measured using only the counts recorded in the Region of Interest (ROI) that surrounds the primary photopeak) and does not use total counts. This allows the peak finding program to better determine the activity of the nuclide when multiple peaks or nuclides are present.

For the Energy1(keV) (**Energy1(keV):**) data, the numeric keypad will appear. Input the desired keV value by touching the appropriate numbers on the keypad and touch the **ACCEPT** button. Figure 5-22 Add User Nuclide Screen will re-appear with **Energy1(keV):** field box populated with the entered value.

Note: *The minimum Energy keV value is 1.000. The maximum Energy keV value is 2000.000.*

To cancel any changes and return to Figure 5-22 Add User Nuclide Screen, touch the **CANCEL** button.

Energy2(keV) Field

The Energy2(keV) field is not required.

Energy2(keV) is the secondary photopeak for the nuclide being added.

For the Energy2(keV) (*Energy2(keV):*) data, the numeric keypad will appear. Input the desired keV value by touching the appropriate numbers on the keypad and touch the **ACCEPT** button. Figure 5-22 Add User Nuclide Screen will re-appear with *Energy2(keV):* field box populated with the entered value.

Note: *The minimum Energy keV value is 1.000. The maximum Energy keV value is 2000.000.*

To cancel any changes and return to Figure 5-22 Add User Nuclide Screen, touch the **CANCEL** button.

Energy3(keV) Field

The Energy3(keV) field is not required.

Energy3(keV) is the tertiary photopeak for the nuclide being added.

For the Energy3(keV) (*Energy3(keV):*) data, the numeric keypad will appear. Input the desired keV value by touching the appropriate numbers on the keypad and touch the **ACCEPT** button. Figure 5-22 Add User Nuclide Screen will re-appear with *Energy3(keV):* field box populated with the entered value.

Note: *The minimum Energy keV value is 1.000. The maximum Energy keV value is 2000.000.*

To cancel any changes and return to Figure 5-22 Add User Nuclide Screen, touch the **CANCEL** button.

Well Efficiency(%) Field

The Well Efficiency can either be input or measured. A value for the Well Efficiency must be input or measured before the data can be accepted.

Input Efficiency

To input an efficiency value, touch the *Well Efficiency(%):* field box. The numeric keypad will appear. Input the desired efficiency value by touching the appropriate numbers on the keypad and touch the **ACCEPT** button. Figure 5-22 Add User Nuclide Screen will re-appear with selected *Well Efficiency(%):* field box populated with the entered value.

Note: *The minimum Efficiency value is 0.001. The maximum Efficiency value is 99.999.*
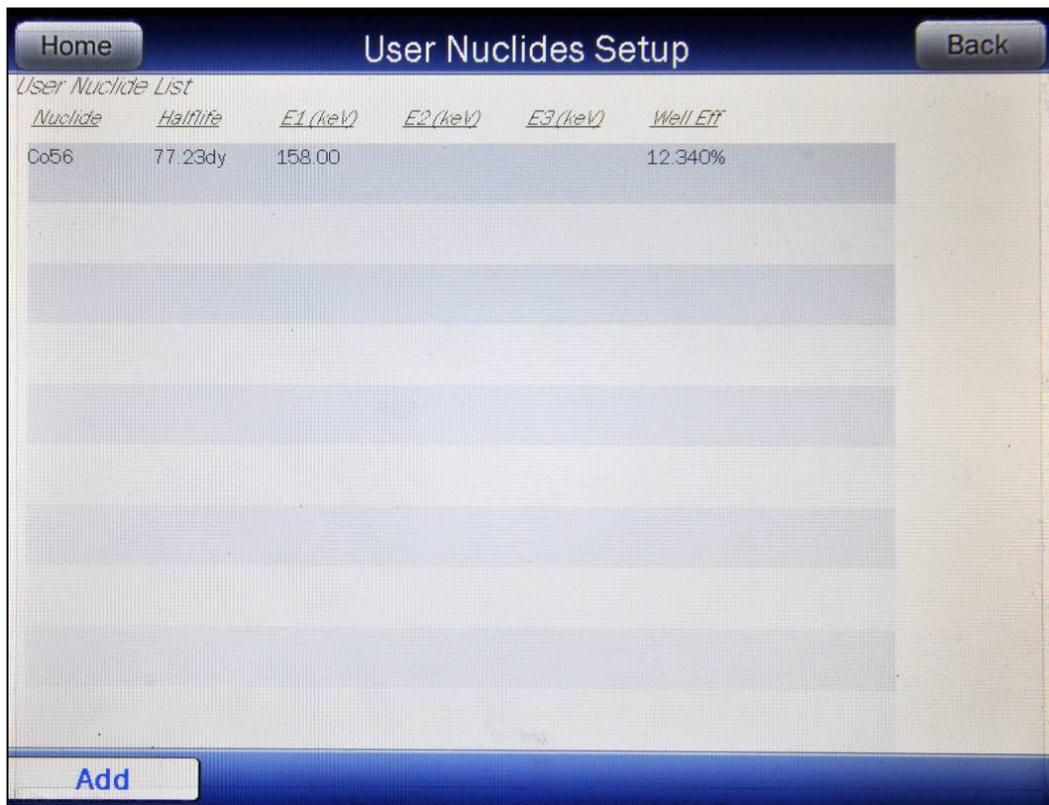
To cancel any changes and return to Figure 5-22 Add User Nuclide Screen, touch the **CANCEL** button.

Measure Efficiency

To measure the Efficiency, touch the **Measure** button on the Well Efficiency line.

The procedure for measuring the efficiency is the same as that given in the Measure Efficiency section on page 5-17.

When all the required data is populated, touch the **ACCEPT** button to save the data. Figure 5-23 User Nuclides Setup Screen with Nuclide will appear with the added nuclide in the list.

Figure 5-23 User Nuclides Setup Screen with Nuclide

To abort adding a user nuclide, touch the **CANCEL** button. Figure 5-21 User Nuclides Setup Screen will re-appear without adding the nuclide.

Editing a User Nuclide

User Nuclide data can be edited. To edit a nuclide, touch the desired nuclide's name from the list in Figure 5-23 User Nuclides Setup Screen with Nuclide. The entire line for the name will become highlighted and the **EDIT** button will appear as shown in Figure 5-24 User Nuclides Setup Screen with Nuclide Selected.
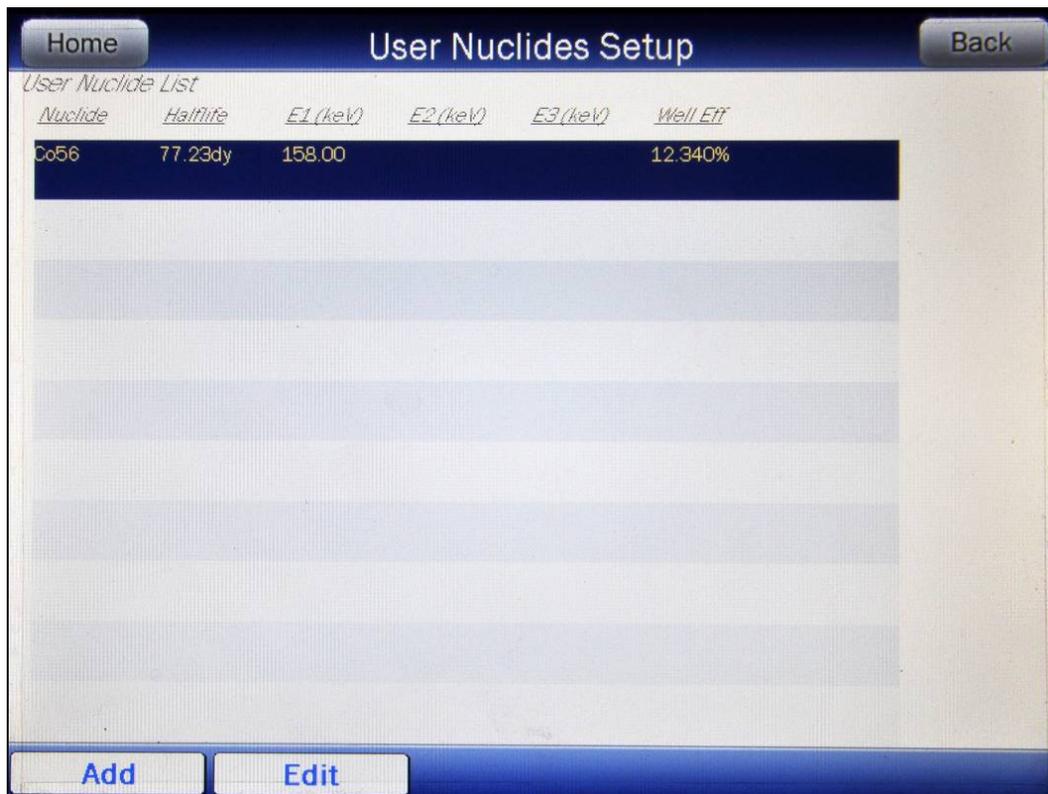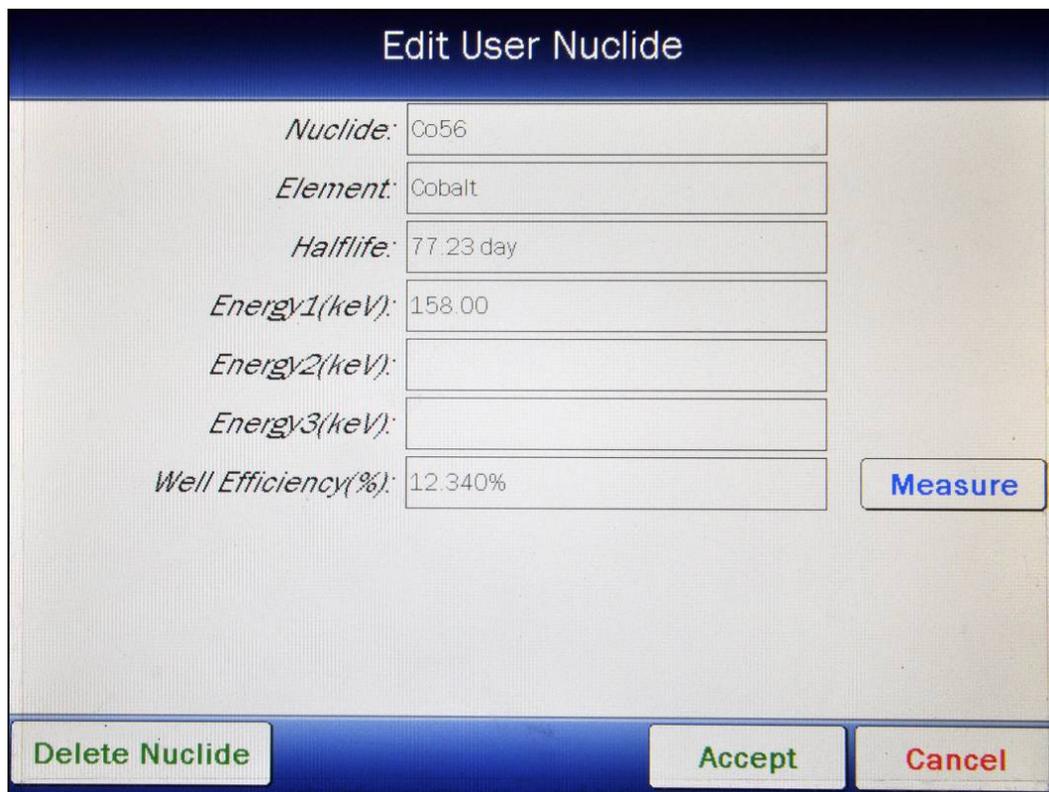

Figure 5-24 User Nuclides Setup Screen with Nuclide Selected

Touch the **EDIT** button. Figure 5-25 Edit User Nuclide Screen will appear.

Figure 5-25 Edit User Nuclide Screen

All data on the screen can be modified as necessary as described in the Adding a User Nuclide section beginning on page 5-25

Deleting a User Nuclide

User Nuclides can be deleted. To delete a User Nuclide, touch the desired nuclide's name from the list in Figure 5-23 User Nuclides Setup Screen with Nuclide. The entire line for the name will become highlighted and the **EDIT** button will appear as shown in Figure 5-24 User Nuclides Setup Screen with Nuclide Selected.

Touch the **EDIT** button. Figure 5-25 Edit User Nuclide Screen will appear.

Touch the **DELETE NUCLIDE** button on to delete the User Nuclide. The User Nuclides Setup screen will appear with the selected nuclide removed from the list.

WIPE TESTS SETUP

Before performing any Wipe measurements, Wipe parameters and Locations must be set up. Wipe Tests Setup provides the following capabilities:

- Set the Trigger Levels for Background, Work Areas, Unrestricted Areas, Sealed Sources and Packages,

- Set the Count Times for Background, Work Areas, Unrestricted Areas, Sealed Sources and Packages,

- Select Nuclides to look for in Work Areas, Unrestricted Areas, Sealed Sources and Packages, and

- Add, edit or delete Wipe Locations and location data.

Wipe Tests Setup is accessed in one of two ways:

1   From Figure 5-2 Well Counter Main Screen:
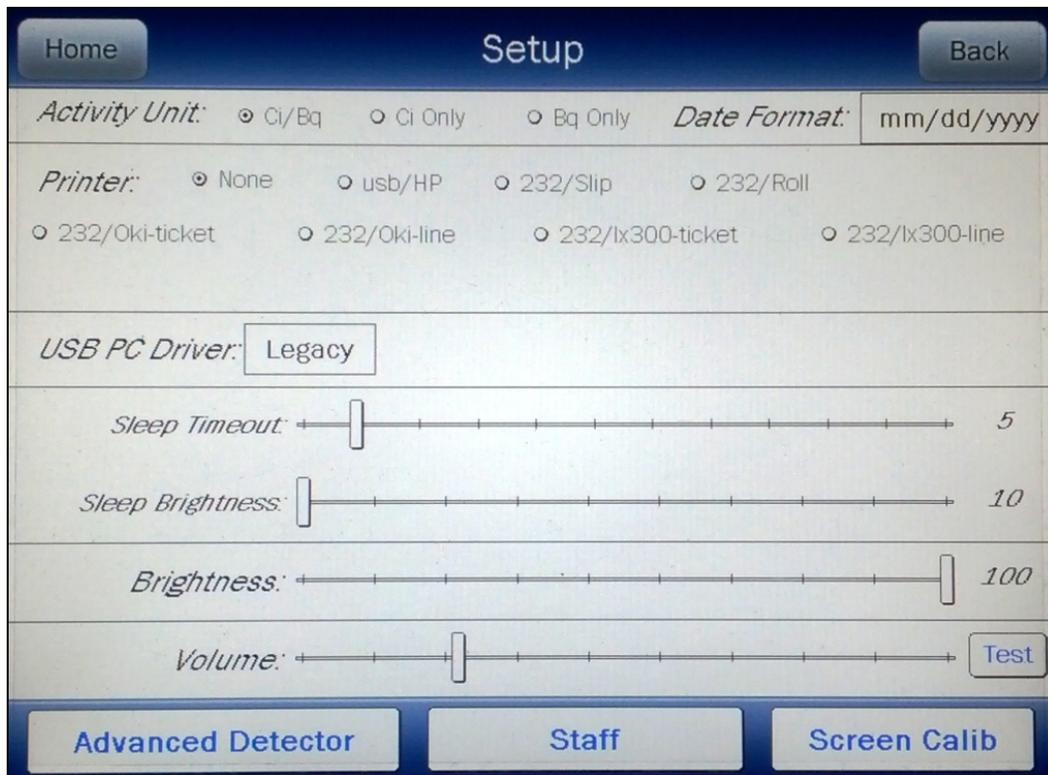   a   Touch the **SETUP** button. Figure 5-26 Setup Screen will appear.

Figure 5-26 Setup Screen

b   Touch the **ADVANCED DETECTOR** button. The numeric keypad screen will appear. Input the password (last 3 digits of the Readout serial number) by touching the appropriate numbers on the keypad.

c   Touch the **ACCEPT** button. Figure 5-27 Advanced Detector Setup Screen will appear.
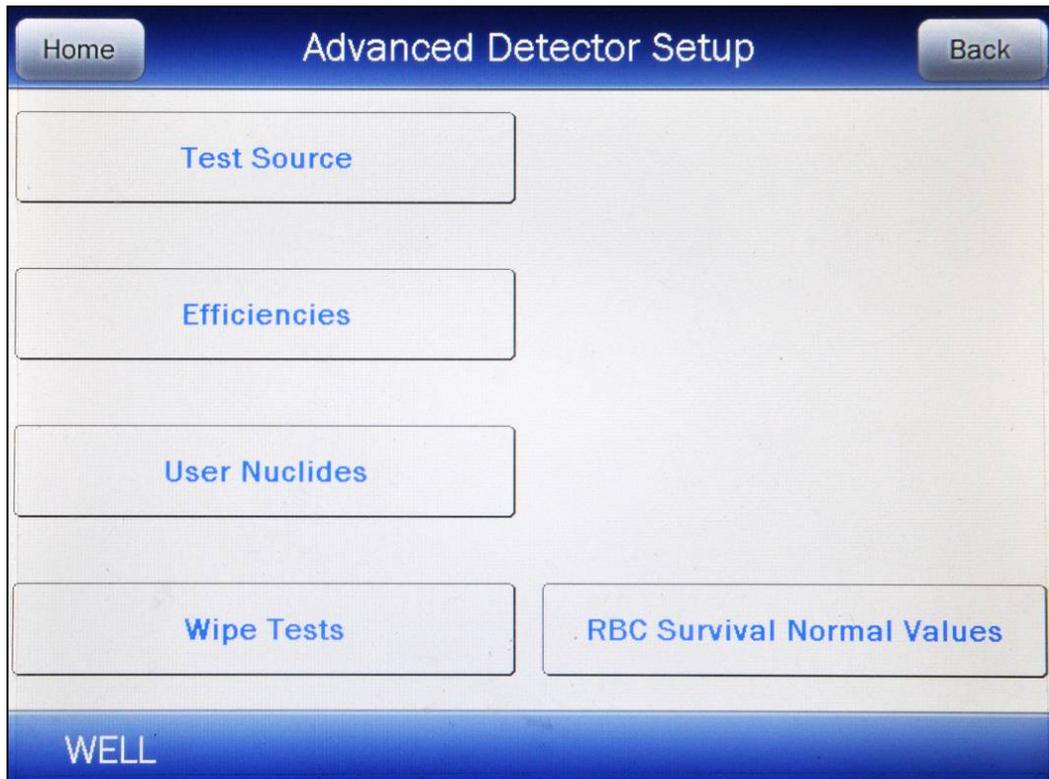

Figure 5-27 Advanced Detector Setup Screen

d   Touch the **WIPE TESTS** button. Figure 5-29 Well Wipes Setup Screen will appear.

2   From Figure 5-2 Well Counter Main Screen:

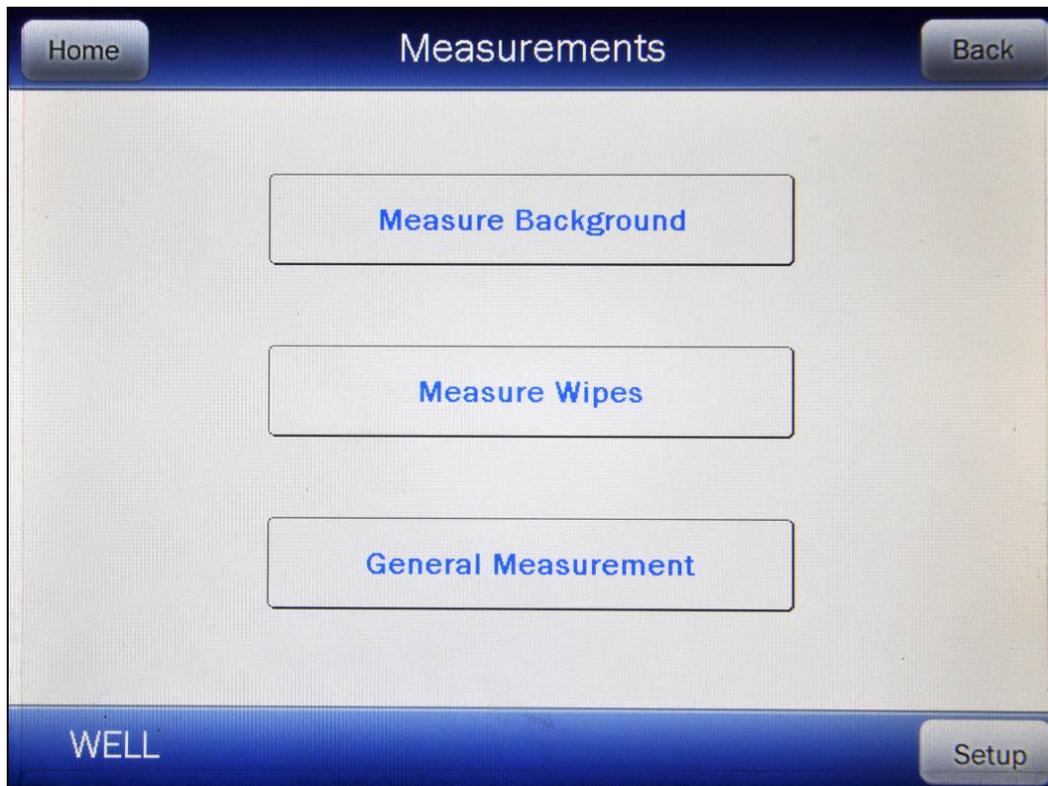a   Touch the **MEASUREMENT** button. Figure 5-28 Measurements Screen will appear.

Figure 5-28 Measurements Screen

b   Touch the **SETUP** button. The numeric keypad screen will appear. Input the password (last 3 digits of the Readout serial number) by touching the appropriate numbers on the keypad.

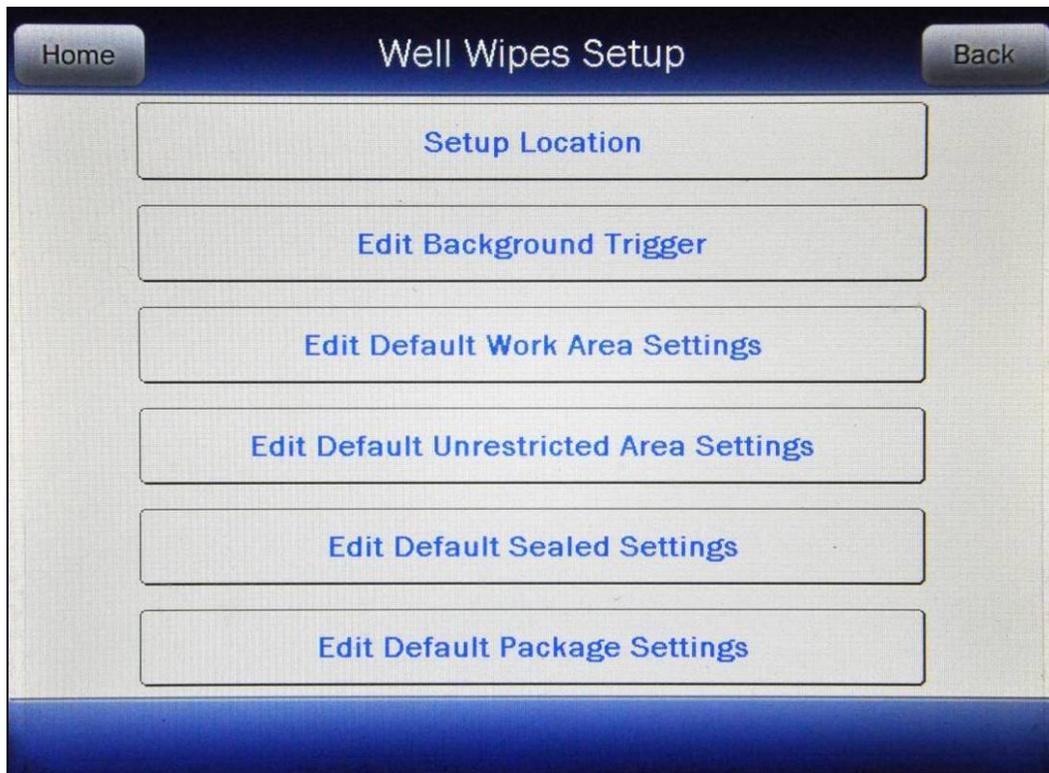c   Touch the **ACCEPT** button. Figure 5-29 Well Wipes Setup Screen will appear.

Figure 5-29 Well Wipes Setup Screen

To exit Figure 5-29 Well Wipes Setup Screen,

- touch the **BACK** button – If the setup was accessed via the Measurements screen, Figure 5-28 Measurements Screen will appear; if the setup was accessed from the Main screen, Figure 5-27 Advanced Detector Setup Screen will appear or

- touch the **HOME** button – Figure 5-2 Well Counter Main Screen will appear.

The defaults for each category should be set up first, and then set up the Locations. Since a Wipe Type is chosen first when setting up a Wipe Location, the default settings for the selected Wipe Type are loaded into the Location.

Trigger Levels

Trigger Levels are count limits that determine when the CRC®-55t indicates that a measurement is too high.

Trigger Levels for Background, Wipe, Unrestricted, Sealed Sources and Packages may be viewed and changed.

The default Trigger Levels set at the factory are listed in Table 5-1 Default Trigger Levels.

Type	Trigger Level	
	Curies	**Becquerels**
Background	3,000.00 cpm	50.000 cps
Work Areas	2,000.00 dpm	33.333 Bq
Unrestricted Areas	200.00 dpm	3.333 Bq
Sealed Source	5.000 nCi	185.000 Bq
Packages	200.00 dpm	3.333 Bq

Table 5-1 Default Trigger Levels

The Trigger Levels minimum and maximum values are listed in Table 5-2 Trigger Level Limits.

Type	Curies		Becquerels	
	Minimum	**Maximum**	**Minimum**	**Maximum**
Background	60.000 cpm	9,960.0000 cpm	1.0000 cps	166.0000 cps
Work Areas	60.0000 dpm	25,000.0000 dpm	1.0000 Bq	416.6667 Bq
Unrestricted	60.0000 dpm	2,500.0000 dpm	1.0000 Bq	41.6667 Bq
Sealed Source	0.1000 nCi	270.0000 nCi	3.7000 Bq	9,990.0000 Bq
Packages	60.000 dpm	2,500.000 dpm	1.0000 Bq	41.6667 Bq

Table 5-2 Trigger Level Limits

Refer to the appropriate sections below for instructions on editing the Trigger Level for the desired category.

Background Settings

From Figure 5-29 Well Wipes Setup Screen, touch the **EDIT BACKGROUND TRIGGER** button. Figure 5-30 Edit Background Trigger Screen will appear.

Figure 5-30 Edit Background Trigger Screen

To save the displayed values, touch the **ACCEPT** button. Any changes made will be saved and Figure 5-29 Well Wipes Setup Screen will re-appear.

To return to Figure 5-29 Well Wipes Setup Screen without saving any changes, touch the **CANCEL** button.

Background Trigger Level

> **Note:** *The Background Trigger Level will be displayed in cpm if the system is set to Curies on the Chamber Measurement screen or cps if set to Becquerels on the Chamber Measurement screen.*

When the measured Wipe Background is greater than the Background Trigger Level, an error message is displayed and the Background result will not be accepted.

The typical Background level of the CRC®-55t Well Counter is approximately 600 cpm or less in a clean room. If the instrument must be located where high level of high-

energy γ-emitters are handled while measurements are made with the Well Counter, additional shielding may be placed around the Well Counter to reduce Background.

Note: *If the instrument is contaminated, the Background level will be increased.*

To change the Background Trigger Level, touch the ***Trigger Level:*** field box. The numeric keypad will appear. Input the new Trigger Level by touching the appropriate numbers on the keypad. Touch the **ACCEPT** button to accept the entered value. Touch the **CANCEL** button to abort any changes.

Note: *Refer to Table 5-2 Trigger Level Limits on page 5-36 for the minimum and maximum Background Trigger Level.*

Background Counting Time

The default counting time is 60 seconds. If it is desired to use a different Background Counting Time, touch the ***Count Time:*** field box.

The numeric keypad will appear. Input the new counting time by touching the appropriate numbers on the keypad. Touch the **ACCEPT** button to accept the entered value. Touch the **CANCEL** button to abort any changes.

Counting the Background for 60 seconds or longer is recommended.

Note: *The minimum count time that can be input is 30 seconds. The maximum count time that can be input is 9,999 seconds.*

To save the changes, touch the **ACCEPT** button. Any changes made will be saved and Figure 5-29 Well Wipes Setup Screen will re-appear.

To return to Figure 5-29 Well Wipes Setup Screen without saving any changes, touch the **CANCEL** button.

Work Area Settings

From Figure 5-29 Well Wipes Setup Screen, touch the **EDIT DEFAULT WORK AREA SETTINGS** button. Figure 5-31 Edit Default Work Area Settings Screen will appear.
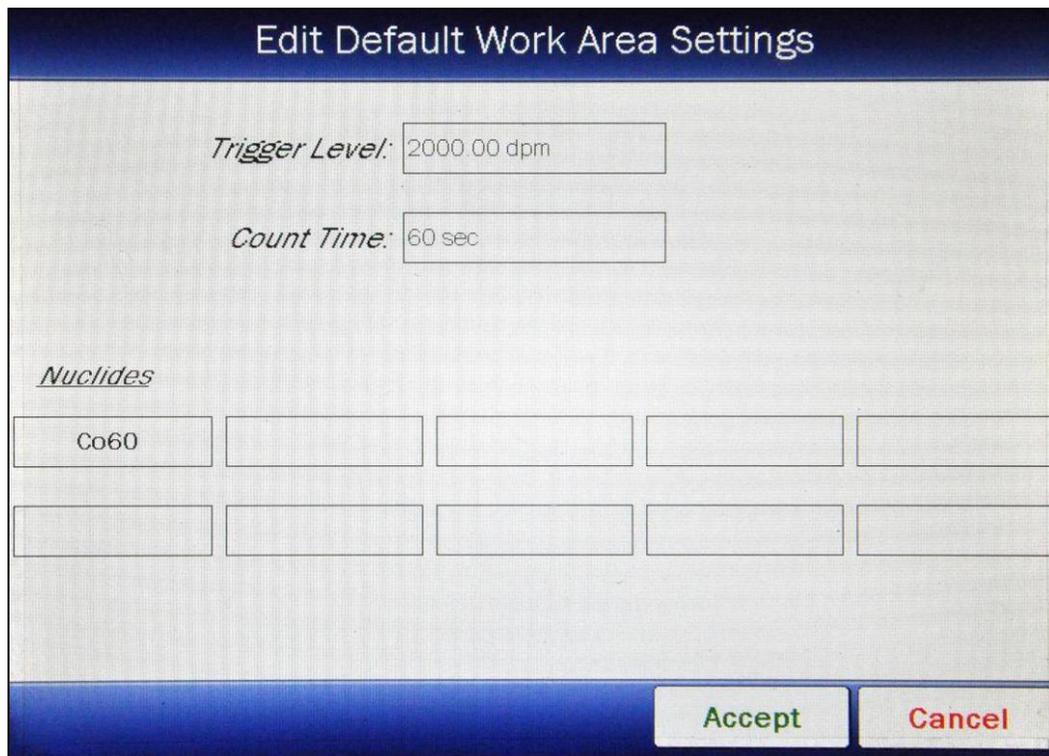
Figure 5-31 Edit Default Work Area Settings Screen

To save the displayed values, touch the **ACCEPT** button. Any changes made will be saved and Figure 5-29 Well Wipes Setup Screen will re-appear.

To return to Figure 5-29 Well Wipes Setup Screen without saving any changes, touch the **CANCEL** button.

Work Area Trigger Level

> ***Note:*** *The Work Area Trigger Level will be displayed in dpm if the system is set to Curies on the Chamber Measurement screen or Bq if set to Becquerels on the Chamber Measurement screen.*

When the activity of a Wipe sample for a particular nuclide exceeds the Wipe Area Trigger Level, "HIGH" will be displayed on the screen and printed on the report.

To change the Default Work Area Trigger Level, touch the ***Trigger Level:*** field box.

The numeric keypad will appear. Input the new Trigger Level by touching the appropriate numbers on the keypad. Touch the **ACCEPT** button to accept the entered value. Touch the **CANCEL** button to abort any changes.

Note: *Refer to Table 5-2 Trigger Level Limits on page 5-36 for the minimum and maximum Work Area Trigger Level.*

Work Area Counting Time

The default counting time is <u>60</u> seconds. If it is desired to use a different Work Area Counting Time, touch the *Count Time:* field box.

The numeric keypad will appear. Input the new counting time by touching the appropriate numbers on the keypad. Touch the **ACCEPT** button to accept the entered value. Touch the **CANCEL** button to abort any changes.

Note: *The minimum count time that can be input is 30 seconds. The maximum count time that can be input is 9,999 seconds.*

Work Area Nuclides

Note: *Efficiency data must be entered for nuclides to be added. (Refer to the EFFICIENCY section on page 5-11)*

Up to 10 nuclides may be selected to be looked for in a Wipe sample. The nuclides selected here will be used as the default nuclides for Work Area Locations.

To add a nuclide to look for, touch a nuclide field box in the *__Nuclides__* section of the screen. The Select Nuclide screen will appear. The screen displays a listing of nuclides that have an Efficiency value assigned to them (Refer to the EFFICIENCY section on page 5-11) – 10 at a time.

The nuclide list is in alphabetical order. The length of the list will vary depending on which nuclides have an Efficiency value assigned to them (Refer to the EFFICIENCY section on page 5-11). The number of pages (or screens) will be shown in the upper right corner of the screen indicating the length of the list. To scroll through the list, touch the **DOWN ARROW** (▼) button. The next group of 10 nuclides will be displayed and the **UP ARROW** (▲) button will appear allowing the user to scroll up in the list.

To cancel any changes and return to Figure 5-31 Edit Default Work Area Settings Screen, touch the **CANCEL** button.

To change the assignment of the chosen *Nuclides:* field box, do one of the following:

- Touch the Nuclide name on the list on the right. The nuclide will be highlighted. (If necessary, scroll the list until the desired nuclide is displayed.) Once a nuclide is selected from the list, an **ACCEPT** button will appear. Touch the **ACCEPT** button to save the change. Figure 5-31 Edit Default Work Area

Settings Screen will re-appear with the selected Nuclide in the chosen *Nuclides:* field box.

- Touch the **CLEAR SELECTED NUCLIDE** button. This will cause the selected *Nuclides:* field box to be blank (no nuclide assigned).Figure 5-31 Edit Default Work Area Settings Screen will re-appear with the chosen *Nuclides:* field box blank.

To save the changes, touch the **ACCEPT** button. Figure 5-29 Well Wipes Setup Screen will re-appear.

To abort any changes, touch the **CANCEL** button. Figure 5-29 Well Wipes Setup Screen will re-appear.

Unrestricted Area Settings

From Figure 5-29 Well Wipes Setup Screen, touch the **EDIT DEFAULT UNRESTRICTED AREA SETTINGS** button. Figure 5-32 Edit Default Unrestricted Area Settings Screen will appear.

Figure 5-32 Edit Default Unrestricted Area Settings Screen

Note: *The Unrestricted Area Trigger Level will be displayed in dpm if the system is set to Curies on the Chamber Measurement screen or Bq if set to Becquerels on the Chamber Measurement screen.*

Entering the Trigger Level, Count Time and selecting Nuclides to look for in Unrestricted Areas follows the same procedure as for Work Areas as described beginning on page 5-39.

To save the displayed values, touch the **ACCEPT** button. Any changes made will be saved and Figure 5-29 Well Wipes Setup Screen will re-appear.

To return to Figure 5-29 Well Wipes Setup Screen without saving any changes, touch the **CANCEL** button.

Sealed Source Settings

From Figure 5-29 Well Wipes Setup Screen, touch the **EDIT DEFAULT SEALED SETTINGS** button. Figure 5-33 Edit Default Sealed Settings Screen will appear.

Figure 5-33 Edit Default Sealed Settings Screen

Note: *The Sealed Trigger Level will be displayed in nCi if the system is set to Curies on the Chamber Measurement screen or Bq if set to Becquerels on the Chamber Measurement screen.*
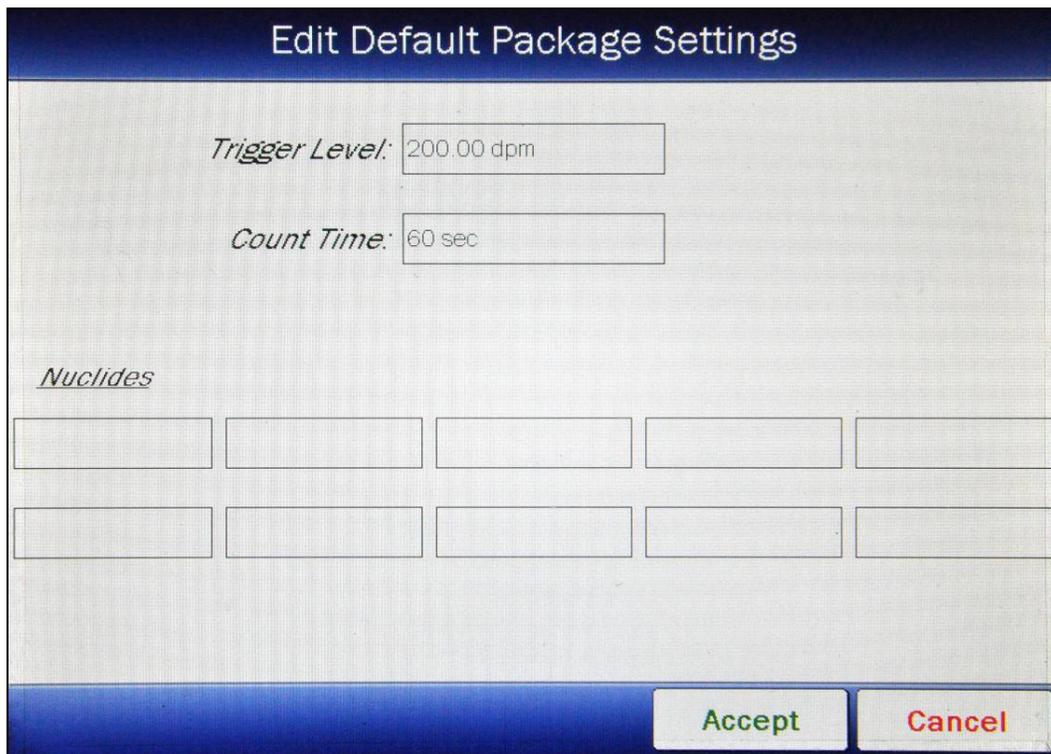
Entering the Trigger Level, Count Time and selecting Nuclides to look for in Sealed Sources follows the same procedure as for Work Areas as described beginning on page 5-39.

To save the displayed values, touch the **ACCEPT** button. Any changes made will be saved and Figure 5-29 Well Wipes Setup Screen will re-appear.

To return to Figure 5-29 Well Wipes Setup Screen without saving any changes, touch the **CANCEL** button.

Package Settings

From Figure 5-29 Well Wipes Setup Screen, touch the **EDIT DEFAULT PACKAGE SETTINGS** button. Figure 5-34 Edit Default Package Settings Screen will appear.

Figure 5-34 Edit Default Package Settings Screen

Note: *The Package Trigger Level will be displayed in dpm if the system is set to Curies on the Chamber Measurement screen or Bq if set to Becquerels on the Chamber Measurement screen.*

Entering the Trigger Level, Count Time and selecting Nuclides to look for in Packages follows the same procedure as for Work Areas as described beginning on page 5-39.

To save the displayed values, touch the **ACCEPT** button. Any changes made will be saved and Figure 5-29 Well Wipes Setup Screen will re-appear.

To return to Figure 5-29 Well Wipes Setup Screen without saving any changes, touch the **CANCEL** button.

Setup Location

Before beginning a Wipe Test, at least one location must be set up by the user. By default, no Wipe Locations are defined.

When the Wipe test is performed, a list of Wipe Locations will be displayed.

When adding a Wipe Location, the default values for the selected Wipe Type will displayed. These values may be used or may be customized for each location.

Note: *When performing a Wipe Test, if no Wipe Locations have been setup, the message "**Wipe Error** Unable to find any wipe locations Please setup a wipe location" will appear.*

From Figure 5-29 Well Wipes Setup Screen, touch the **SETUP LOCATION** button. Figure 5-35 Setup Wipe Locations Screen will appear.
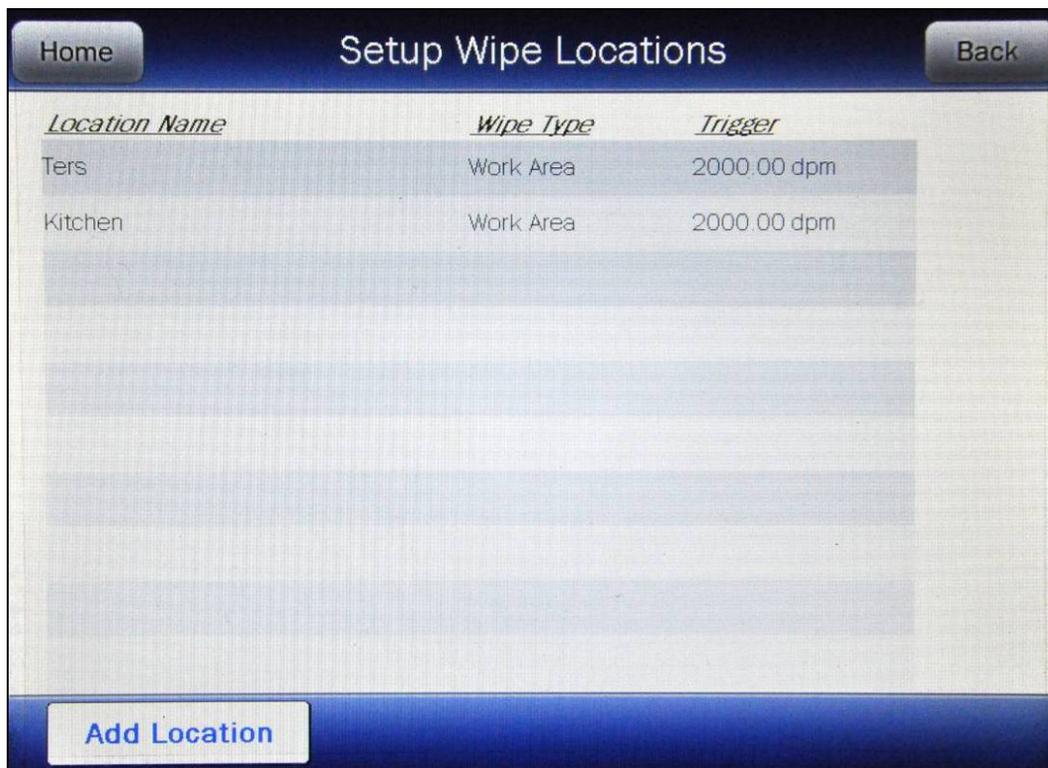
Figure 5-35 Setup Wipe Locations Screen

To exit Figure 5-35 Setup Wipe Locations Screen,

- touch the **BACK** button – Figure 5-29 Well Wipes Setup Screen will appear or
- touch the **HOME** button – Figure 5-2 Well Counter Main Screen will appear.

Adding a Location

To add a location, touch the **ADD LOCATION** button. Figure 5-36 Add New Wipe Location Screen will appear.
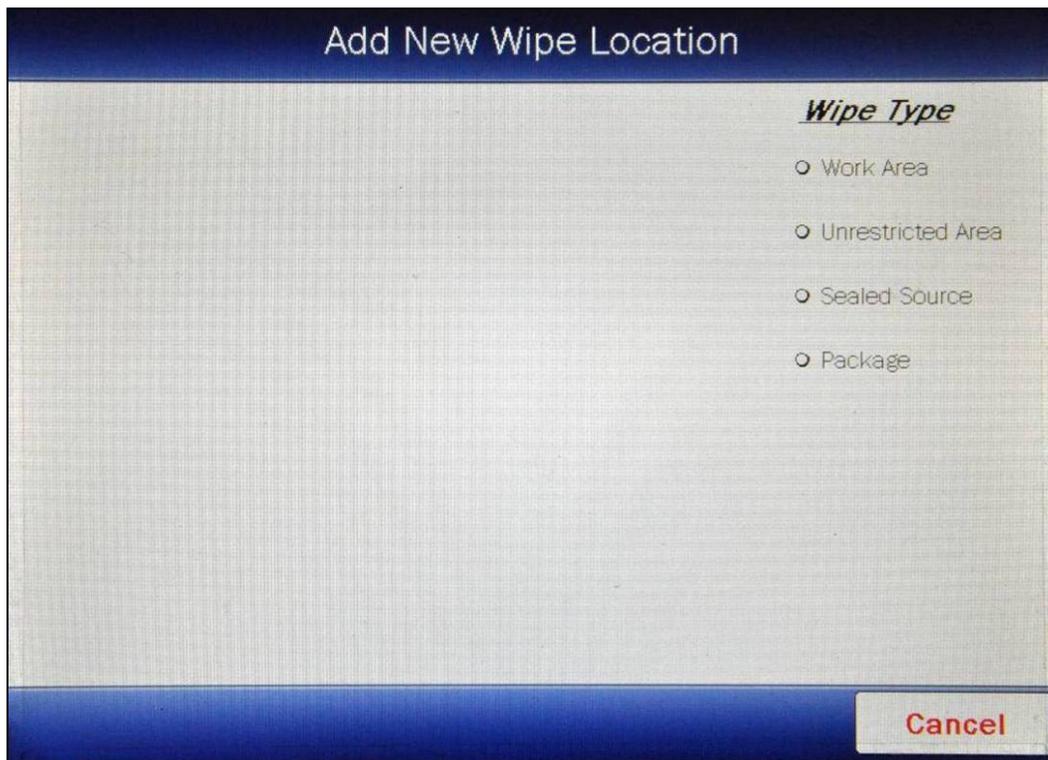

Figure 5-36 Add New Wipe Location Screen

To exit Figure 5-36 Add New Wipe Location Screen without setting up a location, touch the **CANCEL** button. Figure 5-35 Setup Wipe Locations Screen will re-appear.

Selecting Wipe Type

A Wipe Type must be selected for each location. Touch the radio button next to the desired Wipe Type. Figure 5-37 Add New Wipe Location with Wipe Type Selected Screen will appear.

The selected Wipe Type default values (Trigger Level, Count Time and Nuclides *(if any)*) will be automatically entered into the location. The default values may be used or the values may be customized for each location.

In the example, Work Area was selected. The Work Area default values for the Trigger Level, Count Time and Nuclides to look for are 2000 dpm, 60 seconds and Cs137.

Figure 5-37 Add New Wipe Location with Wipe Type Selected Screen

Location Name

Note: *The location must have a name specified. If the **ACCEPT** button is touched without entering a name in the **Location:** field box, the message "**Wipe Location** Missing Location Name" will appear.*

A name must be entered in order to save the Location.

To input a name for the location, touch the **Location:** field box. Figure 5-38 Alphanumeric Keypad Screen will appear.
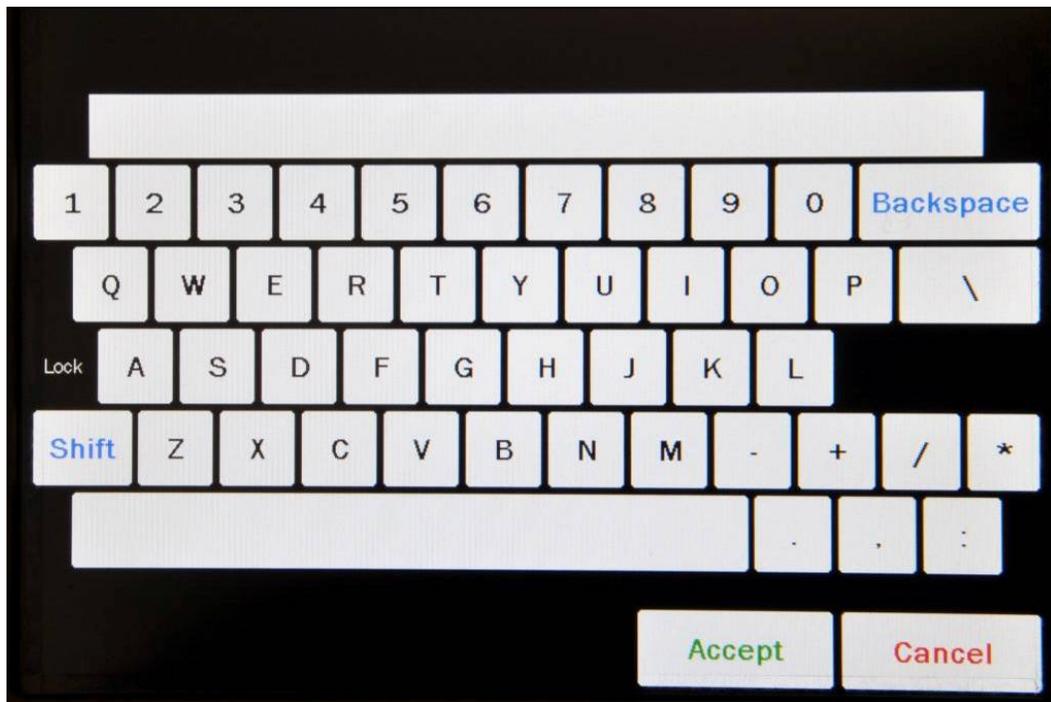
Figure 5-38 Alphanumeric Keypad Screen

Input the desired name for the location being added (e.g. Kitchen) and touch the **ACCEPT** button. Figure 5-37 Add New Wipe Location with Wipe Type Selected Screen will re-appear with the *Location:* field box populated with the entered name. The Location name can contain any combination of 23 alphanumeric characters maximum.

To cancel any changes and return to Figure 5-37 Add New Wipe Location with Wipe Type Selected Screen, touch the **CANCEL** button.

Trigger Level

The default Trigger Level for the selected Wipe Type will be displayed in the ***Trigger Level:*** field box.

To change the Trigger Level for this particular location, touch the ***Trigger Level:*** field box. Figure 5-39 Numeric Keypad Screen will appear.
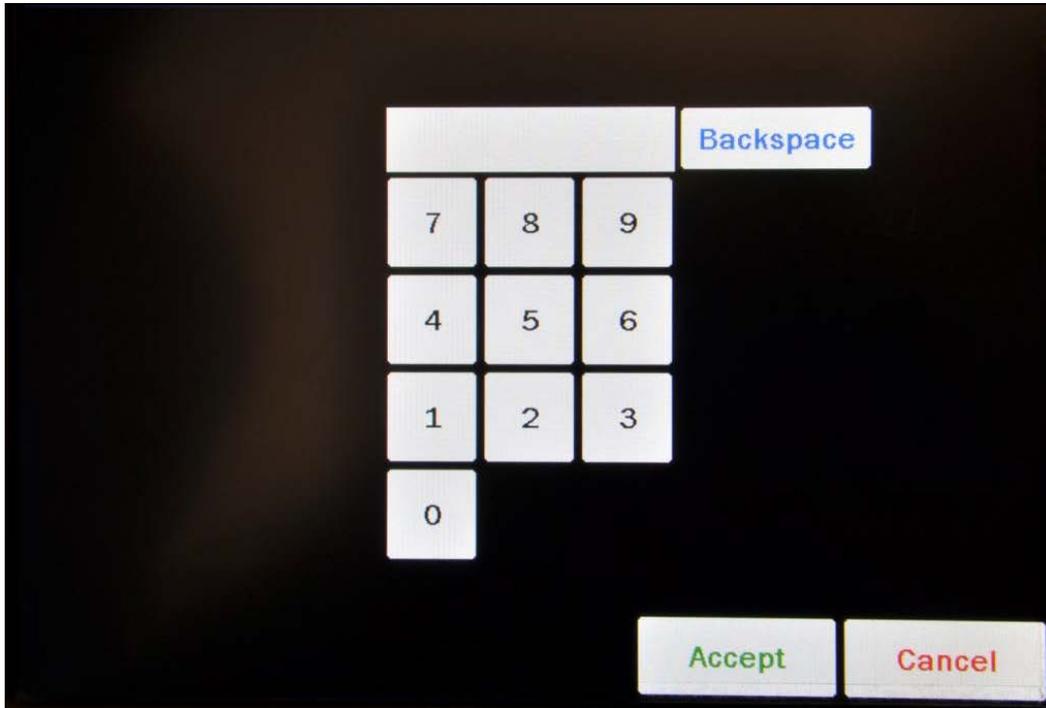

Figure 5-39 Numeric Keypad Screen

Input the desired Trigger Level by touching the appropriate numbers on the keypad. Touch the **ACCEPT** button to accept the entered number. Figure 5-37 Add New Wipe Location with Wipe Type Selected Screen will re-appear with the ***Trigger Level:*** field box for this location populated with the entered value.

Note: *The minimum and maximum Trigger Level values are defined by the Wipe Type. Refer to the Trigger Levels section on page 5-36 for limits for each Wipe Type.*

To cancel any changes and return to Figure 5-37 Add New Wipe Location with Wipe Type Selected Screen, touch the **CANCEL** button.

Count Time

The default Count Time for the selected Wipe Type will be displayed in the ***Count Time:*** field box.

If it is desired to use a different Count Time for this particular location, touch the ***Count Time:*** field box. Figure 5-39 Numeric Keypad Screen will appear.

Input the desired counting time by touching the appropriate numbers on the keypad. Touch the **ACCEPT** button to accept the entered value. Figure 5-37 Add New Wipe Location with Wipe Type Selected Screen will re-appear with the ***Count Time:*** field box for this location populated with the entered value.

Note: *The minimum count time that can be input is 30 seconds. The maximum count time that can be input is 9,999 seconds.*

To cancel any changes and return to Figure 5-37 Add New Wipe Location with Wipe Type Selected Screen, touch the **CANCEL** button.

Nuclides

Note: *Efficiency data must be entered for nuclides to be added. (Refer to the EFFICIENCY DATA section on page 5-11)*

The default Nuclides for the selected Wipe Type will be displayed in the ***Nuclides:*** field boxes.

The ***Nuclides*** section of the screen provides the user with the ability to set nuclides to look for in Wipes for each specific location.

Nuclides are not required when saving the Wipe Location.

Up to 10 nuclides may be selected to be looked for in a Wipe sample for each location. The nuclides selected here will only be used for the specific location.

To add or change a nuclide, touch the desired nuclide field box in the ***Nuclides*** section of the screen. The Select Nuclide screen will appear.

The screen displays a listing of nuclides that have an Efficiency value assigned to them (Refer to the EFFICIENCY DATA section on page 5-11) – 10 at a time.

The nuclide list is in alphabetical order. The length of the list will vary depending on which nuclides have an Efficiency value assigned to them (Refer to the EFFICIENCY section on page 5-11). The number of pages (or screens) will be shown in the upper right corner of the screen indicating the length of the list. To scroll through the list, touch the **DOWN ARROW** (▼) button . The next group of 10 nuclides will be displayed and the **UP ARROW** (▲) button will appear allowing the user to scroll up in the list.

To cancel any changes and return to Figure 5-37 Add New Wipe Location with Wipe Type Selected Screen, touch the **CANCEL** button.

To change the assignment of the chosen *Nuclides:* field box, do one of the following:

- Touch the Nuclide name on the list on the right. The nuclide will become highlighted. (If necessary, scroll the list until the desired nuclide is displayed.) Once a nuclide is selected from the list, an **ACCEPT** button will appear. Touch the **ACCEPT** button to save the change. Figure 5-37 Add New Wipe Location with Wipe Type Selected Screen will re-appear with the selected Nuclide in the chosen *Nuclides:* field box.

- Touch the **CLEAR SELECTED NUCLIDE** button. This will cause the selected *Nuclides:* field box to be blank (no nuclide assigned). Figure 5-37 Add New Wipe Location with Wipe Type Selected Screen will re-appear with the chosen *Nuclides:* field box blank.

Saving the Location

Once all the necessary information is entered into the Location Setup, touch the **ACCEPT** button to save the Location. Figure 5-35 Setup Wipe Locations Screen will re-appear with the new Location displayed on the Wipe Location List.

To abort any changes and return to Figure 5-35 Setup Wipe Locations Screen without saving the Location information, touch the **CANCEL** button.

Editing a Location

Any information for any Wipe Location can be changed.

The Wipe Location List is in entered order. The number of pages (or screens) will be shown in the upper right corner of the screen indicating the length of the list. To scroll through the list, touch the **DOWN ARROW** (▼) button . The next group of 10 Locations will be displayed and the **UP ARROW** (▲) button will appear allowing the user to scroll up in the list.

To edit information for a Wipe Location, touch the desired Location name on Figure 5-35 Setup Wipe Locations Screen. The entire line for the selected Location will become highlighted and an **EDIT LOCATION** button will appear on the lower portion of the screen as shown in Figure 5-40 Add, Edit, Delete Wipe Location Screen.
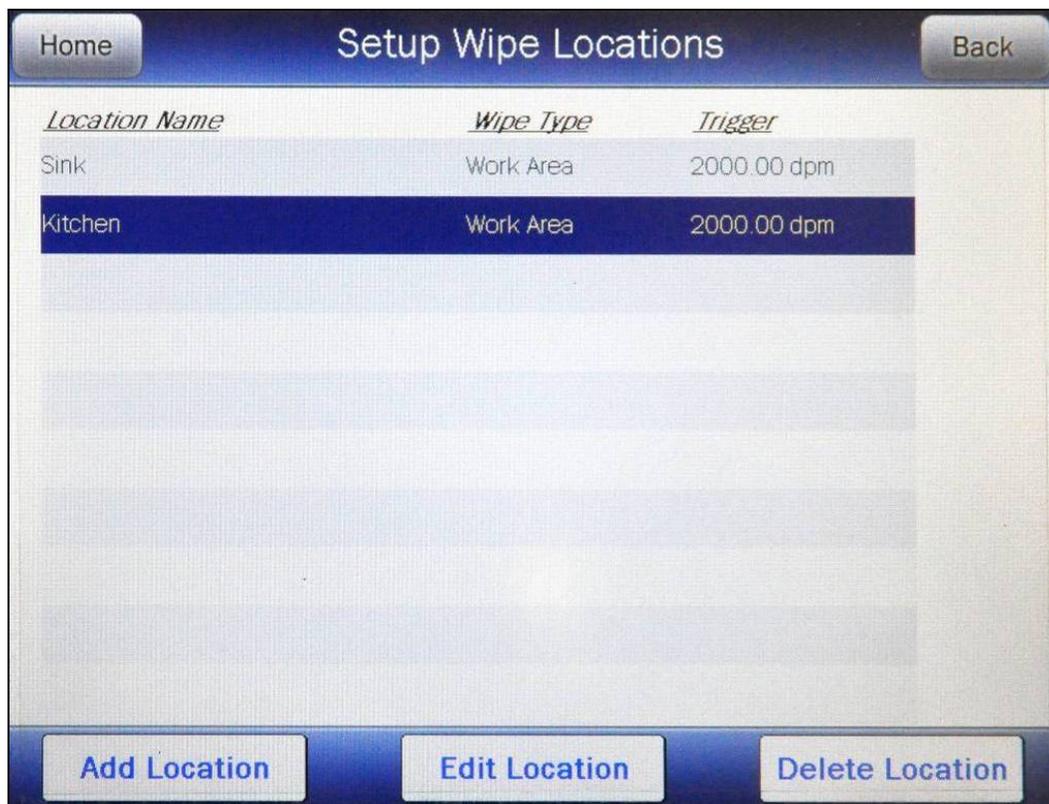
Figure 5-40 Add, Edit, Delete Wipe Location Screen

To edit the information for the highlighted Location, touch the **EDIT LOCATION** button. The Edit Wipe Location screen will appear displaying the selected Location's information.

Edit the desired information as described in the Adding a Location section beginning on page 5-45.

Once all the desired changes are complete, touch the **ACCEPT** button to save the Location data. Figure 5-35 Setup Wipe Locations Screen will re-appear.

To abort changing the Location data, touch the **CANCEL** button. Figure 5-35 Setup Wipe Locations Screen re-appear without saving the changes.

Deleting a Location

Note: *Once a Wipe Location is deleted, it cannot be recovered. The Wipe Tests performed using the deleted Location are not deleted from the database and can still be viewed through the Reports module (reference CHAPTER 11: REPORTS, SECTION: WIPE REPORT).*

Any Wipe Location can be deleted.

The Location list is in entered order. The number of pages (or screens) will be shown in the upper right corner of the screen indicating the length of the list. To scroll through the list, touch the **DOWN ARROW** (▼) button . The next group of 10 Locations will be displayed and the **UP ARROW** (▲) button will appear allowing the user to scroll up in the list.

To delete a Wipe Location, touch the desired Location name on the Figure 5-35 Setup Wipe Locations Screen. The entire line for the selected Location will become highlighted and a **DELETE LOCATION** button will appear on the lower portion of the screen as shown in Figure 5-40 Add, Edit, Delete Wipe Location Screen.

To delete the highlighted Location, touch the **DELETE LOCATION** button. Figure 5-41 Delete Wipe Location Screen will appear with the details of the selected location displayed.

Figure 5-41 Delete Wipe Location Screen

To cancel the deletion of the selected Location, touch the **NO** button. Figure 5-40 Add, Edit, Delete Wipe Location Screen will re-appear with the selected Location still displayed on the Wipe Location List.

To permanently delete the selected Location, touch the **YES** button. Figure 5-40 Add, Edit, Delete Wipe Location Screen will re-appear with the selected Location removed from the Wipe Location List.

This page intentionally left blank.

CHAPTER 6

DIAGNOSTICS

GENERAL

Diagnostics performs functions to test the integrity of the system.

If a printer is attached to the system, a report will be printed containing the system configuration information.

DIAGNOSTICS

From Figure 6-1 Well Counter Main Screen, touch the **UTILITY** button. Figure 6-2 Utility Screen will appear.

Figure 6-1 Well Counter Main Screen
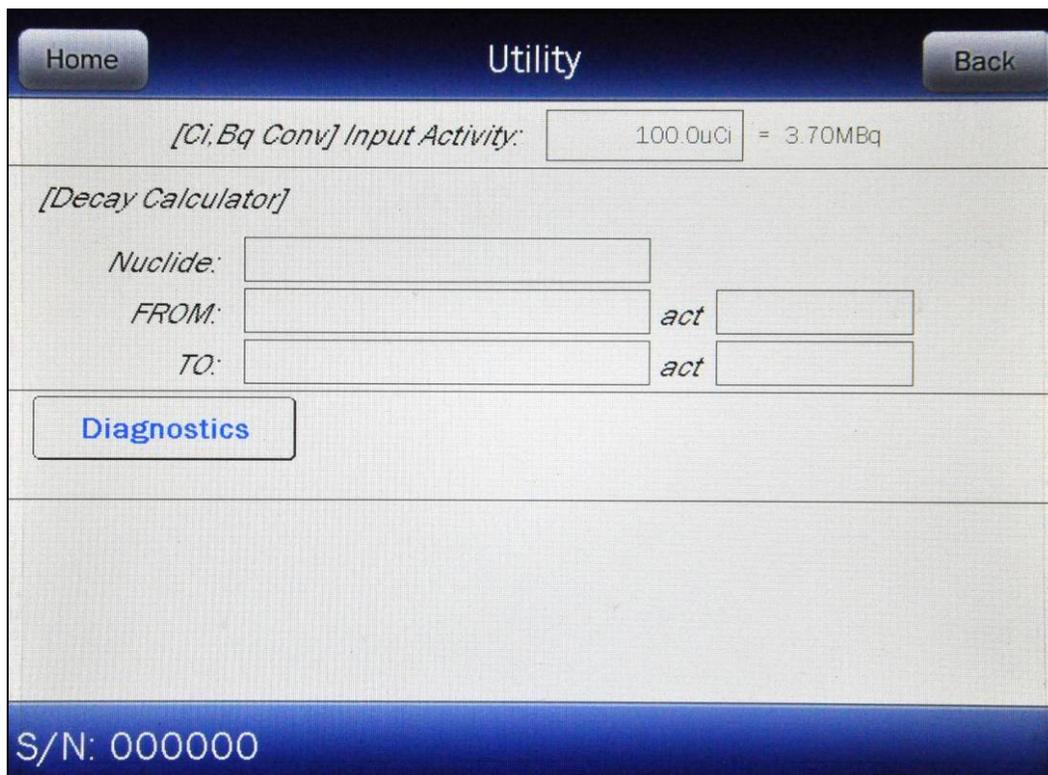
Figure 6-2 Utility Screen

Touch the **DIAGNOSTICS** button. The system diagnostic testing will begin.

The instrument's memories and programs are checked.

If a printer is attached to the system, the results will be printed. The following data is printed on the report:

- A list of the nuclides, their half-lives, their primary photopeak used in measurements and their efficiency value,

- A list of User Added Nuclides, their half-lives, their primary photopeak used in measurements and their efficiency values,

- Well Counter Serial number,

- The Test Source data,

- The Trigger Level limits for Background,

- The default settings for Work Area, Unrestricted Area, Sealed Source and Package,

- Stored Wipe Locations and their settings,

- RBC Survival Normal Range settings,

- Memory Status and

- Program Integrity.

When the test is complete, the message "PROGRAM INTEGRITY – PASS: xxxx" will be displayed as shown in Figure 6-3 Utility Screen with Diagnostics PROGRAM INTEGRITY PASS.

Note: *The value displayed after PASS is for example only and is not a real value. The value displayed will depend upon the current revision of the installed software.*

Figure 6-3 Utility Screen with Diagnostics PROGRAM INTEGRITY PASS

If the Diagnostics test fails, the message "PROGRAM INTEGRITY – FAIL: xxxx" will appear.

At power-up, the CRC®-55t's program is copied from the SD card into RAM memory. If the Diagnostics fails, restart the unit and perform the test again. If it fails again, contact Capintec's <u>only</u> Authorized Service Center (reference the CHAPTER 13: CLEANING AND MAINTENANCE, SECTION: SERVICING) for more information, since this will indicate a SD card error or a system malfunction.

To exit Figure 6-2 Utility Screen, touch the **HOME** or **BACK** button. Figure 6-1 Well Counter Main Screen will appear.

This page intentionally left blank.

CHAPTER 7

ACCEPTANCE & QUALITY ASSURANCE TESTS

GENERAL

To insure proper operation of the CRC®-55t Well Counter, the following tests should be performed at the indicated intervals.

ACCEPTANCE TESTS

Perform a Background Measurement as stated in CHAPTER 9: WIPE MEASUREMENT PROCEDURES, SECTION: MEASURE BACKGROUND.

Verify that the Well Counter data is setup as stated in CHAPTER 5: WELL COUNTER INITIALIZATION.

Perform Diagnostics as stated in CHAPTER 6: DIAGNOSTICS. If a printer is attached to the system, verify the printed information is correct.

QUALITY ASSURANCE TESTS

Well Counter System Test

The Well Counter System Test should be performed every day. It cannot be performed unless a Background measurement has been performed for the current day. (CHAPTER 8: WELL COUNTER TESTS, SECTION: QUALITY ASSURANCE TESTS, System Test)

If there is a printer connected to the system, the test results can be printed at the end of the source measurement.

Contamination Test

This test is normally performed at the end of each workday. At the very least, it should be performed once per week. To test for contamination of the Well Counter liner:

1. Make sure that the liner is in the Well Counter and there is no source in the liner.

2. Perform a Background measurement.

3. When counting is completed, record the displayed reading.

4. Remove the liner from the Well Counter

5. Perform another Background measurement.

6. When counting is completed, record the displayed reading.

7. Subtract the activity in step 6 from the activity in step 3. This is the amount of contamination of the liner.

8. Should the liner exhibit contamination greater than 25% of the normal Background measurement, the liner should be decontaminated or replaced.

⚠ **CAUTION:** Never use the Well Counter without the liner being in place. Liners are inexpensive and easy to replace. A contaminated Well Counter is a very costly mistake.

CHAPTER 8

WELL COUNTER TESTS

GENERAL

This section describes performing the Well Counter Auto Calibration, measuring the Well Counter Background and performing the Well Counter Quality Assurance Tests (System Test, MDA Test and Chi Square Test).

The Lab Tests are described in CHAPTER 10: WELL COUNTER LAB TESTS.

COUNT TIME

The CRC®-55t Well Counter counts using Live Time. Live Time is defined as the time during which the MCA can actually measure a pulse.

Real Time is defined as the actual clock interval. The Live Time and Real Time are displayed above the MCA spectrum on some measurement screens.

The CRC®-55t counts until the MCA's Live Time reaches the specified counting period. The actual counting time (Real Time) is always greater than or equal to the requested Live Time.

The count rate is calculated from measured Live Time.

The MCA in the CRC®-55t measures each pulse that comes out of the Sodium Iodide/Photomultiplier tube detector. To measure each pulse requires a finite amount of time. During the time the MCA is measuring the pulse, another pulse cannot be measured. Any other pulse that occurs during this time is not measured, and therefore, lost. During this time, the MCA is said to be dead.

The Dead Time increases as counting rate increases. To ensure accurate results, the Dead Time should not exceed 80%. Moving the source further away from the detector can decrease the Percent Dead Time.

To calculate the Dead Time,

$$\left(1 - \frac{\text{Live Time}}{\text{Real Time}}\right) \times 100 = \% \text{ Dead Time}$$

AUTO CALIBRATE

The CRC®-55t uses an automatic calibration procedure for the Well Counter to adjust the gain to maintain the correct relationship between energy and channel.

Auto Calibration should be performed on a daily basis.

Auto Calibration is performed using the same Cs137 rod source as in System Test and Eu152. First, calibration is performed with Cs137 where the procedure makes use of its 662 keV and the 32 keV peaks to automatically adjust the gain and zero offset. Next, Eu152 provides multiple gammas over an energy range of 41 keV to 1,408 keV. The software provides a point-by-point energy calibration using these gammas. This function corrects for any non-linearity in response of the NaI detector and provides accurate identification of the energy of the peaks. It is important to complete the calibration of your system using Eu152.

Unless an error message is displayed, the software will have succeeded in finding a set of adjustments, which places the 662 keV gamma peak to the correct energy channel.

The Auto Calibration Test also calculates detector resolution by determining the FWHM (full width-half maximum) area of the peak, and dividing by the peak centroid location. For peaks such as the 662 keV peak of Cs137 whose shape is symmetrical or appears to follow a Gaussian distribution, the FWHM is generally close to 2.35 σ. For well detectors, the resolution should be ≤9.5 percent. Detectors do age with use, and this will result in a very slight increase (1% to 3%) in resolution over a period of several years. A rapid increase in percent resolution may indicate a problem with the detector assembly.

Over time, the amplification characteristics of a photomultiplier tube change. If the gain of the detector is not adjusted occasionally, the resolution of the detector deteriorates significantly, making it difficult to identify nuclides correctly. Therefore, it is important to check the gain of the detector at least once daily.

Note: *Monitoring the stability of the resolution over time is one of the best indications of the overall system performance.*

Figure 8-1 Well Counter Main Screen

To perform the automatic calibration, from Figure 8-1 Well Counter Main Screen, touch the **AUTO CALIBRATE** button. Figure 8-2 Well Auto Calibrate Screen will appear.
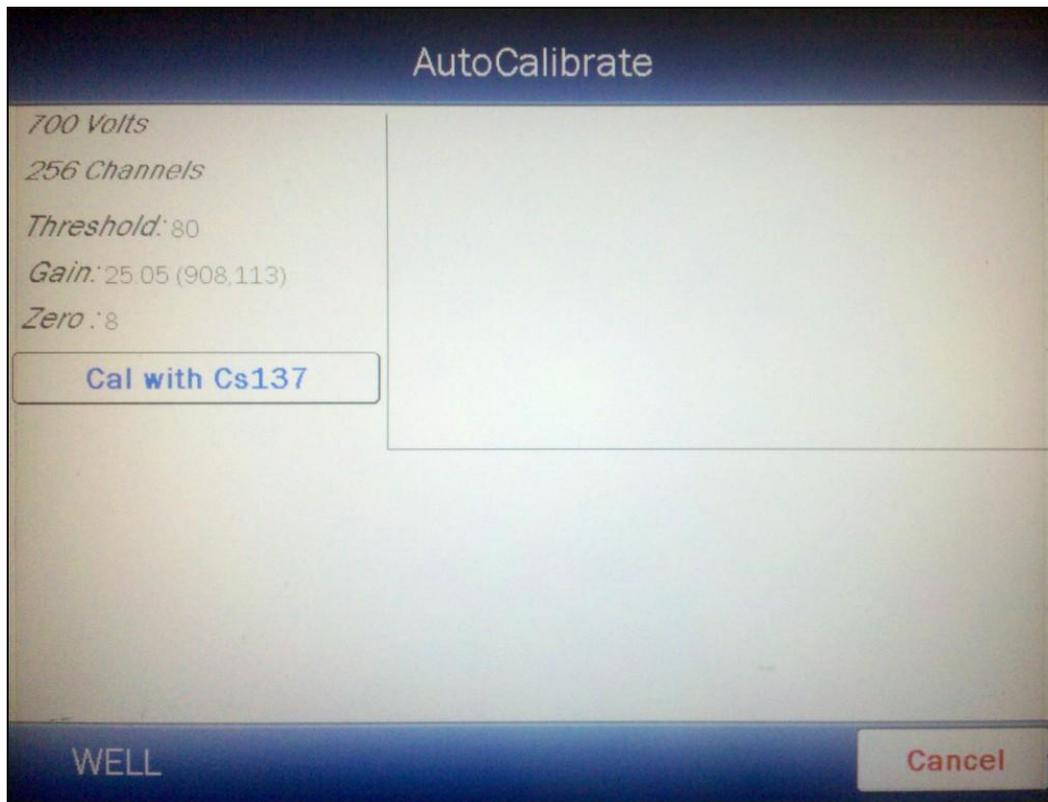
Figure 8-2 Well Auto Calibrate Screen

To begin the automatic calibration, place the Cs137 rod source into the Well Counter and then touch the **Cal with Cs137** button.

Note: *The recommended calibrated activity is in the 0.1-1.0 µCi range. The calibrated activity must not be greater than 10.0 µCi (0.37 MBq).*

The system will begin measuring the Cs137 rod source. As counting progresses, the live spectra are shown. The system will count for as long as necessary until sufficient counts are acquired for proper calibration.

To stop the measurement at any time, touch the **ABORT CAL** button. The collected data is discarded. To re-start the process, touch the **Cal with Cs137** button.

After the Cs137 calibration is completed, the results will be displayed as shown in Figure 8-3 Auto Calibrate Measurement Screen.
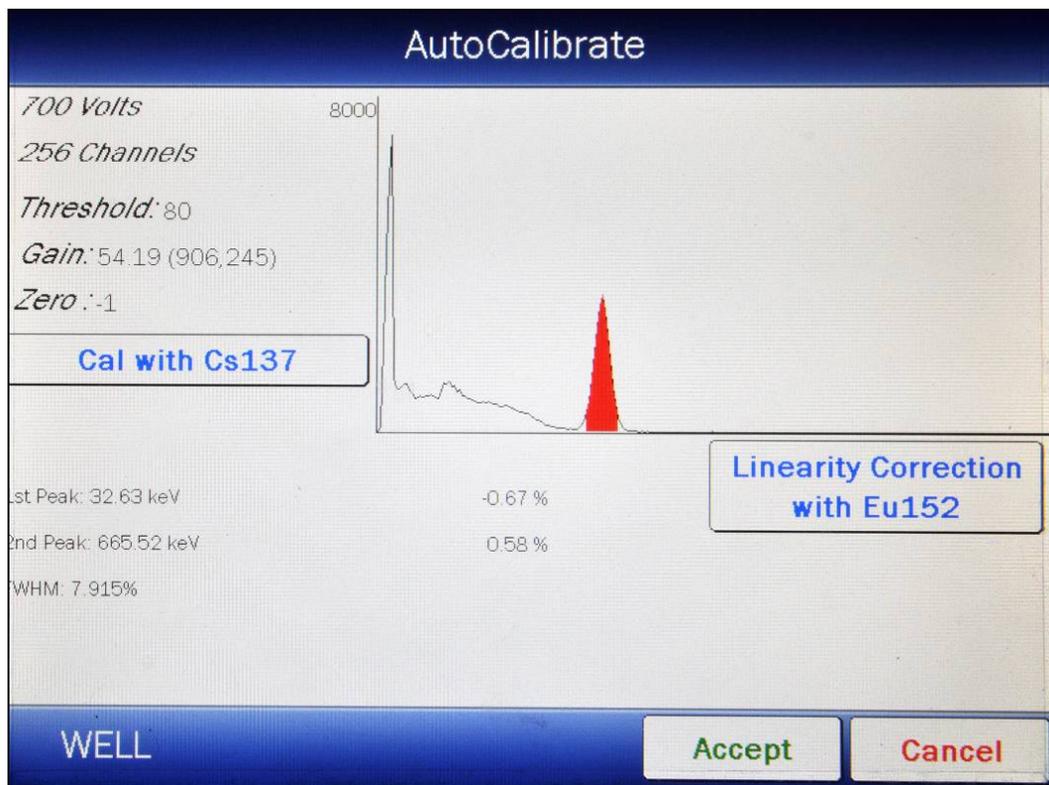
Figure 8-3 Auto Calibrate Measurement Screen

At this point, four choices are available for continuing:

1. Discard the calibration results – Touch the **CANCEL** button. Figure 8-1 Well Counter Main Screen will re-appear.

2. Save the calibration results – Touch the **ACCEPT** button. Figure 8-1 Well Counter Main Screen will re-appear.

3. Repeat the Cs137 calibration procedure – Touch the **Cal with Cs137** button.

4. Perform Linearity Correction with Eu152. This step, though optional, is highly recommended for fine-tuning your system.

    a. To perform the Linearity Correction, remove the Cs137 rod source from the Well Counter and place the Eu152 rod source into the Well Counter

    b. Touch the **Linearity Correction with Eu152** button. The system will begin measuring the Eu152 rod source. As counting progresses, the live spectra are shown. The system will count for as long as necessary until sufficient counts are acquired for proper calibration.

    c. To stop the counting midway, touch the **Abort Linearity Correction** button. The collected data is discarded.

      d. After the Linearity Correction calibration is completed, the results will be displayed as shown in Figure 8-4 Well Auto Calibrate with Eu152 Results Screen.

Note: *After an Auto Calibration, the Background is invalidated and must be re-measured.*
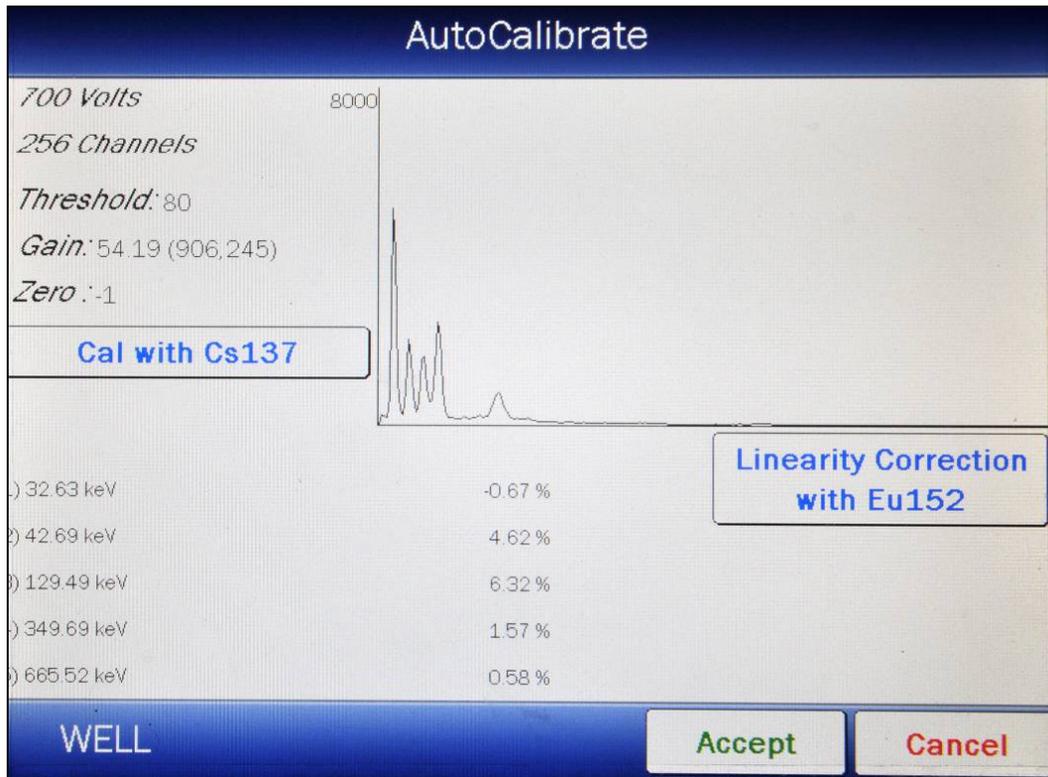
Figure 8-4 Well Auto Calibrate with Eu152 Results Screen

At this point, the following options are available for continuing:

1. Discard the calibration results – Touch the **CANCEL** button. Figure 8-1 Well Counter Main Screen will re-appear.

2. Save the calibration results – Touch the **ACCEPT** button. Figure 8-1 Well Counter Main Screen will re-appear.

3. Repeat the Cs137 calibration procedure.

4. Repeat the Linearity Correction with Eu152 procedure.

Note: *After an Auto Calibration, the Background is invalidated and must be re-measured.*

BACKGROUND

Any presence of contamination may be confirmed by counting without a sample in the Well Counter. Reference CHAPTER 7: ACCEPTANCE & QUALITY ASSURANCE TESTS, SECTION: QUALITY ASSURANCE TESTS, Contamination Test.

Background should be measured on a daily basis.

Reference CHAPTER 9: WIPE MEASUREMENT PROCEDURES, SECTION: MEASURE BACKGROUND for Background measurement procedures.

QUALITY ASSURANCE TESTS

The Quality Assurance Tests consist of the System Test, MDA Test and the Chi Square Test. Each of these tests is described in the following sections.

Figure 8-5 Well Counter Main Screen

To access the Quality Assurance Tests, from Figure 8-5 Well Counter Main Screen, touch the **QUALITY ASSURANCE** button. Figure 8-6 Well Quality Assurance Screen will appear.

Figure 8-6 Well Quality Assurance Screen

To exit Figure 8-6 Well Quality Assurance Screen, touch the **HOME** or **BACK** button. Figure 8-5 Well Counter Main Screen will re-appear.

To edit the Cs137 Test Source data, touch the **SETUP** button. A numeric keypad will appear to allowing the user to input a 3-digit password. Input the password (the last 3 digits of the Readout serial number) by touching the appropriate numbers on the keypad. Touch the **ACCEPT** button to accept the password. Reference CHAPTER 5: WELL COUNTER INITIALIZATION, SECTION: TEST SOURCE DATA for more information.

System Test

The System Test should be performed every day. It cannot be performed unless the Well Counter Background has been measured for the current day.

The Cs137 Test Source must be entered into the system prior to performing the System Test (reference CHAPTER 5: WELL COUNTER INITIALIZATION, SECTION: TEST SOURCE DATA).

Note: *The recommended calibrated activity is in the 0.1-1.0 µCi range. The calibrated activity must not be greater than 10.0 µCi (0.37 MBq).*

To perform the System Test, from Figure 8-6 Well Quality Assurance Screen, touch the **SYSTEM TEST** button. Figure 8-7 System Test Measurement Screen will appear.

Note: *If the Test Source information has not been entered, the message "**System Test Error** Unable to find Cs137 Test Source Please fill out Test Source Setup" will appear.*
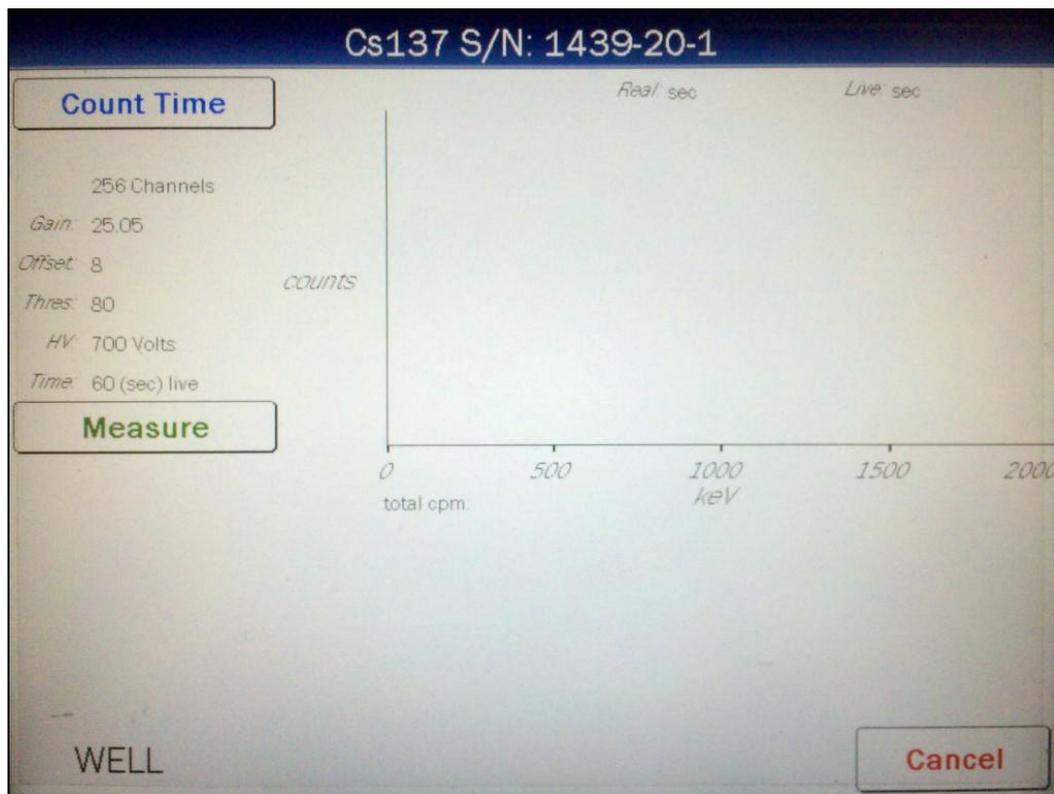
Figure 8-7 System Test Measurement Screen

To exit Figure 8-7 System Test Measurement Screen, touch the **CANCEL** button. Figure 8-6 Well Quality Assurance Screen will re-appear or

Count Time

The default counting time is 60 seconds. If it is desired to use a different counting time, touch the **COUNT TIME** button. Figure 8-8 Numeric Keypad Screen will appear.
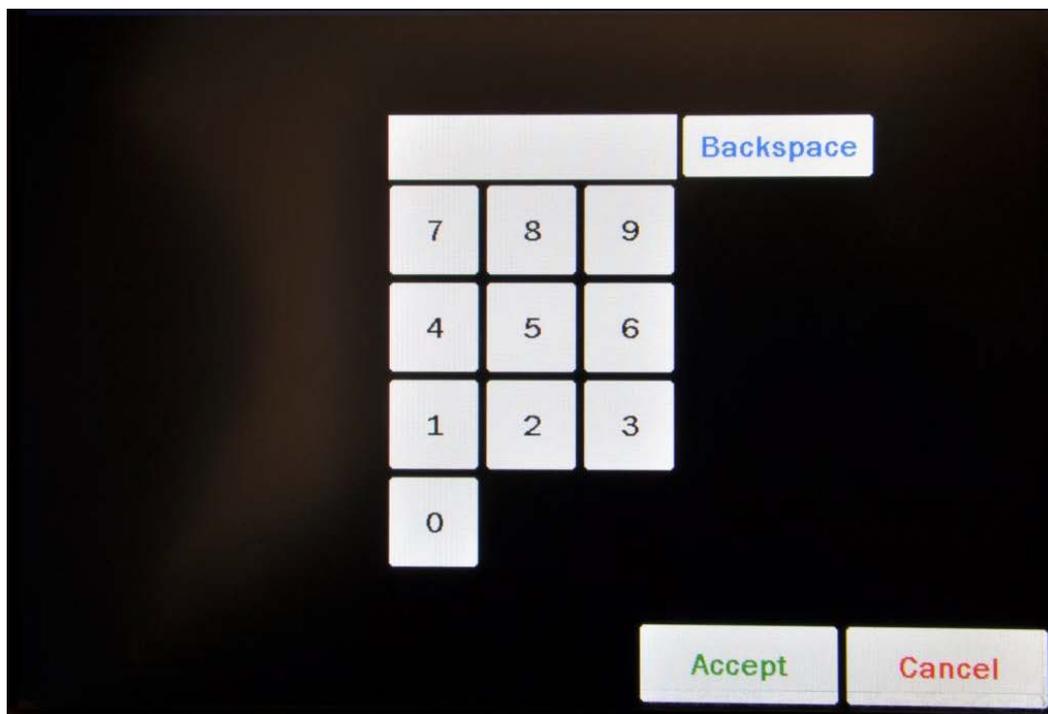
Figure 8-8 Numeric Keypad Screen

Input the desired counting period (in seconds) by touching the appropriate numbers on the keypad. Touch the **ACCEPT** button to accept the entered time. Touch the **CANCEL** button to abort any changes.

Counting the Test Source for 60 seconds or longer is recommended.

Note: *The minimum count time that can be input is 2 seconds. The maximum count time that can be input is 30,000 seconds.*

Measurement

To begin the System Test, place the Cs137 Test Source into the Well Counter and then touch the **MEASURE** button.

The system will begin measuring the Cs137 Test Source. As counting progresses, the live spectra are shown. The Real time, Live time and the counting rate (total cpm) will be displayed and updated. Also, the **MEASURE** button will be replaced with a **STOP** button. At any time during the measurement, touch the **STOP** button to stop the measurement. To re-start the process, touch the **MEASURE** button.

When the measurement is finished, the counting rate is displayed and the message "FINISHED" will appear on the screen below the **MEASURE** button as shown in Figure 8-9 System Test Measurement Results Screen.
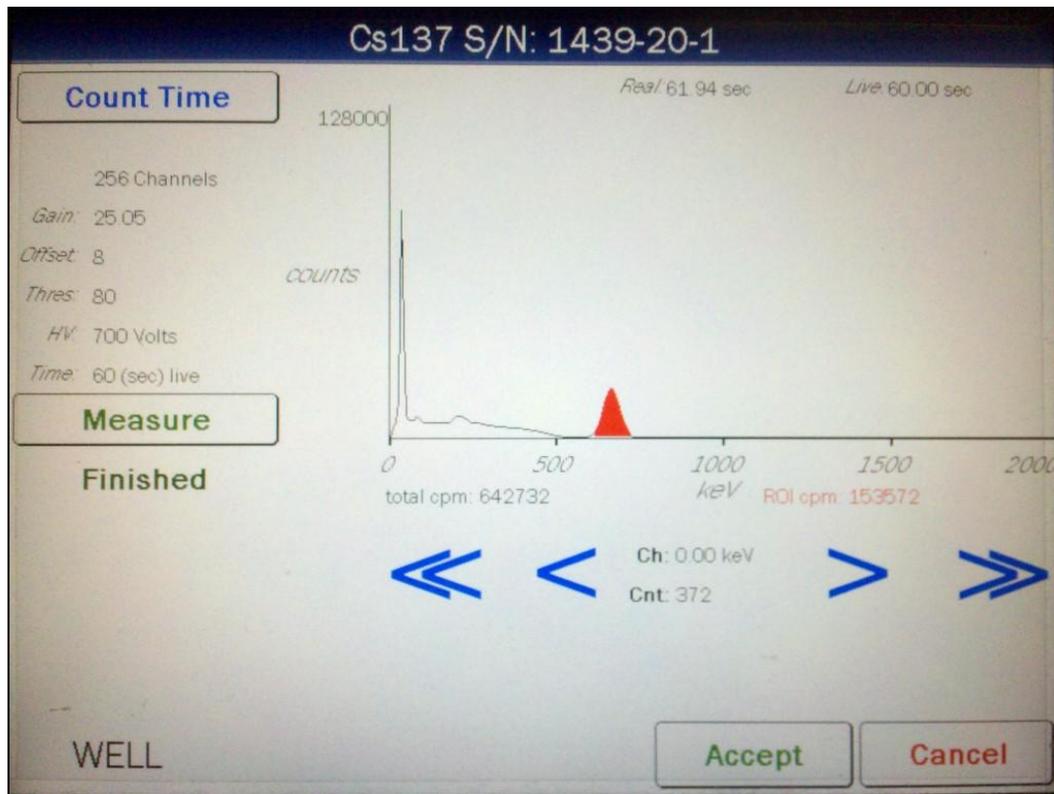
Figure 8-9 System Test Measurement Results Screen

To repeat the measurement, touch the **MEASURE** button.

To discard the measurement results, touch the **CANCEL** button. Figure 8-6 Well Quality Assurance Screen will re-appear.

Results

To save the measurement results, touch the **ACCEPT** button. Figure 8-10 System Test Results Screen will appear.
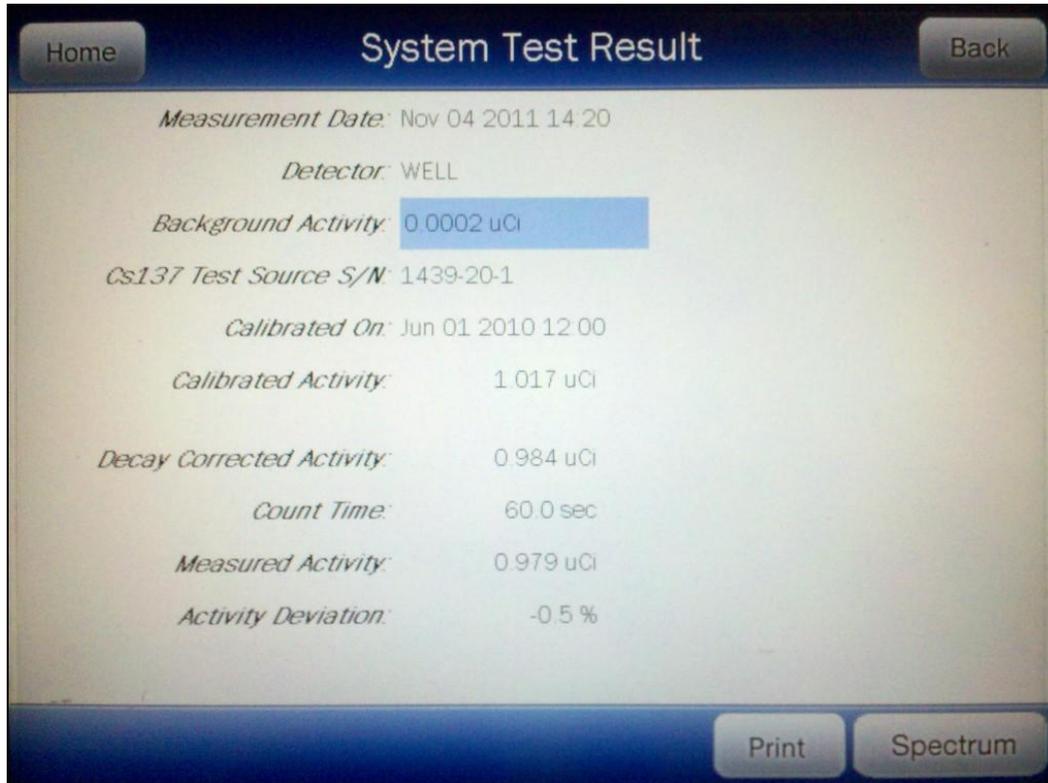
Figure 8-10 System Test Results Screen

The results screen displays the following information:

- The Measurement Date,

- The measured Background activity.

- The entered Cs137 Test Source information.

- Decay Corrected Activity – this is the calculated current activity.

- Count Time – this is the set counting time period.

- Measured Activity – this is the activity that was measured during the System Test.

- Activity Deviation – deviation of the Measured Activity from the Decay Corrected Activity. If the deviation is more than ±10%, "FAILED" will appear in red on the screen next to Activity Deviation result (probably used wrong source).

Print Results

If a printer is attached to the system, the test results can be printed by touching the **PRINT** button.

View System Test Spectrum

To view the Spectrum, touch the **SPECTRUM** button. Figure 8-11 System Test Spectrum Screen will appear.
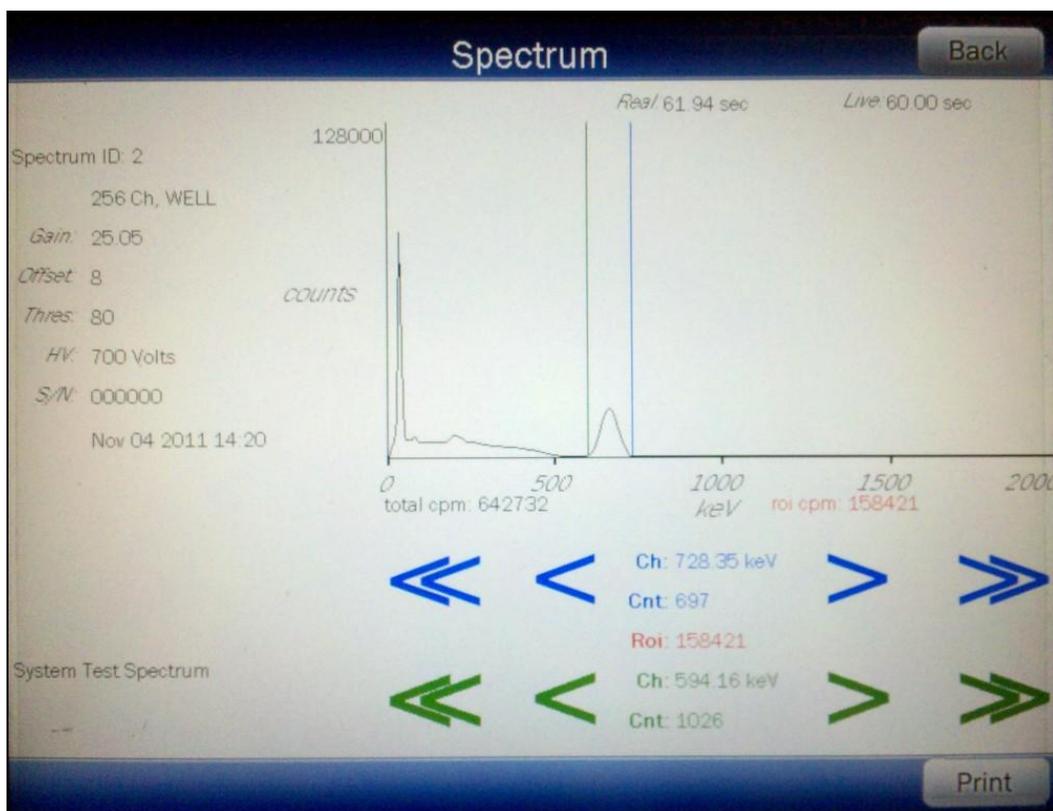
Figure 8-11 System Test Spectrum Screen

A Region of Interest may be defined using the **BLUE** and **GREEN ARROW** buttons to place vertical line cursors around the ROI. **DOUBLE ARROW** buttons move the cursor approximately 75 energy channels. **SINGLE ARROW** buttons move the cursor approximately 7.5 energy channels.

Note: The actual energy channel keV will vary depending upon the Auto Calibration.

When the vertical cursor is moved, the channel energy (keV) and the number of counts in that energy channel are displayed. Once the vertical cursors are set, the total counts in the ROI are displayed.

To print the spectrum, touch the **PRINT** button.

To return to Figure 8-10 System Test Results Screen, touch the **BACK** button.

View Background Spectrum

To view the spectrum of the background that was measured previous to the selected System Test, touch the highlighted ***Background Activity:*** field box. The screen will appear similar to that shown in Figure 8-11 System Test Spectrum Screen. The operation of the **ARROW** buttons is the same as described above.

Exit Results

To exit Figure 8-10 System Test Results Screen,

- touch the **BACK** button – Figure 8-6 Well Quality Assurance Screen will re-appear or
- touch the **HOME** button – Figure 8-5 Well Counter Main Screen will appear.

MDA (Minimum Detectable Activity) Test

Regulatory guidelines may require instruments that are used to measure wipe samples for radioactive contamination be evaluated to determine the minimum level of activity that can be detected by that instrument.

The Minimum Detectable Activity (MDA) is dependent upon the background levels where the instrument is located and the counting time used to assess the background rate.

Because these variables are user-dependent, it is not possible for Capintec to publish an MDA for the CRC®-55tW. Capintec recommends that users determine the appropriate counting time based on the required MDA limit for their application as well as the ambient background rates where the instrument is located.

The CRC®-55tW includes a test that will provide MDA values for a specific nuclide selected by the user. The test measures the background in the channels (ROI) that would be used to measure the activity of the selected nuclide and calculates the MDA for that nuclide.

To perform the MDA Test, from Figure 8-6 Well Quality Assurance Screen, touch the **MDA TEST** button. Figure 8-12 Well MDA Test Screen will appear.

Figure 8-12 Well MDA Test Screen

Note: *All fields (**Measured Background:, Nuclide:, Precision Factor:** and **Correction** **Factor:**) must be completed before the MDA Test can be performed.*

To exit Figure 8-12 Well MDA Test Screen,

- touch the **BACK** button – Figure 8-6 Well Quality Assurance Screen will re-appear or
- touch the **HOME** button – Figure 8-5 Well Counter Main Screen will appear.

Measured Background

A Background measurement must be performed.

Touch the *Measured Background:* field box. A screen will appear similar to Figure 8-13 Background Measurement Screen.
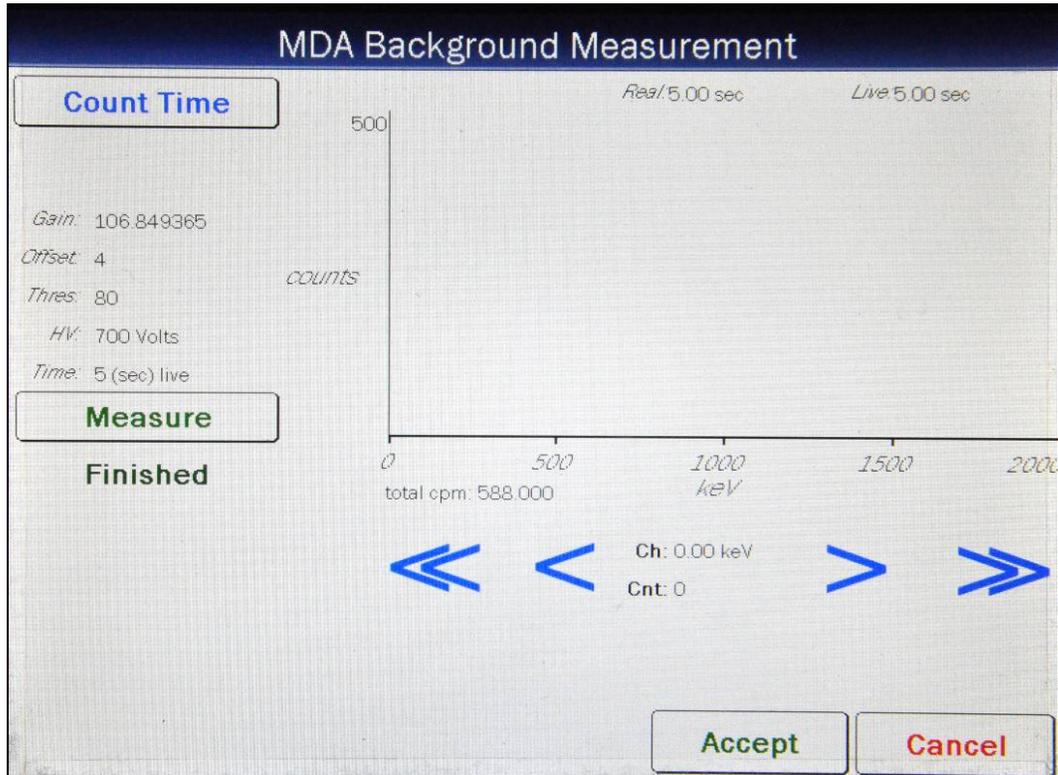
Figure 8-13 Background Measurement Screen

To exit Figure 8-13 Background Measurement Screen, touch the **CANCEL** button. Figure 8-12 Well MDA Test Screen will re-appear.

Count Time

The default counting time is 60 seconds. If it is desired to use a different counting time, touch the **COUNT TIME** button. Figure 8-14 Numeric Keypad Screen will appear.
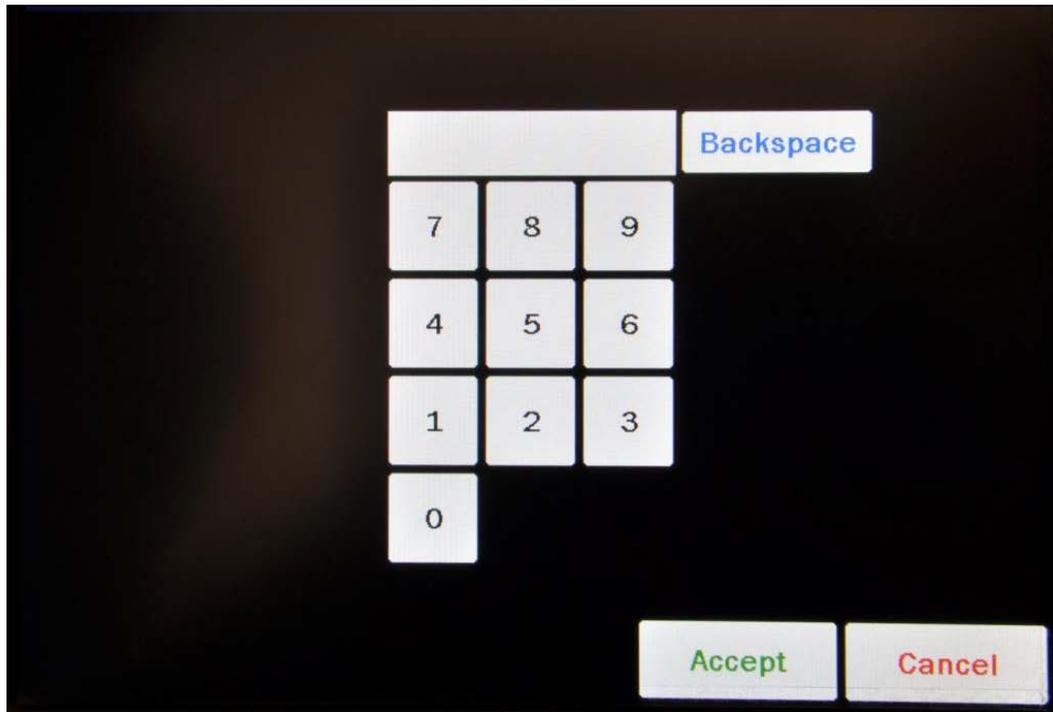
Figure 8-14 Numeric Keypad Screen

Input the desired counting time (in seconds) by touching the appropriate numbers on the keypad. Touch the **ACCEPT** button to accept the entered time. Touch the **CANCEL** button to abort any changes.

Counting the MDA Background for 60 seconds or longer is recommended.

Note: *The minimum count time that can be input is 2 seconds. The maximum count time that can be input is 30,000 seconds.*

Verify that there are no sources in the area and begin the MDA Background measurement by touching the **MEASURE** button. The system will begin measuring the Background and a live spectrum of the acquired Background, the Real time, Live time and the counting rate (total cpm) will be displayed and updated. Also, the **MEASURE** button will be replaced with a **STOP** button. At any time during the measurement, touch the **STOP** button to stop the measurement. To re-start the process, touch the **MEASURE** button.

When the measurement is finished, the Background counting rate is displayed and the message "FINISHED" will appear on the screen below the **MEASURE** button as shown in Figure 8-13 Background Measurement Screen.

To repeat the MDA Background measurement, touch the **MEASURE** button.

To discard the MDA Background measurement results, touch the **CANCEL** button. Figure 8-12 Well MDA Test Screen will re-appear.

To save the MDA Background measurement results, touch the **ACCEPT** button. The screen will appear similar to Figure 8-15 MDA Test Screen after Background Measurement with the ***Measure Background:*** field box populated with the measured Background.

Select Nuclide

Note: *Only nuclides that have Efficiency data entered into the system can be selected for the MDA Test. Reference CHAPTER 5: WELL COUNTER INITIALIZATION; SECTION: EFFICIENCY DATA for information on Efficiency data.*

To select a nuclide for the MDA Test, touch the ***Nuclide:*** field box. The Select Nuclide screen will appear.

The screen displays a listing of nuclides stored in the calibrator's memory (both default and user added nuclides) that have an Efficiency value assigned to them – 10 at a time. Reference the Appendix for a complete listing of the Well Counter nuclides included in the CRC®-55t's memory.

The nuclide list is in alphabetical order. User added nuclides are displayed at the top of the list. The length of the list will vary depending on which nuclides have an Efficiency value assigned to them. The number of pages (or screens) will be shown in the upper right corner of the screen indicating the length of the list. To scroll through the list, touch the **DOWN ARROW** (▼) button . The next group of 10 nuclides will be displayed and the **UP ARROW** (▲) button will appear allowing the user to scroll up in the list.

To cancel any changes and return to Figure 8-12 Well MDA Test Screen, touch the **CANCEL** button.

To select a nuclide in the list, touch the desired nuclide. The entire line for the selected nuclide will become highlighted. (If necessary, scroll the list until the desired nuclide is displayed.) Once a nuclide is selected from the list, an **ACCEPT** button will appear. Touch the **ACCEPT** button to save the selected nuclide. Figure 8-15 MDA Test Screen after Background Measurement will appear with the selected nuclide in the ***Nuclide:*** field box.

Precision Factor

The Precision Factor (standard deviations) used in the calculation must be input. The default Precision Factor is 3.00.

Note: *The allowable range is 1.00-9.00 standard deviations.*

To set the Precision Factor, touch the *Precision Factor:* field box. A numeric keypad will appear allowing for the entry of a new value.

Input the new value using the keypad and touch the **ACCEPT** button. Figure 8-15 MDA Test Screen after Background Measurement will re-appear with *Precision Factor:* field box populated with the entered value.

To cancel changing the Precision Factor, touch the **CANCEL** button on the numeric keypad.

Correction Factor

The Correction Factor used in the calculation must be input. The default Correction Factor is 0.00.

Note: *The allowable range is 0.00-9.00.*

To set the Correction Factor, touch the *Correction Factor:* field box. A numeric keypad will appear allowing for the entry of a new value.

Input the new value using the keypad and touch the **ACCEPT** button. Figure 8-15 MDA Test Screen after Background Measurement will re-appear with *Correction Factor:* field box populated with the entered value.

To cancel changing the Correction Factor, touch the **CANCEL** button on the numeric keypad.

Results

After all field boxes are completed, a **CALCULATE** button will appear on the screen below the *Correction Factor:* field box as shown in Figure 8-15 MDA Test Screen after Background Measurement.

Figure 8-15 MDA Test Screen after Background Measurement

To obtain the results of the MDA Test, touch the **CALCULATE** button. The calculated results will appear in the lower half of the screen as shown in Figure 8-16 MDA Test Results Screen.

Figure 8-16 MDA Test Results Screen

The MDA Test value is calculated from the following equation:

$$\text{MDA} = \frac{\left(f\sqrt{N} + C \right)}{\left(\textit{Eff} \times T \right)}$$

Where,

f = Precision Factor
N = the sum of the total background counts in all relevant channels (ROI) for the selected nuclide multiplied by the counting time (in minutes for Ci; in seconds for Bq)
C = Correction Factor
$\textit{Eff}$ = Efficiency
T = Counting Time (in minutes for Ci; in seconds for Bq)

If a printer is attached to the system, the test results can be printed by touching the **PRINT** button.

To view the spectrum of the MDA Background measurement, touch the **SPECTRUM** button.

To print the spectrum, touch the **PRINT** button on the spectrum screen.

Any of the entered data or the MDA Background measurement can be changed and new results obtained by touching the any of the field boxes and re-measuring or re-entering the data for the desired field(s). Touch the **CALCULATE** button and the new results will appear using the new entries.

To exit Figure 8-16 MDA Test Results Screen,

- touch the **BACK** button – Figure 8-6 Well Quality Assurance Screen will re-appear or

- touch the **HOME** button – Figure 8-5 Well Counter Main Screen will appear.

Chi Square Test

The Chi Square Test provides a sensitive check of the overall counting performance of the system. The software will use the 662 keV peak of the Cs137 Test Source for the tests.

# Repetitions	0.95	0.90	0.10	0.05
5	.711	1.06	7.78	9.49
10	3.33	4.17	14.7	16.9
15	6.57	7.79	21.1	23.7
20	10.1	11.7	27.2	30.1

In the table above, you can see that for a typical 10-repetition test, the Chi Square value should be between 3.33 and 16.9 for 95% of the time. Therefore, it is expected to be outside this range 5% of the time. Also, because of the statistical nature of the Chi Square test, the Chi Square values should not remain exactly the same. They are expected to vary.

The Chi Square Test value is calculated from the following equation:

$$\chi^2 = \frac{1}{x_{av}} \sum_{i=1}^{n} (x_i - x_{av})^2$$

where x_i = counts for measurement i

x_{av} = average for the n measurements

This equation is the same as the following:

$$\chi^2 = \frac{1}{x_{av}} \left\{ (x_1 - x_{av})^2 + (x_2 - x_{av})^2 + ... + (x_n - x_{av})^2 \right\}$$

To perform the Chi Square Test, from Figure 8-6 Well Quality Assurance Screen, touch the **CHI SQUARE TEST** button. Figure 8-17 Well Chi Square Test Screen will appear.

Figure 8-17 Well Chi Square Test Screen

Note: *Both fields (**Duration of each Sample (sec):** and **Number of Samples:**) must be completed before the Chi Square Test can be performed.*

To exit Figure 8-17 Well Chi Square Test Screen,

- touch the **BACK** button – Figure 8-6 Well Quality Assurance Screen will re-appear or
- touch the **HOME** button – Figure 8-5 Well Counter Main Screen will appear.

Duration

The default counting time for each sample is 60 seconds. If it is desired to change the duration, touch the **Duration of each Sample (sec):** field box. Figure 8-18 Numeric Keypad Screen will appear.
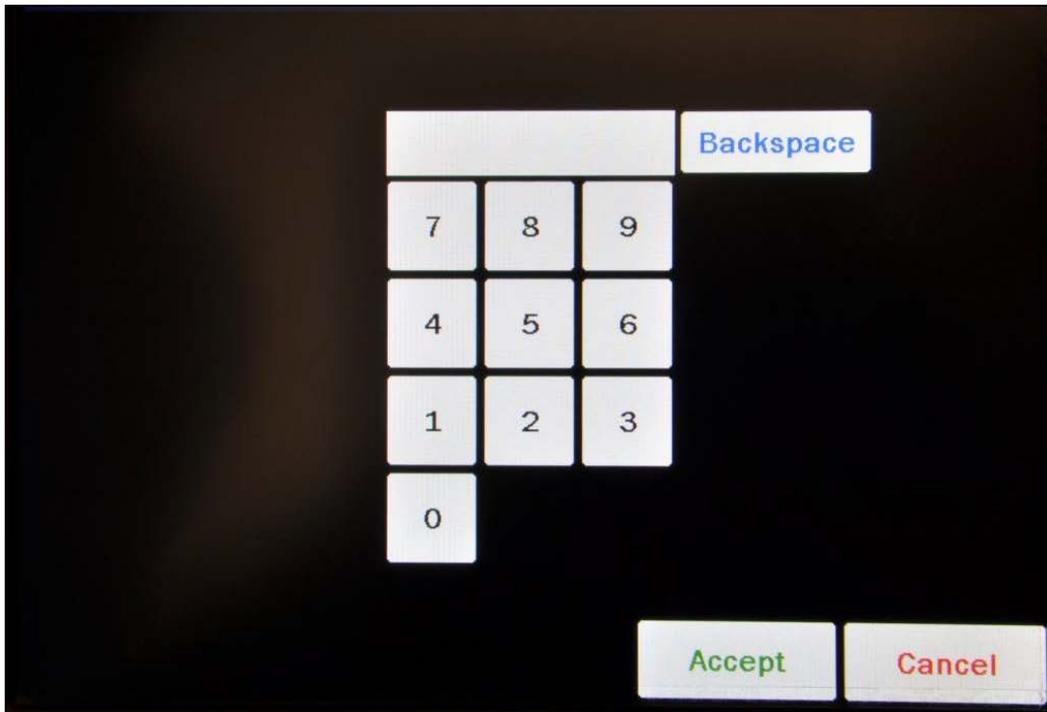
Figure 8-18 Numeric Keypad Screen

Input the desired duration (in seconds) by touching the appropriate numbers on the keypad. Touch the **ACCEPT** button to accept the entered time. Touch the **CANCEL** button to abort any changes.

Counting the background for 60 seconds or longer is recommended.

Note: *The minimum duration that can be input is 2 seconds. The maximum duration that can be input is 9,999 seconds.*

Number of Samples

The default number of samples (repetitions) to be counted is 5. If it is desired to change the number of samples, touch the ***Number of Samples:*** field box. Figure 8-18 Numeric Keypad Screen will appear.

Input the desired number of samples by touching the appropriate numbers on the keypad. Touch the **ACCEPT** button to accept the entered value. Touch the **CANCEL** button to abort any changes.

The recommended number of samples is 10.

Note: *The minimum number of samples that can be input is 5. The maximum number of samples that can be input is 20.*

Measurement

Touch the **Measure Cs137** button. Figure 8-19 Chi Square Test Measurement Screen will appear.
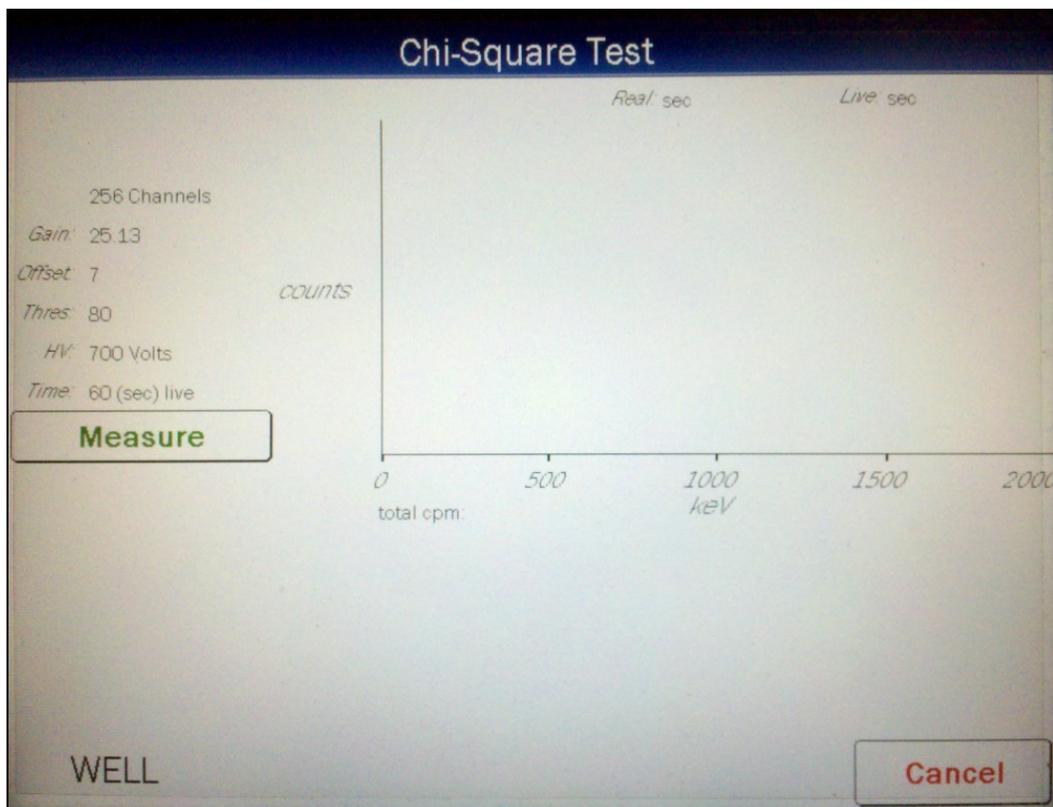
Figure 8-19 Chi Square Test Measurement Screen

To abort the Chi Square Test, touch the **CANCEL** button. Figure 8-17 Well Chi Square Test Screen will re-appear.

To begin the Chi Square Test, place the Cs137 Test Source into the Well Counter and then touch the **MEASURE** button.

The system will begin measuring the Cs137 source. As counting progresses, the screen displays live spectra, measurement time, total cpm, the number of the current repetition and the total number of repetitions as shown in Figure 8-20 Chi Square Test Measurement Screen – In Progress.
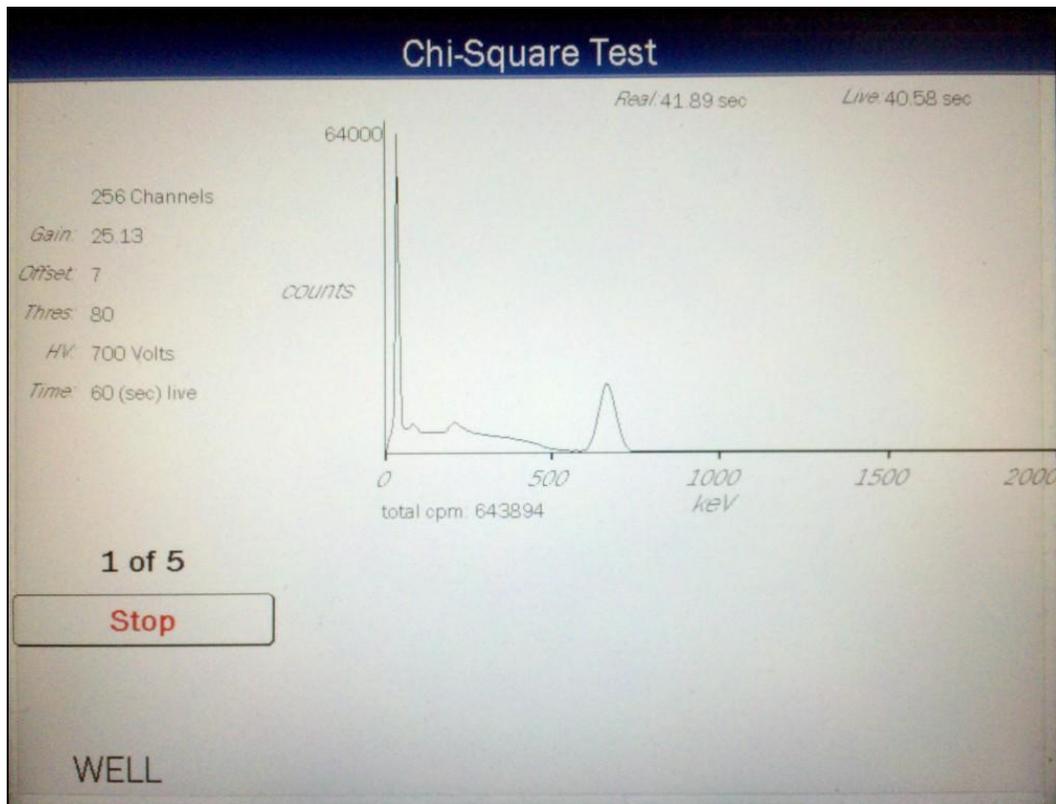
Figure 8-20 Chi Square Test Measurement Screen – In Progress

To end the Chi Square Test before all repetitions are complete, touch the **STOP** button. To re-start the process, touch the **MEASURE** button.

When the total number of samples (repetitions) is complete, the message "FINISHED" will appear on the screen below the **MEASURE** button as shown in Figure 8-21 Chi Square Test Measurement Screen – Complete.
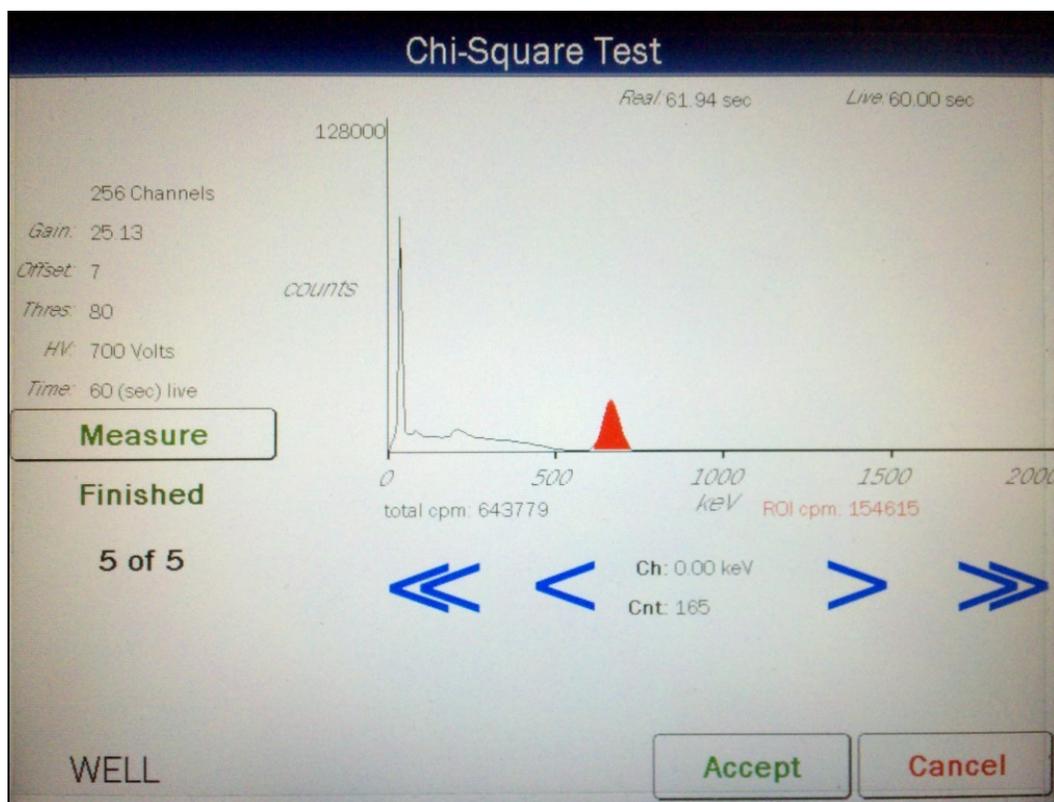
Figure 8-21 Chi Square Test Measurement Screen – Complete

To repeat the Chi Square Test measurements, touch the **MEASURE** button.

To discard the Chi Square Test measurements, touch the **CANCEL** button. Figure 8-17 Well Chi Square Test Screen will re-appear.

Results

To save the Chi Square Test measurements and obtain the results, touch the **ACCEPT** button. The calculated results will appear on the screen as shown in Figure 8-22 Chi Square Test Results Screen.
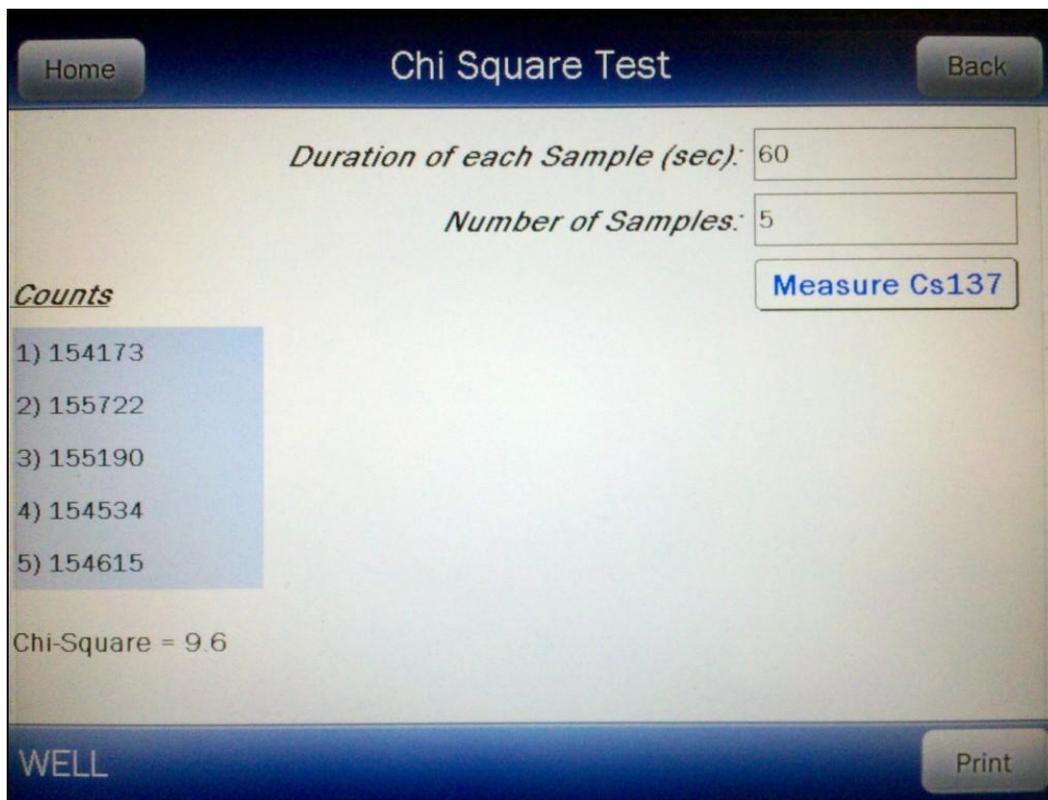
Figure 8-22 Chi Square Test Results Screen

Print Results

If a printer is attached to the system, the test results can be printed by touching the **PRINT** button.

View Spectrum

To view and/or print any of the spectra, touch the desired highlighted count. For example, to view the second spectrum in the above example, touch the line with 1) 154173. Figure 8-23 Chi Square Test Spectrum Screen will appear.
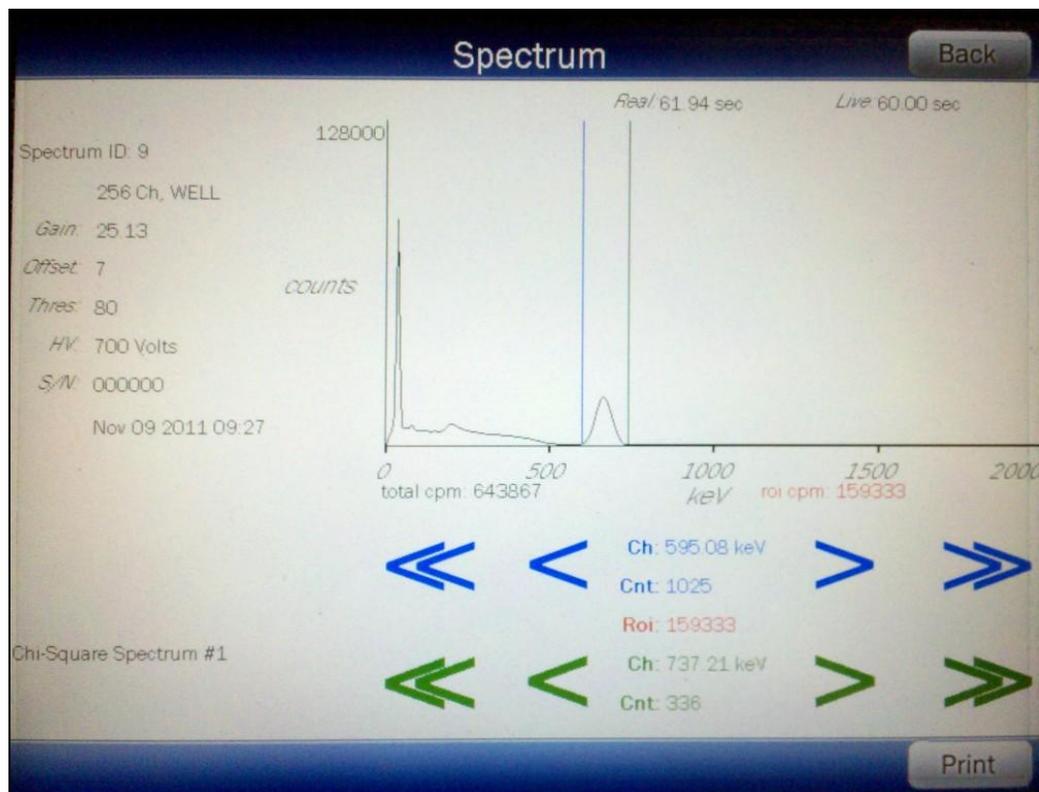
Figure 8-23 Chi Square Test Spectrum Screen

A Region of Interest may be defined using the **BLUE** and **GREEN ARROW** buttons to place vertical line cursors around the ROI. **DOUBLE ARROW** buttons move the cursor approximately 75 energy channels. **SINGLE ARROW** buttons move the cursor approximately 7.5 energy channel.

Note: The actual energy channel keV will vary depending upon the Auto Calibration.

When the vertical cursor is moved, the channel energy (keV) and the number of counts in that energy channel are displayed. Once the vertical cursors are set, the total counts in the ROI are displayed.

To print the spectrum, touch the **PRINT** button.

To return to Figure 8-22 Chi Square Test Results Screen, touch the **BACK** button.

Exit Results

To exit Figure 8-22 Chi Square Test Results Screen,

- touch the **BACK** button – Figure 8-6 Well Quality Assurance Screen will re-appear or

- touch the **HOME** button – Figure 8-5 Well Counter Main Screen will appear.

Interpreting the Chi Square Results

Chi Square values are given in the following table for 5, 10, 15, and 20 repetitions. The Chi Square Test results should fall between the 0.95 and 0.05 probability values in the table below almost all of the time. The more stringent 0.90 and 0.10 values are given for reference.

# Repetitions	0.95	0.90	0.10	0.05
5	.711	1.06	7.78	9.49
10	3.33	4.17	14.7	16.9
15	6.57	7.79	21.1	23.7
20	10.1	11.7	27.2	30.1

If the Chi-Square value is out of range, check the following:

- The positioning of the rod source.

- Ensure that there are no other sources (including dosed patients) in the area.

If a problem is found with any of the two items above, then correct the problem and repeat the Chi Square Test.

If no problems are found with the above items, the out of range Chi Square value may indicate a problem with the counter/timer mechanism of the system or the detector itself. Contact Capintec's only Authorized Service Center for service.

CHAPTER 9

WIPE MEASUREMENT PROCEDURES

GENERAL

The Wipe Test module is used to test for any accidental contamination that may occur in the areas where radioactive material is handled.

Wipe measurements are divided into 5 categories:

- Work Area .... places where radioactive material is handled, e.g. hot labs, medicine administration rooms, storage rooms

- Unrestricted Area ...... places of free access e.g. reception desk, waiting rooms

- Sealed .... devices that contain a sealed radioactive source, use to measure wipe samples from Sealed Sources to detect leakage, for example, from a Co60 teletherapy unit.

- Package .... measure radiation from packages

- General .... measure radiation levels in samples

Each category (except General) may have up to 10 default nuclides assigned. Each Wipe Location may use the default nuclides for its category or may be customized.

The General category does not have any nuclides assigned to it. Refer to the GENERAL MEASUREMENTS section on page 9-13 for instructions for assigning nuclides.

When a measurement is completed, the activity is calculated for each assigned nuclide, *as if it were the only nuclide present.* The activity is also calculated for the Wipe Full Spectrum Efficiency (reference CHAPTER 5: WELL COUNTER INITIALIZATION, SECTION: EFFICIENCY DATA, Wipe Full Spectrum Efficiency).

A Trigger Level is assigned to each category (except General) (Reference CHAPTER 5: WELL COUNTER INITIALIZATION, SECTION: WIPE TESTS SETUP, Trigger Levels) but may be customized for each Wipe Location. The calculated activity is compared to the Trigger Level for the Location. If the activity is greater than the set Trigger Level, the activity is flagged as "HIGH".

Figure 9-1 Well Counter Main Screen

To measure a wipe sample, from Figure 9-1 Well Counter Main Screen, touch the **MEASUREMENT** button. Figure 9-2 Measurements Screen will appear.
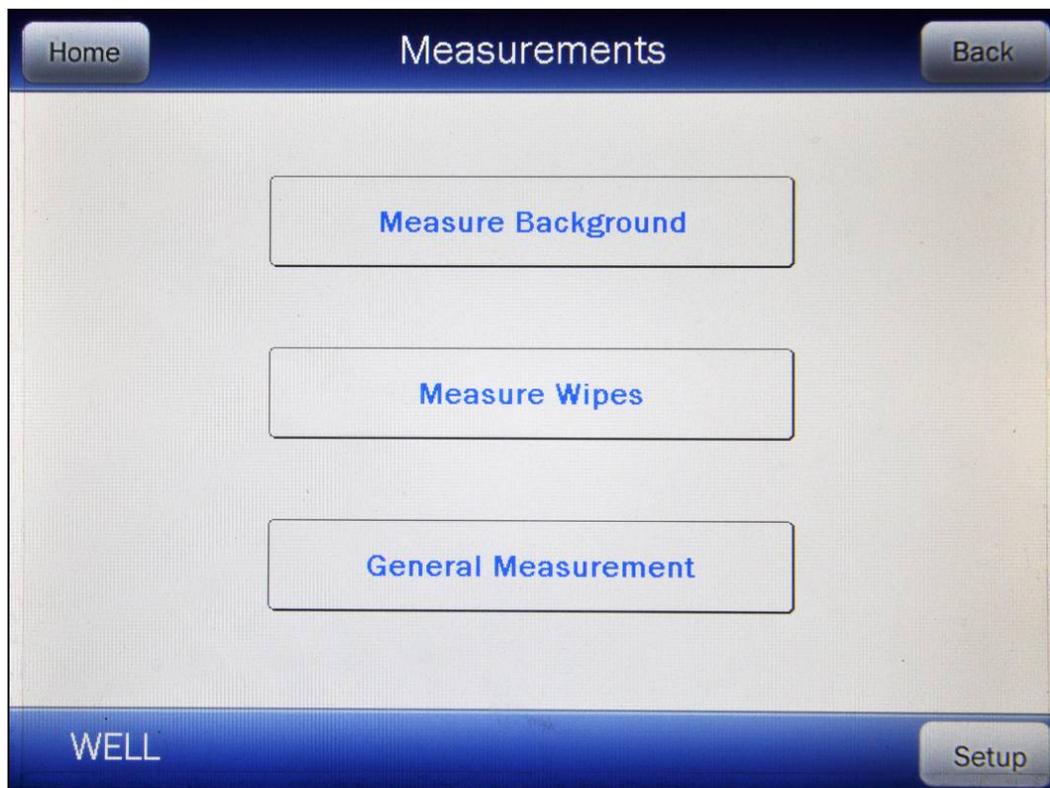
Figure 9-2 Measurements Screen

To exit Figure 9-2 Measurements Screen, touch the **HOME** or **BACK** button. Figure 9-1 Well Counter Main Screen will re-appear.

To edit the Wipe setup, touch the **SETUP** button. A numeric keypad will appear to allowing the user to input a 3-digit password. Input the password (the last 3 digits of the Readout serial number) by touching the appropriate numbers on the keypad. Touch the **ACCEPT** button to accept the password. Reference CHAPTER 5: WELL COUNTER INITIALIZATION, SECTION: WIPE TESTS SETUP for more information.

MEASURE BACKGROUND

Any presence of contamination may be confirmed by counting without a sample in the Well Counter.

Background should be measured on a daily basis.

From Figure 9-2 Measurements Screen, touch the **MEASURE BACKGROUND** button. Figure 9-3 Background Measurement Screen will appear.
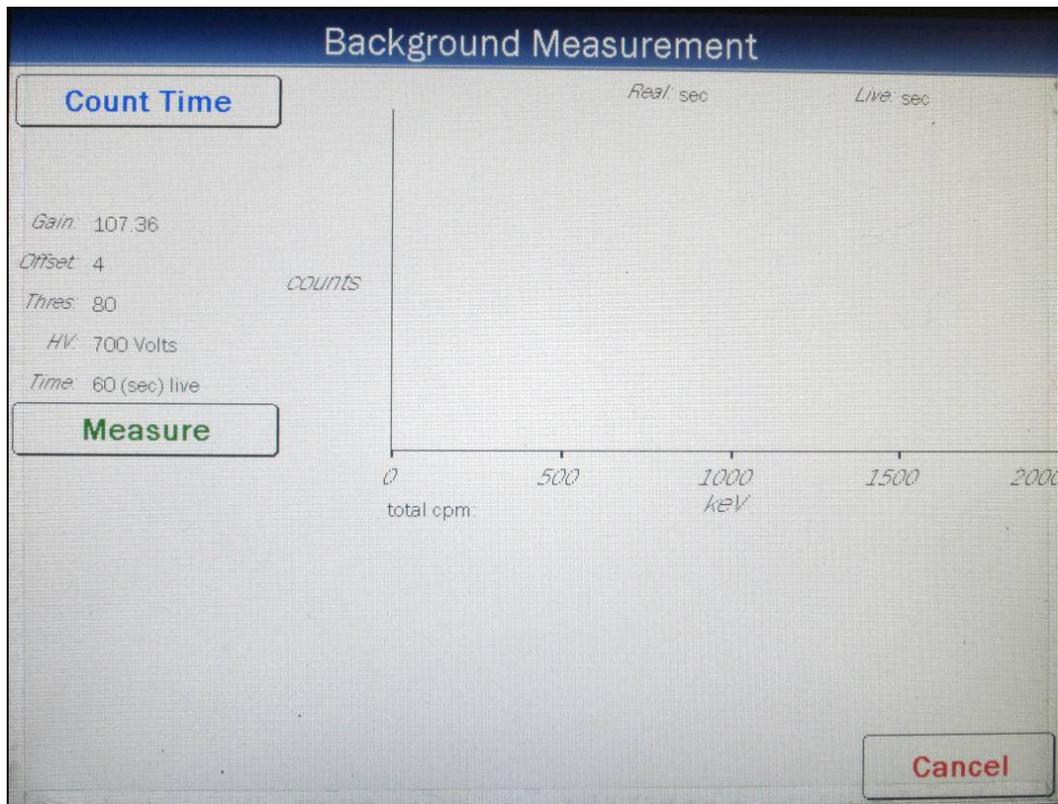
Figure 9-3 Background Measurement Screen

To exit Figure 9-3 Background Measurement Screen, touch the **CANCEL** button. Figure 9-2 Measurements Screen will re-appear.

Count Time

The last counting period selected is displayed. The default counting time is 60 seconds.

If it is desired to use a different counting time, touch the **COUNT TIME** button. Figure 9-4 Numeric Keypad Screen will appear.
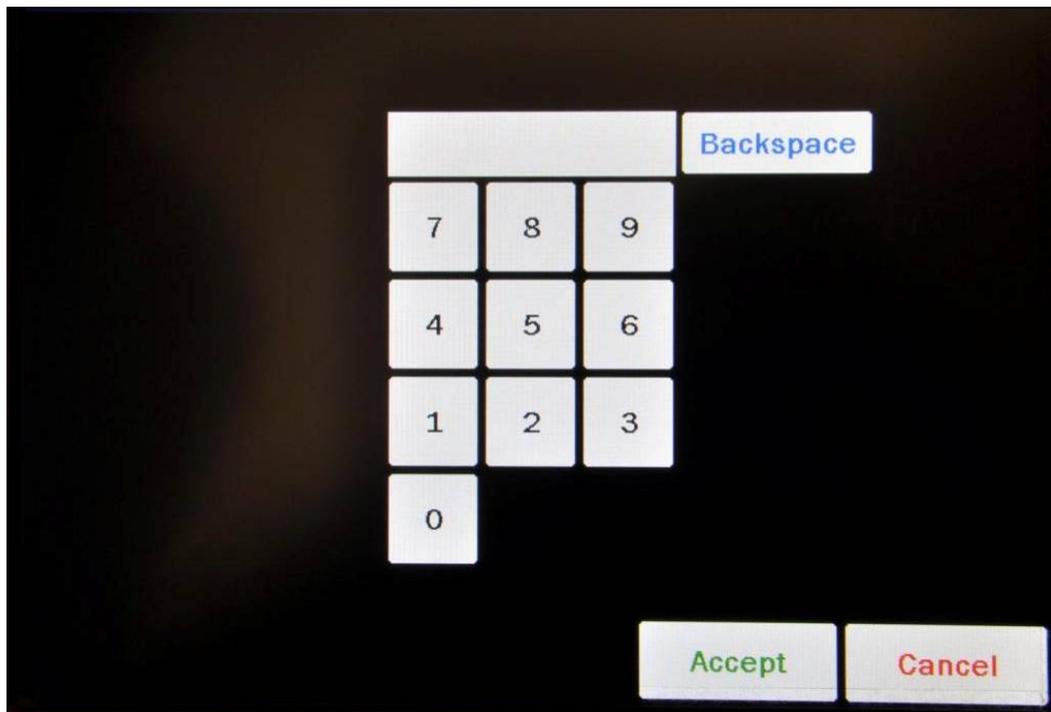
Figure 9-4 Numeric Keypad Screen

Input the desired counting time (in seconds) by touching the appropriate numbers on the keypad. Touch the **ACCEPT** button to accept the entered time. Touch the **CANCEL** button to abort any changes.

Counting the Background for 60 seconds or longer is recommended.

Note: *The minimum count time that can be input is 2 seconds. The maximum count time that can be input is 30,000 seconds.*

Measurement

To begin the Background measurement, verify that no sources are in the Well Counter and touch the **MEASURE** button. The system will begin measuring the Background and a live spectrum of the acquired Background, the Real time, Live time and the counting rate (total cpm) will be displayed and updated. Also, the **MEASURE** button will be replaced with a **STOP** button. At any time during the measurement, touch the **STOP** button to stop the measurement. To re-start the process, touch the **MEASURE** button.

Results

When the measurement is finished, the background counting rate is displayed and the message "FINISHED" will appear on the screen below the **MEASURE** button as shown in Figure 9-5 Background Measurement Results Screen.

Figure 9-5 Background Measurement Results Screen

To see the counts in any channel, use the **BLUE** **ARROW** buttons to move the vertical line cursor to the desired energy channel. **DOUBLE ARROW** buttons move the cursor approximately 75 energy channels. **SINGLE ARROW** buttons move the cursor approximately 7.5 energy channels.

Note: *The actual energy channel keV will vary depending upon the Auto Calibration.*

When the vertical cursor is moved, the channel energy (keV) and the number of counts in that energy channel are displayed.

To repeat the background measurement, touch the **MEASURE** button.

To discard the background measurement results, touch the **CANCEL** button. Figure 9-2 Measurements Screen will re-appear.

To save the background measurement results, touch the **ACCEPT** button. Figure 9-2 Measurements Screen will re-appear.

MEASURE WIPES

Wipes are measured by first selecting them from a list.

From Figure 9-2 Measurements Screen, touch **MEASURE WIPES** button. Figure 9-6
Measure Wipes Screen will appear.
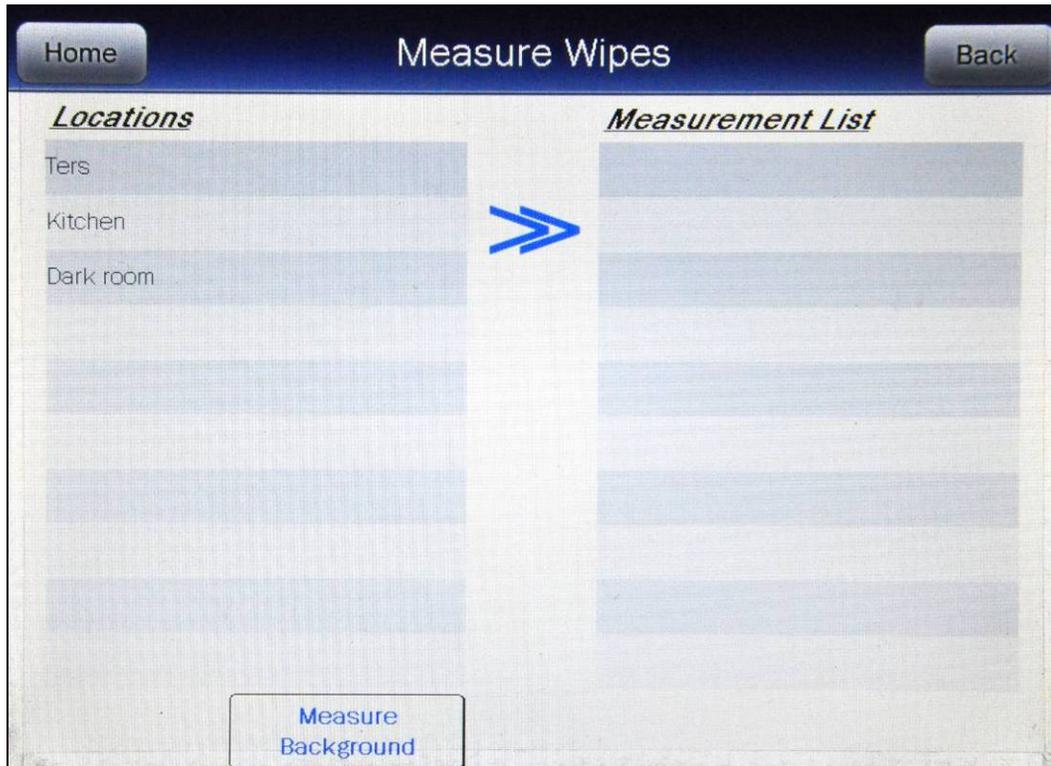
Figure 9-6 Measure Wipes Screen

If Auto Calibration has not been measured for the current day, the message "**Warning**
Expired calibration Please run Auto Calibration" will appear. Reference CHAPTER 8: WELL
COUNTER TESTS, SECTION: AUTO CALIBRATE for Auto Calibration procedures.

If a Background measurement has not been performed for the current day, the message –
"**Background Error** Background has expired Please run Background for today" will appear.

If the measured Background is higher than the Background Trigger Level, the message
"**Background Error** Current background exceeds threshold of XXX.X cpm Remove any
sources from well and try again" will appear.

Background can be measured from Figure 9-6 Measure Wipes Screen by touching the
MEASURE BACKGROUND button. (Reference the MEASURE BACKGROUND section
beginning on page 9-3 for Background measurement procedures.) When Background is
measured from this screen, it will be checked against the Background Trigger Level.

Selecting Wipe Locations

A listing of all the Wipe Locations that have been setup will appear on the left half of the screen in the ***Locations*** List.

The listing is in the order that the Locations were created. The length of the list will vary depending on how many Locations have been setup. If there are more than 10 Locations, the number of pages (or screens) will be shown in the upper right corner of the ***Locations*** column indicating the length of the list. To scroll through the list, touch the **DOWN ARROW** (▼) button below the ***Locations*** List. The next group of 10 Locations will be displayed and an **UP ARROW** (▲) button will appear allowing the user to scroll up in the list.

Wipes are measured by first selecting the desired Wipe Location(s) from the ***Locations*** List, moving them to the ***Measurement List*** on the right half of the screen and then touching the **MEASURE LIST** button.

To measure all of the Wipe Locations in the order that they are listed in the ***Locations*** List, touch the **RIGHT DOUBLE ARROW** button. This will move all of the Wipe Locations from the ***Locations*** List to the ***Measurement List*** in the order that that are displayed in the ***Locations*** List.

To move one Wipe Location to the ***Measurement List***, touch the Location name to highlight it. Then touch the **RIGHT SINGLE ARROW** button to move the location to the ***Measurement List***. To measure more than one Wipe Location in a specific order, move the Location names to the ***Measurement List*** in the order that that are to be measured.

To move one Wipe Location from the ***Measurement List*** back to the ***Locations*** List, touch the Location name to highlight it and then touch the **LEFT SINGLE ARROW** button.

To return all the locations to the Locations list, touch the **LEFT DOUBLE ARROW** button.

Wipes are measured in the order that they appear in the ***Measurement List***.

Measuring Wipes

When all the desired locations are on the Measurement List, touch the **MEASURE LIST** button. Figure 9-7 Measure Wipe Start Screen will appear for the first selected location.

Figure 9-7 Measure Wipe Start Screen

The current Wipe Location name to be measured is displayed at the top of the screen along with the total number of Wipe Locations selected.

If it is not desirable to measure this location, touch the **SKIP WIPE** button. The next Wipe Location name in the list will appear at the top of the screen.

If it is desirable to cancel all subsequent wipe measurements, touch the **SKIP ALL WIPES** button. Figure 9-2 Measurements Screen will appear.

Count Time

The counting time for the selected Wipe Location will be displayed. To change the count time for this measurement only, touch the **COUNT TIME** button. The Numeric Keypad screen will appear. Input the desired counting time (in seconds) by touching the appropriate numbers on the keypad. Touch the **ACCEPT** button to accept the entered time. Touch the **CANCEL** button to abort any changes.

Note: *The minimum count time that can be input is 2 seconds. The maximum count time that can be input is 30,000 seconds.*

Measure

Place the sample for the requested Wipe Location in the Well Counter and then touch the **MEASURE** button to begin counting.

The system will begin measuring the Wipe sample. As counting progresses, the live spectra are shown. The Real time, Live time and the counting rate (total cpm) will be displayed and updated. Also, the **MEASURE** button will be replaced with a **STOP** button. At any time during the measurement, touch the **STOP** button to stop the measurement. To re-start the process, touch the **MEASURE** button.

When the measurement is finished, the total and ROI counting rates are displayed and the message "FINISHED" will appear on the screen below the **MEASURE** button. Also, a **SKIP WIPE** and a **REPORT** button will appear as shown in Figure 9-8 Wipe Measurement Screen.
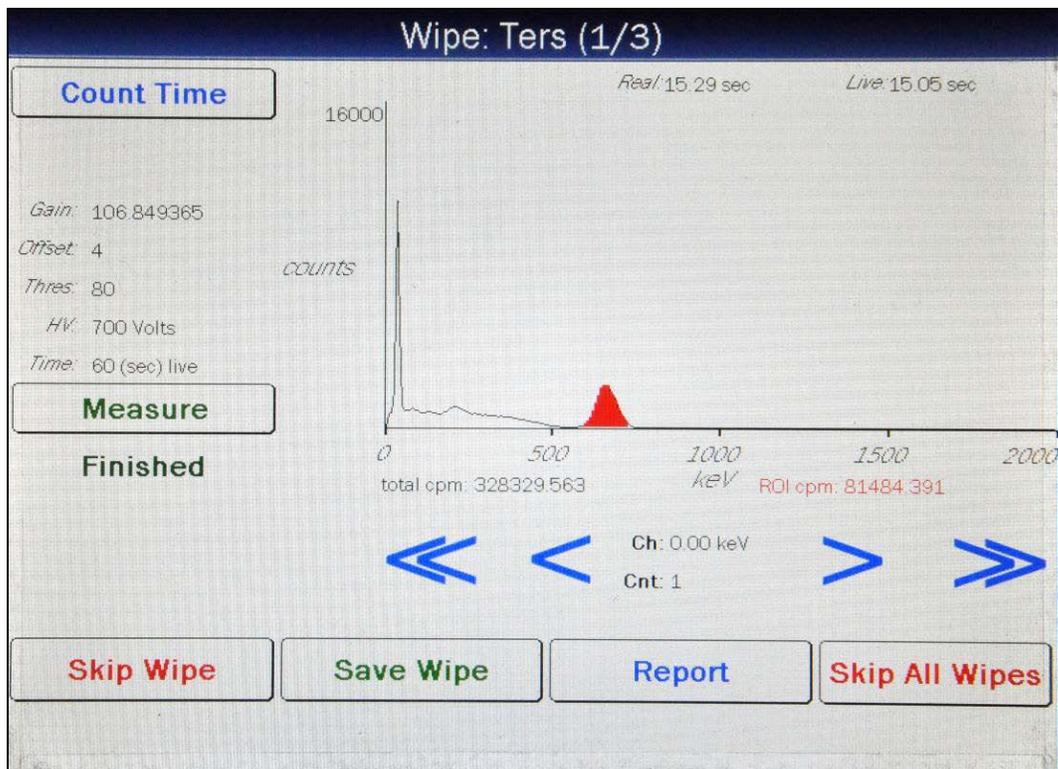
Figure 9-8 Wipe Measurement Screen

Results

From Figure 9-8 Wipe Measurement Screen, the following options are available:

- To discard the measurement results for the measured Wipe Location, touch the **SKIP WIPE** button. Figure 9-7 Measure Wipe Start Screen will re-appear with the next Wipe Location name at the top of the screen and without saving the measurement results.

- To discard the measurement results and skip all subsequent wipe measurements, touch the **SKIP ALL WIPES** button. Figure 9-2 Measurements Screen will re-appear without saving the measurement results.

- To accept and save the measurement results, touch the **SAVE WIPE** button. The results will be saved to the database and Figure 9-7 Measure Wipe Start Screen will re-appear with the next Wipe Location name in the list at the top of the screen ready to measure.

- To view the Wipe Report, touch the **REPORT** button. Figure 9-9 Wipe Measurement Results Screen will appear displaying the measurement results.
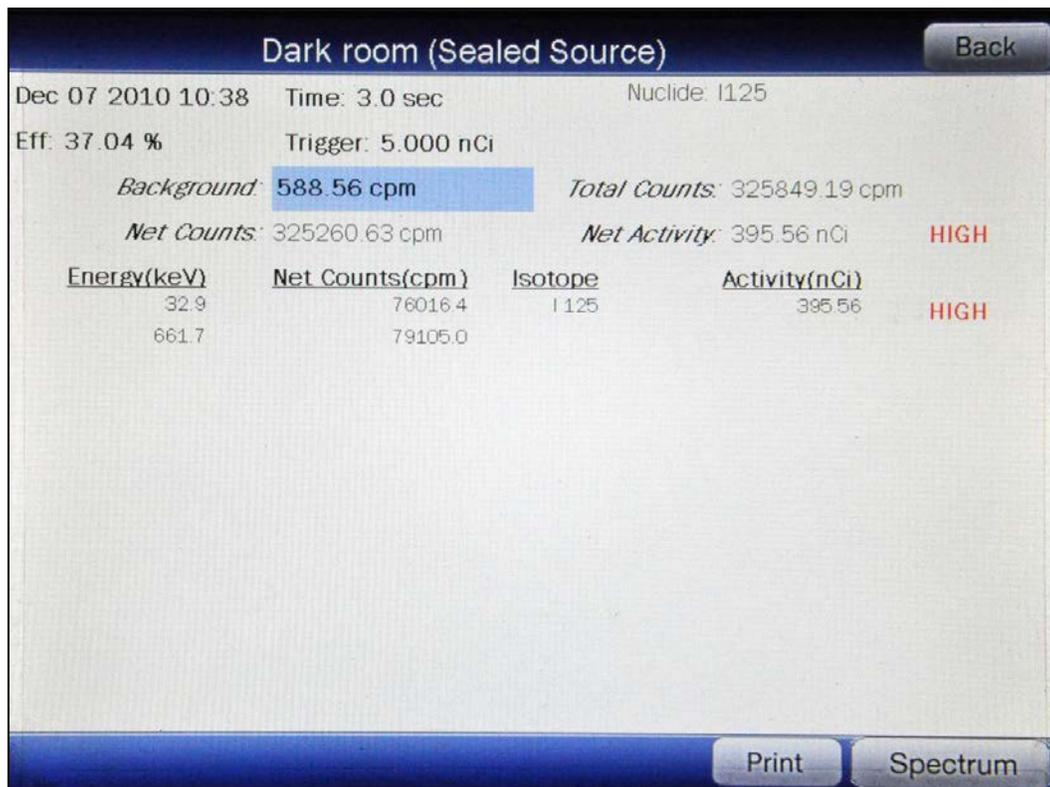
Figure 9-9 Wipe Measurement Results Screen

To return to Figure 9-8 Wipe Measurement Screen, touch the **BACK** button.

If a printer is attached to the system, the Wipe results can be printed by touching the **PRINT** button.

To view the spectrum of the measurement, touch the **SPECTRUM** button. Figure 9-10 Wipe Test Spectrum Screen will appear.
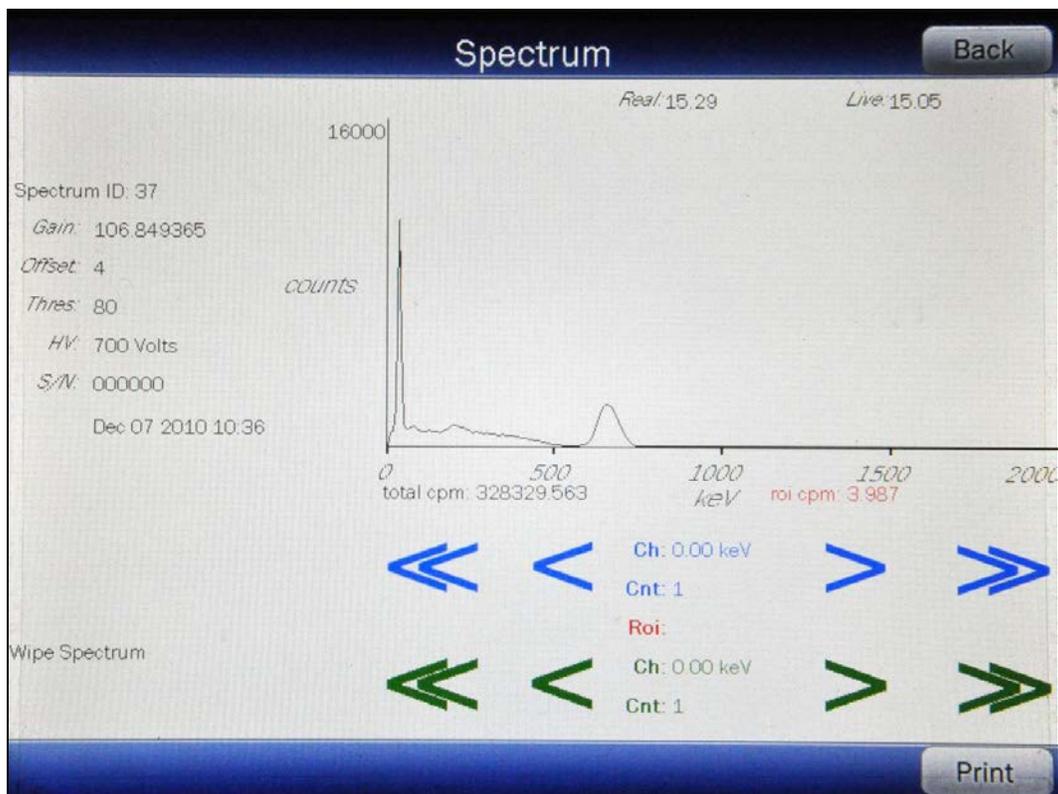
Figure 9-10 Wipe Test Spectrum Screen

A Region of Interest may be defined using the **BLUE** and **GREEN ARROW** buttons to place vertical line cursors around the ROI. **DOUBLE ARROW** buttons move the cursor approximately 75 energy channels. **SINGLE ARROW** buttons move the cursor approximately 7.5 energy channels.

Note: The actual energy channel keV will vary depending upon the Auto Calibration.

When the vertical cursor is moved, the channel energy (keV) and the number of counts in that energy channel are displayed. Once the vertical cursors are set, the total counts in the ROI are displayed.

To print the spectrum, touch the **PRINT** button.

To view the spectrum of the saved background, touch the highlighted *Background:* field box. The screen will appear similar to that shown in Figure 9-10 Wipe Test Spectrum Screen. The operation of the **ARROW** buttons is the same as described above.

To return to Figure 9-9 Wipe Measurement Results Screen, touch the **BACK** button.

GENERAL MEASUREMENTS

The General Measurement category is used to measure radiation levels in samples. For example, this feature can be used to measure liquid samples of blood or urine for lab procedures. Also, if activities are sufficiently low, radiochromatography strips may be counted using the General Measurement category.

A General Measurement is not associated with a particular Location. There is no Trigger Level for General Measurements and no assigned nuclides. Only the counting rate for the selected channels (energy peaks for any nuclides you may want to look for) is calculated for General Measurements.

From Figure 9-2 Measurements Screen, touch the **GENERAL MEASUREMENT** button. Figure 9-11 Wipe General Measurement Screen will appear.
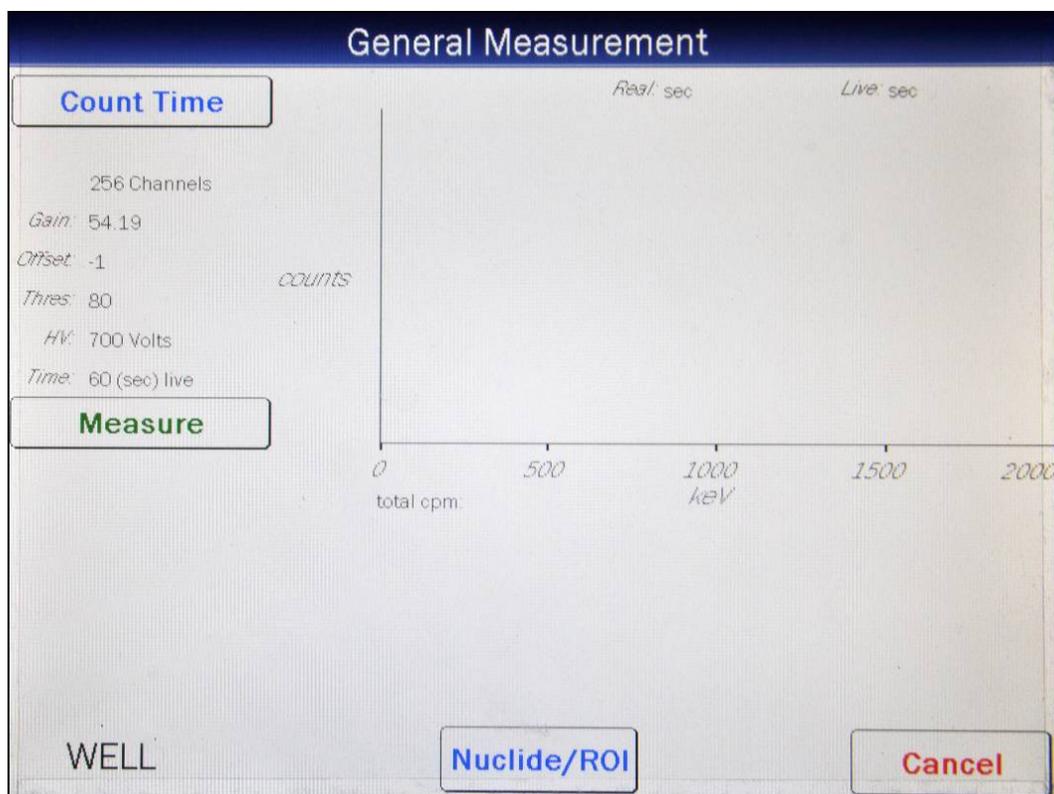
Figure 9-11 Wipe General Measurement Screen

To exit Figure 9-11 Wipe General Measurement Screen, touch the **CANCEL** button. Figure 9-2 Measurements Screen will re-appear.

Count Time

The default counting time is 60 seconds. If it is desired to use a different counting time, touch the **COUNT TIME** button. The Numeric Keypad screen will appear. Input the desired

counting time (in seconds) by touching the appropriate numbers on the keypad. Touch the **ACCEPT** button to accept the entered time. Touch the **CANCEL** button to abort any changes.

Note: *The minimum count time that can be input is 2 seconds. The maximum count time that can be input is 30,000 seconds.*

Set Nuclide/ROI

The ROI (Region Of Interest) can be selected either by choosing a nuclide to look for or by entering the start and end keV for the desired ROI.

To select a nuclide or set an ROI to look for in this General Measurement, touch the **NUCLIDE/ROI** button. The screen will appear similar to Figure 9-12 Wipe General Measurement Set Nuclide Screen.

Figure 9-12 Wipe General Measurement Set Nuclide Screen

To exit Figure 9-12 Wipe General Measurement Set Nuclide Screen without setting a nuclide or ROI,

- touch the **BACK** button – Figure 9-11 Wipe General Measurement Screen will appear or

- touch the **HOME** button – Figure 9-1 Well Counter Main Screen will appear.

Nuclide

To set the ROI by nuclide, touch the ***Nuclide:*** field box. The Select Nuclide screen will appear.

The screen displays a listing of nuclides stored in the calibrator's memory (both default and user added nuclides) – 10 at a time. Reference the Appendix for a complete listing of the nuclides included in the CRC®-55t's memory.

The nuclide list is in alphabetical order. User added nuclides are displayed at the top of the list. The number of pages (or screens) will be shown in the upper right corner of the screen indicating the length of the list. To scroll through the list, touch the **DOWN ARROW** (▼) button. The next group of 10 nuclides will be displayed and the **UP ARROW** (▲) button will appear allowing the user to scroll up in the list.

To cancel nuclide selection and return to Figure 9-12 Wipe General Measurement Set Nuclide Screen, touch the **CANCEL** button.

To select a nuclide, do one of the following:

- Touch the Nuclide name on the list. The nuclide will become highlighted. (If necessary, scroll the list until the desired nuclide is displayed.) Once a nuclide is selected from the list, an **ACCEPT** button will appear. Touch the **ACCEPT** button to choose the nuclide. Figure 9-12 Wipe General Measurement Set Nuclide Screen will re-appear with the selected nuclide shown in the ***Nuclide:*** field box and the keV of the main energy peak in the ***Region of Interest (ROI) Start:*** and ***Region of Interest (ROI) End:*** field boxes.

- Touch the **CLEAR SELECTED NUCLIDE** button. This will cause the ***Nuclide:*** field box to be blank (no nuclide assigned). Figure 9-12 Wipe General Measurement Set Nuclide Screen will re-appear with the ***Nuclide:***, ***Region of Interest (ROI) Start:*** and ***Region of Interest (ROI) End:*** field boxes blank.

Figure 9-12 Wipe General Measurement Set Nuclide Screen depicts an ROI based on a selected nuclide (in this case Cs137).

To abort the General Measurement, touch the **HOME** button. Figure 9-1 Well Counter Main Screen will appear.

To save the set ROI and continue with the General Measurement, touch the **BACK** button. Figure 9-11 Wipe General Measurement Screen will re-appear with the selected nuclide displayed in red on the screen below the **COUNT TIME** button similar to that shown in Figure 9-14 General Measurement Results Screen.

ROI

If it is desired to enter an ROI without specifying a nuclide, then the start and end ROI keV must be specified.

To set the ROI by entering a start and end keV, touch the **Region of Interest (ROI) Start:** field box. The numeric keypad will appear. Input the desired starting keV by touching the appropriate numbers on the keypad. Touch the **ACCEPT** button to accept the entered value. Touch the **CANCEL** button to abort any changes.

Note: *The minimum keV that can be input is 0. The maximum keV that can be input is 2,000.*

Repeat for the above step for the **Region of Interest (ROI) End:** field box.

Once both the Start keV and End keV are entered, the screen will appear similar to Figure 9-13 Set Nuclide/ROI Screen using ROI.

Figure 9-13 Set Nuclide/ROI Screen using ROI

To save the set ROI and continue with the General Measurement, touch the **BACK** button. Figure 9-11 Wipe General Measurement Screen will re-appear with the selected ROI displayed in red on the screen below the **COUNT TIME** button similar to that shown in Figure 9-14 General Measurement Results Screen.

Measuring General Sample

To begin the General Measurement, place the sample in the Well Counter and touch the **MEASURE** button. The system will begin measuring the sample. As counting progresses, the live spectra are shown. The Real time, Live time and the counting rate (total cpm) will be displayed and updated. Also, the **MEASURE** button will be replaced with a **STOP** button. At any time during the measurement, touch the **STOP** button to stop the measurement. To re-start the process, touch the **MEASURE** button.

When the measurement is finished, the selected ROI will be highlighted in red, the total and ROI counting rates are displayed and the message "FINISHED" will appear on the screen below the **MEASURE** button as shown in Figure 9-14 General Measurement Results Screen.
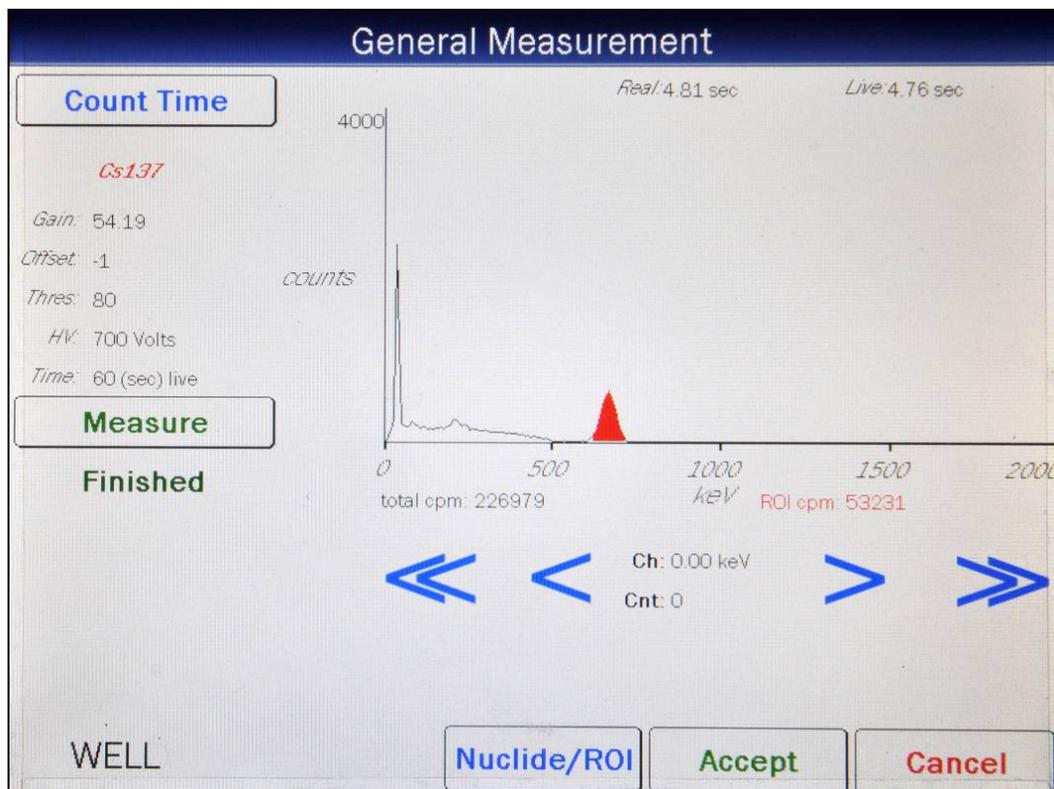
Figure 9-14 General Measurement Results Screen

To see the counts in any channel, use the **BLUE ARROW** buttons to move the vertical line cursor to the desired energy channel. **DOUBLE ARROW** buttons move the cursor approximately 75 energy channels. **SINGLE ARROW** buttons move the cursor approximately 7.5 energy channels.

Note: The actual energy channel keV will vary depending upon the Auto Calibration.

When the vertical cursor is moved, the channel energy (keV) and the number of counts in that energy channel are displayed.

To repeat the measurement, touch the **MEASURE** button.

If it is desired to change the currently set Nuclide/ROI for the current measurement, touch the **NUCLIDE/ROI** button. Figure 9-12 Wipe General Measurement Set Nuclide Screen will re-appear showing the current settings. Choose a different Nuclide or set the Start and/or End ROI to the new values as described above in the Set Nuclide/ROI section beginning on page 9-14 and touch the **BACK** button. Figure 9-14 General Measurement Results Screen will re-appear showing the newly set ROI highlighted in red, the total and ROI counting rates.

Results

To discard the measurement results, touch the **CANCEL** button. Figure 9-2 Measurements Screen will re-appear.

To accept the measurement results, touch the **ACCEPT** button. Figure 9-15 Wipe General Measurement Report Screen will appear displaying the results.
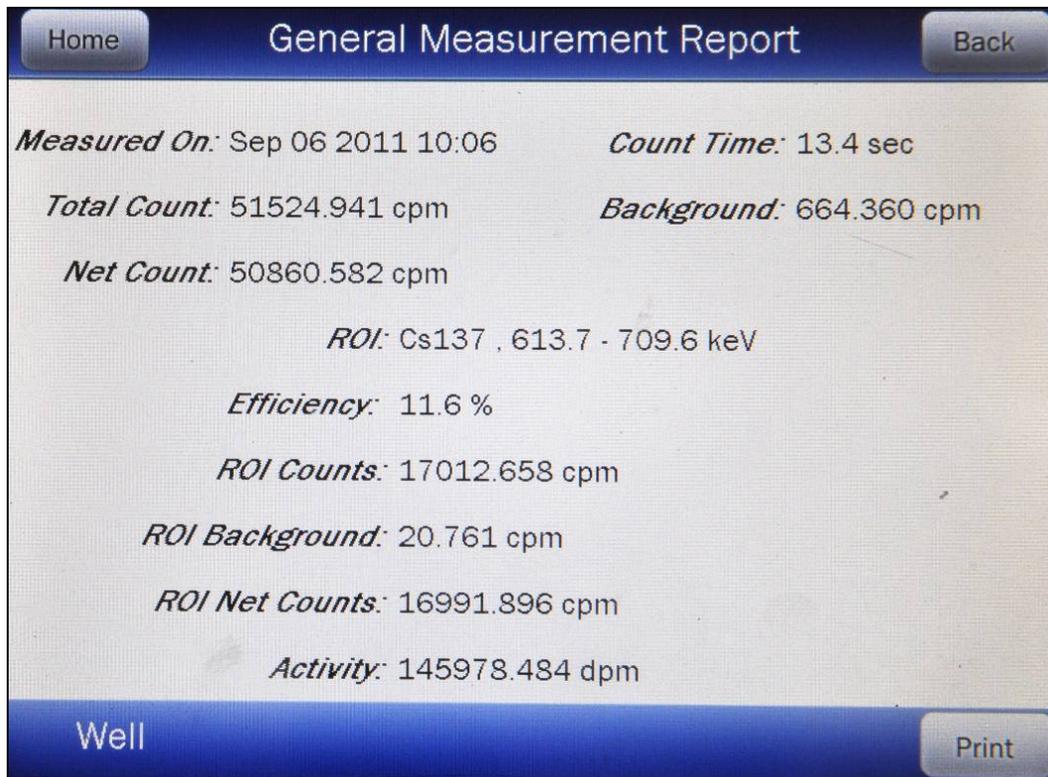
Figure 9-15 Wipe General Measurement Report Screen

If a printer is attached to the system, the test results can be printed by touching the **PRINT** button.

To exit Figure 9-15 Wipe General Measurement Report Screen,

- touch the **BACK** button – Figure 9-2 Measurements Screen will re-appear or
- touch the **HOME** button – Figure 9-1 Well Counter Main Screen will appear.

This page intentionally left blank.

CHAPTER 10

WELL COUNTER LAB TESTS

GENERAL

This chapter describes the three Lab Tests that can be performed using the CRC®-55t Well Counter. They are:

- Urine Test:
  - o Schilling Test
- Blood Tests:
  - o Plasma Volume
  - o RBC Volume
  - o RBC Survival

To access the Lab Tests module, from Figure 10-1 Well Counter Main Screen, touch the **LAB TESTS** button. Figure 10-2 Well Lab Tests Screen will appear.

Figure 10-1 Well Counter Main Screen
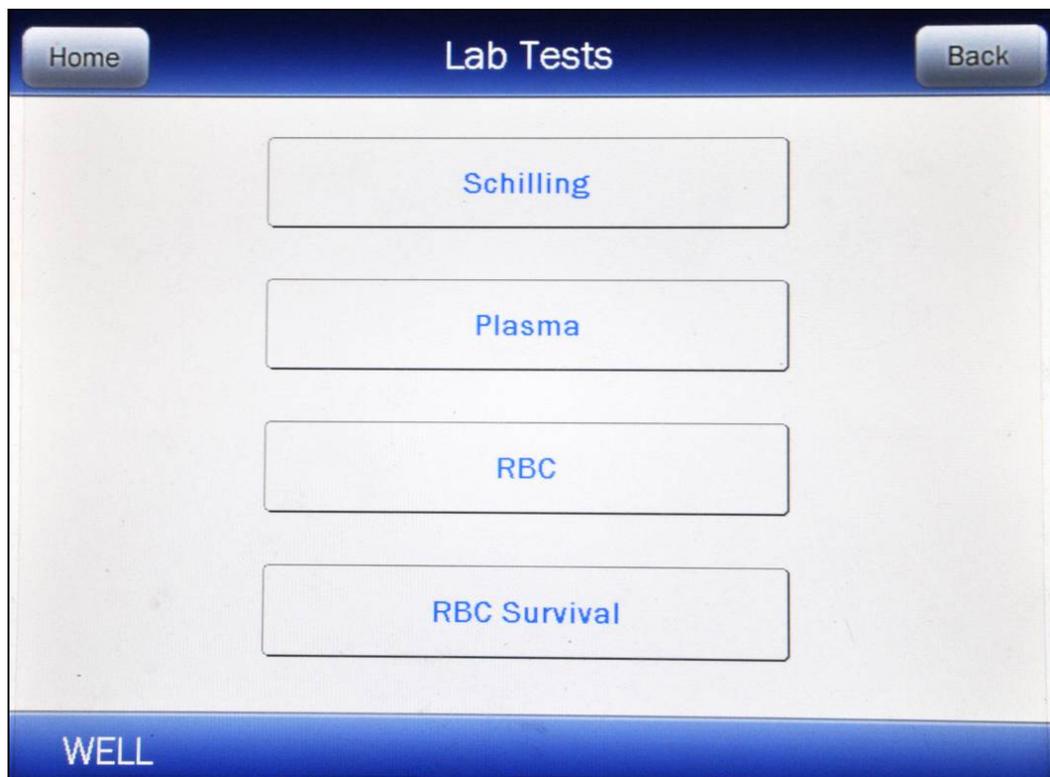
Figure 10-2 Well Lab Tests Screen

To exit Figure 10-2 Well Lab Tests Screen, touch the **HOME** or **BACK** button. Figure 10-1 Well Counter Main Screen will re-appear.

SCHILLING TEST

The Schilling Test is used to determine B-12 deficiencies from either malabsorption, lack of intrinsic factor (pernicious anemia), or intraintestinal destruction. It entails oral administration of Cobalt 57 labeled Vitamin B-12 to the patient. Thereafter, the urine is collected for 24 or 48 hours. The ratio of excreted to administered Co57 is calculated. If the initial results indicate a reduced amount of excreted vitamin, the test is repeated with a second sample of labeled B-12 and intrinsic factor. For Schilling Test I, abnormal results are generally less than 8%-10%. Normal range is generally 11% to 26%. For Schilling Test II, no change indicates malabsorption, while an improved percentage indicates pernicious anemia.

Note: *The exact normal range for excretion for your facility and patients should be independently determined according to the guidelines provided by the Schilling Test kit manufacturer.*

To perform a Schilling Test, touch the **SCHILLING** button on Figure 10-2 Well Lab Tests Screen. Figure 10-3 Schilling Test Measurement Entry Screen will appear.

Figure 10-3 Schilling Test Measurement Entry Screen

To exit Figure 10-3 Schilling Test Measurement Entry Screen,

- touch the **BACK** button – Figure 10-2 Well Lab Tests Screen will re-appear or

- touch the **HOME** button – Figure 10-1 Well Counter Main Screen will appear.

To perform the actual measurements with this protocol, the system assumes the following samples have been prepared for counting:

- Aliquot of urine sample collected over the test period.

- Co57 standard having the identical volume and geometry as the test urine sample above.

Measured Background

A Background measurement must be performed.

Touch the *Measured Background:* field box. A screen will appear similar to that shown in Figure 10-4 Background Measurement Screen.
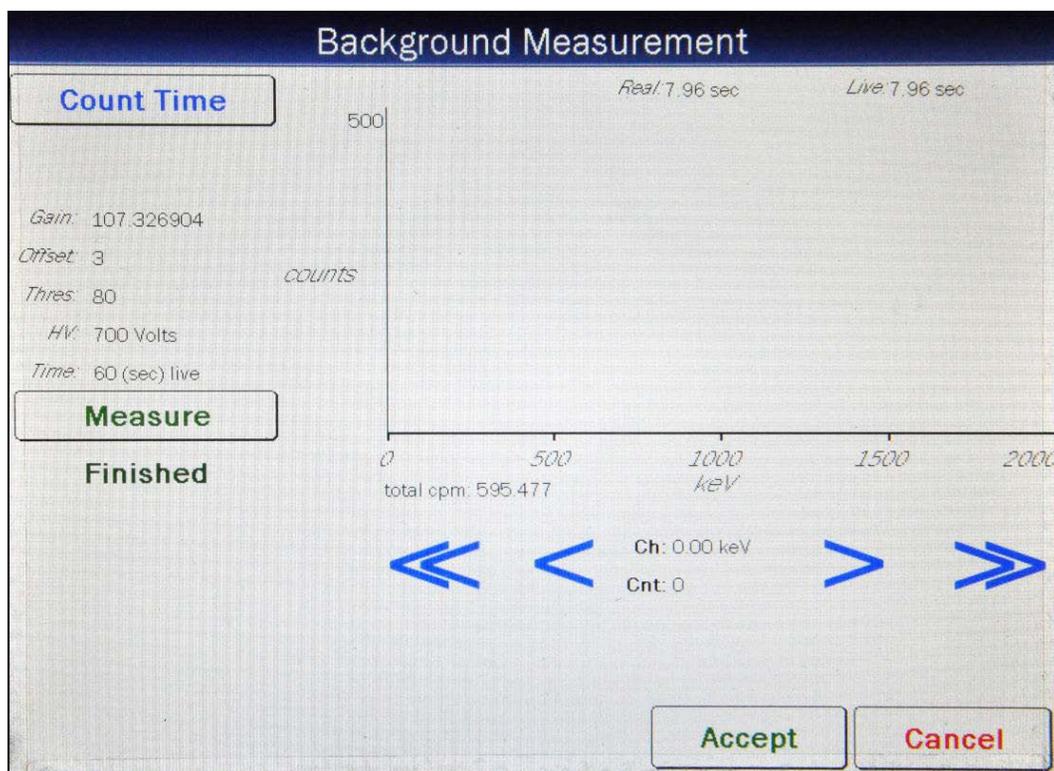
Figure 10-4 Background Measurement Screen

To exit Figure 10-4 Background Measurement Screen, touch the **CANCEL** button. Figure 10-3 Schilling Test Measurement Entry Screen will re-appear.

The last counting time selected is displayed. The default counting time is 60 seconds. If it is desired to use a different counting time, touch the **COUNT TIME** button. Figure 10-5 Numeric Keypad Screen will appear.

Figure 10-5 Numeric Keypad Screen

Input the desired counting time (in seconds) by touching the appropriate numbers on the keypad. Touch the **ACCEPT** button to accept the entered time. Touch the **CANCEL** button to abort any changes.

Counting the Background for 60 seconds or longer is recommended.

Note: *The minimum count time that can be input is 2 seconds. The maximum count time that can be input is 30,000 seconds.*

Verify that there are no sources in the area and begin the Background measurement by touching the **MEASURE** button. The system will begin measuring the Background and a live spectrum of the acquired Background, the Real time, Live time and the counting rate (total cpm) will be displayed and updated. Also, the **MEASURE** button will be replaced with a **STOP** button. At any time during the measurement, touch the **STOP** button to stop the measurement. To re-start the process, touch the **MEASURE** button.

When the measurement is finished, the Background counting rate is displayed and the message "FINISHED" will appear on the screen below the **MEASURE** button as shown in Figure 10-4 Background Measurement Screen.

To see the counts in any channel, use the **SINGLE ARROW** buttons to move the vertical line cursor to the desired energy channel. **DOUBLE ARROW** buttons move the cursor approximately 75 energy channels. **SINGLE ARROW** buttons move the cursor approximately 7.5 energy channels.

Note: *The actual energy channel keV will vary depending upon the Auto Calibration.*

When the vertical cursor is moved, the channel energy (keV) and the number of counts in that energy channel are displayed.

To repeat the Background measurement, touch the **MEASURE** button.

To discard the Background measurement results, touch the **CANCEL** button. Figure 10-3 Schilling Test Measurement Entry Screen will re-appear.

To save the Background measurement results, touch the **ACCEPT** button. Figure 10-3 Schilling Test Measurement Entry Screen will re-appear with the *Measured Background:* field box populated with the measurement results.

Urine Volume

The Urine Volume must be input. The Urine Volume is the volume of urine collected over the duration of the test period. If the urine has been diluted to a convenient volume (such as 2000 ml), use this value.

To input the Urine Volume, touch the *Urine Volume (ml):* field box. A numeric keypad will appear allowing for the volume entry.

Note: *The minimum value that can be input is 0.1. The maximum value that can be input is 999,999.0.*

Input the volume in milliliters using the keypad and touch the **ACCEPT** button. Figure 10-3 Schilling Test Measurement Entry Screen will re-appear with the *Urine Volume (ml):* field box populated with the entered value.

To cancel inputting the Urine Volume, touch the **CANCEL** button on the numeric keypad.

Urine Aliquot Volume

The Urine Aliquot Volume must be input. The Urine Aliquot Volume is the volume of urine taken from the full urine volume collected.

To input the Urine Aliquot Volume, touch the *Urine Aliquot Volume (ml):* field box. A numeric keypad will appear allowing for the volume entry.

Note: *The minimum value that can be input is 0.1. The maximum value that can be input is 9,999.0.*

Input the volume in milliliters using the keypad and touch the **ACCEPT** button. Figure 10-3 Schilling Test Measurement Entry Screen will re-appear with the *Urine Aliquot Volume (ml):* field box populated with the entered value.

To cancel inputting the Urine Volume, touch the **CANCEL** button on the numeric keypad.

Standard Dilution Factor

The Standard Dilution Factor must be input. The Standard Dilution Factor is the ratio of the activity of the Co57 capsule to the activity of the Co57 standard. When using a 1% standard, the Dilution Factor equals 100.

To input the Standard Dilution Factor, touch the *(Standard Dilution Factor) 1:* field box. A numeric keypad will appear allowing for the Dilution Factor entry.

Note: *The minimum value that can be input is 0.1. The maximum value that can be input is 999,999.0.*

Input the Dilution Factor using the keypad and touch the **ACCEPT** button. Figure 10-3 Schilling Test Measurement Entry Screen will re-appear with the *(Standard Dilution Factor) 1:* field box populated with the entered value.

To cancel inputting the Standard Dilution Factor, touch the **CANCEL** button on the numeric keypad.

Measured Standard

Touch the *Measured Standard:* field box. A screen will appear similar to Figure 10-4 Background Measurement Screen.

The last counting time selected is displayed. The default counting time is 60 seconds. If it is desired to use a different counting time, touch the **COUNT TIME** button. Figure 10-5 Numeric Keypad Screen will appear.

Input the desired counting time (in seconds) by touching the appropriate numbers on the keypad. Touch the **ACCEPT** button to accept the entered time. Touch the **CANCEL** button to abort any changes.

Note: *The minimum count time that can be input is 2 seconds. The maximum count time that can be input is 30,000 seconds.*

Place the Standard in the Well Counter and begin the measurement by touching the **MEASURE** button. The system will begin measuring the Standard and a live spectrum of the acquired counts, the Real time, Live time and the counting rate (total cpm) will be displayed and updated. Also, the **MEASURE** button will be replaced with a **STOP** button. At any time during the measurement, touch the **STOP** button to stop the measurement. To re-start the process, touch the **MEASURE** button.

When the measurement is finished, the Co57 ROI will be highlighted in red, the total and ROI counting rates are displayed and the message "FINISHED" will appear on the screen below the **MEASURE** button.

To see the counts in any channel, use the **SINGLE ARROW** buttons to move the vertical line cursor to the desired energy channel. **DOUBLE ARROW** buttons move the cursor

approximately 75 energy channels. **SINGLE ARROW** buttons move the cursor approximately 7.5 energy channels.

Note: *The actual energy channel keV will vary depending upon the Auto Calibration.*

When the vertical cursor is moved, the channel energy (keV) and the number of counts in that energy channel are displayed.

To repeat the measurement, touch the **MEASURE** button.

To discard the measurement results, touch the **CANCEL** button. Figure 10-3 Schilling Test Measurement Entry Screen will re-appear.

To save the measurement results, touch the **ACCEPT** button. Figure 10-3 Schilling Test Measurement Entry Screen will re-appear with the *Measured Standard:* field box populated with the measurement results.

Measured Urine Aliquot

Touch the *Measured Urine Aliquot:* field box. A screen will appear similar to Figure 10-4 Background Measurement Screen.

The last counting time selected is displayed. The default counting time is 60 seconds. If it is desired to use a different counting time, touch the **COUNT TIME** button. Figure 10-5 Numeric Keypad Screen will appear.
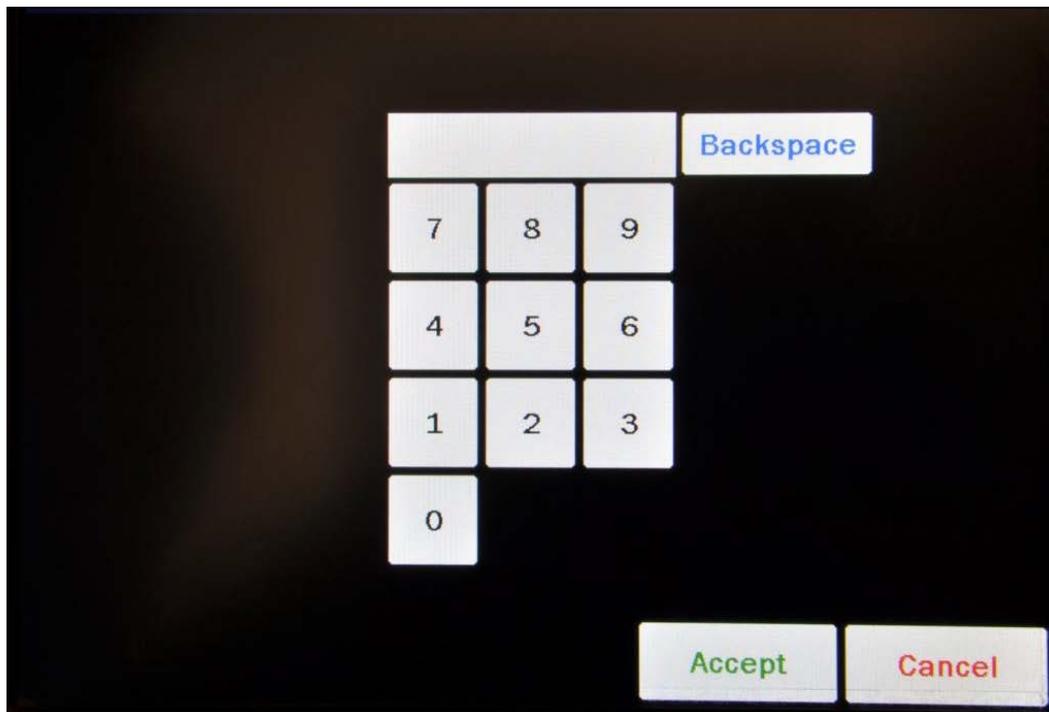
Input the desired counting time (in seconds) by touching the appropriate numbers on the keypad. Touch the **ACCEPT** button to accept the entered time. Touch the **CANCEL** button to abort any changes.

Note: *The minimum count time that can be input is 2 seconds. The maximum count time that can be input is 30,000 seconds.*

Place the Aliquot in the Well Counter and begin the measurement by touching the **MEASURE** button. The system will begin measuring the Aliquot and a live spectrum of the acquired counts, the Real time, Live time and the counting rate (total cpm) will be displayed and updated. Also, the **MEASURE** button will be replaced with a **STOP** button. At any time during the measurement, touch the **STOP** button to stop the measurement. To re-start the process, touch the **MEASURE** button.

When the measurement is finished, the Co57 ROI will be highlighted in red, the total and ROI counting rates are displayed and the message "FINISHED" will appear on the screen below the **MEASURE** button.

To see the counts in any channel, use the **SINGLE ARROW** buttons to move the vertical line cursor to the desired energy channel. **DOUBLE ARROW** buttons move the cursor approximately 75 energy channels. **SINGLE ARROW** buttons move the cursor approximately 7.5 energy channels.

Note: *The actual energy channel keV will vary depending upon the Auto Calibration.*

When the vertical cursor is moved, the channel energy (keV) and the number of counts in that energy channel are displayed.

To repeat the measurement, touch the **MEASURE** button.

To discard the measurement results, touch the **CANCEL** button. Figure 10-3 Schilling Test Measurement Entry Screen will re-appear.

To save the measurement results, touch the **ACCEPT** button. The screen will appear similar to Figure 10-6 Schilling Test Completed Measurement Entry Screen with the *Measured Urine Aliquot:* field box populated with the measurement results.

Figure 10-6 Schilling Test Completed Measurement Entry Screen

To exit Figure 10-6 Schilling Test Completed Measurement Entry Screen,

- touch the **BACK** button – Figure 10-2 Well Lab Tests Screen will re-appear or
- touch the **HOME** button – Figure 10-1 Well Counter Main Screen will appear.

Results

To obtain the results of the Schilling Test, touch the **CALCULATE** button. The calculated results will appear similar to that shown in Figure 10-7 Schilling Test Measurement Analysis Screen.
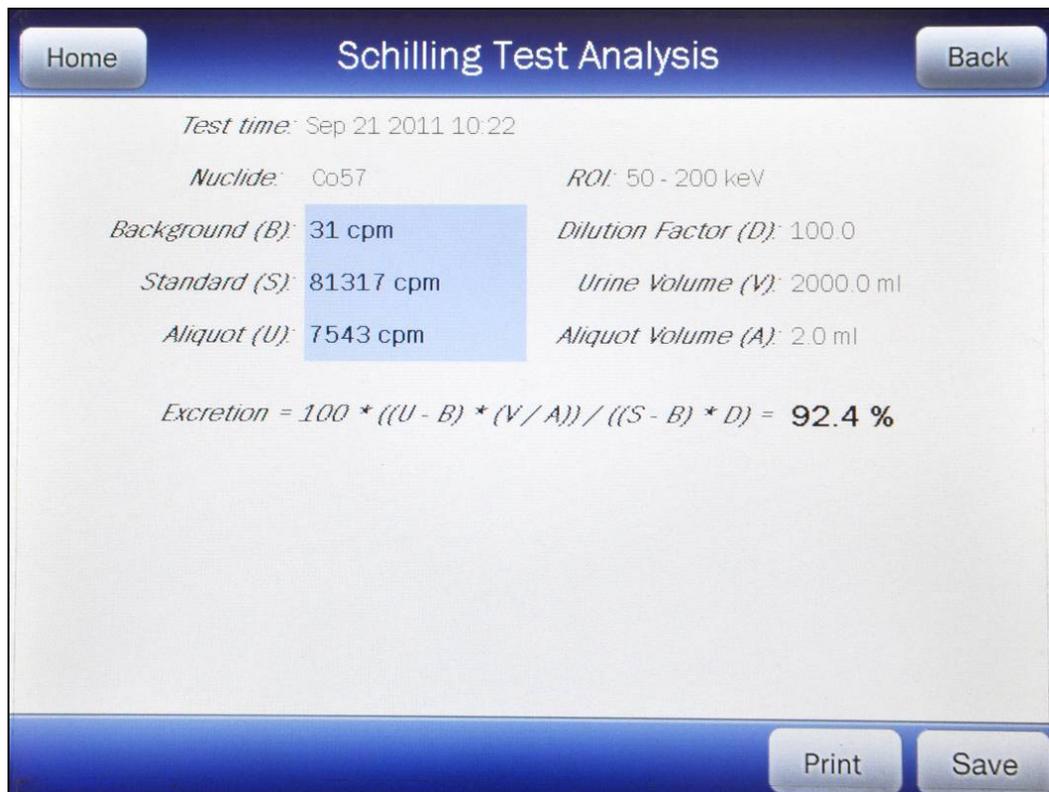
Figure 10-7 Schilling Test Measurement Analysis Screen

The percent excretion is calculated as:

$$\% \text{ Excretion} = 100 \times \frac{((U - B) \times (V/A))}{((S - B) \times D)}$$

Where
      A = Aliquot Volume
      B = Background
      D = Dilution Factor
      S = Standard
      U = Aliquot
      V = Urine Volume

The following sections describe the functions that are available from Figure 10-7 Schilling Test Measurement Analysis Screen.

Recalculate

Any of the measurements or entered data can be changed and new results obtained by touching the **BACK** button to return to Figure 10-6 Schilling Test Completed Measurement Entry Screen and re-measuring or re-entering the data for the desired field(s). Touch the **CALCULATE** button and the new results will appear using the new entries.

Print Results

If a printer is attached to the system, the test results can be printed by touching the **PRINT** button.

View Measurement Spectrums

To view the spectrum for a specific measurement (*Background (B)*, *Standard (S)* or *Aliquot (U)*), touch the blue highlighted count rate box beside the desired measurement. The Spectrum Screen (similar to Figure 10-8 Spectrum Screen) will appear.

Figure 10-8 Spectrum Screen

A Region of Interest may be defined using the **BLUE** and **GREEN** **ARROW** buttons to place vertical line cursors around the ROI. **DOUBLE ARROW** buttons move the

cursor approximately 75 energy channels. **SINGLE ARROW** buttons move the cursor approximately 7.5 energy channels.

Note: The actual energy channel keV will vary depending upon the Auto Calibration.

When the vertical cursor is moved, the channel energy (keV) and the number of counts in that energy channel are displayed. Once the vertical cursors are set, the total counts in the ROI are displayed.

If a printer is attached to the system, touch the **PRINT** button to print the spectrum.

To return to Figure 10-7 Schilling Test Measurement Analysis Screen, touch the **BACK** button.

Saving Data

The results of the Schilling Test and information about the patient can be saved.

From Figure 10-7 Schilling Test Measurement Analysis Screen, touch the **SAVE** button. Figure 10-9 Additional Test Information Screen will appear.

Figure 10-9 Additional Test Information Screen

Note: The only information required to save the results is the Last Name. All other fields are optional.

To exit Figure 10-9 Additional Test Information Screen without entering any supplementary information or saving the results, touch the **BACK** button. Figure 10-7 Schilling Test Measurement Analysis Screen will re-appear.

In order to save the results, the ***Last Name:*** field box must be completed. If the Last Name is not entered, the results cannot be saved. When the Last Name is entered, a **SAVE** button will appear in the lower right hand corner of the screen.

Enter the desired data by touching the appropriate field boxes.

When all of the desired data has been entered, touch the **SAVE** button. Figure 10-2 Well Lab Tests Screen will appear.

Exit Results

To exit the Schilling Test without saving the results, touch the **HOME** button. Figure 10-1 Well Counter Main Screen will appear.

PLASMA VOLUME (I 125)

Note: *The CRC®-55t software follows the testing protocol outlined in the Mallinckrodt Blood Volume Kit Instructions.*

Blood Volume determinations involving radioactive tagging are most frequently used in specific disease conditions when the hematocrit may not accurately estimate true blood volume. Such conditions include extensive trauma or burns, certain types of anemia, and polycythemia. In this test, I-125 labeled protein is used as a radioactive tracer for plasma measurements.

To perform a Plasma Test, touch the **PLASMA** button on Figure 10-2 Well Lab Tests Screen. Figure 10-10 Plasma Test Measurement Entry Screen will appear.

Figure 10-10 Plasma Test Measurement Entry Screen

To exit Figure 10-10 Plasma Test Measurement Entry Screen,

- touch the **BACK** button – Figure 10-2 Well Lab Tests Screen will re-appear or
- touch the **HOME** button – Figure 10-1 Well Counter Main Screen will appear.

Measured Background

A Background measurement must be performed.

Touch the *Measured Background:* field box. A screen will appear similar to Figure 10-11 Background Measurement Screen.
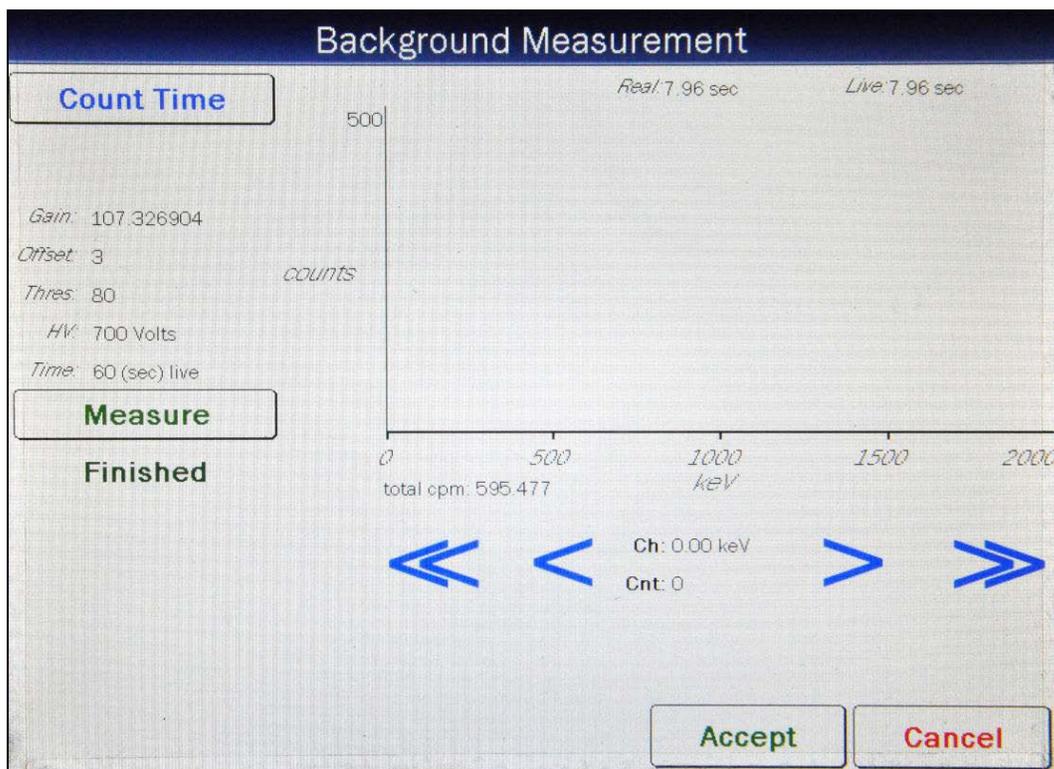
Figure 10-11 Background Measurement Screen

To exit Figure 10-11 Background Measurement Screen, touch the **CANCEL** button. Figure 10-10 Plasma Test Measurement Entry Screen will re-appear.

The last counting time selected is displayed. The default counting time is 60 seconds. If it is desired to use a different counting time, touch the **COUNT TIME** button. Figure 10-12 Numeric Keypad Screen will appear.

Figure 10-12 Numeric Keypad Screen

Input the desired counting time (in seconds) by touching the appropriate numbers on the keypad. Touch the **ACCEPT** button to accept the entered time. Touch the **CANCEL** button to abort any changes.

Counting the background for 60 seconds or longer is recommended.

Note: *The minimum count time that can be input is 2 seconds. The maximum count time that can be input is 30,000 seconds.*

Verify that there are no sources in the area and begin the Background measurement by touching the **MEASURE** button. The system will begin measuring the Background and a live spectrum of the acquired Background, the Real time, Live time and the counting rate (total cpm) will be displayed and updated. Also, the **MEASURE** button will be replaced with a **STOP** button. At any time during the measurement, touch the **STOP** button to stop the measurement. To re-start the process, touch the **MEASURE** button.

When the measurement is finished, the Background counting rate is displayed and the message "FINISHED" will appear on the screen below the **MEASURE** button as shown in Figure 10-11 Background Measurement Screen.

To see the counts in any channel, use the **SINGLE ARROW** buttons to move the vertical line cursor to the desired energy channel. **DOUBLE ARROW** buttons move the cursor approximately 75 energy channels. **SINGLE ARROW** buttons move the cursor approximately 7.5 energy channels.

Note: *The actual energy channel keV will vary depending upon the Auto Calibration.*

When the vertical cursor is moved, the channel energy (keV) and the number of counts in that energy channel are displayed.

To repeat the Background measurement, touch the **MEASURE** button.

To discard the Background measurement results, touch the **CANCEL** button. Figure 10-10 Plasma Test Measurement Entry Screen will re-appear.

To save the Background measurement results, touch the **ACCEPT** button. Figure 10-10 Plasma Test Measurement Entry Screen will re-appear the ***Measured Background:*** field box populated with the measurement results.

Standard Dilution Factor

The Standard Dilution Factor must be input.

To input the Standard Dilution Factor, touch the ***(Standard Dilution Factor) 1:*** field box. A numeric keypad will appear allowing for the Dilution Factor entry.

Note: *The minimum value that can be input is 0.1. The maximum value that can be input is 999,999.0.*

Input the Dilution Factor using the keypad and touch the **ACCEPT** button. Figure 10-10 Plasma Test Measurement Entry Screen will re-appear with ***(Standard Dilution Factor) 1:*** field box populated with the entered value.

To cancel inputting the Standard Dilution Factor, touch the **CANCEL** button on the numeric keypad.

Sample Volume

The Sample Volume must be input.

To input the Sample Volume, touch the ***Sample Volume (ml):*** field box. A numeric keypad will appear allowing for the volume entry.

Note: *The minimum value that can be input is 0.1. The maximum value that can be input is 9,999.0.*

Input the volume in milliliters using the keypad and touch the **ACCEPT** button. Figure 10-10 Plasma Test Measurement Entry Screen will re-appear with ***Sample Volume (ml):*** field box populated with the entered value.

To cancel inputting the Sample Volume, touch the **CANCEL** button on the numeric keypad.

Hematocrit

The Hematocrit percentage must be input.

The hematocrit percentage is determined from a whole blood sample drawn from the patient five to ten minutes post injection.

To input the hematocrit percentage, touch the *Hematocrit (%):* field box. A numeric keypad will appear allowing for the hematocrit percentage entry.

Note: *The minimum value that can be input is 0.1. The maximum value that can be input is 100.0.*

Input the percentage using the keypad and touch the **ACCEPT** button. Figure 10-10 Plasma Test Measurement Entry Screen will re-appear with *Hematocrit (%):* field box populated with the entered value.

To cancel inputting the hematocrit percentage, touch the **CANCEL** button on the numeric keypad.

Patient Weight

The patient weight must be input.

To input the patient weight, touch the *Patient Weight (kg):* field box. A numeric keypad will appear allowing for the patient weight entry.

Note: *The minimum value that can be input is 1.0. The maximum value that can be input is 9,999.0.*

Input the patient weight in kilograms using the keypad and touch the **ACCEPT** button. Figure 10-10 Plasma Test Measurement Entry Screen will re-appear with *Patient Weight (kg):* field box populated with the entered value.

To cancel inputting the patient weight, touch the **CANCEL** button on the numeric keypad.

Measured Standard

Touch the *Measured Standard:* field box. A screen will appear similar to Figure 10-11 Background Measurement Screen.

The last counting time selected is displayed. The default counting time is 60 seconds. If it is desired to use a different counting time, touch the **COUNT TIME** button. Figure 10-12 Numeric Keypad Screen will appear.

Input the desired counting time (in seconds) by touching the appropriate numbers on the keypad. Touch the **ACCEPT** button to accept the entered time. Touch the **CANCEL** button to abort any changes.

Note: *The minimum count time that can be input is 2 seconds. The maximum count time that can be input is 30,000 seconds.*

Place the Standard in the Well Counter and begin the measurement by touching the **MEASURE** button. The system will begin measuring the Standard and a live spectrum of the acquired counts, the Real time, Live time and the counting rate (total cpm) will be displayed and updated. Also, the **MEASURE** button will be replaced with a **STOP** button. At any time during the measurement, touch the **STOP** button to stop the measurement. To re-start the process, touch the **MEASURE** button.

When the measurement is finished, the I125 ROI will be highlighted in red, the total and ROI counting rates are displayed and the message "FINISHED" will appear on the screen below the **MEASURE** button.

To see the counts in any channel, use the **SINGLE ARROW** buttons to move the vertical line cursor to the desired energy channel. **DOUBLE ARROW** buttons move the cursor approximately 75 energy channels. **SINGLE ARROW** buttons move the cursor approximately 7.5 energy channels.

Note: *The actual energy channel keV will vary depending upon the Auto Calibration.*

When the vertical cursor is moved, the channel energy (keV) and the number of counts in that energy channel are displayed.

To repeat the measurement, touch the **MEASURE** button.

To discard the measurement results, touch the **CANCEL** button. Figure 10-10 Plasma Test Measurement Entry Screen will re-appear.

To save the measurement results, touch the **ACCEPT** button. Figure 10-10 Plasma Test Measurement Entry Screen will appear with the *Measured Standard:* field box populated with the measurement results.

Measured Whole Blood Sample

Touch the *Measured Whole Blood Sample:* field box. A screen will appear similar to Figure 10-11 Background Measurement Screen.

The last counting time selected is displayed. The default counting time is 60 seconds. If it is desired to use a different counting time, touch the **COUNT TIME** button. Figure 10-12 Numeric Keypad Screen will appear.

Input the desired counting time (in seconds) by touching the appropriate numbers on the keypad. Touch the **ACCEPT** button to accept the entered time. Touch the **CANCEL** button to abort any changes.

Note: *The minimum count time that can be input is 2 seconds. The maximum count time that can be input is 30,000 seconds.*

Place the Whole Blood Sample in the Well Counter and begin the measurement by touching the **MEASURE** button. The system will begin measuring the Sample and a live spectrum of the acquired counts, the Real time, Live time and the counting rate (total cpm) will be displayed and updated. Also, the **MEASURE** button will be replaced with a **STOP** button. At any time during the measurement, touch the **STOP** button to stop the measurement. To re-start the process, touch the **MEASURE** button.

When the measurement is finished, the I125 ROI will be highlighted in red, the total and ROI counting rates are displayed and the message "FINISHED" will appear on the screen below the **MEASURE** button.

To see the counts in any channel, use the **SINGLE ARROW** buttons to move the vertical line cursor to the desired energy channel. **DOUBLE ARROW** buttons move the cursor approximately 75 energy channels. **SINGLE ARROW** buttons move the cursor approximately 7.5 energy channels.

Note: *The actual energy channel keV will vary depending upon the Auto Calibration.*

When the vertical cursor is moved, the channel energy (keV) and the number of counts in that energy channel are displayed.

To repeat the measurement, touch the **MEASURE** button.

To discard the measurement results, touch the **CANCEL** button. Figure 10-10 Plasma Test Measurement Entry Screen will re-appear.

To save the measurement results, touch the **ACCEPT** button. Figure 10-10 Plasma Test Measurement Entry Screen will re-appear with the *Measured Whole Blood Sample:* field box populated with the measurement results.

Measured Plasma Sample

Touch the *Measured Plasma Sample:* field box. A screen will appear similar to Figure 10-11 Background Measurement Screen.

The last counting time selected is displayed. The default counting time is 60 seconds. If it is desired to use a different counting time, touch the **COUNT TIME** button. Figure 10-12 Numeric Keypad Screen will appear.
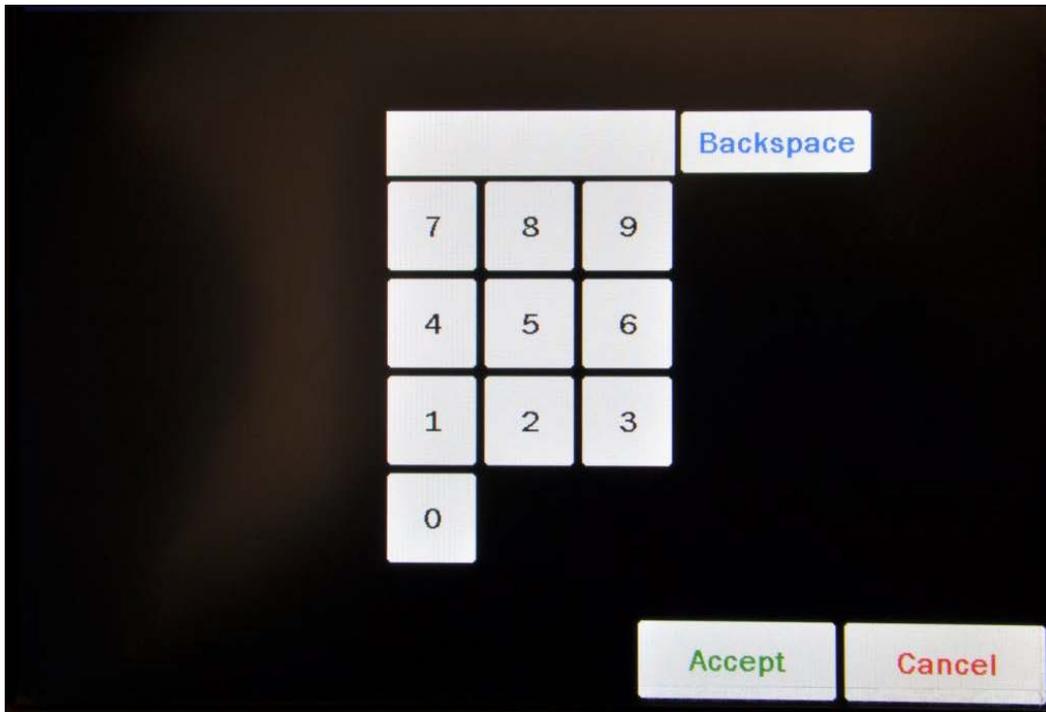
Input the desired counting time (in seconds) by touching the appropriate numbers on the keypad. Touch the **ACCEPT** button to accept the entered time. Touch the **CANCEL** button to abort any changes.

Note: *The minimum count time that can be input is 2 seconds. The maximum count time that can be input is 30,000 seconds.*

Place the Plasma Sample in the Well Counter and begin the measurement by touching the **MEASURE** button. The system will begin measuring the Sample and a live spectrum of the acquired counts, the Real time, Live time and the counting rate (total cpm) will be displayed

and updated. Also, the **MEASURE** button will be replaced with a **STOP** button. At any time during the measurement, touch the **STOP** button to stop the measurement. To re-start the process, touch the **MEASURE** button.

When the measurement is finished, the I125 ROI will be highlighted in red, the total and ROI counting rates are displayed and the message "FINISHED" will appear on the screen below the **MEASURE** button.

To see the counts in any channel, use the **SINGLE ARROW** buttons to move the vertical line cursor to the desired energy channel. **DOUBLE ARROW** buttons move the cursor approximately 75 energy channels. **SINGLE ARROW** buttons move the cursor approximately 7.5 energy channels.

Note: *The actual energy channel keV will vary depending upon the Auto Calibration.*

When the vertical cursor is moved, the channel energy (keV) and the number of counts in that energy channel are displayed.

To repeat the measurement, touch the **MEASURE** button.

To discard the measurement results, touch the **CANCEL** button. Figure 10-10 Plasma Test Measurement Entry Screen will re-appear.

To save the measurement results, touch the **ACCEPT** button. The screen will appear similar to Figure 10-13 Plasma Test Completed Measurement Entry Screen with the *Measured Plasma Sample:* field box populated with the measurement results.

Figure 10-13 Plasma Test Completed Measurement Entry Screen

To exit Figure 10-13 Plasma Test Completed Measurement Entry Screen,

- touch the **BACK** button – Figure 10-2 Well Lab Tests Screen will re-appear or
- touch the **HOME** button – Figure 10-1 Well Counter Main Screen will appear.

Results

To obtain the results of the Plasma Test, touch the **CALCULATE** button. The calculated results will appear similar to that shown in Figure 10-14 Plasma Test Measurement Analysis Screen.
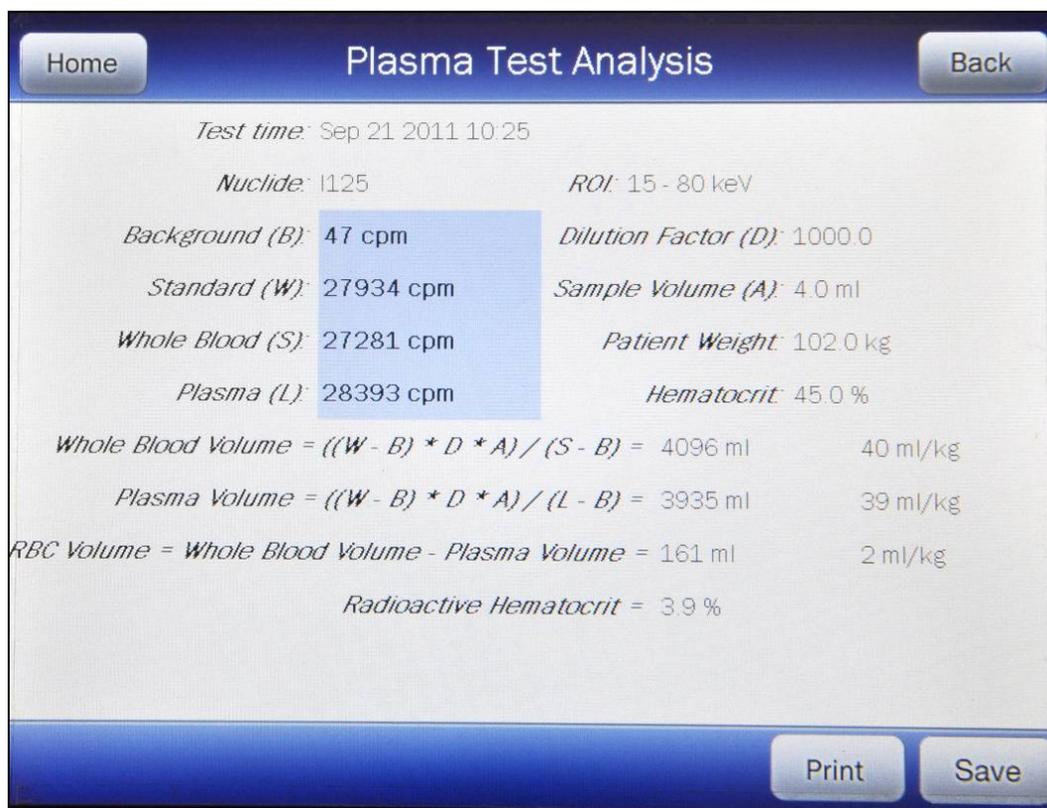
Figure 10-14 Plasma Test Measurement Analysis Screen

The results are calculated as follows:

$$\text{Whole Blood Volume (ml)} = \frac{\left((\text{W} - \text{B}) \times \text{D} \times \text{A}\right)}{\text{S} - \text{B}}$$

$$\text{Plasma Volume (ml)} = \frac{\left((\text{W} - \text{B}) \times \text{D} \times \text{A}\right)}{\text{L} - \text{B}}$$

$$\text{RBC Volume (ml)} = \text{Whole Blood Volume} - \text{Plasma Volume}$$

$$\text{Radioactive Hematocrit} = 100 \times \frac{\text{RBC Volume}}{\text{Whole Blood Volume}}$$

Where
         A = Sample Volume
         B = Background
         D = Dilution Factor
         L = Plasma
         S = Whole Blood
         W = Standard

Note: *A comparison of the calculated hematocrit with the microhematocrit will give an indication of the accuracy of the procedure and calculations.*

The standard, blood, and plasma counts must be taken under identical sample volume and geometric conditions relative to the detector crystal or else the difference must be accounted for in the computations by an appropriate correction factor.

The following sections describe the functions that are available from Figure 10-14 Plasma Test Measurement Analysis Screen.

Recalculate

Any of the measurements or entered data can be changed and new results obtained by touching the **BACK** button to return to Figure 10-13 Plasma Test Completed Measurement Entry Screen and re-measuring or re-entering the data for the desired field(s). Touch the **CALCULATE** button and the results will appear using the new entries.

Print Results

If a printer is attached to the system, the test results can be printed by touching the **PRINT** button.

View Measurement Spectrums

To view the spectrum for a specific measurement (***Background (B)***, ***Standard (W)***, ***Whole Blood (S)*** or ***Plasma (L)***), touch the blue highlighted count rate box beside the desired measurement. The Spectrum Screen (similar to Figure 10-15 Spectrum Screen) will appear.

Figure 10-15 Spectrum Screen

A Region of Interest may be defined using the **BLUE** and **GREEN ARROW** buttons to place vertical line cursors around the ROI. **DOUBLE ARROW** buttons move the cursor approximately 75 energy channels. **SINGLE ARROW** buttons move the cursor approximately 7.5 energy channels.

Note: The actual energy channel keV will vary depending upon the Auto Calibration.

When the vertical cursor is moved, the channel energy (keV) and the number of counts in that energy channel are displayed. Once the vertical cursors are set, the total counts in the ROI are displayed.

If a printer is attached to the system, touch the **PRINT** button to print the spectrum.

To return to Figure 10-14 Plasma Test Measurement Analysis Screen, touch the **BACK** button.

Saving Data

The results of the Plasma Test and information about the patient can be saved.

From Figure 10-14 Plasma Test Measurement Analysis Screen, touch the **SAVE** button. Figure 10-16 Additional Test Information Screen will appear.

Figure 10-16 Additional Test Information Screen

Note: *The only information required to save the results is the Last Name. All other fields are optional.*

To exit Figure 10-16 Additional Test Information Screen without entering any supplementary information or saving the results, touch the **BACK** button. Figure 10-14 Plasma Test Measurement Analysis Screen will re-appear.

In order to save the results, the *Last Name:* field box must be completed. If the Last Name is not entered, the results cannot be saved. When the Last Name is entered, a **SAVE** button will appear in the lower right hand corner of the screen.

Enter the desired data by touching the appropriate field box.

When all of the desired data has been entered, touch the **SAVE** button. Figure 10-2 Well Lab Tests Screen will appear.

Exit Results

To exit the Plasma Test without saving the results, touch the **HOME** button. Figure 10-1 Well Counter Main Screen will appear.

RBC VOLUME (Cr51)

Note: *The CRC®-55t software follows the testing protocol outlined in the Mallinckrodt Blood Volume Kit Instructions.*

This test is used to determine red blood cell volume or mass and is most frequently used in specific disease conditions when the hematocrit may not accurately estimate true blood volume. In this test, Cr51 tagged RBCs are used as radioactive tracers for red cell mass determination.

To perform a RBC Test, touch the **RBC** button on Figure 10-2 Well Lab Tests Screen. Figure 10-17 RBC Test Measurement Entry Screen will appear.

Figure 10-17 RBC Test Measurement Entry Screen

To exit Figure 10-17 RBC Test Measurement Entry Screen,

- touch the **BACK** button – Figure 10-2 Well Lab Tests Screen will re-appear or

- touch the **HOME** button – Figure 10-1 Well Counter Main Screen will appear.

Measured Background

A Background measurement must be performed.

Touch the *Measured Background:* field box. A screen will appear similar to Figure 10-18 Background Measurement Screen.
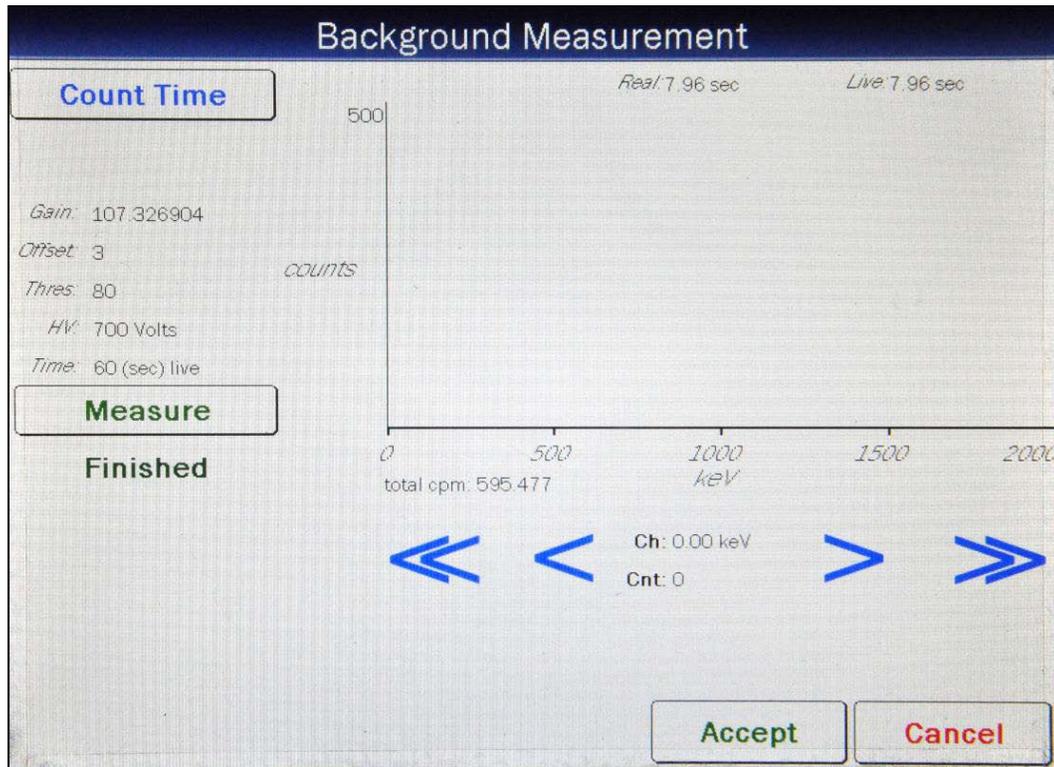
Figure 10-18 Background Measurement Screen

To exit Figure 10-18 Background Measurement Screen, touch the **CANCEL** button. Figure 10-17 RBC Test Measurement Entry Screen will re-appear.

The last counting time selected is displayed. The default counting time is 60 seconds. If it is desired to use a different counting time, touch the **COUNT TIME** button. Figure 10-19 Numeric Keypad Screen will appear.

Figure 10-19 Numeric Keypad Screen

Input the desired counting time (in seconds) by touching the appropriate numbers on the keypad. Touch the **ACCEPT** button to accept the entered time. Touch the **CANCEL** button to abort any changes.

Counting the background for 60 seconds or longer is recommended.

Note: *The minimum count time that can be input is 2 seconds. The maximum count time that can be input is 30,000 seconds.*

Verify that there are no sources in the area and begin the Background measurement by touching the **MEASURE** button. The system will begin measuring the Background and a live spectrum of the acquired background, the Real time, Live time and the counting rate (total cpm) will be displayed and updated. Also, the **MEASURE** button will be replaced with a **STOP** button. At any time during the measurement, touch the **STOP** button to stop the measurement. To re-start the process, touch the **MEASURE** button.

When the measurement is finished, the Background counting rate is displayed and the message "FINISHED" will appear on the screen below the **MEASURE** button as shown in Figure 10-18 Background Measurement Screen.

To see the counts in any channel, use the **SINGLE ARROW** buttons to move the vertical line cursor to the desired energy channel. **DOUBLE ARROW** buttons move the cursor approximately 75 energy channels. **SINGLE ARROW** buttons move the cursor approximately 7.5 energy channels.

Note: *The actual energy channel keV will vary depending upon the Auto Calibration.*

When the vertical cursor is moved, the channel energy (keV) and the number of counts in that energy channel are displayed.

To repeat the background measurement, touch the **MEASURE** button.

To discard the background measurement results, touch the **CANCEL** button. Figure 10-17 RBC Test Measurement Entry Screen will re-appear.

To save the background measurement results, touch the **ACCEPT** button. The screen will appear similar to Figure 10-17 RBC Test Measurement Entry Screen with the ***Measured Background:*** field box populated with the measurement results.

Dose Hematocrit

The Dose Hematocrit percentage must be input.

The Dose Hematocrit percentage is the Hematocrit of the tagged RBC suspension determined from the remainder of the suspension of the injection into the patient.

To input the Dose Hematocrit percentage, touch the ***Dose Hematocrit (%):*** field box. Figure 10-19 Numeric Keypad Screen will appear allowing for the hematocrit percentage entry.

Note: *The minimum value that can be input is 0.1. The maximum value that can be input is 100.0.*

Input the percentage using the keypad and touch the **ACCEPT** button. Figure 10-17 RBC Test Measurement Entry Screen will re-appear with the Dose ***Hematocrit (%):*** field box populated with the entered value.

To cancel inputting the Dose Hematocrit percentage, touch the **CANCEL** button on the numeric keypad.

Patient Hematocrit

The Patient Hematocrit percentage must be input.

The Patient Hematocrit percentage is the Hematocrit of a blood sample withdrawn from the patient ten to twenty minutes post injection.

To input the Patient Hematocrit percentage, touch the ***Patient Hematocrit (%):*** field box. Figure 10-19 Numeric Keypad Screen will appear allowing for the hematocrit percentage entry.

Note: *The minimum value that can be input is 0.1. The maximum value that can be input is 100.0.*

Input the percentage using the keypad and touch the **ACCEPT** button. Figure 10-17 RBC Test Measurement Entry Screen will re-appear with the *Patient Hematocrit (%):* field box populated with the entered value.

To cancel inputting the Patient Hematocrit percentage, touch the **CANCEL** button on the numeric keypad.

Patient Weight

The patient weight must be input.

To input the patient weight, touch the *Patient Weight (kg):* field box. Figure 10-19 Numeric Keypad Screen will appear allowing for the patient weight entry.

Note: The minimum value that can be input is 1.0. The maximum value that can be input is 9,999.0.

Input the patient weight in kilograms using the keypad and touch the **ACCEPT** button. Figure 10-17 RBC Test Measurement Entry Screen will re-appear with the *Patient Weight (kg):* field box populated with the entered value.

To cancel inputting the patient weight, touch the **CANCEL** button on the numeric keypad.

Measured Whole Blood Standard

Touch the *Measured Whole Blood Standard:* field box. A screen will appear similar to Figure 10-18 Background Measurement Screen.

The last counting time selected is displayed. The default counting time is 60 seconds. If it is desired to use a different counting time, touch the **COUNT TIME** button. Figure 10-19 Numeric Keypad Screen will appear.

Input the desired counting time (in seconds) by touching the appropriate numbers on the keypad. Touch the **ACCEPT** button to accept the entered time. Touch the **CANCEL** button to abort any changes.

Note: The minimum count time that can be input is 2 seconds. The maximum count time that can be input is 30,000 seconds.

Place the Whole Blood Standard in the Well Counter and begin the measurement by touching the **MEASURE** button. The system will begin measuring the Standard and a live spectrum of the acquired counts, the Real time, Live time and the counting rate (total cpm) will be displayed and updated. Also, the **MEASURE** button will be replaced with a **STOP** button. At any time during the measurement, touch the **STOP** button to stop the measurement. To re-start the process, touch the **MEASURE** button.

When the measurement is finished, the Cr51 ROI will be highlighted in red, the total and ROI counting rates are displayed and the message "FINISHED" will appear on the screen below the **MEASURE** button.

To see the counts in any channel, use the **SINGLE ARROW** buttons to move the vertical line cursor to the desired energy channel. **DOUBLE ARROW** buttons move the cursor approximately 75 energy channels. **SINGLE ARROW** buttons move the cursor approximately 7.5 energy channels.

Note: *The actual energy channel keV will vary depending upon the Auto Calibration.*

When the vertical cursor is moved, the channel energy (keV) and the number of counts in that energy channel are displayed.

To repeat the measurement, touch the **MEASURE** button.

To discard the measurement results, touch the **CANCEL** button. Figure 10-17 RBC Test Measurement Entry Screen will re-appear.

To save the measurement results, touch the **ACCEPT** button. Figure 10-17 RBC Test Measurement Entry Screen will re-appear with the *Measured Whole Blood Standard:* field box populated with the measurement results.

Measured Plasma Standard

Touch the *Measured Plasma Standard:* field box. A screen will appear similar to Figure 10-18 Background Measurement Screen.

The last counting time selected is displayed. The default counting time is 60 seconds. If it is desired to use a different counting time, touch the **COUNT TIME** button. Figure 10-19 Numeric Keypad Screen will appear.

Input the desired counting time (in seconds) by touching the appropriate numbers on the keypad. Touch the **ACCEPT** button to accept the entered time. Touch the **CANCEL** button to abort any changes.

Note: *The minimum count time that can be input is 2 seconds. The maximum count time that can be input is 30,000 seconds.*

Place the Plasma Standard in the Well Counter and begin the measurement by touching the **MEASURE** button. The system will begin measuring the Standard and a live spectrum of the acquired counts, the Real time, Live time and the counting rate (total cpm) will be displayed and updated. Also, the **MEASURE** button will be replaced with a **STOP** button. At any time during the measurement, touch the **STOP** button to stop the measurement. To re-start the process, touch the **MEASURE** button.

When the measurement is finished, the Cr51 ROI will be highlighted in red, the total and ROI counting rates are displayed and the message "FINISHED" will appear on the screen below the **MEASURE** button.

To see the counts in any channel, use the **SINGLE ARROW** buttons to move the vertical line cursor to the desired energy channel. **DOUBLE ARROW** buttons move the cursor

approximately 75 energy channels. **SINGLE ARROW** buttons move the cursor approximately 7.5 energy channels.

Note: *The actual energy channel keV will vary depending upon the Auto Calibration.*

When the vertical cursor is moved, the channel energy (keV) and the number of counts in that energy channel are displayed.

To repeat the measurement, touch the **MEASURE** button.

To discard the measurement results, touch the **CANCEL** button. Figure 10-17 RBC Test Measurement Entry Screen will re-appear.

To save the measurement results, touch the **ACCEPT** button. Figure 10-17 RBC Test Measurement Entry Screen will re-appear with the *Measured Plasma Standard:* field box populated with the measurement results.

Measured Whole Blood Sample

Touch the *Measured Whole Blood Sample:* field box. A screen will appear similar to Figure 10-18 Background Measurement Screen.

The last counting time selected is displayed. The default counting time is 60 seconds. If it is desired to use a different counting time, touch the **COUNT TIME** button. Figure 10-19 Numeric Keypad Screen will appear.

Input the desired counting time (in seconds) by touching the appropriate numbers on the keypad. Touch the **ACCEPT** button to accept the entered time. Touch the **CANCEL** button to abort any changes.

Note: *The minimum count time that can be input is 2 seconds. The maximum count time that can be input is 30,000 seconds.*

Place the Whole Blood Sample in the Well Counter and begin the measurement by touching the **MEASURE** button. The system will begin measuring the Sample and a live spectrum of the acquired counts, the Real time, Live time and the counting rate (total cpm) will be displayed and updated. Also, the **MEASURE** button will be replaced with a **STOP** button. At any time during the measurement, touch the **STOP** button to stop the measurement. To re-start the process, touch the **MEASURE** button.

When the measurement is finished, the Cr51 ROI will be highlighted in red, the total and ROI counting rates are displayed and the message "FINISHED" will appear on the screen below the **MEASURE** button.

To see the counts in any channel, use the **SINGLE ARROW** buttons to move the vertical line cursor to the desired energy channel. **DOUBLE ARROW** buttons move the cursor approximately 75 energy channels. **SINGLE ARROW** buttons move the cursor approximately 7.5 energy channels.

Note: *The actual energy channel keV will vary depending upon the Auto Calibration.*

When the vertical cursor is moved, the channel energy (keV) and the number of counts in that energy channel are displayed.

To repeat the measurement, touch the **MEASURE** button.

To discard the measurement results, touch the **CANCEL** button. Figure 10-17 RBC Test Measurement Entry Screen will re-appear.

To save the measurement results, touch the **ACCEPT** button. Figure 10-17 RBC Test Measurement Entry Screen will re-appear with the ***Measured Whole Blood Sample:*** field box populated with the measurement results.

Measured Plasma Sample

Touch the ***Measured Plasma Sample:*** field box. A screen will appear similar to Figure 10-18 Background Measurement Screen.

The last counting time selected is displayed. The default counting time is 60 seconds. If it is desired to use a different counting time, touch the **COUNT TIME** button. Figure 10-19 Numeric Keypad Screen will appear.

Input the desired counting time (in seconds) by touching the appropriate numbers on the keypad. Touch the **ACCEPT** button to accept the entered time. Touch the **CANCEL** button to abort any changes.

Note: *The minimum count time that can be input is 2 seconds. The maximum count time that can be input is 30,000 seconds.*

Place the Plasma Sample in the Well Counter and begin the measurement by touching the **MEASURE** button. The system will begin measuring the Sample and a live spectrum of the acquired counts, the Real time, Live time and the counting rate (total cpm) will be displayed and updated. Also, the **MEASURE** button will be replaced with a **STOP** button. At any time during the measurement, touch the **STOP** button to stop the measurement. To re-start the process, touch the **MEASURE** button.

When the measurement is finished, the Cr51 ROI will be highlighted in red, the total and ROI counting rates are displayed and the message "FINISHED" will appear on the screen below the **MEASURE** button.

To see the counts in any channel, use the **SINGLE ARROW** buttons to move the vertical line cursor to the desired energy channel. **DOUBLE ARROW** buttons move the cursor approximately 75 energy channels. **SINGLE ARROW** buttons move the cursor approximately 7.5 energy channels.

Note: *The actual energy channel keV will vary depending upon the Auto Calibration.*

When the vertical cursor is moved, the channel energy (keV) and the number of counts in that energy channel are displayed.

To repeat the measurement, touch the **MEASURE** button.

To discard the measurement results, touch the **CANCEL** button. Figure 10-17 RBC Test Measurement Entry Screen will re-appear.

To save the measurement results, touch the **ACCEPT** button. The screen will appear similar to Figure 10-20 RBC Test Completed Measurement Entry Screen with the *Measured Plasma Sample:* field box populated with the measurement results.

Figure 10-20 RBC Test Completed Measurement Entry Screen

To exit Figure 10-20 RBC Test Completed Measurement Entry Screen,

- touch the **BACK** button – Figure 10-2 Well Lab Tests Screen will re-appear or
- touch the **HOME** button – Figure 10-1 Well Counter Main Screen will appear.

Results

To obtain the results of the RBC Test, touch the **CALCULATE** button. The calculated results will appear similar to that shown in Figure 10-21 RBC Test Measurement Analysis Screen.
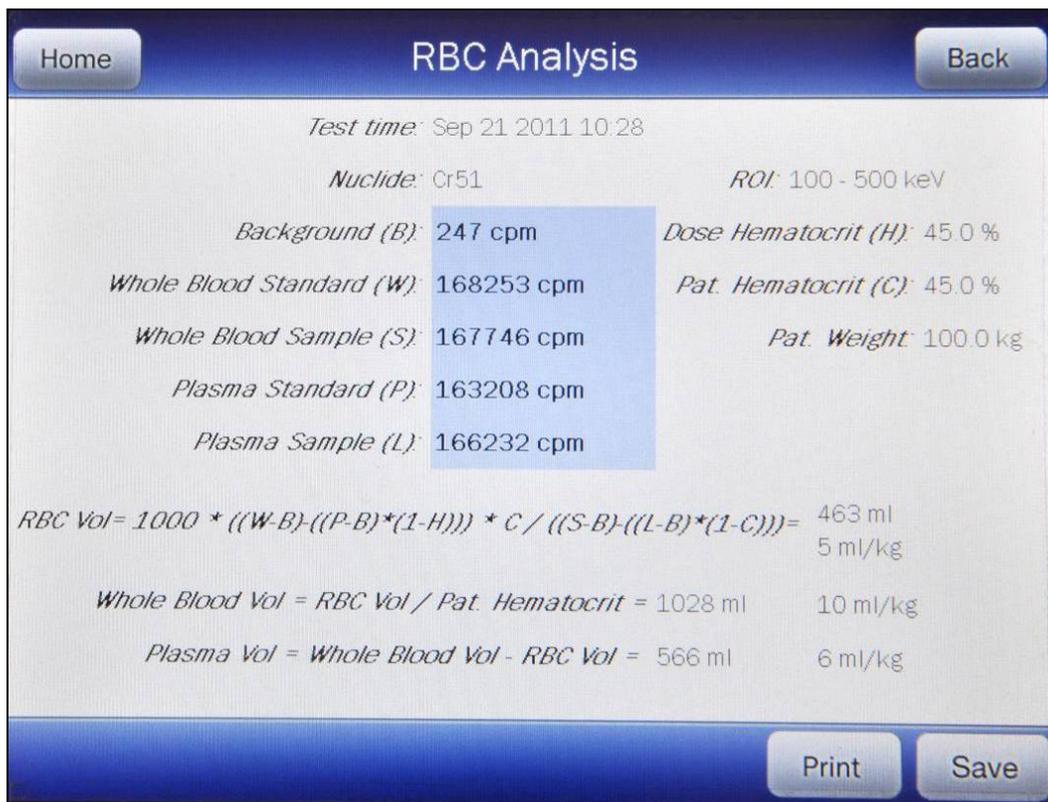
Figure 10-21 RBC Test Measurement Analysis Screen

RBC Volume is calculated as follows:

$$\text{Red Cell Volume (ml)} = \frac{1000 \times ((W\text{-}B) - ((P\text{-}B) \times (1-H))) \times C}{(S\text{-}B) - ((L\text{-}B) \times (1-C))}$$

Where

  B = Background Activity
  C = Patient Hematocrit
  H = Dose Hematocrit
  L = Plasma Sample Activity
  P = Plasma Standard Activity
  S = Whole Blood Sample Activity
  W = Whole Blood Standard Activity

$$\text{Whole Blood Volume (ml)} = \frac{\text{Red Cell Volume (ml)}}{\text{Patient Hematocrit}}$$

Plasma Volume (ml) = Whole Blood Volume (ml) - Red Cell Volume (ml)

The following sections describe the functions that are available from Figure 10-14 Plasma Test Measurement Analysis Screen.

Recalculate

Any of the measurements or entered data can be changed and new results obtained by touching the **BACK** button to return to Figure 10-20 RBC Test Completed Measurement Entry Screen and re-measuring or re-entering the data for the desired field(s). Touch the **CALCULATE** button and the results will appear using the new entries.

Print Results

If a printer is attached to the system, the test results can be printed by touching the **PRINT** button.

View Measurement Spectrums

To view the spectrum for a specific measurement (*Background (B)*, *Whole Blood Standard (W)*, *Whole Blood Sample (S)*, *Plasma Standard (P)* or *Plasma Sample (L)*), touch the blue highlighted count rate box beside the desired measurement. The Spectrum Screen (similar to Figure 10-22 Spectrum Screen) will appear.

Figure 10-22 Spectrum Screen

A Region of Interest may be defined using the **BLUE** and **GREEN** **ARROW** buttons to place vertical line cursors around the ROI. **DOUBLE ARROW** buttons move the cursor approximately 75 energy channels. **SINGLE ARROW** buttons move the cursor approximately 7.5 energy channels.

Note: *The actual energy channel keV will vary depending upon the Auto Calibration.*

When the vertical cursor is moved, the channel energy (keV) and the number of counts in that energy channel are displayed. Once the vertical cursors are set, the total counts in the ROI are displayed.

If a printer is attached to the system, touch the **PRINT** button to print the spectrum.

To return to Figure 10-21 RBC Test Measurement Analysis Screen, touch the **BACK** button.

Saving Data

The results of the RBC Test and information about the patient can be saved.

From Figure 10-21 RBC Test Measurement Analysis Screen, touch the **SAVE** button. Figure 10-23 Additional Test Information Screen will appear.

Figure 10-23 Additional Test Information Screen

Note: *The only information required to save the results is the Last Name. All other fields are optional.*

To exit Figure 10-23 Additional Test Information Screen without entering any supplementary information or saving the results, touch the **BACK** button. Figure 10-21 RBC Test Measurement Analysis Screen will re-appear.

In order to save the results, the *Last Name:* field box must be completed. If the Last Name is not entered, the results cannot be saved. When the Last Name is entered, a **SAVE** button will appear in the lower right hand corner of the screen.

Enter the desired data by touching the appropriate field box.

When all of the desired data has been entered, touch the **SAVE** button. Figure 10-2 Well Lab Tests Screen will appear.

Exit Results

To exit the RBC Test without saving the results, touch the **HOME** button. Figure 10-1 Well Counter Main Screen will appear.

RBC SURVIVAL TEST

Note: *The CRC®-55t software follows the testing protocol outlined in the Mallinckrodt RBC Survival kit that utilizes Sodium Chromate Cr51 injections.*

This test is most frequently used in diagnosis of hemolytic anemia. The software standardizes the 24-hour sample to 100% survival, and automatically decay-corrects each subsequent sample. This permits the user to measure each sample as soon as it is collected. For this reason, all sample volumes must be the same. Each sample must also have a hematocrit (HCT) entered. The subsequent samples are corrected for any differences in hematocrit.

Normal Values

The user may enter an RBC Survival Normal Range. These are the minimum and maximum days which would be considered normal 50% survival. There are no preset values for the range and may be entered as desired. This is an optional setting.

From the Setup screen, touch the **ADVANCED DETECTOR** button. A numeric keypad will appear to allowing the user to input a 3-digit password as shown in Figure 10-24 Enter Password: Screen.
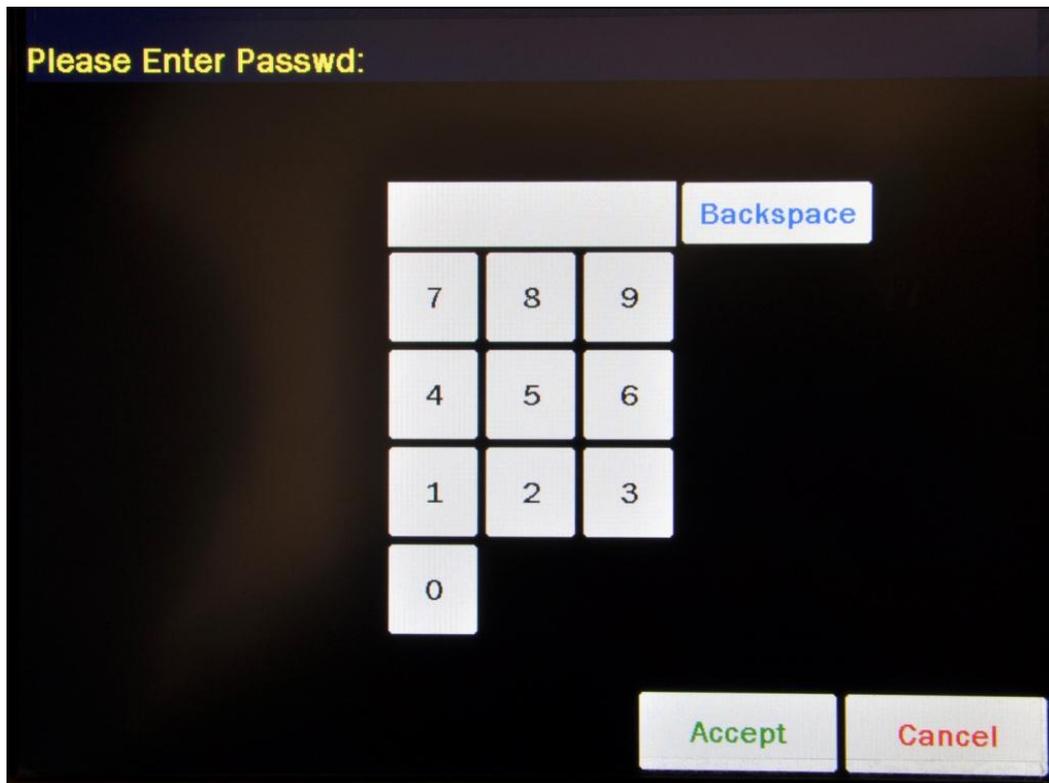
Figure 10-24 Enter Password: Screen

Input the password (the last 3 digits of the Readout serial number) by touching the appropriate numbers on the keypad. Touch the **ACCEPT** button to accept the password. Figure 10-25 Advanced Detector Setup Screen will appear.
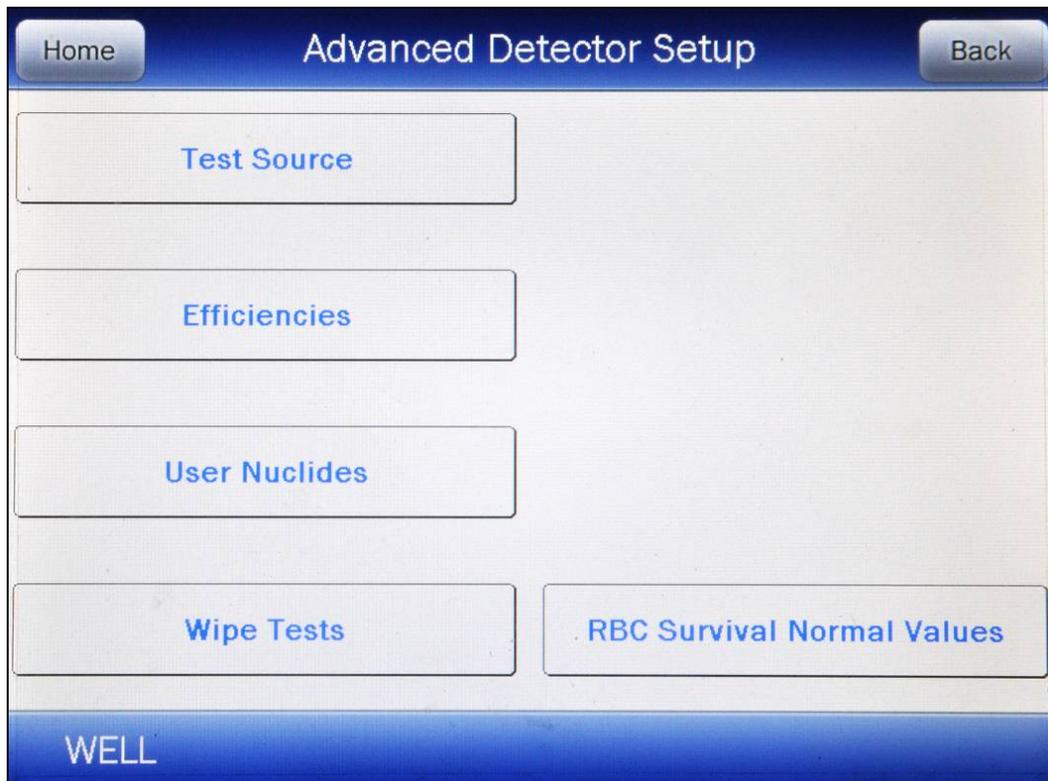
Figure 10-25 Advanced Detector Setup Screen

Touch the **RBC SURVIVAL NORMAL VALUES** button. Figure 10-26 Setup RBC Survival Normal Range Screen will appear.

Figure 10-26 Setup RBC Survival Normal Range Screen

If Normal Range values have been entered, they will also be printed.

Minimum Days

To input the minimum days, touch the *Minimum Days* field box. The Numeric Keypad screen will appear allowing for the minimum days entry.

Note: *The minimum value that can be input is1. 0. The maximum value that can be input is 99.0.*

Input the number of days using the keypad and touch the **ACCEPT** button. Figure 10-26 Setup RBC Survival Normal Range Screen will re-appear with the *Minimum Days* field box populated with the entered value.

To cancel inputting the minimum days, touch the **CANCEL** button on the numeric keypad.

Maximum Days

To input the maximum days, touch the *Maximum Days* field box. The Numeric Keypad screen will appear allowing for the maximum days entry.

> *Note:* *The minimum value that can be input is1. 0. The maximum value that can be input is 99.0.*

Input the number of days using the keypad and touch the **ACCEPT** button. Figure 10-26 Setup RBC Survival Normal Range Screen will re-appear with the *Maximum Days* field box populated with the entered value.

To cancel inputting the maximum days, touch the **CANCEL** button on the numeric keypad.

Clearing Days

To erase the set *Minimum Days* and *Maximum Days*, touch the **CLEAR** button located next to the *Maximum Days* field box. The field boxes will now be blank indicating that no Normal Values are set.

Patient Information

Adding a Patient

To add a patient, from Figure 10-2 Well Lab Tests Screen, touch the **RBC SURVIVAL** button. Figure 10-27 RBC Survival Measurement List Screen will appear.
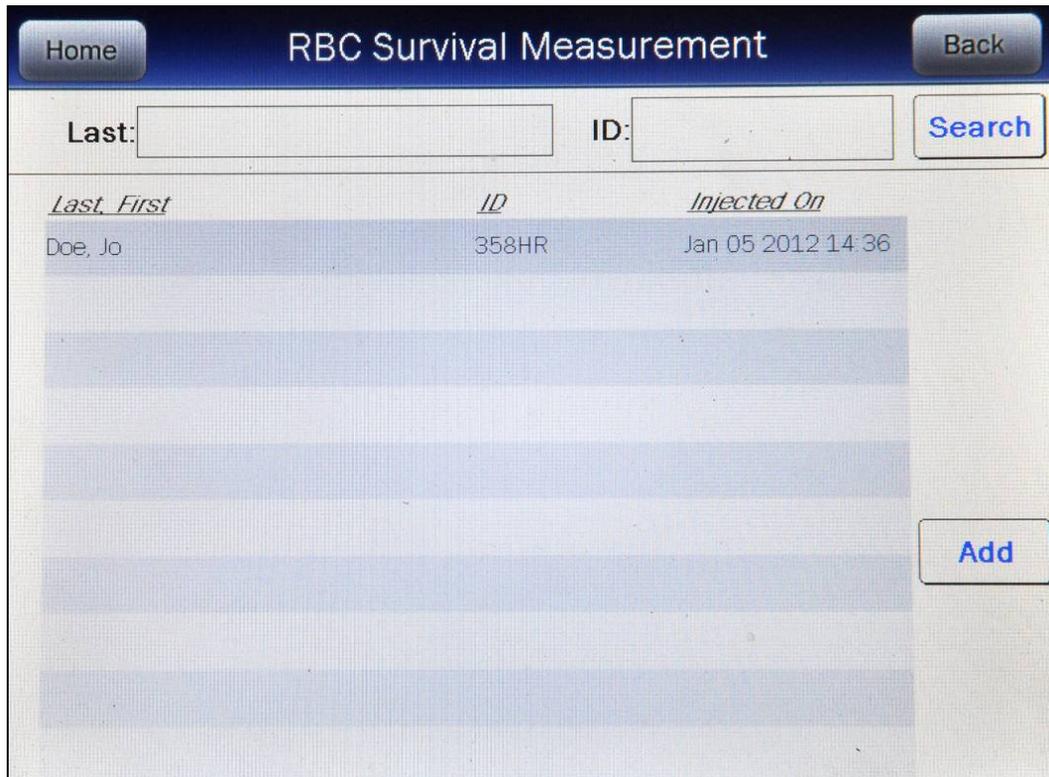
Figure 10-27 RBC Survival Measurement List Screen

Touch the **ADD** button. Figure 10-28 Add RBC Survival Test Screen will appear.

Figure 10-28 Add RBC Survival Test Screen

Patient Information

The top section of Figure 10-28 Add RBC Survival Test Screen contains the information relative to the Patient.

Note: *All fields in* ***bold*** *are required before you can begin the test. However, you may enter the Patient's first and last name, ID and Date of Birth and touch the* ***ACCEPT*** *button and enter the rest later. If the remaining data is not entered when trying to perform a test, the message "**RBC Survival** Please complete required test information" will appear.*

Patient First Name

This is a required field.

To enter the first name for the Patient, touch the ***First:*** field box. Figure 10-29 Alphanumeric Keypad Screen will appear.
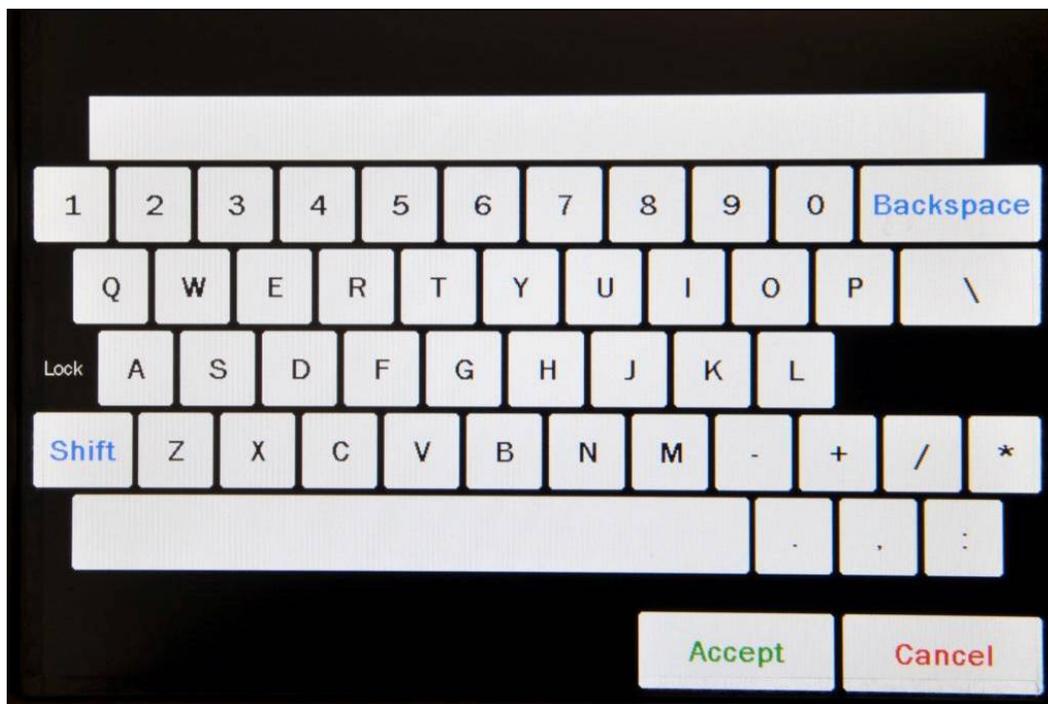
Figure 10-29 Alphanumeric Keypad Screen

Input the first name for the Patient and touch the **ACCEPT** button. Figure 10-28 Add RBC Survival Test Screen will re-appear with *First:* field box populated with the entered name. The name can contain any combination of 17 alphanumeric characters maximum.

To cancel any changes and return to Figure 10-28 Add RBC Survival Test Screen, touch the **CANCEL** button.

Last Name

This is a required field.

To enter the last name for the Patient, touch the *Last:* field box. Figure 10-29 Alphanumeric Keypad Screen will appear.

Input the last name for the Patient and touch the **ACCEPT** button. Figure 10-28 Add RBC Survival Test Screen will re-appear with *Last:* field box populated with the entered name. The name can contain any combination of 17 alphanumeric characters maximum.

To cancel any changes and return to Figure 10-28 Add RBC Survival Test Screen, touch the **CANCEL** button.

ID

This is a required field.

To enter the ID for the Patient, touch the *ID:* field box. Figure 10-29 Alphanumeric Keypad Screen will appear.

Input the ID for the Patient and touch the **ACCEPT** button. Figure 10-28 Add RBC Survival Test Screen will re-appear with *ID:* field box populated with the entered ID. The ID can contain any combination of 10 alphanumeric characters maximum.

To cancel any changes and return to Figure 10-28 Add RBC Survival Test Screen, touch the **CANCEL** button.

Date of Birth (DOB)

This is a required field.

To enter the date of birth (DOB) for the Patient, touch the *DOB:* field box. The Enter Date of Birth screen will appear.

The screen displays the currently set date and time. Above and below each of the fields are **+** and **–** buttons, respectively. To adjust the displayed value for a specific field, touch the **+** button to increase the displayed value or the **-** button to decrease the displayed value.

For the year, **+10** and **-10** buttons are provided to quickly change the tens column of the years.

Adjust the displayed date to show the date of birth of the Patient.

Touch the **ACCEPT** button to accept the set date. Figure 10-28 Add RBC Survival Test Screen will re-appear with the *DOB:* field box populated with the entered date.

To cancel any changes and return to Figure 10-28 Add RBC Survival Test Screen, touch the **CANCEL** button.

Sex

This is an optional field.

To enter the sex of Patient, touch the *Sex:* field box. Figure 10-29 Alphanumeric Keypad Screen will appear.

Input the sex of the Patient and touch the **ACCEPT** button. Figure 10-28 Add RBC Survival Test Screen will re-appear with *Sex:* field box populated with the entered sex. The acceptable entries are *M*, *m*, *F*, or *f.*

To cancel any changes and return to Figure 10-28 Add RBC Survival Test Screen, touch the **CANCEL** button.

Physician

This is an optional field.

To enter the Physician name for the Patient, touch the *Phys:* field box. Figure 10-29 Alphanumeric Keypad Screen will appear.

Input the Physician name and touch the **ACCEPT** button. Figure 10-28 Add RBC Survival Test Screen will re-appear with *Phys:* field box populated with the entered name. The name can contain any combination of 17 alphanumeric characters maximum.

To cancel any changes and return to Figure 10-28 Add RBC Survival Test Screen, touch the **CANCEL** button.

Technologist

This is an optional field.

To enter the Technologist ID/name performing the procedure, touch the *Tech:* field box. Figure 10-29 Alphanumeric Keypad Screen will appear.

Input the Technologist ID/name and touch the **ACCEPT** button. Figure 10-28 Add RBC Survival Test Screen will re-appear with *Tech:* field box populated with the entered ID/name. The ID/name can contain any combination of 17 alphanumeric characters maximum.

To cancel any changes and return to Figure 10-28 Add RBC Survival Test Screen, touch the **CANCEL** button.

Dosage Information

The bottom section of Figure 10-28 Add RBC Survival Test Screen contains the information relative to the Administered Dose.

The Activity, Calibration Date/Time and Lot Number may be determined from your measurements of the Dose in the Dose Calibrator or from the previously prepared Dose label.

Activity

This is a required field.

To input the Dosage's calibrated activity data, touch the *Activity:* field box. Figure 10-30 Enter Activity Screen will appear.
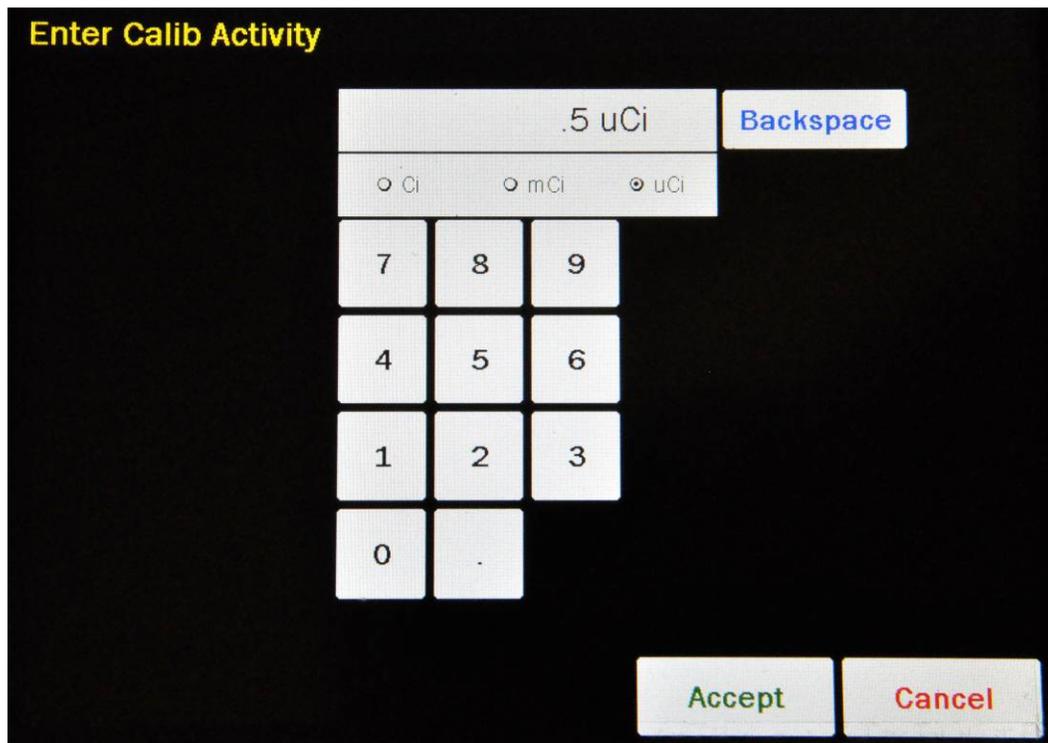
Figure 10-30 Enter Activity Screen

Input the activity value using the keypad and touch the appropriate radio button for the unit of measure of the Dose.

Note: *The available units will change depending on which unit of measurement is selected on the Setup screen. i.e. if set for Curies, the available units will be Ci, mCi and μCi; if set for Becquerels, the available units will be GBq, MBq and kBq.*

Touch the **ACCEPT** button. Figure 10-28 Add RBC Survival Test Screen will re-appear with *Activity:* field box populated with the entered activity.

To cancel any changes and return to Figure 10-28 Add RBC Survival Test Screen, touch the **CANCEL** button.

Calibration Date

This is a required field.

To input the Dosage's Calibration Date, touch the *Calibration Date:* field box. Figure 10-31 Date/Time Screen will appear.
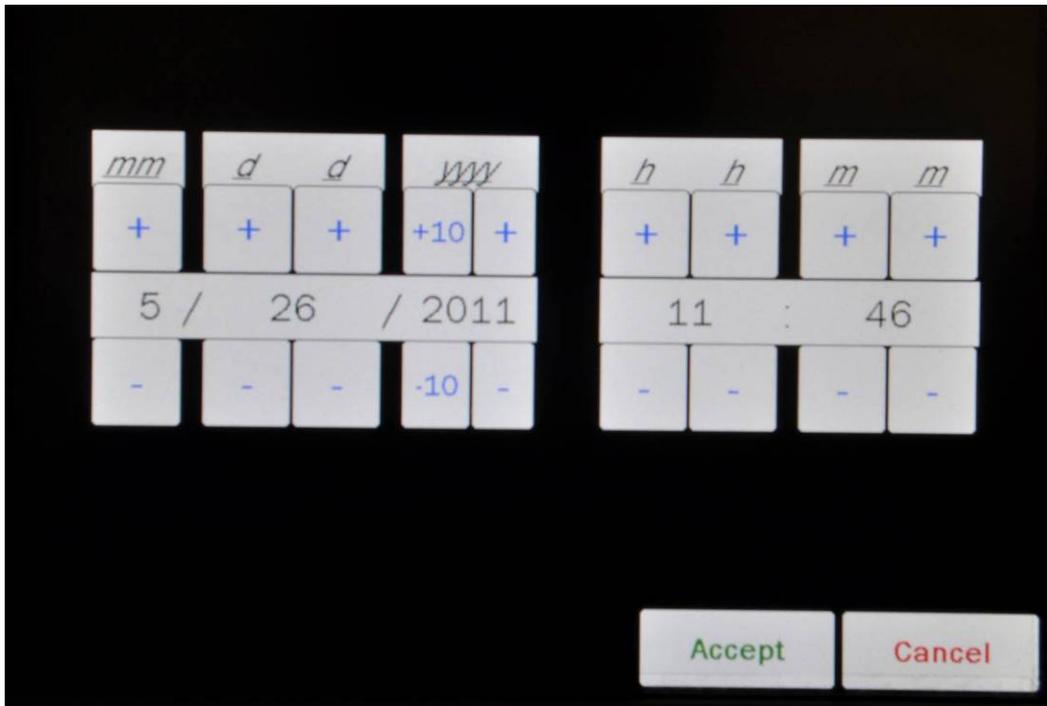
Figure 10-31 Date/Time Screen

The screen displays the currently set date and time. Above and below each of the fields are **+** and **–** buttons, respectively. To adjust the displayed value for a specific field, touch the **+** button to increase the displayed value or the **-** button to decrease the displayed value.

For the year, **+10** and **-10** buttons are provided to quickly change the tens column of the years.

Adjust the displayed date and time to show the calibration date/time of the Dose.

Touch the **ACCEPT** button to accept the set calibration date and time. Figure 10-28 Add RBC Survival Test Screen will re-appear with the *Calibration Date:* field box populated with the entered calibration date and time.

To cancel any changes and return to Figure 10-28 Add RBC Survival Test Screen, touch the **CANCEL** button.

Lot Number

This is a required field.

To enter the Lot Number of the Dose, touch the *Lot Num:* field box. Figure 10-29 Alphanumeric Keypad Screen will appear.

Input the Lot Number of the Dose and touch the **ACCEPT** button. Figure 10-28 Add RBC Survival Test Screen will re-appear with *Lot Num:* field box populated with the entry. The Lot Number can contain any combination of 10 alphanumeric characters maximum.

To cancel any changes and return to Figure 10-28 Add RBC Survival Test Screen, touch the **CANCEL** button.

Injection Date

This is a required field.

To input the Injection Date, touch the *Injection Date:* field box. Figure 10-31 Date/Time Screen will appear.

The screen displays the currently set date and time. Above and below each of the fields are **+** and **–** buttons, respectively. To adjust the displayed value for a specific field, touch the **+** button to increase the displayed value or the **-** button to decrease the displayed value.

For the year, **+10** and **-10** buttons are provided to quickly change the tens column of the years.

Adjust the displayed date and time to show the injection date/time of the Dose.

Touch the **ACCEPT** button to accept the set injection date and time. Figure 10-28 Add RBC Survival Test Screen will re-appear with the *Injection Date:* field box populated with the entered injection date and time.

To cancel any changes and return to Figure 10-28 Add RBC Survival Test Screen, touch the **CANCEL** button.

Count Time

The default Counting Time of 60 seconds is displayed in the *Count Time:* field box.

If it is desired to use a different Counting Time, touch the *Count Time:* field box.

The numeric keypad will appear. Input the desired counting time by touching the appropriate numbers on the keypad. Touch the **ACCEPT** button to accept the entered number. Touch the **CANCEL** button to abort any changes.

Figure 10-28 Add RBC Survival Test Screen will re-appear with *Count Time:* field box populated with the entered value.

Note: *The minimum count time that can be input is 10 seconds. The maximum count time that can be input is 9,999 seconds.*

Viewing/Editing Patient Information

Figure 10-32 RBC Survival Measurement List Screen

If there are no existing Patients in the database, the Patient List will be empty. If there are Patients in the database, all *active* Patients will be displayed. The list will display the Patient's name, ID and the Injection date and time (if already done).

The Patient List is sorted by their Injection time, latest one first. The number of pages (or screens) will be shown in the upper right corner of the screen indicating the length of the list. To scroll through the list, touch the **DOWN ARROW** (▼) button . The next group of 10 Patients will be displayed and the **UP ARROW** (▲) button will appear allowing the user to scroll up in the list.

There are three ways to locate a specific patient record:

1. Use the **UP ARROW** (▲) and **DOWN ARROW** (▼) buttons to move up or down in the Patient List.

2. Touch the *Last:* field box. Figure 10-29 Alphanumeric Keypad Screen will appear. Input the Patient's exact last name. If the exact spelling of the last name is not known, input the first letter of the last name and then touch the **WILDCARD** (**%**) button in the lower left of the alphanumeric keypad. For example, if you want to see all Patients with last names that begin with the letter "C", input "C%". Once the last name is input, touch the **ACCEPT** button. Figure 10-32 RBC Survival Measurement List Screen will re-appear with *Last:* field box populated with the entered search criteria. Touch the

SEARCH button. Any Patient that matches the requested search criteria will be displayed.

3. Touch the *ID:* field box. Figure 10-29 Alphanumeric Keypad Screen will appear. Input the Patient's exact ID. If the exact spelling of the ID is not known, input the first character of the ID and then touch the **WILDCARD** (**%**) button in the lower left of the alphanumeric keypad. For example, if you want to see all Patients with IDs that begin with the number "3", input "3%". Once the ID is input, touch the **ACCEPT** button. Figure 10-32 RBC Survival Measurement List Screen will re-appear with *ID:* field box populated with the entered search criteria. Touch the **SEARCH** button. Any Patient that matches the requested search criteria will be displayed.

Note: *The* **Last:** *and* **ID:** *field boxes can be used in conjunction with each other. That is, the* **Last:** *field box can contain "C%' and the* **ID:** *field box can contain "3%" and once the* **SEARCH** *button is touched, the screen will display all active Patients with last names that begin with "C" and IDs that begin with "3".*

Once the desired Patient is displayed in the screen, touch the Patient. The entire line for the selected Patient will become highlighted and an **EDIT** button will appear in the lower portion of the screen as shown in Figure 10-33 Highlighted Patient Screen.
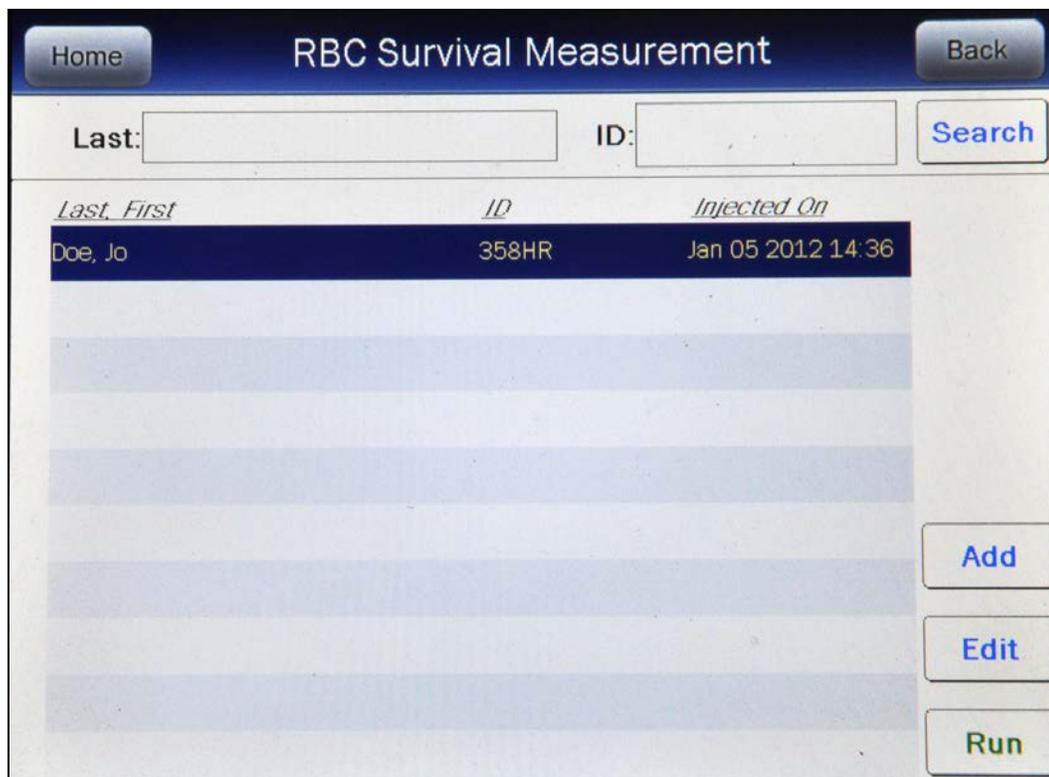
Figure 10-33 Highlighted Patient Screen

Touch the **EDIT** button. Figure 10-34 Edit Patient Information Screen will appear showing the selected Patient's information.

Figure 10-34 Edit Patient Information Screen

Edit the desired information as described in the Patient Information section beginning on page 10-45.

Touch the **ACCEPT** button to save the changes or touch the **CANCEL** button to cancel the changes and return to Figure 10-32 RBC Survival Measurement List Screen.

Deleting a Patient

As long as no measurements have been performed for a Patient, that Patient can be deleted from the database. Once a measurement has been performed, that Patient can not be deleted from the database.

To delete a Patient from the database, find the desired Patient by following the instructions for Viewing/Editing Patient Information beginning on page 10-52.

When Figure 10-34 Edit Patient Information Screen appears, if no measurements have been performed on the selected Patient, a **DELETE** button will be displayed on the lower part of the screen. If the **DELETE** button is not displayed, the Patient can not be deleted from the database.

Touch the **DELETE** button. The Delete RBC Survival Test confirmation screen will appear.

To cancel the deletion of the selected Patient, touch the **NO** button. Figure 10-34 Edit Patient Information Screen will re-appear displaying the selected Patient's information.

To delete the selected Patient, touch the **YES** button. Figure 10-32 RBC Survival Measurement List Screen will re-appear with the selected Patient removed from the list.

Making Measurements

Before making any measurements on a patient, verify that all required patient information has been entered and that the Auto Calibration and Background measurements have been performed for the current day.

To select a Patient for the test, touch the desired Patient in the Patient List on Figure 10-32 RBC Survival Measurement List Screen. Figure 10-35 RBC Survival Measurement Screen with Highlighted Patient will appear.

Figure 10-35 RBC Survival Measurement Screen with Highlighted Patient

Touch the **RUN** button to begin the test. Figure 10-36 RBC Survival Test Screen will appear.

Figure 10-36 RBC Survival Test Screen

Touch the **MEASURE PATIENT** button. Figure 10-37 RBC Survival Measurement Screen will appear.
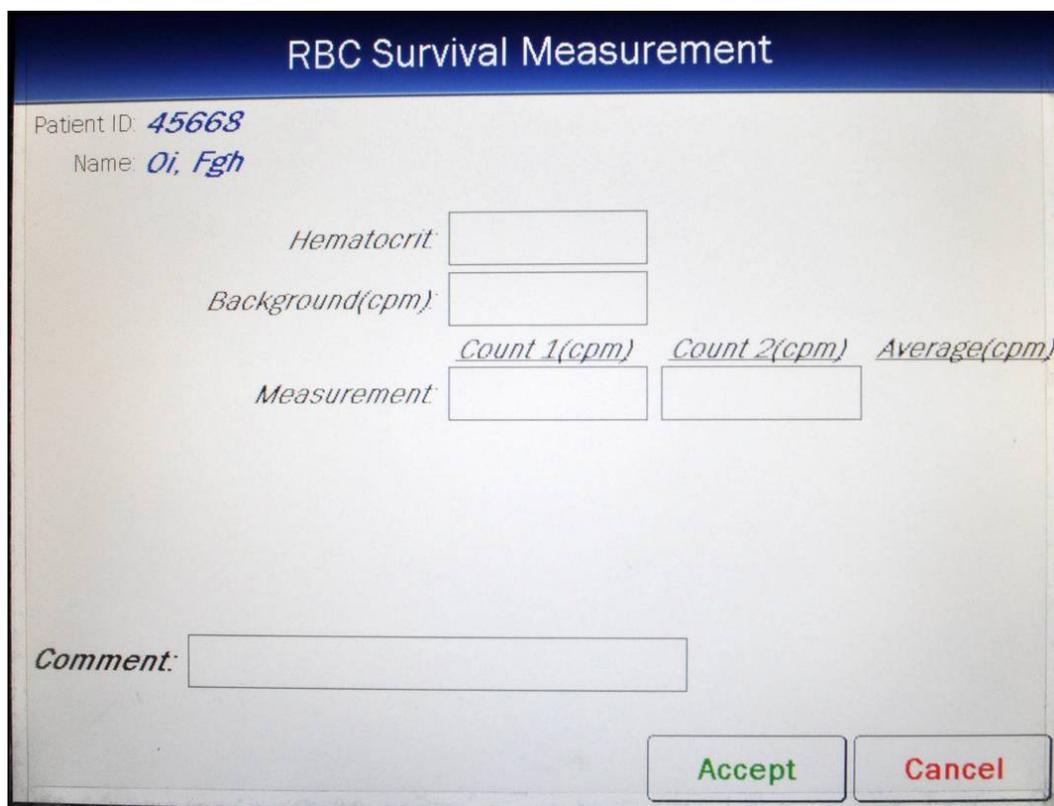
Figure 10-37 RBC Survival Measurement Screen

Hematocrit

The Hematocrit percentage must be input.

The Hematocrit percentage is the Hematocrit of a blood sample withdrawn from the patient ten to twenty minutes post injection.

To input the Hematocrit percentage, touch the *Hematocrit:* field box. Figure 10-19 Numeric Keypad Screen will appear allowing for the hematocrit percentage entry.

Note: The minimum value that can be input is 0.1. The maximum value that can be input is 100.0.

Input the percentage using the keypad and touch the **ACCEPT** button. Figure 10-37 RBC Survival Measurement Screen will re-appear with the *Hematocrit:* field box populated with the entered value.

To cancel inputting the Hematocrit percentage, touch the **CANCEL** button on the numeric keypad.

Background

If there is a valid room Background measurement, the ***Background(cpm):*** field box will be populated with the measured value and the measurement date and time will be displayed next to the field box.

To measure Background, touch the ***Background(cpm):*** field box. The Background Measurement screen will appear.

Verify that there are no radioactive sources nearby and perform the Background measurement. Once the measurement is accepted, Figure 10-37 RBC Survival Measurement Screen will re-appear with the ***Background(cpm):*** field box populated with the measured value.

Measurement

Touch the ***Measurement Count 1(cpm)*** field box, The Measure RBC Survival Sample screen will appear.

Place the sample in the well and perform the Sample measurement. Once the measurement is accepted, Figure 10-38 RBC Survival After Measurement Screen will appear with the ***Measurement Count 1(cpm)*** field box populated with the measured value.

The ***Count 2(cpm)*** measurement is optional.

Figure 10-38 RBC Survival After Measurement Screen

Comment

> To enter an optional comment for the measurement, touch the *Comment:* field box. Figure 10-29 Alphanumeric Keypad Screen will appear.
>
> Input the desired comment for the measurement and touch the **ACCEPT** button. Figure 10-38 RBC Survival After Measurement Screen will re-appear with the *Comment:* field box populated with the entered comment. The comment can contain any combination of 22 alphanumeric characters maximum.

Finish Measurement

> To abort the Sample measurements, touch the **CANCEL** button. Figure 10-36 RBC Survival Test Screen will re-appear.
>
> After all required measurements are made, touch the **ACCEPT** button to accept the measurement results. The measurements will be saved to the database and Figure 10-39 RBC Survival Measurement Accepted Screen will appear.

Figure 10-39 RBC Survival Measurement Accepted Screen

> To perform another measurement, touch the **MEASURE PATIENT** button.

After four measurements have been made, a least squares fit will be performed to find the number of days for 50% survival.

View Normal Values

To view the RBC Survival Normal Range settings, touch the **VIEW NORMAL** button. Figure 10-40 RBC Survival View Normal Range Screen will appear.
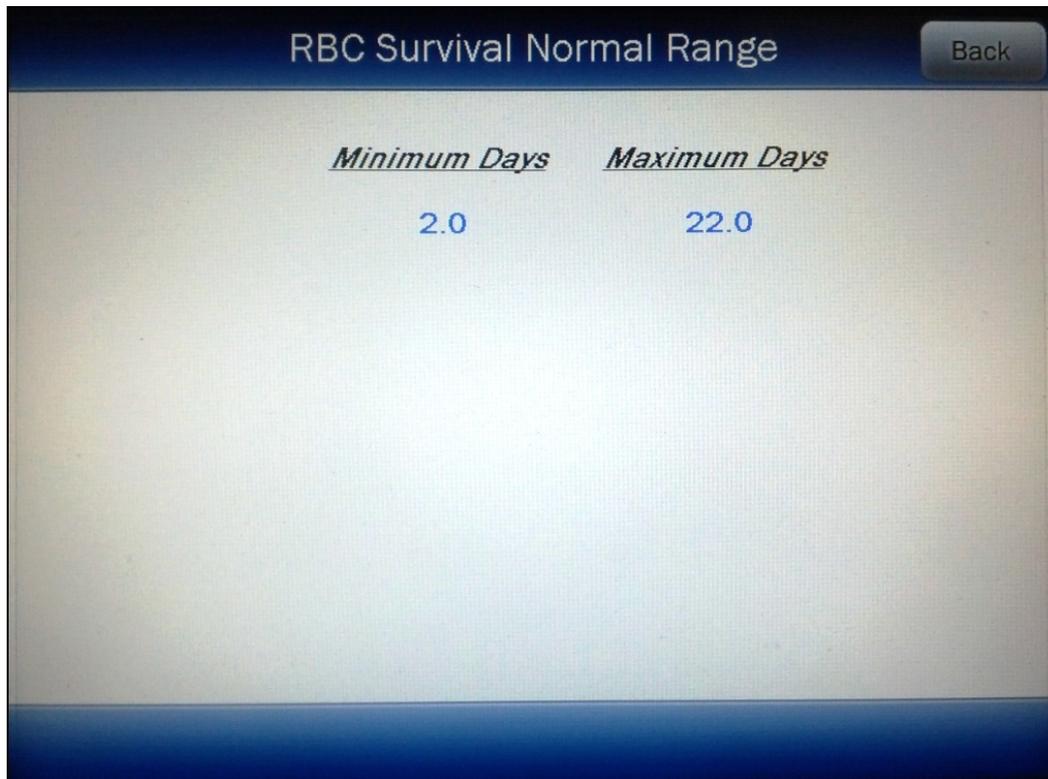
Figure 10-40 RBC Survival View Normal Range Screen

Touch the **BACK** button to return to Figure 10-39 RBC Survival Measurement Accepted Screen.

Patient Report

A Patient measurement report can be printed at any time within the process.

Follow the instructions in the Viewing/Editing Patient Information section beginning on page 10-52 to select a Patient to print the report for.

Touch the desired Patient in the Patient List on Figure 10-32 RBC Survival Measurement List Screen. Figure 10-35 RBC Survival Measurement Screen with Highlighted Patient will appear.

Touch the **RUN** button. The details of the measurements will be displayed similar to that shown in Figure 10-39 RBC Survival Measurement Accepted Screen.

Touch the **PRINT** button to print the report.

Viewing Measurements

Specific measurement test results and spectrums can be viewed.

Follow the instructions in the Viewing/Editing Patient Information section beginning on page 10-52 to select a Patient to view the measurement results.

Touch the desired Patient in the Patient List on Figure 10-32 RBC Survival Measurement List Screen. Figure 10-35 RBC Survival Measurement Screen with Highlighted Patient will appear.

Touch the **RUN** button. The details of the measurements will be displayed similar to that shown in Figure 10-39 RBC Survival Measurement Accepted Screen.

To view the test result measurements, touch any of the blue highlighted count measurements. A screen similar to that shown in Figure 10-41 RBC Survival – View Measurement Results Screen will appear.

Figure 10-41 RBC Survival – View Measurement Results Screen

To return to Figure 10-39 RBC Survival Measurement Accepted Screen, touch the **BACK** button.

To view the spectrum for a specific measurement, touch the blue highlighted count field box beside the desired measurement. A Spectrum Screen (similar to Figure 10-22 Spectrum Screen) will appear.

A Region of Interest may be defined using the **BLUE** and **GREEN ARROW** buttons to place vertical line cursors around the ROI. **DOUBLE ARROW** buttons move the cursor approximately 75 energy channels. **SINGLE ARROW** buttons move the cursor approximately 7.5 energy channels.

Note: *The actual energy channel keV will vary depending upon the Auto Calibration.*

When the vertical cursor is moved, the channel energy (keV) and the number of counts in that energy channel are displayed. Once the vertical cursors are set, the total counts in the ROI are displayed.

To print the spectrum, touch the **PRINT** button.

To return to Figure 10-41 RBC Survival – View Measurement Results Screen, touch the **BACK** button.

Completing a Patient

When all measurements have been performed on a Patient, the Patient should be removed from the list of patients to be measured and transferred to the list of patients to be displayed in the Reports Module.

A Patient can be completed after any measurement is made. The most likely place to do this would be after all Patient measurements have been made.

Follow the instructions in the Viewing/Editing Patient Information section beginning on page 10-52 to select a Patient to complete.

Touch the desired Patient in the Patient List on Figure 10-32 RBC Survival Measurement List Screen. Figure 10-35 RBC Survival Measurement Screen with Highlighted Patient will appear.

Touch the **RUN** button. The details of the measurements will be displayed similar to that shown in Figure 10-39 RBC Survival Measurement Accepted Screen.

Touch the **COMPLETE** button. Figure 10-42 Complete RBC Survival Test Confirmation Screen will appear.
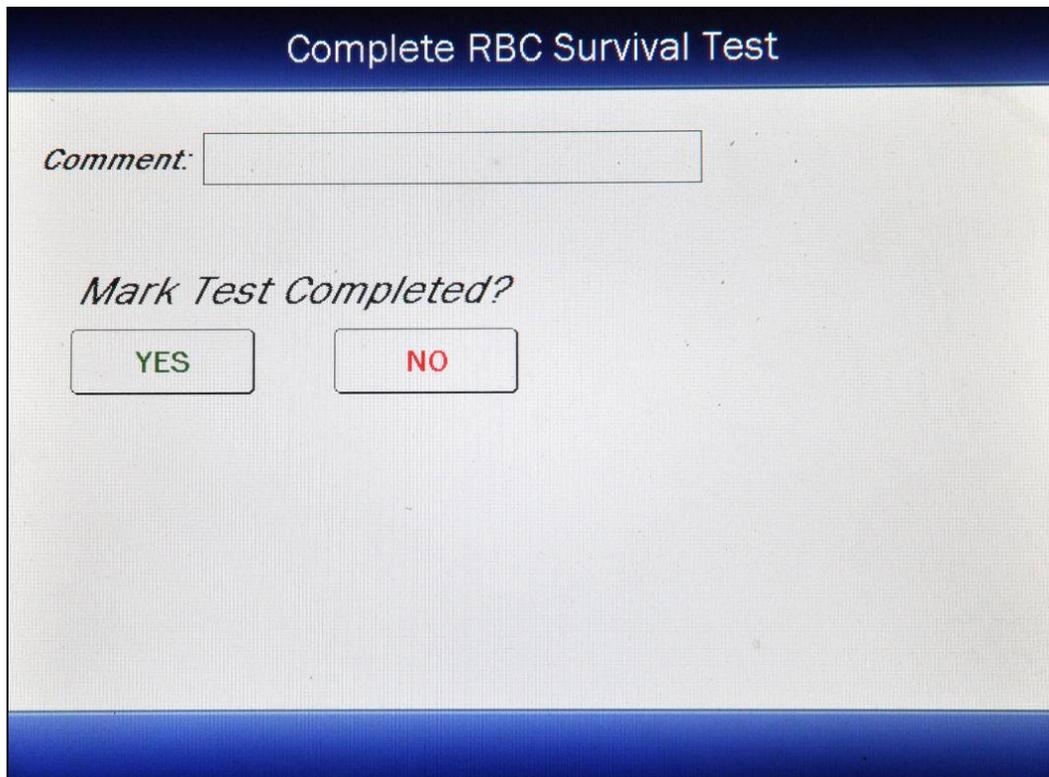
Figure 10-42 Complete RBC Survival Test Confirmation Screen

To enter an optional comment for the Patient, touch the *Comment:* field box. Figure 10-29 Alphanumeric Keypad Screen will appear.

Input the desired comment for the Patient and touch the **ACCEPT** button. Figure 10-42 Complete RBC Survival Test Confirmation Screen will re-appear with the *Comment:* field box populated with the entered comment. The comment can contain any combination of 22 alphanumeric characters maximum.

If more measurements are to be made for the Patient, touch the **NO** button. Figure 10-39 RBC Survival Measurement Accepted Screen will re-appear and the Patient will remain in the list of patients to be measured.

To mark the Patient as completed, touch the **YES** button. Figure 10-32 RBC Survival Measurement List Screen will re-appear with the selected Patient removed from the list of patients to be measured. The Patient has been moved to the list of Patients to be displayed in the Reports Module (reference CHAPTER 11: REPORTS).

This page intentionally left blank.

CHAPTER 11

REPORTS

GENERAL

The Reports module is used to view and print reports of all tests which have been saved to the database.

Figure 11-1 Well Counter Main Screen

From Figure 11-1 Well Counter Main Screen, touch the **REPORTS** button. Figure 11-2 Reports Screen will appear.
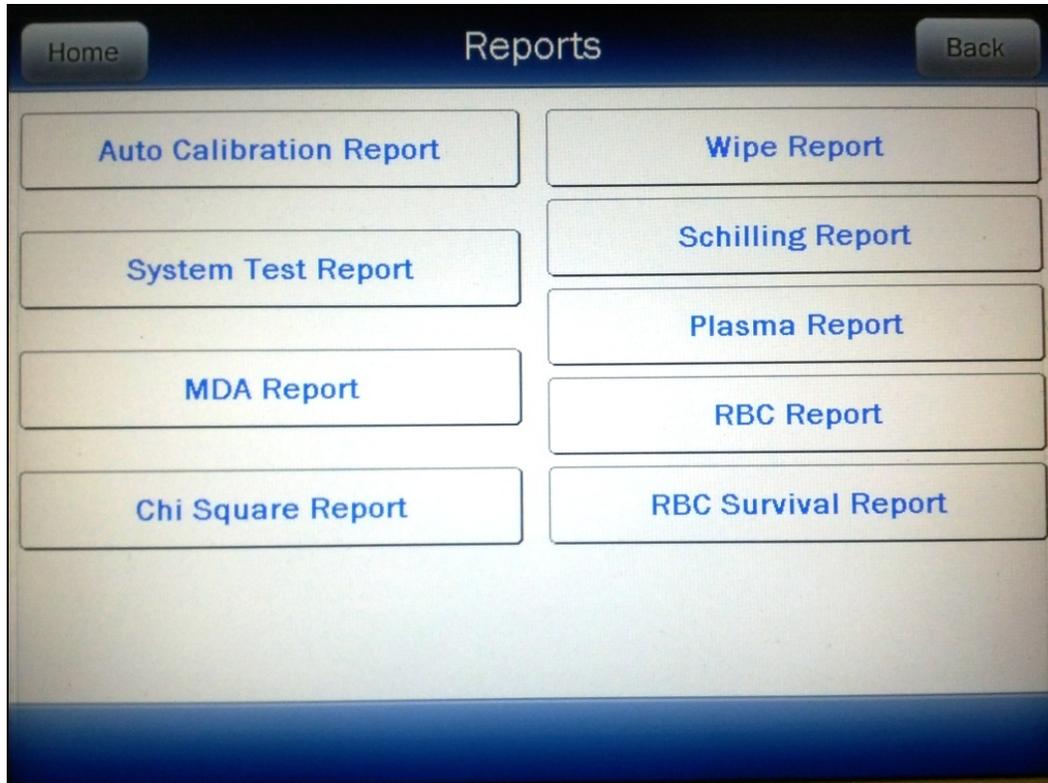
Figure 11-2 Reports Screen

To exit Figure 11-2 Reports Screen, touch the **HOME** or **BACK** button. Figure 11-1 Well Counter Main Screen will re-appear.

AUTO CALIBRATION REPORT

From Figure 11-2 Reports Screen, touch the **AUTO CALIBRATION REPORT** button. Figure 11-3 Auto Calibration Search Screen will appear.
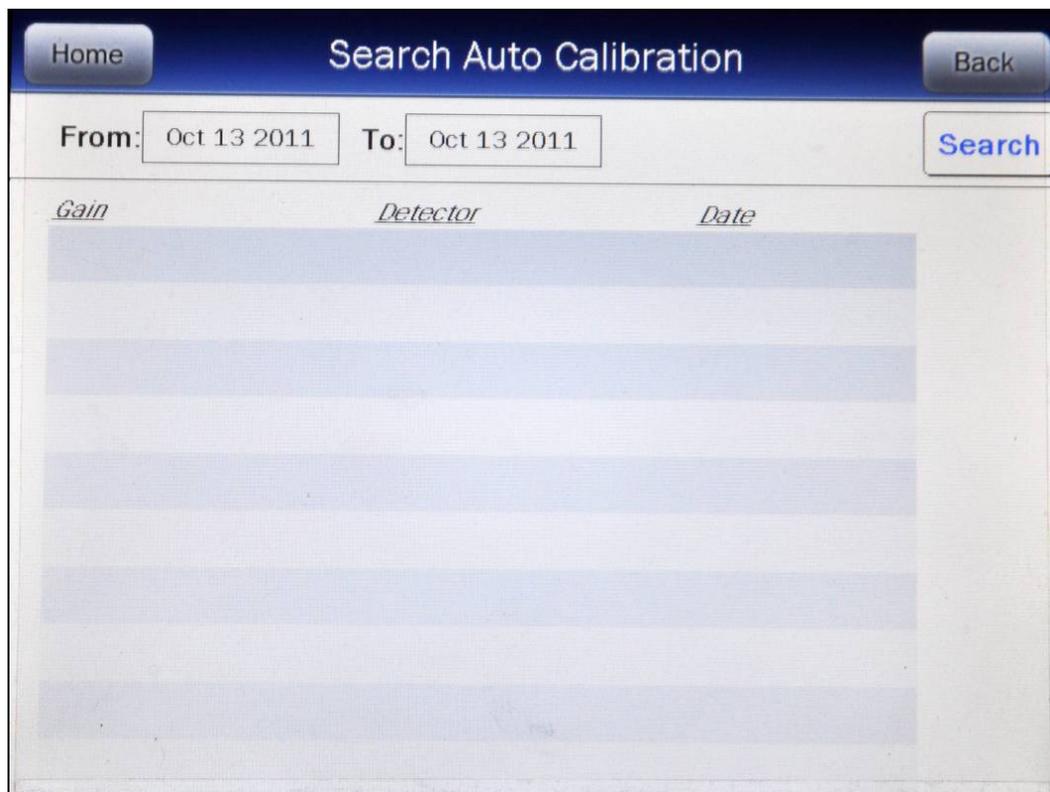
Figure 11-3 Auto Calibration Search Screen

To exit Figure 11-3 Auto Calibration Search Screen,

- touch the **BACK** button – Figure 11-2 Reports Screen will re-appear or
- touch the **HOME** button – Figure 11-1 Well Counter Main Screen will appear.

The Auto Calibration results are searchable by using a date range. The default *From:* and *To:* dates are "today".

Set Date

To change the From date, touch the *From:* field box. The Enter Start Date screen will appear.

The screen displays the currently set date. Above and below each of the fields are **+** and **–** buttons, respectively. To adjust the displayed value for a specific field, touch the **+** button to increase the displayed value or the **–** button to decrease the displayed value.

For the year, **+10** and **-10** buttons are provided to quickly change the tens column of the years.

Touch the **ACCEPT** button to accept the set date or the **CANCEL** button to cancel any changes. Figure 11-3 Auto Calibration Search Screen will re-appear showing the set date.

To change the To date, touch the *To:* field box. The Enter End Date screen will appear.

The screen displays the currently set date. Above and below each of the fields are **+** and **–** buttons, respectively. To adjust the displayed value for a specific field, touch the **+** button to increase the displayed value or the **–** button to decrease the displayed value.

For the year, **+10** and **-10** buttons are provided to quickly change the tens column of the years.

Touch the **ACCEPT** button to accept the set date or the **CANCEL** button to cancel any changes. Figure 11-3 Auto Calibration Search Screen will re-appear showing the set date.

Search

When the From and To dates are correct, touch the **SEARCH** button. The screen displays a listing of the data for the Auto Calibrations performed within the specified date range as shown in Figure 11-4 Auto Calibration Search Screen after Search.

Figure 11-4 Auto Calibration Search Screen after Search

Note: *If the search results in more then 100 items, the message "**Search Auto Call Error** More then 100 items have been returned Please refine criteria" will appear. Refine the search by narrowing the date range to search for.*

To exit Figure 11-4 Auto Calibration Search Screen after Search,

- touch the **BACK** button – Figure 11-2 Reports Screen will re-appear or

- touch the **HOME** button – Figure 11-1 Well Counter Main Screen will appear.

The listing is in reverse chronological order (newest at the top of the list). The length of the list will vary depending on how many Auto Calibrations have been performed between the selected dates. If there are more than 10 results, the number of pages (or screens) will be shown in the upper right corner of the screen indicating the length of the list. To scroll through the list, touch the **DOWN ARROW** (▼) button . The next group of 10 results will be displayed and the **UP ARROW** (▲) button will appear allowing the user to scroll up in the list.

Summary Report

If a printer is attached to the system, a summary report of the search results can be printed by touching the **PRINT** button.

Detailed Report

To obtain a detailed report for a particular Auto Calibration result, touch the desired result on the list. The result will become highlighted and a **VIEW** button will appear on the screen as shown in Figure 11-5 Auto Calibration Search Screen with Highlighted Calibration. (If necessary, scroll the list until the desired result is displayed.)

Figure 11-5 Auto Calibration Search Screen with Highlighted Calibration

Touch the **VIEW** button. Figure 11-6 Auto Calibration Report Screen will appear displaying the detailed report for the selected Auto Calibration result.
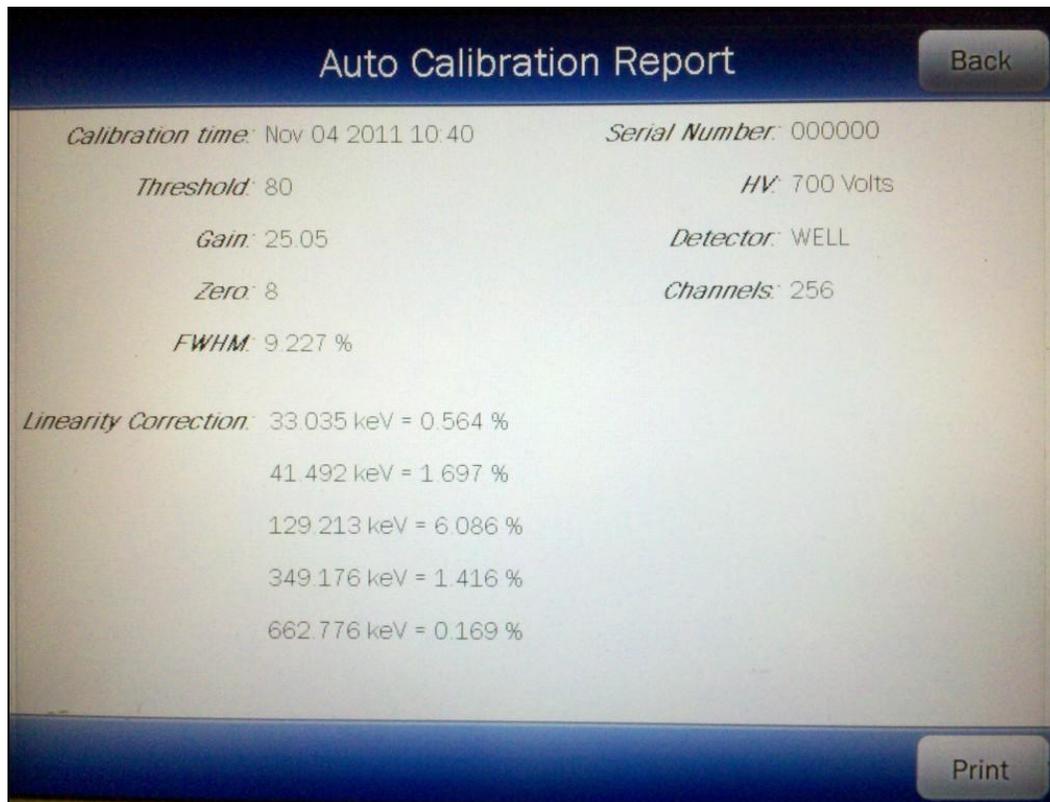
Figure 11-6 Auto Calibration Report Screen

If a printer is attached to the system, the detailed report of the selected Auto Calibration result can be printed by touching the **PRINT** button.

From Figure 11-6 Auto Calibration Report Screen, touch the **BACK** button to return to Figure 11-4 Auto Calibration Search Screen after Search.

SYSTEM TEST REPORT

From Figure 11-2 Reports Screen, touch the **SYSTEM TEST REPORT** button. The Search System Tests Screen will appear and be similar to that shown in Figure 11-3 Auto Calibration Search Screen.

The System Test results are searchable by using a date range. The default *From:* and *To:* dates are "today".

Set Date

To change the From date, touch the *From:* field box. The Enter Start Date screen will appear.

The screen displays the currently set date. Above and below each of the fields are **+** and **–** buttons, respectively. To adjust the displayed value for a specific field, touch the **+** button to increase the displayed value or the **–** button to decrease the displayed value.

For the year, **+10** and **-10** buttons are provided to quickly change the tens column of the years.

Touch the **ACCEPT** button to accept the set date or the **CANCEL** button to cancel any changes. The Search System Tests Screen will re-appear showing the set date.

To change the To date, touch the *To:* field box. The Enter End Date screen will appear.

The screen displays the currently set date. Above and below each of the fields are **+** and **–** buttons, respectively. To adjust the displayed value for a specific field, touch the **+** button to increase the displayed value or the **–** button to decrease the displayed value.

For the year, **+10** and **-10** buttons are provided to quickly change the tens column of the years.

Touch the **ACCEPT** button to accept the set date or the **CANCEL** button to cancel any changes. The Search System Tests Screen will re-appear showing the set date.

Search

When the From and To dates are correct, touch the **SEARCH** button. The screen displays a listing of the data for the System Tests performed within the specified date range as shown in Figure 11-7 System Tests Search Screen after Search.
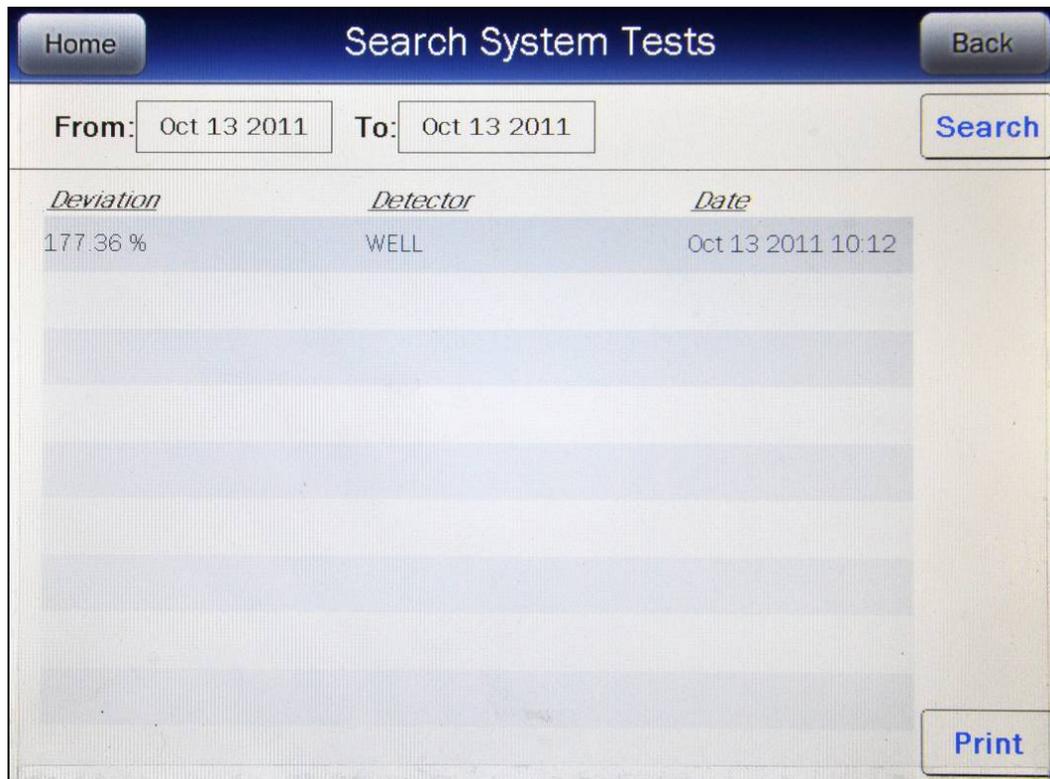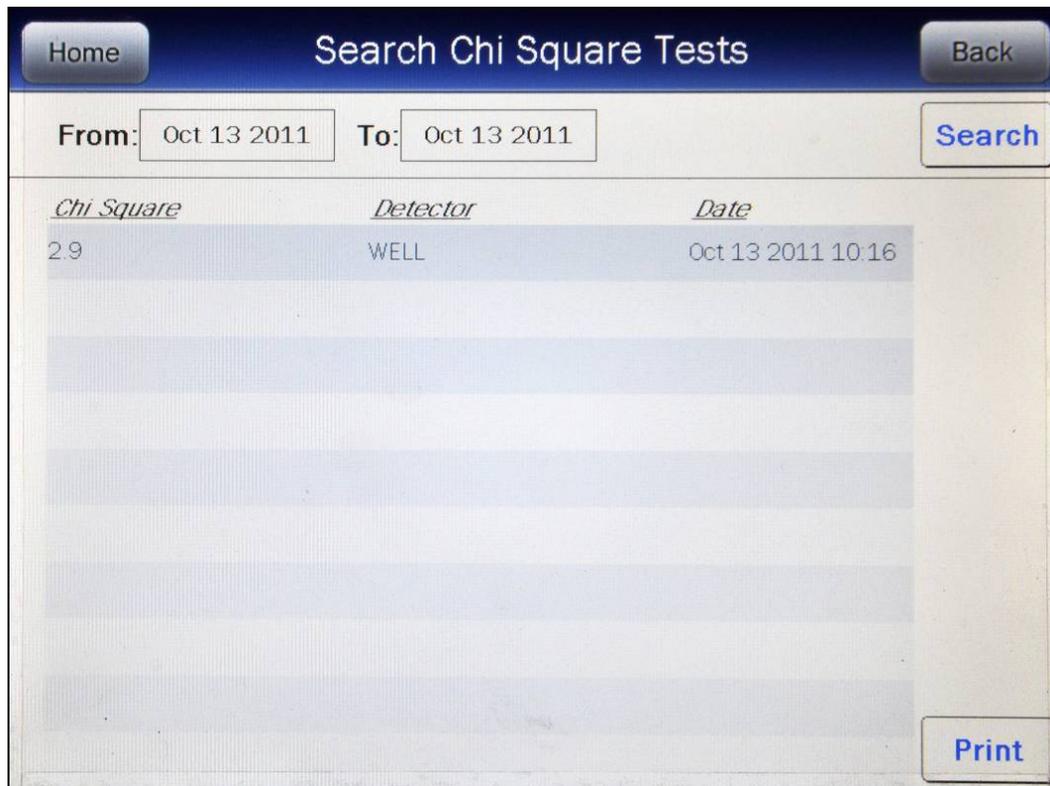
Figure 11-7 System Tests Search Screen after Search

Note: *If the search results in more then 100 items, the message "__Search System Test__ __Error__ More then 100 items have been returned Please refine criteria" will appear. Refine the search by narrowing the date range to search for.*

To exit Figure 11-7 System Tests Search Screen after Search,

- touch the **BACK** button – Figure 11-2 Reports Screen will re-appear or
- touch the **HOME** button – Figure 11-1 Well Counter Main Screen will appear.

The listing is in reverse chronological order (newest at the top of the list). The length of the list will vary depending on how many System Tests have been performed between the selected dates. If there are more than 10 results, the number of pages (or screens) will be shown in the upper right corner of the screen indicating the length of the list. To scroll through the list, touch the **DOWN ARROW** (▼) button . The next group of 10 results will be displayed and the **UP ARROW** (▲) button will appear allowing the user to scroll up in the list.

Summary Report

If a printer is attached to the system, a summary report of the search results can be printed by touching the **PRINT** button.

Detailed Report

To obtain a detailed report for a particular System Test result, touch the desired result on the list. The result will become highlighted and a **VIEW** button will appear on the screen as shown in Figure 11-8 System Tests Search Screen with Highlighted Test. (If necessary, scroll the list until the desired result is displayed.)
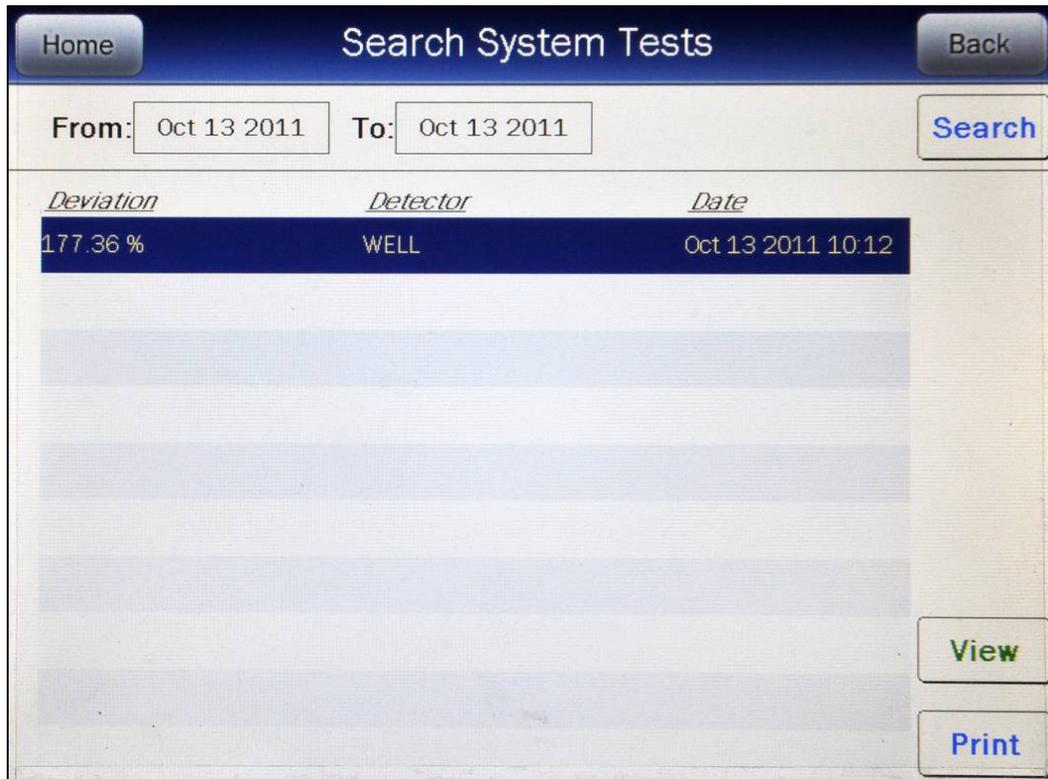
Figure 11-8 System Tests Search Screen with Highlighted Test

Touch the **VIEW** button. Figure 11-9 System Test Result Screen will appear displaying the detailed report for the selected System Test result.
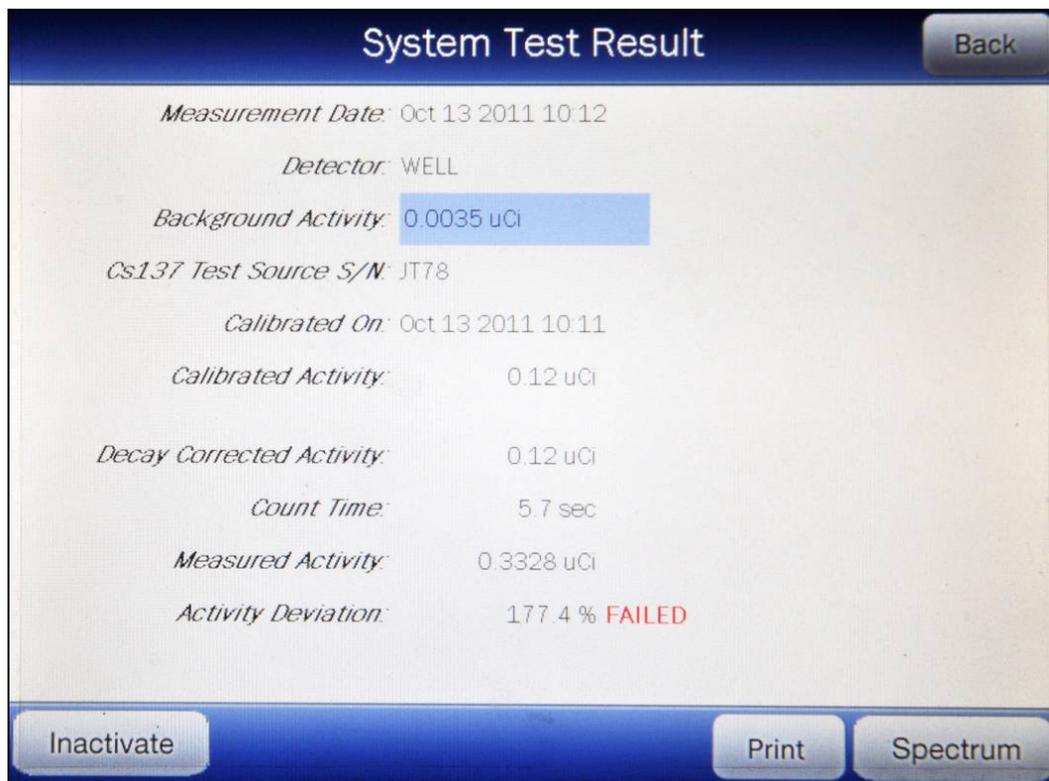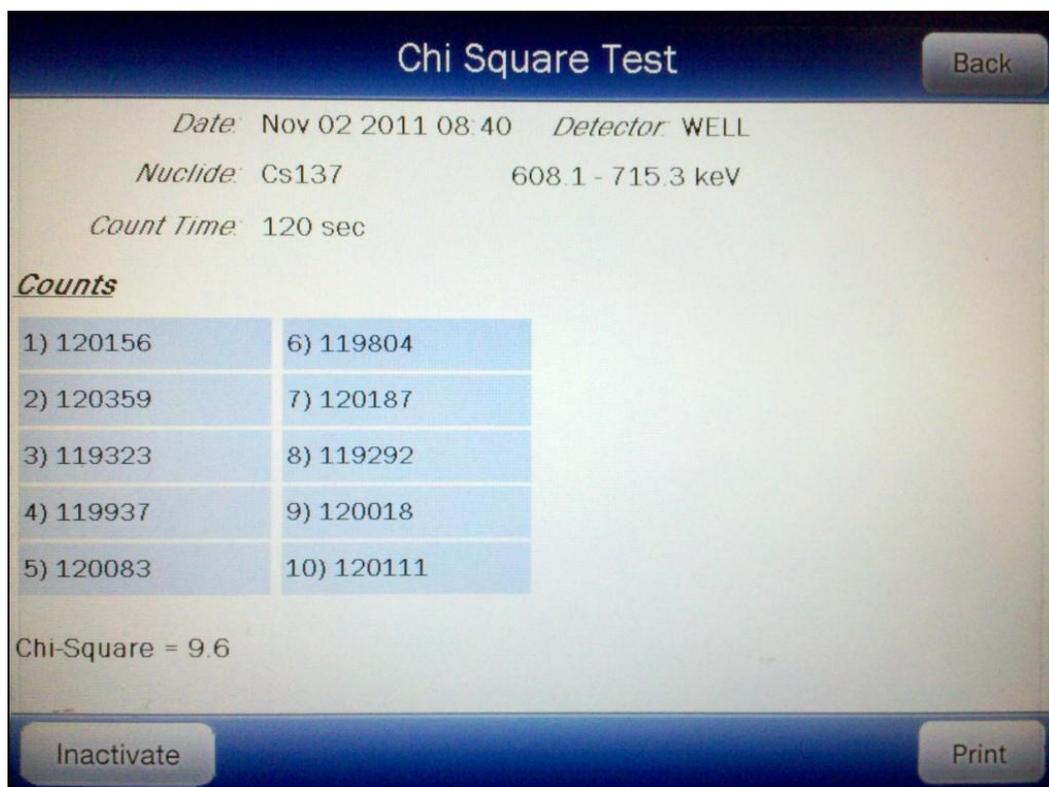
Figure 11-9 System Test Result Screen

The following sections describe the functions that are available from Figure 11-9 System Test Result Screen.

Print Detailed Result

If a printer is attached to the system, the detailed report of the selected System Test result can be printed by touching the **PRINT** button.

Inactivate a System Test

A System Test result can be inactivated. Reasons for doing this can be:

- the test was a simulation for training,
- a mistake was made doing the test, etc.

The System Test result will still be saved in the database. When the test is displayed on the list, it will be shown with a line through the characters. When the summary report is printed, the word "INACTIVE" and the optional comment will appear instead of the data. When the individual report is printed, "INACTIVE" and the optional comment will appear.

To inactivate the selected System Test, touch the **INACTIVATE** button. Figure 11-10 Inactivate Record Screen will appear.
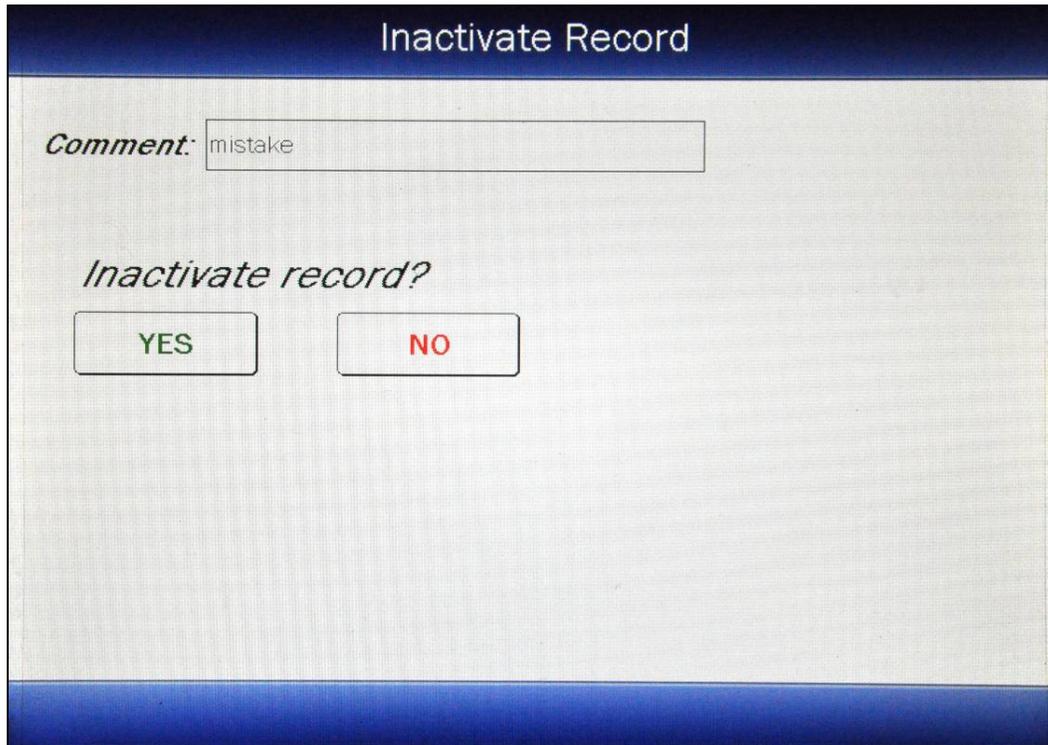
Figure 11-10 Inactivate Record Screen

To enter an optional comment (description or reason) for the selected System Test result inactivation, touch the **Comment:** field box. Figure 11-11 Alphanumeric Keypad Screen will appear.

Figure 11-11 Alphanumeric Keypad Screen

Input the desired comment (description or reason) for the invalidation and touch the **ACCEPT** button. Figure 11-10 Inactivate Record Screen will re-appear with the *Comment:* field box populated with the entered comment. The comment can contain any combination of 22 alphanumeric characters maximum.

To cancel any changes and return to Figure 11-10 Inactivate Record Screen, touch the **CANCEL** button.

To complete the inactivation of the selected System Test result, touch the **YES** button.

If it is decided not to inactivate the selected System Test result, touch the **NO** button.

View System Test Spectrum

To view the Cs137 System Test Spectrum, touch the **SPECTRUM** button. Figure 11-12 System Test Spectrum Screen will appear.

Figure 11-12 System Test Spectrum Screen

A Region of Interest may be defined using the **BLUE** and **GREEN** **ARROW** buttons to place vertical line cursors around the ROI. **DOUBLE ARROW** buttons move the cursor approximately 75 energy channels. **SINGLE ARROW** buttons move the cursor approximately 7.5 energy channels.

Note: The actual energy channel keV will vary depending upon the Auto Calibration.

When the vertical cursor is moved, the channel energy (keV) and the number of counts in that energy channel are displayed. Once the vertical cursors are set, the total counts in the ROI are displayed.

To print the spectrum, touch the **PRINT** button.

To return to Figure 11-9 System Test Result Screen, touch the **BACK** button.

View Background Spectrum

To view the spectrum of the background that was measured previous to the selected System Test, touch the blue highlighted *Background Activity:* count rate box. The screen will appear similar to that shown in Figure 11-12 System Test Spectrum Screen. The operation of the **ARROW** buttons is the same as described above.

Exit Detailed Result

To exit Figure 11-9 System Test Result Screen, touch the **BACK** button. Figure 11-7 System Tests Search Screen after Search will re-appear.

MDA REPORT

From Figure 11-2 Reports Screen, touch the **MDA REPORT** button. The Search MDA Tests Screen will appear and be similar to that shown in Figure 11-3 Auto Calibration Search Screen.

The MDA Test results are searchable by using a date range. The default *From:* and *To:* dates are "today".

Set Date

To change the From date, touch the *From:* field box. The Enter Start Date screen will appear.

The screen displays the currently set date. Above and below each of the fields are **+** and **–** buttons, respectively. To adjust the displayed value for a specific field, touch the **+** button to increase the displayed value or the **–** button to decrease the displayed value.

For the year, **+10** and **-10** buttons are provided to quickly change the tens column of the years.

Touch the **ACCEPT** button to accept the set date or the **CANCEL** button to cancel any changes. The Search MDA Tests Screen will re-appear showing the set date.

To change the To date, touch the *To:* field box. The Enter End Date screen will appear.

The screen displays the currently set date. Above and below each of the fields are **+** and **–** buttons, respectively. To adjust the displayed value for a specific field, touch the **+** button to increase the displayed value or the **–** button to decrease the displayed value.

For the year, **+10** and **-10** buttons are provided to quickly change the tens column of the years.

Touch the **ACCEPT** button to accept the set date or the **CANCEL** button to cancel any changes. The Search MDA Tests Screen will re-appear showing the set date.

Search

When the From and To dates are correct, touch the **SEARCH** button. The screen displays a listing of the data for the MDA Tests performed within the specified date range as shown in Figure 11-13 MDA Tests Search Screen after Search.
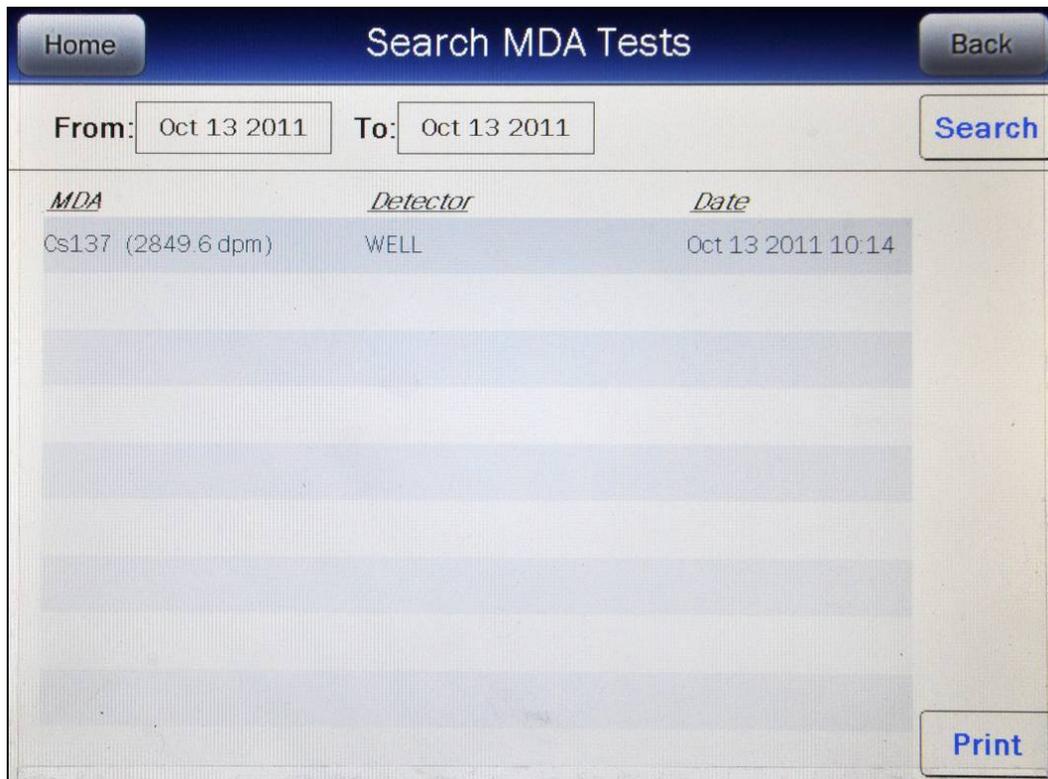
Figure 11-13 MDA Tests Search Screen after Search

Note: *If the search results in more then 100 items, the message "**Search MDA Test Error** More then 100 items have been returned Please refine criteria" will appear. Refine the search by narrowing the date range to search for.*

To exit Figure 11-13 MDA Tests Search Screen after Search,

- touch the **BACK** button – Figure 11-2 Reports Screen will re-appear or

- touch the **HOME** button – Figure 11-1 Well Counter Main Screen will appear.

The listing is in reverse chronological order (newest at the top of the list). The length of the list will vary depending on how many MDA Tests have been performed between the selected dates. If there are more than 10 results, the number of pages (or screens) will be shown in the upper right corner of the screen indicating the length of the list. To scroll through the list, touch the **DOWN ARROW** (▼) button . The next group of 10 results will be displayed and the **UP ARROW** (▲) button will appear allowing the user to scroll up in the list.

Summary Report

If a printer is attached to the system, a summary report of the search results can be printed by touching the **PRINT** button.

Detailed Report

To obtain a detailed report for a particular MDA Test result, touch the desired result on the list. The result will become highlighted and a **VIEW** button will appear on the screen as shown in Figure 11-14 MDA Tests Search Screen with Highlighted Test. (If necessary, scroll the list until the desired result is displayed.)
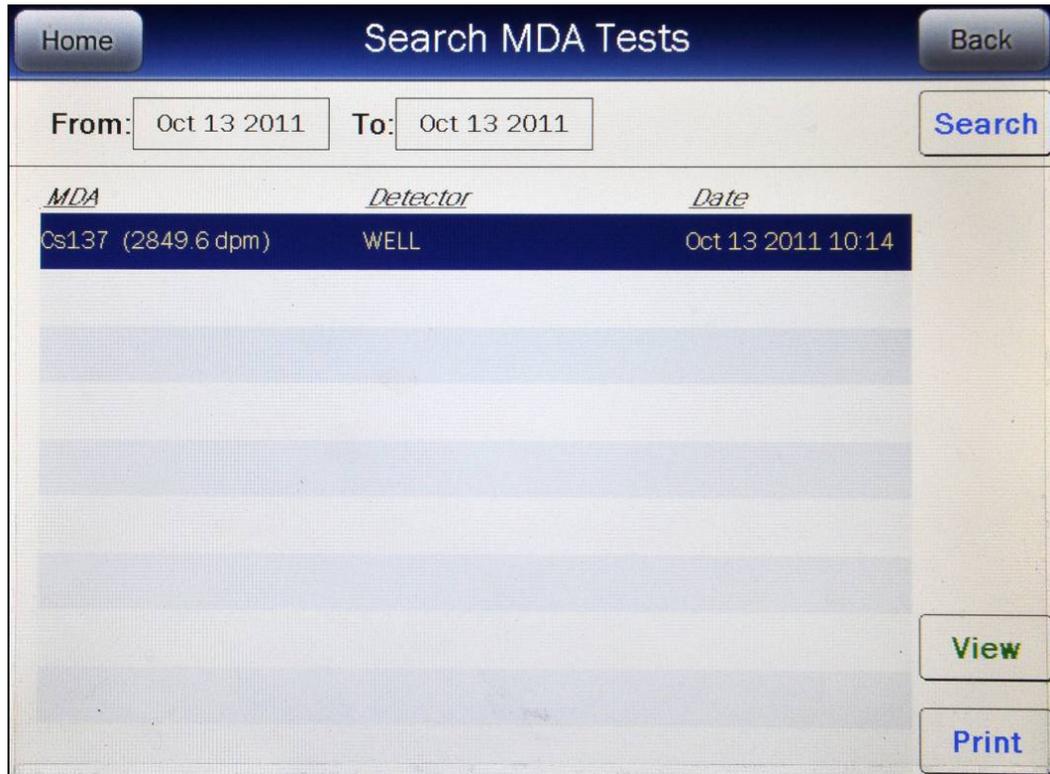
Figure 11-14 MDA Tests Search Screen with Highlighted Test

Touch the **VIEW** button. Figure 11-15 MDA Test Result Screen will appear displaying the detailed report for the selected MDA Test result.
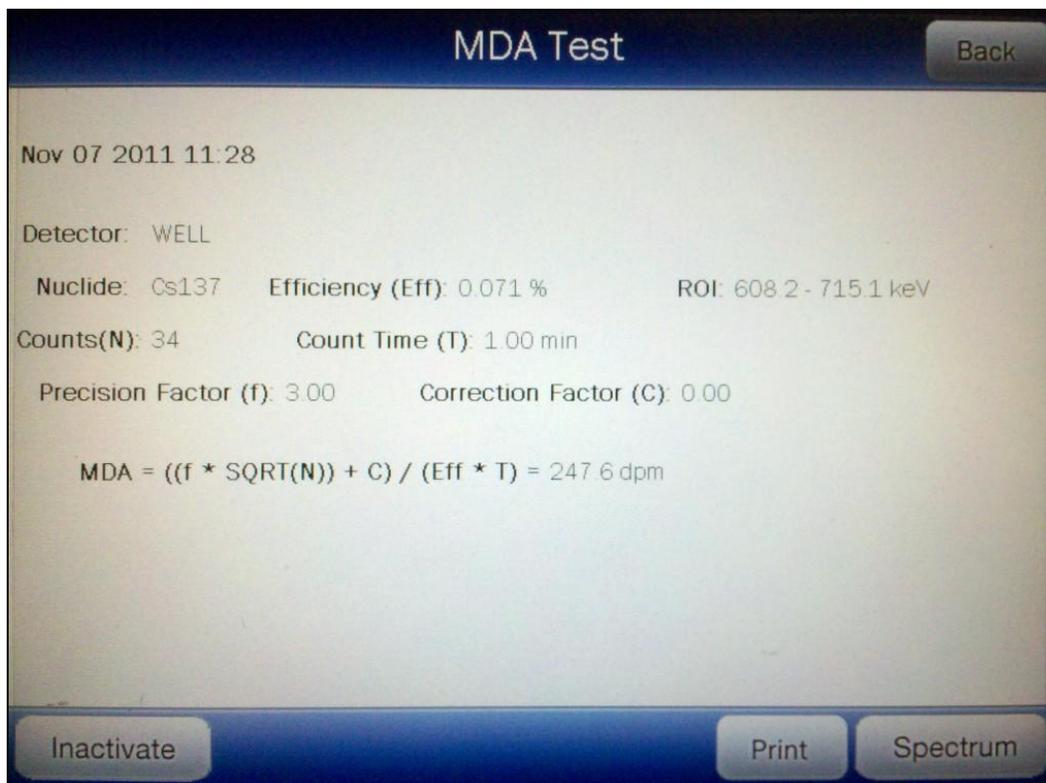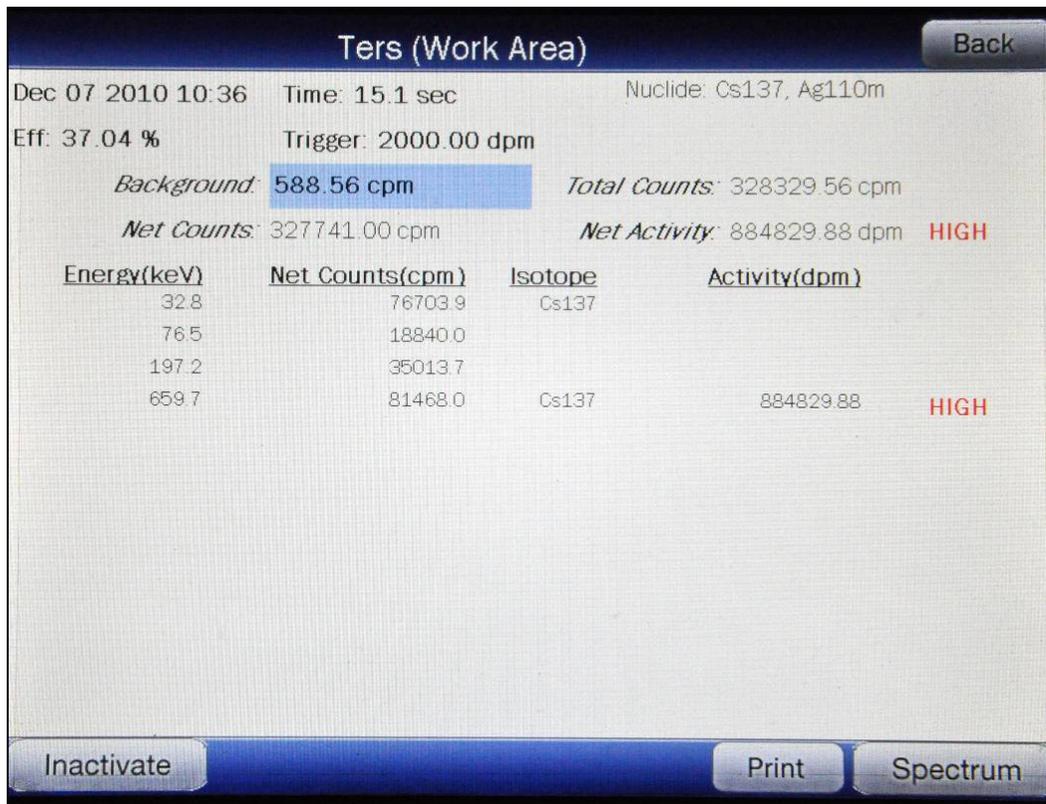
Figure 11-15 MDA Test Result Screen

The following sections describe the functions that are available from Figure 11-15 MDA Test Result Screen.

Print Detailed Result

If a printer is attached to the system, the detailed report of the selected MDA Test result can be printed by touching the **PRINT** button.

Inactivate an MDA Test

An MDA Test result can be inactivated. Reasons for doing this can be:

- the test was a simulation for training,
- a mistake was made doing the test, etc.

The MDA Test result will still be saved in the database. When the test is displayed on the list, it will be shown with a line through the characters. When the summary report is printed, the word "INACTIVE" and the optional comment will appear instead of the data. When the individual report is printed, "INACTIVE" and the optional comment will appear.

To inactivate the selected MDA Test, touch the **INACTIVATE** button. Figure 11-10 Inactivate Record Screen will appear.

To enter an optional comment (description or reason) for the selected MDA Test result inactivation, touch the *Comment:* field box. Figure 11-11 Alphanumeric Keypad Screen will appear.

Input the desired comment (description or reason) for the invalidation and touch the **ACCEPT** button. Figure 11-11 Alphanumeric Keypad Screen will re-appear with the *Comment:* field box populated with the entered comment. The comment can contain any combination of 22 alphanumeric characters maximum.

To cancel any changes and return to Figure 11-10 Inactivate Record Screen, touch the **CANCEL** button.

To complete the inactivation of the selected MDA Test result, touch the **YES** button.

If it is decided not to inactivate the selected MDA Test result, touch the **NO** button.

View MDA Test Spectrum

To view the MDA Test Spectrum, touch the **SPECTRUM** button. The Spectrum Screen (similar to Figure 11-12 System Test Spectrum Screen) will appear.

A Region of Interest may be defined using the **BLUE** and **GREEN ARROW** buttons to place vertical line cursors around the ROI. **DOUBLE ARROW** buttons move the cursor approximately 75 energy channels. **SINGLE ARROW** buttons move the cursor approximately 7.5 energy channels.

Note: The actual energy channel keV will vary depending upon the Auto Calibration.

When the vertical cursor is moved, the channel energy (keV) and the number of counts in that energy channel are displayed. Once the vertical cursors are set, the total counts in the ROI are displayed.

To print the spectrum, touch the **PRINT** button.

To return to Figure 11-15 MDA Test Result Screen, touch the **BACK** button.

Exit Detailed Result

To exit Figure 11-15 MDA Test Result Screen, touch the **BACK** button. Figure 11-13 MDA Tests Search Screen after Search will re-appear.

CHI SQUARE REPORT

From Figure 11-2 Reports Screen, touch the **CHI SQUARE REPORT** button. The Search Chi Square Tests Screen will appear and be similar to that shown in Figure 11-3 Auto Calibration Search Screen.

The Chi Square Test results are searchable by using a date range. The default *From:* and *To:* dates are "today".

Set Date

To change the From date, touch the *From:* field box. The Enter Start Date screen will appear.

The screen displays the currently set date. Above and below each of the fields are **+** and **–** buttons, respectively. To adjust the displayed value for a specific field, touch the **+** button to increase the displayed value or the **–** button to decrease the displayed value.

For the year, **+10** and **-10** buttons are provided to quickly change the tens column of the years.

Touch the **ACCEPT** button to accept the set date or the **CANCEL** button to cancel any changes. The Search Chi Square Tests Screen will re-appear showing the set date.

To change the To date, touch the *To:* field box. The Enter End Date screen will appear.

The screen displays the currently set date. Above and below each of the fields are **+** and **–** buttons, respectively. To adjust the displayed value for a specific field, touch the **+** button to increase the displayed value or the **–** button to decrease the displayed value.

For the year, **+10** and **-10** buttons are provided to quickly change the tens column of the years.

Touch the **ACCEPT** button to accept the set date or the **CANCEL** button to cancel any changes. The Search Chi Square Tests Screen will re-appear showing the set date.

Search

When the From and To dates are correct, touch the **SEARCH** button. The screen displays a listing of the data for the Chi Square Tests performed within the specified date range as shown in Figure 11-16 Chi Square Tests Search Screen.
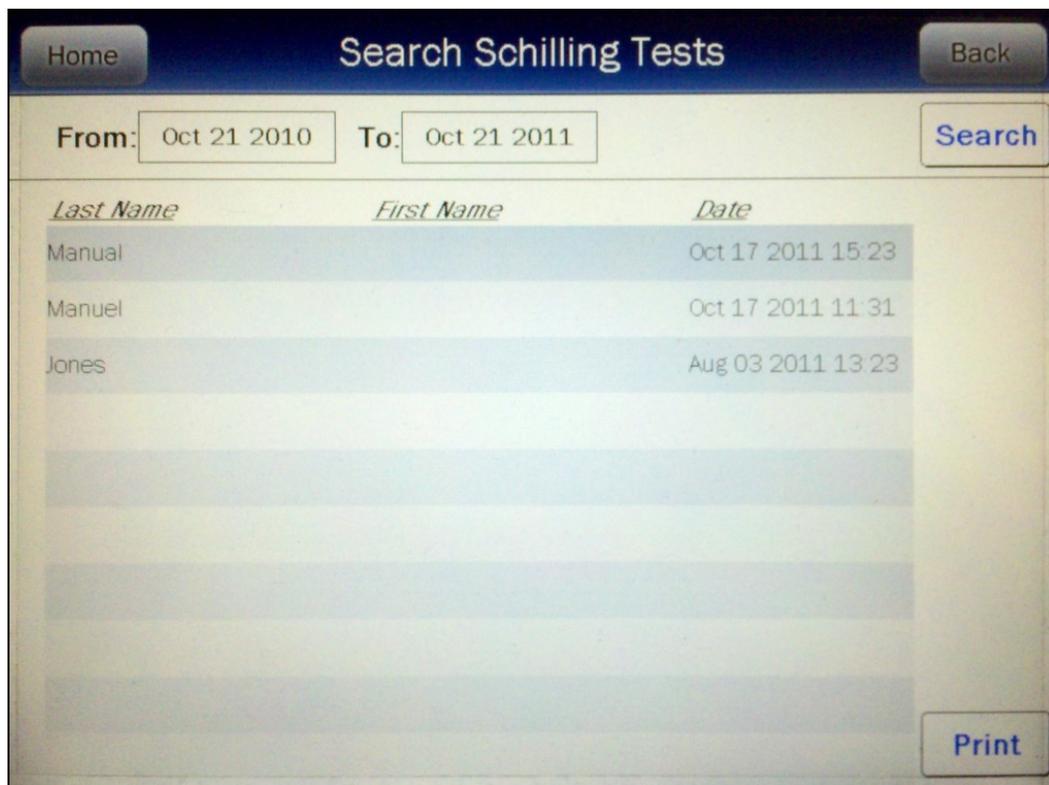
Figure 11-16 Chi Square Tests Search Screen

Note: *If the search results in more then 100 items, the message "__Search Chi Square Test__ __Error__ More then 100 items have been returned Please refine criteria" will appear. Refine the search by narrowing the date range to search for.*

To exit Figure 11-16 Chi Square Tests Search Screen,

- touch the **BACK** button – Figure 11-2 Reports Screen will re-appear or

- touch the **HOME** button – Figure 11-1 Well Counter Main Screen will appear.

The listing is in reverse chronological order (newest at the top of the list). The length of the list will vary depending on how many Chi Square Tests have been performed between the selected dates. If there are more than 10 results, the number of pages (or screens) will be shown in the upper right corner of the screen indicating the length of the list. To scroll through the list, touch the **DOWN ARROW** (▼) button . The next group of 10 results will be displayed and the **UP ARROW** (▲) button will appear allowing the user to scroll up in the list.

Summary Report

If a printer is attached to the system, a summary report of the search results can be printed by touching the **PRINT** button.

Detailed Report

To obtain a detailed report for a particular Chi Square Test result, touch the desired result on the list. The result will become highlighted and a **VIEW** button will appear on the screen shown in Figure 11-17 Chi Square Tests Search Screen with Highlighted Test. (If necessary, scroll the list until the desired result is displayed.)

Figure 11-17 Chi Square Tests Search Screen with Highlighted Test

Touch the **VIEW** button. Figure 11-18 Chi Square Test Result Screen will appear displaying the detailed report for the selected Chi Square Test result.

Figure 11-18 Chi Square Test Result Screen

The following sections describe the functions that are available from Figure 11-18 Chi Square Test Result Screen.

Print Detailed Result

If a printer is attached to the system, the detailed report of the selected Chi Square Test result can be printed by touching the **PRINT** button.

Inactivate a Chi Square Test

A Chi Square Test result can be inactivated. Reasons for doing this can be:

- the test was a simulation for training,
- a mistake was made doing the test, etc.

The Chi Square Test result will still be saved in the database. When the test is displayed on the list, it will be shown with a line through the characters. When the summary report is printed, the word "INACTIVE" and the optional comment will appear instead of the data. When the individual report is printed, "INACTIVE" and the optional comment will appear.

To inactivate the selected Chi Square Test, touch the **INACTIVATE** button. Figure 11-10 Inactivate Record Screen will appear.

To enter an optional comment (description or reason) for the selected Chi Square Test result inactivation, touch the *Comment:* field box. Figure 11-11 Alphanumeric Keypad Screen will appear.

Input the desired comment (description or reason) for the invalidation and touch the **ACCEPT** button. Figure 11-10 Inactivate Record Screen will re-appear with the *Comment:* field box populated with the entered comment. The comment can contain any combination of 22 alphanumeric characters maximum.

To cancel any changes and return to Figure 11-10 Inactivate Record Screen, touch the **CANCEL** button.

To complete the inactivation of the selected Chi Square Test result, touch the **YES** button.

If it is decided not to inactivate the selected Chi Square Test result, touch the **NO** button.

View Chi Square Test Spectrum

To view the spectrum of a specific counting repetition, touch any of the blue highlighted **_Counts_** field boxes. The Spectrum Screen (similar to Figure 11-12 System Test Spectrum Screen) will appear.

A Region of Interest may be defined using the **BLUE** and **GREEN** **ARROW** buttons to place vertical line cursors around the ROI. **DOUBLE ARROW** buttons move the cursor approximately 75 energy channels. **SINGLE ARROW** buttons move the cursor approximately 7.5 energy channels.

Note: The actual energy channel keV will vary depending upon the Auto Calibration.

When the vertical cursor is moved, the channel energy (keV) and the number of counts in that energy channel are displayed. Once the vertical cursors are set, the total counts in the ROI are displayed.

To print the spectrum, touch the **PRINT** button.

To return to Figure 11-18 Chi Square Test Result Screen, touch the **BACK** button.

Exit Detailed Result

To exit Figure 11-18 Chi Square Test Result Screen, touch the **BACK** button. Figure 11-16 Chi Square Tests Search Screen will re-appear.

WIPE REPORT

From Figure 11-2 Reports Screen, touch the **WIPE REPORT** button. Figure 11-19 Wipes Search Screen will appear.

Figure 11-19 Wipes Search Screen

The Wipe Test results are searchable by using a date range and Wipe type. The default *From:* and *To:* dates are "today" and the Wipe Type is defaulted to ALL WIPES.

Set Date

To change the From date, touch the *From:* field box. The Enter Start Date screen will appear.

The screen displays the currently set date. Above and below each of the fields are **+** and **–** buttons, respectively. To adjust the displayed value for a specific field, touch the **+** button to increase the displayed value or the **–** button to decrease the displayed value.

For the year, **+10** and **-10** buttons are provided to quickly change the tens column of the years.

Touch the **ACCEPT** button to accept the set date or the **CANCEL** button to cancel any changes. Figure 11-19 Wipes Search Screen will re-appear showing the set date.

To change the To date, touch the *To:* field box. The Enter End Date screen will appear.

The screen displays the currently set date. Above and below each of the fields are **+** and **–** buttons, respectively. To adjust the displayed value for a specific field, touch the **+** button to increase the displayed value or the **–** button to decrease the displayed value.

For the year, **+10** and **-10** buttons are provided to quickly change the tens column of the years.

Touch the **ACCEPT** button to accept the set date or the **CANCEL** button to cancel any changes. Figure 11-19 Wipes Search Screen will re-appear showing the set date.

Wipe Type Selection

The search results can be narrowed by selecting a particular Wipe type.

The default is the display of **All Wipes**. To change the display criteria, touch the **ALL WIPES** button. Figure 11-20 Wipe Criteria Selection Screen will appear.
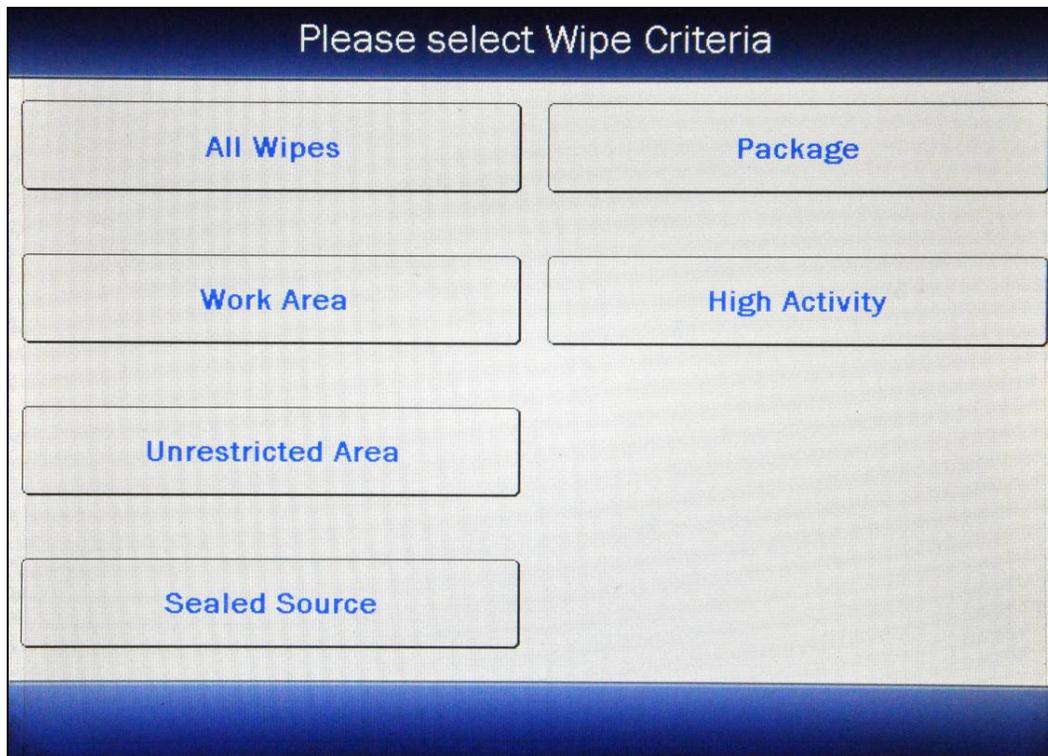
Figure 11-20 Wipe Criteria Selection Screen

Touch the desired button to select the wipes to be displayed:
- All Wipes
- Work Area
- Unrestricted Area
- Sealed Source
- Package
- Wipes with High Activity

After touching the desired button, Figure 11-19 Wipes Search Screen will re-appear with the selected criteria shown.

Search

When the From and To dates and the Wipe type are correct, touch the **SEARCH** button. The screen displays a listing of the data for the Wipe Tests performed within the specified date range and selected Wipe type as shown in Figure 11-21 Search Wipes Screen after Search.

Figure 11-21 Search Wipes Screen after Search

Note: *If the search results in more then 100 items, the message "__Search Wipe Test Error__ More then 100 items have been returned Please refine criteria" will appear. Refine the search by narrowing the date range and/or changing the type of Wipes to search for.*

To exit Figure 11-21 Search Wipes Screen after Search,

- touch the **BACK** button – Figure 11-2 Reports Screen will re-appear or

- touch the **HOME** button – Figure 11-1 Well Counter Main Screen will appear.

The listing is in reverse chronological order (newest at the top of the list). The length of the list will vary depending on how many Wipe Tests have been performed between the selected dates and for the selected Wipe type. If there are more than 10 results, the number of pages (or screens) will be shown in the upper right corner of the screen indicating the length of the list. To scroll through the list, touch the **DOWN ARROW** (▼) button . The next group of 10 results will be displayed and the **UP ARROW** (▲) button will appear allowing the user to scroll up in the list.

Wipes that have a red "**H**" to the left of the ***Wipe Location*** column have a high activity.

Summary Report

If a printer is attached to the system, a summary report of the search results can be printed by touching the **PRINT** button.

Detailed Report

To obtain a detailed report for a particular Wipe Test result, touch the desired result on the list. The result will become highlighted and a **VIEW** button will appear on the screen as shown in Figure 11-22 Search Wipes Screen with Highlighted Wipe. (If necessary, scroll the list until the desired result is displayed.)

Figure 11-22 Search Wipes Screen with Highlighted Wipe

Touch the **VIEW** button. Figure 11-23 Wipe Report Screen will appear displaying the detailed report for the selected Wipe Test result.

Figure 11-23 Wipe Report Screen

The following sections describe the functions that are available from Figure 11-23 Wipe Report Screen.

Print Detailed Result

If a printer is attached to the system, the detailed report of the selected Wipe Test result can be printed by touching the **PRINT** button.

Inactivate a Wipe Test

A Wipe Test result can be inactivated. Reasons for doing this can be:

- the test was a simulation for training,
- a mistake was made doing the test, etc.

The Wipe Test result will still be saved in the database. When the test is displayed on the list, it will be shown with a line through the characters. When the summary report is printed, the word "INACTIVE" and the optional comment will appear instead of the data. When the individual report is printed, "INACTIVE" and the optional comment will appear.

To inactivate the selected Wipe Test, touch the **INACTIVATE** button. Figure 11-10 Inactivate Record Screen will appear.

To enter an optional comment (description or reason) for the selected Wipe Test result inactivation, touch the *Comment:* field box. Figure 11-11 Alphanumeric Keypad Screen will appear.

Input the desired comment (description or reason) for the invalidation and touch the **ACCEPT** button. Figure 11-10 Inactivate Record Screen will re-appear with the *Comment:* field box populated with the entered comment. The comment can contain any combination of 22 alphanumeric characters maximum.

To cancel any changes and return to Figure 11-10 Inactivate Record Screen, touch the **CANCEL** button.

To complete the inactivation of the selected Wipe Test result, touch the **YES** button.

If it is decided not to inactivate the selected Wipe Test result, touch the **NO** button.

View Wipe Test Spectrum

To view the Wipe Test Spectrum, touch the **SPECTRUM** button. The Spectrum Screen (similar to Figure 11-12 System Test Spectrum Screen) will appear.

A Region of Interest may be defined using the **BLUE** and **GREEN ARROW** buttons to place vertical line cursors around the ROI. **DOUBLE ARROW** buttons move the cursor approximately 75 energy channels. **SINGLE ARROW** buttons move the cursor approximately 7.5 energy channels.

Note: The actual energy channel keV will vary depending upon the Auto Calibration.

When the vertical cursor is moved, the channel energy (keV) and the number of counts in that energy channel are displayed. Once the vertical cursors are set, the total counts in the ROI are displayed.

To print the spectrum, touch the **PRINT** button.

To return to the Figure 11-23 Wipe Report Screen, touch the **BACK** button.

View Background Spectrum

To view the spectrum of the Background that was measured previous to the selected Wipe Test, touch the blue highlighted *Background:* count rate box. The screen will appear similar to that shown in Figure 11-12 System Test Spectrum Screen. The operation of the **ARROW** buttons is the same as described above.

Exit Detailed Result

To exit Figure 11-23 Wipe Report Screen, touch the **BACK** button. Figure 11-22 Search Wipes Screen with Highlighted Wipe will re-appear.

SCHILLING REPORT

From Figure 11-2 Reports Screen, touch the **SCHILLING REPORT** button. The Search Schilling Tests Screen will appear and be similar to that shown in Figure 11-3 Auto Calibration Search Screen.

The Schilling Test results are searchable by using a date range. The default *From:* and *To:* dates are "today".

Set Date

To change the From date, touch the *From:* field box. The Enter Start Date screen will appear.

The screen displays the currently set date. Above and below each of the fields are **+** and **–** buttons, respectively. To adjust the displayed value for a specific field, touch the **+** button to increase the displayed value or the **–** button to decrease the displayed value.

For the year, **+10** and **-10** buttons are provided to quickly change the tens column of the years.

Touch the **ACCEPT** button to accept the set date or the **CANCEL** button to cancel any changes. The Search Schilling Tests Screen will re-appear showing the set date.

To change the To date, touch the *To:* field box. The Enter End Date screen will appear.

The screen displays the currently set date. Above and below each of the fields are **+** and **–** buttons, respectively. To adjust the displayed value for a specific field, touch the **+** button to increase the displayed value or the **–** button to decrease the displayed value.

For the year, **+10** and **-10** buttons are provided to quickly change the tens column of the years.

Touch the **ACCEPT** button to accept the set date or the **CANCEL** button to cancel any changes. The Search Schilling Tests Screen will re-appear showing the set date.

Search

When the From and To dates are correct, touch the **SEARCH** button. The screen displays a listing of the data for the Schilling Tests performed within the specified date range as shown in Figure 11-24 Schilling Tests Search Screen.

Figure 11-24 Schilling Tests Search Screen After Search

Note: *If the search results in more then 100 items, the message "**Search Schilling Test Error** More then 100 items have been returned Please refine criteria" will appear. Refine the search by narrowing the date range to search for.*

To exit Figure 11-24 Schilling Tests Search Screen,

- touch the **BACK** button – Figure 11-2 Reports Screen will re-appear or

- touch the **HOME** button – Figure 11-1 Well Counter Main Screen will appear.

The listing is in reverse chronological order (newest at the top of the list). The length of the list will vary depending on how many Schilling Tests have been performed between the selected dates. If there are more than 10 results, the number of pages (or screens) will be shown in the upper right corner of the screen indicating the length of the list. To scroll through the list, touch the **DOWN ARROW** (▼) button . The next group of 10 results will be displayed and the **UP ARROW** (▲) button will appear allowing the user to scroll up in the list.

Summary Report

If a printer is attached to the system, a summary report of the search results can be printed by touching the **PRINT** button.

Detailed Report

To obtain a detailed report for a particular Schilling Test result, touch the desired result on the list. The result will become highlighted and a **VIEW** button will appear on the screen similar to that shown in Figure 11-22 Search Wipes Screen with Highlighted Wipe. (If necessary, scroll the list until the desired result is displayed.)

Touch the **VIEW** button. Figure 11-25 Schilling Test Report Screen will appear displaying the detailed report for the selected Schilling Test result.

Figure 11-25 Schilling Test Report Screen

The following sections describe the functions that are available from Figure 11-25 Schilling Test Report Screen.

Print Detailed Result

If a printer is attached to the system, the detailed report of the selected Schilling Test result can be printed by touching the **PRINT** button.

Inactivate a Schilling Test

A Schilling Test result can be inactivated. Reasons for doing this can be:

- the test was a simulation for training,

- a mistake was made doing the test, etc.

The Schilling Test result will still be saved in the database. When the test is displayed on the list, it will be shown with a line through the characters. When the summary report is printed, the word "INACTIVE" and the optional comment will appear instead of the data. When the individual report is printed, "INACTIVE" and the optional comment will appear.

To inactivate the selected Schilling Test, touch the **INACTIVE** button. Figure 11-10 Inactivate Record Screen will appear.

To enter an optional comment (description or reason) for the selected Schilling Test result inactivation, touch the *Comment:* field box. Figure 11-11 Alphanumeric Keypad Screen will appear.

Input the desired comment (description or reason) for the invalidation and touch the **ACCEPT** button. Figure 11-10 Inactivate Record Screen will re-appear with the *Comment:* field box populated with the entered comment. The comment can contain any combination of 22 alphanumeric characters maximum.

To cancel any changes and return to Figure 11-10 Inactivate Record Screen, touch the **CANCEL** button.

To complete the inactivation of the selected Schilling Test result, touch the **YES** button.

If it is decided not to inactivate the selected Schilling Test result, touch the **NO** button.

View Schilling Test Spectrums

The spectrum of the following measurements can be viewed: *Background (B)*, *Standard (S)* and *Aliquot (U)*. To view the spectrum for desired measurement, touch the corresponding blue highlighted count rate box. The Spectrum Screen (similar to Figure 11-12 System Test Spectrum Screen) will appear.

A Region of Interest may be defined using the **BLUE** and **GREEN ARROW** buttons to place vertical line cursors around the ROI. **DOUBLE ARROW** buttons move the cursor approximately 75 energy channels. **SINGLE ARROW** buttons move the cursor approximately 7.5 energy channels.

Note: *The actual energy channel keV will vary depending upon the Auto Calibration.*

When the vertical cursor is moved, the channel energy (keV) and the number of counts in that energy channel are displayed. Once the vertical cursors are set, the total counts in the ROI are displayed.

To print the spectrum, touch the **PRINT** button.

To return to the Figure 11-25 Schilling Test Report Screen, touch the **BACK** button.

Exit Detailed Result

To exit Figure 11-25 Schilling Test Report Screen, touch the **BACK** button. Figure 11-24 Schilling Tests Search Screen After Search will re-appear.

PLASMA REPORT

From Figure 11-2 Reports Screen, touch the **PLASMA REPORT** button. Figure 11-26 Plasma Tests Search Screen will appear.

Figure 11-26 Plasma Tests Search Screen

The Plasma Test results are searchable by using a date range. The default *From:* and *To:* dates are "today".

Set Date

To change the From date, touch the *From:* field box. The Enter Start Date screen will appear.

The screen displays the currently set date. Above and below each of the fields are **+** and **–** buttons, respectively. To adjust the displayed value for a specific field, touch the **+** button to increase the displayed value or the **–** button to decrease the displayed value.

For the year, **+10** and **-10** buttons are provided to quickly change the tens column of the years.

Touch the **ACCEPT** button to accept the set date or the **CANCEL** button to cancel any changes. Figure 11-26 Plasma Tests Search Screen will re-appear showing the set date.

To change the To date, touch the **To:** field box. The Enter End Date screen will appear.

The screen displays the currently set date. Above and below each of the fields are **+** and **–** buttons, respectively. To adjust the displayed value for a specific field, touch the **+** button to increase the displayed value or the **–** button to decrease the displayed value.

For the year, **+10** and **-10** buttons are provided to quickly change the tens column of the years.

Touch the **ACCEPT** button to accept the set date or the **CANCEL** button to cancel any changes. Figure 11-26 Plasma Tests Search Screen will re-appear showing the set date.

Search

When the From and To dates are correct, touch the **SEARCH** button. The screen displays a listing of the data for the Plasma Tests performed within the specified date range similar to that shown in Figure 11-24 Schilling Tests Search Screen After Search.

Note: *If the search results in more then 100 items, the message "__Search Plasma Test Error__ More then 100 items have been returned Please refine criteria" will appear. Refine the search by narrowing the date range to search for.*

To exit Figure 11-26 Plasma Tests Search Screen,

- touch the **BACK** button – Figure 11-2 Reports Screen will re-appear or
- touch the **HOME** button – Figure 11-1 Well Counter Main Screen will appear.

The listing is in reverse chronological order (newest at the top of the list). The length of the list will vary depending on how many Plasma Tests have been performed between the selected dates. If there are more than 10 results, the number of pages (or screens) will be shown in the upper right corner of the screen indicating the length of the list. To scroll through the list, touch the **DOWN ARROW** (▼) button . The next group of 10 results will be

displayed and the **UP ARROW** (▲) button will appear allowing the user to scroll up in the list.

Summary Report

If a printer is attached to the system, a summary report of the search results can be printed by touching the **PRINT** button.

Detailed Report

To obtain a detailed report for a particular Plasma Test result, touch the desired result on the list. The result will become highlighted and a **VIEW** button will appear on the screen similar to that shown in Figure 11-22 Search Wipes Screen with Highlighted Wipe. (If necessary, scroll the list until the desired result is displayed.)

Touch the **VIEW** button. Figure 11-27 Plasma Test Report Screen will appear displaying the detailed report for the selected Plasma Test result.

Figure 11-27 Plasma Test Report Screen

The following sections describe the functions that are available from Figure 11-27 Plasma Test Report Screen.

Print Detailed Result

If a printer is attached to the system, the detailed report of the selected Plasma Test result can be printed by touching the **PRINT** button.

Inactivate a Plasma Test

A Plasma Test result can be inactivated. Reasons for doing this can be:

- the test was a simulation for training,
- a mistake was made doing the test, etc.

The Plasma Test result will still be saved in the database. When the test is displayed on the list, it will be shown with a line through the characters. When the summary report is printed, the word "INACTIVE" and the optional comment will appear instead of the data. When the individual report is printed, "INACTIVE" and the optional comment will appear.

To inactivate the selected Plasma Test, touch the **INACTIVATE** button. Figure 11-10 Inactivate Record Screen will appear.

To enter an optional comment (description or reason) for the selected Schilling Test result inactivation, touch the *Comment:* field box. Figure 11-11 Alphanumeric Keypad Screen will appear.

Input the desired comment (description or reason) for the invalidation and touch the **ACCEPT** button. Figure 11-10 Inactivate Record Screen will re-appear with the *Comment:* field box populated with the entered comment. The comment can contain any combination of 22 alphanumeric characters maximum.

To cancel any changes and return to Figure 11-10 Inactivate Record Screen, touch the **CANCEL** button.

To complete the inactivation of the selected Plasma Test result, touch the **YES** button.

If it is decided not to inactivate the selected Plasma Test result, touch the **NO** button.

View Plasma Test Spectrum

The spectrum of the following measurements can be viewed: *Background (B)*, *Standard (W)*, *Whole Blood (S)* and *Plasma (L)*. To view the spectrum for desired measurement, touch the corresponding blue highlighted count rate box. The Spectrum Screen (similar to Figure 11-12 System Test Spectrum Screen) will appear.

A Region of Interest may be defined using the **BLUE** and **GREEN ARROW** buttons to place vertical line cursors around the ROI. **DOUBLE ARROW** buttons move the

cursor approximately 75 energy channels. **SINGLE ARROW** buttons move the cursor approximately 7.5 energy channels.

Note: The actual energy channel keV will vary depending upon the Auto Calibration.

When the vertical cursor is moved, the channel energy (keV) and the number of counts in that energy channel are displayed. Once the vertical cursors are set, the total counts in the ROI are displayed.

To print the spectrum, touch the **PRINT** button.

To return to Figure 11-27 Plasma Test Report Screen, touch the **BACK** button.

Exit Detailed Result

To exit Figure 11-27 Plasma Test Report Screen, touch the **BACK** button. Figure 11-26 Plasma Tests Search Screen will re-appear.

RBC REPORT

From Figure 11-2 Reports Screen, touch the **RBC REPORT** button. The Search RBC Tests Screen will appear and be similar to that shown in Figure 11-26 Plasma Tests Search Screen.

The RBC Test results are searchable by using a date range. The default *From:* and *To:* dates are "today".

Set Date

To change the From date, touch the *From:* field box. The Enter Start Date screen will appear.

The screen displays the currently set date. Above and below each of the fields are **+** and **–** buttons, respectively. To adjust the displayed value for a specific field, touch the **+** button to increase the displayed value or the **–** button to decrease the displayed value.

For the year, **+10** and **-10** buttons are provided to quickly change the tens column of the years.

Touch the **ACCEPT** button to accept the set date or the **CANCEL** button to cancel any changes. The Search RBC Tests Screen will re-appear showing the set date.

To change the To date, touch the *To:* field box. The Enter End Date screen will appear.

The screen displays the currently set date. Above and below each of the fields are **+** and **–** buttons, respectively. To adjust the displayed value for a specific field, touch the **+** button to increase the displayed value or the **–** button to decrease the displayed value.

For the year, **+10** and **-10** buttons are provided to quickly change the tens column of the years.

Touch the **ACCEPT** button to accept the set date or the **CANCEL** button to cancel any changes. The Search RBC Tests Screen will re-appear showing the set date.

Search

When the From and To dates are correct, touch the **SEARCH** button. The screen displays a listing of the data for the RBC Tests performed within the specified date range as shown in Figure 11-28 RBC Tests Search Screen after Search.

Figure 11-28 RBC Tests Search Screen after Search

Note: *If the search results in more then 100 items, the message "__Search RBC Test Error__ More then 100 items have been returned Please refine criteria" will appear. Refine the search by narrowing the date range to search for.*

To exit Figure 11-28 RBC Tests Search Screen after Search,

- touch the **BACK** button – Figure 11-2 Reports Screen will re-appear or
- touch the **HOME** button – Figure 11-1 Well Counter Main Screen will appear.

The listing is in reverse chronological order (newest at the top of the list). The length of the list will vary depending on how many RBC Tests have been performed between the selected dates. If there are more than 10 results, the number of pages (or screens) will be shown in the upper right corner of the screen indicating the length of the list. To scroll through the list, touch the **DOWN ARROW** (▼) button . The next group of 10 results will be displayed and the **UP ARROW** (▲) button will appear allowing the user to scroll up in the list.

Summary Report

If a printer is attached to the system, a summary report of search results can be printed by touching the **PRINT** button.

Detailed Report

To obtain a detailed report for a particular RBC Test result, touch the desired result on the list. The result will become highlighted and a **VIEW** button will appear on the screen similar to that shown in Figure 11-22 Search Wipes Screen with Highlighted Wipe. (If necessary, scroll the list until the desired result is displayed.)

Touch the **VIEW** button. Figure 11-29 RBC Test Report Screen will appear displaying the detailed report for the selected RBC Test result.

Figure 11-29 RBC Test Report Screen

The following sections describe the functions that are available from Figure 11-29 RBC Test Report Screen.

Print Detailed Result

If a printer is attached to the system, the detailed report of the selected RBC Test result can be printed by touching the **PRINT** button.

Inactivate a RBC Test

An RBC Test result can be inactivated. Reasons for doing this can be:

- the test was a simulation for training,
- a mistake was made doing the test, etc.

The RBC Test result will still be saved in the database. When the test is displayed on the list, it will be shown with a line through the characters. When the summary report is printed, the word "INACTIVE" and the optional comment will appear instead of the data. When the individual report is printed, "INACTIVE" and the optional comment will appear.

To inactivate the selected RBC Test, touch the **INACTIVATE** button. Figure 11-10 Inactivate Record Screen will appear.

To enter an optional comment (description or reason) for the selected Schilling Test result inactivation, touch the *Comment:* field box. Figure 11-11 Alphanumeric Keypad Screen will appear.

Input the desired comment (description or reason) for the invalidation and touch the **ACCEPT** button. Figure 11-10 Inactivate Record Screen will re-appear with the *Comment:* field box populated with the entered comment. The comment can contain any combination of 22 alphanumeric characters maximum.

To cancel any changes and return to Figure 11-10 Inactivate Record Screen, touch the **CANCEL** button.

To complete the inactivation of the selected RBC Test result, touch the **YES** button.

If it is decided not to inactivate the selected RBC Test result, touch the **NO** button.

View RBC Test Spectrums

The spectrum of the following measurements can be viewed: *Background (B)*, *Whole Blood Standard (W)*, *Whole Blood Sample (S)*, *Plasma Standard (P)* and *Plasma Sample (L)*. To view the spectrum for desired measurement, touch the corresponding blue highlighted count rate box. The Spectrum Screen (similar to Figure 11-12 System Test Spectrum Screen) will appear.

A Region of Interest may be defined using the **BLUE** and **GREEN ARROW** buttons to place vertical line cursors around the ROI. **DOUBLE ARROW** buttons move the cursor approximately 75 energy channels. **SINGLE ARROW** buttons move the cursor approximately 7.5 energy channels.

Note: The actual energy channel keV will vary depending upon the Auto Calibration.

When the vertical cursor is moved, the channel energy (keV) and the number of counts in that energy channel are displayed. Once the vertical cursors are set, the total counts in the ROI are displayed.

To print the spectrum, touch the **PRINT** button.

To return to Figure 11-29 RBC Test Report Screen, touch the **BACK** button.

Exit Detailed Result

To exit Figure 11-29 RBC Test Report Screen, touch the **BACK** button. Figure 11-28 RBC Tests Search Screen after Search will re-appear.

RBC SURVIVAL REPORT

From Figure 11-2 Reports Screen, touch the **RBC SURVIVAL REPORT** button. Figure 11-30 RBC Survival Test Search Screen will appear.

Figure 11-30 RBC Survival Test Search Screen

To exit Figure 11-30 RBC Survival Test Search Screen,

- touch the **BACK** button – Figure 11-2 Reports Screen will re-appear or
- touch the **HOME** button – Figure 11-1 Well Counter Main Screen will appear.

Search

All completed Patients can be displayed or the RBC Survival Test results can be searched for a particular Patient by Last Name and/or ID.

To view all completed patients, touch the **SEARCH** button. The screen will appear similar to that shown in Figure 11-31 Search RBC Survival Tests Screen – All Patients.
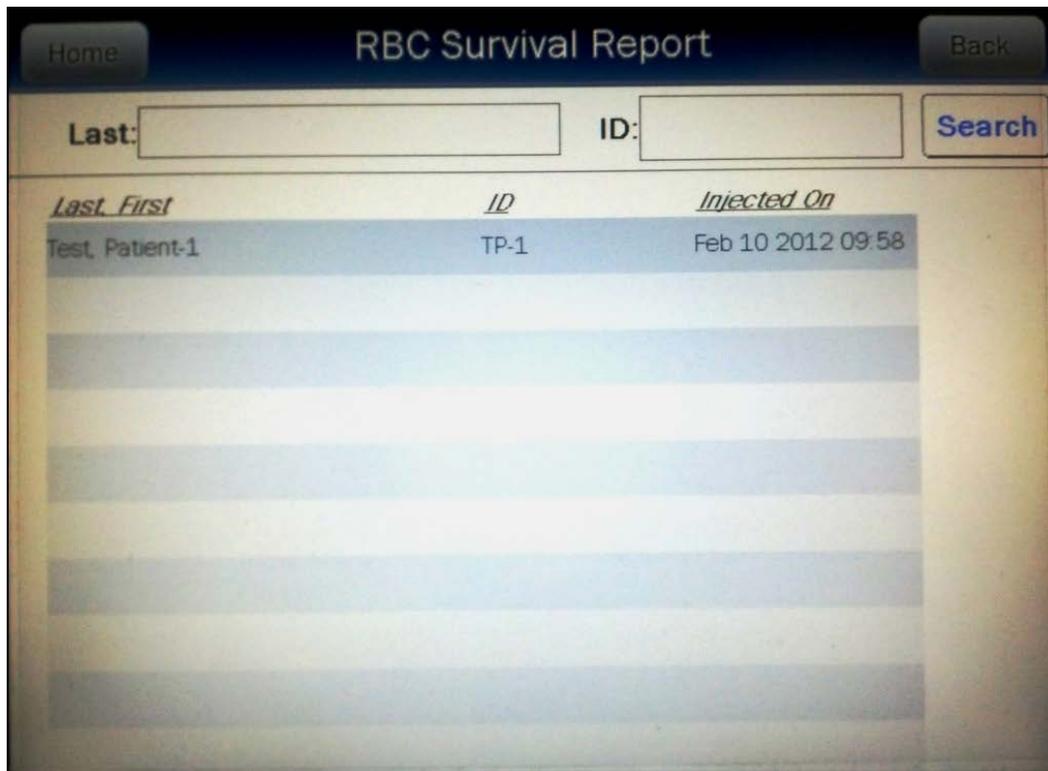
Figure 11-31 Search RBC Survival Tests Screen – All Patients

The Patient List is sorted by their Injection time, latest one first. The number of pages (or screens) will be shown in the upper right corner of the screen indicating the length of the list. To scroll through the list, touch the **DOWN ARROW** (▼) button . The next group of 10 Patients will be displayed and the **UP ARROW** (▲) button will appear allowing the user to scroll up in the list.

There are two ways to search for a particular Patient:

1. From Figure 11-30 RBC Survival Test Search Screen or Figure 11-31 Search RBC Survival Tests Screen – All Patients, touch the *Last:* field box. Figure 11-11 Alphanumeric Keypad Screen will appear. Input the Patient's exact last name. If the exact spelling of the last name is not known, input the first letter of the last name and then touch the **WILDCARD** (**%**) button in the lower left of the alphanumeric keypad. For example, if you want to see all Patients with last names that begin with the letter "C", input "C%". Once the last name is input, touch the **ACCEPT** button. The RBC Survival Tests Search screen will re-appear with *Last:* field box populated with the entered search criteria. Touch the **SEARCH** button. Any Patient that matches the requested search criteria will be displayed.

2. From Figure 11-30 RBC Survival Test Search Screen or Figure 11-31 Search RBC Survival Tests Screen – All Patients, touch the *ID:* field box. Figure 11-11 Alphanumeric Keypad Screen will appear. Input the Patient's exact ID. If the exact spelling of the ID is not known, input the first character of the ID and then touch the **WILDCARD** (**%**) button in the lower left of the alphanumeric keypad. For example, if

you want to see all Patients with IDs that begin with the number "3", input "3%". Once the ID is input, touch the **ACCEPT** button. The RBC Survival Tests Search screen will re-appear with *ID:* field box populated with the entered search criteria. Touch the **SEARCH** button. Any Patient that matches the requested search criteria will be displayed.

Note: The **Last:** *and* **ID:** *field boxes can be used in conjunction with each other. That is, the* **Last:** *field box can contain "C%' and the* **ID:** *field box can contain "3%" and once the* **SEARCH** *button is touched, the screen will display all active Patients with last names that begin with "C" and IDs that begin with "3".*

Once the desired Patient is displayed on the screen, touch the Patient. The entire line for the selected Patient will become highlighted and a **VIEW** button will appear in the lower portion of the screen as shown in Figure 11-32 RBC Survival Report Search Screen with Highlighted Patient.
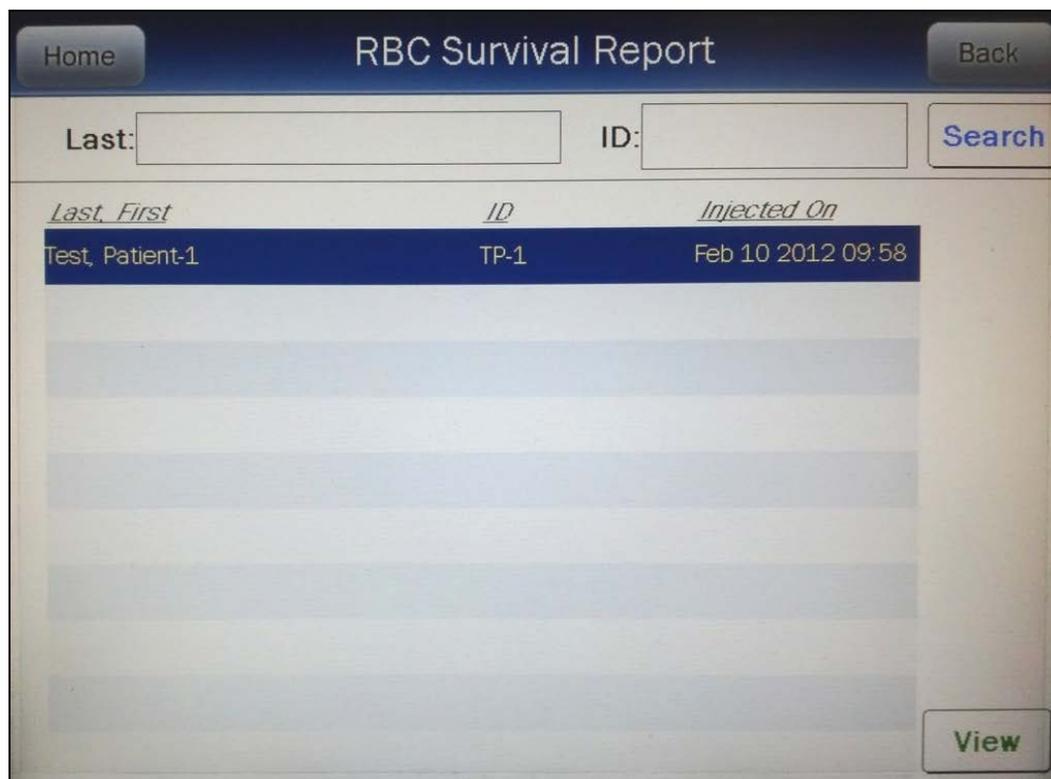
Figure 11-32 RBC Survival Report Search Screen with Highlighted Patient

Report

To obtain a report for the selected Patient, touch the **VIEW** button. Figure 11-33 RBC Survival Test Report Screen will appear displaying the detailed report for the selected patient result.

Figure 11-33 RBC Survival Test Report Screen

The following sections describe the functions that are available from Figure 11-33 RBC Survival Test Report Screen.

Print Result

If a printer is attached to the system, the report of the selected Patient Test results can be printed by touching the **PRINT** button.

Reactivate a Patient

If more measurements are required for the selected Patient, the Patient can be transferred from the list of patients displayed in the Reports Module to the list of patients to be measured in the RBC Survival Test Module.

To re-activate the Patient, touch the **REACTIVATE** button. The ReActivate RBC Survival Test screen will appear.

To complete the reactivation of the selected RBC Survival Test Patient, touch the **YES** button. The Patient will be removed from the Reports Module and transferred to the list of patients to be measured in the RBC Survival Tests Module.

If it is decided not to re-activate the selected Patient, touch the **NO** button. Figure 11-33 RBC Survival Test Report Screen will re-appear.

View Normal Values

To view the RBC Survival Normal Range settings, touch the **VIEW NORMAL** button. Figure 11-34 RBC Survival View Normal Range Screen will appear.

Figure 11-34 RBC Survival View Normal Range Screen

Touch the **BACK** button to return to Figure 11-33 RBC Survival Test Report Screen.

Viewing Measurements

Specific measurement test results and spectrums can be viewed.

To view the test result measurements, touch any of the blue highlighted count measurements. A screen similar to that shown in Figure 11-35 RBC Survival – View Measurement Results Screen will appear.

Figure 11-35 RBC Survival – View Measurement Results Screen

To return to Figure 11-33 RBC Survival Test Report Screen, touch the **BACK** button.

To view the spectrum for a specific measurement, touch the blue highlighted count field box beside the desired measurement. A Spectrum Screen (similar to Figure 11-12 System Test Spectrum Screen) will appear.

A Region of Interest may be defined using the **BLUE** and **GREEN ARROW** buttons to place vertical line cursors around the ROI. **DOUBLE ARROW** buttons move the cursor approximately 75 energy channels. **SINGLE ARROW** buttons move the cursor approximately 7.5 energy channels.

Note: *The actual energy channel keV will vary depending upon the Auto Calibration.*

When the vertical cursor is moved, the channel energy (keV) and the number of counts in that energy channel are displayed. Once the vertical cursors are set, the total counts in the ROI are displayed.

To print the spectrum, touch the **PRINT** button.

To return to Figure 11-35 RBC Survival – View Measurement Results Screen, touch the **BACK** button.

Exit Results

To exit Figure 11-33 RBC Survival Test Report Screen, touch the **BACK** button.
Figure 11-31 Search RBC Survival Tests Screen – All Patients will re-appear.

This page intentionally left blank.

CHAPTER 12

CALCULATION UTILITIES

GENERAL

Two calculation utilities are provided with the CRC®-55t. These are the same utilities that are described in the CRC®-55t Owner's Manual. They are:

- Conversion between Curie and Becquerel and

- Decay Calculation.

To access the calculation utilities, touch the **UTILITY** button on Figure 12-1 Well Counter Main Screen. Figure 12-2 Utility Screen will appear.

Figure 12-1 Well Counter Main Screen

Figure 12-2 Utility Screen

CONVERSION BETWEEN Ci AND Bq

Located in the top section of Figure 12-2 Utility Screen is the Curie/Becquerel converter. An activity is input in Curies and the value is displayed in Becquerels or an activity is input in Becquerels and the value is displayed in Curies.

To perform a conversion, touch the *[Ci,Bq Conv] Input Activity:* field box. Figure 12-3 Enter Activity Screen will appear.
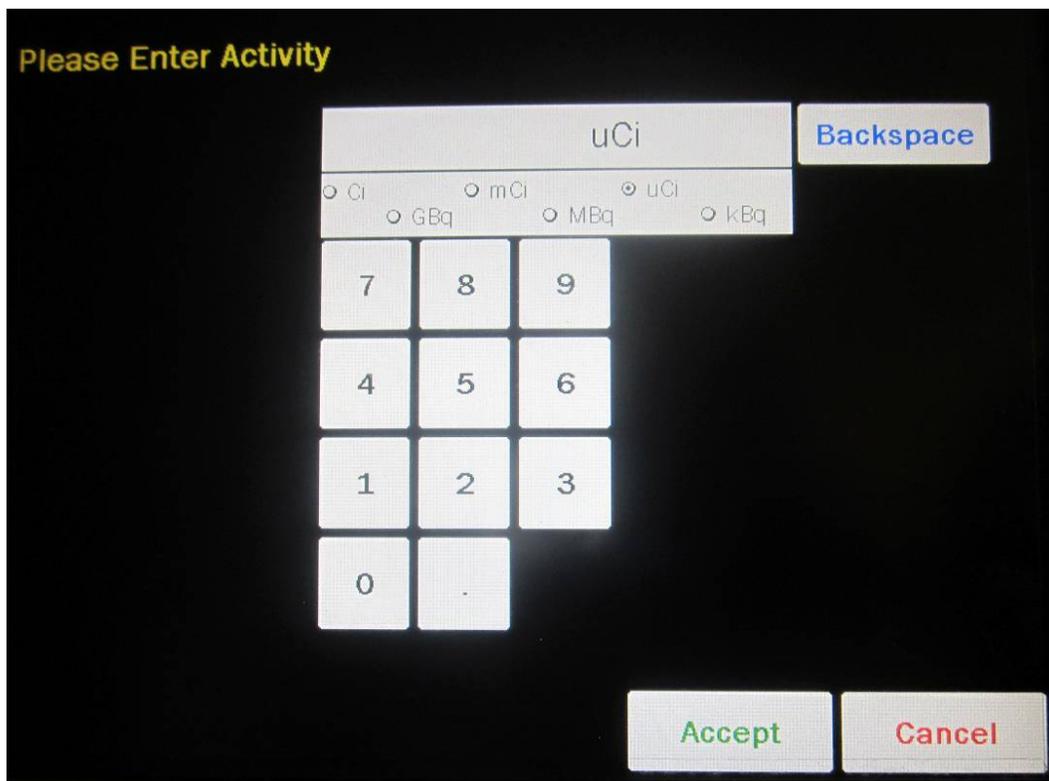
Figure 12-3 Enter Activity Screen

Input the activity to be converted using the keypad and touch the appropriate radio button for the unit of measure.

To exit the Curie/Becquerel Converter and return to Figure 12-2 Utility Screen, touch the **CANCEL** button.

Once the activity and units are correct, touch the **ACCEPT** button. Figure 12-2 Utility Screen will re-appear with the *[Ci,Bq Conv] Input Activity:* field box populated with the entered activity. The result of the conversion is located next to the field box.

To perform another conversion, touch the *[Ci,Bq Conv] Input Activity:* field box. Figure 12-3 Enter Activity Screen will re-appear.

DECAY CALCULATOR

Located in the center section of Figure 12-2 Utility Screen is the Decay Calculator. This utility is used to calculate the activity of a source at a different time (either in the past or the future).

Select Nuclide

To select the desired nuclide, touch the *Nuclide:* field box. The Select Nuclide screen will appear.

The screen displays a listing of nuclides stored in the calibrator's memory (both default and user added nuclides) – 10 at a time. Reference the Appendix for a complete listing of the nuclides included in the CRC®-55t's memory.

The nuclide list is in alphabetical order. User added nuclides are displayed at the top of the list. The number of pages (or screens) will be shown in the upper right corner of the screen indicating the length of the list. To scroll through the list, touch the **DOWN ARROW** (▼) button. The next group of 10 nuclides will be displayed and the **UP ARROW** (▲) button will appear allowing the user to scroll up in the list.

To cancel the nuclide selection and return to Figure 12-2 Utility Screen, touch the **CANCEL** button.

To select a nuclide for calculation, touch the Nuclide name on the list. The nuclide will become highlighted. (If necessary, scroll the list until the desired nuclide is displayed.) Once a nuclide is selected from the list, an **ACCEPT** button will appear. Touch the **ACCEPT** button to choose the nuclide. Figure 12-2 Utility Screen will re-appear with the selected nuclide shown in the *Nuclide:* field box along with the half-life.

Date and Activity

The beginning (From) date/time and activity and ending (To) date/time must be input to perform the calculation.

Beginning Date and Time

To input the beginning date and time for the calculation, touch the *FROM:* field box. Figure 12-4 Date/Time Screen will appear.
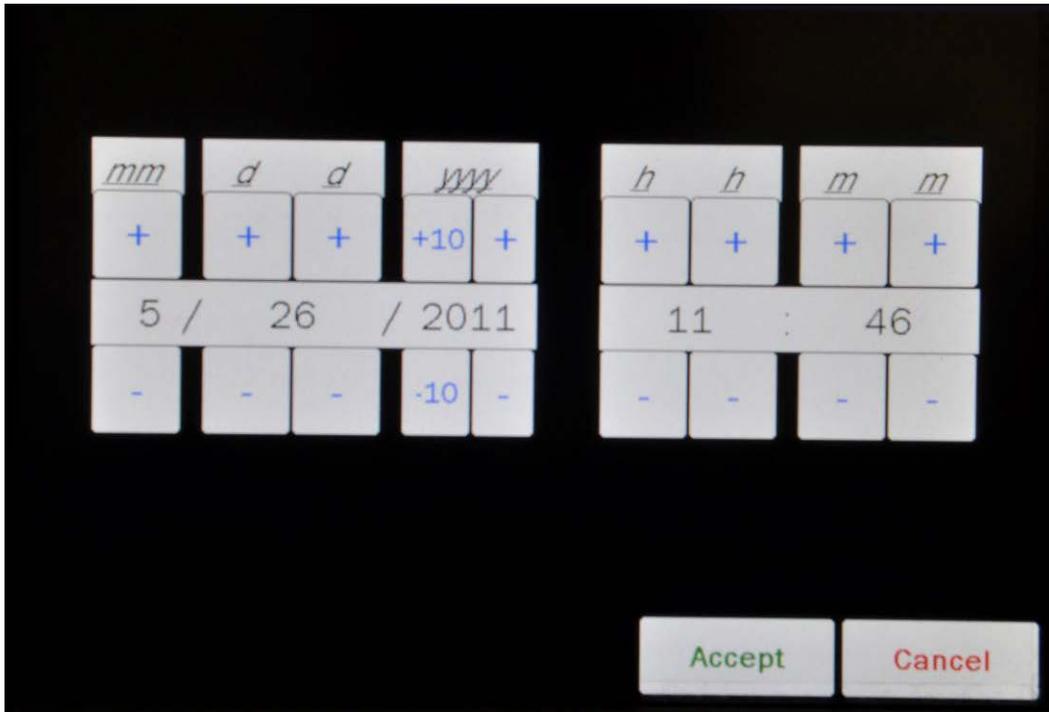
Figure 12-4 Date/Time Screen

The screen displays the currently set date and time. Above and below each of the fields are **+** and **–** buttons, respectively. To adjust the displayed value for a specific field, touch the **+** button to increase the displayed value or the **–** button to decrease the displayed value.

For the year, **+10** and **-10** buttons are provided to quickly change the tens column of the years.

Adjust the displayed date and time as required to show the beginning date/time of the calculation.

To cancel any changes and return to the Figure 12-2 Utility Screen, touch the **CANCEL** button.

Touch the **ACCEPT** button to accept the set date and time. Figure 12-2 Utility Screen will re-appear with *FROM:* field box populated with the entered date and time.

Beginning Activity

To input the beginning activity for the calculation, touch the *FROM: act* field box. Figure 12-5 Enter Activity Screen will appear.
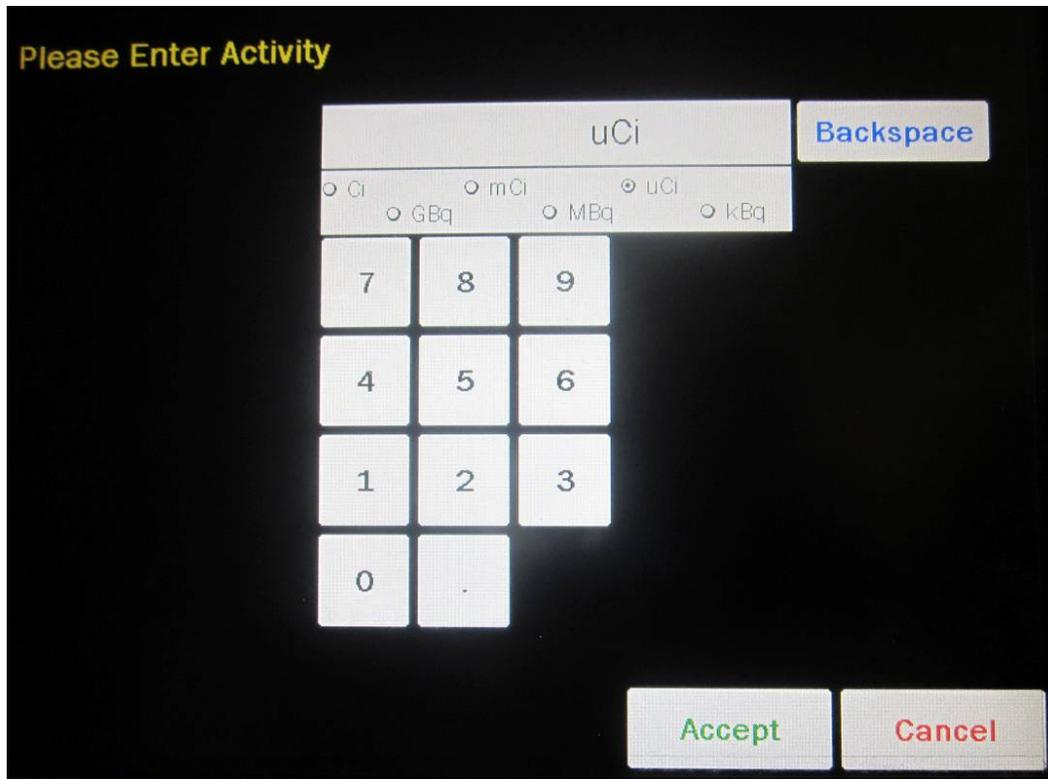
Figure 12-5 Enter Activity Screen

Input the beginning activity to be converted using the keypad and touch the appropriate radio button for the unit of measure.

To cancel any changes and return to the Figure 12-2 Utility Screen, touch the **CANCEL** button.

Touch the **ACCEPT** button to accept entered activity. Figure 12-2 Utility Screen will re-appear with *FROM: act* field box populated with the entered activity.

Ending Date and Time

To input the ending date and time for the calculation, touch the *TO:* field box. Figure 12-6 Date/Time Screen will appear.
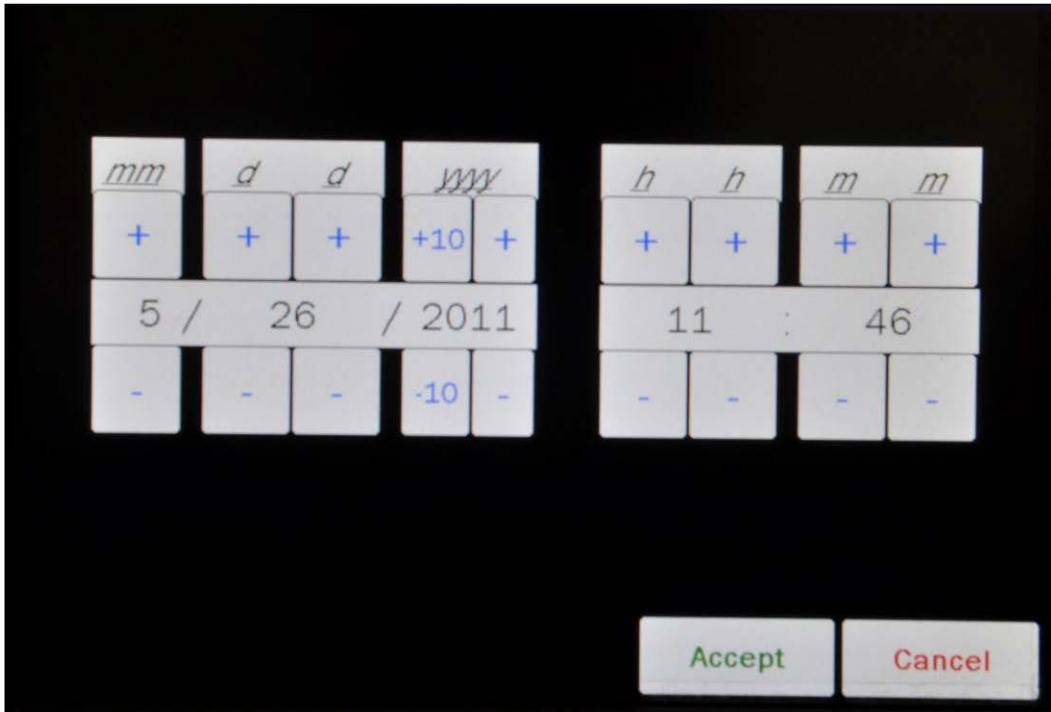
Figure 12-6 Date/Time Screen

The screen displays the currently set date and time. Above and below each of the fields are **+** and **–** buttons, respectively. To adjust the displayed value for a specific field, touch the **+** button to increase the displayed value or the **–** button to decrease the displayed value.

For the year, **+10** and **-10** buttons are provided to quickly change the tens column of the years.

Adjust the displayed date and time as required to show the ending date/time of the calculation.

To cancel any changes and return to the Figure 12-2 Utility Screen, touch the **CANCEL** button.

Touch the **ACCEPT** button to accept the set date and time. Figure 12-2 Utility Screen will re-appear with *TO:* field box populated with the entered date and time.

Results

After the *FROM:*, *FROM: act* and *TO:* field boxes are filled in, the calculated ending activity results will be displayed and highlighted in green as shown in Figure 12-7 Decay Calculator Results Screen.

Figure 12-7 Decay Calculator Results Screen

CHAPTER 13

CLEANING AND MAINTENANCE

GENERAL

This chapter provides the information necessary for the user to perform the basic maintenance of instrument cleaning and general preventative maintenance. There are no internal adjustments or calibration settings that may be done by the user within the conditions of the warranty.

⚠ **CAUTION:** REFER ALL SERVICING TO A QUALIFIED SERVICE REPRESENTATIVE!

It is recommended that periodic (every five years) re-calibration of the CRC®-55t Well Counter be performed only by Capintec's Authorized Service Center to guarantee the instrument's high reliability is maintained. Contact Capintec's <u>only</u> Authorized Service Center in Pittsburgh for servicing or re-calibration at 1-800-227-6832.

CLEANING and DISINFECTING

⚠ **CAUTION:**
- DISCONNECT THE POWER BEFORE CLEANING.
- TO AVOID ELECTRICAL SHOCK OR DAMAGING OF THE CRC® -55t WELL COUNTER, NEVER ALLOW WATER OR LIQUIDS TO PENETRATE THE DETECTOR HOUSING.
- DO NOT USE AEROSOL DISPENSERS TO SPRAY THE EQUIPMENT WITH CLEANING SOLUTIONS OR LIQUIDS.
- TO AVOID DAMAGING, DO NOT USE AROMATIC HYDROCARBONS, CHLORINATED SOLVENTS OR METHANOL-BASED CLEANING SOLUTIONS.
- TO AVOID DAMAGE TO THE NaI CRYSTAL, NEVER USE ANY KIND OF SCRAPER TO CLEAN THE FRONT FACE OF THE DETECTOR.

Cleaning Instructions

Well Counter

Wipe the surfaces clean using a damp, non-abrasive cloth or sponge and a mild detergent and water; do not use solvents or aerosol cleaners. After cleaning, wipe all surfaces dry with a soft, non-abrasive cloth. To avoid scratches, do not use abrasive pads.

Liner

Remove the Liner from the Well Counter and wipe the surfaces clean using a damp, non-abrasive cloth or sponge and a mild detergent and water; do not use solvents or aerosol cleaners. After cleaning, wipe all surfaces dry with a soft, non-abrasive cloth. To avoid scratches, do not use abrasive pads.

Replace the Liner in the Well Counter.

⚠️ **CAUTION:** Never use the CRC®-55t Well Counter without the liner in place. Liners are inexpensive and easy to replace. A contaminated Well Counter is a very costly mistake.

Disinfecting Instructions

All surfaces can be disinfected with bleach using a mixture of 1 cup of bleach per gallon of water. Wipe all surfaces using a non-abrasive cloth lightly dampened with the bleach mixture. After disinfecting, wipe dry with a soft, non-abrasive cloth.

All surfaces can also be wiped with soft cloth lightly dampened with alcohol, such as an alcohol prep pad. After wiping, the surface can be left to air dry.

Liner

Remove the Liner from the Well Counter and disinfect as directed above.

Replace the Liner in the Well Counter.

⚠️ **CAUTION:** Never use the CRC®-55t Well Counter without the liner in place. Liners are inexpensive and easy to replace. A contaminated Well Counter is a very costly mistake.

PREVENTATIVE MAINTENANCE

The following preventative maintenance should be performed at the specified intervals. General cleaning is at the discretion of the user (see Cleaning Instructions above). It is recommended to periodically perform the Quality Assurance Tests as described in CHAPTER 7: ACCEPTANCE & QUALITY ASSURANCE TESTS.

Tests must be performed in an environment where the temperature is stable within a range of +50°F to +85°F (+10°C to +30°C) and the maximum relative humidity is 90% non-condensing. The unit should be powered-up for at least one-half hour prior to performing any measurements. No other precautions need to be observed.

⚠️ **CAUTION:** If these environmental requirements are not followed, the instrument may display erroneous readings.

Note: *Never put a sharp instrument like a pen into the well. If the aluminum coating of the NaI detector is scratched, allowing light and moisture to penetrate, the detector will be ruined. The rod source is plastic and can be safely placed against the surface of the detectors when handled carefully.*

The Quality Assurance Tests should be immediately performed if:

- The equipment has been subjected to extreme physical stress,

- Liquids enter the Well Counter, or

- The Well Counter cable shows signs of damage

DISPOSAL

The following items should be taken into consideration before disposing. These items should be disposed of in accordance with local and national regulations. Please contact Capintec, Inc. or an authorized disposal company to decommission your equipment.
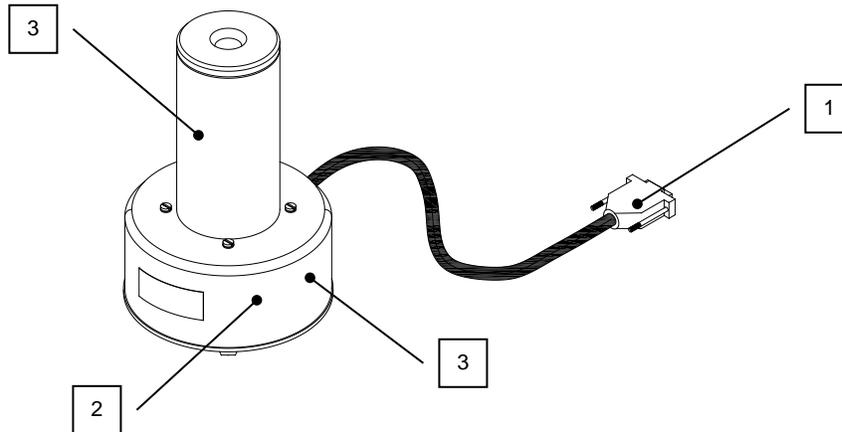
No.	Recycling/Material Code	Important Information
1	External Electrical Cable	
2	Printed Circuit Board	High Voltage Power Supply
3	Lead	Lead Shielding around Detector

SERVICING

The system is covered by a two year limited warranty, under normal conditions of use.

There are no user serviceable parts contained in the Well Counter.

Every five years, the system should be returned to Capintec's only Authorized Service Center for a complete verification.

> CAPINTEC, Inc.
> 620 Alpha Drive
> Pittsburgh, PA 15238
> Phone (412) 963-1988, 1-800-227-6832
> Fax   (412) 963-0610

TROUBLESHOOTING

Some problems may be very easy to diagnose and correct in the field with little or no equipment. If a problem should occur, check here before calling for service. A considerable amount of time and money may be saved.

Wrong Detector Connection.

- Make sure the Well Counter Cable is plugged into the connector labeled "WELL COUNTER" on the rear of the Readout unit. Reference CHAPTER 4:SYSTEM SETUP; SECTION:UNPACKING AND INSTALLATION.

High Background indication.

- The Well Liner may have become contaminated. Reference CHAPTER 7: ACCEPTANCE & QUALITY ASSURANCE TESTS; SECTION: QUALITY ASSURANCE TESTS, Contamination Test.
- Background may actually be high. Check by placing a lead sheet over the top of the Well Counter and re-measure the background.

Indication of significant negative activity.

- Background level may have changed. Re-measure the background. Reference CHAPTER 9: WIPE MEASUREMENT PROCEDURES; SECTION: MEASURE BACKGROUND.

ACCESSORIES AND REPLACEMENT PARTS

The following accessories and replacement parts are available from Capintec. Call Capintec's <u>only</u> Authorized Service Center at 1-800-227-6832 for answers to your questions or to place an order.

- Rod Source: Cs137 (0.5 µCi) 0975-137R
- Rod Source: Eu152 (0.5 µCi) 0970-152R
- Well Counter Well Inserts (Liners) (pack of 100) 5420-0087
- ½" Auxiliary Shield 5420-2072
- PET (1.5") Auxiliary Shield 5420-2141
- Okidata 320 Ticket and Report Printer 5110-1150
- Epson LX-300+II Ticket and Report Printer 5110-0126
- Epson Roll Printer 5430-0058
- HP Inkjet Printer..5430-0146
- Printer Ribbons ....CALL
- Inkjet Cartridges...CALL
- Multi-part Tickets, Paper, etc...CALL
- Additional copies of Owner's Manual 9250-0138

Note: *Circuit diagrams, component parts lists, descriptions and calibration instructions are available to appropriately qualified personnel.*

SHIPPING

If for any reason the CRC®-55t Well Counter must be returned to Capintec, the shipping carton must contain the following or equivalent labeling as shown in Figure 13-1. Label stipulating the maximum environmental conditions for safe storage and shipment.

Figure 13-1

APPENDIX

NUCLIDE LIST

The following table is a listing of the default nuclides that are built into the CRC®-55t and available when using the Well Counter. The table shows the primary photopeak keV (Photopeak 1), up to two other photopeaks keV (Photopeak 2 and Photopeak 3) and the default efficiency nuclides.

Note: --- indicates that the value is not available

The following abbreviations pertain to the half-life:
- H – hours
- M – minutes
- D – days
- Y – years

Nuclide		Half-Life	Photopeak 1 (keV)	Photopeak 2 (keV)	Photopeak 3 (keV)	Efficiency
Ag110m	Silver	249.80 D	658.00	---	---	---
Am241	Americium	432.20 Y	59.50	---	---	---
Ar41	Argon	1.83 H	---	---	---	---
As72	Arsenic	26.00 H	511.00	834.00	---	---
As74	Arsenic	17.78 D	595.80	511.00	634.80	---
As76	Arsenic	26.32 H	559.08	657.03	1217.70	---
Au198	Gold	2.70 D	411.80	---	---	---
Au199	Gold	3.14 D	158.40	72.30	208.20	---
Ba131	Barium	11.80 D	31.60	496.30	123.80	---
Ba133	Barium	10.50 Y	31.60	356.00	81.00	17.000%
Bi207	Bismuth	32.20 Y	569.70	1063.66	76.50	---
Br77	Bromine	56.00 H	239.00	520.70	---	---
C 11	Carbon	20.38 M	511.00	---	---	---
Cd109	Cadmium	426.60 D	22.60	88.03	---	---
Ce139	Cerium	137.60 D	34.20	165.90	---	---
Ce144	Cerium	284.30 D	---	---	---	---
Co55	Cobalt	17.54 H	511.00	931.10	477.20	---
Co57	Cobalt	271.70 D	123.64	14.41	---	80.000%
Co58	Cobalt	70.82 D	810.80	511.00	---	---
Co60	Cobalt	5.27 Y	1173.24	1332.50	---	4.000%
Cr51	Chromium	27.70 D	320.08	---	---	---
Cs131	Cesium	9.69 D	30.40	---	---	---
Cs132	Cesium	6.47 D	---	---	---	---
Cs134	Cesium	2.07 Y	604.70	795.80	567.40	---
Cs136	Cesium	13.10 D	818.50	1048.10	340.60	---
Cs137	Cesium	30.00 Y	661.66	32.85	---	7.000%
Cu64	Copper	12.70 H	511.00	---	---	---
Cu67	Copper	2.58 D	184.60	93.31	---	---

Nuclide		Half-Life	Photopeak 1 (keV)	Photopeak 2 (keV)	Photopeak 3 (keV)	Efficiency
Dy157	Dysprosium	8.10 H	326.20	45.50	---	---
Eu152	Europium	13.40 Y	41.00	122.00	344.28	---
F 18	Fluorine	109.70 M	511.00	---	---	18.000%
Fe52	Iron	8.27 H	168.70	511.00	---	---
Fe59	Iron	44.51 D	1099.00	1292.00	---	---
Ga66	Gallium	9.40 H	511.00	1039.90	---	---
Ga67	Gallium	3.26 D	93.31	184.58	300.21	34.000%
Ga68	Gallium	68.00 M	---	---	---	---
Ga72	Gallium	14.10 H	834.00	630.00	---	---
Hf181	Hafnium	42.40 D	482.00	133.00	58.80	---
Hg197	Mercury	64.10 H	71.70	---	---	---
Hg203	Mercury	46.60 D	279.20	---	---	---
I 123	Iodine	13.22 H	158.97	28.05	---	28.000%
I 124	Iodine	4.18 D	602.72	28.04	511.00	---
I 125	Iodine	59.60 D	28.40	---	---	16.000%
I 129	Iodine	15.70 MY	31.28	---	---	---
I 130	Iodine	12.36 H	536.10	668.50	739.50	---
I 131	Iodine	8.02 D	364.48	637.14	284.30	18.000%
I 133	Iodine	20.80 H	529.47	875.33	---	---
In111	Indium	2.81 D	171.28	23.62	245.39	---
In113m	Indium	1.66 H	391.70	24.70	---	---
In116m	Indium	54.15 M	---	---	---	---
Ir192	Iridium	73.83 D	310.64	468.10	---	---
K 42	Potassium	12.36 H	1524.67	---	---	---
K 43	Potassium	22.30 H	375.55	617.49	593.40	---
Kr79	Krypton	35.04 H	---	---	---	---
Kr87	Krypton	76.30 M	---	---	---	---
Lu177	Lutetium	6.71 D	---	---	---	---
Mn52	Manganese	5.59 D	1434.10	935.50	744.20	---
Mn52m	Manganese	21.10 M	511.00	1434.06	---	---
Mn54	Manganese	312.50 D	834.84	---	---	---
Mn56	Manganese	2.58 H	---	---	---	---
Mo99	Molybdenum	65.92 H	140.51	749.65	181.05	---
N 13	Nitrogen	9.97 M	511.00	---	---	---
Na22	Sodium	2.60 Y	511.00	1274.54	---	---
Na24	Sodium	14.96 H	1368.00	---	---	---
Nd147	Niobium	10.98 D	39.60	91.20	531.00	---
Np239	Neptunium	2.36 D	105.70	---	---	---
O 15	Oxygen	2.04 M	---	---	---	---
P 32	Phosphorus	14.29 D	---	---	---	---
Pb203	Lead	51.88 H	74.40	279.20	---	---
Pb212	Lead	10.64 H	238.60	78.70	---	---
Ra226	Radium	1600.00 Y	609.00	352.00	79.20	---
Rb81	Rubidium	4.58 H	511.00	446.10	190.30	---
Rb82	Rubidium	1.27 M	---	---	---	---
Rb84	Rubidium	32.77 D	881.61	511.00	---	---
Sb117	Antimony	2.80 H	---	---	---	---
Sb122	Antimony	2.70 D	564.24	692.65	---	---
Sb124	Antimony	60.20 D	602.73	1690.98	720.17	---

Nuclide		Half-Life	Photopeak 1 (keV)	Photopeak 2 (keV)	Photopeak 3 (keV)	Efficiency
Sc44	Scandium	3.99 H	---	---	---	---
Sc46	Scandium	83.79 D	889.25	1120.51	---	---
Se75	Selenium	119.80 D	269.10	1120.51	---	---
Sn113	Tin	115.10 D	391.70	---	---	---
Sr85	Strontium	64.85 D	514.00	---	---	---
Sr89	Strontium	50.50 D	---	---	---	---
Sr90	Strontium	28.50 Y	---	---	---	---
Tc99m	Technetium	6.01 H	140.51	---	---	68.000%
Tl201	Thallium	72.91 H	72.32	167.43	135.34	46.000%
V 48	Vanadium	15.97 D	511.00	983.52	---	---
Xe133	Xenon	5.24 D	---	---	---	---
Xe135	Xenon	9.09 H	---	---	---	---
Y 86	Yttrium	14.74 H	1076.63	511.00	627.72	---
Y 88	Yttrium	106.60 D	898.00	1836.00	---	---
Y 90	Yttrium	64.00 H	---	---	---	---
Yb169	Ytterbium	32.03 D	54.01	198.00	177.00	---
Zn65	Zinc	243.90 D	1116.00	511.00	---	---
Zn69m	Zinc	13.76 H	436.60	---	---	---

This page intentionally left blank.

INDEX

NEW PRODUCT WARRANTY

Conditions and Limitations

CAPINTEC warrants our products to be free from defects in material and workmanship for a period of 24 months after delivery to the original buyer (unless indicated otherwise).   Our obligation under this warranty is limited to servicing or adjusting products returned to our factory for that purpose promptly upon any claim under this warranty, provided our examination discloses to our satisfaction that the affected parts were originally defective and have not been subjected to misuse, abuse, mishandling or improper operation. This warranty extends to every part of the product except batteries, fuses, ink, magnetic storage media, toner, transistors, tubes or any other normally consumable item. In no event shall we liable for transportation, installation, adjustment or any other expenses which may arise in connection with such products or their servicing or adjustment.

This warranty is expressly in lieu of any other express or implied warranties, and we make no warranty that the products sold herein are merchantable or are suitable for any particular purpose. The benefits of this warranty shall extend only to the buyer and to none other. We shall have no liability of any nature arising out of the use or application of the product in conformity with this warranty. If the product shall fail to perform in conformity with the warranty made herein, we shall be liable solely for the repair and replacement of the product as provided hereinabove, and shall have no other liability in respect of such failure or performance, or any consequences therefrom, including, without limitation, business impairment or loss, personal injury or property damage.

No agent, employee, or representative of ours has any authority to bind us to any representation or warranty concerning the product sold herein, and unless a representation or warranty made by an agent, employee or representative is specifically included herein, it shall not be enforceable by the buyer. No waiver, alteration or modification of the foregoing conditions shall be valid, unless made in writing and signed by an executive officer of our corporation.

This page intentionally left blank.

CAPINTEC, INC.

DECLARATION OF CONFORMITY
THE EC DIRECTIVE AND CE MARKING

We,   Capintec, Inc.
       6 Arrow Road
       Ramsey, NJ 07466
       Phone: 800-631-3826
       Fax: 201-825-1336

Capintec, Inc.
620 Alpha Drive
Pittsburgh, PA 15238
Phone: 412-963-1988
Fax: 412-963-0610

declare under our sole responsibility that the product CRC®-55tW RADIOISOTOPE DOSE CALIBRATOR (including use with Epson Roll and Epson Slip printers) to which this declaration relates is in conformity with the Medical Device Directive 93/42/EEC and the In Vitro Diagnostic Device Directive 90/385/EEC.

This product is in conformity with the following standards or other normative documents following:

1. EN61010-1
2. EN60601-1-2

Certified to Annex V of the Directive 93/42/EEC on Medical Devices
Dose Calibrators, Class I with measuring function
Certified through Intertek Semko AB, Notified Body MDD
CE Mark as shown denotes conformance to the above statement.

$C\mathcal{E}_{0413}$

The Technical Construction File is maintained at:
     Capintec, Inc.   Phone: 412-963-1988
     620 Alpha Drive   Fax: 412-963-0610
     Pittsburgh, PA 15238

The authorized representative located within the Community is:
     Atlantico Systems Ltd.
     34 Oldfield, Kingston, Galway, Republic of Ireland

Date of issue: 11/21/11

Place of issue:
     Capintec, Inc.
     620 Alpha Drive
     Pittsburgh, PA 15238

_____
Mary Anne Dell, Vice President & General Manager