CAPTUS® 3000 Portable

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THYROID UPTAKE SYSTEM

OWNER'S MANUAL

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WARRANTY

DECLARATION OF CONFORMITY

PREFACE

GENERAL

Thank you for purchasing the Capintec line of Thyroid Uptake Measurement Systems. Every effort has been made to ensure that the information in this document is complete, accurate, and up-to-date. Mention of products manufactured by other companies does not necessarily constitute endorsement by Capintec, Inc. Capintec assumes no responsibility for the results of errors beyond its control.

Please address any comments pertaining to this manual to:

CAPINTEC, Inc.
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Pittsburgh, PA 15238
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Fax (412) 963-0610

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

SYSTEM DESCRIPTION

Your new CAPTUS® 3000 is available in several configurations. Please take a moment to review your system to determine exactly the configuration you have received. The basic Thyroid Uptake System consists of the following:

- Portable Stand with Collimator, internal Isolation Transformer and CAP-MCA Multi-Channel Analyzer
- NaI (Sodium Iodide) Detector with Detector Socket Base

  Note: *Two versions of detectors are available: Flat Face or Drilled.*
- Laptop Computer with software installed to switch inputs and perform multi-channel analysis
- Cables for connecting the Detector, CAP-MCA, etc.
- 15 foot power cord with hospital grade plug
- Windows XP or later, Manuals and Distribution Disks
- CAPTUS® 3000 Portable Software Installation CD including Owner's Manual
- Ability to connect optional external printer and/or Well Counter

MEDICAL EQUIPMENT SAFETY CLASSIFICATION

- CLASS I EQUIPMENT energized from an external power source.
- TYPE B EQUIPMENT with applied part (Positioning Rod).
- Ordinary EQUIPMENT without protection against the ingress of water.
- Suitable for CONTINUOUS OPERATION.
- NOT suitable for use in the presence of a FLAMMABLE ANAESTHETIC MIXTURE WITH AIR or WITH OXYGEN OR NITROUS OXIDE.

ELECTROMAGNETIC INTERFERENCE POTENTIAL

This equipment complies fully with interference immunity requirements of the standard IEC 60601-1-2 “Medical electrical equipment: Part 1: General safety requirements; 2. Supplementary standard: Electromagnetic compatibility”.

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 only Authorized Service Center.

INSTALLATION

Your system has been shipped from the factory pre-configured and fully tested. Installation consists of placing the components and securing them in place. Detailed installation and assembly instructions are provided in the included **Unpacking and Assembly Instructions** for your system.

IMPORTANT SAFETY INFORMATION

The CAPTUS® 3000 measurement system 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 the CHAPTER 1: SAFETY before operating this equipment.

TRADEMARKS

CAPTUS® 3000 and CII® are registered trademarks of Capintec, Inc.

Microsoft® and MS Windows® are U.S. registered trademarks of the Microsoft Corporation.

Hewlett Packard® DeskJet is a registered trademark of the Hewlett Packard Company.

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CHAPTER 1

SAFETY

GENERAL 1-1
SYMBOL DEFINITIONS.....1-1
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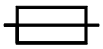
GENERAL

These warnings and instructions form an integral part of the CAPTUS® 3000 system and must be kept available for consultation at all times. Precise compliance with the warnings and instructions is an essential condition for correct usage and safety of patients and users.

SYMBOL DEFINITIONS

	Dangerous Voltage Present
	Protective Earth Ground
	Caution
	Operator should consult accompanying documents
	Fuse
	AC Voltage
	“ON” (power)
	“OFF” (power)
	Type B Equipment
	Date of Manufacture
	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.
	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 in the center section on both sides of the Spring-Arm is a warning label (Figure 1-1) concerning the hazard of removing the Collimator when the Spring-Arm is in the wrong position. If the weight of the Collimator is removed from the Spring-Arm, the arm may forcefully spring upward causing serious injury to the operator. The Spring-Arm must be fully extended in the upright position to prevent this from happening.

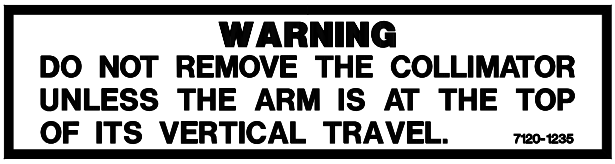


Figure 1-1

Located in the front section on both sides of the Spring-Arm is a warning label (Figure 1-2) concerning the hazard of improperly installing the Collimator onto the Spring-Arm. If the Collimator Support Pin is not fully inserted and latched into the Receptacle Block of the Spring-Arm, the Collimator may detach from the Spring-Arm and fall onto the patient. In addition, the Spring-Arm can forcefully swing upward and cause serious injury to the operator. The Collimator is safely installed on the Spring-Arm when the red warning ring is ***NOT*** visible between the Collimator and the Receptacle Block. Refer to the **UNPACKING AND ASSEMBLY INSTRUCTIONS** for illustrations.

Figure 1-2

Located on the Spring-Arm is a caution label (Figure 1-3) concerning the stowing of the Collimator/Spring-Arm, computer and printer before moving the system. If the Collimator/Spring-Arm is not properly stowed and secured to the Lock Bar, the

Collimator/Spring-Arm may inadvertently swing out and/or upward causing serious injury to the operator or a bystander or in addition, causing the stand itself to become unbalanced and tip over.

Refer to the **UNPACKING AND ASSEMBLY INSTRUCTIONS** for illustrations.

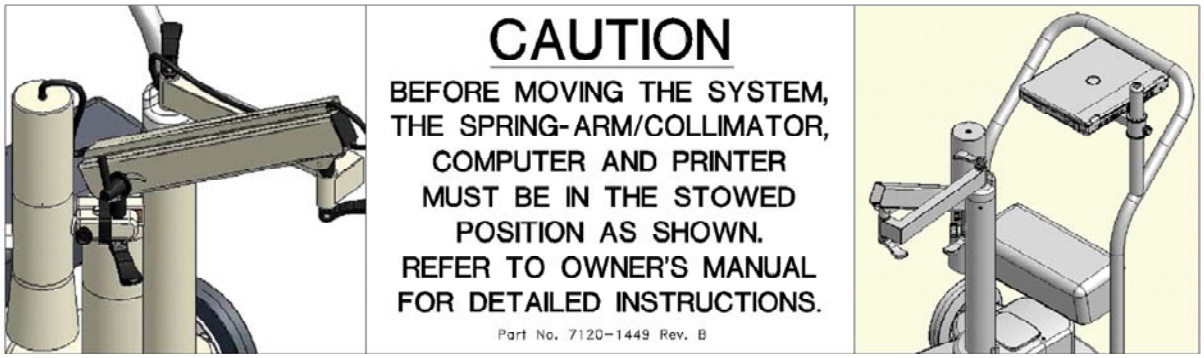


Figure 1-3

Located on the Stand Base is a label (Figure 1-4) providing the serial number and manufacture date of the system.

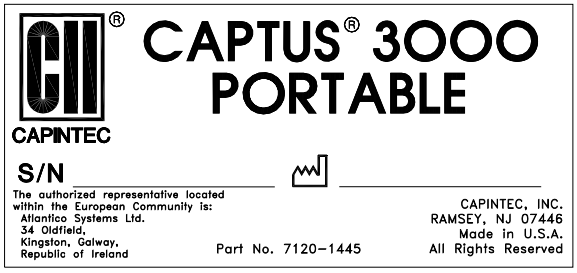


Figure 1-4

Located on the Stand Base is a label (Figure 1-5) providing the system power requirements and the input voltage. This label also lists the replacement fuse values for both power line voltages.

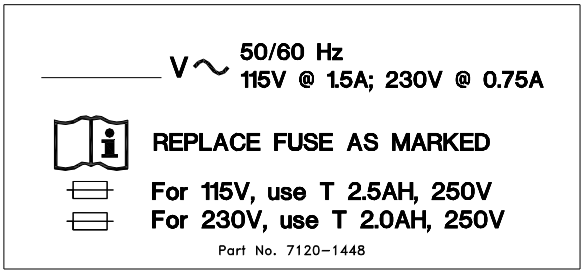


Figure 1-5

CAUTION: Please reference CHAPTER 15: CLEANING AND MAINTENANCE for instructions on how to change the fuses in the Stand Base.

CAUTION: A fire hazard may exist if the wrong size of fuse is installed.

Located on the Stand Base is a label (Figure 1-6) with two caution statements pertaining to the main power cord:

- **READ INSTRUCTIONS CAREFULLY BEFORE CONNECTING TO OUTLET** – This statement directs the user to the Owner's Manual before connecting the power.
- **"HOSPITAL ONLY" or "HOSPITAL GRADE"** – This statement alerts the user to select an electrical power receptacle that is designated as such, to ensure reliable grounding to the CAPTUS® system.

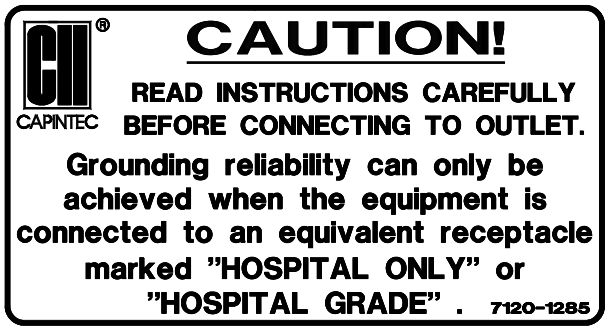


Figure 1-6

CAUTIONS AND NOTES

CAUTION: Changing the date or time while a timed test is in progress (for example, a 24 hour Thyroid Uptake Test) might affect the results or introduce unexpected error. Care should be taken to evaluate any potential impact for ongoing tests before changing the date or time. Verify that in the Date and Time Properties in Windows Control Panel that the "Automatically adjust clock for daylight saving changes" checkbox is not checked.

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: High voltage is present inside the Detectors (up to 1000 Volts). Due to the presence of this high voltage, refer all servicing to qualified personnel.

CAUTION: There are no internal adjustments inside the detector, computer, printer or CAP-MCA that should be performed by the user within the conditions of the warranty, except for changing the Isolation Transformer fuses. Due to the presence of high voltages, opening the CAP-MCA with the system plugged in may be hazardous. Refer all servicing to qualified personnel.

CAUTION: Never use the Well Detector without the well liner in place. Liners are inexpensive and easy to replace. A contaminated detector is a very costly mistake. If unit becomes contaminated remove liner and clean unit as stated in CHAPTER 15: CLEANING AND MAINTENANCE before operating.

CAUTION: Care must be exercised when moving the system or when maintenance is performed. If the system is inclined at more than a 15-degree angle, it may tip over.

CAUTION: Verify that the collimator is correctly installed as stated in the **UNPACKING AND ASSEMBLY INSTRUCTIONS**. Failure to follow these instructions could result in injury or product malfunction.

CAUTION: This equipment generates radio frequency energy and is susceptible to radio frequency energy (such as from other equipment and portable and mobile RF communications equipment). The equipment needs to be installed and used accordingly with these instructions; otherwise the equipment may not function properly or may cause harmful Electromagnetic Interference (EMI) to nearby devices. There is, however, no guarantee that interference will not occur in a particular installation/location.

CAUTION: If any other detectors than those supplied by Capintec are used, the safety of the unit may be compromised or other devices located in the same general area as the CAPTUS® 3000 may become susceptible to EMI.

CAUTION: If any components are used other than those supplied by Capintec, the power and signal connections must be the same as those for the original manufacturer's configuration or the safety of the unit may be compromised.

CAUTION: The equipment should not be used adjacent to or stacked with other equipment and that if adjacent or stacked use is necessary, the equipment should be observed to verify normal operation in the configuration in which it will be used.

CAUTION: Do not disconnect or connect the cables from the detectors or CAP-MCA while the system is powered on. Turn the CAP-MCA power off first.

CAUTION: The unit contains lead. The unit should be disposed of in accordance with local and national regulations.

CAUTION: The unit contains a lithium battery. This 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.

CAUTION: To remove main power from the system, the main power cable must be unplugged from the medical grade wall socket.

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 15: CLEANING AND MAINTENANCE) to guarantee that the instrument's high reliability is maintained).*

GENERAL SAFETY TIPS

- Verify all equipment is powered off before cleaning. Use only a damp cloth; do not use solvents or aerosol cleaners.
- To protect the equipment from overheating, make sure none of the openings (vents) on the computer or Stand Base are blocked.
- Do not use the equipment directly in front of a radiator, heat register or air conditioning duct.
- Do not use the equipment near water or spill liquids of any kind into the equipment.
- Be sure that your power source matches the rating listed on the Stand Base.
- The power cord has a grounded, 3-prong plug as a safety feature, and it will only fit into a grounded outlet. Do not use an adapter to defeat the grounding.
- The Laptop Computer is connected to the internal Isolation Transformer to comply with electrical safety for Medical Electrical Equipment.
- To avoid damaging the power cord, do not place anything on it or place it where it will be walked 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. There are no user serviceable parts contained in the system other than the fuses in the internal Isolation Transformer. 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.
- Do not subject the Detector(s) to rough handling or rapid temperature changes, as the NaI Scintillation Crystal can be damaged.

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CHAPTER 2

FUNCTIONAL & TECHNICAL DESCRIPTION

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INTENDED USE

The CAPTUS® 3000 Portable Thyroid Uptake / Well System is intended to be used by trained Nuclear Medicine Technologists for performing Thyroid Uptake, Thyroid Bioassay, Wipe Test, Blood Volume (with Cr51 or I 125) Test, Schillings Test 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, Linearity, Constancy, Accuracy, etc.).

The CAPTUS® 3000 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:**
  - Minimum: at least an Associate Degree
  - No maximum
- **Knowledge:**
  - Minimum: Understands the basic concepts of nuclear medicine.
  - No maximum
- **Language Understanding:**
  - English
  - Other languages are available for instructions for use
- **Experience:**
  - Minimum: Has minimum training or is under surveillance by a trained user.
  - No maximum

OPERATOR TRAINING

This Owner's Manual contains all of the information required to operate the CAPTUS® 3000.

FUNCTIONAL DESCRIPTION

Thyroid Uptake

Thyroid uptake is a measurement of the ratio of the amount of radioactive material concentrated in the thyroid gland to the amount of radioactive material administered to the patient. Thyroid uptake measurements are generally used to determine conditions of hyperthyroidism. High uptake results are found in Graves disease, toxic nodular goiter, and stimulator secreting tumors or can be TSH-induced. Low uptake results are found with thyroid hormone secretion in ectopic tumors, hormonal release in thyroid injury, after intake of thyroid hormone, or in Jod-Basedow disease. During the treatment of thyroid cancer by I 131 ablation, uptake measurements are used to monitor thyroid activity.

The CAPTUS® 3000 system will store patient demographic and dosage information, count data for both the administered dosage and the patient, decay correct all count data, calculate thyroid uptake results, and store all of this information in the thyroid uptake database. Regions of Interest have been defined for three isotopes, I 131, I 123, or Tc99m. If normal values have been entered, results exceeding these values will be flagged. All of the patient information may be printed. The thyroid uptake software has been designed to accommodate a variety of different counting protocols, using either capsules or liquid dosages.

Wipe Test

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

Note: *A Drilled Probe for the Collimator or an optional external Well Counter is required for Wipe measurements.*

Lab Tests

Urine Tests

Schilling Test

The Schilling Test utilizes Cobalt 57 labeled Vitamin 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

Blood 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 Survival Test

RBC survival determination involving radioactive tagging is most frequently used in diagnosis of hemolytic anemia. The CAPTUS® 3000 software and default counting parameters follow the testing protocol outlined in the Mallinckrodt RBC Survival Instructions that utilize 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) measurement. The subsequent samples are corrected for any differences in hematocrit.

Bioassay

All staff members who work with Iodine 131, Iodine 125, or Iodine 123 need to have regular Bioassay measurements taken to monitor exposure levels. Most state and federal radiation safety regulations mandate that these thyroid measurements be taken periodically.

The CAPTUS® 3000 uses one bioassay protocol, which is user-defined. Before performing bioassay measurements on the staff, the staff member names and ID numbers should be added to the database and parameters for the bioassay protocol should be set up.

TECHNICAL DESCRIPTION

The CAPTUS® 3000 is a PC based application running on the Windows® operating system.

The basic Thyroid Uptake system consists of the following:

- Portable Stand with Collimator, internal Isolation Transformer and CAP-MCA Multi-Channel Analyzer
- NaI (Sodium Iodide) Detector with Detector Socket Base

  Note: *Two versions of detectors are available: Flat Face or Drilled.*
- Laptop Computer with software installed to switch inputs and perform multi-channel analysis
- Cables for connecting the Detector, CAP-MCA, etc.
- 15 foot power cord with hospital grade plug
- Windows XP or later, Manuals and Distribution Disks
- CAPTUS® 3000 Portable Software Installation CD including Owner's Manual
- Ability to connect optional external printer and/or Well Counter

Detector

The CAPTUS® 3000 system is equipped with one or two NaI (Tl) (Thallium-activated Sodium Iodide) crystal and photomultiplier tube detector assemblies, a 1024 channel MCA (Multi-Channel Analyzer), along with associated electronics and electronic controls which provide power and amplification of the pulses generated by the detectors, as well as software modules which record, analyze, manipulate, and store the measured data.

Since NaI crystals are hygroscopic, the detector assemblies are hermetically sealed with an aluminum coating. If the seal is broken, then water will be absorbed by the crystal, causing deterioration of its measurement capabilities, and eventually it will require replacement. For this reason, always handle the detectors with care. Avoid scratching the surface with metal objects such as pens.

When a gamma or x-ray from a radioactive source reaches the NaI crystal, it collides with the electrons in the crystal matrix and transfers energy, primarily through Compton interaction. The excited electron releases this energy as visible light in direct proportion to its absorbed energy. For this reason, NaI detectors are classified as scintillation detectors. The higher the energy of the incident ray, the more Compton collisions and consequently the more visible

light emissions will be measured before all of the energy is absorbed. These sequential emissions of light for each incident ray generated from the sequential Compton collisions appear to the measuring system as a single light pulse. The intensity of the pulse is directly proportional to the energy of the incident gamma or x-ray. The light is eventually directed toward the photomultiplier tube, either by the direction in which it was emitted or by reflection from the interior of the aluminum housing. The photomultiplier tube, which is optically connected to the sodium iodide crystal, converts the visible light pulses into electrical energy and amplifies the signal through a series of dynodes. The resultant electrical signal is directly proportional to the intensity of the incident light pulse. Therefore, the pulse height generated by the system is directly proportional to the energy of the incident gamma or x-ray detected by the system.

Multi-Channel Analyzer

A Multi-Channel Analyzer records the number and height of the electrical pulses generated by the system, divides the pulses into groups based upon pulse height, and provides a visible picture or spectrum of the pulses as well as count information. The CAPTUS® 3000 divides the pulses into 1024 groups or channels. Since pulse height is directly related to the energy of the incident photon, the spectrum displays the pulse heights as a graph of pulses or counts on the vertical scale and energy on the horizontal scale. By matching the displayed spectrum to the decay scheme of an isotope, positive identification of the radioactive source can be achieved.

Electronics associated with the process include the high voltage power supply, amplifiers, and gain adjustments. The high voltage power supply provides voltage to the photomultiplier tube for the light to electrical impulse conversion and amplification process. The amplifiers linearly amplify the electrical signal produced by the photomultiplier tube before the signal is passed to the MCA. The pulse height remains proportional to the energy of the incident ray. The gain controls the amount of amplification that is performed by the card, and is adjustable by the user.

The spectral display also has adjustments which control the pulse height that include zero adjust and lower level discriminators (threshold). The zero adjust controls the channel used for 0 pulse height or 0 energy. The threshold sets the limit for the lowest pulse height to be analyzed.

TECHNICAL SPECIFICATIONS

System Hardware

Detectors, Data Acquisition, and Computer

A laptop computer system including the MS Windows® operating system, the CAP-MCA, a dual input Multi-Channel Analyzer, scintillation detector(s), and easy to use CAPTUS® 3000 application software.

Floor Stand

A Rugged portable stand with heavy duty locking wheels and an articulating arm for the positioning of the Detector/Collimator. A shelf is provided for the CAPTUS® 3000 laptop computer system. The Isolation Transformer is mounted internally in the base of the stand.

Dimensions:

Height	119.4 cm	(47”)
Width	76.2 cm	(30”)
Depth	101.6 cm	(40”)

Weight:

Overall	83.0 kg	(183 lb)

Isolation Transformer

An Isolation Transformer is provided internally with the CAPTUS® 3000 Portable system to ensure that the leakage current meets IEC 60601-1 Medical Equipment Safety Standard. A detachable 4.6m (15 ft) power cord, with a hospital grade plug, is provided to connect the Isolation Transformer to the power source. Dual power line fuses are provided at the power entry module for quick replacement.

Laptop Computer (Minimum System Requirements)

PC compatible, Pentium II / 400 MHz CPU
CD-ROM Drive
500MB free Hard Drive space
128MB RAM
SVGA Graphics Card (800×600, 24 bit Color)
SVGA 14” Color Screen
Keyboard
Mouse or Trackball (optional)
MS Windows® XP

CAP-MCA

A CAP-MCA multi-channel analyzer is provided internally
1024 Channels
Maximum Count Rate 100,000 cps
ROI's – Automatic or Manual
QA automatic – gain adjust, energy calibration, resolution, chi-squared, constancy
Automatic efficiency calculation and storage
Adjustable Lower Level Discriminator (Threshold)
Differential Nonlinearity <2% over the top 98% of channels
Integral Nonlinearity <1% over the top 98% of channels
Adjustable Zero
Preset Live Time, Real Time, Total Counts
Automatic Peak Finding

Detector Inputs

Software control of detector selection
SHV connectors for TU Probe Detector and optional Well Counter

CAPTUS® 3000 Software Package

Stores and prints all test data results
Reference library for isotopes
User definable normal ranges on printout
Thyroid Uptake
Wipe Test
Schilling Test
Blood Volume
RBC Survival
MCA

TU Probe Detector

NaI(Tl) flat face crystal / PM Tube:... 5.1 x 5.1 cm ...(2" x 2")
Monoline construction
Pulse Height Resolution – ≤8.5% or better for Cs137

Lead Shielded Collimator
Complies with ANSI Standard N44.3-1973

10 ft. (maximum) coaxial signal/high voltage cable

Well Counter – Optional

NaI(Tl) well type crystal / PM Tube: ..5.1 x 5.1 cm... (2" x 2")
Well diameter: .....1.6 cm..... (0.625")
Well depth: .....4 cm..... (1.5")
Monoline construction
Pulse Height Resolution – ≤10% or better for Cs137

Lead shielding – lined with brass (0.16 cm (1/16") thick) to minimize backscatter
Thickness: .....2.5 cm..... (1")
Height: .....32.5 cm..... (12.8")
Diameter: .....11.4 cm..... (4.5")
Weight: .....27.9 kg..... (61.4 lb.)

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 for 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 for 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

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 CAPTUS® 3000 Portable.

System Power Requirements

CAUTION: If the input voltage to the following items is not within the stated limits, the unit may not function correctly or may be damaged

Input Power

Line Voltage:.....115 or 230 VAC depending on model ordered
Line Frequency:.....60 or 50 Hz
Current:.....1.5 Ampere @ 115V
0.75 Ampere @ 230V
Fuse: For 115V use T 2.5AH, 250V, (Time Delay)
For 230V use T 2.0AH, 250V, (Time Delay)

Isolation Transformer Output

Output Voltage:.....115VAC
Current Output:.....1.5A
Frequency:.....50/60Hz

Regulatory Listings

The CAPTUS® 3000 Portable has been independently tested and is manufactured in compliance with the following Standards:

EMC

- IEC 60601-1-2 (2007): Medical Electrical Equipment – Part 1 General Requirements for Safety – Section 1.2 Collateral Standard: Electromagnetic Compatibility – Requirements and Tests

Safety

- AAMI ES60601-1 Issued: 2005: Medical electrical equipment Part 1: General requirements for basic safety and essential performance
- CAN.CSA-C22.2 No. 60601-1:08: Medical electrical equipment – Part 1: General requirements for basic safety and essential performance
- IEC 60601-1 Issued: 2005 Ed:3: Medical electrical equipment Part 1: General requirements for basic safety and essential performance
- IEC 60601-1-6 2010 3rd Edition: Medical electrical equipment – Part 1-6: General requirements for basic safety and essential performance – Collateral Standard: Usability

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CHAPTER 3

GENERAL OPERATING INSTRUCTIONS

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Common Controls and Techniques....3-1
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INTRODUCTION

The CAPTUS 3000 software runs on the Microsoft Windows® operating system and follows standard Windows interface conventions. If you are familiar with running Windows based programs, then you should find the CAPTUS 3000 a very user friendly and easy to use program. If you have never used a Windows based program before, please read the next section in this chapter carefully. Windows uses very consistent techniques for user interaction. These techniques are visual and generally oriented toward use of a pointing device, such as a mouse or trackball. In most cases there are alternate keyboard techniques for accomplishing the same task.

WINDOWS OPERATING CONVENTIONS

Common Controls and Techniques

The CAPTUS 3000, like all Windows based programs, is task oriented. Each task to be performed will consist of one or more dialog boxes, as shown in Figure 3-1. Each screen will have various controls on it, which perform functions when clicked with the pointing device or when selected from the keyboard. When you are finished with all of the tasks on a given screen, selecting the Done or Exit button will return you to the previous screen.

Windows Controls

The most common Windows controls are described below. When controls are selected they cause functions or actions to be performed. A control can be selected in several ways; the most common way is with the pointing device. Positioning the pointing device cursor over the control and clicking the left pointing device button selects the control. The pointing device cursor takes several different shapes depending on what is going on in the program and where it is on the screen. Most controls can also be selected through the keyboard. The *Tab* key on the keyboard is used to move from one control to another. Pressing *Shift+Tab* will move back one control. Once a control is selected it can be activated, or changed with other keys. The specific keys that affect each type of control are discussed below.

Pointing Device Cursor

The pointing device cursor is used to select items on the screen. Most of the time the cursor appears as an arrow with a black outline filled with white. When the system is busy doing something that will prohibit it from responding, the cursor changes to an hourglass. When in MCA mode and the cursor is within the boundaries of the spectrum display, the cursor changes to a double-ended vertical arrow.

When the cursor is located within a text box it will change to a thin vertical “I-beam”. Note that actually having the ability to input or edit requires that you click the pointing device button to cause the edit cursor, a blinking vertical line, to appear.

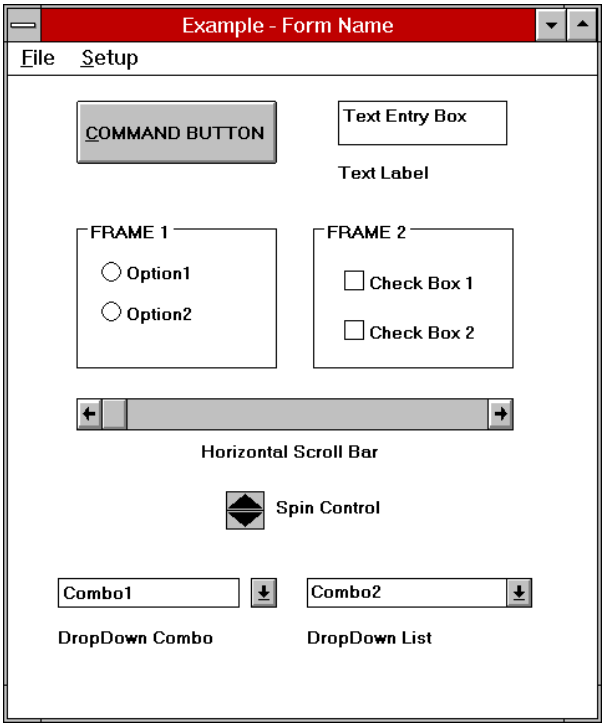
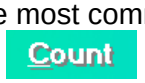


Figure 3-1

Command Button

The most common control in the CAPTUS 3000 is the command button, for example the 

command button. A command button can be activated in one of three ways:

- positioning the pointing device over the button and clicking the pointing device's left button once,
- using the *Tab* key on the keyboard to move the highlight from control to control until the desired control is highlighted, then press the *Enter* key, or
- holding down the *Alt* key and pressing the letter in the command button caption which is underlined. (In the example button, this would be *Alt+C*).

Activating a command button will cause it to perform the specified function. This may involve additional dialog boxes or various other modes of interaction with the user.

Frame

A frame groups various controls together into a logical group. Any type of control may be located within a frame. The only control type that is affected by being in a frame is the radio button.

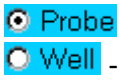
Radio Button ◉

Radio buttons are used to select options. They are called radio buttons because they behave like the selector buttons on a car radio – only one of the buttons in a group may be selected at a time.

A button may be selected in two ways:

- positioning the pointing device over the desired button and clicking one time, or
- by using the *Tab* key to select a set of buttons and then using the up and down arrow keys (↑ ↓) to move from one button in the group to another.

A selected button has a dot in the button and an unselected button has no dot. For example:



- Selected
- Unselected

Check Box ☐

Check boxes are also used to select or enable various options; however, check boxes work as individual controls not in groups. When a check box is true a "√" will appear in the box.

A check box may be selected in two ways:

- positioning the pointing device over the desired button and clicking one time will activate the box, clicking again will deactivate the box, or
- by using the *Tab* key to select a box and then using the *Space Bar* to activate or deactivate the box.

A selected button has a check in the button and an unselected button is unchecked. For example:

- Selected
- Unselected

Text Entry Box

The text box is used whenever input of numeric or alphanumeric information is required.

A text box can be selected in one of two ways:

- positioning the pointing device over the box and clicking the pointing device's left button once, or
- using the *Tab* key on the keyboard to move from control to control until the desired text box is highlighted or the cursor appears in the text box.

When a box is highlighted, typing will replace the highlighted information and the previous contents will be lost. If you wish to edit the existing information use either the left or right arrow (← or →) to move the cursor to the appropriate location. As soon as the cursor moves the highlight will be removed. The contents of the text box can then be edited. The following control keys are active during editing:

Delete ..... Deletes the character after the cursor
Backspace ..... Deletes the character before the cursor
Right Arrow ..... Moves one character to the right
Left Arrow ..... Moves one character to the left
End ..... Moves to the end of the input
Home ..... Moves to the beginning of the input

Some text input boxes provide input verification. If the information typed in the box is invalid, i.e. does not match the requested format (for example, an input in a box requesting a date of 13/45/92) or falls outside the range of valid values, a warning message will be given and the user will be forced to edit or re-input the information.

When the information in a text box is highlighted it indicates that the data is provided by the system and cannot be edited by the user.

There is one special type of text box that is used in the CAPTUS 3000 for input of comments that will appear on test reports. In these boxes up to 8,000 characters of text may be entered. Within the box, text will automatically wrap from one line to the next as it is typed in. The user may also move to the next line by using the *Enter* key. *Ctrl*+*Tab* causes a tab to be entered into the text and the cursor to move to the next tab position (remember pressing just *Tab* will move you to the next control).

Scroll Bars

There are two types of scroll bars, horizontal and vertical. They are used to change the value of some parameter within the program.

When using the pointing device to manipulate a scroll bar there are a number of actions that will cause the bar to change. Clicking the arrow at an end of the bar will cause the "value" of the scroll bar to change in that direction by an amount referred to as a small change. Clicking the bar itself at any location between the end arrow and the slider will cause the value to change in that direction by an amount referred to as a large change (usually 8 to 32 times the amount of a small change). The slider may also be moved by placing the cursor on the slider, pressing the left pointer button down and holding it there while you "drag" the slider to the desired position.

The scroll bar may also be adjusted from the keyboard. The scroll bar is activated through the *Tab* key. When it is active the slider will blink. The slider can then be positioned using the following keys:

Up Arrow.....Moves the slider a small change up or to the right
Right Arrow.....Moves the slider a small change to the right or up
Down Arrow.....Moves the slider a small change down or to the left
Left Arrow.....Moves the slider a small change to the left or down
Home.....Moves the slider all the way to the left or down
End.....Moves the slider all the way to the right or up

Spin Control

The spin control is also used to adjust values. The control consists of two back to back arrows. Clicking an arrow with the cursor causes the value under control to change in the specified direction. The spin button can only be controlled with the pointing device.

List Controls

There are two types of "list" controls used in the CAPTUS 3000. Both appear quite similar on the screen (refer to bottom of Figure 3-1). The only difference in appearance is that on the Drop-Down Combo control, the arrow is not attached to text box portion, while on the Drop-Down List control the arrow is attached. In function both controls are similar except for one item. On the Drop-Down Combo control the user can either enter new data directly into the text box or select from the list. In the Drop-Down List control the user can only select from the list.

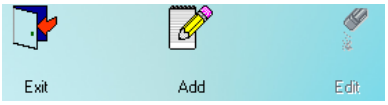
To select an entry from the list, use the pointing device left button to click the down arrow. The list will appear. If there are more items on the list than can be shown vertical scroll bars will appear on the right edge of the list. Place the pointer over the desired entry and double-click the left pointing device button. The box will retract and only the selected item will be displayed. Once the control is selected the up and down arrows may also be used to scroll through the list of items.

Menu Bars

Across the top of many forms you will find a menu bar. In the example the menu bar in Figure 3-1 contains two items: **File** and **Setup**. These are referred to as the top-level menu items. A menu item can be selected either with the pointing device or by typing *Alt+K* where *K* is the letter underlined in the name of the menu item. In some cases the top-level menu item causes action to be taken immediately. In other cases selecting it will cause another dialog box to appear. Selecting an item in the same way is then necessary.

Icons

Icons are graphic symbols located at the top of user module test screens (refer to Figure 3-3). The icons that are in color are active and therefore are selectable. The icons that are grayed are inactive and therefore not selectable.



An icon can be activated in one of two ways:

- positioning the pointing device over the icon and clicking the pointing device's left button once, or
- using the *Tab* key on the keyboard to move the highlight from icon to icon until the desired control is highlighted and then press the *Enter* key.

Activating an icon cause it to perform the specified function. This may involve additional dialog boxes or various other modes of interaction with the user.

Keyboard Control

Most commands or actions can also be activated by keyboard strokes. The command buttons and menu bar items are all controlled from the keyboard in the same manner. Each word has one letter underlined. Holding down the Alt key, and then pressing the underlined letter on the keyboard activates the selection. Almost every action in the CAPTUS 3000 can be accomplished from keyboard control in this manner.

CAPTUS SCREENS

The CAPTUS 3000 Main screen appears as shown in Figure 3-2. This screen provides access to all the user modules (Quality Assurance, MCA, Time Activity Analysis, Thyroid Uptake, Bioassay, Wipe Test, Lab Tests). At the bottom of the screen, access is provided to General Setup modules (Setup), an Isotope Reference Library (Isotopes), Archived results (Archive) and contact information for Capintec, Inc. (About). To select a module, move the pointing device's cursor over the name of the module you wish to select. A highlight box will appear around the module title. Then, single left click activate the module.

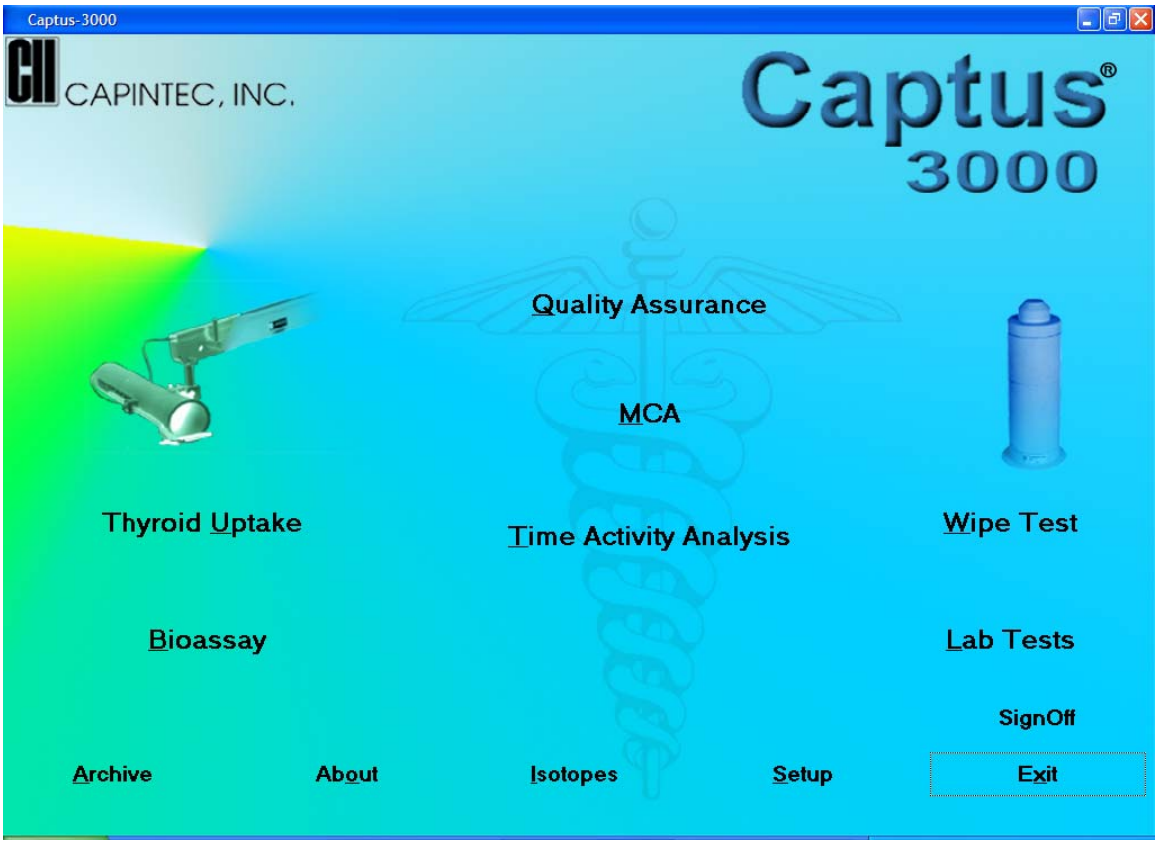


Figure 3-2

Typical Test Screen

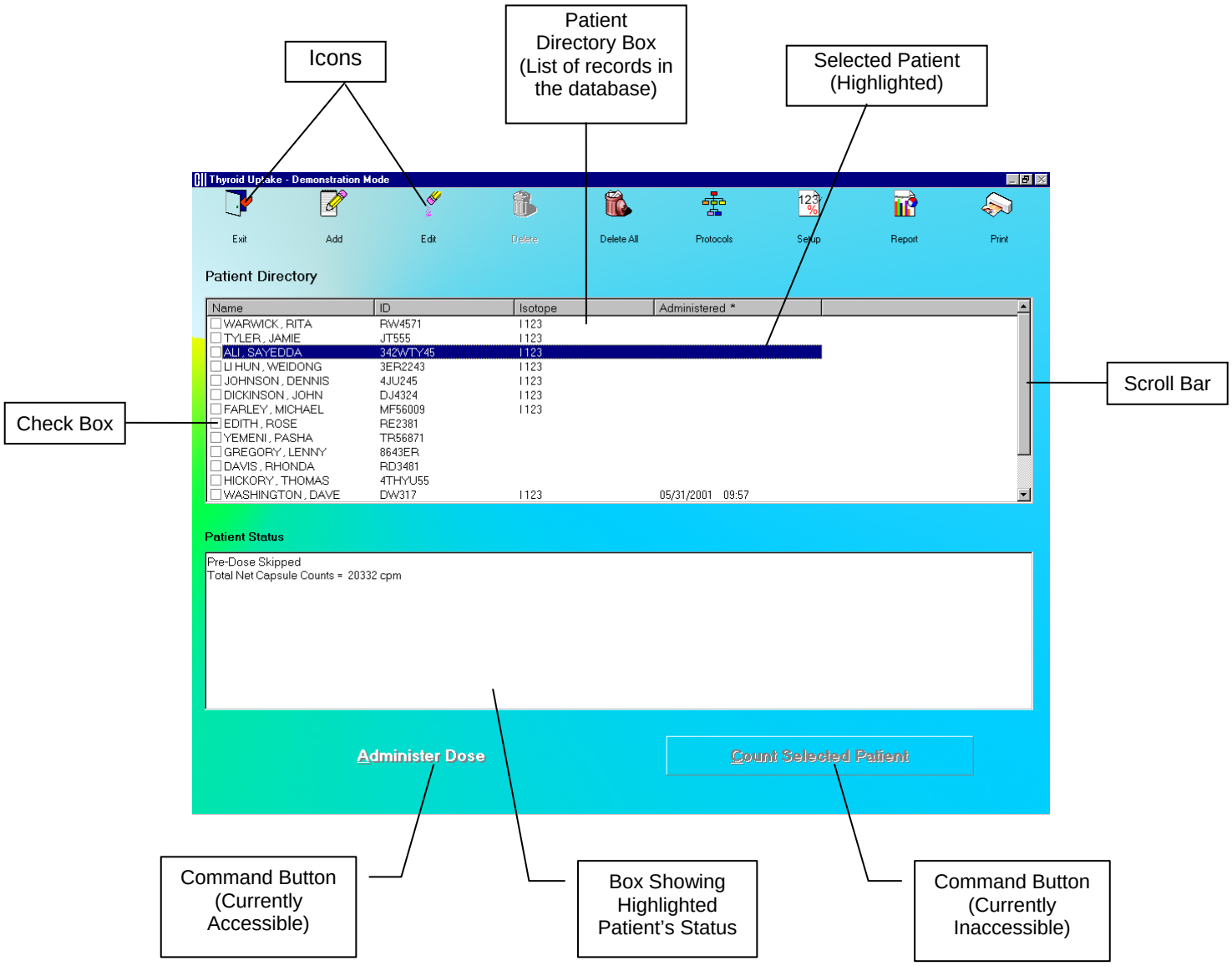


Figure 3-3

Typical Input Screen

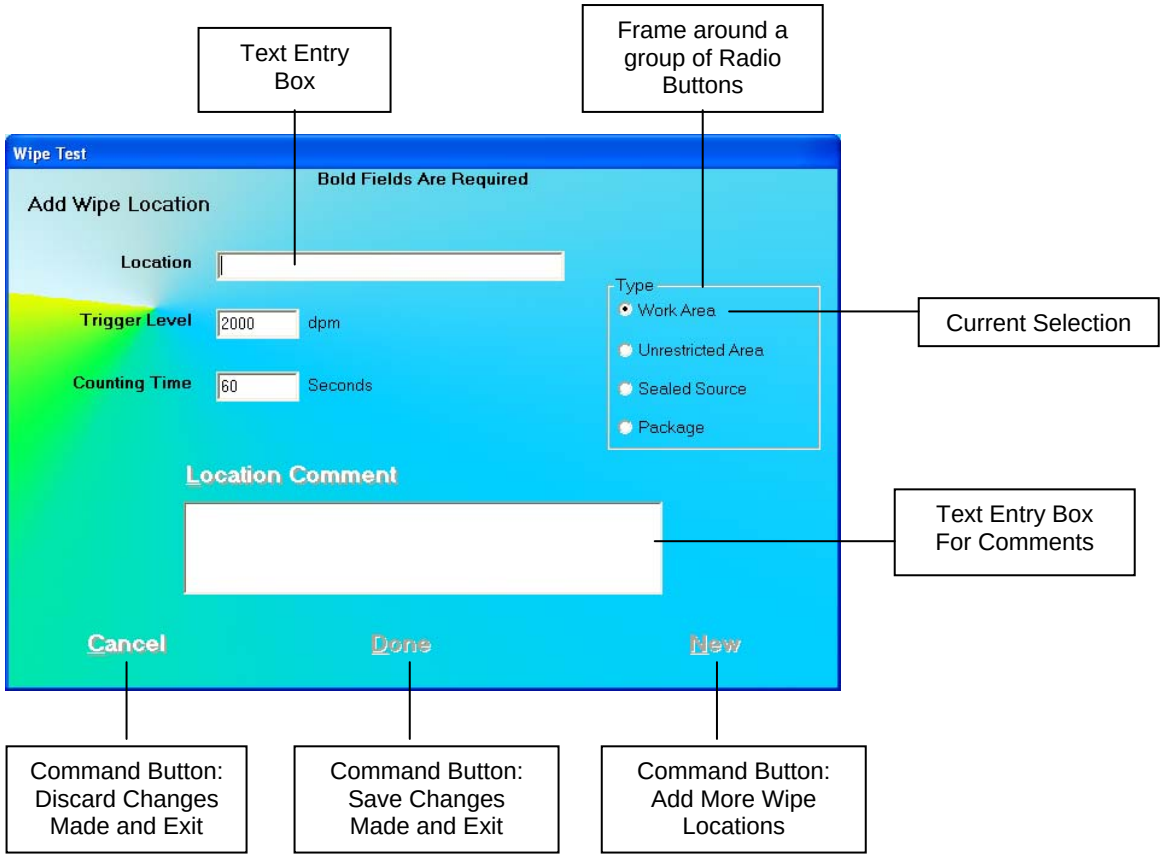


Figure 3-4

Measurement Screen

The Measurement screen is identical in all the test procedures and is as shown in Figure 3-5. The live time elapsed while counting appears on the upper right hand corner of the screen. The spectrum of the measurement is displayed in the white box.

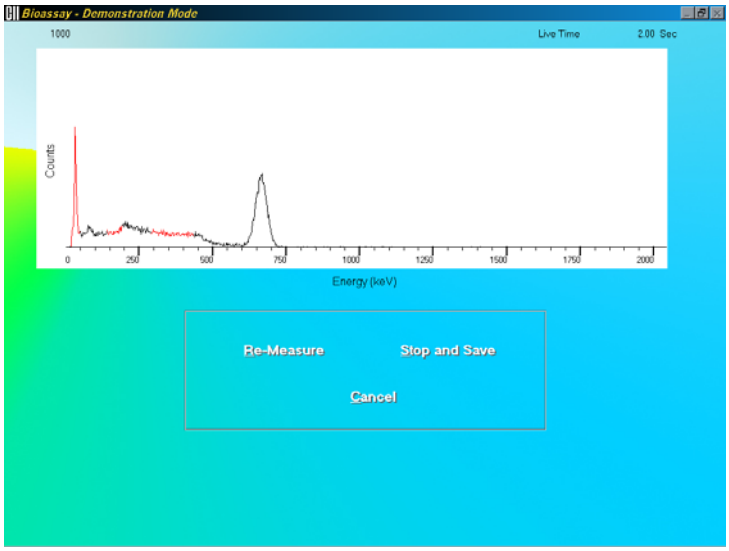


Figure 3-5

The counting lasts for a duration as specified on the Test Setup screen.

To interrupt the counting, three options are available:

- Re-Measure button or press *Alt+R* – To discard collected counts and begin counting again.
- Stop and Save button or press *Alt+S* – To stop collecting counts midway and save the data.
- Cancel button or press *Alt+C* – To stop collecting counts midway and discard the data collected.

Add Comments Screen

The screen for adding comments to reports is identical to those for all the test procedures. You may type in the comments as free text using standard editing keys.

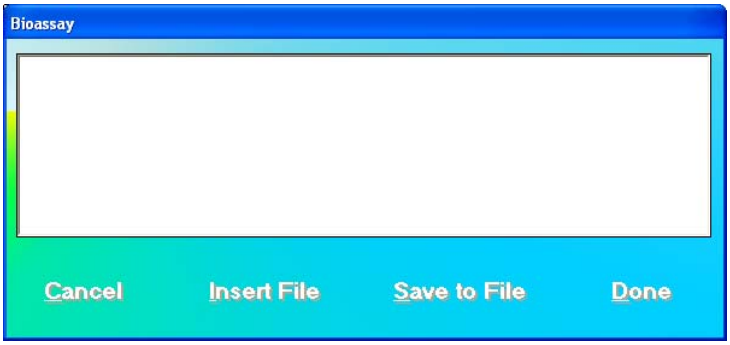


Figure 3-6

The following options are available on this screen:

- Insert File button or press *Alt+I* – To copy comments from an existing text file (.txt files only).
- Save to File button or press *Alt+S* – To save the entered comments as a text file (.txt file only).
- Cancel button or press *Alt+C* – To discard the changes made and quit.
- Done button or press *Alt+D* – To save the changes made and quit.

SHORTCUT KEYS

All Screens

Operation	Key(s)
Cycle through all items on the screen	Tab
Select from a list of records in the database	First letter of the desired record (Name field), when the records box is active
Scroll up or down the list of records in the database	Page Up and Page Down, when the records box is active
Move up or down in the list of records in the database	↑ and ↓, when the records box is active
Select a function or command	ALT + Underlined letter OR Tab(s) and Enter
Exit to the previous screen	Esc

Input Screens

Operation	Key(s)
Cycle through fields on the screen	Tab
Select from a drop-down list	First letter of the desired selection, when drop-down box is active
Select within a group of mutually exclusive options	↑ and ↓, when group is active
Choose a Command (e.g. Cancel, Done, New in Figure 3-4 above)	ALT + Underlined letter OR Tab(s) and Enter
Cancel changes made and exit to the previous screen	Esc

CHAPTER 4

GENERAL SETUP

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INSTALLATION

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

Initial installation and checkout procedures are described in this section. Your system has been shipped from the factory pre-configured and fully tested.

Installation consists of assembling the Portable Stand, placing the components on the stand and securing them in place. Refer to the included **"UNPACKING AND ASSEMBLY INSTRUCTIONS"** document for more details.

Note: *If an optional Well Counter is attached to the system, please verify that a Well Liner has been inserted into the Well before use (refer to Figure 4-1 Well Counter Assembly). This prevents contamination of the Well Detector if a spill or leak occurs.*

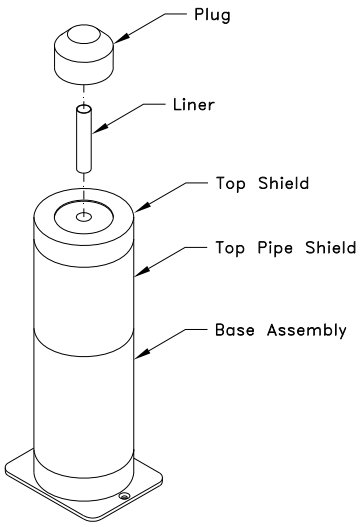

Figure 4-1 Well Counter Assembly

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.

POWER REQUIREMENTS

CAUTION: If the input voltage is not within the stated limits, the unit may not function correctly or may be damaged.

Input Power

Line Voltage:.....115 or 230 VAC depending on model ordered
Line Frequency:.....60 or 50 Hz
Current:.....1.5 Ampere @ 115V
0.75 Ampere @ 230V
Fuse: For 115V use T 2.5AH, 250V, (Time Delay)
For 230V use T 2.0AH, 250V, (Time Delay)

Isolation Transformer Output

Output Voltage:.....115VAC
Current Output:.....1.5A
Frequency:.....50/60Hz

TURN ON PROCEDURE

Verify all system components are mounted securely and all cables are connected. Connect the Isolation Transformer main power cable to a medical grade wall socket.

All software necessary for proper operation of your CAPTUS® 3000 Portable Thyroid Uptake System has been pre-installed and tested at the factory to ensure trouble-free setup.

Please follow the steps below to properly boot the system:

1. Plug the power cord into the receptacle at the rear of the Stand Base. Verify that the power switch is in the OFF (**O**) position. Be sure to set the correct operating voltage on the Power Entry Module as required.
2. Attach the power cord to the main power source.
3. First, turn on the computer power. The computer will proceed through the boot-up sequence and display the Windows® Desktop screen.
4. Once the computer is at the Desktop screen, turn ON (**I**) the main power switch on the rear of the Stand Base.
5. Turn on the Printer power.

Note: *To remove main power from the system, the main power cable must be unplugged from the wall socket.*

CAUTION: Changing the date or time while a timed test is in progress (for example, a 24 hour Thyroid Uptake Test) might affect the results or introduce unexpected error. Care should be taken to evaluate any potential impact for ongoing tests before changing the date or time. Verify that in the Date and Time Properties in Windows Control Panel that the “Automatically adjust clock for daylight saving changes” checkbox is not checked.

LOG ON

Note: *Before performing any measurements, allow the system to warm up at least 30 minutes.*

To run the CAPTUS® 3000 software, double-click on the CAPTUS® 3000 icon. When the program is launched, Figure 4-2 Log On Sign In Window will appear:

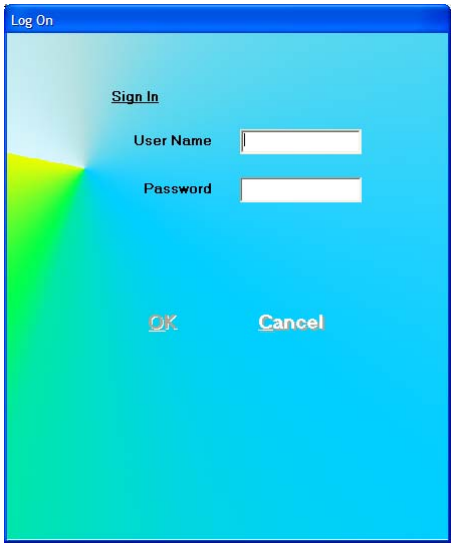

Figure 4-2 Log On Sign In Window

Sign In

Users must set up by the Administrator prior to logging on to the CAPTUS® 3000. User Names and Passwords are case sensitive.

Input the User Name and then the Password. Asterisks (*) will appear when the Password is entered.

The

button will be enabled when entries have been made in both User Name and Password.

When the User Name and Password are correct, clicking on

will close the Sign In window and Figure 4-12 Main Screen will appear.

Note: *If the Startup Tips option is enabled is Setup, Figure 4-9 Startup Tips Window will appear instead of Figure 4-12 Main Screen.*

Sign Off

After signing in to the CAPTUS® 3000, a user may sign off by clicking the SignOff button located on the Main Screen above the Exit button (Refer to Figure 4-12 Main Screen). Clicking this button will end the session for the currently logged on user and return to Figure 4-2 Log On Sign In Window so that another user can sign on.

Admin Log On

The Administrator is the user who has control of user management. The Administrator can view and print Log On / Log Off Reports and can add, delete or invalidate users.

For the Administrator to log on:

- In the User Name text box, input **Admin** and press the *Tab* key.
- In the Password text box, input the password (**AlphaDrive** is default) and press the *Tab* key.

Note: *User Names and Passwords are case sensitive.*

Note: *It is recommended that the Admin password be changed at first log in.*

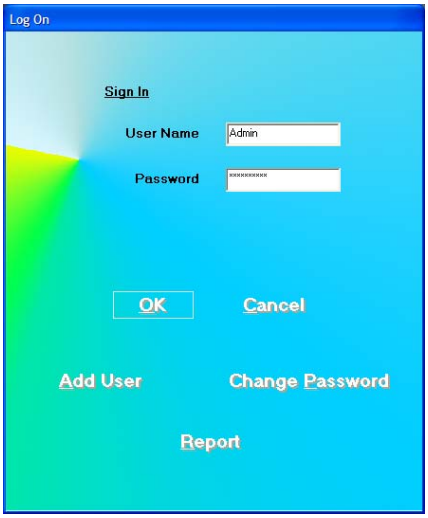

Figure 4-3 Admin Log On Sign In Window

When Admin logs on, the following buttons will appear:

- Add User – this allows the Admin to add users,
- Change Password – this allows the Admin to change the Admin password and,
- Report – allows viewing and printing of the User Log On Report.

User Log On

Once the Admin sets up a user, the user may log on to the CAPTUS® 3000 program.

For a user to log on:

- In the User Name text box, input the user's name and press the *Tab* key.
- In the Password text box, input the user's password and press the *Tab* key.

Note: *User Names and Passwords are case sensitive.*

The Change Password button will appear. Clicking this button allows a user to change his/her own password.

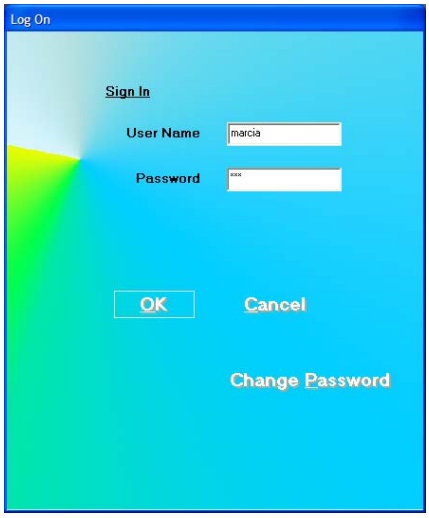

Figure 4-4 User Log On Sign In Window

ADD USER

From Figure 4-3 Admin Log On Sign In Window, click the Add User button.

Add User – Staff Member

If the user to be added is a staff member, in the "Is User a Staff Member?" frame, select the Yes radio button. Figure 4-5 Add User (Staff Member) Window will appear.

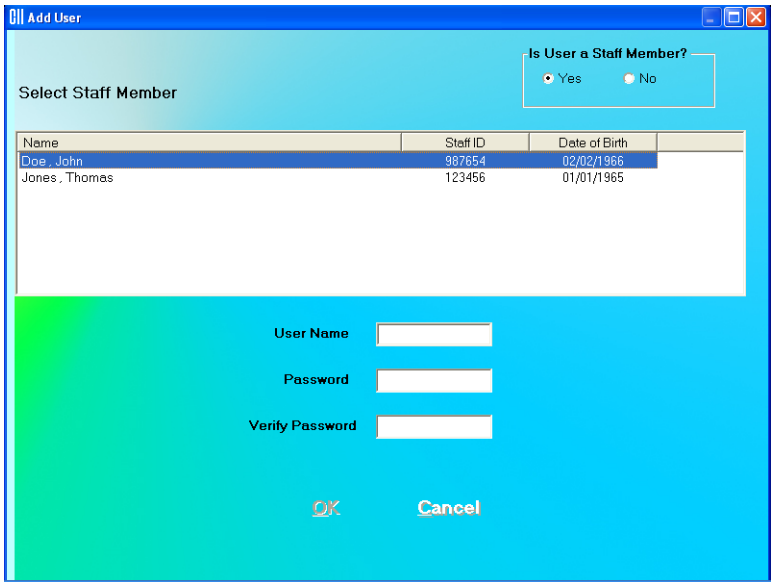

Figure 4-5 Add User (Staff Member) Window

Note: *In order for the Staff Member List to be displayed, Staff Members must be added in the Bioassay module in the CAPTUS® 3000 software as described in CHAPTER 11: BIOASSAY, SECTION: ADDING STAFF MEMBERS. If no Staff Members have been added, the "Is User a Staff Member?" frame will be grayed-out (disabled) and defaulted to No and the Select Staff Member List will not be displayed.*

Select the Staff Member from the displayed list of Staff Members. Setting the user as a Staff Member allows that user to access, count and print his/her own Bioassay data.

Input the new User Name for the selected Staff Member and then the Password. Input the Password again in the *Verify Password* text box.

When the OK button is clicked, the new user and password will be accepted and Figure 4-3 Admin Log On Sign In Window will re-appear.

Add User – Not a Staff Member

If the user to be added is not a staff member, in the "Is User a Staff Member?" frame, select the No radio button. Figure 4-6 Add User (Not a Staff Member) Window will appear.

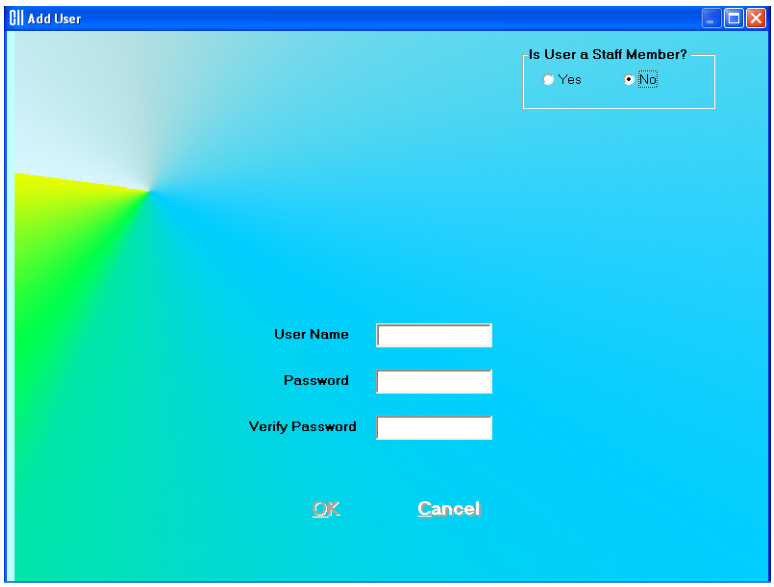

Figure 4-6 Add User (Not a Staff Member) Window

Input the new User Name and then the Password. Input the Password again in the *Verify Password* text box.

When the OK button is clicked, the new user and password will be accepted and Figure 4-3 Admin Log On Sign In Window will re-appear.

CHANGE PASSWORD

From Figure 4-3 Admin Log On Sign In Window, the Admin may change his/her own password by clicking the Change Password button.

Note: *It is recommended that the Admin password be changed at first log in.*

From Figure 4-4 User Log On Sign In Window, a user may change his/her own password by clicking the Change Password button.

When the Change Password button is clicked, Figure 4-7 Change Password Window will appear.

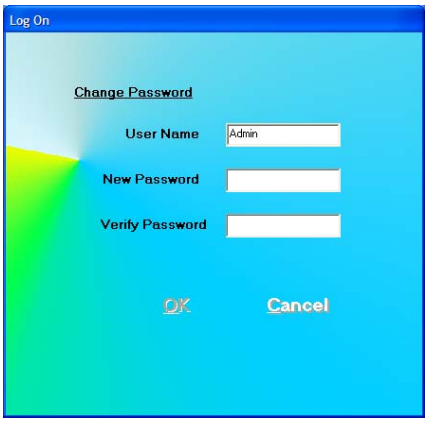

Figure 4-7 Change Password Window

The current User Name is displayed and cannot be changed.

Input the New Password and then re-input it again for verification.

Click the OK button to accept the new password.

LOG ON REPORT

A log is kept of when each user logs on and logs off.

When Admin is logged on (Figure 4-3 Admin Log On Sign In Window), the Log On Report may be viewed by clicking the Report button. Figure 4-8 Log On Report Window will appear.

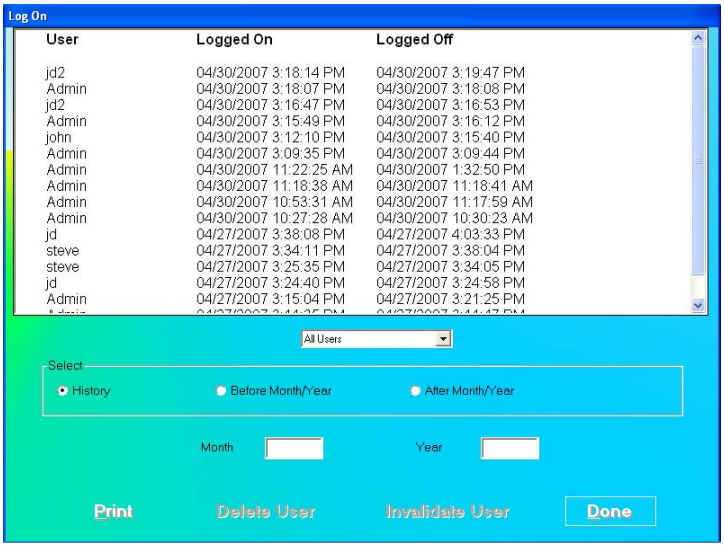

Figure 4-8 Log On Report Window

The User, Log On Date/Time and Log Off Date/Time are displayed in reverse chronological order.

When *All Users* are displayed, the Delete User and Invalidate User buttons are disabled (grayed-out).

Displaying Selected User

The Drop-Down List box contains the names of all the users. When a user is selected, the log on data for that user is displayed and the Delete User and Invalidate User buttons are enabled.

Note: *The Delete User and Invalidate User buttons are not enabled if Admin is the selected user, since Admin may not be deleted or invalidated.*

Delete User

To delete a user and all log on data for the user, select the User Name from the Drop-Down List box and click the Delete User button.

Invalidate User

Invalidating a user will remove the user from the list of users who may log onto the program but it will not delete the user's log on data.

To invalidate a user, select the User Name from the Drop-Down List box and click the Invalidate User button.

Displaying Data by Date

Log On Data may be displayed before or after a given month and year.

To display the Log On Data by date:

- In the Month text box, input the month in numeric format (1 to 12).
- In the Year text box, input the year in 4 digit year format.
- Click the **Before Month/Year** or **After Month/Year** radio button.

The selected data will be displayed.

Printing Report

The displayed Log On Data may be printed.

To print a report of the displayed Log On Data, click the Print button.

Exiting

To exit the Log On Reports window and return to Log On window, click the Done button.

FIRST TIME STARTUP

If this is the first time the CAPTUS® 3000 software is run, the Startup Tips window will be displayed as shown in Figure 4-9 Startup Tips Window.

The Startup Tips window provides a quick and convenient way to get ready for performing test procedures. This screen provides access to the System Parameters, Quality Assurance Tests and the preliminary Measurement Setups that need to be performed before beginning measurements.

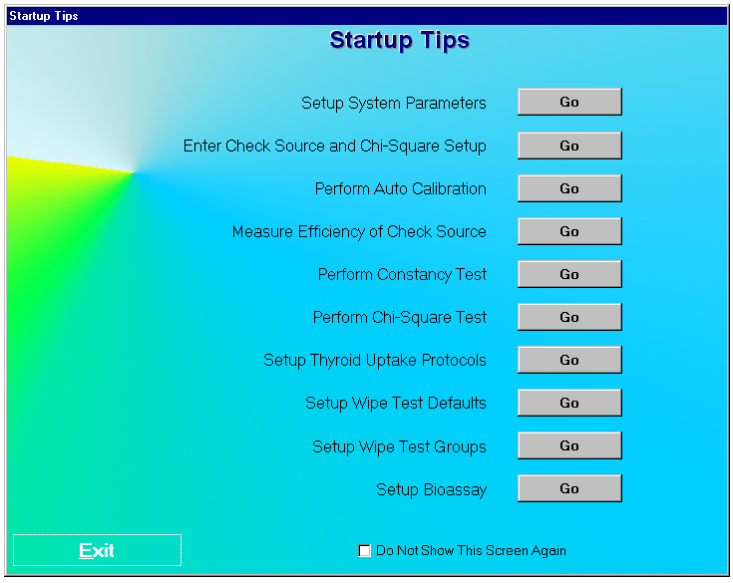

Figure 4-9 Startup Tips Window

The system parameters for the CAPTUS® 3000 software can be altered through the Setup module. The Setup module (Figure 4-10 Setup Module Screen) standardizes units of measurement, printing mode, date format and detector type for the entire system. A report header can be entered that will appear at the top of all report printouts. An option is also provided to enable or disable the viewing of the Startup Tips that will appear when the CAPTUS® 3000 software is started.

System Parameters

1. Click the Go button beside “Setup System Parameters”. Figure 4-10 Setup Module Screen will appear.

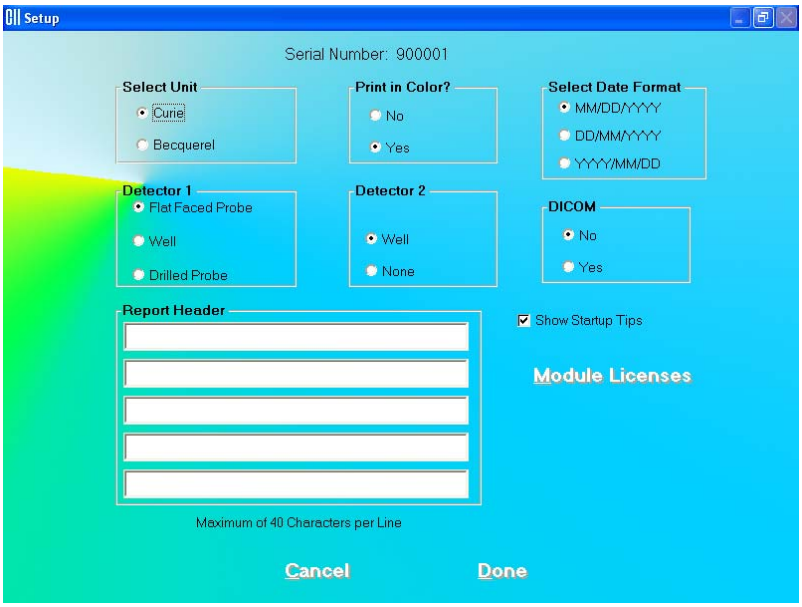

Figure 4-10 Setup Module Screen

Except for the report header, all other parameters are predefined with default settings. The **Serial Number** at the top of the screen is specific to your system and is set at the factory.

2. To change the default settings for unit of activity, mode of printing or format of the date, click in the appropriate radio button. You can safely change any of these at any time during the use of your system.

   Note: *If the date format is changed, the conversion will apply to stored data also. If the unit for counts is changed, the new unit will apply to the new measurements only.*

3. To select another detector type, click on one of the radio buttons in the Detector 1 box. The Detector 2 box options, **Well** and **None**, are applicable, only when you select a **Flat Faced Probe** as Detector 1.

   Note: *Your detector settings have been selected for the specific hardware shipped with your system. Therefore, the default detector settings should **not** be changed without consulting with the technical service staff at Capintec.*

4. If Cap-DICOM Software is installed on you system, select the **Yes** radio button in the DICOM Frame. Otherwise, select the **No** radio button.

5. To enter a heading for each printed report, click in the first blank box under **Report Header**. Enter the first line of the header. The length of each line is limited to 40

characters per line. To enter another line, click in the blank box below or press the *Tab* key. An example of report header is as given below in Figure 4-11 Report Header Frame. This header will appear centered at the top of each report printout.

Figure 4-11 Report Header Frame

6. Click the Done button or press *Alt+D* to save the changes or click the Cancel button or press *Alt+C* to exit without saving the changes. Figure 4-9 Startup Tips Window will re-appear.

QUICK TIPS:

- To move between boxes use the *Tab* key and to move within boxes use ← or → keys.
- To customize your report printouts, you can input the address of your medical facility as the report header.

Quality Assurance Tests

Note: *All QA Tests (Enter Check Source and Chi-Square Setup, Auto Calibration, Measure Efficiency, Constancy Test, and Chi-Square Test) must be performed before any measurements can take place. Measurement Setups (Thyroid Uptake Protocols, Wipe Test Defaults, Wipe Test Groups, Bioassay) need only be performed if required.*

Before performing any of the Quality Assurance tests, allow the system to warm up at least 30 minutes.

1. Click the Go button beside "Enter Check Source and Chi-Square Setup".

2. Enter the required fields. For details on the screen, see the pages listed in **Reference Pages** below.

3. Upon exiting the Check Source and Chi-Square Setup window, you will be automatically returned to the Startup Tips window.

4. Continue with the next test in the list (e.g., Auto Calibration).

5. Repeat steps 1-4 for each remaining test (Measure Efficiency, Constancy Test, and Chi-Square Test).

6. If you do not wish to perform the Measurement Setups at this time, click the Exit button or press *Alt+E* to close the Startup Tips window. Otherwise, continue to the Measurements Setups section.

   Note: *If you do not want the Startup Tips window to appear the next time the CAPTUS® 3000 software is started, click in the check box "Do Not Show This Screen Again" at the bottom of the window after all setups have been completed.*

Reference Pages

For further information on the tests, refer to the following pages in the manual:

- Enter Check Source and Chi-Square Setup..... 5-3
- Perform Auto Calibration 5-5
- Measure Efficiency of Check Source..... 6-6
- Perform Constancy Test..... 5-10
- Perform Chi-Square Test 5-15

Measurement Setups

Note: *It is only necessary to setup the tests that you are going to perform.*

1. Click the Go button beside "Setup Thyroid Uptake Protocols".

2. Enter the required fields. For details on the screen, see the pages listed in **Reference Pages** below.

3. Upon exiting the Setup Thyroid Uptake Protocols screen, you will be automatically returned to the Startup Tips window.

4. Continue with the next setup in the list (e.g., Wipe Test Defaults).

5. Repeat steps 1-4 for each remaining setup (Wipe Test Groups, and Bioassay).

6. Click the Exit button or press *Alt+E* to close the Startup Tips window.

   Note: *If you do not want the Startup Tips window to appear the next time CAPTUS® 3000 software is started, click in the check box "Do Not Show This Screen Again" at the bottom of the window after all setups have been completed.*

   It is recommended that this selection remain unchecked, otherwise it will be displayed every time the program is started.

Reference Pages

For further information on the tests, refer to the following pages in the manual:

- Setup Thyroid Uptake Protocols.....7-3
- Setup Wipe Test Defaults.....8-3
- Setup Wipe Test Groups 8-6
- Setup Bioassay.....11-2

NORMAL STARTUP

To run the CAPTUS® 3000 software, double-click on the CAPTUS® 3000 icon. If the Startup Tips window was disabled, the Main screen will appear as shown in Figure 4-12 Main Screen. Before beginning any measurements, allow the system to warm up at least 30 minutes. It is recommended that the system remain powered at all times; however, the computer can be turned off while leaving the CAP-MCA module powered because the module provides power to the detector.

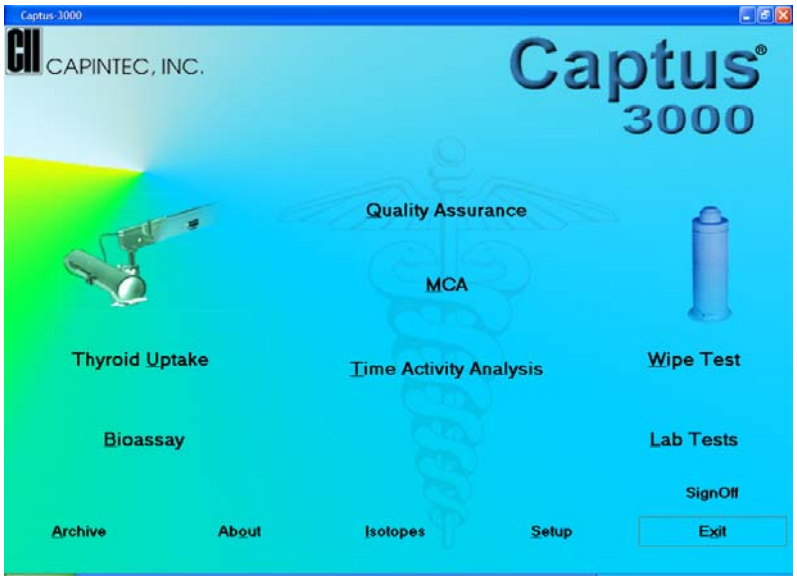

Figure 4-12 Main Screen

The software version installed on your CAPTUS® 3000 can be identified by selecting the **About** button located at the bottom of the Main screen. The user cannot alter information concerning the software version. Any software upgrades will automatically change the version number accordingly.

Note: *The **Serial Number,** together with your software version, is to be used as a reference when contacting the Capintec Service Center for information or assistance. To get the software version, click the* **About** *button on the CAPTUS® 3000 Main screen.*

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CHAPTER 5

QUALITY ASSURANCE

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AUTO CALIBRATION 5-5
About Auto Calibration 5-10
CONSTANCY TEST 5-10
CHI-SQUARE TEST 5-15
MDA TEST.....5-19
VIEWING SYSTEM PARAMETERS.....5-21
VIEWING AND PRINTING HISTORY.....5-23

INTRODUCTION

There are several Quality Assurance tests that should be performed periodically on the CAPTUS 3000 system to ensure its optimum operation.

The Quality Assurance (QA) tests include the following: Auto Calibration, Constancy Test, Chi-Square Test and MDA (Minimum Detectable Activity) Test. The CAPTUS 3000 performs all these tests quickly and automatically using the two 0.5µCi reference sources, Cs137 and Eu152, supplied with the system. The software automatically saves all the results from these tests.

For systems with two detectors, (Uptake Probe and optional external Well Counter), the Quality Assurance tests must be performed on both the detectors. Note that if a Drilled Probe is used, both the Probe and Well should be calibrated, even though there is only one detector. Each software module uses the calibration parameters of the particular detector that is associated with the module. For example, the Thyroid Uptake program uses the calibration parameters of the Probe, and the Wipe Test program uses those of the Well.

Note: *For systems with a Drilled Probe or an optional external Well Counter, sources should be in the range of 0.1 to 1.0µCi.*

Recommended Routine for CAPTUS 3000 System

1. **Turning on the System** – If your system will be used in a single location, we recommend that you leave the computer and CAP-MCA powered at all times.

Note: *If you prefer to turn off the entire system every day, then allow at least 30 minutes for system warm up before performing any calibration procedures or making any measurements.*

2. **Schedule for performing the Quality Assurance (QA) Tests**

   a. Setting Up QA Parameters -- *Once, at initial system setup* (page 5-2)
   b. Auto Calibration---------- *Daily, before the first procedure* (page 5-5)
   c. Constancy Test ---------- *Daily, before the first procedure* (page 5-10)
   d. Chi-Square Test ---------- *Quarterly* (page 5-15)
   e. MDA Test---------- *Quarterly* (page 5-19)

   While performing any Quality Assurance test, ensure the following:
   - Consistent placement of the radioactive standard source in the detector is critical. The source should not be leaning against the sides.
   - Keep background rates constant throughout the counting process by ensuring that no radioactive sources or other dosed patients are in the immediate area.

   Note: *Perform all the needed QA procedures for one detector and then, repeat the same for the second detector, if applicable.*

3. **Record Keeping** – After the system is setup and all the QA Tests have been completed successfully, it is recommended that a list be printed of the system parameters for your records (Refer to **VIEWING SYSTEM PARAMETERS** in this chapter). These are all the default values used while doing various measurements (Thyroid Uptake, Bioassay, Wipe Test etc.). In case of suspicious results in any module, confirm the Setup values in that module with the values in your records. All QA results are stored automatically and may be accessed at any time (Refer to **VIEWING AND PRINTING HISTORY** in this chapter).

SETTING UP QA PARAMETERS

To access the QA tests, click the

button or press *Alt+Q* on the CAPTUS 3000 Main screen. Figure 5-1 Quality Assurance Main Screen appears as shown.

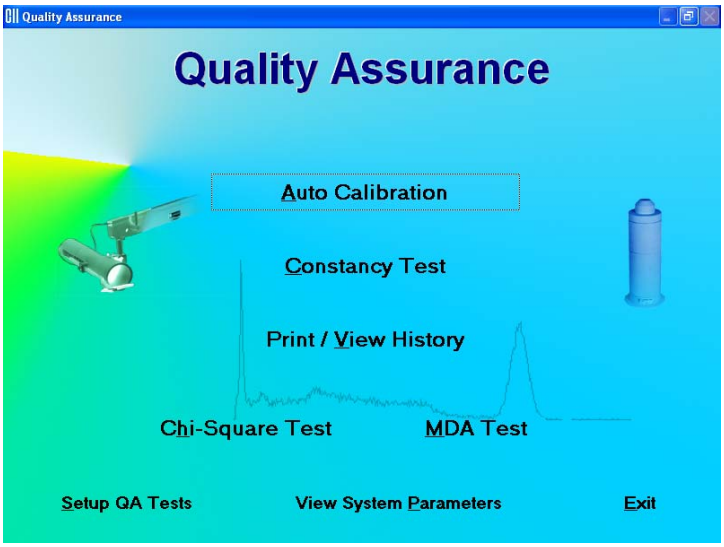

Figure 5-1 Quality Assurance Main Screen

The following tests require setting up parameters prior to performing the test: Constancy Test, Chi-Square Test and MDA Test. This can be done via the QA Setup screen, which is accessible through the **Setup QA Tests** button at the bottom of Figure 5-1 Quality Assurance Main Screen or through the **Setup** button provided on all QA Test screens.

1. Click the **Setup QA Tests** button or press *Alt+S* on Figure 5-1 Quality Assurance Main Screen. Figure 5-2 Quality Setup Screen appears as shown.

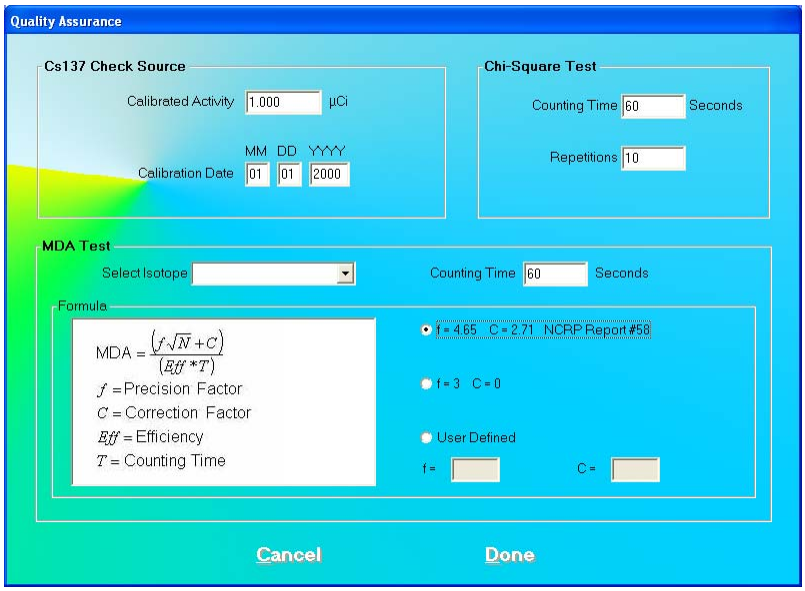

Figure 5-2 Quality Setup Screen

2. **Constancy Test Parameters** – These are provided in the **Cs137 Check Source** frame. Input the **Calibrated Activity** and **Calibration Date** marked on the Cs137 standard source in the appropriate text boxes.

3. **Chi-Square Test** – **Counting Time** is the duration over which counts are collected each time and **Repetitions** is the number of times the counts are collected. They are set by default to a value of 60 seconds and 10 repetitions, respectively. To change these values, click in the appropriate text box in the **Chi-Square Test** frame and input the new values. Restrict Repetition value to 5, 10, 15 or 20.

4. **MDA Test Parameters**
   a. Click in the **Select Isotope** drop-down box. View the drop-down list and click on the desired isotope. This defines the ROIs over which the activity will be measured. Without an isotope selection, the MDA Test cannot be performed.

   b. To change the default Counting Time, click in the **Counting Time** box in the **MDA Test** frame and input the new value.

   c. To alter the values being used in the formula (as shown on the left side) for MDA calculation, click the desired radio button in **Formula** frame.

   Note: *The default settings for Precision Factor (f) and Correction Factor (C) are 4.65 and 2.71 respectively (Knoll method). Selecting the **User Defined** radio button enables the text boxes for entering your own values of 'f' and 'C'.*

5. Click the Done button or press *Alt+D* to save the changes or click the Cancel button to cancel the changes made and return to Figure 5-1 Quality Assurance Main Screen.

QUICK TIPS:

- To return to the CAPTUS 3000 Main screen from the QA Tests screen, click the Exit button or press the *Esc* Key.
- Rest your mouse close to each module title on Figure 5-1 Quality Assurance Main Screen to read a brief description of that function.
- Setup values can be conveniently changed later if needed from any QA Test screen.
- Keep a record of the parameters set above. To do so, click the View System Parameters button on Figure 5-1 Quality Assurance Main Screen and click the Print button.

AUTO CALIBRATION

Calibration is done with Cs137 and Eu152 standard sources.

1. Click the Auto Calibration button or press *Alt+A* on Figure 5-1 Quality Assurance Main Screen. Figure 5-3 Auto Calibration Screen will appear. When the procedure is started, the spectrum appears in the upper half of the screen as it is being collected and displays the measurement time elapsed in the upper right corner. Note that the Cs137 Efficiency button at the top of the screen is enabled only after calibration has been done at least once on that day.

Figure 5-3 Auto Calibration Screen

2. Note that in the **Select Detector** frame, **PROBE** is selected by default. To change the detector to Well, click the radio button marked **WELL**.

3. Click the Start Procedure button or press *Alt+S* to start the calibration procedure. The screen appears as shown in Figure 5-4.

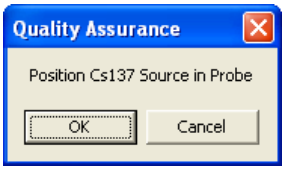

Figure 5-4

4. Place the Cs137 rod source in the selected detector. To ensure reproducible source placement for the uptake probe, turn the uptake probe so that the collimator opening is facing upwards towards the ceiling. Gently place the active end of the rod source onto the middle surface of the crystal. The rod should stand freely and not lean to the side.

QUICK TIPS:

- To ensure that the Cs137 source rod is consistently placed in the center of the probe face, you may wish to purchase Capintec's Rod Source Holder, part number 7315-1850. The Rod Source Holder is specifically designed for the Capintec Collimator to provide reliable measurements.

Note: *Never put a sharp instrument like a pen into the Well or Probe.*

5. Click the OK button to proceed with the calibration process. Otherwise, click the Cancel button to stop the process. As counting is progressing, the live spectra is shown. The software will count for as long as necessary until sufficient counts are acquired for proper calibration.

6. To stop the counting midway, click the Abort button or press *Alt+A*. The collected data is discarded. To re-start the process, click the Start Procedure button or press *Alt+S*.

7. After calibration is completed, the results will display "Calibration Successful" as shown in Figure 5-5 below.

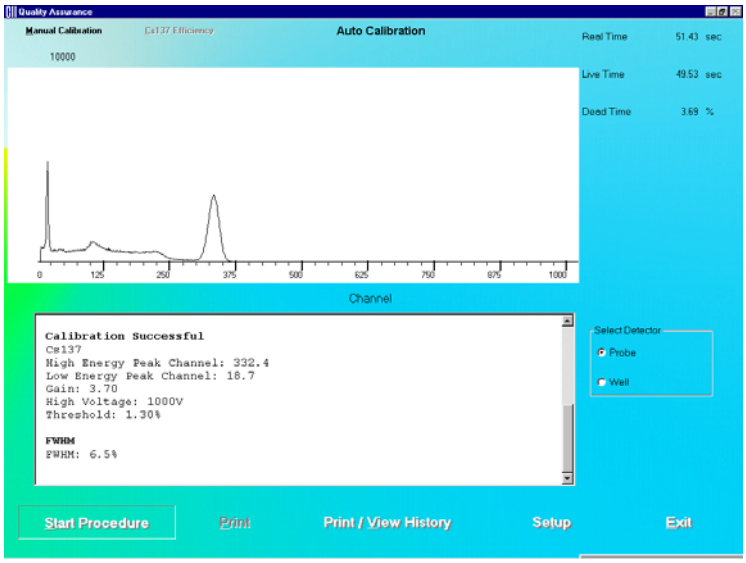

Figure 5-5

8. Next, the screen appears as shown in Figure 5-6, prompting you to perform Linearity Correction using Eu152. This step, though optional, is highly recommended for fine-tuning your system.

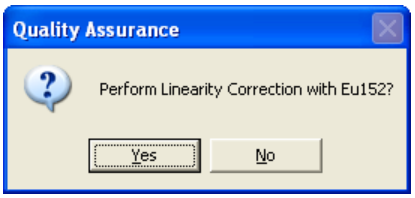

Figure 5-6

9. Click the Yes button or press the *Y* key to proceed with further calibration. Otherwise click the No button or press the *N* key to stop here.

10. If you are continuing with Eu152, the screen appears as shown in Figure 5-7. Place the Eu152 source in the selected detector in the same position as Cs137 and click the OK button.

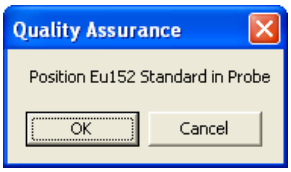

Figure 5-7

After the count collection is over, the system is fully calibrated. Complete results are displayed in the lower half of the screen and all the data is automatically stored in the system.

Note: *If the calibration is not successful, click the* **Manual Calibration** *button or press Alt+M on the Auto Calibration screen. The MCA module is started. Refer to CHAPTER 13: MCA. If this does not correct the problem, contact Capintec's only Authorized Service Center for service.*

11. If the calibration was successful, Eu152 Linearity Correction results appear on the screen and the software prompts you to perform Constancy Test as shown in Figure 5-8. Click the Yes button or press the *Y* key to proceed. Otherwise, click the No button or press the *N* key to exit the Auto Calibration procedure.

Note: *If Cs137 efficiency has* ***never*** *been measured in your system, do not perform Constancy Test at this time because the test needs the Detector Efficiency value. Click the* No *button or press the N key and perform the Constancy Test as described in the* ***CONSTANCY TEST*** *section in this chapter.*

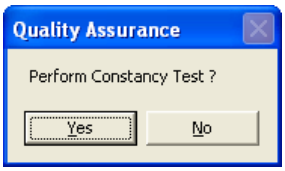

Figure 5-8

If you are performing the Constancy Test, Figure 5-9 will be displayed.

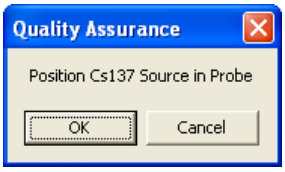

Figure 5-9

12. Place the Cs137 source rod in the selected detector. Since the Constancy Test is a measure of reproducibility, it is ***important*** that the source be placed in exactly the same position each time the Constancy Test is performed.

13. Click the OK button to proceed with the test, or else click the Cancel button to stop the process. As the counting progresses, the live spectra and measurement times are displayed.

14. To stop the counting, click the Abort button or press *Alt+A*. The collected data is discarded. To re-start the process, click the Start Procedure button or press *Alt+S*.

15. After the test is completed, the results of the test appear in the box below as shown in Figure 5-10. Note the Deviation value at the bottom.

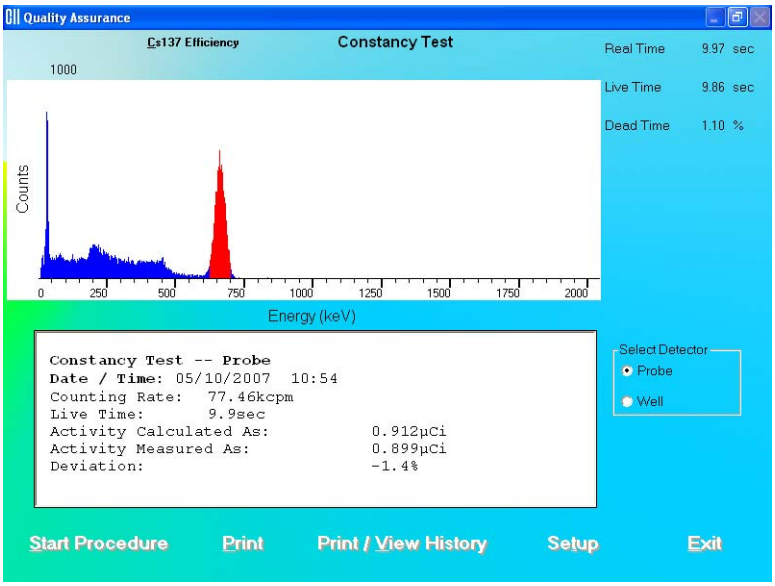

Figure 5-10

An unacceptable deviation is indicated in red as HIGH (greater than ±5%).

If the Deviation is indicated as HIGH, check the following:

- The positioning of the rod source, especially for the Probe detector.
- Ensure that there are no other sources (including dosed patients) in the area.
- Click the Setup button or press *Alt+T* at the bottom of the Calibration screen. Calibrated Activity and Calibration Date should match your Cs137 standard.

If a problem is found with any of the three items above, then correct the problem and repeat the Constancy Test.

If no problems are found with the above items, then the efficiency of the Cs137 standard should be re-measured. If this does not correct the problem, contact Capintec's only Authorized Service Center for service.

16. Click the Exit button or press *Alt+E* to exit and return to Figure 5-1 Quality Assurance Main Screen.

QUICK TIPS:

- To print current results for record keeping, click the Print button or press *Alt+P* on Auto Calibration or Constancy Test screen after calibration is completed.
- To view or print results for all the Quality Assurance tests performed to date, click the Print / View History button or press *Alt+V* (Refer to the **VIEWING AND PRINTING HISTORY** section in this chapter).

About Auto Calibration

Calibration is done using Cs137 and Eu152 isotopes. First, calibration is performed with Cs137 where the procedure makes use of its 662 keV and the 32 keV peaks to automatically adjust the high voltage, gain, and zero offset (as required by CAP-MCA module) to provide a calibration of approximately 2.0 keV per channel in the MCA. Next, Eu152 provides multiple gammas over an energy range of 41 keV to 1,408 keV. The CAPTUS 3000 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. The ROI's in the Thyroid Uptake and Lab Tests are based on the energy ranges defined by the Eu152 calibration. In addition, the automatic peak identification program, which is accessed in the Wipe Test and MCA, requires the Eu152 energy calibration in order to work properly.

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 within ±2 channels of the theoretical value for a calibration of 2.00 keV per channel. The software has preset limits that prohibit operation outside of appropriate voltage, gain, and zero adjust values.

The Auto Calibration Test also calculates detector resolution by determining the full width-half maximum (FWHM) 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 flat-faced detectors the resolution should be $\leq$8 percent measured at the Cs137 662 keV peak. For well detectors the resolution should be $\leq$8.5 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.

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

CONSTANCY TEST

This test compares the Cs137 standard source activity entered in the setup with the activity that it measures. The activity entered in the setup is decay corrected by the software. The counts measured in the Constancy Test are converted to activity using efficiency values from the Isotope Library. The deviation between the calculated and measured activity is the percent error and should be within ±10%. If the deviation is outside ±10%, it will be indicated as HIGH. NaI detectors are very sensitive and any radioactive sources even in neighboring rooms may affect the results.

- Perform **SETTING UP QA PARAMETERS** in this chapter before performing the Constancy Test the *first time.*
- Perform Auto Calibration ***before*** Constancy Test.

1. Click the Constancy Test button or press *Alt+C* on Figure 5-1 Quality Assurance Main Screen. Figure 5-11 Constancy Test Main Screen will appear.

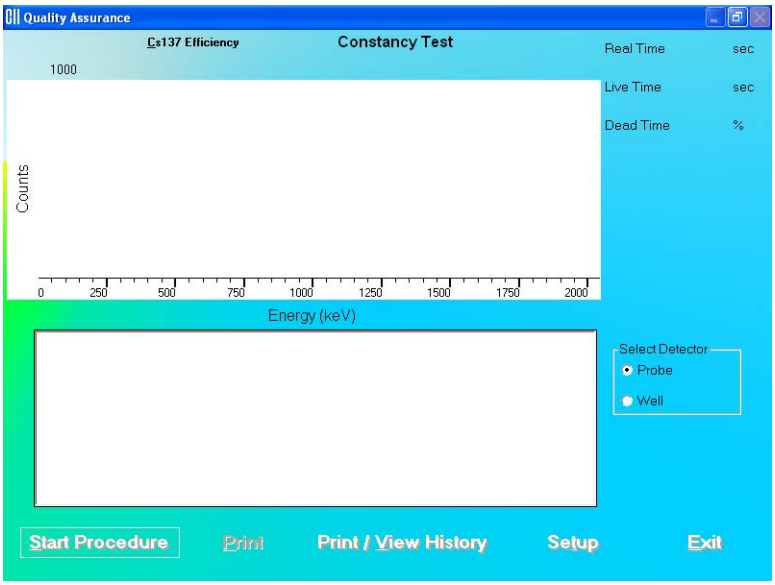

Figure 5-11 Constancy Test Main Screen

2. If Cs137 efficiency has ***never*** been measured on your system, proceed to Step 3. Otherwise, skip to Step 4.

3. **Measuring Cs137 Efficiency** – The Constancy Test requires the Cs137 efficiency value as measured on your system. This step enters the Cs137 efficiency value in the Isotope Library, which is used for calculations every time Constancy Test is performed.

   Note: *This is a **one-time** procedure and should not to be repeated unless Constancy Test is unsuccessful.*

   a. Click the Cs137 Efficiency button at the top of the screen or press *Alt+C*. The screen appears as shown in Figure 5-12. Calibrated Activity and Date are already entered from QA Setup done above.

      Note: Cs137 Efficiency *is enabled only after Auto Calibration has been performed that day.*

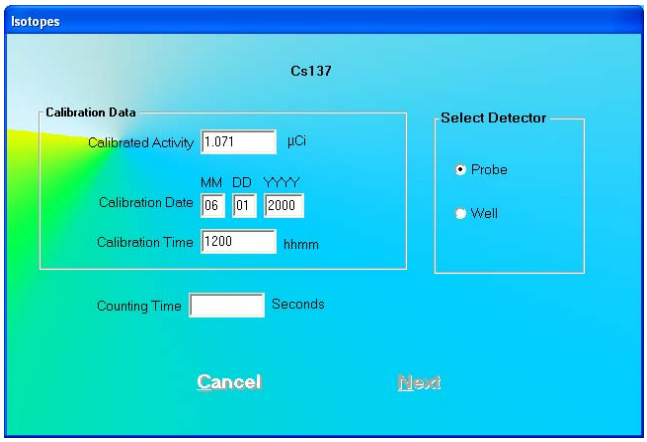

Figure 5-12

b. Input the Counting Time in seconds.
c. Note the detector selection. To change the selection, click the appropriate radio button in the **Select Detector** frame.
d. Click the Next button. Figure 5-13 will appear.

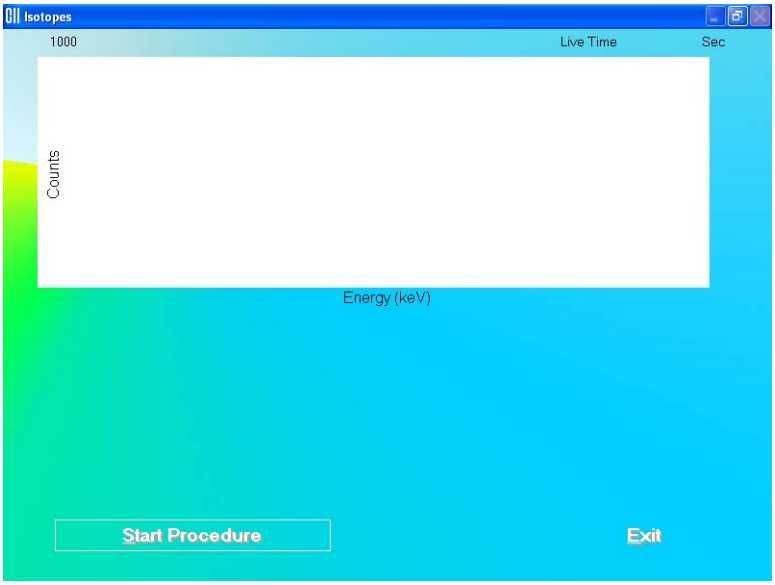

Figure 5-13

e. Click the Start Procedure button or press *Alt+S* to start measurements. Follow the on-screen instructions.
f. After efficiency is measured, click the Exit button to return the Constancy Test screen.

g. For systems with two detectors, if the efficiency has never been measured on the other detector, then repeat Step 3. Remember to change the detector selection in Step 3c.

Note: *For further information, refer to CHAPTER 6: ISOTOPES, SECTION: MEASURING EFFICIENCY.*

4. Note the detector selected in the **Select Detector** frame. To change the detector, click the appropriate radio button.

5. Click the Start Procedure button or press *Alt+S* to start the test. The screen appears as shown in Figure 5-14.

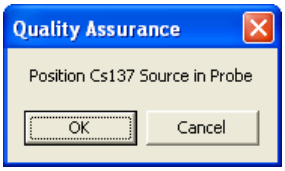

Figure 5-14

6. Place the Cs137 source rod in the selected detector. Since the Constancy Test is a measure of reproducibility, it is ***important*** that the source be placed in exactly the same position each time the Constancy Test is performed.

7. Click the OK button to proceed with the test, or else click the Cancel button to stop the process. As the count progresses, the live spectra and measurement times are displayed.

8. To stop the counting, click the Abort button or press *Alt+A*. The collected data is discarded. To re-start the process, click the Start Procedure button or press *Alt+S*.

9. After the test is completed, the results of the test appear in the box below as shown in Figure 5-15 Constancy Test Results Screen. Note the Deviation value at the bottom.

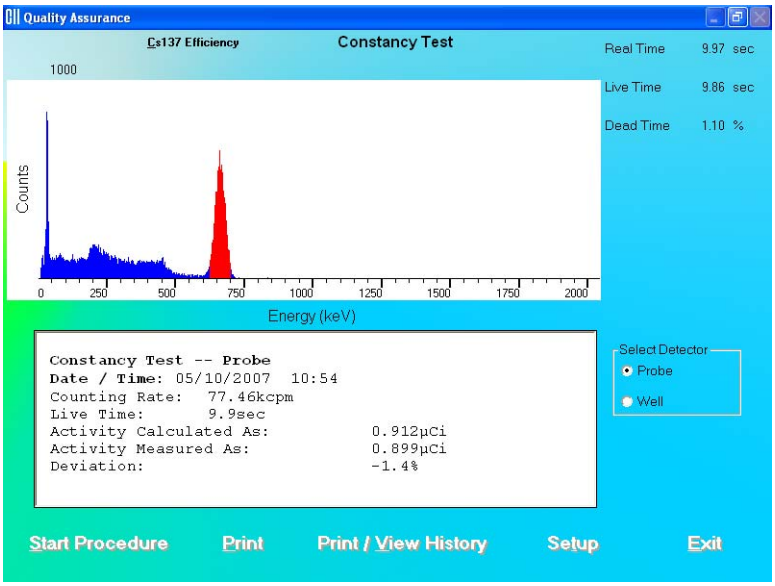

Figure 5-15 Constancy Test Results Screen

An unacceptable deviation is indicated in red as HIGH (greater than ±5%).

If the Deviation is indicated as HIGH, check the following:

- The positioning of the rod source, especially for the Probe detector.
- Ensure that there are no other sources (including dosed patients) in the area.
- Click the Setup button or press *Alt+T* at the bottom of the Constancy Test screen. Calibrated Activity and Calibration Date should match your Cs137 standard.

If a problem is found with any of the three items above, then correct the problem and repeat the Constancy Test.

If no problems are found with the above items, then the efficiency of the Cs137 standard should be re-measured. If this does not correct the problem, contact Capintec's only Authorized Service Center for service.

10. Click the Exit button or press *Alt+E* to exit and return to Figure 5-1 Quality Assurance Main Screen.

QUICK TIPS:

- To print current results for record keeping, click the Print button or press *Alt+P* on Constancy Test screen after the test is completed.
- To view or print results for all the Quality Assurance tests performed to date, click the Print / View History button or press *Alt+V* (Refer **VIEWING AND PRINTING HISTORY** in this chapter).

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 your Cs137 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:

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

where x_i = counts for measurement i

x_{av} = average for the n measurements

This equation is the same as the following:

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

1. Click the Chi-Square Test button or press *Alt+H* on Figure 5-1 Quality Assurance Main Screen. The screen appears as shown in Figure 5-16 Chi-Square Test Screen.

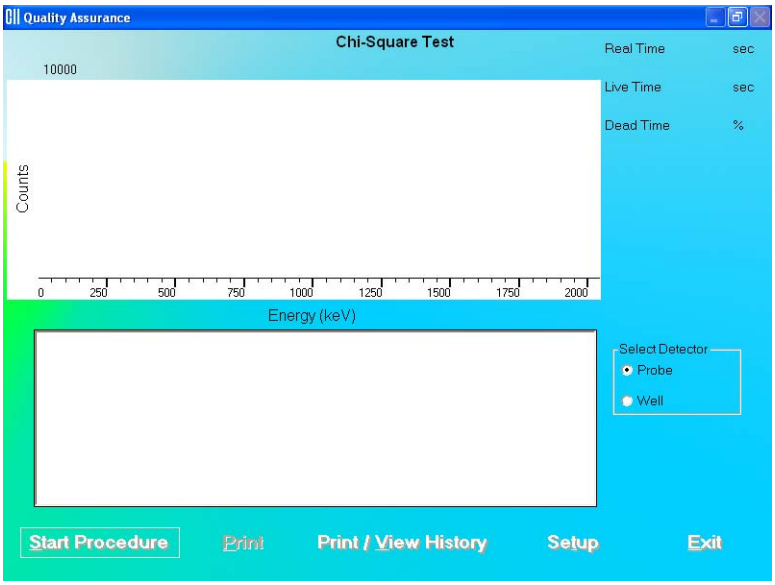

Figure 5-16 Chi-Square Test Screen

2. Note that in the **Select Detector** frame, **PROBE** is selected by default. To change the detector to Well, click the **WELL** radio button.

3. Click the Setup button or press *Alt+T*. Figure 5-17 Quality Setup Screen will appear. ONLY the **Chi-Square Test** frame values are used in this test.

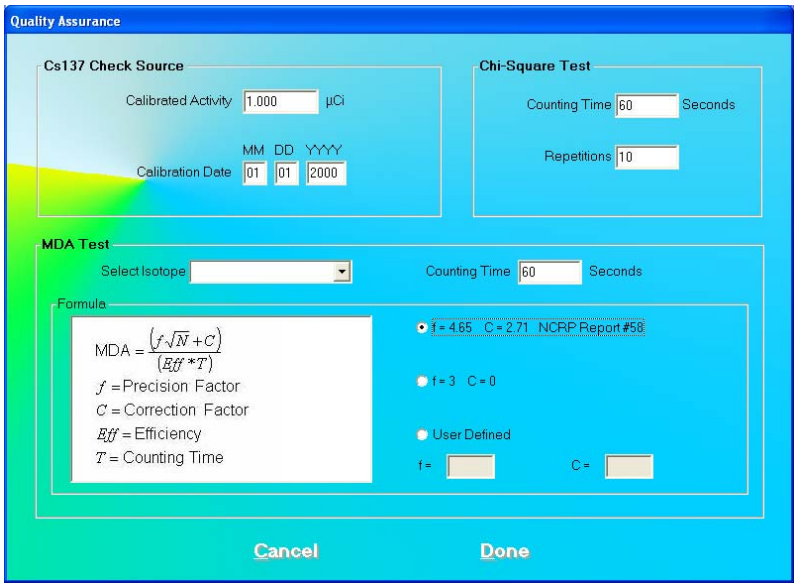

Figure 5-17 Quality Setup Screen

4. To change the default values in **Chi-Square Test** frame in Setup, click in the text boxes and input the new values.

5. Click the Done button or press *Alt+D* to save the added information or click the Cancel button or press *Alt+C* to cancel the changes and return to Figure 5-16 Chi-Square Test Screen.

6. Click the Start Procedure button or press *Alt+S* to start the test. The screen appears as shown in Figure 5-18.

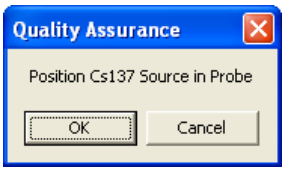

Figure 5-18

7. Place the Cs137 source in the same position as for Auto Calibration and Constancy Test.

8. Click the OK button to proceed with the test. Otherwise, click the Cancel button to stop the procedure.

   If the procedure has started, then the screen shown in Figure 5-19 appears. The screen displays live spectra, measurement time (upper right corner) and the number of repetitions remaining (middle right side).

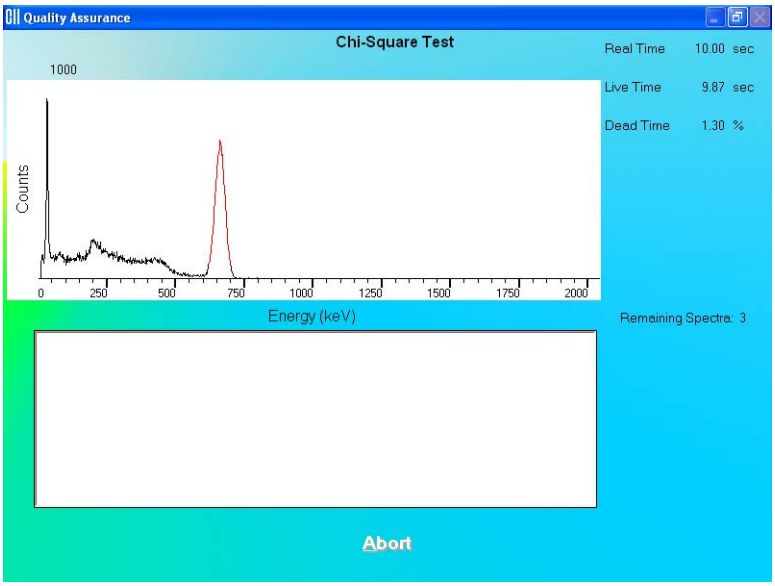

Figure 5-19

9. To stop the counting, click the Abort button or press *Alt+A*. The collected data is discarded. To re-start the process, click the Start Procedure button or press *Alt+S*.

10. After the test is completed, the results of the test appear in the box below as shown in Figure 5-20. Note the Chi-Square value.

Figure 5-20

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, especially for the Probe detector.
- 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.

In 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.

QUICK TIPS:

- To print current results for record keeping, click the Print button or press *Alt+P* on Chi-Square Test screen after the test is completed.
- To view or print results for all the Quality Assurance tests performed to date, click the Print / View History button or press *Alt+V* (Refer to **VIEWING AND PRINTING HISTORY** in this chapter).

MDA TEST

This test measures counts and calculates activity in the ROI for the isotope selected in the Setup. The measurement is performed with no isotope placed in the detector, which therefore gives a value for the Minimum Detectable Activity (MDA).

1. Click the MDA Test button or press *Alt+M* on Figure 5-1 Quality Assurance Main Screen. Figure 5-21 MDA Test Screen will appear.

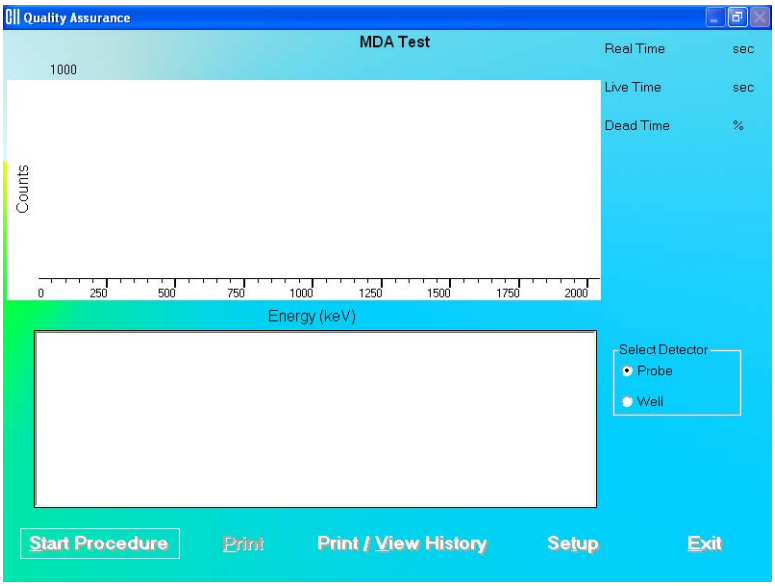

Figure 5-21 MDA Test Screen

2. Note that in the **Select Detector** frame, **PROBE** is selected by default. To change the detector to Well, click the **WELL** radio button.

3. Click the Setup button or press *Alt+T*. Figure 5-22 Quality Setup Screen will appear. Only the **MDA Test** frame values are used in this test.

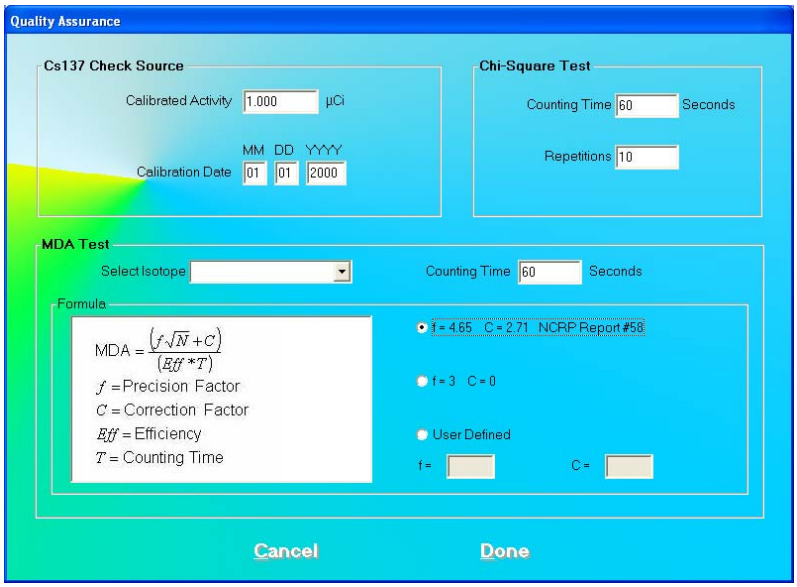

Figure 5-22 Quality Setup Screen

4. To select an isotope, click in the **Selected Isotope** drop-down box and click on the desired isotope to select it. This sets a ROI for count measurement.

5. To change the **Counting Time** click in the text box and input the new value.

6. To alter values used in the formula for MDA calculation, click in the desired radio button in **Formula** frame.

7. Click the Done button or press *Alt+D* to save the added information or click the Cancel button or press *Alt+C* to cancel the changes and return to Figure 5-21 MDA Test Screen.

8. Click the Start Procedure button or press *Alt+S* to start the test. The screen appears as shown in Figure 5-23.

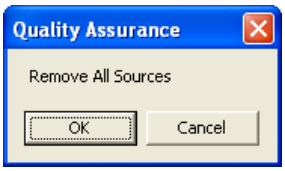

Figure 5-23

9. Remove any radioactive source from the vicinity and click the OK button to proceed with the test. Else, click the Cancel button to stop the procedure.

10. When the measurement is completed, the screen appears as shown in Figure 5-24 displaying the Minimum Detectable Activity (MDA) measured in the selected isotope's ROI.

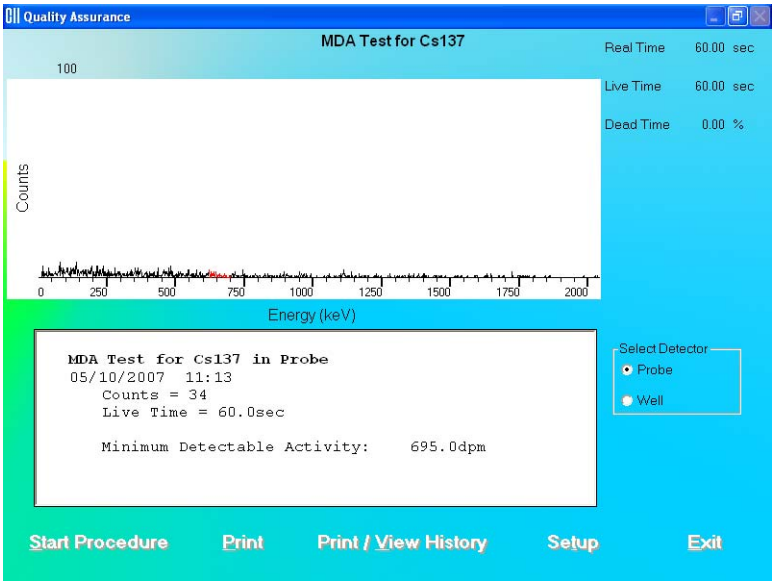

Figure 5-24

QUICK TIPS:

- To print current results for record keeping, click the Print button or press *Alt+P* on MDA Test screen after the test is completed.
- To view or print results for all the Quality Assurance tests performed to date, click the Print / View History button or press *Alt+V* (Refer to **VIEWING AND PRINTING HISTORY** in this chapter).

VIEWING SYSTEM PARAMETERS

This function provides access to all the parameters used for the measurements and calculations of results in all procedures (Thyroid Uptake, Lab Tests, Wipe Test, QA Tests etc.) provided by the CAPTUS 3000 system.

1. Click the View System Parameters button or press *Alt+P* on Figure 5-1 Quality Assurance Main Screen. The screen appears as shown in Figure 5-25. You may scroll down to see all of the parameters. The system details appear at the top followed by the Quality Assurance parameters. Below that, setup values are listed for each type of procedure.

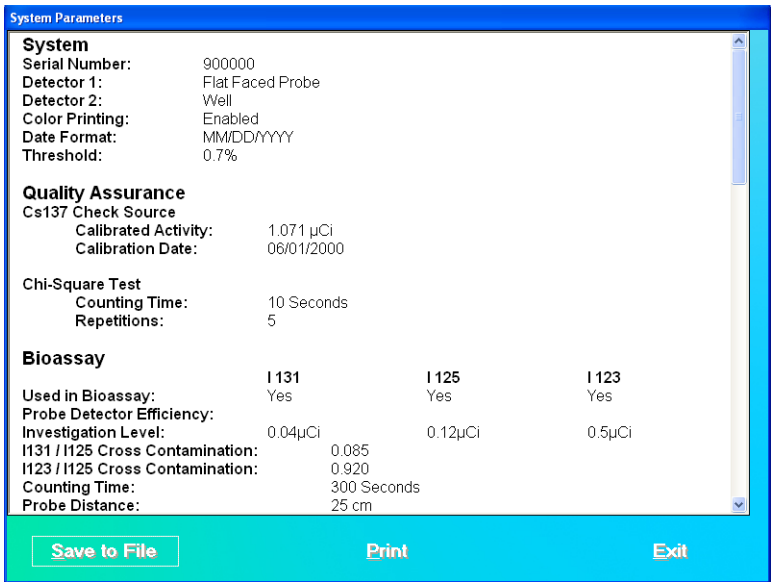

Figure 5-25

2. To save all these parameters to a file, click the Save to File button or press *Alt*+*S*. The Save As screen appears as shown in Figure 5-26. The default folder is in CAPTUS 3000_2\Reports. Data is saved in rich text format (.rtf), which may be viewed in a word processor (such as WordPad).

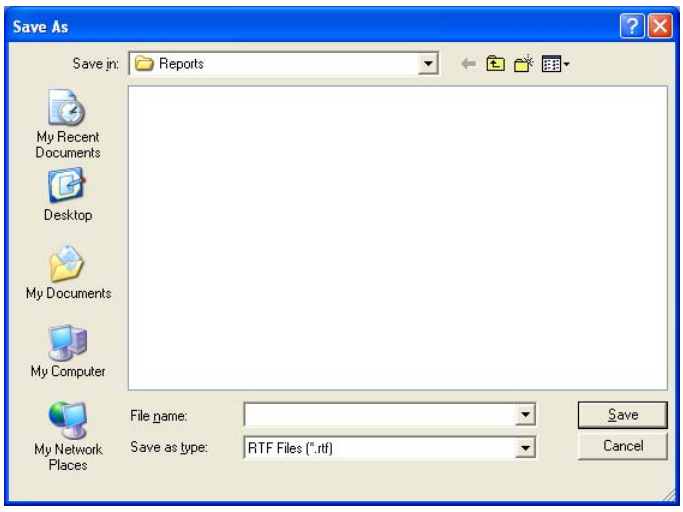

Figure 5-26

3. Type in an appropriate file name and click the Save button or press *Alt*+*S*.

4. To print all the parameters, click the Print button or press *Alt*+*P*.

5. To return to Figure 5-1 Quality Assurance Main Screen, click the Exit button or press *Alt+E*.

VIEWING AND PRINTING HISTORY

This function provides a history of all the QA Tests performed to date. It can be accessed from Figure 5-1 Quality Assurance Main Screen or any one of the QA Test screens.

1. To access the QA Tests history, click the Print / View History button or press *Alt+V* on Figure 5-1 Quality Assurance Main Screen or any one of the QA Test screens. The screen appears as shown in Figure 5-27. There are various ways of viewing the history. Note that the default selection is **Today's Tests**. All of the tests performed on that day appear with the date at the top. When the selection is changed, the screen changes accordingly.

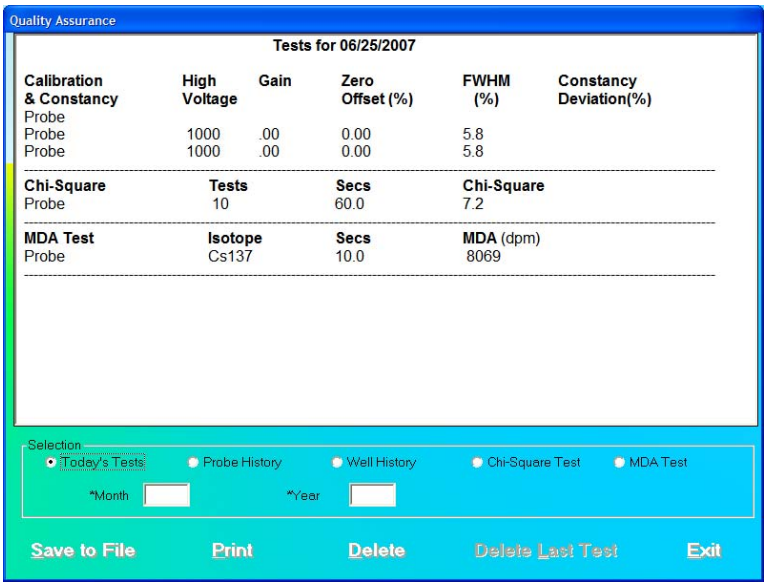

Figure 5-27

2. To view all the results of each Auto Calibration and Constancy Test performed to date on the Probe or Well detector, click the appropriate radio button for the **Probe History** or **Well History**.

   To view only the results from a specific month and year, click in the **Month** and **Year** text boxes and input the desired date. Click on the **Probe History** or **Well History** radio button to display the selected data.

3. To view all the results of each **Chi-Square Test** or **MDA Test** performed to date, click the appropriate radio button for that test.

To view only the results from a specific month and year, click in the **Month** and **Year** text boxes and input the desired date. Click on the **Chi-Square Test** or **MDA Test** radio button to display the selected data.

4. To print the results on the current screen, click the Print button or press *Alt+P*.

5. To save the results on the current screen, click the Save to File button or press *Alt+S*.

6. To delete the latest test on the current screen, click the Delete Last Test button or press *Alt+L*. This function is not accessible when **Today's Tests** is selected. The screen appears as shown in Figure 5-28. Click the Yes button or press the *Y* key to confirm the deletion. Otherwise, click the No button or press the *N* key.

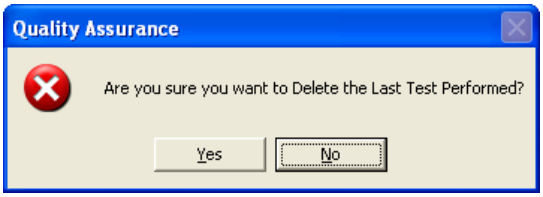

Figure 5-28

7. To delete *all* the tests on the current screen, click the Delete button or press *Alt+D*. You will be prompted to confirm the deletion as shown in Figure 5-28 above.

   Note: *You may want to archive the QA data before deleting the history. Refer to CHAPTER 14: ARCHIVE.*

8. To exit the Print/View History screen and return to Figure 5-1 Quality Assurance Main Screen or the previous QA Test screen, click the Exit button or press *Alt+E*.

CHAPTER 6

ISOTOPES

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⚠ **CAUTION:** To ensure optimum performance of the CAPTUS 3000, before using the **Isotopes** module, perform the System Setup Procedures as outlined in CHAPTER 4: GENERAL SETUP.

INTRODUCTION

The CAPTUS 3000 has an extensive reference library of at least 76 isotopes that contains information on their half-lives, major energy peaks, and known efficiencies. This information is used in the identification of isotope peaks in MCA, Wipe Test module, radioactive decay corrections and measurement of efficiencies. The user may add new isotopes to this list if required.

To access the Isotopes module, click the

button or press *Alt+I* on the CAPTUS 3000 Main screen. Figure 6-1 Isotopes Main Screen will appear.

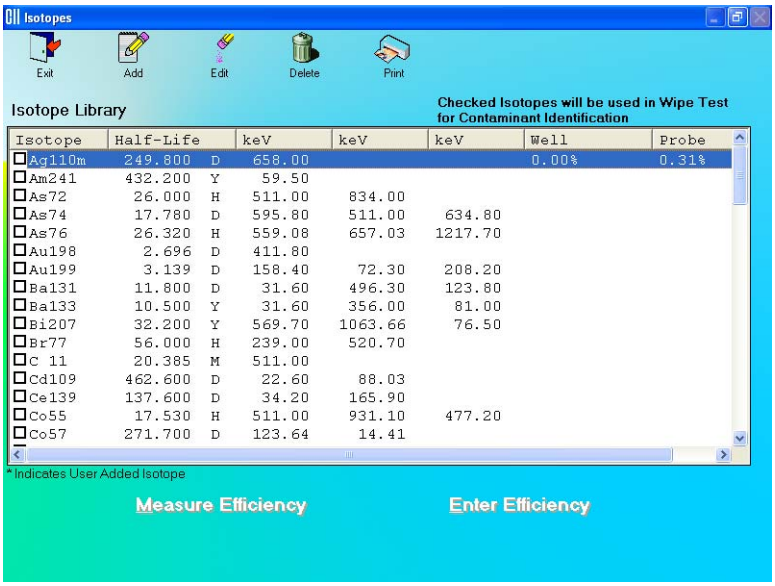

Figure 6-1 Isotopes Main Screen

The **Isotope Library** box in the middle of the screen lists the isotopes alphabetically, with their respective **Half-Lives** in minutes (M), hours (H), days (D) or years (Y), **keV** (for major energy peaks), and **Well** and **Probe** efficiencies, if known. The icons at the top provide functions for adding new isotopes, editing and deleting the added isotopes and printing the library. The Measure Efficiency and Enter Efficiency buttons at the bottom of the screen let you measure efficiency or enter a new efficiency value respectively for the selected isotope.

Note: *At the top right of the **Isotope Library** box, the message **"Checked Isotopes will be used in Wipe Test for Contaminant Identification"** is displayed. All isotopes with a check mark in their check box will have their energy peaks used for isotope identification in the Wipe Test module.*

To return to the CAPTUS 3000 Main screen from this screen, click the

icon or press the *Esc* key.

VIEWING AND PRINTING ISOTOPE LIBRARY

1. To view all the isotopes, scroll up or down the list in **Isotopes Library** box using the scroll bar or use *Page Down*, *Page Up*, ↑ and ↓ keys.

2. To locate an isotope, press the first letter of the isotope to bring it into view. The first isotope with that letter is highlighted. Use ↓ key to move further down if necessary.

3. To print the entire contents of Isotope Library, click the

icon.

ADDING A NEW ISOTOPE TO THE LIBRARY

Note: *All fields in **bold** are required before the* Done *button will be enabled.*

1. Click the Add icon on Figure 6-1 Isotopes Main Screen. Figure 6-2 will appear.

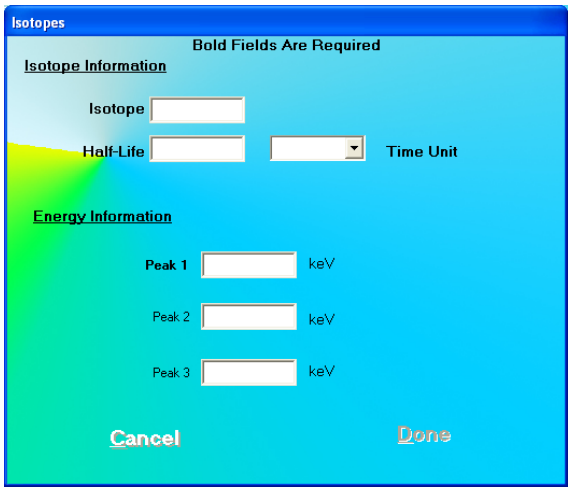

Figure 6-2

2. Click in the appropriate text box under **Isotope Information** to input the isotope name and its half-life. Select a time unit for the entered half-life from the drop-down list by clicking the arrow button in the Time Unit drop-down list box.

   Note: *An isotope name can be entered only in a specific format; which is the symbol of the element (alphabetical character) followed by the atomic mass (number). If the element symbol is one character, be sure to insert a space between the character and the number. If the element symbol is two characters, do not insert a space between the character and numbers. If entered otherwise, an error message will appear as shown in Figure 6-3.*

Figure 6-3

3. Click in the text boxes under **Energy Information** and input the peak energy values in keV. At least one peak value must be input.

4. To save the added information and return to the Isotopes Main screen, click the Done button or press *Alt+D*. Alternatively, click the Cancel button or press *Alt+C* to return without saving. Note that the Done button is enabled only after all the required fields are entered.

QUICK TIPS:

- To move between data fields use the *Tab* key.
- To return to CAPTUS 3000 Main screen from the Isotopes Main screen, click the Exit icon or press the *ESC* key.

EDITING ISOTOPE INFORMATION

Note: *Only user added isotopes can be edited. Information in the system's pre-existing Isotope Library cannot be altered.*

1. If the isotope to be edited is out of view in the **Isotope Library** box on Figure 6-1 Isotopes Main Screen, scroll up or down the list in **Isotopes Library** box using the scroll bar or use *Page Down*, *Page Up*, ↑ and ↓ keys or press the first letter of the isotope to bring it into view.

2. Click on the isotope to select it (highlighted) for editing as shown in Figure 6-4.

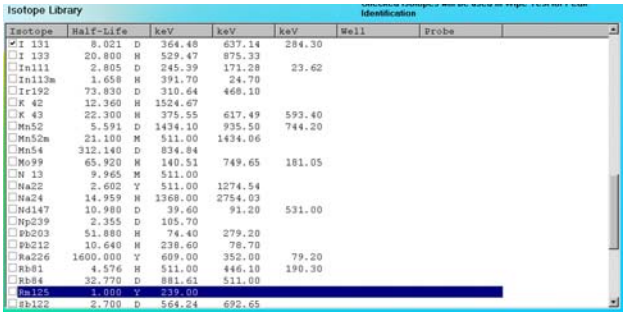

Figure 6-4

3. Click the Edit icon. Figure 6-2 will appear.

Note: *If the selected isotope is in the system's permanent isotope database, the following error message will appear (Figure 6-5). Click the* OK *button.*

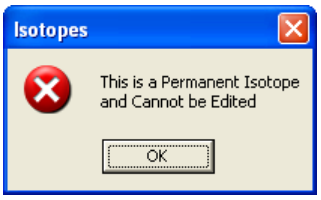

Figure 6-5

4. Click in the text box or use the *Tab* key to move around. Type over the existing information.

5. Click the Done button or press *Alt+D* to save changes or click the Cancel button or press *Alt+C* to cancel the changes and return to Figure 6-1 Isotopes Main Screen.

QUICK TIPS:

- To locate an isotope, use the scroll bar, use *Page Down*, *Page Up*, ↑ and ↓ keys or press the first letter of the isotope to bring it into view.

DELETING AN ISOTOPE

Note: *Only user added isotopes can be deleted. Isotopes in the system's pre-existing Isotope Library cannot be deleted.*

1. If the isotope to be deleted is out of view in the **Isotope Library** box on Figure 6-1 Isotopes Main Screen, scroll up or down the list in **Isotopes Library** box using the scroll bar or use *Page Down*, *Page Up*, ↑ and ↓ keys or press the first letter of the isotope to bring it into view.

2. Click on the isotope to select it (highlighted) for deleting as shown in Figure 6-4.

3. Click the Delete icon. The screen appears as shown in Figure 6-6.

Figure 6-6

Note: *If the selected isotope is in the system's permanent isotope database, the following error message will appear (Figure 6-7). Click the* OK *button.*

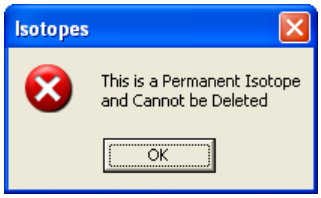

Figure 6-7

4. Click the Yes button or press the *Y* key to confirm the deletion. Alternatively, click the No button or press the *N* key to cancel the deletion.

QUICK TIPS:

- To locate an isotope, use the scroll bar, use *Page Down*, *Page Up*, ↑ and ↓ keys or press the first letter of the isotope to bring it into view.

MEASURING EFFICIENCY

1. If the isotope to be measured is out of view in the **Isotope Library** box on Figure 6-1 Isotopes Main Screen, scroll up or down the list in **Isotopes Library** box using the scroll bar or use *Page Down*, *Page Up*, ↑ and ↓ keys or press the first letter of the isotope to bring it into view.

2. Click on the isotope to select it (highlighted) for measuring as shown in Figure 6-4.

3. Click the Measure Efficiency button or press *Alt+M*. The screen appears as shown in Figure 6-8 with the name of the isotope at the top.

Figure 6-8

4. Click in the text box or use the *Tab* key to move around. Input the **Calibration Activity**, **Calibration Date** and **Calibration Time** from the source label and **Counting Time** desired in seconds.

5. To change the detector from **PROBE** to **WELL**, click in the appropriate radio button in the **Select Detector** frame.

6. Click the Next button or press *Alt+N*. The screen appears as shown in Figure 6-10.

   Note: *If calibration has not been performed for the current day, you will be prompted with the screen as shown in Figure 6-9. If calibration is performed now, the program will return to Figure 6-10 after calibration is complete.*

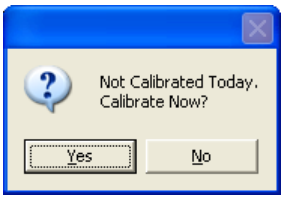

Figure 6-9

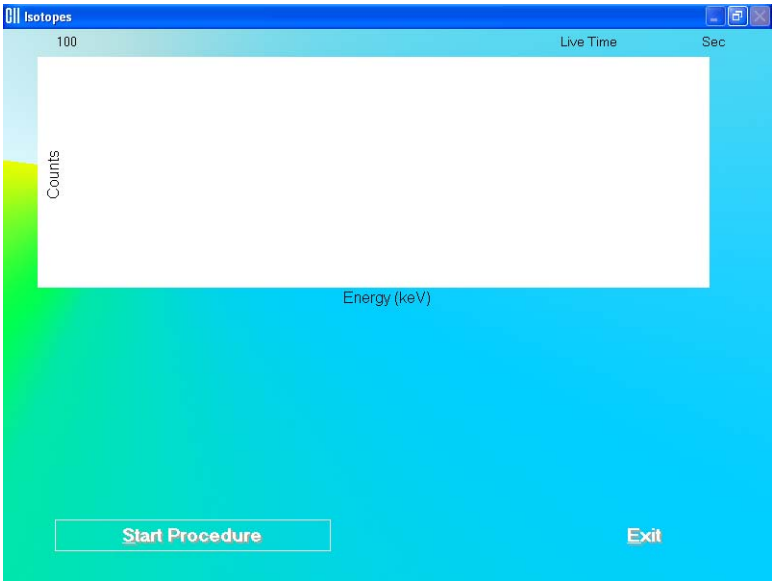

Figure 6-10

7. Click the Start Procedure button or press *Alt+S* to start measurements. Alternatively, click the Exit button or press *Alt+E* to return to Figure 6-1 Isotopes Main Screen.

8. When the procedure is started, the screen appears as shown in Figure 6-11.

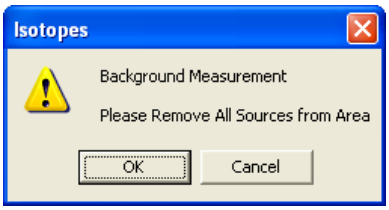

Figure 6-11

To begin counting, verify that there are no radioactive sources nearby and click the OK button. Otherwise, click the Cancel button to return to the measurement screen. The Data Acquisition screen appears as shown in Figure 6-12.

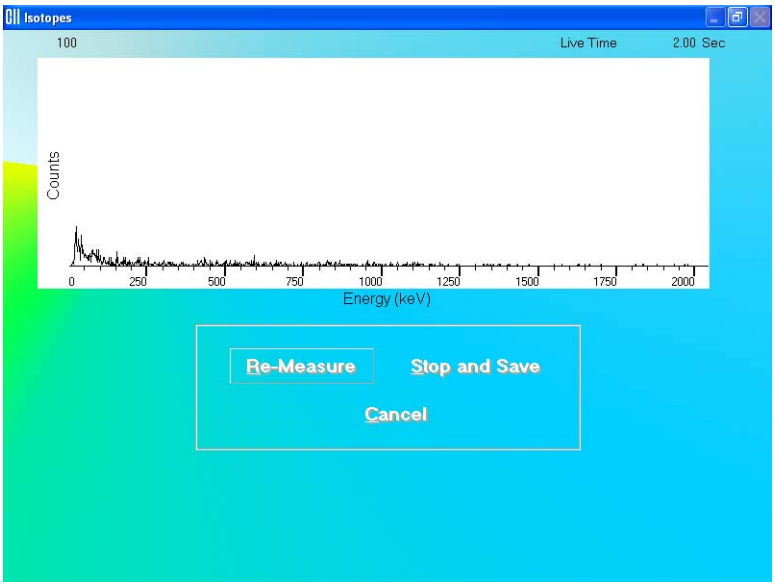

Figure 6-12

9. Next, the screen appears as shown in Figure 6-13, prompting you to measure the isotope selected for efficiency measurement.

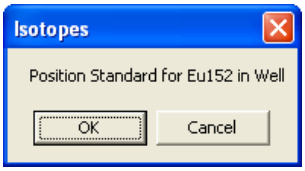

Figure 6-13

To measure the isotope, place the isotope standard in the Probe or Well as the message indicates and click the OK button. Data collection begins as shown in Figure 6-12 above. To stop the measurement, click the Cancel button. The screen then appears as shown in Figure 6-14.

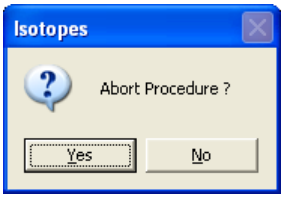

Figure 6-14

Click the Yes button or press the *Y* key to end the procedure. The screen appears as shown in Figure 6-10. Click the Start Procedure button to start again or click the Exit button to quit.

10. After the measurement is completed, the screen appears as shown in Figure 6-15. The results in the lower part of the screen show measured counts and calculated values for activity and efficiency.

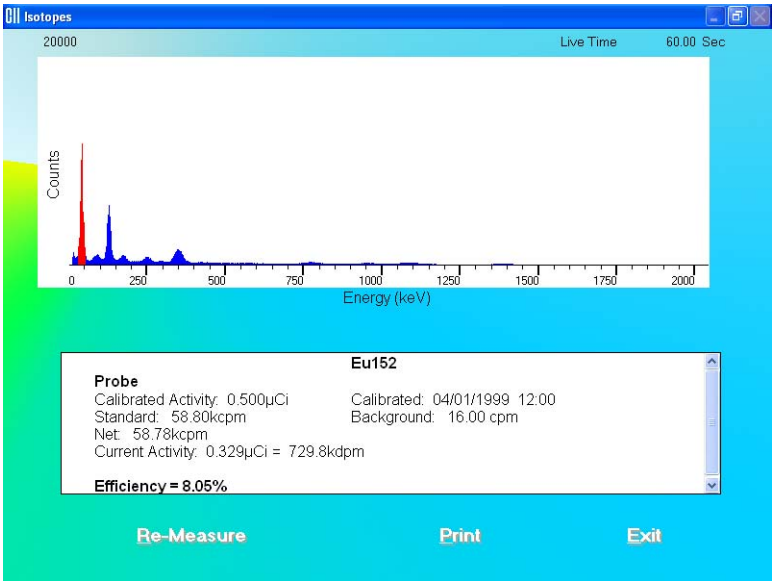

Figure 6-15

11. To repeat the efficiency measurement for the same isotope, click the Re-Measure button or press *Alt+R*. Steps 8 thru 10 are repeated.

12. To print the spectrum and results on the screen, click the Print button or press *Alt+P*.

13. To exit and return to the main Isotopes screen, click the Exit button or press *Alt+E*.

ENTERING EFFICIENCY

1. If the isotope whose Efficiency is to be entered is out of view in the **Isotope Library** box on Figure 6-1 Isotopes Main Screen, scroll up or down the list in **Isotopes Library** box using the scroll bar or use *Page Down*, *Page Up*, ↑ and ↓ keys or press the first letter of the isotope to bring it into view.

2. Click on the isotope to select it (highlighted) for entering efficiency as shown in Figure 6-4.

3. Click the Enter Efficiency button or press *Alt+E*. The screen appears as shown in Figure 6-16. The name of the isotope appears at the top. Efficiency values for Well and Probe may or may not already exist.

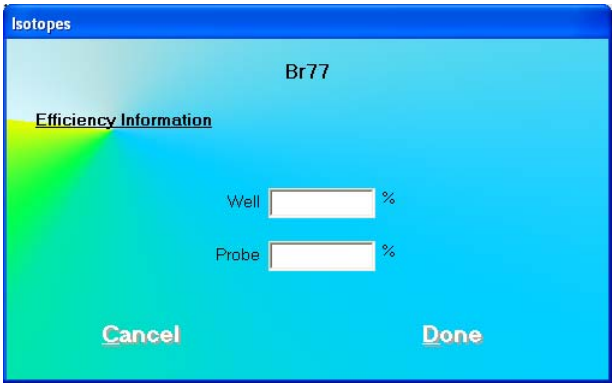

Figure 6-16

4. Click in the appropriate text box or use the *Tab* key to move around. Input the new efficiency value for Well or Probe or both as needed.

5. Click the Done button or press *Alt+D* to save changes or click the Cancel button or press *Alt+C* to cancel the changes and return to Figure 6-1 Isotopes Main Screen.

QUICK TIPS:

- To locate an isotope, use the scroll bar, use *Page Down*, *Page Up*, ↑ and ↓ keys or press the first letter of the isotope to bring it into view.

CHAPTER 7

THYROID UPTAKE

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⚠ **CAUTION:** To ensure optimum performance of CAPTUS 3000, before using the **Thyroid Uptake** module, perform the System Setup Procedures as outlined in CHAPTER 4: GENERAL SETUP.

INTRODUCTION

Thyroid Uptake is a measurement of the ratio of the amount of radioactive material concentrated in the thyroid gland to the amount of radioactive material administered to the patient. The results of the procedure are expressed as a percentage. Dose Administration time being regarded as 0 hours,

$$\text{Uptake at 6 Hrs} = \frac{\text{Patient Activity at 6 Hrs}}{\text{Capsule Activity at 6 Hrs}} \times 100\%$$

Thyroid Uptake measurements are generally used to determine conditions of hyperthyroidism. High uptake results are found in Graves disease, toxic nodular goiter, and stimulator secreting tumors or can be TSH-induced. Low uptake results are found with

thyroid hormone secretion in ectopic tumors, hormonal release in thyroid injury, after intake of thyroid hormone, or Jod-Basedow disease. During the treatment of thyroid cancer by I-131 ablation, uptake measurements are used to monitor thyroid activity.

The CAPTUS 3000 system will store patient demographic and dosage information, count data for both the administered dosage and the patient, decay correct all count data, calculate thyroid uptake results, and store all of this information. Regions of Interest have been defined for three isotopes, I-131, I-123, or Tc99m. If normal values have been entered in the setup, then uptake results exceeding these values will be flagged. All of the patient information may be printed. The thyroid uptake software has been designed to accommodate a variety of different counting protocols, using either capsules or liquid dosages.

Note: *In the following sections of the chapter, the word capsule will be used for either a capsule or liquid dosage.*

To access the Thyroid Uptake functions, click the **Thyroid Uptake** button or press *Alt+U* on the CAPTUS 3000 Main screen. Figure 7-1 Main Thyroid Uptake Screen will appear. The **Patient Directory** box will be empty if there are no existing patients in the database. This box will display the patient's name, ID, administered isotope (if known) and the time and date of dose administration (if already done). By default, patients are sorted by their dose administration time, latest one first. The **Patient Status** box below the **Patient Directory** box shows the current status of the selected patient. If the uptake procedure has been started, the updated results will be displayed here.

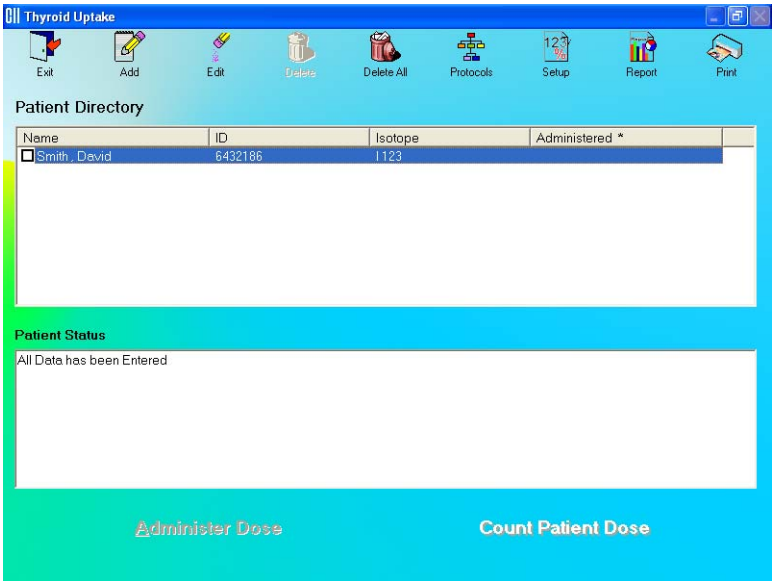


Figure 7-1 Main Thyroid Uptake Screen

To return to the CAPTUS 3000 Main screen from Figure 7-1 Main Thyroid Uptake Screen, click the

icon or press the *Esc* key.

Note: *At least one measurement protocol must be set up before any patient can be added to the* ***Patient Directory*** *or any other function can be accessed from Figure 7-1 Main Thyroid Uptake Screen.*

QUICK STEP GUIDE FOR THYROID UPTAKE PROCEDURE

1. Set up a protocol for measurement (refer to **Adding Protocols** on page 7-5).

2. Add all the required patient information and dosage information (refer to **Adding Patients** on page 7-10).

3. If the counting method selected in protocol is Decay Correct Administered Dose (refer to **MAKING MEASUREMENTS** on page 7-17), count each capsule for an initial capsule count before the patient arrives.

4. If needed, measure pre-dose patient when the patient arrives.

5. Administer the capsule(s) to the patient. Record the administered time (refer to **Dose Administration** on page 7-4).

6. Count the patient after a desired uptake time (refer to **Counting Selected Patient** on page 7-19).

7. Print the patient report if needed (refer to **Patients Reports** on page 7-24).

MEASUREMENT PROTOCOLS

Protocols need to be set up to select the method of measurement and dose administration to the patient (refer to **Adding Protocols** on page 7-5 in this chapter).

Counting Methods

There are two counting methods that can be used as the measurement protocol:

1. Decay Correct Administered Dose

In this method, a single capsule is used.

- Measure the capsule *before* administering it to the patient.
- Then administer this capsule to the patient.
- Measure the patient for uptakes at the required intervals.

Sometimes, individual capsules may vary in activity from one to another. This method eliminates any error caused by a difference in activity between the capsule administered to the patient and a second different capsule used as a standard. It is less time consuming, since it eliminates the need to recount a standard capsule each time an uptake measurement is performed. This method is also cost effective since it eliminates the need of a second capsule to be used only as a standard. If your facility uses an alternate method, try making comparison measurements with your current

method and the Decay Correct method. Most facilities find that Decay Correct Administered Dose is the most convenient and cost effective method.

2. Measure Same Reference Dose Before Each Uptake

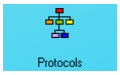
In this method, two capsules are used – one is used as a standard and the other is administered to the patient.

- Administer the dose to the patient.
- Each time the uptake is performed, measure the standard first and then the patient. The uptake will be calculated from this standard capsule and patient measurement.

Dose Administration

There are four modes of Dose Administration that can be used in a protocol:

MODES	NO. OF DOSES	FORM OF DOSE	DESCRIPTION
Dose Measured is Dose Administered	Single or Multiple	Capsule or Liquid	Measure the dose administered. These measured counts are used directly for uptake calculations.
Measure Each Dose and Add Activity	Multiple	Capsule or Liquid	Measure each of the capsules individually. The software adds the activities together to get the activity for total dose administered.
Measure One Capsule and Multiply by Number Administered	Multiple	Capsule	Measure only one capsule. The software then multiplies that count rate by the number of capsules administered to the patient (entered when the patient is added to the database).
Measure Liquid and Multiply by Factor	Multiple	Liquid	Measure the activity for a fraction of the liquid dose to be administered. The software then multiplies that count rate by appropriate factor (entered when the patient is added to the database) to calculate the total activity for the entire dose given.

Click the 

icon to access protocols. The screen appears as shown in Figure 7-2 Protocols Screen. The **Protocols** box is empty the first time, because there are no protocols

defined as yet by the user. Therefore, the only functions accessible at this stage are

and

.

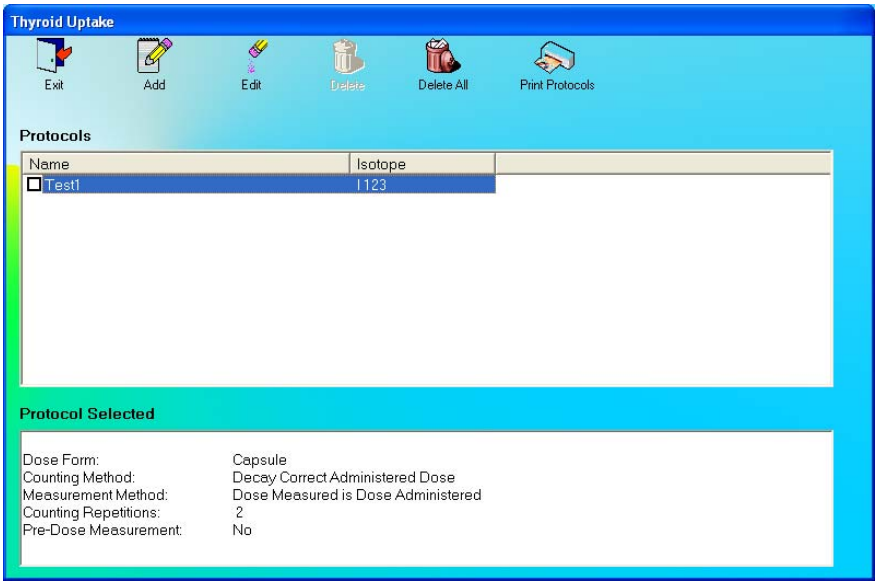


Figure 7-2 Protocols Screen

Adding Protocols

1. Click the

icon on Figure 7-2 Protocols Screen. The Protocol Setup screen will appear as shown in Figure 7-3. In each of the frames on this screen, only one option can be selected.

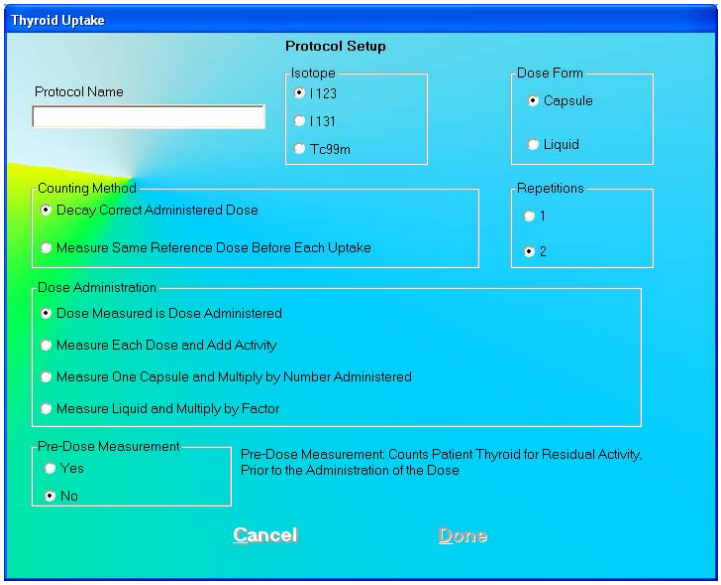


Figure 7-3

2. Input a descriptive name for the protocol being defined in the **Protocol Name** text box. Spaces, numbers and other characters may be used (e.g. “Decay Correct Single Dose-1”). No two protocols can have the same name.

3. Click the appropriate radio button in the **Isotope** frame to select the isotope that will be administered to the patient. The choices are **I123**, **I131**, or **Tc99m**.

4. Click the appropriate radio button in the **Dose Administration** frame to select a mode.

5. Click the appropriate radio button in the **Dose Form** frame to select the form of dose (**CAPSULE** or **LIQUID**) that will be administered to the patient.

   Note: *Depending on the selection in the **Dose Administration** frame, the Capsule or Liquid option may be unavailable.*

6. Click the appropriate radio button in the **Counting Method** frame to select a counting method.

7. Click the appropriate radio button in the **Pre-Dose Measurement** frame to select whether or not you want the patient to be measured before any dose is administered. If **YES** is selected, when the uptake is performed, you will be prompted to perform a pre-dose measurement. These pre-dose measurements will be subtracted from the subsequent thyroid uptake measurements.

   Note: *This option should be enabled whenever a patient has received a prior dose of the same isotope, as that which would be used for the thyroid uptake procedure. For example, pre-dose measurement should be made for thyroid cancer patients who have been treated with I131 for tumor oblation, and then require a subsequent I131 thyroid uptake performed in order to evaluate the efficacy of the treatment.*

8. Click the appropriate radio button in the **Repetitions** frame to select the number of repetitions to be performed each time a capsule or patient is counted (the background for the capsule is only counted once). For 2 repetitions, the counts will be averaged and then used to calculate a thyroid uptake result. You will be given the option to skip the second repetition after each count.

9. Click the

button or press *Alt+D* to save the protocol or click the

button or press *Alt+C*, to cancel the protocol and return to Figure 7-2 Protocols Screen.

10. To add more protocols, click the

icon on Figure 7-2 Protocols Screen.

11. To stop adding protocols, click the

button to return to Figure 7-1 Main Thyroid Uptake Screen.

QUICK TIPS:

- To move between boxes use the *Tab* key and to move within boxes use ↓ or ↑ keys.

Editing Protocols

Note: *If a protocol is presently being used in an uptake, modifying that protocol will not affect the uptake being performed.*

1. Click on the desired protocol in the **Protocols** box on the Protocols screen or use ↓ and ↑ keys to select the desired protocol for editing or viewing. As shown in Figure 7-4, the selected protocol's settings are shown in the **Protocol Selected** box.

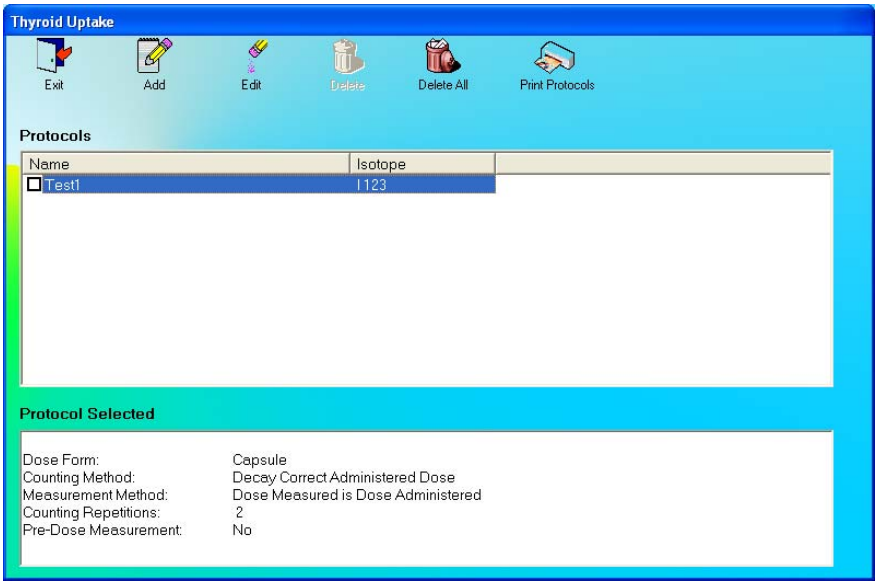


Figure 7-4

2. Click the

icon to edit any settings. The Protocol Setup screen appears as shown in Figure 7-5.

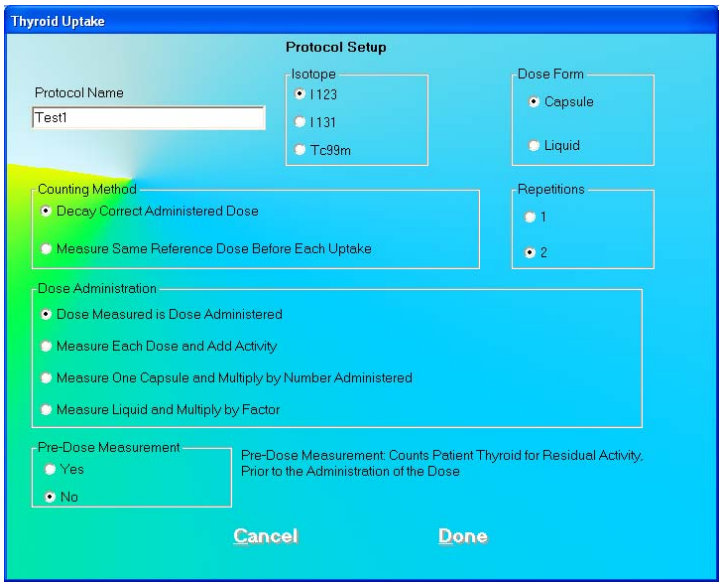


Figure 7-5

3. Click the appropriate radio button(s) to make new selections. To change the name of the protocol, click in the **Protocol Name** text box and type over the existing name.

4. Click the Done button to save the changes or click the Cancel button to cancel the changes and return to Figure 7-2 Protocols Screen.

QUICK TIPS:

- To move between boxes, use the *Tab* key and to move within boxes use ↓ or ↑ keys.
- To return to Figure 7-1 Main Thyroid Uptake Screen from the Protocols screen, click the Exit icon or press the *Esc* key.

Deleting Protocols

Note: *If a protocol is presently being used in an uptake, modifying that protocol will not affect the uptake being performed.*

To keep a record of deleted protocols, print the existing protocols before deleting.

Click the Print Protocols icon to print a list of all the existing protocols with their settings.

1. To select one or more protocols for deletion, click in the check box to the left of the protocol name in the **Protocols** box on the Protocols screen as shown in Figure 7-6. A check should appear in the check box to indicate it has been selected. To deselect a protocol, click in its check box again and the check will be removed from the check box.

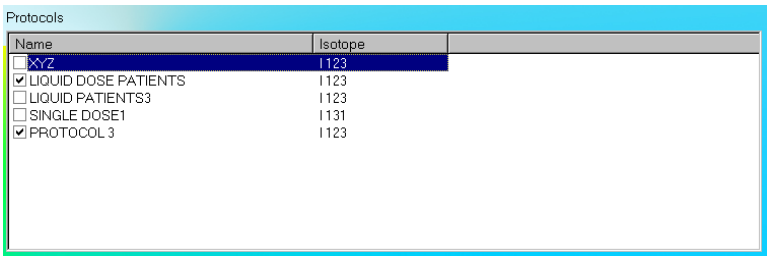


Figure 7-6

2. Click the

icon. Figure 7-7 will appear.

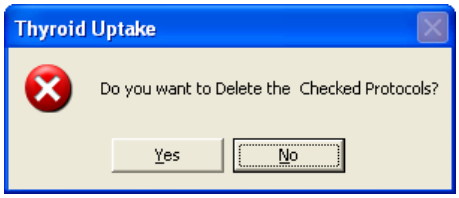


Figure 7-7

3. Click the Yes button or press the *Y* key to confirm the deletion. Otherwise, click the No button or press the *N* key.

4. To delete all the protocols at once, click the

icon. Figure 7-8 will appear prompting you to confirm the deletion.

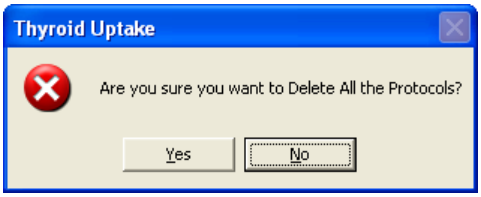


Figure 7-8

5. Click the Yes button or press the *Y* key to confirm the deletion. Otherwise, click the No button or press the *N* key.

6. Click the

icon return to Figure 7-1 Main Thyroid Uptake Screen.

Printing Protocol Report

Click the

icon to print a list of existing protocols with their settings.

PATIENT INFORMATION

Adding Patients

To add patients to the database, at least one measurement protocol must exist. To create a protocol, refer to **MEASUREMENT PROTOCOLS** on page 7-3.

Note: *All fields in **bold** are required before you can begin the uptake procedure. However, you may enter the patient name, ID and Date of Birth and click the* Done *button and enter the rest later. The **Patient Status** box on Figure 7-1 Main Thyroid Uptake Screen will show that the patient data is partially entered.*

1. Click the Add icon on Figure 7-1 Main Thyroid Uptake Screen. The Patient Information screen appears as shown in Figure 7-9, with information to be entered in three sections.

Figure 7-9

QUICK TIPS:

- Click in the text box or use the *Tab* key to move from one text box to another. To select from drop-down list use ↓ or ↑ keys.

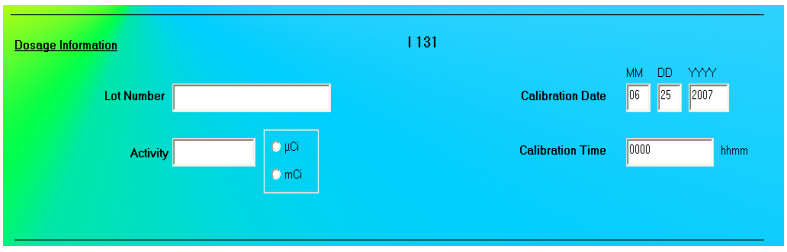
2. Enter the **Patient Information**.
   - Input the **Last Name**, **First Name**, **Date of Birth**, **Patient ID** and **Physician**.
   - In the **Sex** box, select male or female from the drop-down list or press the *M* or *F* key.
   - In the **Select Protocol** box, select a pre-defined protocol from the drop-down list box for the Thyroid Uptake procedure.

Note: *Any combination of up to 20 alphanumeric characters can be used for the First Name, Last Name, Patient ID and Physician. Fields not in bold are optional.*

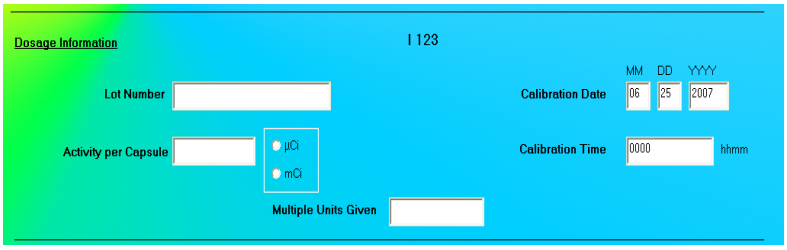
Note: *If Cap-DICOM software is not installed, the Accession # field will not be present.*

3. Next, input the **Dosage Information**.
   - The isotope associated with the selected protocol will appear at the top of this section. The fields in this section of the screen will vary according to the **Dose Administration** mode selected in the protocol as follows:

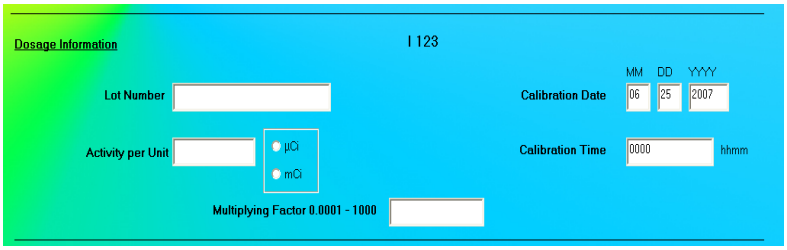
Dose Measured is Dose Administered
(Single Dose)



Measure Each Dose and Add Activity
OR
Measure one Capsule and Multiply by Number Administered
(Multiple Doses)



Measure Liquid and Multiply by Factor
(Multiple Doses)



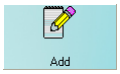
   - The **Lot Number**, **Calibration Date**, **Activity** and **Calibration Time** may be determined from your measurements of the dose in a dose calibrator or from the previously prepared dose label.
   - For Capsule Multiple Doses, input the number of capsules to be administered (Multiple Units Given). For Liquid Multiple Doses, input the Multiplying Factor [(Total Vol of Liq) / (Vol of Liq Counted)].

Note: *The fields in the **Dosage Information** section are available only when you have selected a protocol for the patient.*

4. Enter **General Information**.

- Click in the **Probe Distance** text box and input the distance of the Probe from the patient to be measured in centimeters (cm).
- Click in the **Counting Time** text box and input the counting time in seconds.
- Click in the **Tech ID** text box and input the alphanumeric ID of the person performing the procedure.

5. Click the Done button to save the changes or click the Cancel button to cancel the changes and return to Figure 7-1 Main Thyroid Uptake Screen.

6. To add more patients, click the 

icon on Figure 7-1 Main Thyroid Uptake Screen.

QUICK TIPS:

- To move between data fields use the *Tab* key and to select from drop-down list use ↓ or ↑ keys.
- To return to the CAPTUS 3000 Main screen, click the

icon or use the *Esc* key.

Viewing Patient Information

The **Patient Status** box displays a concise report of the highlighted patient record. If a test has not yet been started, it will show the current data status.

To locate a specific patient record;

1. Click in the **Patient Directory** box to activate it.

2. To select a patient, use the ↑ ↓ keys or *Page Up* and *Page Down* keys to move up or down in the patient list. If the list is long, the scroll bar is also available. To reach a particular patient, press the first letter of the patient name. Press the ↓ key if necessary, to go further down.

Note: *To locate a patient record easily, the records are sorted by dose administration date, latest one first. You may change to sorting by patient name by clicking on **Name** header in the **Patient Directory** box. The field being used for sorting is denoted by an asterisk beside the header name.*

Editing Patient Information

Note: *Once measurements for a patient have been started, the following fields on the Edit Patient screen cannot be changed – **Protocol**, **Multiple Units Given**, **Multiplying Factor**, **Probe Distance** and **Counting Time**.*

1. To select a patient to be edited, use the ↑ ↓ keys or *Page Up* and *Page Down* keys to move up or down in the patient list. If the list is long, the scroll bar is also available. To reach a particular patient, press the first letter of the patient name. Press the ↓ key if necessary, to go further down (Figure 7-10).

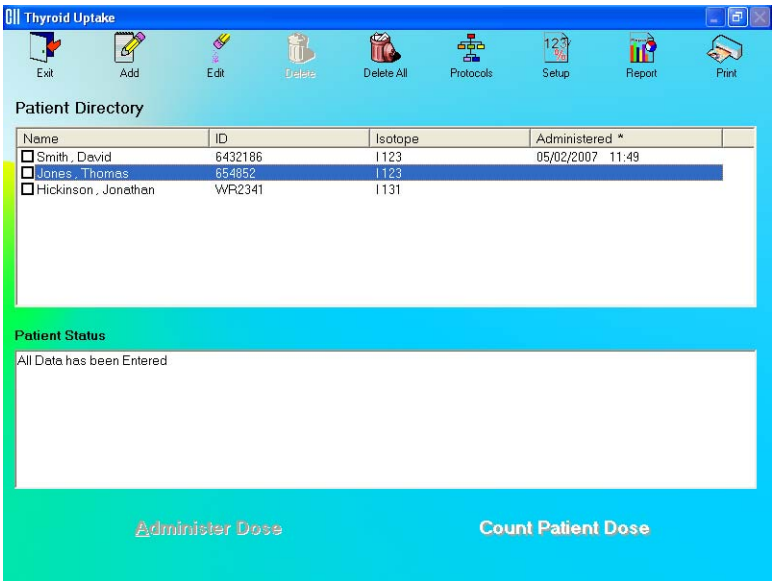


Figure 7-10

2. Selecting a patient with partially entered data will prompt you with the screen below (Figure 7-11).

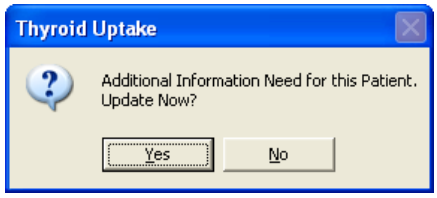


Figure 7-11

Click the Yes button or press the *Y* key to update the patient information, or else click the No button or press the *N* key to return to Figure 7-1 Main Thyroid Uptake Screen.

3. Click the Edit icon. The screen appears as shown in Figure 7-12.

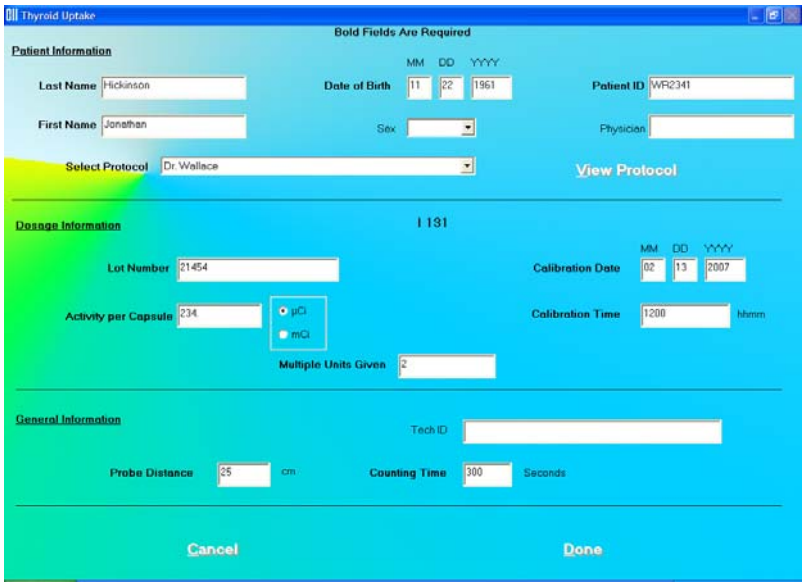


Figure 7-12

QUICK TIPS:

- Click in the text box or use the *Tab* key to move from one text box to another. To select from drop-down list use ↓ or ↑ keys.

4. Click in the text box to be edited and type over the existing information.

   Note: *All fields in **bold** are required before the uptake procedure can begin.*

5. Click the **Done** button to save changes or click the **Cancel** button to cancel the changes and return Figure 7-1 Main Thyroid Uptake Screen.

Deleting Patient Records

Note: *If you wish to save patient information before deleting, refer to CHAPTER 14: ARCHIVE.*

1. To select one or more patients for deletion, click in the check box to the left of the patient name in the **Patient Directory** box on Figure 7-1 Main Thyroid Uptake Screen as shown in Figure 7-13. A check should appear in the check box to indicate it has been selected. To deselect a patient, click in their check box again and the check will be removed from the check box.

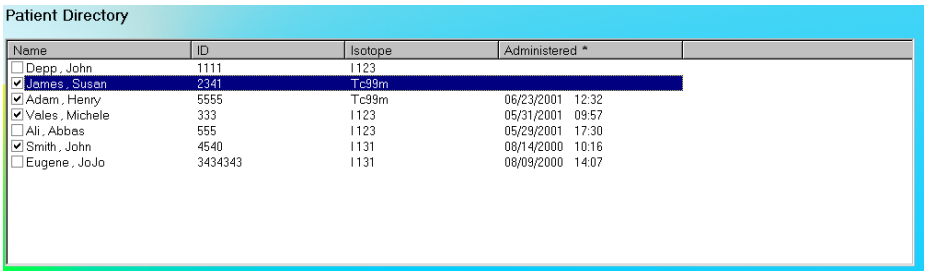
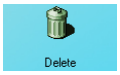


Figure 7-13

2. Click the 

icon. Figure 7-14 will appear.

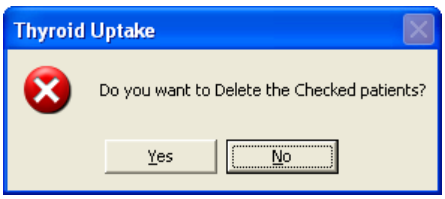
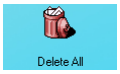


Figure 7-14

3. Click the Yes button or press the *Y* key to confirm the deletion. Otherwise, click the No button or press the *N* key.

4. To delete all the patients at once, simply click the 

icon. You will be prompted to confirm the deletion. Figure 7-15 will appear.

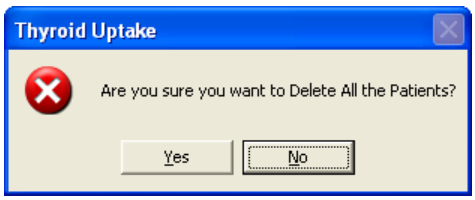


Figure 7-15

5. Click the Yes button or press the *Y* key to confirm the deletion. Otherwise, click the No button or press the *N* key.

VIEWING AND CHANGING THE SETUP

1. Click the

icon on Figure 7-1 Main Thyroid Uptake Screen. The screen appears as shown in Figure 7-16 with three frames: **Normal Range**, **Counting Parameters** and **ROI Selection**.

Figure 7-16

Normal Range frame – This defines the Minimum and Maximum for a Normal Range of uptake percentage values measured at various Uptake Times. A percentage uptake measured below or above this range is flagged as out of range in the patient reports. There are no preset values for this range, and they may be entered as desired. This is an optional setting.

Counting Parameters frame – The values for Counting Time (period of data collection), Probe Distance (distance between the Probe and the patient to be counted) and Calibration Time (of the capsule before administration) are preset to 300 seconds, 25 cm and 12:00 respectively. These values are the default values used in the Patient Information screen (Figure 7-9). They are typical in the procedure, but may be changed if required.

ROI Selection frame – ROI defines the region of interest in the spectrum of the isotope being measured and is based upon the peak energy (keV) of the uptake isotope selected. A percentage of the primary peak is used to set the Low and High ends of the observation window. The range should be sufficiently wide so that the entire peak is within the measurement window and the slopes of the peak are not beyond range.

Note: *The default ROI settings provide an adequate observation window for each of the isotopes and are strongly recommended to be left unchanged for optimum measurement results.*

2. To edit values, click in the desired text box and then input the new number.

3. Click the Done button or press *Alt+D* to save changes or click the Cancel button or press *Alt+C* to cancel the changes and return to Figure 7-1 Main Thyroid Uptake Screen.

   Note: *Except for **Normal Range** values, the changed setup is applicable to only new patients added after the change.*

QUICK TIPS:

- To restore the default values for the ROI at anytime, click the Restore Original Values button.
- To count for a time less than the **Counting Time** entered in the setup, you may stop and save the data midway while measuring.

MAKING MEASUREMENTS

- Before making any measurements on a patient, verify that all required patient information has been entered.
- Any changes to the measurement setup/protocols must be done *before* performing the uptake.

1. To select a patient for the uptake procedure, click on that record in the **Patient Directory** box on Figure 7-1 Main Thyroid Uptake Screen. The **Patient Status** box will show the current status on the patient. If this box reads, "All Data has been Entered", the uptake procedure can be started. If an uptake procedure is midway for a patient, the box will display the results obtained to that point.

   Note: *To select a patient, use the ↑ ↓ keys or Page Up and Page Down keys to move up or down in the patient list. If the list is long, the scroll bar is also available. To reach a particular patient, press the first letter of the patient name. Press the ↓ key if necessary, to go further down.*

   *If the **Patient Status** box displays "Data Partially Entered", no measurements can be made until all the required information is entered. Refer to **Editing Patient Information** on page 7-12.*

2. To begin the measurements, follow the sequence of steps as shown below depending upon the Counting Method selected in the protocol:

   a. Decay Correct Administered Dose

   i. Click the Count Patient Dose button on Figure 7-1 Main Thyroid Uptake Screen. Follow the on-screen instructions to:
      - If **Pre-Dose Measurement** is selected in the protocol, then you will be stepped through the measurement of patient background and neck.
      - Measure room background.

- If **Measure Each Dose and Add Activity** is selected, then measure the capsule (multiple capsules) in the phantom.

ii. Click the Administer Dose button or press *Alt+A* on Figure 7-1 Main Thyroid Uptake Screen. Follow the on-screen instructions to
- Measure patient background and then the neck (If **Pre-Dose Measurement** is selected & was omitted in step 2.a.i.).
- Administer the capsules measured while entering the administration time.

iii. Click the Count Patient Dose button on Figure 7-1 Main Thyroid Uptake Screen to measure the uptake after desired time. Follow the on-screen instructions to
- Measure patient background.
- Measure patient neck.

iv. Repeat 2.a.iii as desired.

b. Measure Same Reference Dose Before Each Uptake

i. Click the Administer Dose button or press *Alt+A* on Figure 7-1 Main Thyroid Uptake Screen. Follow the on-screen instructions to
- Measure the patient background and then the neck, if **Pre-Dose Measurement** is selected.
- Administer the dose to the patient and enter the administration time simultaneously.

ii. Click the Count Patient Dose button on Figure 7-1 Main Thyroid Uptake Screen to measure the uptake after desired time. Follow the on-screen instructions to
- Measure room background.
- Measure capsule in the phantom or multiple capsules in the phantom, *if* **Measure Each Dose and Add Activity** is selected.
- Measure patient background.
- Measure patient neck.

iii. Repeat 2.b.ii as desired.

Note: *If a measurement for a patient has already been started, to resume the procedure, select the patient. The appropriate button,* Count Patient Dose *or* Administer Dose *will be available to continue the procedure right from where you left off.*

QUICK TIPS:

- Either Count Patient Dose *or* Administer Dose is enabled on Figure 7-1 Main Thyroid Uptake Screen at one time while the other is gray or disabled, depending upon the patient status and settings in the selected protocol.
- After clicking the Count Patient Dose *or* Administer Dose button, the program

automatically guides you through the measurements that need to be made.

Counting Selected Patient

1. Click the Count Patient Dose button from Figure 7-1 Main Thyroid Uptake Screen. The screen appears as shown in Figure 7-17.

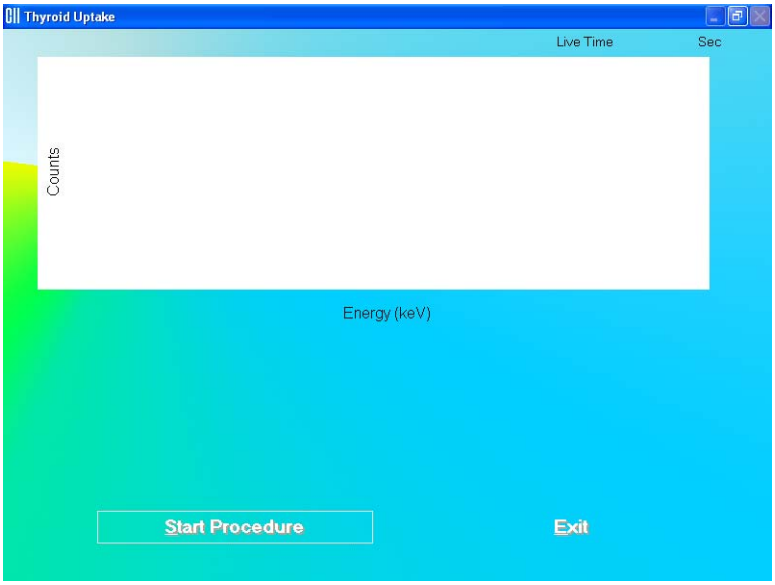


Figure 7-17

Note: *If calibration has not been performed for the current day, you will be prompted with the screen as shown in Figure 7-18. If calibration is performed now, the program will return to the Thyroid Uptake measurement screen shown in Figure 7-17 after calibration is complete.*

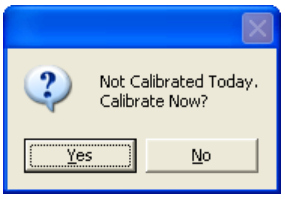


Figure 7-18

If **Pre-Dose Measurement** is set to Yes in the protocol, the screen will appear as shown in Figure 7-19. To perform pre-dose count, click the Yes button or press the *Y* key. The screen will appear as shown in Figure 7-17.

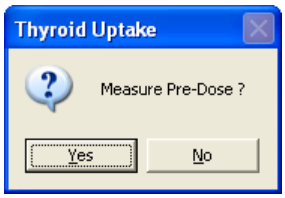


Figure 7-19

Note: ***Pre-Dose*** *measurements may be skipped, if desired. This allows the Dose Measurement to be performed before the Pre-Dose measurement. You will be asked again to measure the Pre-Dose at the beginning of the Dose Administration phase of the protocol.*

2. Click the Start Procedure button or press *Alt+S*. Figure 7-20 will appear confirming the selected patient. To cancel the uptake or if the incorrect patient was selected, click the No button to return to Figure 7-10, otherwise click Yes to continue.

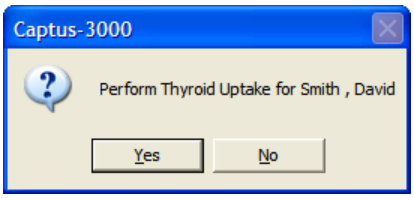


Figure 7-20

3. From this point onwards, the program begins a cycle, directing you through to measure the background counts, capsule or patient depending upon the protocol and the stage of uptake procedure. Simply follow the on-screen instructions. As the count progresses, the screen appears as shown in Figure 7-21. The live spectrum is displayed with time elapsed at the upper right corner.

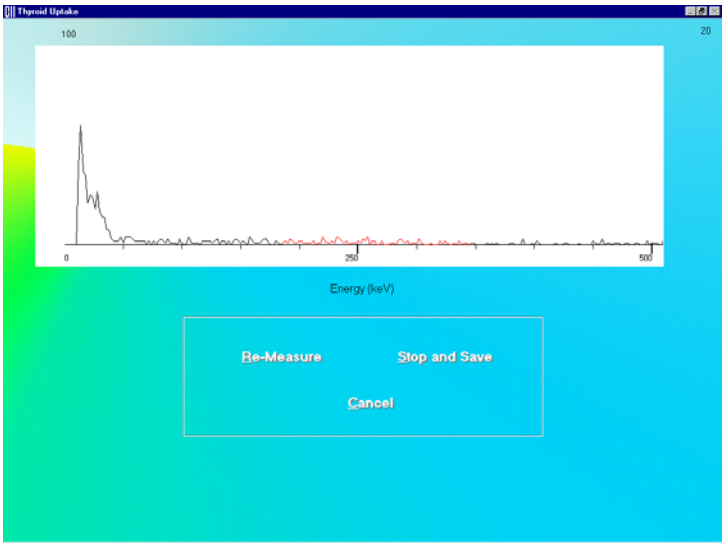


Figure 7-21

Note: *If the number of **Repetitions** is set to 2 in the protocol, you will be prompted to repeat each measurement twice (except for the capsule background). You may skip the second repetition, if desired.*

To know details about the data collection screen (Figure 7-21), refer to CHAPTER 3: GENERAL OPERATING INSTRUCTIONS; SECTION: MEASUREMENT SCREEN.

If a Dose with the same Lot Number, Activity, Calibration Date and Calibration Time has been previously measured, Figure 7-22 will appear. To use the previous Dose measurement, click Yes. To measure the Dose for this patient, click No.

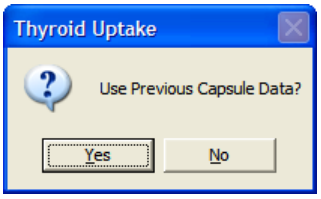


Figure 7-22

4. To cancel the measurements, there are two options:
   a. Before starting a measurement, a pop-up screen prompting you to make the measurement similar to Figure 7-23 will appear. To cancel the measurement, click the Cancel button on the pop-up screen.

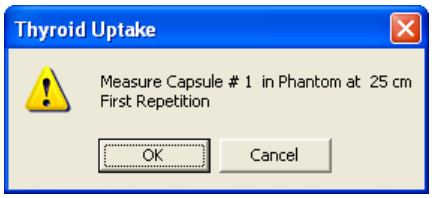


Figure 7-23

The screen then appears as shown in Figure 7-24. Click the Yes button or press *Alt+Y* to confirm abortion of the cycle. Data collected is discarded and the screen returns to that shown in Figure 7-17.

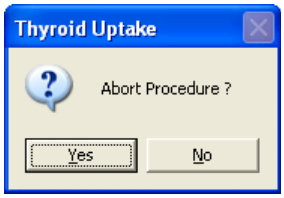


Figure 7-24

b. If you are in the process of making a measurement, then press the Cancel button on the Measurement screen.

   The screen then appears as shown in Figure 7-25. Click the Yes button or press *Alt+Y* to confirm abortion of the cycle. Data collected is discarded and the screen returns to that shown in Figure 7-17.

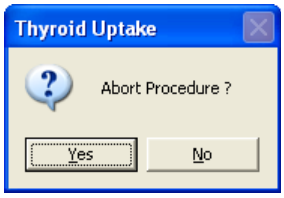


Figure 7-25

5. To restart measurements after canceling a previous measurement, click the Start Procedure button or press *Alt+S* on the Measurement screen.

6. Click the Exit button or press *Alt+E* after the cycle of measurements is completed, to return to Figure 7-1 Main Thyroid Uptake Screen.

   Note: *Once all the measurements are complete, the* Exit *button automatically becomes enabled.*

Administering Dose

1. Click the Administer Dose button or press *Alt+A* from Figure 7-1 Main Thyroid Uptake Screen. The screen appears as shown in Figure 7-26.

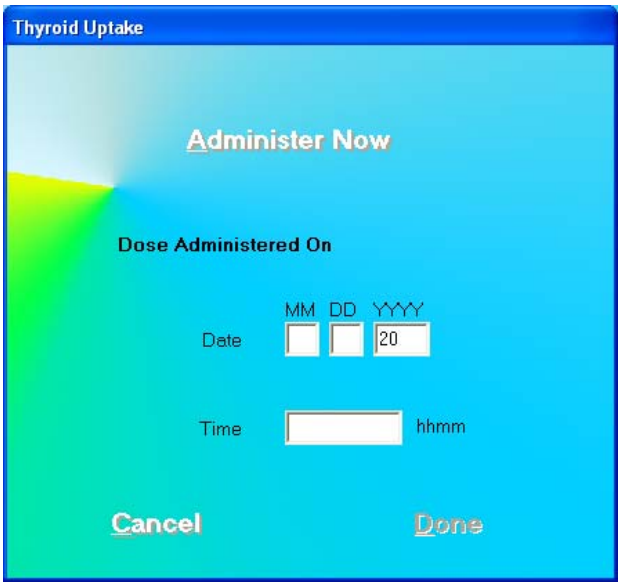


Figure 7-26

2. If the dose is to be administered now, click the Administer Now button or press *Alt+A* and the current date and time from the system will be automatically input.

   If the dose has been previously administered to the patient, then enter the date and time in the appropriate text box of when the dose was administered.

   Note: *The software uses this time to calculate the elapsed hours for the thyroid uptake measurement.*

3. Click the Done button to confirm Dose Administration or click the Cancel button to cancel Dose Administration and return to Figure 7-1 Main Thyroid Uptake Screen.

RESULTS

All uptake results for the selected patient appear in the **Patient Status** box on Figure 7-1 Main Thyroid Uptake Screen.

The results are calculated as follows:

$$\%\ \text{Thyroid Uptake} = \frac{(P - T)}{(C - B)} \times 100$$

where P = Patient neck count rate
T = Patient background count rate (thigh count)
C = Dose (standard) count rate
B = Room background count rate

When a pre-dose measurement has been recorded, then

P = Patient Neck count rate – Patient Background count rate
T = Pre-Dose Neck count rate – Pre-Dose Patient Background count rate

Patients Reports

1. To view or print a Patient Report, first select a patient by using the ↑ ↓ keys or *Page Up* and *Page Down* keys to move up or down in the patient list. If the list is long, the scroll bar is also available. To reach a particular patient, press the first letter of the patient name. Press the ↓ key if necessary, to go further down.

   Note: *To locate a patient record easily, the records are sorted by dose administration date, latest one first. You may change to sorting by patient name by clicking on* ***Name*** *header in the* ***Patient Directory*** *box. The field being used for sorting is denoted by an asterisk beside the header name.*

2. Then, click on the desired patient's name in the **Patient Directory** box on Figure 7-1 Main Thyroid Uptake Screen to select (highlight) that patient.

3. Click the

icon. A typical patient report screen appears as shown in Figure 7-27. It contains the patient's demographic data, measurement protocol, dosage information, count data and calculated results. If Normal Range values have been entered in the setup, normal ranges will also be printed. Any results outside of these limits, provided that the thyroid uptake was performed within 1 hour of the stated time in Normal Range setup, will be flagged as out of range.

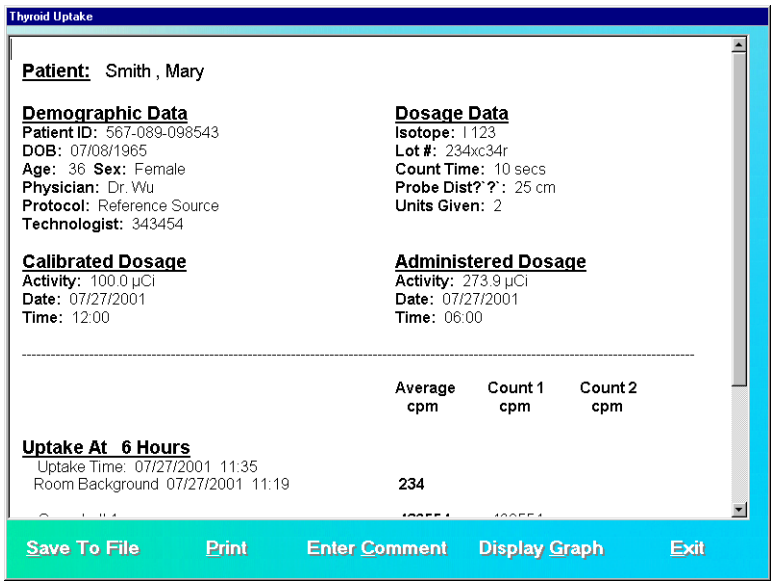


Figure 7-27

Using the scroll bars, scroll down the report screen to view the complete report. As shown in Figure 7-28, the results appear for each uptake time, depending on the protocol used. In this particular example, the background counts and the counts measured for two capsules, each capsule for two repetitions and their average is shown. This average is used for calculations. Next, the measured patient background counts and neck counts appear. The calculated uptake percentage at that uptake time appears in bold blue.

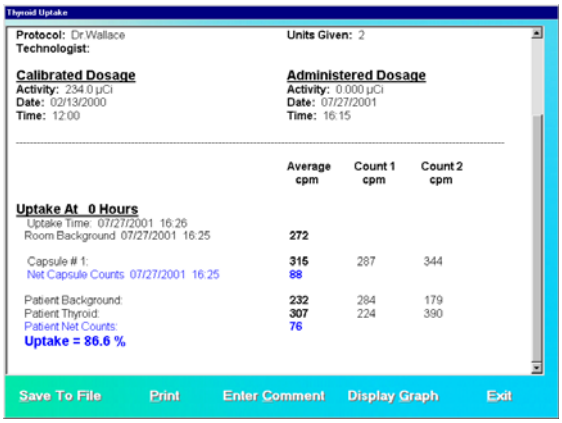


Figure 7-28

4. To save the report on the screen, click the Save to File button or press *Alt+S*. The Save As box appears as shown in Figure 7-29. Reports are saved as rich text format file (.rtf file) in Captus3000_2\Reports\ folder by default. These files can be opened using WordPad or Microsoft Word.

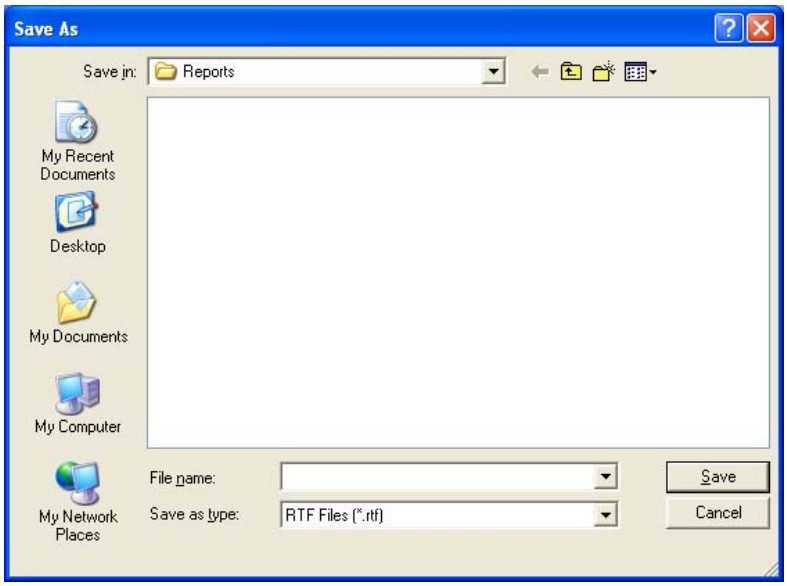


Figure 7-29

5. To print the report, click the Print button or press *Alt+P*.

6. To add comments to the report, click the Enter Comment button or press *Alt+C*. The screen appears as shown in Figure 7-30. Refer to CHAPTER 3: GENERAL OPERATING INSTRUCTIONS; SECTION: ADD COMMENTS SCREEN.

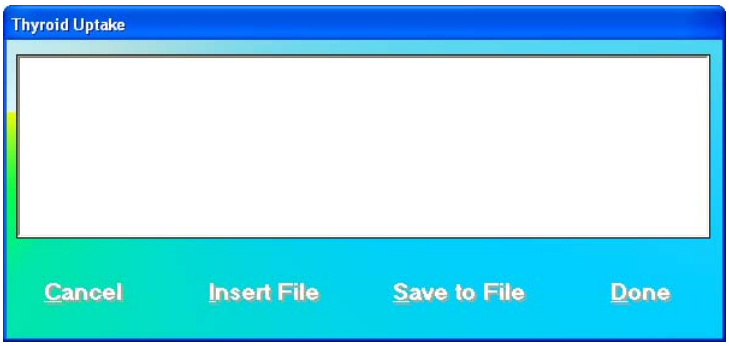


Figure 7-30

7. To view a graph of calculated uptake percentage vs. uptake time, click the Display Graph button or press *Alt+G*.

   The screen appears as shown in Figure 7-31. Click the Exit button or press *Alt+E* to exit to the report screen.

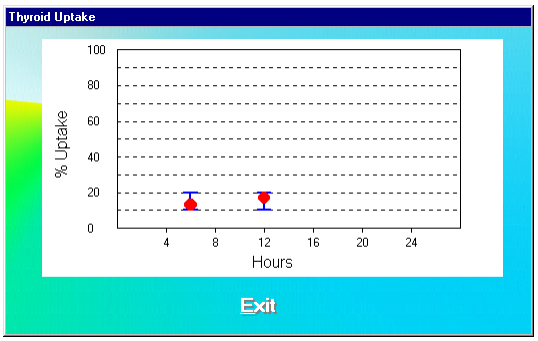


Figure 7-31

8. To exit to Figure 7-1 Main Thyroid Uptake Screen, click the Exit button or press *Alt+E*.

QUICK TIPS:

- To quickly print a patient report, click on the patient in the **Patient Directory** box and click the Print icon. The printout will have patient demographic data, dosage data and a summary of the results with a graph of Uptake % against Hours. Below that, it will also print detailed data of counts measured at every step.

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CHAPTER 8

WIPE TESTS

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SELECTING ISOTOPES FOR WIPE TEST **8-4**
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CAUTION: To ensure optimum performance of CAPTUS 3000, before using the **Wipe Test** module, perform the System Setup Procedures as outlined in CHAPTER 4: GENERAL SETUP.

INTRODUCTION

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

To access the Wipe Test functions, click the Wipe Test button or press *Alt+W* on Figure 8-1 Main Screen.

Figure 8-1 Main Screen

The Wipe Test screen appears, as shown in Figure 8-2 Wipe Test Main Screen.

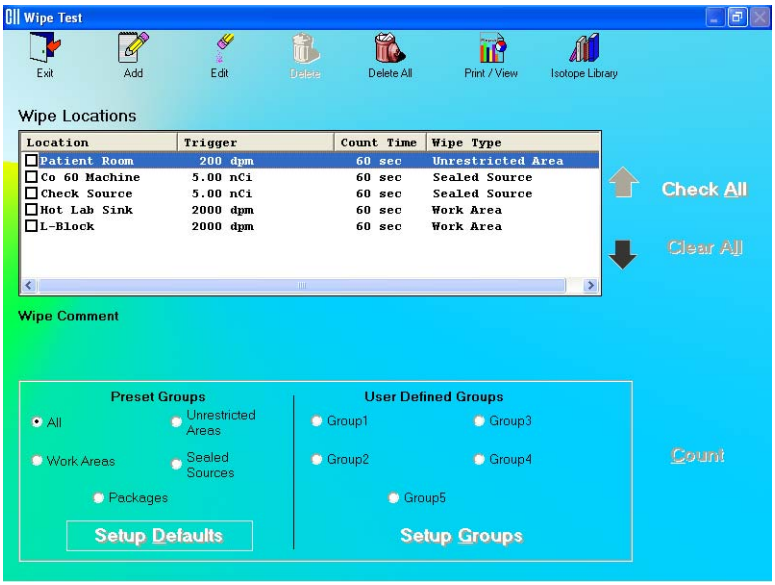


Figure 8-2 Wipe Test Main Screen

The **Wipe Locations** box shows a history of the tests performed to date and will be empty if no wipes have been performed previously. Each record appears with the location of testing, trigger level, counting time used in its measurement and the wipe type (location) (page 8-3). By default, the first record is selected. When counting is started, the wipe tests are measured in the same order as they appear in the **Wipe Locations** box. This order can be changed using the and arrows on the right side of the box. The icons at the top of the screen allow you to add, edit, delete and print/view data. The last icon provides access to the

Isotope Library. The bottom portion of the screen pertains to the setup parameters for measurement and organization of wipe locations into groups.

This will be referred to as the Wipe Test Main screen. To return to Figure 8-1 Main Screen from Figure 8-2 Wipe Test Main Screen, click the

icon or press the *Esc* key.

QUICK STEP GUIDE FOR WIPE TEST

			Page
1.	Setup default parameters	**SETTING UP DEFAULTS**	8-3
2.	Select isotopes for measurement	**SELECTING ISOTOPES**	8-4
3.	Add wipe locations	**ADDING WIPE LOCATIONS**	8-6
4.	Organize wipe locations into groups	**GETTING ORGANIZED**	8-7
5.	Select a group of wipe locations to work with	**SELECTING WIPES…**	8-9
6.	Make measurements	**MAKING MEASUREMENTS**	8-12
7.	View and print results	**VIEWING AND PRINTING…**	8-18

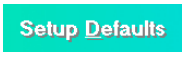
SETTING UP DEFAULTS

All wipe locations belong to one of the following four pre-set groups or types:

- **Work Areas** places where radioactive material is handled, e.g. hot labs, medicine administration rooms, storage rooms
- **Unrestricted Areas** places of free access e.g. reception desk, waiting rooms
- **Sealed Sources** devices that contain a sealed radioactive source
- **Packages** arriving or leaving shipments of radioactive material

Each group has default values set for **Trigger Level** (threshold activity) and **Counting Time** (live time duration for count collection). All wipe locations belong to one of the above groups, which automatically sets the **Trigger Level** and **Counting Time** for the wipe location. These values are also set to a default for background, which is common for all the wipe locations. In addition to these values, **Full Spectrum Efficiency** is set to an optimum number, 65% (Refer to **ISOTOPE EFFICIENCY** on page 8-29 for more information).

To view or change the Trigger Level, Counting Time or the Full Spectrum Efficiency default values,

1. Click the 

button or *Alt+D* at the bottom of Figure 8-2 Wipe Test Main Screen. Figure 8-3 Wipe Test Setup Screen will appear.

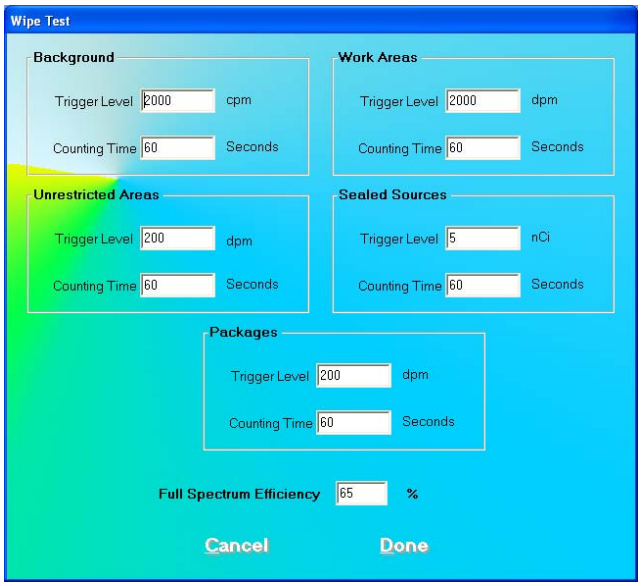


Figure 8-3 Wipe Test Setup Screen

2. To change any values, click in the text box or use the *Tab* key to move from one text box to another and input the appropriate data.

3. Click the Done button to save changes or click the Cancel button to cancel the changes and return to Figure 8-2 Wipe Test Main Screen.

SELECTING ISOTOPES FOR WIPE TEST

1. Click the Isotope Library icon to view the Isotope Library. Figure 8-4 Isotope Library Screen will appear. A list is shown of isotopes with their half-lives, peak energies and the Well and Probe efficiencies for each isotope, if available.

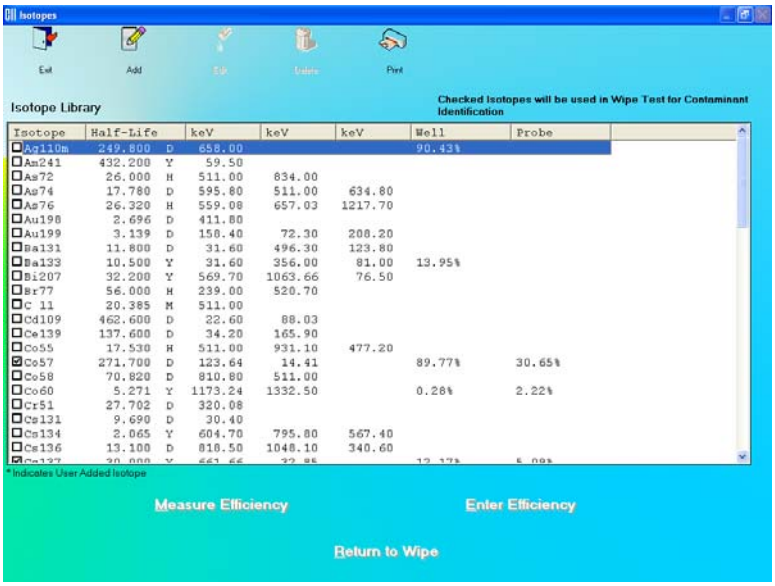


Figure 8-4 Isotope Library Screen

2. To select the isotopes to be detected in the Wipe Test, click in the check box to the left of the isotope name in the **Isotope Library** box on Figure 8-4 Isotope Library Screen as shown. A check should appear in the check box to indicate the isotope has been selected. To deselect an isotope, click in its check box again and the check will be removed from the check box. Select all the isotopes you would like to be identified by the Wipe Test.

   Note: *If all the isotopes are selected for identification, the automatic peak finding program will report any isotope whose peak keV is within ±5% of the energy listed in the Isotope Library. Since at least 76 isotopes are stored in memory, selecting all isotopes does not provide a useful interpretation of the Wipe Test results.*

   The recommended procedure for Wipe Test identification is to select only those isotopes that may be found in your facility.

   For more details about the Isotope module functions, refer CHAPTER 6: ISOTOPES.

3. Click the Return to Wipe button or press *Alt+R* to return to Figure 8-2 Wipe Test Main Screen.

ADDING WIPE LOCATIONS TO PRESET GROUPS

Note: *All fields in **bold** are required before the* Done *button becomes active.*

1. Click the Add icon on Figure 8-2 Wipe Test Main Screen. Figure 8-5 Add Wipe Location Screen will appear.

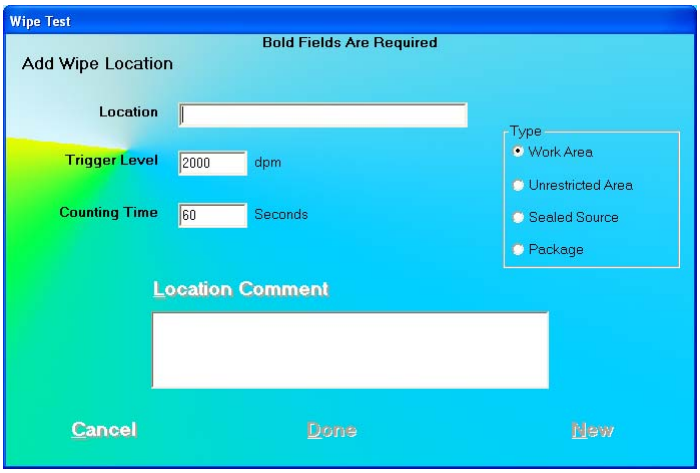


Figure 8-5 Add Wipe Location Screen

2. Input the wipe location name in the **Location** text box (e.g. Patient Waiting Area or Lab Room No. 421, etc.). Any combination of up to 32 alphanumeric characters and spaces may be used.

3. To select a wipe type (Preset Group), click the appropriate radio button in the **Type** frame. Changing the **Type** will automatically apply **Trigger Level** and **Counting Time** according to values entered in Figure 8-3 Wipe Test Setup Screen.

4. To change the **Trigger Level** or **Counting Time** for this wipe location, click in the appropriate text box and type in the new number.

5. To add comments about the wipe location, click the Location Comment button or press *Alt+L*.

   Note: *The comments entered will be displayed in the **Wipe Comment** box immediately below the **Wipe Locations** box on Figure 8-2 Wipe Test Main Screen when the location is selected. The comments will also appear in the Wipe Test results.*

6. To add more wipe locations, click the New button or press *Alt+N*.

7. Click the Done button or press *Alt+D* to save changes or click the Cancel button or press *Alt+C* to cancel the changes and return to Figure 8-2 Wipe Test Main Screen.

QUICK TIPS:

- To move between data fields use the *Tab* key, and to select Type of wipe location use ↓ or ↑ keys.
- To better organize your wipe test routine, sort the added locations into groups depending on their functionality. Refer to ADDING WIPE LOCATIONS TO USER DEFINED GROUPS below for details.

ADDING WIPE LOCATIONS TO USER DEFINED GROUPS

To organize routine measurements, group the Preset Group wipe locations according to your needs. You may then perform various functions on any set of wipe locations or group as defined by you.

1. Click the Setup Groups button or press *Alt+G* on Figure 8-2 Wipe Test Main Screen. Figure 8-6 will appear.

Figure 8-6 Setup Groups Screen

2. Click in the **Select Group** drop-down list box and click on a group to define or make changes. The **Selected Wipes** box indicates any existing wipe locations that are included in that group. You may define up to five different groups.

3. To add wipe locations to the selected group,
   a. Click on the wipe location you want to add in the **Wipes Not Selected** box.

   Note: *To select a range of locations, click on the first location. Then, hold down the Shift key while clicking on the last location. Or click and hold the mouse button*

down on the first location in the range and then drag your mouse to the last location and release the button.

To make non-contiguous selections, press the Ctrl key while clicking the mouse on locations to be selected.

b. Click the Add to Group button or press *Alt+A*.

4. To delete wipe locations in the selected group,
   a. Select locations in the **Selected Wipes** box.

Note: *To select a range of locations, click on the first location. Then, hold down the Shift key while clicking on the last location. Or click and hold the mouse button down on the first location in the range and then drag your mouse to the last location and release the button.*

To make non-contiguous selections, press the Ctrl key while clicking the mouse on locations to be selected.

   b. Click the Remove From Group button or press *Alt+R*.

5. To change the name of the selected group,
   a. Click the Change Group Name button or press *Alt+N*. Figure 8-7 will appear. Type in the new name up to 10 alpha-numeric characters.

Figure 8-7

   b. Click the Done button to save changes or click the Cancel button to cancel the changed name and return to Figure 8-6 Setup Groups Screen.

6. Click the Done button on Figure 8-6 Setup Groups Screen to save changes or click the Cancel button to cancel the changes and return to Figure 8-2 Wipe Test Main Screen.

QUICK TIPS:

- You can group wipe locations according to the frequency with which they

are performed or by the technician's share of duties etc. (e.g. wipe tests done daily or wipe tests done by "Tom" can be grouped together).

- Changing the group name is recommended to reflect the kind of group.

EDITING WIPE LOCATION INFORMATION

1. From Figure 8-2 Wipe Test Main Screen, select a group in the **Preset Groups** or **User Defined Groups** frame by clicking in its radio button to view only those wipe locations that belong to that group. For example, selecting the Work Areas group will display all locations entered with Type as Work Area. Selecting Group 2 will show all locations that you added to Group 2. Selecting ALL will show all the existing wipe locations in all the groups.

2. Click inside the **Wipe Locations** box to make it active.

3. To select a wipe location for editing, use the ↑ ↓ keys or *Page Up* and *Page Down* keys to move up or down in the wipe location list. If the list is long, the scroll bar is also available. To reach a particular location, press the first letter of the location name. Press the ↓ key if necessary, to go further down.

   In Figure 8-8 below, Tech187 group is selected and only wipe tests belonging to that group appear. To see all wipe locations, select **All** in the **Preset Groups** frame.

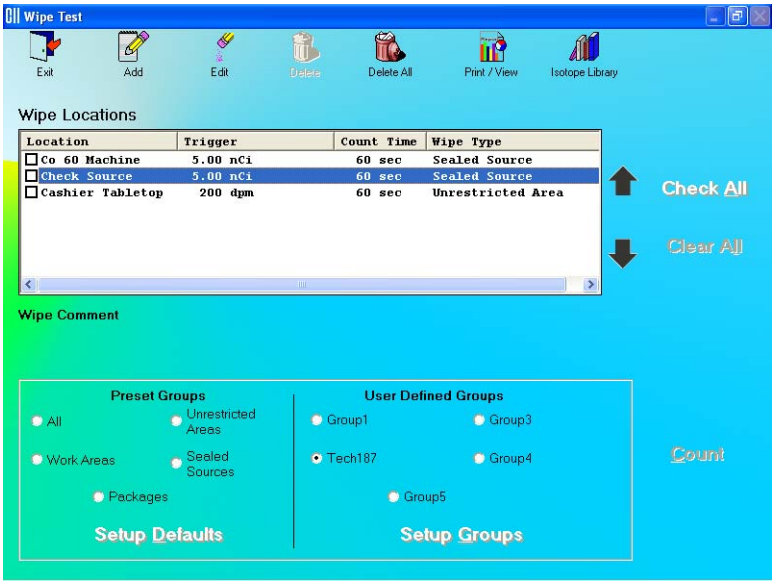
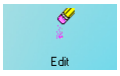


Figure 8-8

4. Click the 

icon. Figure 8-9 Edit Wipe Location Screen will appear.

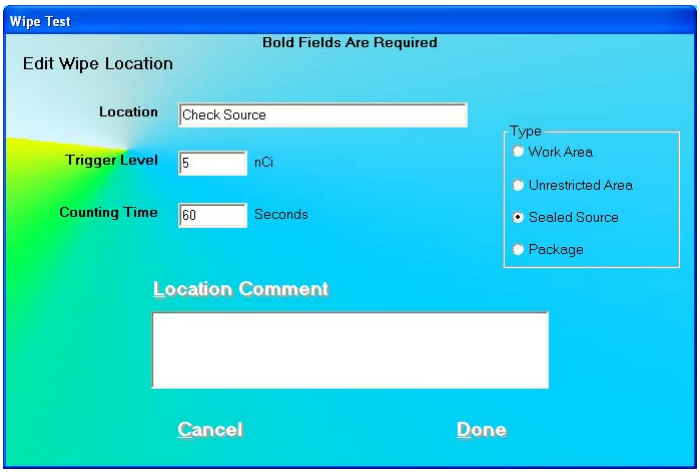


Figure 8-9 Edit Wipe Location Screen

5. Click in the appropriate text box or **Type** frame radio button. Type over the existing information.

   Note: *To move between data fields use the Tab key, and to select Type of wipe location use ↑ or ↓ keys.*

6. To edit or add comments, click the Location Comment button.

7. Click the Done button to save changes or click the Cancel button to cancel the changes and return to Figure 8-2 Wipe Test Main Screen.

DELETING WIPE TEST LOCATION

Note: *If you wish to save Wipe Location information before deleting, refer to CHAPTER 14: ARCHIVE.*

1. Select a group in the **Preset Groups** or **User Defined Groups** frame by clicking in its radio button to view only those wipe locations that belong to that group.

2. Click inside the **Wipe Locations** box to make it active.

3. To select a wipe location for deletion, use the ↑ ↓ keys or *Page Up* and *Page Down* keys to move up or down in the wipe location list. If the list is long, the scroll bar is also available. To reach a particular location, press the first letter of the location name. Press the ↓ key if necessary, to go further down.

4. To select one or more wipe locations for deletion, click in the check box to the left of the wipe location name in the **Wipe Locations** box on the Main Wipe Test Screen as shown in Figure 8-10. A check should appear in the check box to indicate it has been selected.

To deselect a wipe location, click in the check box again and the check will be removed from the check box.

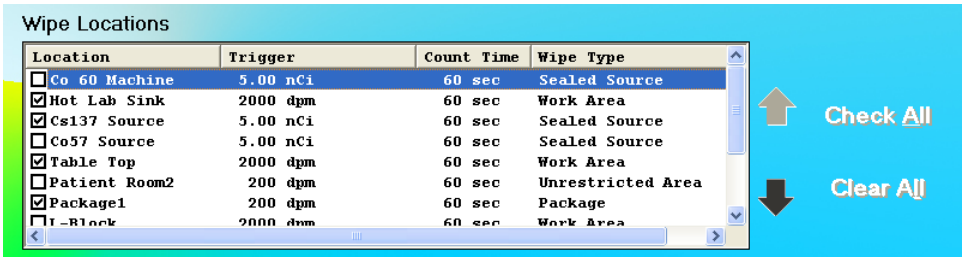
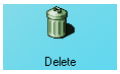


Figure 8-10

5. Click the 

icon. Figure 8-11 will appear.

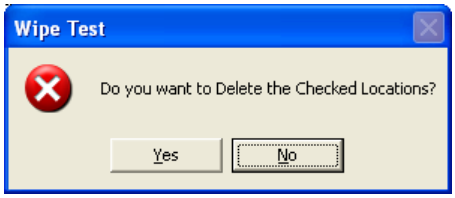
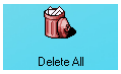


Figure 8-11

6. Click the Yes button to confirm the deletion. Otherwise, click the No button or press the *N* key.

7. To delete all the Wipe Locations at once, click the 

icon. You will be prompted to confirm the deletion. Figure 8-12 will appear.

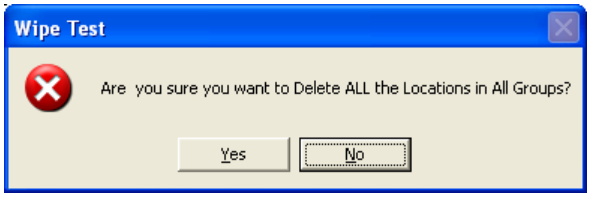


Figure 8-12

8. Click the Yes button or press the *Y* key to confirm the deletion. Otherwise, click the No button or press the *N* key.

QUICK TIPS:

- Select ALL in Preset Groups to be able to see all wipe locations.
- To check all wipe locations, click the Check All button or press *Alt+A*.
- To deselect all wipe locations, click the Clear All button or press *Alt+L*.

MAKING MEASUREMENTS

CAUTION: Calibration is recommended before making any measurements. Refer to CHAPTER 5: QUALITY ASSURANCE TESTS; SECTION: AUTO CALIBRATION.

Note: *A wipe location must be created before making any measurements. Refer to ADDING WIPE LOCATIONS TO PRESET GROUPS on page 8-6 and ADDING WIPE LOCATIONS TO USER DEFINED GROUPS on page 8-7.*

For an isotope to be identified in the wipe test, the isotope must have been selected in the Isotope Library. Refer to SELECTING ISOTOPES FOR WIPE TEST *on page 8-4.*

The default settings for trigger level and counting time must be set before making any measurements. Refer to EDITING WIPE LOCATION INFORMATION on page 8-9.

1. Select a group in the **Preset Groups** or **User Defined Groups** frame by clicking in its radio button to view only those wipe locations that belong to that group.

2. Click inside the **Wipe Locations** box to make it active.

3. To select a wipe location for measurement, use the ↑ ↓ keys or *Page Up* and *Page Down* keys to move up or down in the wipe location list. If the list is long, the scroll bar is also available. To reach a particular location, press the first letter of the location name. Press the ↓ key if necessary, to go further down.

   For example, in Figure 8-13 below, all Group2 (a user defined group) locations are selected for measurement.

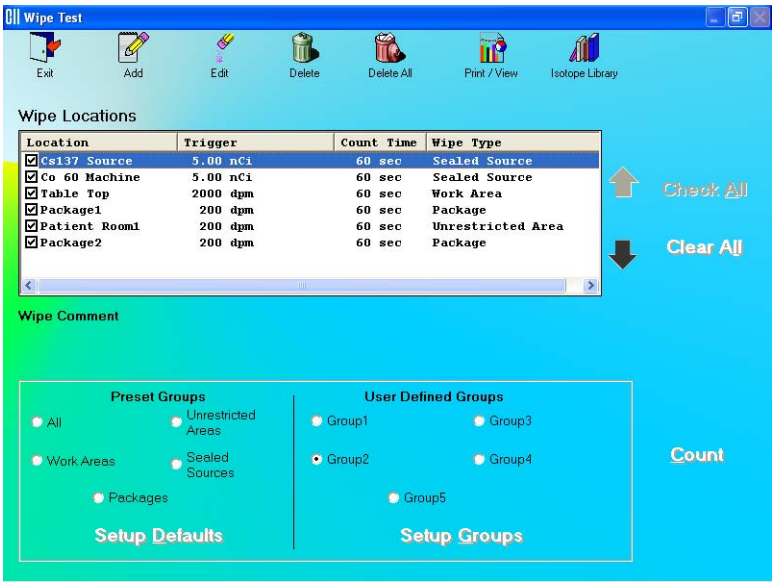


Figure 8-13 Main Wipe Test Screen

4. To begin the measurements, click the Count button or press *Alt+C*. Figure 8-15 Wipe Test Measurement Screen will appear.

   Note: *If calibration has not been performed for the current day, you will be prompted with the screen as shown in Figure 8-14. After the calibration is complete, the program will return to Figure 8-15 Wipe Test Measurement Screen.*

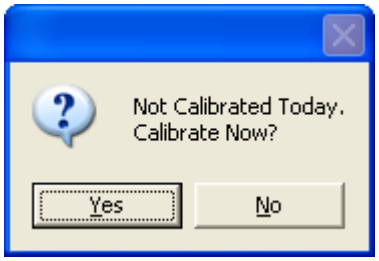


Figure 8-14

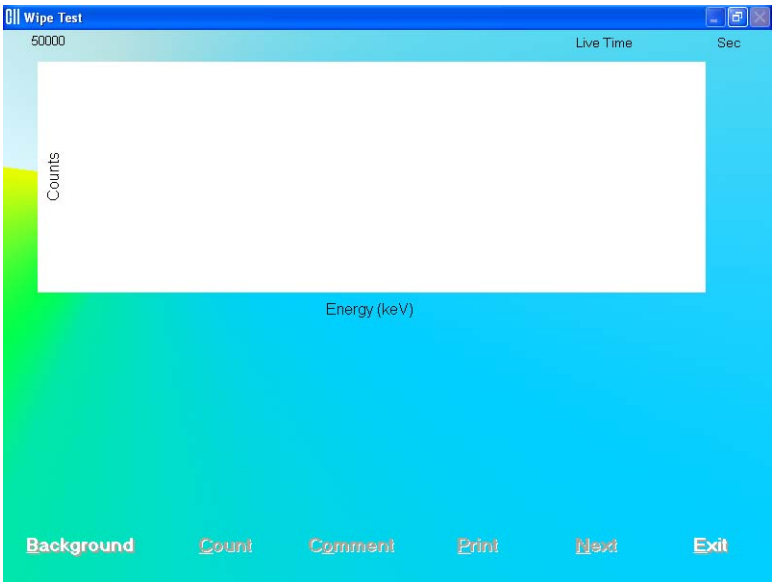


Figure 8-15 Wipe Test Measurement Screen

5. Click the Background button or press *Alt+B* to measure background counts. Figure 8-16 will appear.

   Note: *Before counts can be measured on any wipe location, Background counts need to be measured everyday at least once.*

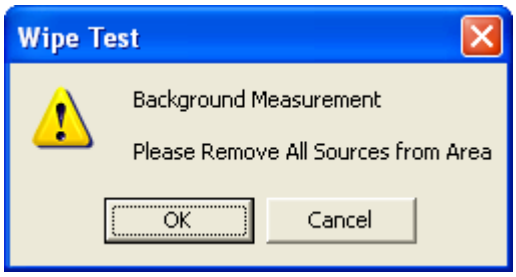


Figure 8-16

   To begin counting, verify that there are no radioactive sources nearby and click the OK button. To abort the measurement, click the Cancel button.

6. The screen appears as shown in Figure 8-17. The live spectrum is displayed with elapsed time shown at the upper right corner.

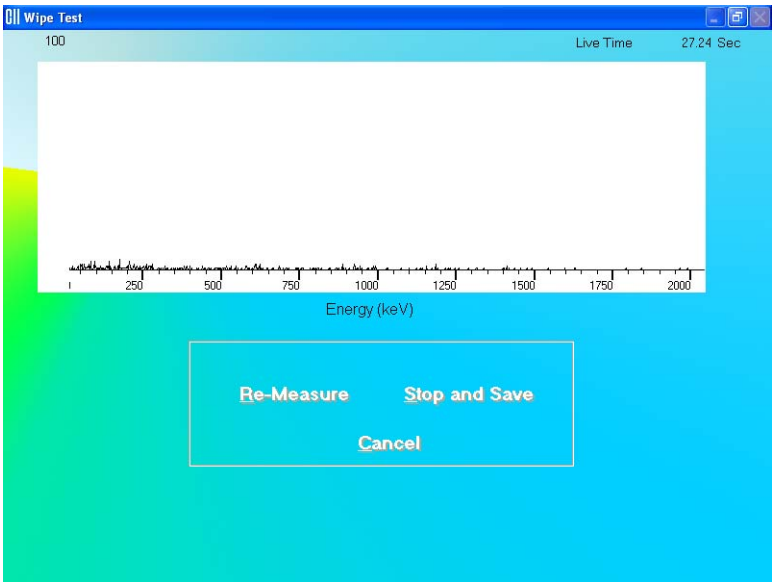


Figure 8-17

To stop the counting midway and begin counting again, click the Re-Measure button or press *Alt+R*.

To stop the counting midway and save collected data and move to the next step, click the Stop and Save button or press *Alt+S*.

To stop the counting midway and quit without saving, click the Cancel button or press *Alt+C*. The abort procedure screen will appear.

After count collection is completed, the screen appears as shown in Figure 8-18.

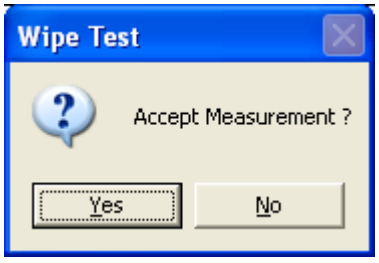


Figure 8-18

To accept the measurement and continue with the next step, click the Yes button or press the *Y* key. To discard and recount the current measurement, click the No button or press the *N* key.

7. Once the background measurement is completed, the spectrum and the background total count are displayed as shown in Figure 8-19.

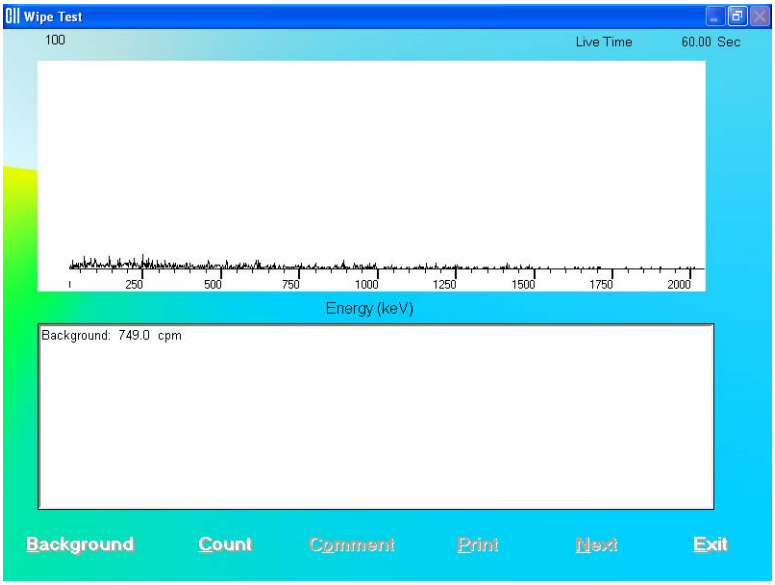


Figure 8-19

8. To begin counting the wipe location, click the Count button or press *Alt*+*C*. Figure 8-20 will appear (the location *Check Source* is shown in the example).

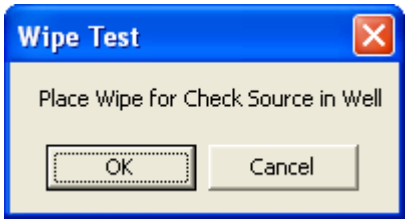


Figure 8-20

9. Place the appropriate wipe in the Well and click the OK button. The screen appears similar to that shown in Figure 8-17 above while counts are being collected.

10. Once measurements are accepted, the spectrum and the results are displayed similar to that shown in Figure 8-21.

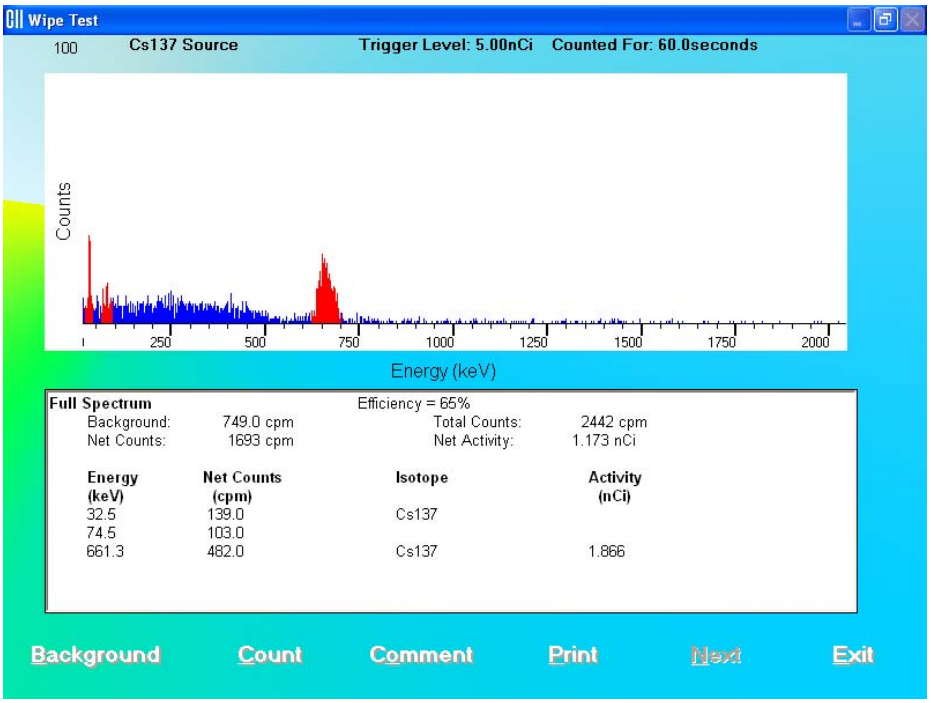


Figure 8-21

11. To add comments about the counts measured, click the Comment button or press *Alt+O*.

12. To print the results, click the Print button or press *Alt+P*.

13. If multiple wipes were selected, click the Next button or press *Alt+N* to count the next wipe. The order in which wipes are counted is the same as listed in the Main Wipe Test Screen.

14. To exit counting, click the Exit button or press *Alt+E*.

Note: *The data is stored permanently. To view data after exiting counting, click the*

icon on Figure 8-13 Main Wipe Test Screen to see the Wipe History.

Results

The results of the count measurement include Background and Total Counts counted for the wipe in cpm (counts per minute). Net Counts (Total Counts – Background) and Net Activity are calculated for the wipe.

Next, the values for Energy, Net Counts, Isotope and Activity are shown for each peak (red region) in the spectrum. The Isotope and Activity corresponding to each peak will appear depending on the data in the Isotope Library. If the isotopes have been selected for use as

wipes in the Isotope Library, they will be identified in the spectrum. If those isotopes have an efficiency value stored in the Isotope Library, its value will also be displayed.

The wipe test results will automatically be saved to the database.

An example result screen is shown in Figure 8-22. The red HIGH shown against certain values is displayed when the net counts exceed the Trigger Level value in Setup.

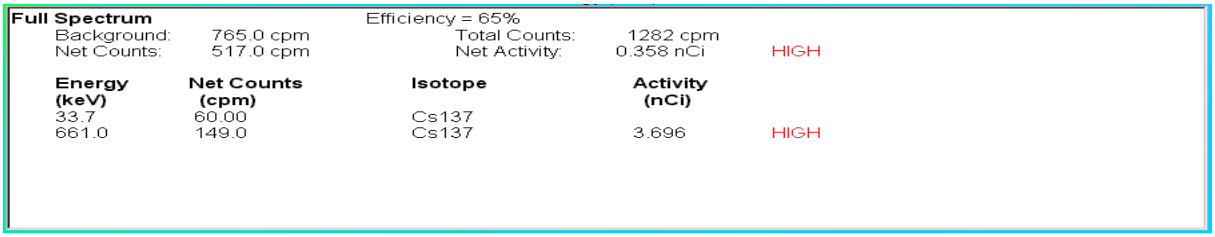


Figure 8-22

VIEWING AND PRINTING RESULTS

Click the

icon on Figure 8-13 Main Wipe Test Screen. Figure 8-23 Wipe Test Search Window will appear.

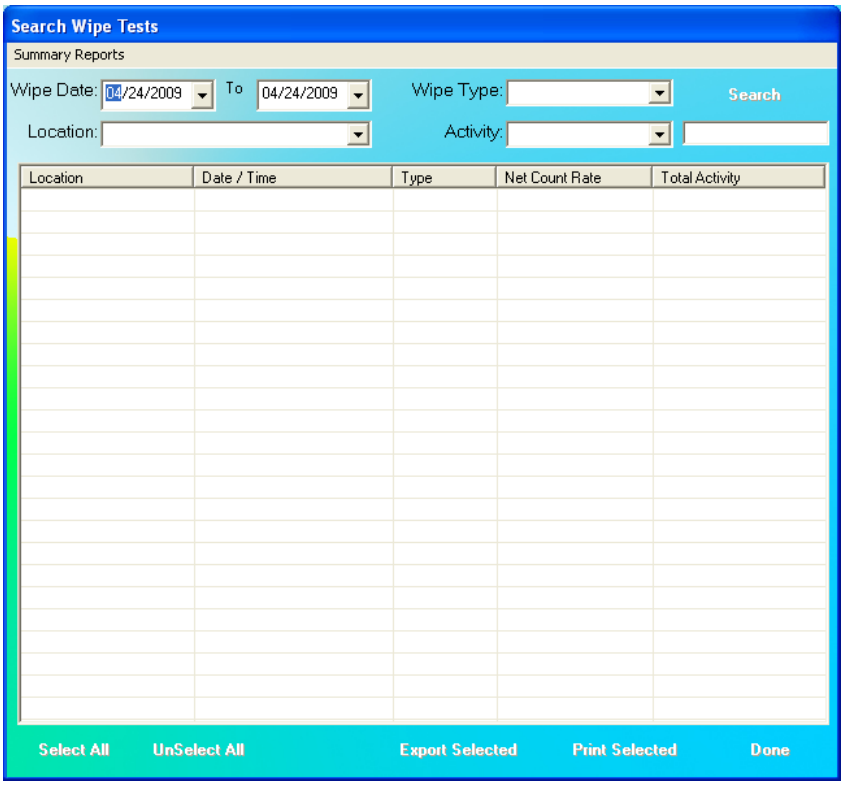


Figure 8-23 Wipe Test Search Window

The Wipe Test Search window allows users to search for certain wipe test results, export selected wipes in Excel format and print selected wipes to the system printer. The Summary Reports button allows printing of selected reports.

Search

Wipes test results can be searched by using the specified criteria as follows:

Note: *Fields that are left blank are not used when the* Search *is clicked. The minimum search requirement is the Wipe Date/To range.*

- **Wipe Date/To** This allows setting of a date or a range of dates that the user is interested in. The date can be selected by clicking the drop-down arrow and choosing the date from the pop-up calendar as shown below or by directly typing the date in using the number keys in conjunction with the arrow keys.

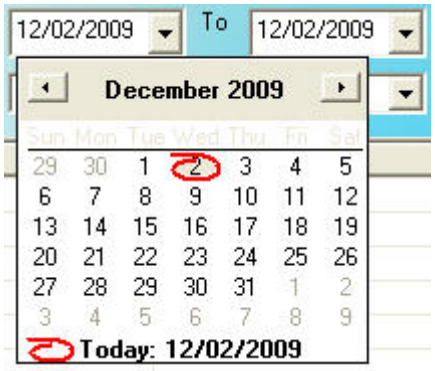


Figure 8-24

- **Location** This allows setting of the Wipe Location that the user is interested in finding within the specified date range. The Location is selected by clicking the drop-down arrow and choosing the desired location from the drop-down list.

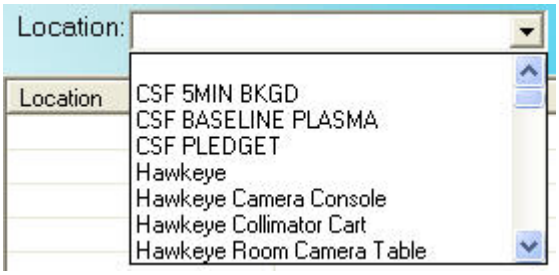


Figure 8-25

- **Wipe Type** This allows setting of Wipe Type that the user is interested in finding within the specified date range. The Wipe Type is selected by clicking the drop-down arrow and choosing the desired Wipe Type from the drop-down list.

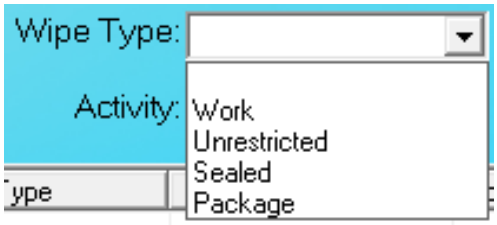


Figure 8-26

- **Activity** This allows setting of an activity level that the user is interested in finding within the specified date range. The activity level is set by clicking the drop-down arrow and choosing the desired comparison phrase from the drop-down list. If *Above or Equals* or *Below or Equals* is chosen, then the desired activity level is entered the in the text box to the right. If *Above Trigger Level* is chosen, then the search will be based on the defined Trigger Levels.

Figure 8-27

After setting the desired criteria, click the Search button. If data are available for the set criteria, the results will be displayed in the **Wipe Test Search Results** box. If no data are available for the selected criteria, the following message will appear:

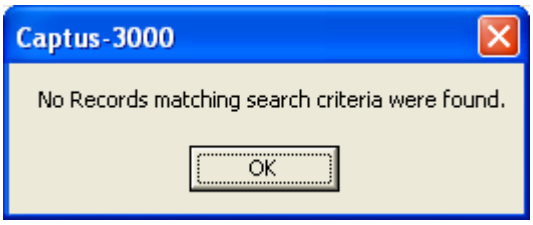


Figure 8-28

Refine the search criteria until the desired results are displayed. In the example below, the Wipe Date/To range and Location are specified.

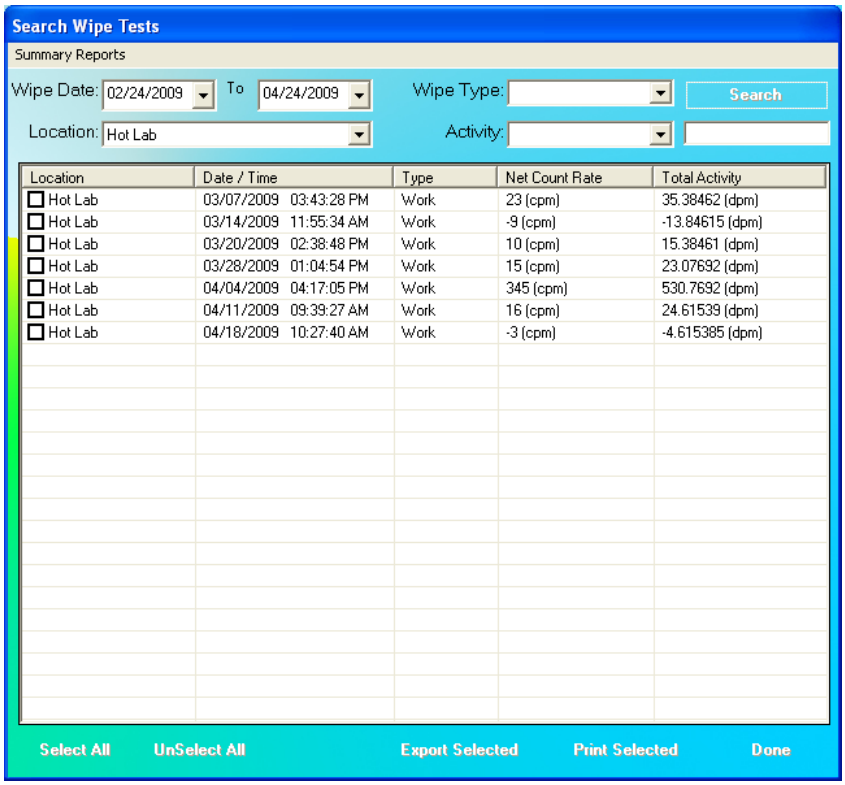


Figure 8-29 Wipe Test Search Window with Results

The **Wipe Test Search Results** box displays the wipe location, wipe date/time, wipe type, net count rate and total activity. By default, searched results are sorted by the wipe date/time, oldest one first. The sort order can be changed by clicking on the column headers in the **Wipe Test Search Results** box.

Viewing Wipe Test Data Selectively

The details for a specific Wipe Test can be viewed by double-clicking on the desired data in the **Wipe Test Search Results** box. Figure 8-30 Selected Wipe Test Details Window will appear showing the details of the selected Wipe Test.

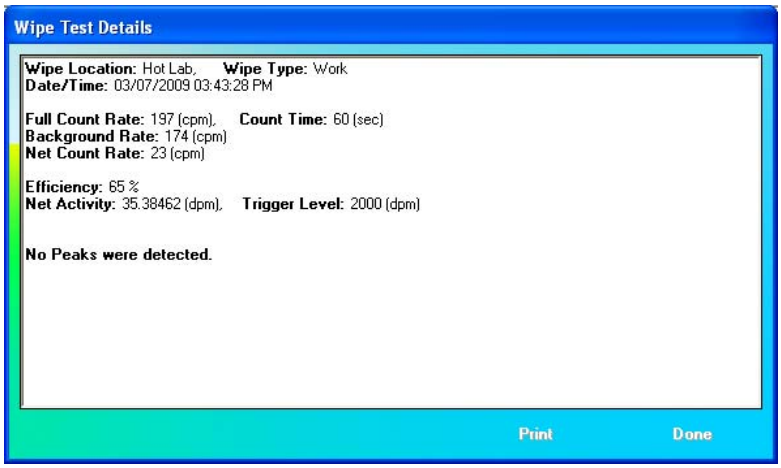


Figure 8-30 Selected Wipe Test Details Window

Click the Print button to print the details to the system printer or click the Done button to return to Figure 8-29 Wipe Test Search Window with Results.

Selecting Results

To select specific results for exporting or printing, click in the check box to the left of the result location name in the **Wipe Test Search Results** box on Figure 8-29 Wipe Test Search Window with Results. A check should appear in the check box to indicate it has been selected. To deselect a specific result, click in the check box again and the check will be removed from the check box.

To select all of the results, click the Select All button. A check should appear in all of the check boxes to indicate that all results have been selected.

To unselect all of the results, click the UnSelect All button. All checks should be removed from all of the check boxes to indicate that all results have been de-selected.

Exporting Wipe Test Results

Any or all of the displayed Wipe Test search results may be saved to a comma-separated value (.csv) file and may be recalled for future evaluation and use. The file can be opened using a spreadsheet program such as Microsoft Excel.

Note: *It is recommended that the* ***Save as type:*** *is not changed from CSV Files (*.csv)*

1. Select the result or results to be exported as described above.

2. Click the Export Selected button to export the selected result(s). Figure 8-31 Export Wipe Test Dialog Window will appear.

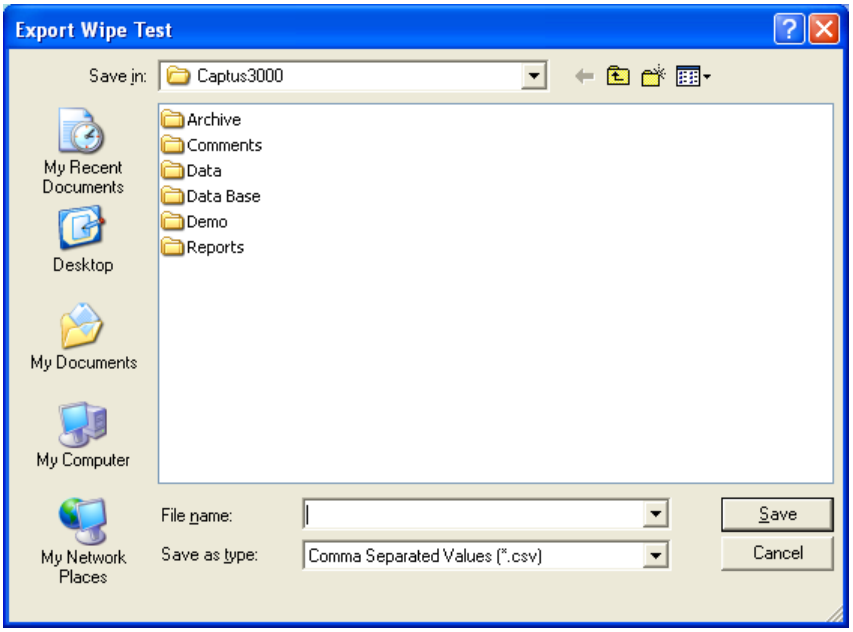


Figure 8-31 Export Wipe Test Dialog Window

3. Input a file name and click the Save button. The file can then be opened in a spreadsheet program.

Printing Wipe Test Results

Any or all of the displayed Wipe Test search results may be printed to the system printer.

1. Select the result or results to be printed as described above.
2. Click the Print Selected button.

QUICK TIPS:

- Sort the results to organize your Wipe Test data before exporting or printing.
- To return to the Figure 8-13 Main Wipe Test Screen, click the Done button.

Exiting Search

Click the Done button on Figure 8-23 Wipe Test Search Window to return to Figure 8-13 Main Wipe Test Screen.

Summary Reports

To access the Summary Reports module, click the Summary Reports menu bar button on Figure 8-32 Wipe Test Search Window.

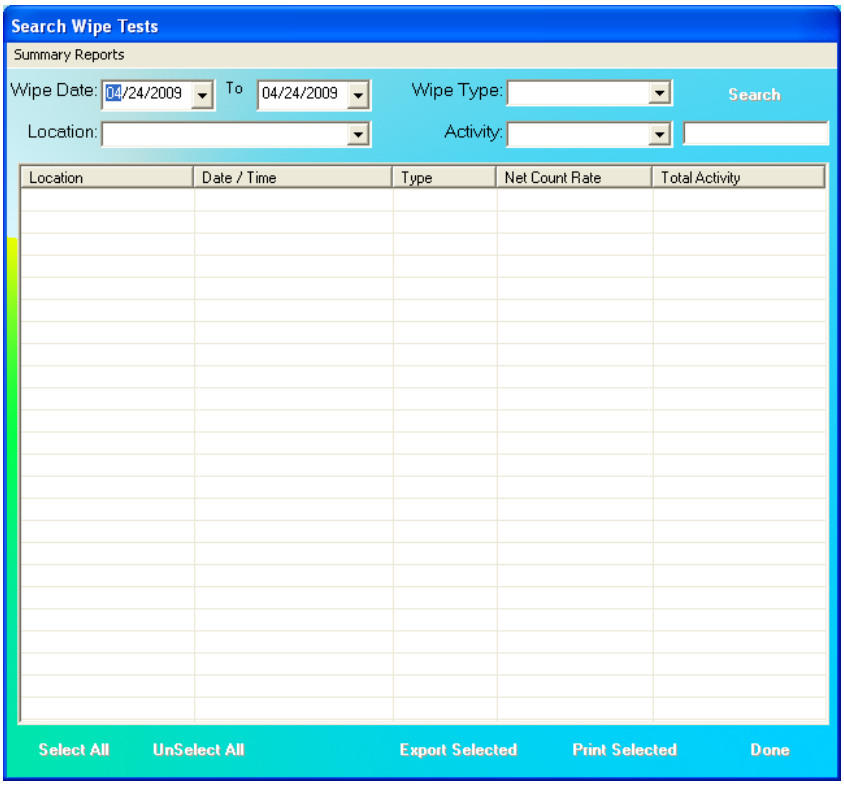


Figure 8-32 Wipe Test Search Window

Figure 8-33 Wipe Test Summary Reports Window will appear.

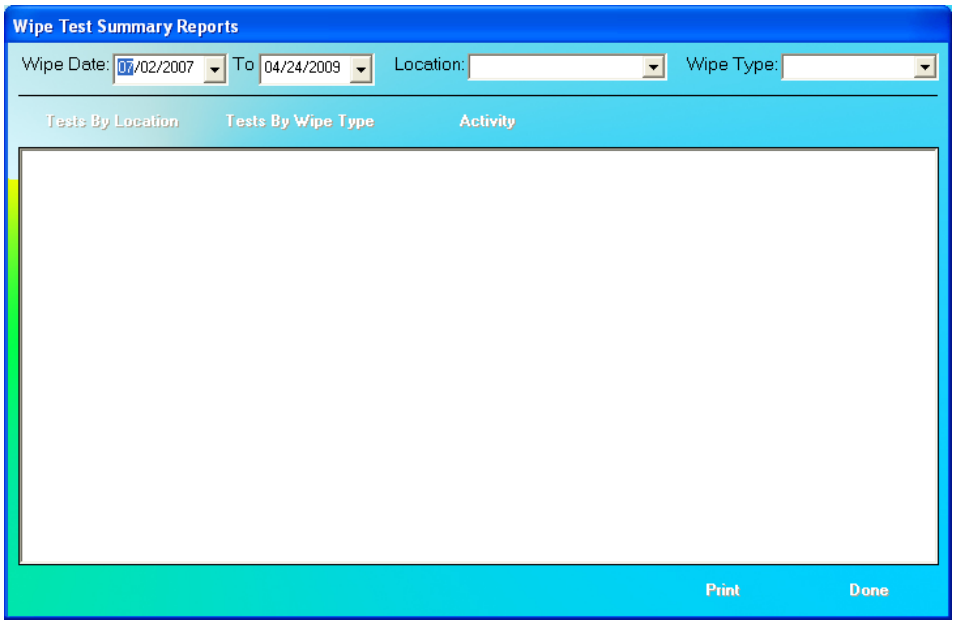


Figure 8-33 Wipe Test Summary Reports Window

Wipes Test Summary Reports can be displayed by using the specified criteria as follows:

- **Wipe Date/To** This allows setting of a date or a range of dates that the user is interested in. The date can be selected by clicking the drop-down arrow and choosing the date from the pop-up calendar as shown below or by directly typing the date in using the number keys in conjunction with the arrow keys.

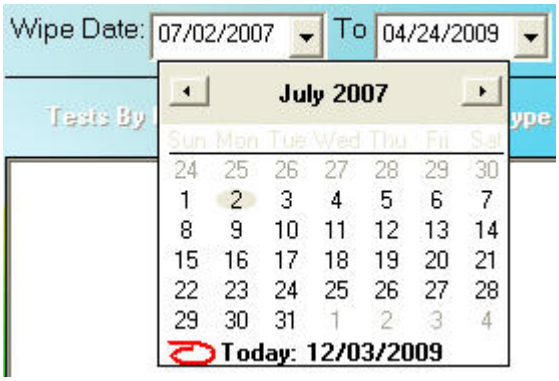


Figure 8-34

Note that the defaults displayed dates range from the date the first Wipe Test was performed to the date the last Wipe Test was performed.

- **Location** This allows setting of Wipe Location that the user is interested in finding within the specified date range. The Location is selected by clicking the drop-down arrow and choosing the desired location from the drop-down list.

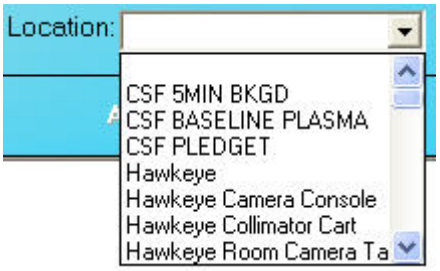


Figure 8-35

- **Wipe Type** This allows setting of Wipe Type that the user is interested in finding within the specified date range. The Wipe Type is selected by clicking the drop-down arrow and choosing the desired Wipe Type from the drop-down list.

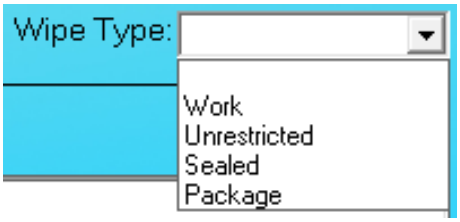


Figure 8-36

After setting the desired criteria, click the one of the following buttons.

Note: *Fields that are left blank are not used when the any of the following buttons are clicked. The minimum search requirement is the Wipe Date/To range.*

– Clicking this button will display a list showing the number of tests by wipe location for the set criteria. The data is sorted by the total number of tests performed per Wipe Location. A percentage is given for the number of tests performed at each wipe location versus the overall total number of tests performed. Reference Figure 8-37 Summary Report – Tests By Location 1 and Figure 8-38 Summary Report – Tests By Location 2.

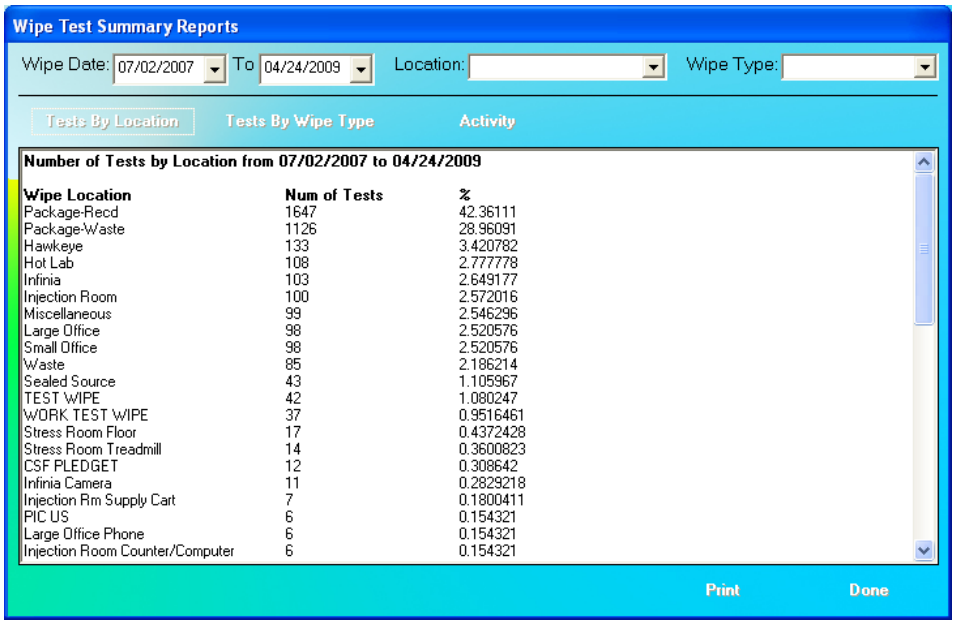


Figure 8-37 Summary Report – Tests By Location 1

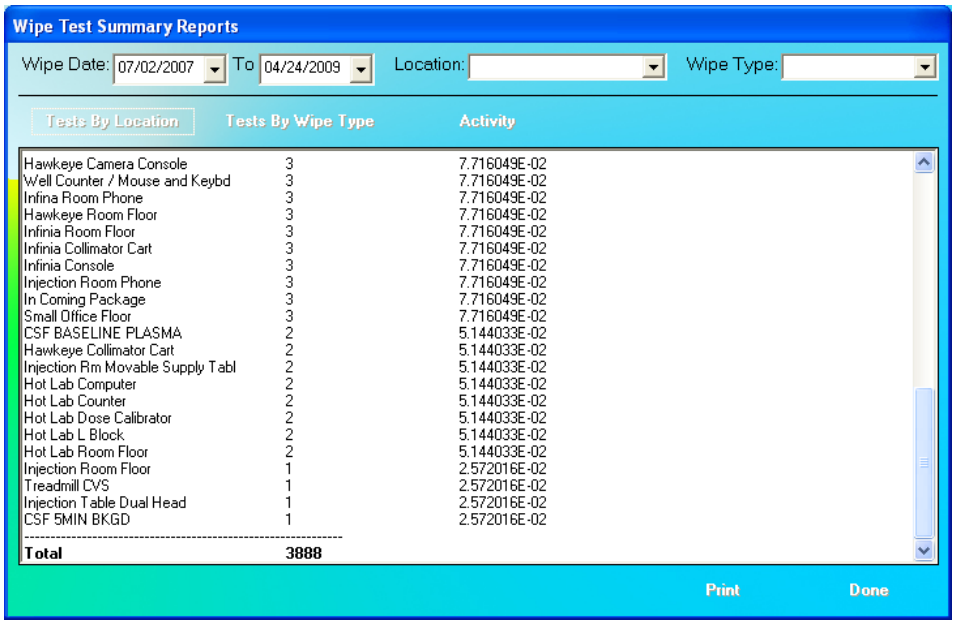


Figure 8-38 Summary Report – Tests By Location 2

Tests By Wipe Type – Clicking this button will display a list showing the number of tests by wipe type for the set criteria. The data is sorted by the total number of tests performed per Wipe Type. A percentage is given for the number of tests performed for each wipe type versus the overall total number of tests performed. Reference Figure 8-39 Summary Report – Tests By Wipe Type.

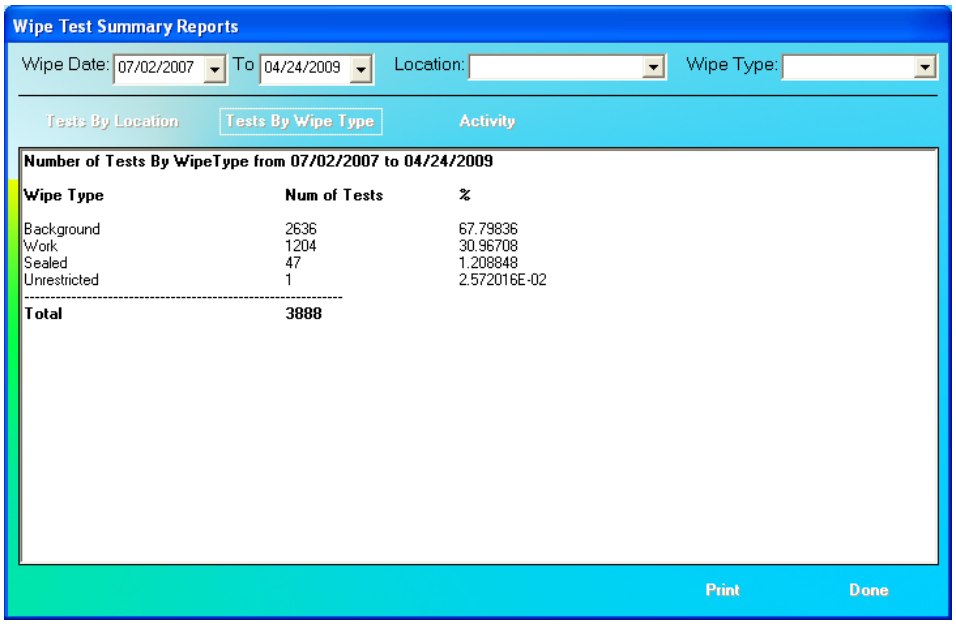


Figure 8-39 Summary Report – Tests By Wipe Type

Activity – Clicking this button will display a list showing an Activity Summary for the set criteria. The included data is average activity, minimum activity, maximum activity, the standard deviation of the activity and the total number of Wipe tests performed. Reference Figure 8-40 Summary Report – Activity.

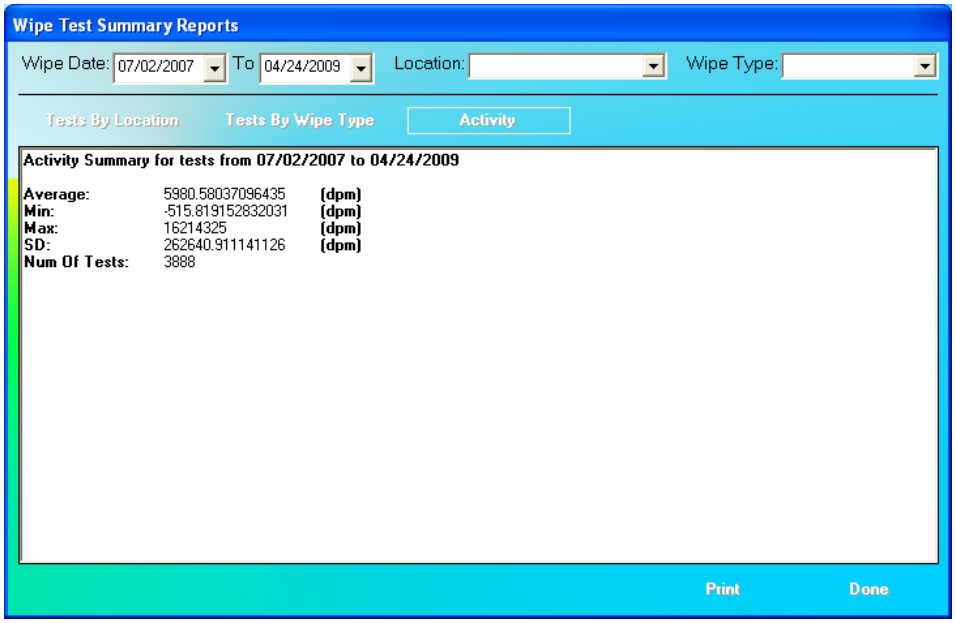


Figure 8-40 Summary Report – Activity

If data are available for the set criteria, the results will be displayed in the **Wipe Test Summary Reports** box. If no data are available for the selected criteria, the following message will appear:

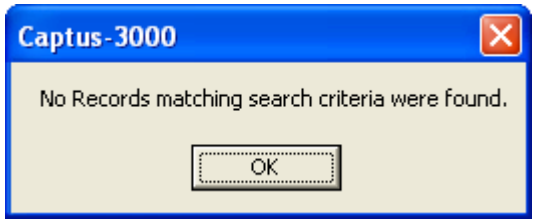


Figure 8-41

Refine the search criteria until the desired results are displayed.

Printing Wipe Test Summary Report

Any of the displayed Wipe Test Summary Reports may be printed to the system printer.

When the desired Summary Report is displayed in the window, click the Print button.

Exiting Summary Reports

Click the Done button on Figure 8-33 Wipe Test Summary Reports Window to return to Figure 8-23 Wipe Test Search Window.

ISOTOPE EFFICIENCY

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

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 an isotope 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 isotope to another. The CAPTUS 3000 uses a default value of 65% for full spectrum efficiency. Full spectrum means the total number of counts detected in all of the MCA channels. This is the nominal value for whole spectrum efficiency for Tc99m when measured in a 2” × 2” drilled well detector.

The default value for whole spectrum efficiency can be changed as required. To change the whole spectrum efficiency, two methods are suggested. Choose 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.

Alternatively, calculate the total spectrum efficiency for several isotopes most frequently used. Input the lowest efficiency. This will provide a conservative estimate for activity by overestimating the activity of most wipes. If no value is entered in the full spectrum efficiency box, results will only be displayed as cpm and will be meaningless.

To calculate total spectrum efficiency, first measure the isotope in MCA mode. The total count rate will appear on the MCA spectral printout in units of cpm. Next convert the current activity of the source measured in the MCA into units of dpm. Remember that 1μCi = 2.22 x 10^6 dpm. Then calculate the full spectrum efficiency.

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

The CAPTUS 3000 also measures efficiencies in the Isotope Library, which are used by the automatic peak finding program to provide both the identity and the activity of a peak identified in the Wipe Test program.

Note that the Isotope Library measures peak efficiency using only the counts recorded in the ROI that surrounds the primary photopeak, and does not use total counts. This allows the peak finding program to better determine the activity of an isotope when multiple peaks or isotopes are present. For this reason, the efficiency recorded in the Isotope Library will always be lower than the full spectrum efficiency.

CHAPTER 9

ABSORBED DOSE ALERT

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Note: *This is an Optional Module which must be purchased in addition to the CAPTUS 3000 system.*

⚠ **CAUTION:** To ensure optimum performance of CAPTUS 3000, when the system is in storage, all QA tests should be run quarterly using dedicated check sources to assure proper operation as detailed in CHAPTER 4: GENERAL SETUP and CHAPTER 5: QUALITY ASSURANCE.

⚠ **CAUTION:** Prior to performing Absorbed Dose ALERT screening procedures, carry out the Auto Calibration procedure (Calibration, Linearity Correction and Constancy Test only) described in CHAPTER 5: QUALITY ASSURANCE, SECTION: AUTO CALIBRATION. (These procedures will take approximately 5 minutes to complete.)

INTRODUCTION

When radioactive materials are released into the environment it can pose a possible health hazard if inhaled or ingested. When a large population is exposed, the critical public health challenge is to provide initial emergency field screening to rapidly triage and identity individuals with significant amounts of internal contamination. The Absorbed Dose ALERT module of the CAPTUS® 3000 software is an emergency screening module which provides

an automated program to quickly measure intake and calculate absorbed organ dose in a dynamic fashion. Results which exceed predefined trigger levels are flagged to alert public health officials, who will determine the appropriate follow-up actions.

Basis for Conversion Calculations

The conversion from counts to µCi-intake is based on physical measurements using the CAPTUS® 3000 and computer modeling data developed at Georgia Institute of Technology, School of Nuclear and Radiological Engineering and Medical Physics. Support and research funding were provided by the Centers for Disease Control and Prevention (CDC). The conversion is based on the following scientific methodology:

- The CAPTUS® 3000 physical measurement data and proprietary collimator design were simulated using MCNP5, [Los Alamos Monte Carlo N-Particle Transport Code].
- The CAPTUS® 3000 system was modeled to respond to six body types using MIRD[1] [Medical Internal Radiation Dose] anthropomorphic phantoms.
    - Male and female adult
    - Male and female adipose adult
    - Male and female child
- The absorbed dose to the organ of interest was calculated over time based on biokinetic models generated by DCAL* [Dose and Risk Calculation Software]. Data was generated from 1 to 30 days following initial intake.
- The ALERT software automatically calculates BMI (Body Mass Index) and selects the most appropriate conversion data based on BMI, age, and gender. The selection criteria for appropriate body type were provided by CDC.

MAIN SCREEN

Click the Absorbed Dose ALERT button or press *Alt+D* on CAPTUS 3000 Main screen. You will be asked to verify the current date as shown in Figure 9-1 Date Verification Screen.

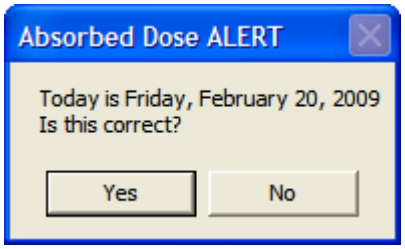


Figure 9-1 Date Verification Screen

If Yes is pressed, Figure 9-3 Absorbed Dose ALERT Main Screen will appear.

If No is pressed, Figure 9-2 will appear:

[1] *Both MIRD and DCAL were developed by Oak Ridge National Laboratory, Center for Biokinetic and Dosimetric Research. DCAL dose coefficients are based on ICRP Publication 30.*

Figure 9-2

The user will remain on the CAPTUS 3000 Main Screen and will not be able to enter the Absorbed Dose ALERT module until the date is verified.

The **Patient Directory** box will be empty if there are currently no existing patients in the database. Each added patient will appear in this box with their name, ID and Incident/Site Description. The **Patient Status** box will show the measurement results if a measurement has been made.

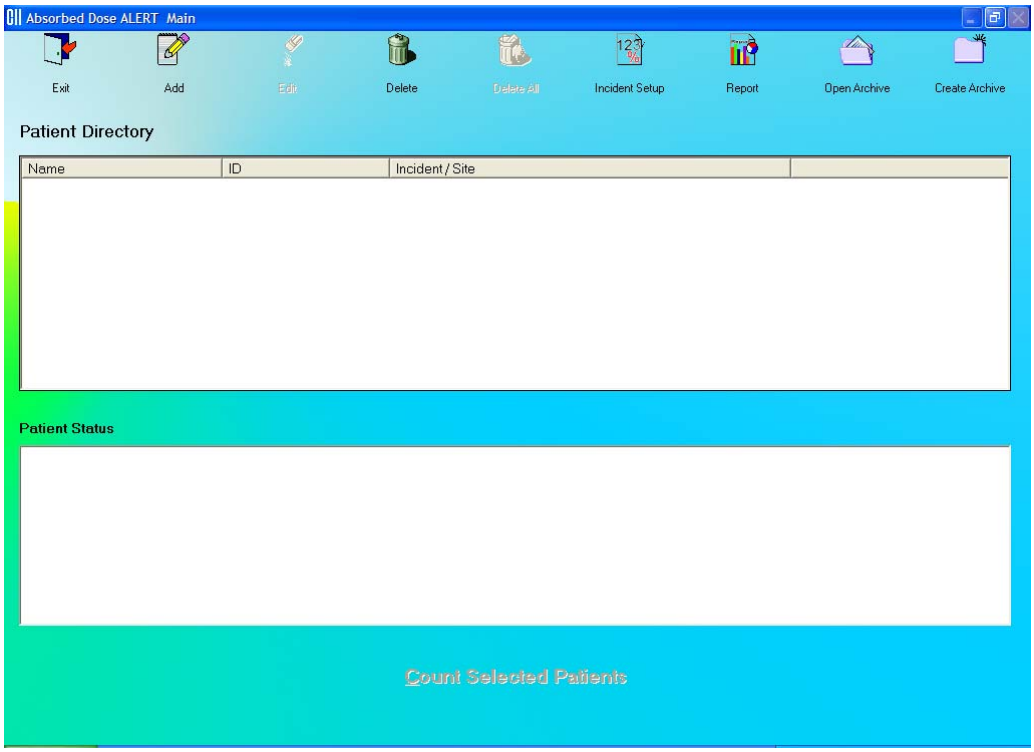


Figure 9-3 Absorbed Dose ALERT Main Screen

To return to the CAPTUS 3000 Main Screen from here, click the

icon or press the *Esc* key.

INCIDENT SETUP

Click the

icon on Figure 9-3 Absorbed Dose ALERT Main Screen. Figure 9-4 Incident Setup Screen will appear.

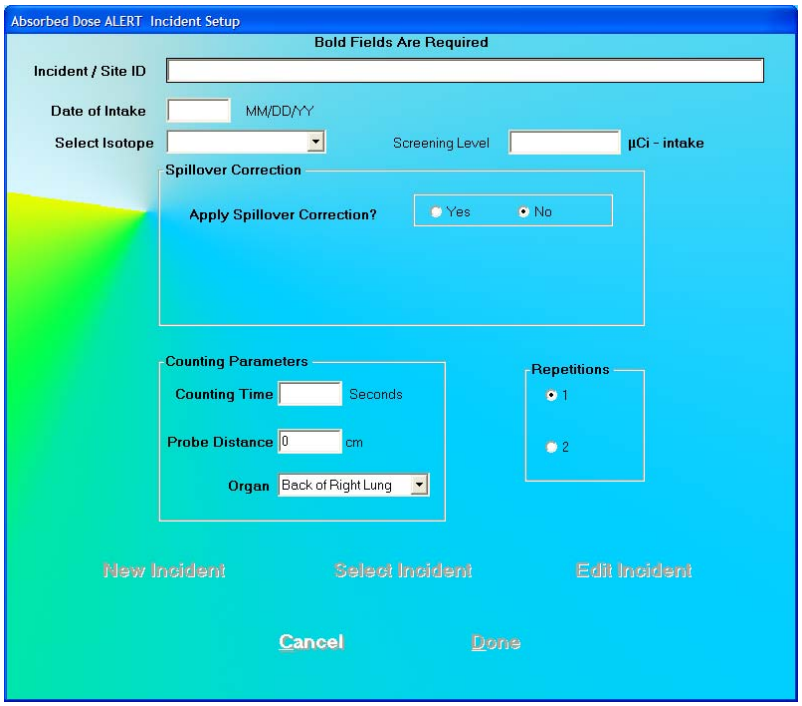


Figure 9-4 Incident Setup Screen

The New Incident, Select Incident and Edit Incident buttons will be disabled until an initial incident has been set up.

Setup Incident Parameters

The parameters for a specific incident must be set up before any patients exposed to that incident are measured. If any parameter must be changed for a particular patient, it can be done when that patient is added.

Incident / Site ID

The Incident/Site ID text box is used to describe the incident and location where the measurements are being made. This is a required field and the description can be any combination of alphanumeric characters to a maximum of 70 characters.

Date of Intake

The Date of Intake text box is most often used to describe date the incident occurred. If a patient was exposed at a later date, this can be changed when the patient is

added. This is a required field and the date must be entered in the format MM/DD/YY, DD/MM/YY or YY/MM/DD depending on the selected date format in setup (Refer to CHAPTER 4: GENERAL SETUP, SECTION: FIRST TIME STARTUP).

Select Isotope

The Select Isotope drop-down list box contains the isotopes that can be measured. This is a required filed and must be set. The isotopes are: Cs137, Co60, I131, Ir192

Screening Level

The Screening Level is an optional entry. If a measurement is greater than the specified screening level, it will be marked as “ABOVE SCREENING LEVEL” (in Red text). If the measurement is less than the specified screening level, it will be marked as “BELOW SCREENING LEVEL” (in Green text). If the Screening Level text box is left blank, the measurement will not be marked. Screening level is entered as µCi – intake or MBq – intake.

Spillover Correction Frame

Apply Spillover Correction

Spillover occurs when a higher energy isotope contributes counts in the selected region of interest of the identified isotope (e.g. Cs137, Co60, I131, Ir192). If contamination is suspected, a spillover correction factor can be applied to the measurement to subtract counts from the higher energy isotope to provide the correct counting rate in the selected ROI. The default value is No Spillover Correction.

To apply Spillover Correction, click the Yes radio button. Spillover Ratio and Spillover ROI (keV) will appear in the Spillover Correction frame as shown in Figure 9-5 Spillover Correction Frame.

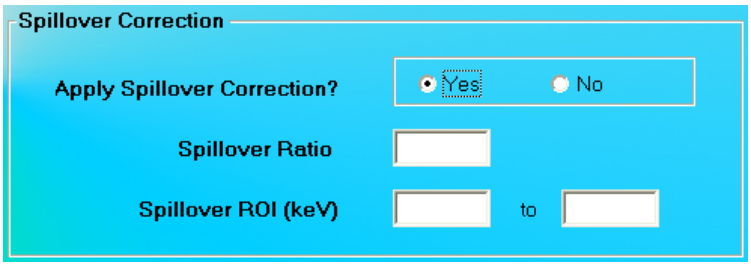


Figure 9-5 Spillover Correction Frame

Spillover Ratio

Spillover Ratio is the ratio of counts in the Spillover ROI that will be found in the ROI of the isotope being measured. The input value must be between 0.0001 and 1.

Spillover ROI

Spillover ROI is the region of interest, in keV, of the higher energy isotope whose activity adds counts to the ROI of the isotope being measured. The keV range must be between 10 and 2000 keV.

Counting Parameters Frame

Counting Time

The Counting Time is the duration for counting, in seconds, for each measurement. The default counting time is 60 seconds. All counting time is Live Time. This is a required field and the input value must be between 10 and 9999 seconds.

Probe Distance

Probe Distance is the distance of the probe from the body. The default is 0 cm. This value is only used to prompt the user to perform the measurement. The input value must be between 0 and 50 cm.

Organ

The Organ drop-down list box allows the selection of the organ that will be measured. The selections are Back of Right Lung, Outer Thigh, and Thyroid. The default is Back of Right Lung.

Repetitions Frame

The Repetitions frame allows the user to select either one or two repetitions for each measurement. For two repetitions, the average value of both measurements is used in the calculations. The second repetition may be skipped during the measurement procedure, if so desired. The default is one repetition.

Note: *The user can change the default value at any time as required.*

1. To input new values in any frame, click the appropriate text box or radio button or use the *Tab* key to move from one selection to another.

2. Click the Done button to save changes or click the Cancel button to discard the changes and return to Figure 9-3 Absorbed Dose ALERT Main Screen.

QUICK TIP:

- To return to previous screen without saving changes press the *ESC* key.

New Incident

Click the Incident Setup icon on Figure 9-3 Absorbed Dose ALERT Main Screen. Figure 9-6 will appear.

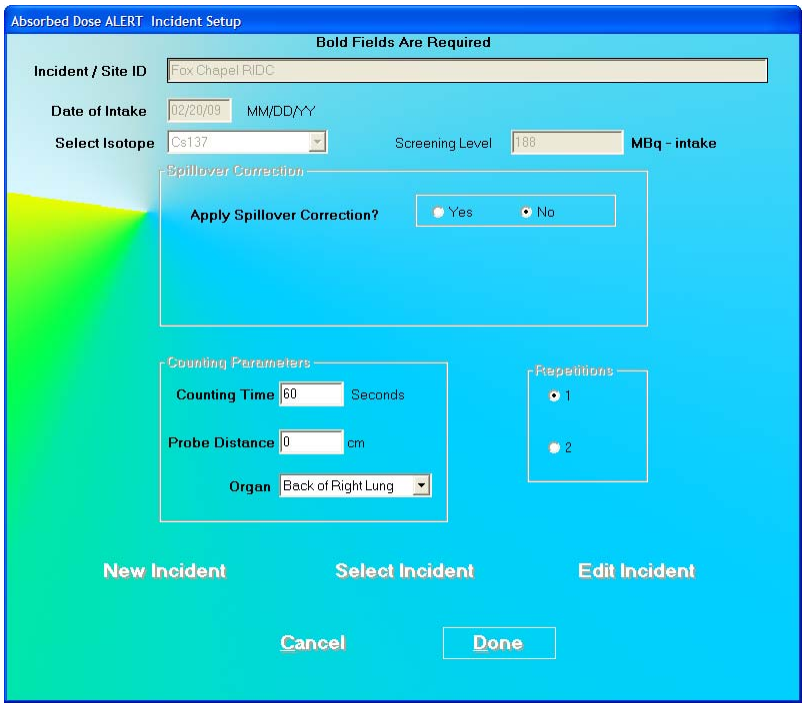


Figure 9-6

Note: *The* New Incident *button will only be enabled after an initial incident has been set up.*

Click the New Incident button. Figure 9-4 Incident Setup Screen will appear.

1. Input all necessary values and click the appropriate text box or radio button or use the *Tab* key to move from one selection to another.

2. Click the Done button to save changes or click the Cancel button to discard the changes and return to Figure 9-3 Absorbed Dose ALERT Main Screen.

QUICK TIP:

- To return to previous screen without saving changes press the *ESC* key.

Select Incident

Click the Incident Setup icon on Figure 9-3 Absorbed Dose ALERT Main Screen. Figure 9-7 will appear.

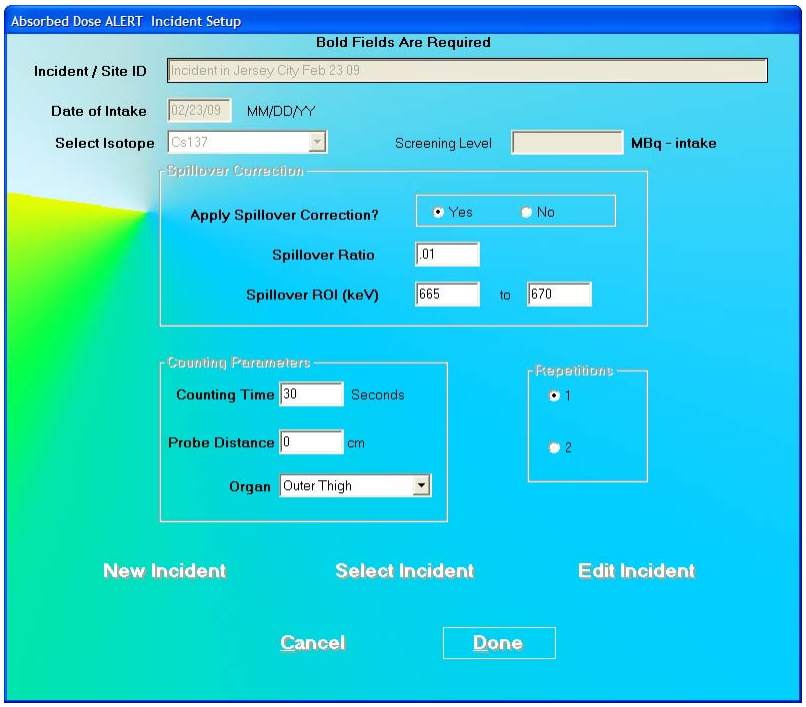


Figure 9-7

1. Click the **Select Incident** button. Figure 9-8 Incident Selection Screen will appear.

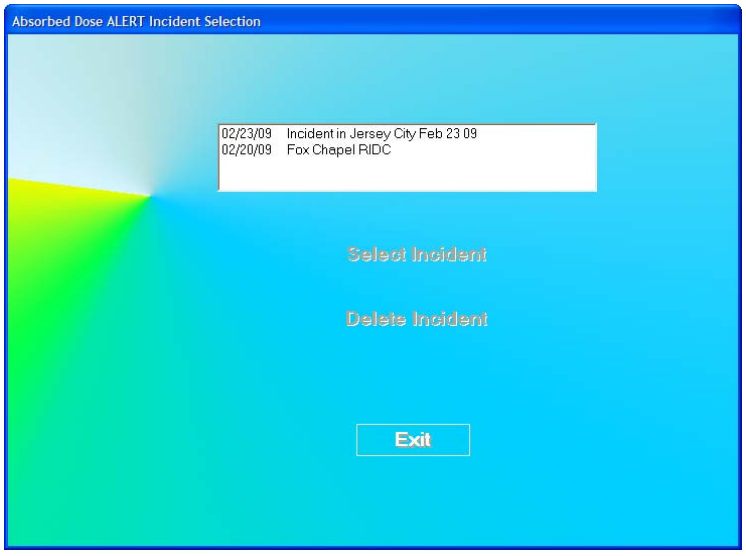


Figure 9-8 Incident Selection Screen

The **Select Incident** and **Delete Incident** buttons will be disabled until an incident is selected (highlighted) in the Incident list box.

2. To select an incident, click on the incident name in the list box on Figure 9-8 Incident Selection Screen. The Incident name will become highlighted and the **Select Incident** and **Delete Incident** buttons will become enabled as shown in Figure 9-9.

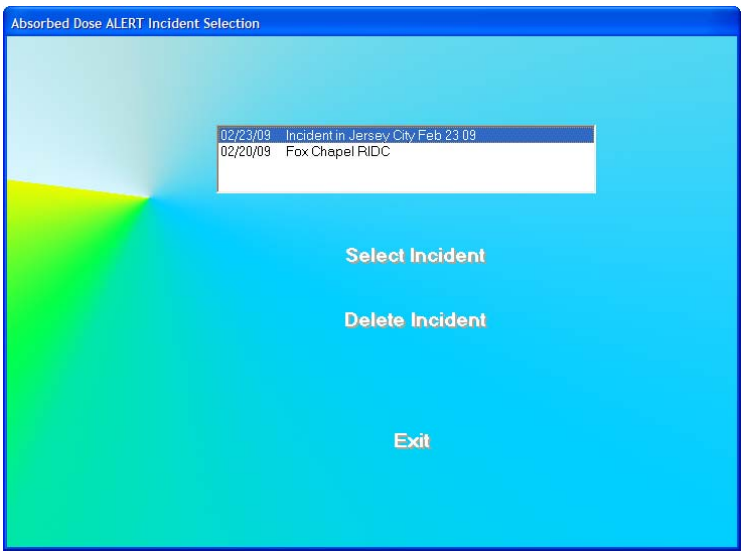


Figure 9-9

3. Click the **Select Incident** button to set the highlighted incident as the currently active incident. The Incident Setup Screen (Figure 9-7) will re-appear displaying the parameters for the selected incident.

QUICK TIP:

- To return to previous screen without saving changes press the *ESC* key.

Note: *Once an incident is selected, it becomes the currently active incident. Any patients that are added after changing the incident will use the selected incident until another incident is set up or selected.*

Delete Incident

Note: *The currently active incident can not be deleted without first setting another incident as the current incident.*

1. To delete the selected incident, verify that the desired incident is highlighted in the Incident list box and click the **Delete Incident** button. If the selected incident is not the currently active incident, Figure 9-10 will appear.

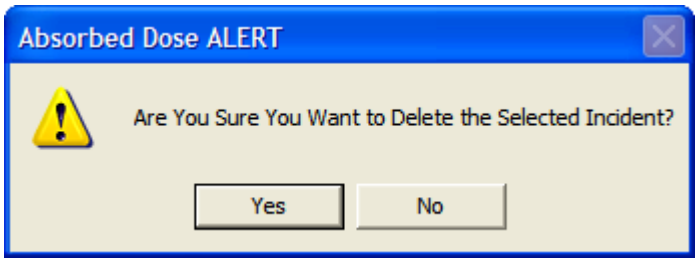


Figure 9-10

2. Click the Yes button or press the *Y* key to confirm the deletion. Otherwise, click the No button or press the *N* key.

3. If the selected incident is the currently active incident, it can not be deleted without first setting another incident as the current incident. Figure 9-11 will appear.

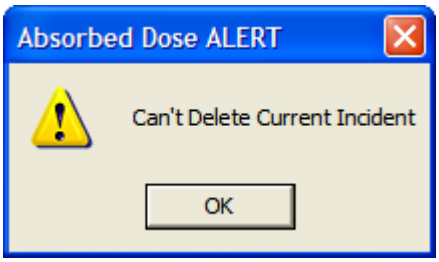


Figure 9-11

4. Click the OK button to dismiss the dialog window.

To delete the currently active incident, select (highlight) a different incident and click the Select Incident button. The Incident Setup Screen will re-appear displaying the parameters for the selected incident. Click the Select Incident button on the Incident Setup Screen. Figure 9-8 Incident Selection Screen will re-appear. Highlight the desired incident and press the Delete Incident button. Figure 9-10 will appear.

QUICK TIP:

- To return to previous screen without saving changes press the *ESC* key.

Edit Incident

Once an incident has been saved, it can be edited.

Click the

icon on Figure 9-3 Absorbed Dose ALERT Main Screen. Figure 9-12 will appear.

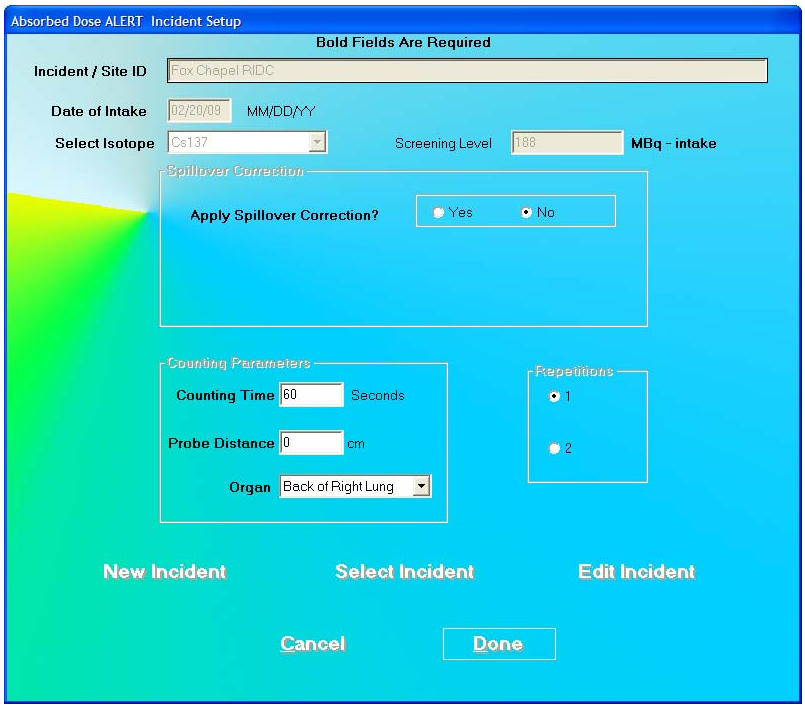


Figure 9-12

The Edit Incident button will now be enabled. Note that all of the fields and frames are disabled (grayed-out).

Click the Edit Incident button. The Incident Setup Screen will appear as shown in Figure 9-13.

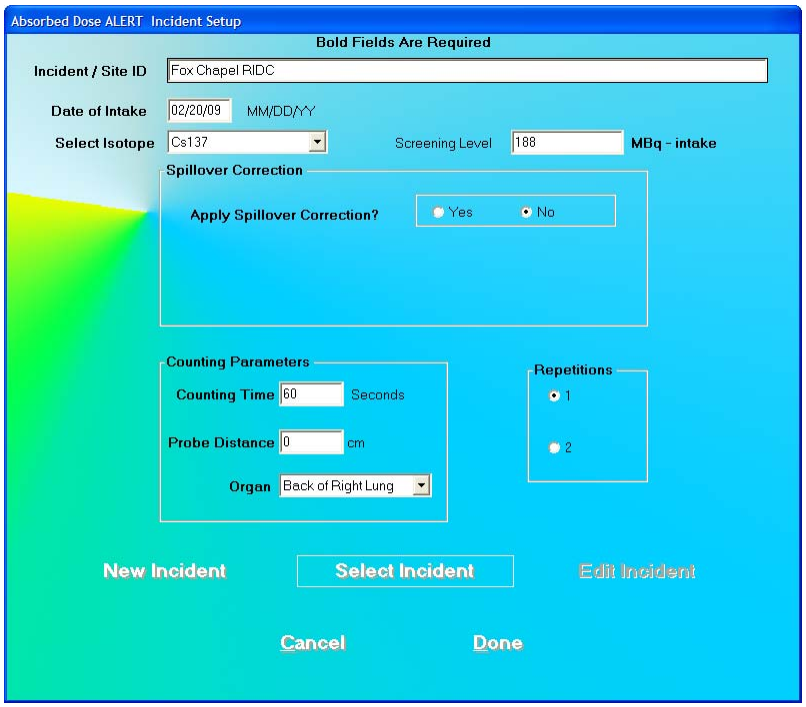


Figure 9-13

1. To input new values in any frame, click the appropriate text box or radio button or use the *Tab* key to move from one selection to another.

2. Click the Done button to save changes or click the Cancel button to discard the changes and return to Figure 9-3 Absorbed Dose ALERT Main Screen.

Note: *Changing any of the parameters will not affect patients which were already counted before the edit took place. All patients added after the edit will use the changed parameters.*

QUICK TIP:

- To return to previous screen without saving changes press the *ESC* key.

ADDING PATIENTS

Note: *All fields in **bold** are required before you can begin an Absorbed Dose ALERT emergency screening measurement.*

1. Click the Add icon on Figure 9-3 Absorbed Dose ALERT Main Screen. Figure 9-14 Patient Data Screen will appear. All information input in the Incident Setup will appear on this screen.

2. To alter any information entered in Incident Setup, click the **Change Setup Values** button. A message box will appear asking if you are sure you want to change the Incident Setup Values. If Yes is selected, the disabled (grayed-out) boxes will become enabled.

   Note: *Only change the Incident/Site ID if there is something unique about the incident or site for this patient.*

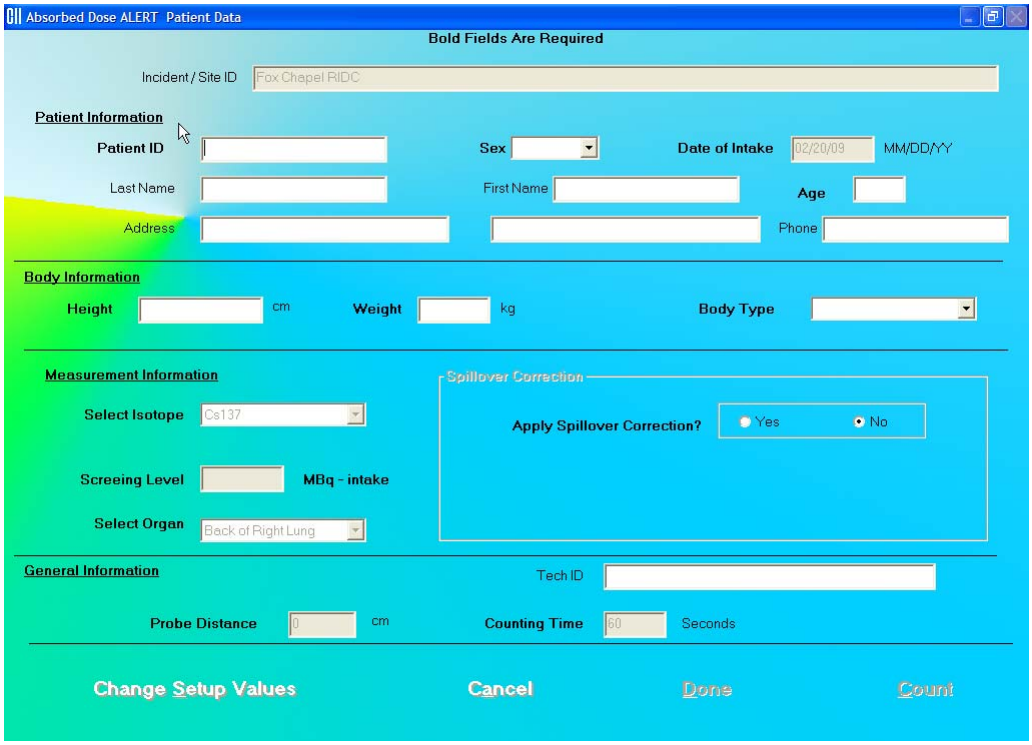


Figure 9-14 Patient Data Screen

QUICK TIP:

- Click in the text box or use the *Tab* key to move from one text box to another. To select from drop-down list use ↑ or ↓ keys.

3. **Patient Information**.
   - **Patient ID:** A unique ID assigned to each patient (ex. social security number). This field is required and can be any combination of alphanumeric characters to a maximum of 20 characters.
   - **Sex:** Select male or female from the drop-down list box or press the *M* or *F* key. This field is required.
   - **Date of Intake:** If the date of intake differs from the date stored in the Incident Setup, the date should be changed. The Date must be entered in the format indicated. This field is required.
   - **Last Name** and **First Name:** The first and last names of the patient. These fields are optional and can be a maximum of 20 characters.
   - **Age:** The patient's age in years. This field is required and can be from 1 to 99.

- **Address:** The patient's 2 line address. These fields are optional and can be a maximum of 50 characters.
- **Phone:** The patient's phone number. This field is optional and can be a maximum of 20 characters.

4. **Body Information**.
   - **Height:** The patient's height. If the system is set to Curie Mode, the height is input in feet (1 to 9) and inches (0 to 11.5). Inches may be input to the half-inch. If the system is set to Becquerel Mode, the height is input in centimeters (30 to 300).
   - **Weight:** The patient's weight. If the system is set to Curie Mode, the weight is input in pounds (20 to 999). If the system is set to Becquerel Mode, the weight is input in kilograms (9 to 450).
   - **BMI:** After the patient's Height and Weight have been input, the BMI (Body Mass Index) is calculated and displayed. The BMI is calculated using the following formula:

$$\text{BMI } [\frac{\text{kg}}{\text{m}^2}] = \frac{\text{weight (kg)}}{(\text{height (m)})^2}$$

   - **Body Type:** If the patient's age has been input, the Body Type will be displayed in the drop-down list box. The Body Types are Adult, Adult 1X, and Pediatric.

     The Body Type is selected by the following criteria:
     - o Pediatric Age < 15 or Weight < 100 lb
     - o Adult 1X BMI = 30 or greater
     - o Adult all others

     The calculated Body Type may be changed by selecting the desired Body Type in the drop-down list box.

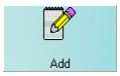
5. To make any changes in the **Measurement Information** section (**Select Isotope**, **Screening Level**, **Select Organ**, and **Spillover Correction**) specific to this patient, click, the Change Setup Values button.

6. To make any changes in the **General Information** section (**Probe Distance** or **Counting Time**) specific to this patient, click the Change Setup Values button.

7. **Tech ID:** Input the ID of the technologist performing the procedure. This field is optional and can be any combination of alphanumeric characters to a maximum of 32 characters.

8. When data entry is complete, click the Done button to save the information, or click the Cancel button to discard the changes.

9. To measure this patient now, click the Count button. Figure 9-21 Count Patient Measurement Screen will appear.

10. To add more patients, click the 

icon on Figure 9-3 Absorbed Dose ALERT Main Screen.

EDITING PATIENTS

Note: *Once the patient has been measured, the only fields on the Edit Screen that can be changed are:* ***Patient Name****,* ***Patient ID****,* ***Sex****,* ***Address****,* ***Phone****, and* ***Tech ID****.*

1. To select (highlight) a patient to be edited, use the ↑ and ↓ keys or *Page Up* and *Page Down* keys to move up or down in the patient list. If the list is long, the scroll bar is also available. To reach a particular patient, press the first letter of the patient name. Press the ↓ key if necessary, to go further down (Figure 9-15).

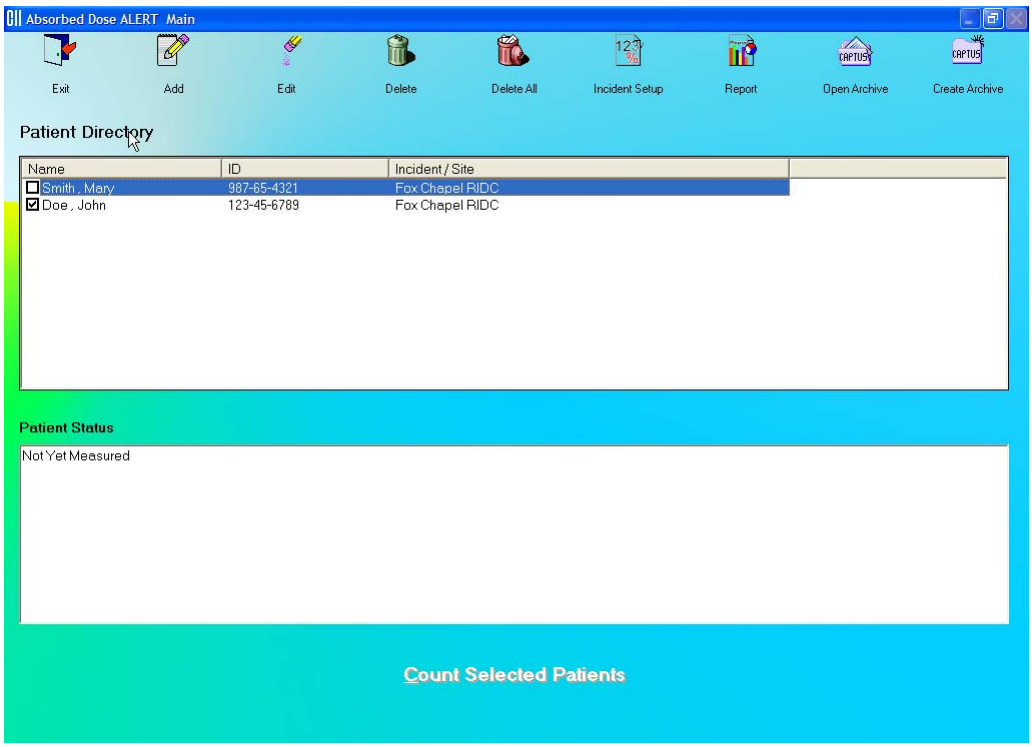
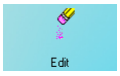


Figure 9-15

2. Click the 

icon. The screen appears as shown in Figure 9-16.

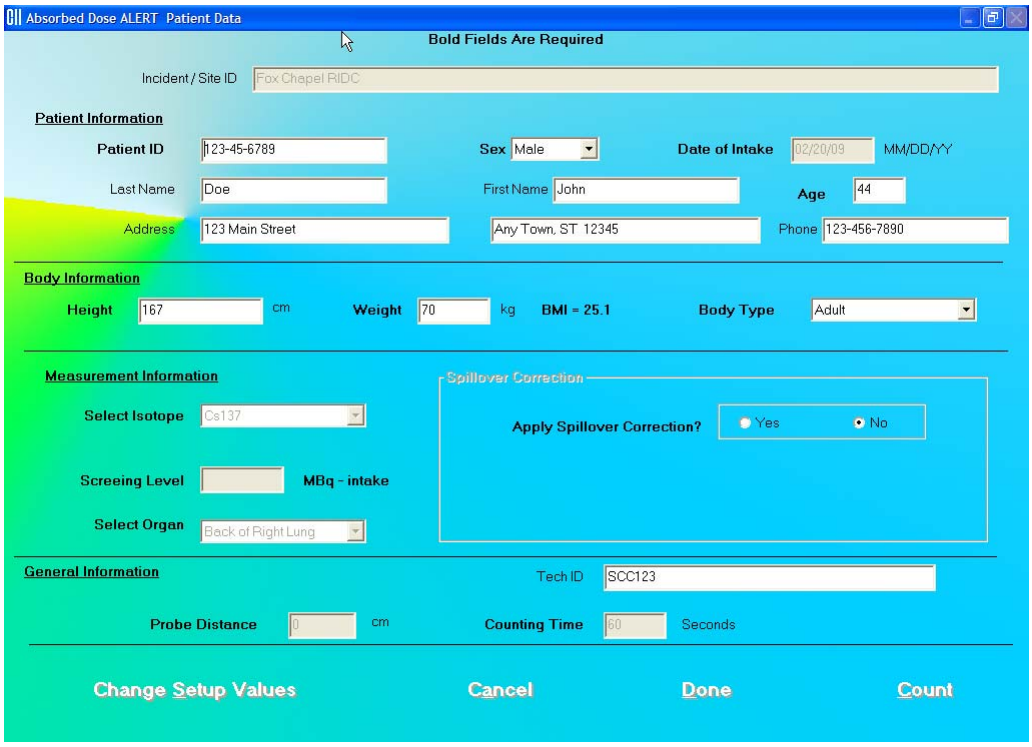


Figure 9-16

3. Click in the text box to be edited and type over the existing information.

   Note: *All fields in **bold** are required before you can begin the test.*

4. When finished editing the patient data, click the Done button to save the entered information, or the Cancel button to discard the changes.

5. To measure this patient now, click the Count button. Figure 9-21 Count Patient Measurement Screen will appear.

DELETING PATIENTS

Note: *If you wish to save patient information before deleting, refer to the sections CREATING AN ARCHIVE on page 9-23 and OPENING AN ARCHIVE on page 9-24.*

To select one or more patients for deletion, click in the check box to the left of the patient's name in the **Patient Directory** box on the Emergency Screening Main Screen (Figure 9-17). A check should appear in the check box to indicate it has been selected. To deselect a patient, click in the check box again and the check will be removed.

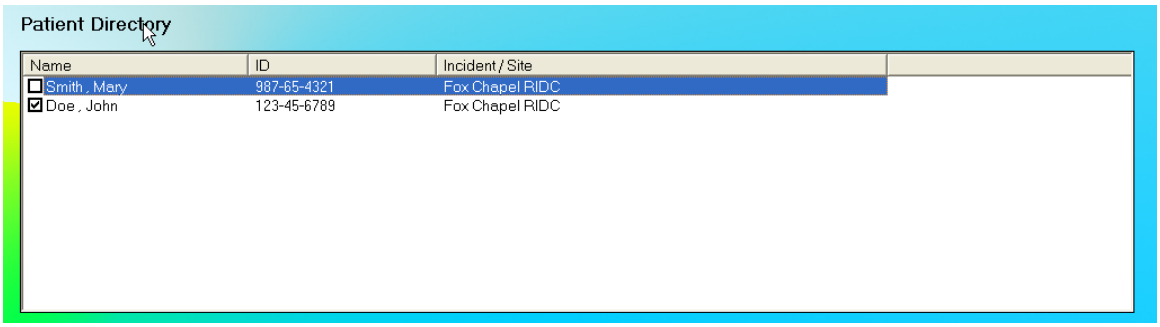
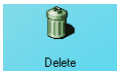


Figure 9-17

1. Click the 

icon. Figure 9-18 will appear.

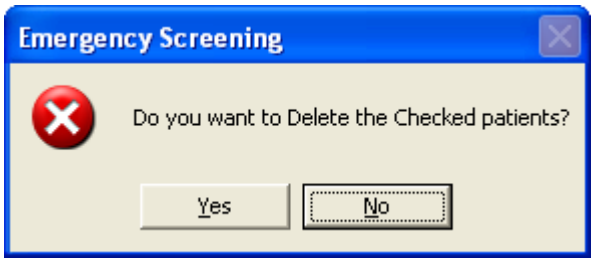
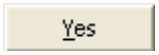
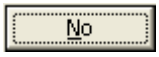
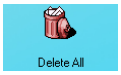


Figure 9-18

2. Click the 

button or press the *Y* key to confirm the deletion or click the 

button or press the *N* key to cancel.

3. To delete all the patients at once, simply click the 

icon. You will be prompted to confirm the deletion. Figure 9-19 will appear.

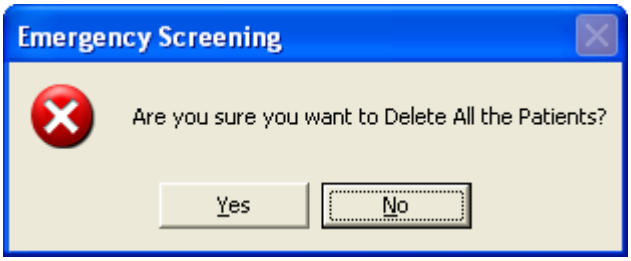
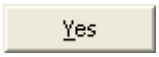


Figure 9-19

4. Click the 

button or press the *Y* key to confirm the deletion. Otherwise, click the

button or press the *N* key.

MAKING MEASUREMENTS

CAUTION: Prior to performing any measurements, it is recommended to carry out the Auto Calibration procedure (Calibration, Linearity Correction and Constancy Test only) described in CHAPTER 5: QUALITY ASSURANCE, SECTION: AUTO CALIBRATION.

Measurements can be made immediately after adding or editing that patient's data by pressing the Count button.

For faster throughput, several patients can be added to the **Patient Directory**, and then counted using the following procedure:

1. To select one or more patients for measurement, click the box for each patient to be measured in the **Patient Directory** box on Figure 9-3 Absorbed Dose ALERT Main Screen.

2. To begin the measurements, click the Count Selected Patients button or press *Alt+C*. The screen appears as shown in Figure 9-21 Count Patient Measurement Screen.

   Note: *If calibration has not been performed for the current day, you will be prompted with the screen as shown in* Figure 9-20*. After the calibration is complete, the program will return to the Emergency Screening Count Patient screen shown in Figure 9-21 Count Patient Measurement Screen.*

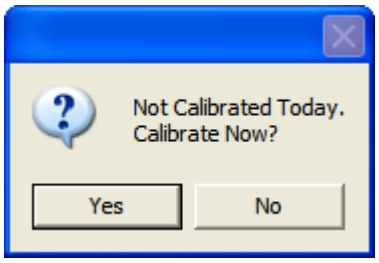


Figure 9-20

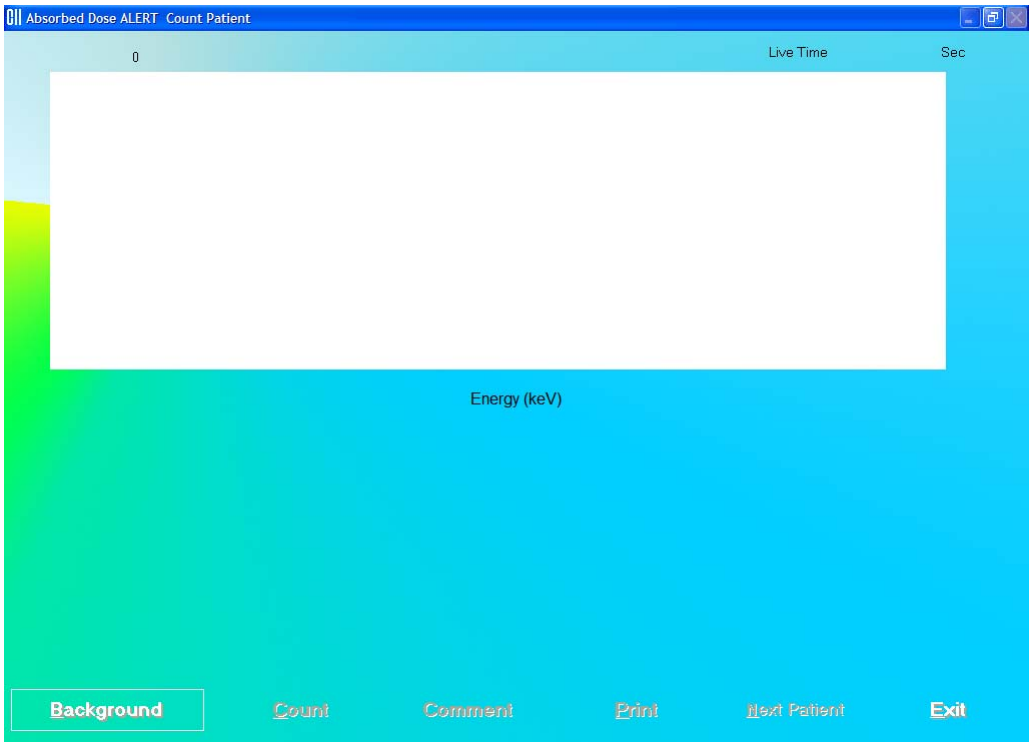


Figure 9-21 Count Patient Measurement Screen

3. Background must be measured when the program is initially entered, or if the Isotope or Spillover Correction is different from the previous measurement.

4. Click the Background button or press *Alt+B* to measure background. Figure 9-22 will appear.

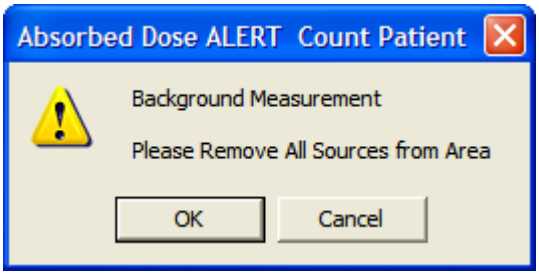


Figure 9-22

To begin counting, verify that there are no radioactive sources nearby and click the OK button. To abort the measurement, click the Cancel button.

When the background has been measured and confirmed, the Count button will become active.

5. Click the Count button to begin counting the selected patient. Figure 9-23 will appear confirming the selected patient. To cancel the test or if the incorrect patient was selected, click the No button, otherwise click Yes to continue.

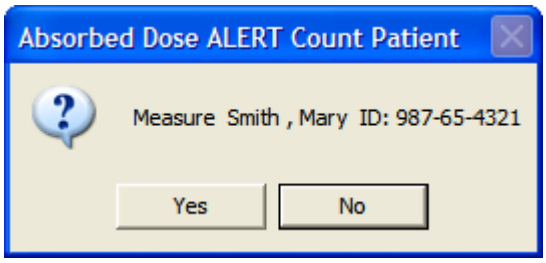


Figure 9-23

6. You will be prompted to measure the correct organ as shown in Figure 9-24.

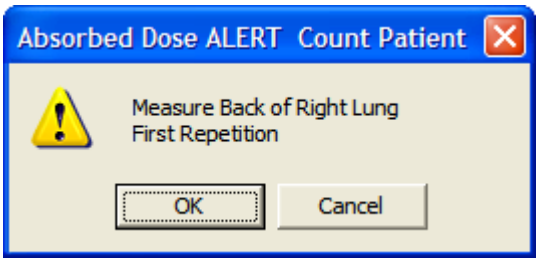


Figure 9-24

Note: *If the number of **Repetitions** in the setup has been set to 2, each measurement, excluding background, will be repeated twice. You may skip the second repetition, if desired, by clicking the* No *button as shown in Figure 9-25.*

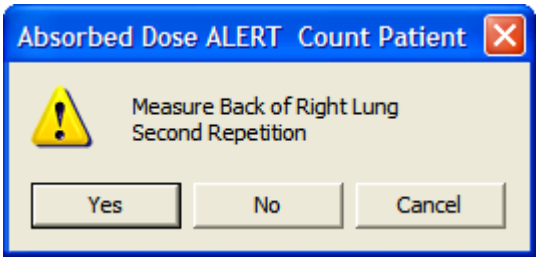


Figure 9-25

To begin counting, position the probe and click the OK button. To quit counting, click the Cancel button. This will give a prompt to abort the patient test, as shown in Figure 9-26.

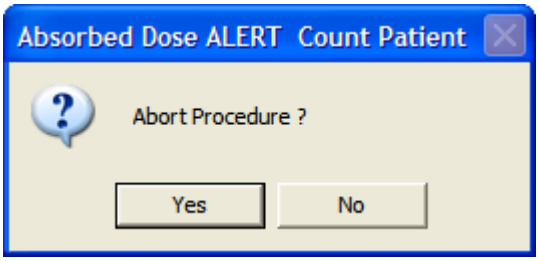


Figure 9-26

7. When the measurement is complete, a detailed report of that measurement will be displayed. Press Print to print the report. If there was more than one measurement for this patient, the report for all measurements can be obtained from the Absorbed Dose ALERT Report window.

8. To add comments to the report, click the Comment button. The Comment window will appear as shown in Figure 9-27. Refer to CHAPTER 3: GENERAL OPERATING INSTRUCTIONS; SECTION: ADD COMMENTS SCREEN.

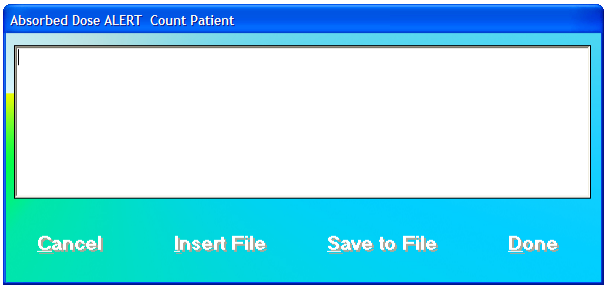


Figure 9-27

9. If more than one patient was selected, the Next Patient button will be enabled. Press this button to measure the next patient.

10. Click the Exit button or press *Alt+E* after all the patients have been measured to return to Figure 9-3 Absorbed Dose ALERT Main Screen. The **Patient Status** box will show the calculated result for the highlighted patient.

Data Acquisition

The data acquisition screen appears as shown in Figure 9-28 Data Acquisition Screen, which displays the live spectrum as counts are being collected.

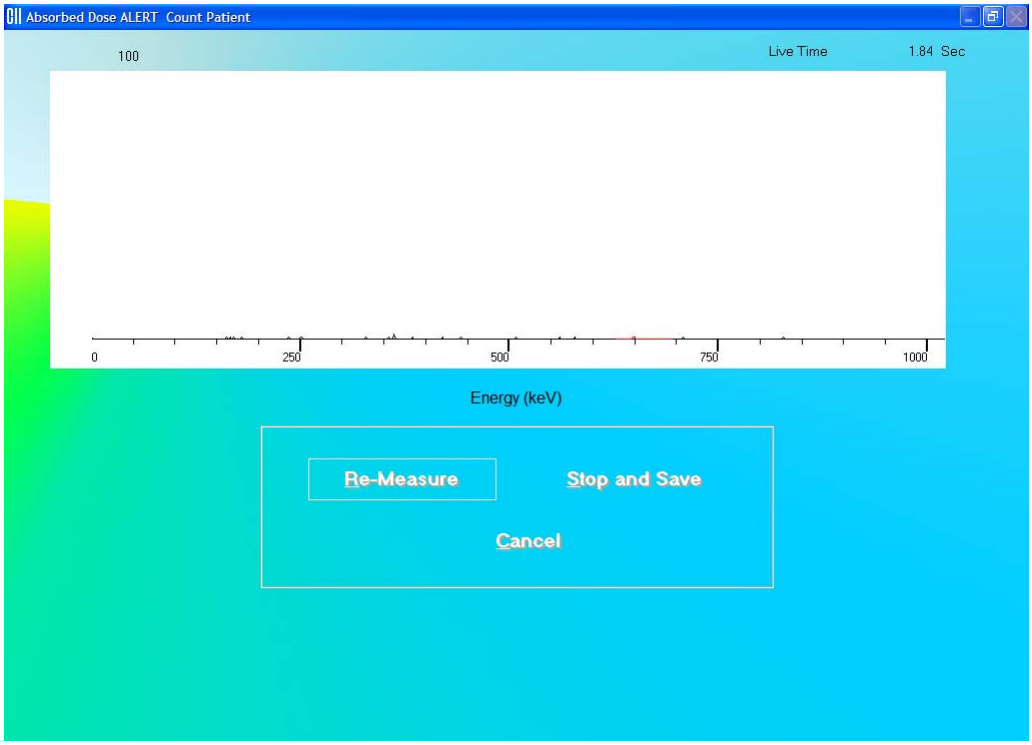


Figure 9-28 Data Acquisition Screen

To stop the counting midway and begin counting again, click the Re-Measure button or press *Alt+R*.

To stop the counting midway and save collected data and move to the next step, click the Stop and Save button or press *Alt+S*.

To stop the counting midway and quit without saving, click the Cancel button or press *Alt+C*. The abort procedure screen appears as shown in Figure 9-26.

After count collection is completed, the screen appears as shown in Figure 9-29.

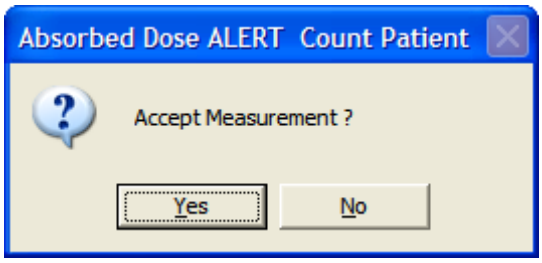


Figure 9-29

To accept the measurements and continue with the next step, click the Yes button or press the *Y* key. To discard and recount the current measurement, click the No button or press the *N* key.

CREATING AN ARCHIVE

The Absorbed Dose ALERT database should be kept current by periodically archiving, then deleting completed patients from the **Patient Directory**.

Reminder:

- ***Always*** archive the database before deleting patients

1. On Figure 9-3 Absorbed Dose ALERT Main Screen, click the Create Archive icon. The Create Archive dialog, Figure 9-30, will appear.

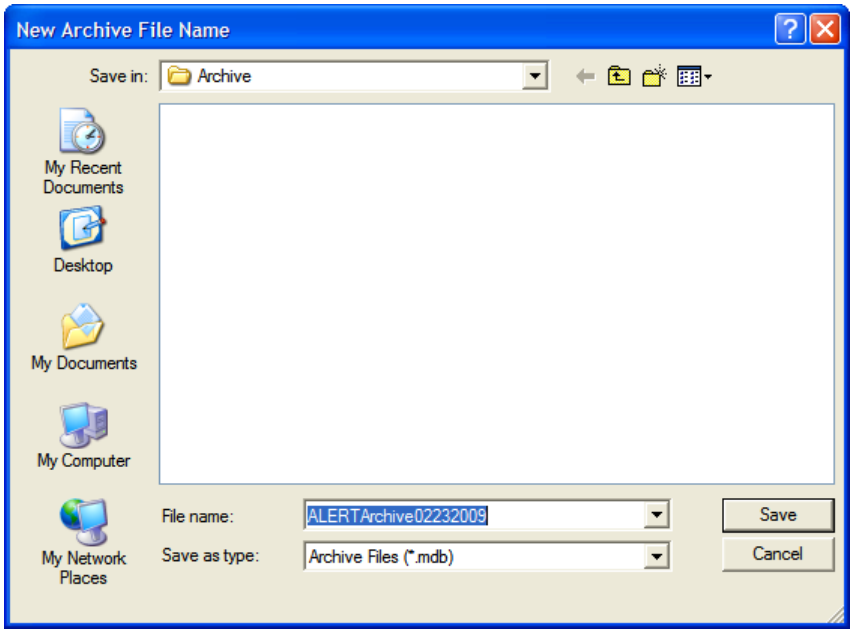


Figure 9-30

2. The default filename is ALERTArchive followed by the current date. The filename can be changed. When the filename is correct, click the Save button.

OPENING AN ARCHIVE

Reports can be viewed and printed from a previously archived database.

1. To open an existing archived database, on Figure 9-3 Absorbed Dose ALERT Main Screen, click the Open Archive icon. The Open Archive dialog Figure 9-31 will appear.

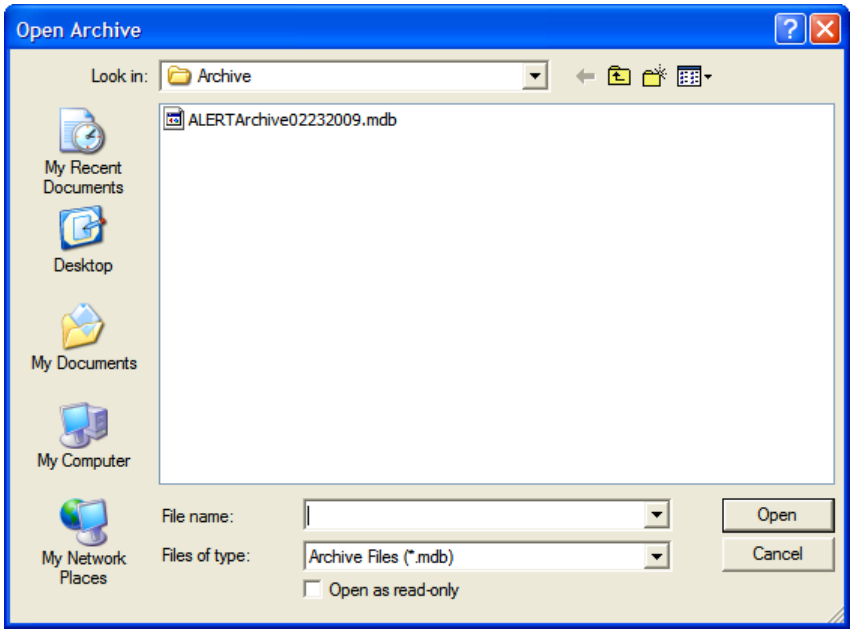


Figure 9-31

2. Select the desired database and click the Open button. The Absorbed Dose ALERT Main Screen will appear similar to that shown in Figure 9-32 with the patient list from the opened database displayed.

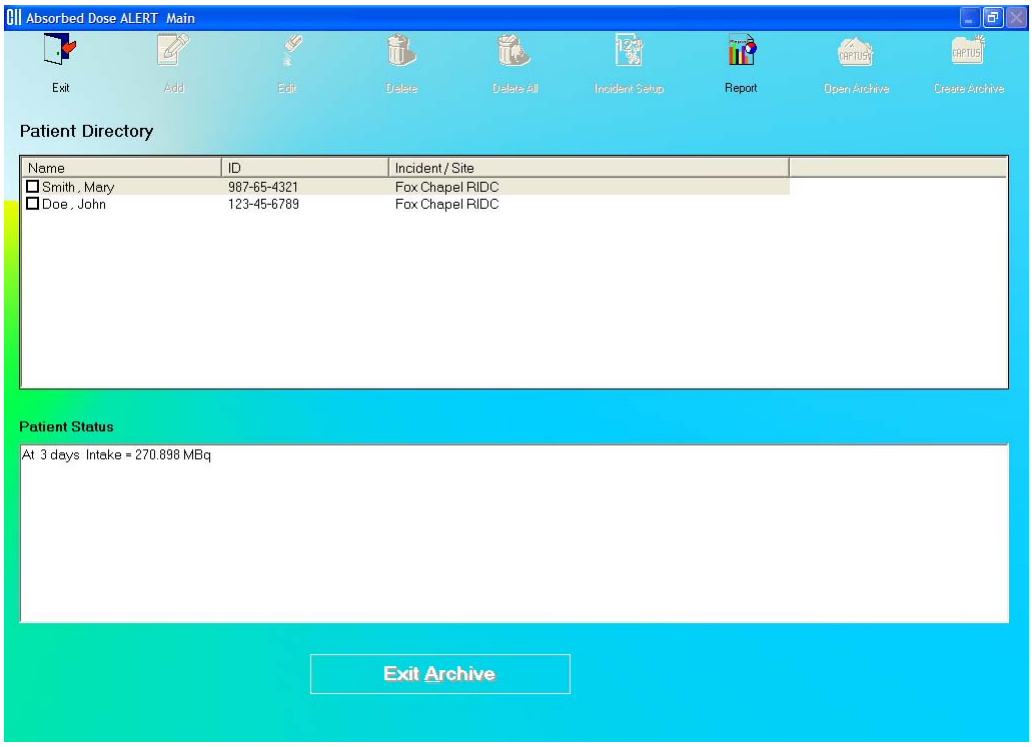


Figure 9-32

3. The only available function is Report.

4. To return to the current database and access all functions, click the

button. The patient list from the current database will be displayed and full functionality will be returned.

PATIENT REPORTS

Displaying and Printing

1. On the Absorbed Dose ALERT Main Screen, click the

icon. The screen appears as shown in Figure 9-33, and includes a summary of all the patients in the database. For each patient measurement the summary report includes:
    - Incident description,
    - Patient name and ID,
    - Elapsed time since incident in days,
    - Organ measured,
    - Isotope measured,
    - Net counting rate,
    - Intake in µCi, and
    - Comment.

If the Intake was greater than the entered Screening Level, the message “ABOVE SCREENING LEVEL” will be displayed.

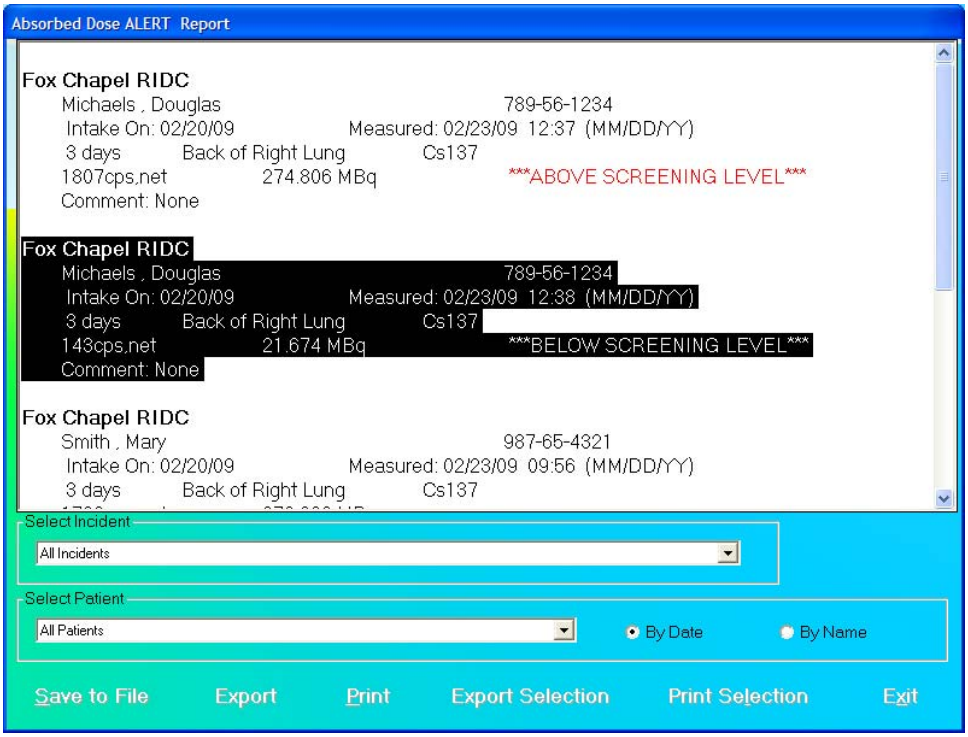


Figure 9-33

2. The drop-down list box in the **Select Incident** frame contains a list of all incidents in the database. Select an incident from the drop-down list to display a summary report for the selected incident.

3. Click the Print button to print the summary that is displayed.

4. You can use the mouse to select one or more contiguous records. When records have been selected, the Print Selection button will be enabled.

5. Click the Print Selection button to print the highlighted selection.

6. A detailed report of the measurements for a single patient can be obtained by selecting a patient from the drop-down list in the **Select Patient** frame. Selected patients are listed by Date (most recent first) or by Name. A sample report is shown below.

Figure 9-34 Patient Report

For each measurement, the following information is displayed:

- Measurement at x days: Elapsed Time in days
- Time: Date/time of the measurement
- Factor: Conversion factor in cpm/µCi; (in cps/Bq for Becquerel mode)
- Room Background: Background measurement
- Organ: Net cpm (cps in Becquerel mode) for the measured organ. Includes counts for the first and second repetition
- Comments: User comments, as necessary
- Intake: Calculated intake displayed in µCi (MBq in Becquerel mode). ***Note:*** *If the Screening Level was entered, "BELOW SCREENING LEVEL" or "ABOVE SCREENING LEVEL" will be displayed.*

7. Click the Print button to print a detailed report for the patient.

8. To save the displayed report or summary, click the Save to File button or press *Alt+S*. The Save As box appears as shown in Figure 9-35. Reports are saved as an RTF file in the Reports folder by default.

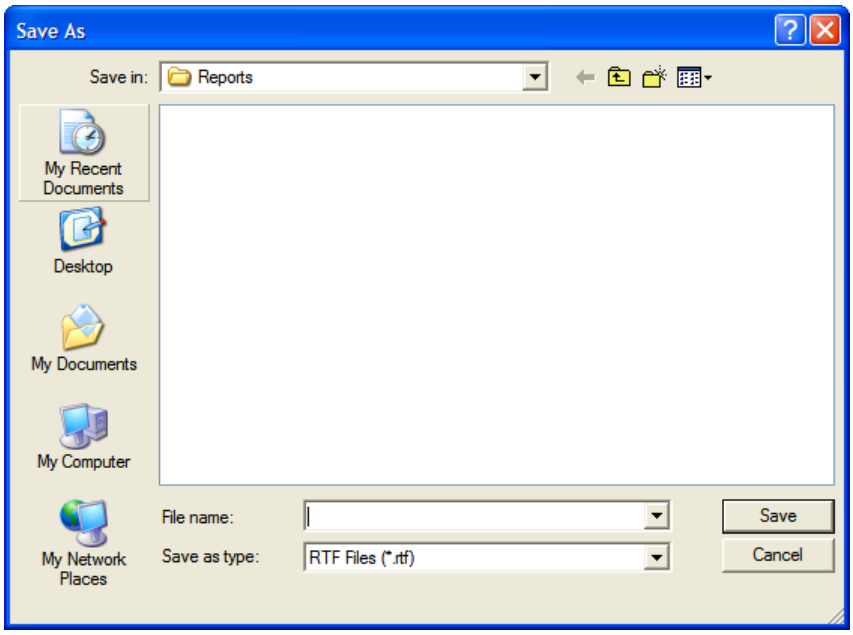


Figure 9-35

9. Click the Exit button or press *Alt+X* to return to Figure 9-3 Absorbed Dose ALERT Main Screen.

Exporting

1. On the Absorbed Dose ALERT Main Screen, click the Report icon. The screen appears as shown in Figure 9-36, displaying a summary of all the patients in the database. For each patient measurement, the summary includes:
   - Incident description,
   - Patient name and ID,
   - Elapsed time since incident in days,
   - Organ measured,
   - Isotope measured,
   - Net counting rate,
   - Intake in µCi, and
   - Comment.

   If the Intake was greater than the entered Screening Level, “ABOVE SCREENING LEVEL” will be displayed.

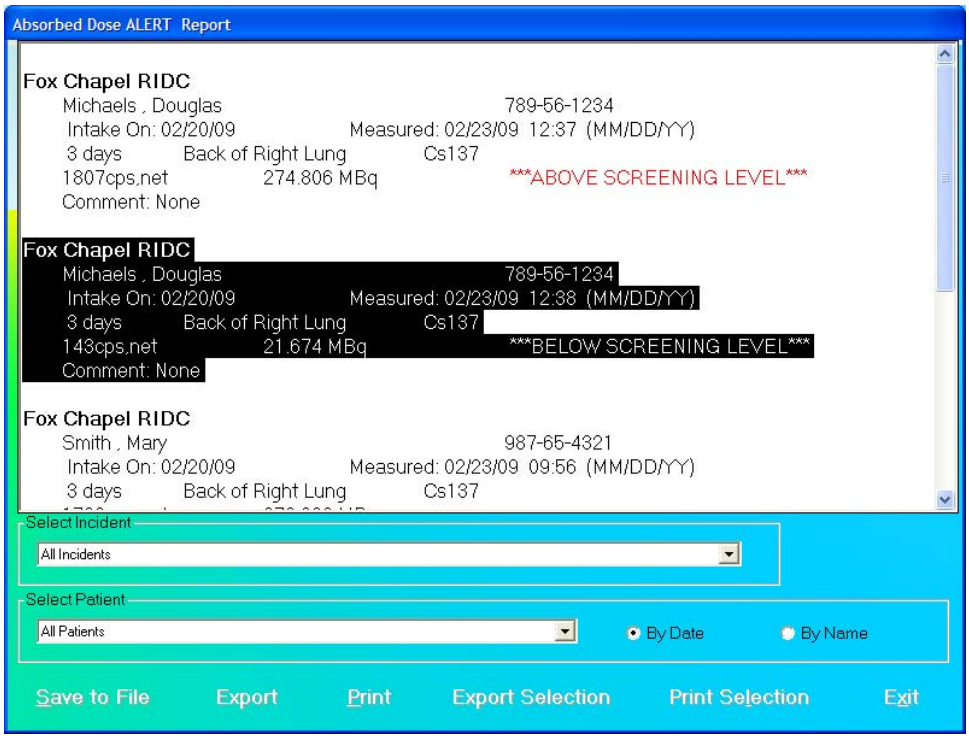


Figure 9-36

2. The drop-down list in the **Select Incident** frame contains a list of all incidents in the database. Select an incident to display a summary report for that incident.

3. Click the Export button to export the summary to an Excel file. The Export dialog will appear.

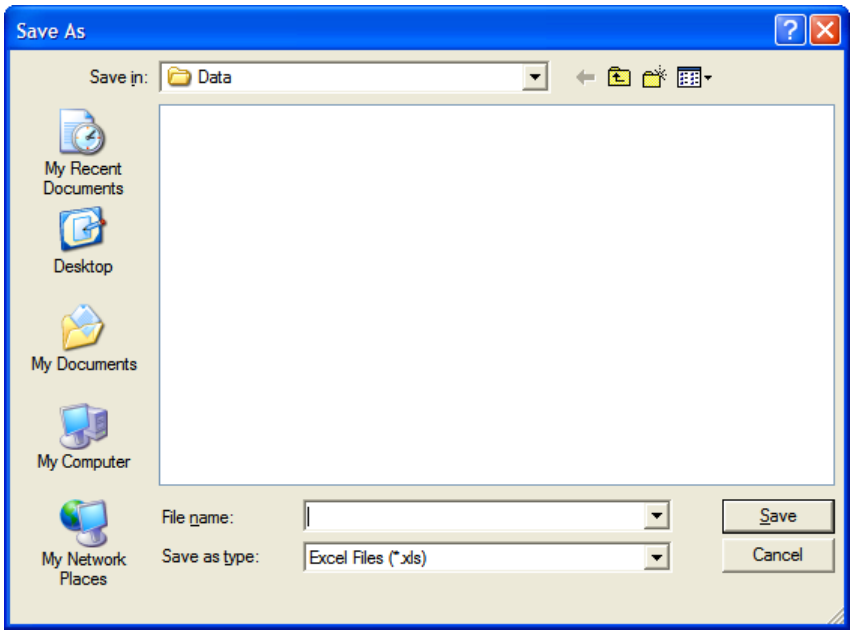


Figure 9-37 Selecting Excel File

Input a file name and click the Save button. You can then open the file in Excel and see the same data as in the summary presented in a spreadsheet.

4. You can use the mouse to select one or more contiguous records. Once selected, the Export Selection button will become enabled.

5. Click the Export Selection button to export the highlighted selection to an Excel file. You will be asked if you want to add to the previously exported data. If this selection is from the same summary that was previously exported, answer Yes, and the data will be added. Answering No will create a new Excel file. In either case, select the Excel file as in Figure 9-37 Selecting Excel File.

6. Click the Exit button or press *Alt+X* to return to Figure 9-3 Absorbed Dose ALERT Main Screen.

CHAPTER 10

LAB TESTS

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⚠ **CAUTION:** To ensure optimum performance of the CAPTUS 3000, before using the **Lab Tests** module, perform the System Setup Procedures as outlined in CHAPTER 4: GENERAL SETUP.

INTRODUCTION

The **Lab Tests** module on the CAPTUS 3000 Main screen is comprised of all the in vitro testing modules for urine and blood – Schilling Test, I 125 and Cr51 Blood Volume Test and RBC Survival Test.

Click the Lab Tests button or press *Alt+L* on the CAPTUS 3000 Main screen to access all the Lab Tests. Figure 10-1 Lab Tests Main Screen will appear.

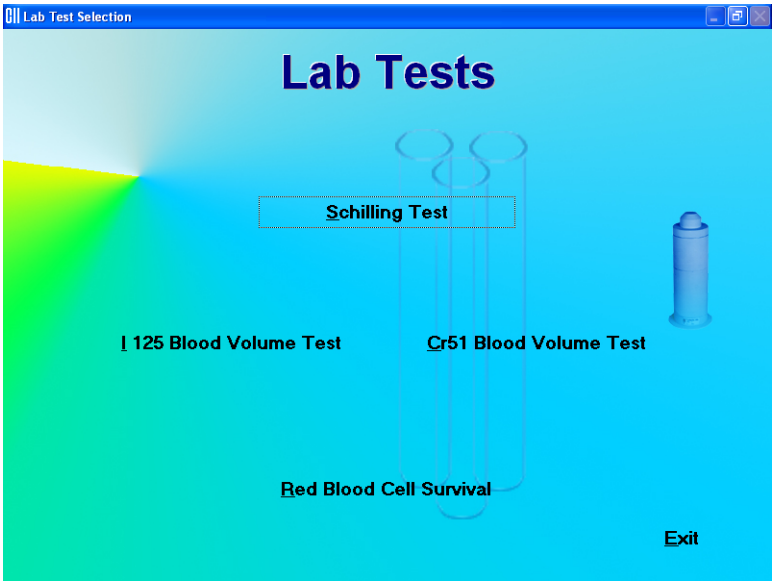


Figure 10-1 Lab Tests Main Screen

All the tests in the **Lab Tests** module have the same screen layout. As in Figure 10-2 Schilling Test Main Screen, they have the Exit, Add, Edit, Delete, Delete All, Setup, Report and Print function icons located at the top of the screen. The **Patient Directory** box, displaying the patient records, appears in the middle of the screen. The **Patient Status** box below displays the latest patient information (*For complete results of the patient, use the Report function located at the top of the screen*). The Count Selected Patient button at the bottom of the screen is used to perform measurements for a selected patient. The Data Acquisition screen also operates in an identical manner in each test.

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.*

Click the **Schilling Test** button or press *Alt+S* on Figure 10-1 Lab Tests Main Screen. Figure 10-2 Schilling Test Main Screen will appear. The **Patient Directory** box will be empty if there are currently no existing patients in the database. Each added patient will appear in this box with their name and ID number along with the time and date the last test was performed. The **Patient Status** box will show the data status of the patient if the test has not yet been performed, or the latest test results.

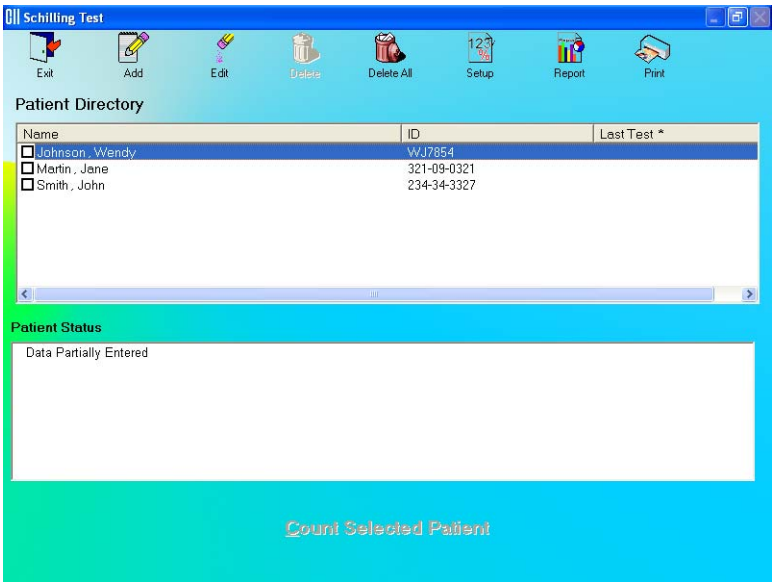


Figure 10-2 Schilling Test Main Screen

To return to the CAPTUS 3000 Main screen from here, click the Exit icon or press the *Esc* key. Click the **Exit** button or press the *Esc* key again.

Setup Counting Parameters

1. Click the

icon on Figure 10-2 Schilling Test Main Screen. The screen appears as shown in Figure 10-3. This screen allows the user to enter counting parameters, which will be the default settings each time a patient is entered into the Schilling Test Patient Directory. These settings may be changed as needed for any individual patient or patients.

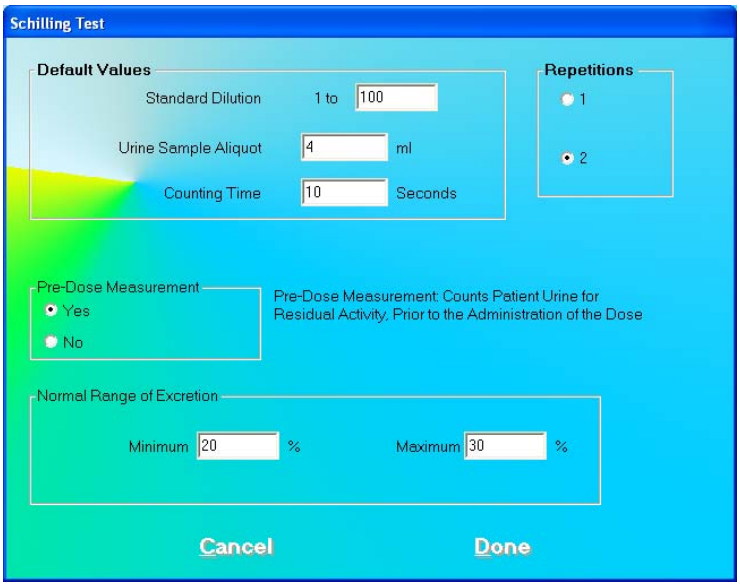


Figure 10-3

Default Values frame

Standard Dilution – Generally, the activity of the standard solution is too high to measure in a well counter without dilution. A 1 to 100 dilution means that 1 part of standard solution is mixed with 99 parts of non-radioactive solution to make a diluted solution of 1%. A 1 to 50 dilution is a 2% solution, and so on. The default value is set to 100.

Urine Sample Aliquot – This is the volume used for the sample counted in the well counter and should not exceed the useful counting dimensions of the well. An aliquot sample volume of 4 ml is a good sample volume for the well detector provided with the CAPTUS 3000 system.

Note: *The aliquot volume must be the same for both the patient's sample and the standard solution sample.*

Counting Time – This is the duration for counting, in seconds, each time a measurement is performed. The default value is set to 60 seconds.

Repetitions frame – This is the number of repetitions each time a measurement is made. For two repetitions, the average value is used in calculations. The second repetition may be skipped during the measurement procedure, if so desired.

Pre- Dose Measurement frame – This option allows patient urine to be counted before administering radioactive Vitamin B-12. The urine sample collected from the patient before administration is called the patient blank. It will be subtracted from the post-dose urine sample to yield net patient counts. This is an important measurement for a patient who has previously received a radioactive isotope that may be excreted in the urine. It may be skipped during the measurement procedure.

Normal Range of Excretion Frame – **Minimum** and **Maximum** – These numbers will define a range of values for excretion that can be considered as medically normal. They are entered as seen fit by the doctors. Out of range results indicate a medical condition and will be flagged in the report. Entering these values is optional.

2. To input new values in any frame, click in the appropriate text box or radio button or use the *Tab* key to move from one selection to another.

3. Click the Done button to save changes or click the Cancel button to discard the changes and return to Figure 10-2 Schilling Test Main Screen.

QUICK TIPS:

- The **Standard Dilution**, **Urine Sample Aliquot** and **Counting Time** fields appear again while adding a patient for a Schilling Test procedure. Any changes made on the Add Patient screen will override the default values entered in the Setup.
- For greater flexibility, set **Pre-Dose Measurement** to Yes and **Repetitions** to 2, as these additional steps may be skipped if desired, while performing the measurements.
- To return to previous screen without saving changes press the *ESC* key.

Adding Patients

Note: *All fields in **bold** are required before you can begin the Schilling Test. However, you may input the **Patient Name**, **Date of Birth** and **Patient ID** alone, click the* Done *button and input the remaining information later. The **Patient Status** box on Figure 10-2 Schilling Test Main Screen will display the message "Data Partially Entered".*

1. Click the Add icon on Figure 10-2 Schilling Test Main Screen. The Patient Information screen appears as shown in Figure 10-4, with information to be entered in three sections.

Figure 10-4

QUICK TIPS:

- Click in the text box or use the *Tab* key to move from one text box to another. To select from drop-down list use ↓ or ↑ keys.

2. Enter the **Patient Information**.
   - Enter the **Last Name**, **First Name**, **Date of Birth**, **Patient ID** and **Physician**.
   - In the **Sex** box, select male or female from the drop-down list or press the *M* or *F* key.

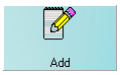
   Note: *Any combination of up to 20 alphanumeric characters can be used for the First Name, Last Name, ID and Physician. Fields not in bold are optional.*

3. Next, input the **Dosage Information**.
   - The name of the isotope used for labeling Vitamin B-12, Co57 appears on the screen.
   - The **Lot Number** and **Activity** may be determined from your measurements of the dose in a dose calibrator or from the previously prepared dose label.

4. In the **Sample Preparation** section, input the **Total Urine Volume** collected over the required period of time. **Standard Dilution** and **Urine Sample Aliquot** will reflect the default values entered in the Setup. Any new values entered in these text boxes will override the default settings.

5. Click in a **General Information** text box if you wish to change the default value for **Counting Time** or enter the ID number of the technician performing the procedure.

6. When finished adding patient data, click the Done button to save the entered information, or the Cancel button to discard the changes.

7. To add more patients, click the 

icon on Figure 10-2 Schilling Test Main Screen.

Editing Patient Information

Note: *Once the patient urine sample has been measured, the following fields on the Edit Patient screen cannot be changed – Lot Number, Activity, Total Urine Volume, Standard Dilution, Urine Sample Aliquot and Counting Time.*

1. To select (highlight) a patient to be edited, use the ↑ ↓ keys or *Page Up* and *Page Down* keys to move up or down in the patient list. If the list is long, the scroll bar is also available. To reach a particular patient, press the first letter of the patient name. Press the ↓ key if necessary, to go further down (Figure 10-5).

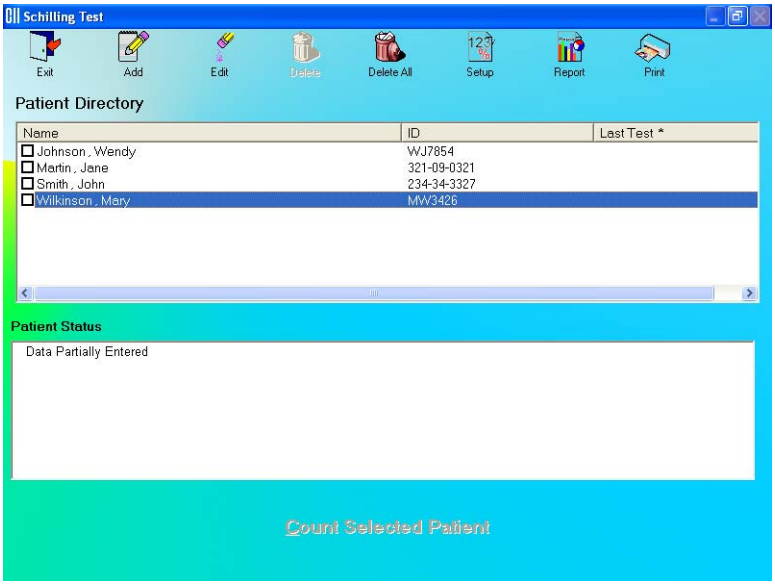
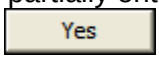
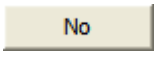


Figure 10-5

Selecting a patient with partially entered data will prompt you with the screen below (Figure 10-6). Click the 

button or press the *Y* key to update the patient information or click the 

button or press the *N* key to return to the Schilling Test Main screen.

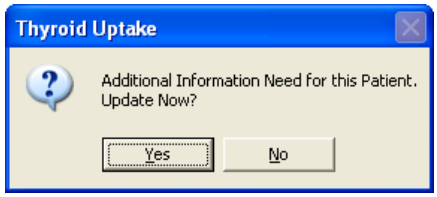
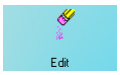


Figure 10-6

2. Click the 

icon. The screen appears as shown in Figure 10-7.

Figure 10-7

3. Click in the text box to be edited and type over the existing information.

   Note: *All fields in **bold** are required before you can begin the test.*

4. Click the Done button to save changes or click the Cancel button to discard the changes and return to Figure 10-2 Schilling Test Main Screen.

Deleting Patient Information

Note: *If you wish to save patient information before deleting, refer to CHAPTER 14: ARCHIVE.*

1. To select one or more patients for deletion, click in the check box to the left of the patient name in the **Patient Directory** box on the Main Schilling Test Screen (Figure 10-8). A check should appear in the check box to indicate it has been selected. To deselect a patient, click in their check box again and the check will be removed from the check box.

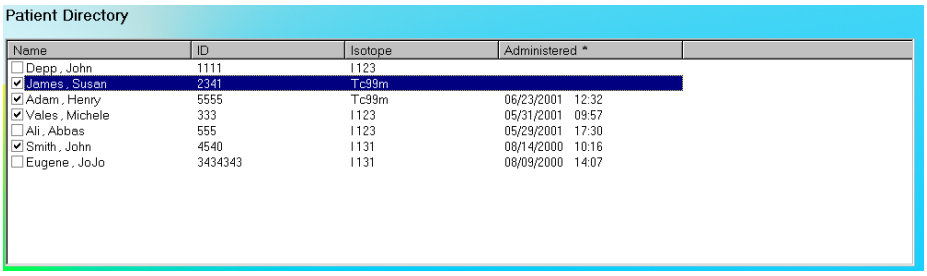
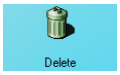


Figure 10-8

2. Click the 

icon. Figure 10-9 will appear.

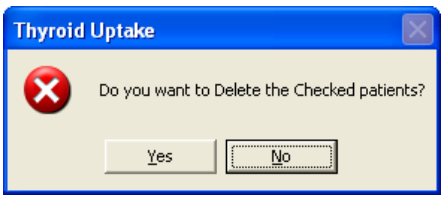
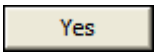
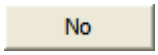
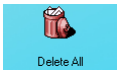


Figure 10-9

3. Click the 

button or press the *Y* key to confirm the deletion or click the 

button or press the *N* key to cancel.

4. To delete all the patients at once, simply click the 

icon. You will be prompted to confirm the deletion. Figure 10-10 will appear.

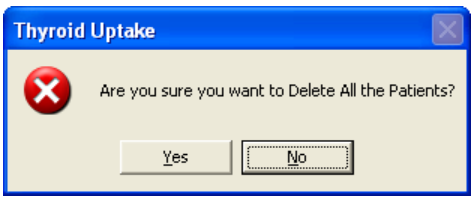
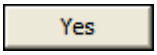
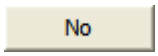


Figure 10-10

5. Click the 

button or press the *Y* key to confirm the deletion. Otherwise, click the 

button or press the *N* key.

Making Measurements

CAUTION: Calibration is recommended before making any measurements. Refer to CHAPTER 5: QUALITY ASSURANCE TESTS; SECTION: AUTO CALIBRATION.

- Before making any measurements on a patient, verify that all required patient information has been entered.
- Make sure the default settings on the Edit Patient screen and the Setup screen are appropriate. The values on Edit Patient screen override those on the Setup screen.

1. To select a patient for the test, click on that record in the **Patient Directory** box on Figure 10-2 Schilling Test Main Screen. The **Patient Status** box will show the current status of the patient. If this box reads, "All Data has been entered", the Count Selected Patient button at the bottom of the screen is accessible and the test can be started. If data is partially entered, the Count Selected Patient button is inaccessible.

   Note: *If the **Patient Status** box shows "Data Partially Entered", no measurements can be made until all the required information is entered. Refer to **Editing Patient Information** on page 10-7.*

2. To begin the measurements, click the Count Selected Patient button or press *Alt+C*. The screen appears as shown in Figure 10-12.

   Note: *If calibration has not been performed, you will be prompted with the screen as shown in Figure 10-11. After the calibration is complete, the program will return to the Schilling Test measurement screen shown in Figure 10-12.*

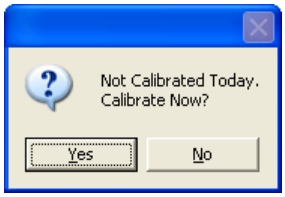


Figure 10-11

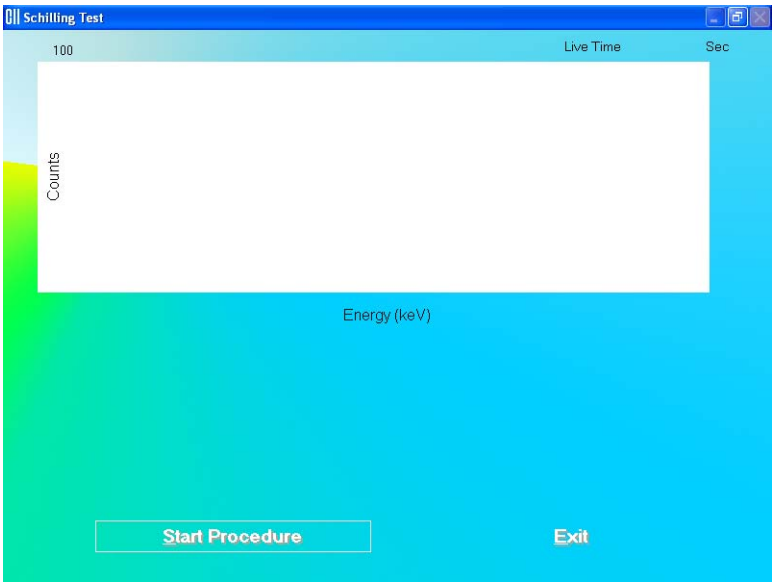


Figure 10-12

3. Click the Start Procedure button or press *Alt+S* to begin the test. Figure 10-13 will appear confirming the selected patient. To cancel the test or if the incorrect patient was selected, click the No button to return to Figure 10-5, otherwise click Yes to continue.

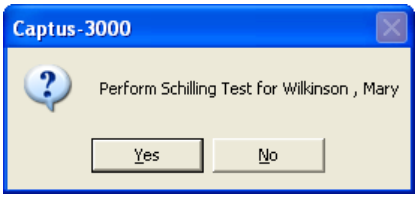


Figure 10-13

4. First, the screen prompts you to measure background counts as shown in Figure 10-15.

Note: *If the background has recently been counted, then the screen shown in Figure 10-14 will appear. To skip counting the background again and proceed to step 5, click the* Yes *button or press the Y key. To re-measure the background, click the* No *button or press the N key. The screen shown in Figure 10-15 will appear.*

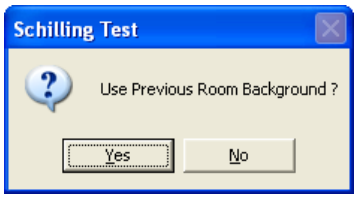


Figure 10-14

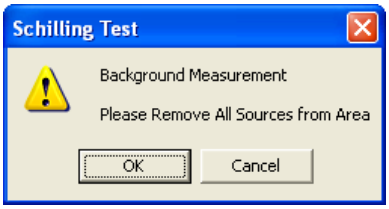


Figure 10-15

To begin counting, verify that there are no radioactive sources nearby and click the OK button. To abort the measurement, click the Cancel button and the screen will return to that shown Figure 10-12. To exit to Figure 10-2 Schilling Test Main Screen, click the Exit button or press *Alt+E*. To begin the test again, click the Start Procedure button or press *Alt+S*.

5. If the **Pre-Dose** Measurement option was set to YES in the setup, the screen prompts you to measure the pre-dose urine sample (patient blank) as shown in Figure 10-16.

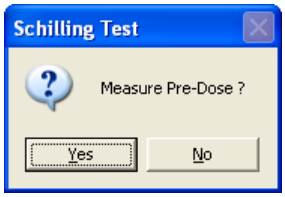


Figure 10-16

To measure patient blank, place the patient blank in the well and click the Yes button or press the *Y* key. To skip this step, click the No button or press the *N* key.

QUICK TIPS:

- To skip the second repetition or Pre-Dose measurements, click the No button or press the *N* key when prompted to do so.

6. The screen appears as in Figure 10-17, prompting you to measure the Co57 standard.

Figure 10-17

Note: *If the number of **Repetitions** in the setup has been set to 2, each measurement, except for the room background, will be repeated twice. You may skip the second repetition, if desired, by clicking the* No *button as shown in Figure 10-18.*

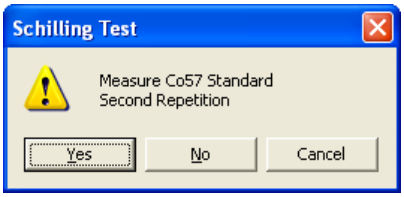


Figure 10-18

To begin counting, place the standard in the well and click the OK button. To quit counting, click the Cancel button. This will give a prompt to abort the patient test, as shown in Figure 10-19.

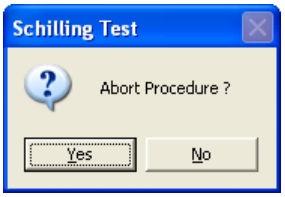


Figure 10-19

To abort the procedure, click the Yes button or press the *Y* key. Collected data will be discarded and the screen will return to the Schilling Test Measurement Screen (Figure 10-12). To resume the test, click the No button or press the *N* key.

7. The screen appears as shown in Figure 10-20, prompting you to measure the patient urine sample.

Figure 10-20

To measure the patient sample, place the sample in the well and click the OK button. To quit counting, click the Cancel button and Figure 10-19 will appear.

8. Click the Exit button or press *Alt+E* after the cycle of measurements is completed to return to Figure 10-2 Schilling Test Main Screen. The **Patient Status** box will show the calculated result for the test. For a detailed report, refer to **Patients Reports** on page 10-15.

Data Acquisition

The data acquisition screen appears as shown in Figure 10-21, which displays the live spectrum as counts are being collected.

Figure 10-21

To stop the counting midway and begin counting again, click the Re-Measure button or press *Alt+R*.

To stop the counting midway and save collected data and move to the next step, click the Stop and Save button or press *Alt+S*.

To stop the counting midway and quit without saving, click the Cancel button or press *Alt+C*. The abort procedure screen appears as shown in Figure 10-19.

After count collection is completed, the screen appears as shown in Figure 10-22.

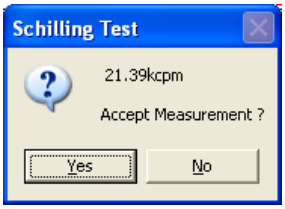


Figure 10-22

To accept the measurements and continue with the next step, click the Yes button or press the *Y* key. To discard and recount the current measurement, click the No button or press the *N* key.

Test Results

Once the measurement process for a patient is complete, clicking on the patient in the **Patient Directory** on Figure 10-2 Schilling Test Main Screen will show the latest test result in the **Patient Status** box. Test results are expressed as percent excretion, which is calculated as follows:

$$\%\ \text{Excretion} = \frac{100 \times (U - B) \times V/A}{(S - B) \times D}$$

where U = Urine sample count rate
B = Background (either room or patient blank)
S = standard count rate
V = total urine volume
A = urine aliquot
D = dilution of the standard

Patients Reports

1. Click on a patient in the **Patient Directory** box on Figure 10-2 Schilling Test Main Screen to select a patient for viewing or printing the report.

2. Click the Report icon. The screen appears as shown in Figure 10-23, showing a typical patient report. It contains the patient's demographic data, dosage and sample information, count data and calculated results. If Normal Range values have been entered in the setup, then the normal ranges will also be printed. Any results outside of these limits will be flagged in red.

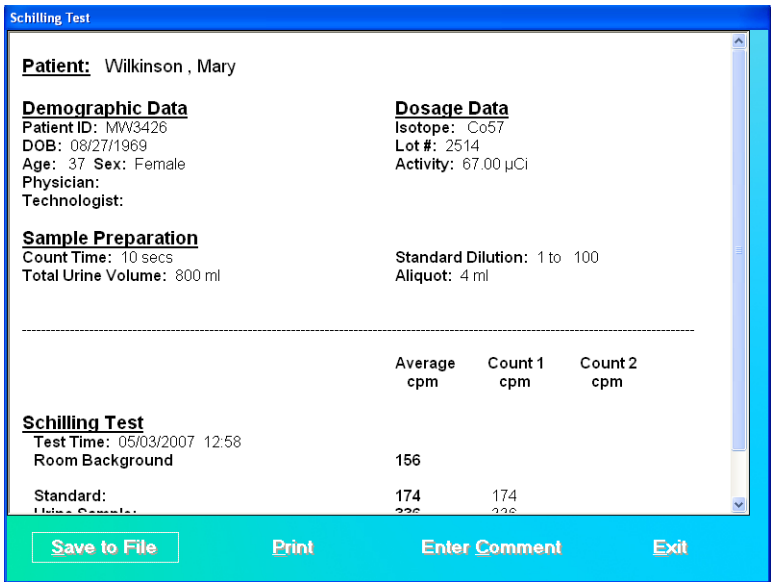


Figure 10-23

Scroll down the report screen to view the complete report. As shown in Figure 10-24, the results appear for each test performed, showing the time that the test was performed. If counting was repeated for a measurement, Count 1, Count 2 and their average are shown. This average is used for calculations. The calculated excretion appears at the end of each test.

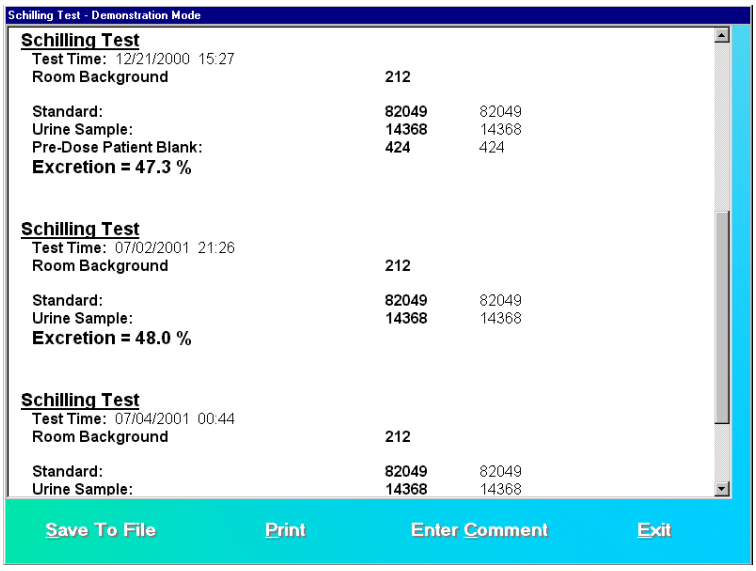


Figure 10-24

3. To save the report on the screen, click the Save to File button or press *Alt*+*S*. The Save As box appears as shown in Figure 10-25. Reports are saved as an RTF file in Captus3000_2\Reports\ folder by default.

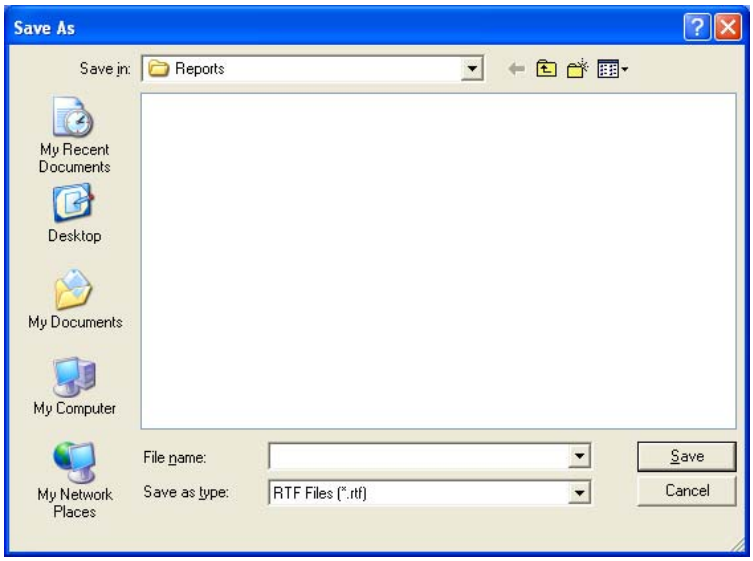


Figure 10-25

4. To print the report on the screen, click the Print button or press *Alt+P*.

5. To add comments to the report, click the Enter Comment button or press *Alt+C*. The screen appears as shown in Figure 10-26.

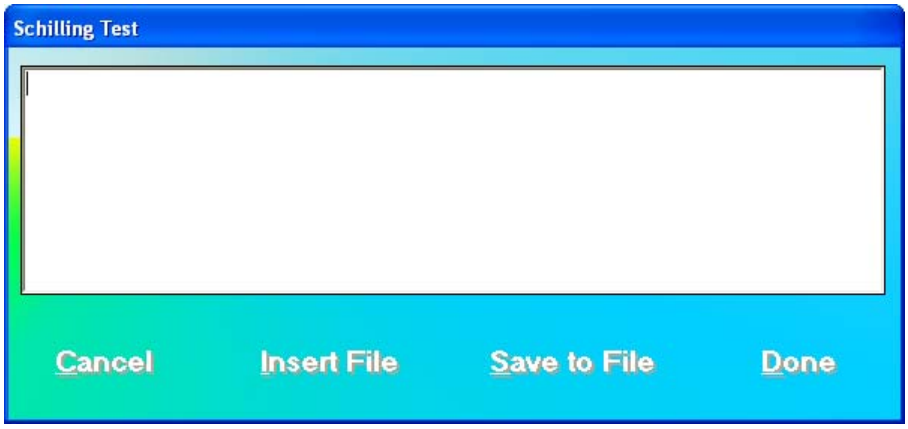


Figure 10-26

Type in the comments or click the Insert File button or press *Alt+I* to copy comments from a text file (Notepad or .txt files only).

To save the comments as a text file (.txt file), click the Save to File button or *Alt+S*.

To stop adding comments without saving, click the Cancel button or *Alt+C*.

To finish adding comments, click the Done button or *Alt+D*.

6. To exit to Figure 10-2 Schilling Test Main Screen, click the Exit button or press *Alt+E*.

QUICK TIPS:

- To print a patient report quickly, click on the patient in the **Patient Directory** box and click the Print icon. For each test for that patient, there will be a separate printout with patient demographic data, dosage data, details of Schilling Test (actual counts and calculated Excretion) and normal range and comments.

I 125 BLOOD VOLUME TEST

Note: *The CAPTUS 3000 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.

Click the I 125 Blood Volume Test button or press *Alt+I* on Figure 10-1 Lab Tests Main Screen (page 10-2). Figure 10-27 I 125 Blood Volume Test Main Screen will appear. The **Patient Directory** box will be empty if there are currently no existing patients in the database. Each added patient will appear in this box with their name and ID number along with the time and date the last test was performed. The **Patient Status** box will show the data status on the patient if the test has not yet been performed, or the latest test results.

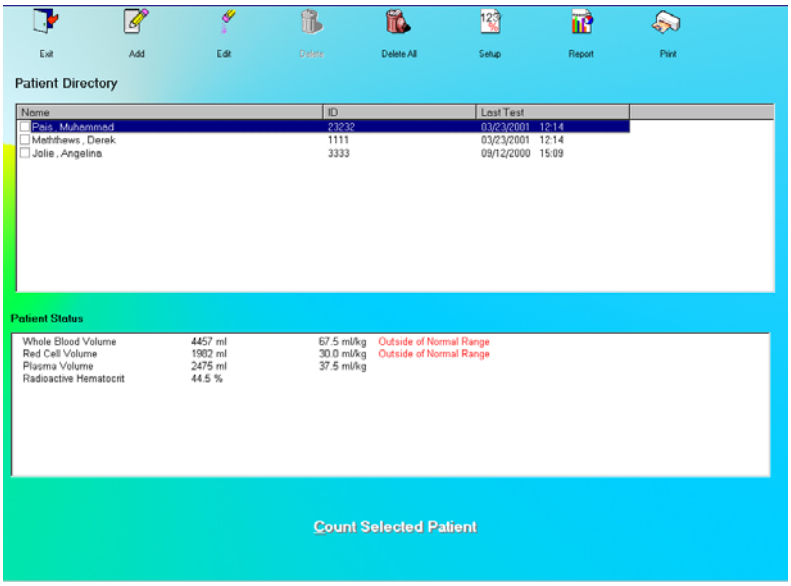


Figure 10-27 I 125 Blood Volume Test Main Screen

To return to the CAPTUS 3000 Main Screen from here, click the

icon or press the *Esc* key. Click the **Exit** button or press the *Esc* key again.

Setup Counting Parameters

1. Click the

icon on Figure 10-27 I 125 Blood Volume Test Main Screen. The screen appears as shown in Figure 10-28. This screen allows the user to input counting parameters, which will be the default settings each time a patient is entered into the I-125 Blood Volume Test Patient Directory. These settings may be changed as needed for any individual patient or patients.

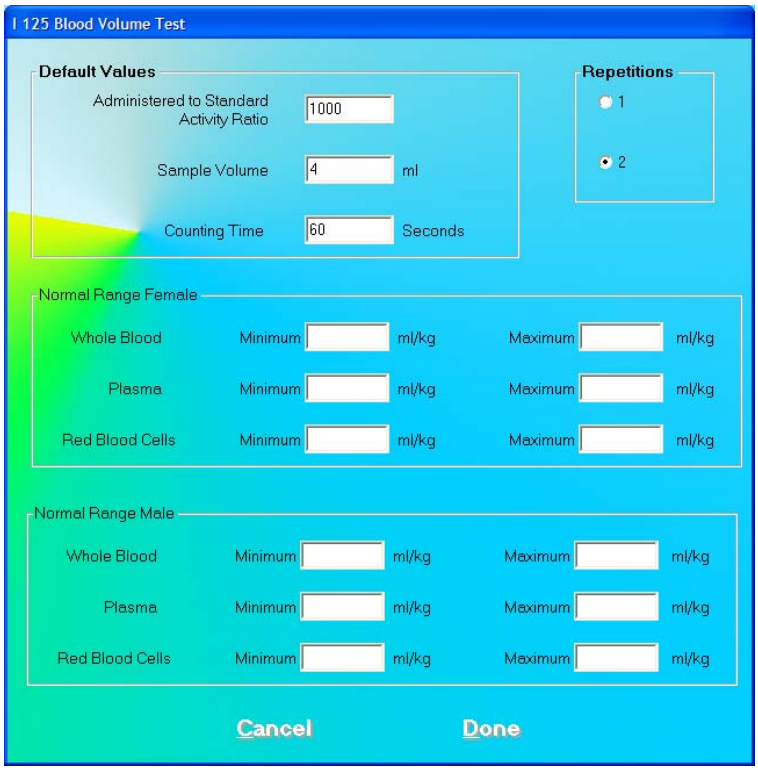


Figure 10-28

Default Values frame

Administered to Standard Activity Ratio – This is the standard dilution factor, which is 1000 for this procedure.

Sample Volume – This is the volume used for the samples counted in the well counter, and should not exceed the useful counting dimensions of the well. A sample volume of 4 ml is a good sample for the well detector provided with the CAPTUS 3000 system.

Note: *The volume must be the same for both the patient's sample and the standard solution sample.*

Counting Time – This is the duration for counting, in seconds, each time a measurement is performed. The default value is set to 60 seconds.

Repetitions frame – This is the number of repetitions each time a measurement is made. For two repetitions, the average value is used in calculations. The second repetition may be skipped during the measurement procedure, if so desired.

Normal Range (Female / Male) frames

Minimum and Maximum (ml/kg) for Whole Blood, Plasma and Red Blood Cells – These numbers will define a range of values for blood, plasma and red blood cell volumes respectively, for Females and Males, which can be considered normal for the patient's weight. They are entered as seen fit by the doctors. Out of range results indicate a medical condition and will be flagged in the report. Entering these values is optional.

2. To input new values in any frame, click in the appropriate text box or radio button or use the *Tab* key to move from one selection to another.

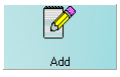
3. Click the Done button to save changes or click the Cancel button to discard the changes and return to Figure 10-27 I 125 Blood Volume Test Main Screen.

QUICK TIPS:

- The **Administered to Standard Activity Ratio**, **Sample Volume** and **Counting Time** fields appear again, while adding a patient for the I-125 Blood Volume Test. Any changes made on the Add Patient screen will override the default values entered in the Setup.
- For greater flexibility, set **Repetitions** to 2, as the second repetition may be skipped if desired, while performing the measurements.
- To return to previous screen without saving changes press the *Esc* key.

Adding Patients

Note: *All fields in **bold** are required, before beginning the I-125 Blood Volume Test. However, you may enter the **Patient Name**, **Date of Birth** and **Patient ID** alone, click the* Done *button and input the remaining information later. The **Patient Status** box on Figure 10-27 I 125 Blood Volume Test Main Screen will display the message "Data Partially Entered".*

1. Click the 

icon on Figure 10-27 I 125 Blood Volume Test Main Screen. The Patient Information screen appears as shown in Figure 10-29, with information to be entered in three sections.

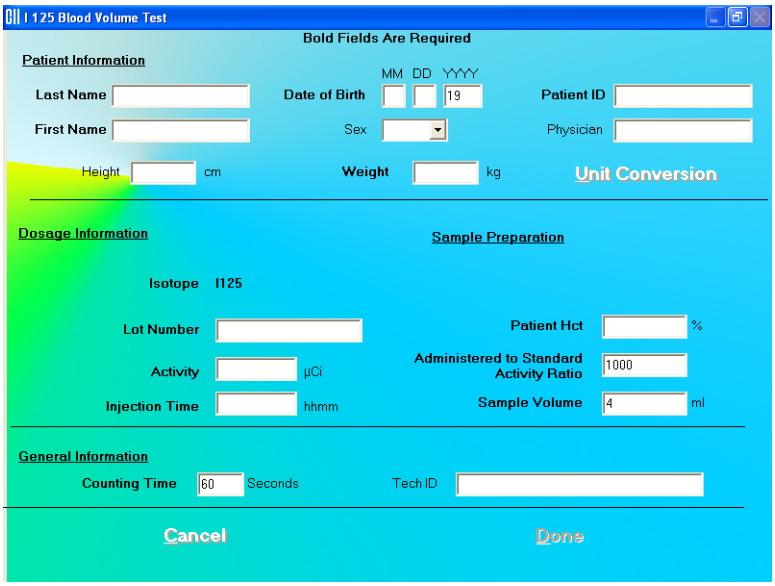


Figure 10-29

QUICK TIPS:

- Click in the text box or use the *Tab* key to move from one text box to another. To select from drop-down list use ↓ or ↑ keys.

2. Enter the **Patient Information**.
   - Input the **Last Name**, **First Name**, **Date of Birth**, **Patient ID** and **Physician**.
   - In the **Sex** box, select male or female from the drop-down list or press the *M* or *F* key.

   Note: *Any combination of up to 20 alphanumeric characters can be used for the First Name, Last Name, ID and Physician. Fields not in bold are optional.*

3. Input the **Weight** in kg (If weight is only known in pounds then click the Unit Conversion button or press *Alt+U* to convert weight from lb to kg). The screen appears as shown in Figure 10-30.

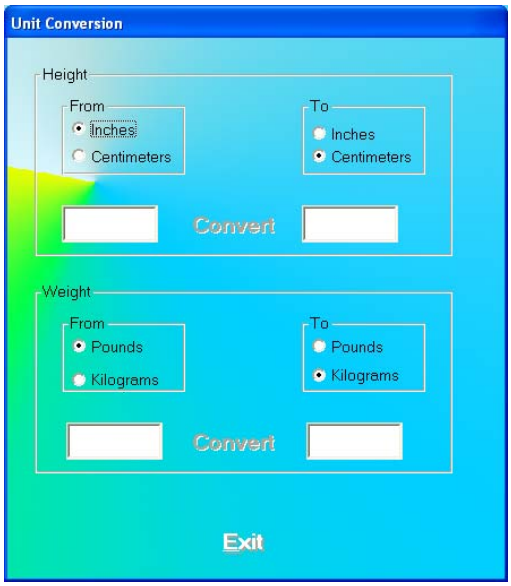


Figure 10-30

This screen converts units for height and weight.

a. Click the appropriate radio button in the **From** and **To** frames to convert height or weight from one unit to another.
b. Click in the text box to input height or weight that is to be converted.
c. Then click the Convert button to convert the entered value into the other unit.
d. Repeat Steps a, b and c to do more conversions if needed.
e. Click the Exit button or press *Alt+E* to return to Figure 10-29.

4. Next, input the **Dosage Information**.
   - The name of the isotope used for the procedure, I-125, appears on the screen.
   - The **Lot Number** and **Activity** may be determined from your measurements of the dose in a dose calibrator or from the previously prepared dose label.

5. In the **Sample Preparation** section, input the hematocrit result for the patient as a percentage in the **Patient HCT** box, which will be used in the calculation of the results. The other two text boxes will show the default values from setup. You may alter them if necessary.

6. Click in a **General Information** text box if you wish to change the default value for **Counting Time** or enter the ID number of the technician performing the procedure.

7. When finished adding patient data, click the Done button to save the entered information, or the Cancel button to discard the changes.

8. To add more patients, click the Add icon on Figure 10-27 I 125 Blood Volume Test Main Screen.

Editing Patient Information

Note: *Once the test has begun, none of the Dosage Information fields, Sample Preparation fields or Counting Time can be changed.*

1. To select (highlight) a patient to be edited, use the ↑ ↓ keys or *Page Up* and *Page Down* keys to move up or down in the patient list. If the list is long, the scroll bar is also available. To reach a particular patient, press the first letter of the patient name. Press the ↓ key if necessary, to go further down (Figure 10-31).

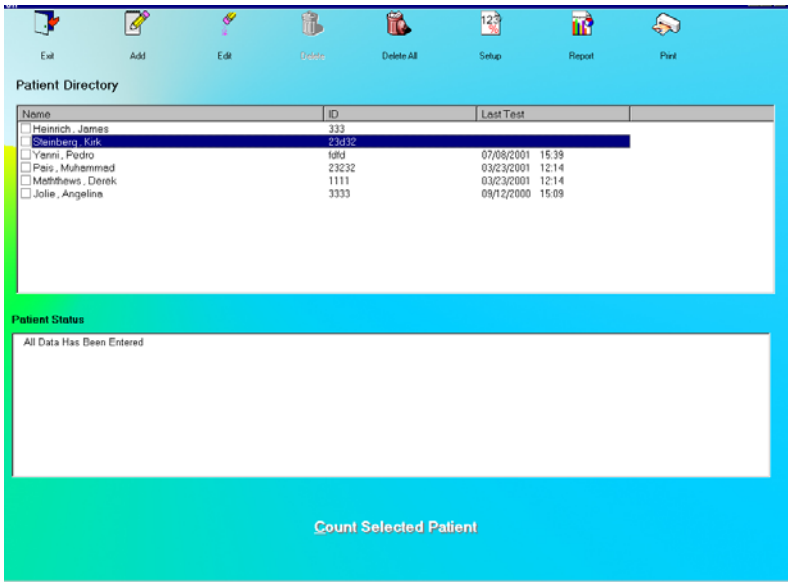


Figure 10-31

Selecting a patient with partially entered data will prompt you with the screen below (Figure 10-32). Click the Yes button or press the *Y* key to update the patient information or click the No button or press the *N* key to return to the main I 125 Blood Volume Test screen.

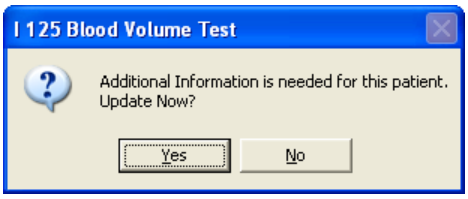


Figure 10-32

2. Click the Edit icon. The screen appears as shown in Figure 10-29.

3. Click in the text box to be edited and type over the existing information.

   Note: *All fields in **bold** are required before testing can begin.*

4. Click the Done button to save changes or click the Cancel button to discard the changes and return to Figure 10-27 I 125 Blood Volume Test Main Screen.

Deleting Patient Information

Note: *If you wish to save patient information before deleting, refer to CHAPTER 14: ARCHIVE.*

1. To select one or more patients for deletion, click in the check box to the left of the patient name in the **Patient Directory** box on the Main I 125 Blood Volume Test Screen (Figure 10-33). A check mark should appear in the check box to indicate it has been selected. To deselect a patient, click in their check box again and the check will be removed from the check box.

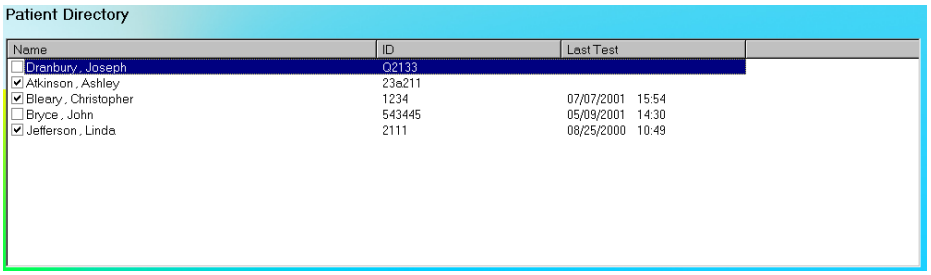


Figure 10-33

2. Click the Delete icon. Figure 10-34 will appear.

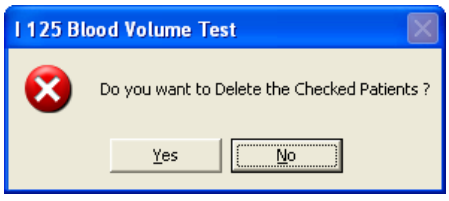


Figure 10-34

3. Click the Yes button or press the *Y* key to confirm the deletion or click the No button or press the *N* key to cancel.

4. To delete all the patients at once, simply click the Delete All icon. You will be prompted to confirm the deletion. Figure 9-52 appears.

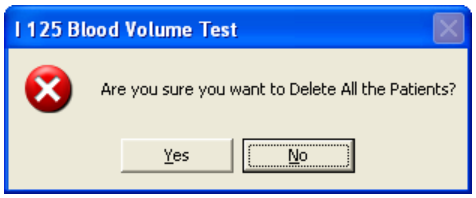


Figure 10-35

5. Click the Yes button or press the *Y* key to confirm the deletion. Otherwise, click the No button or press the *N* key.

Making Measurements

CAUTION: Calibration is recommended before making any measurements. Refer to CHAPTER 5: QUALITY ASSURANCE TESTS; SECTION: AUTO CALIBRATION.

- Before making any measurements on a patient, verify that all required patient information has been entered.
- Make sure the default settings on the Edit Patient screen and the Setup screen are appropriate. The values on the Edit Patient screen override those on the Setup screen.

1. To select a patient for the test, click on that record in the **Patient Directory** box on Figure 10-27 I 125 Blood Volume Test Main Screen. The **Patient Status** box will show the current status of the patient. If this box reads, "All Data Has Been Entered", the Count Selected Patient button at the bottom of the screen is accessible and the test can be started. If data is partially entered, the Count Selected Patient button is inaccessible.

   Note: *If the **Patient Status** box shows "Data Partially Entered", no measurements can be made until all the required information is entered. Refer to **Editing Patient Information** on page 10-24.*

2. To begin the measurements, click the Count Selected Patient button or press *Alt+C*. The screen appears as shown in Figure 10-37.

   Note: *If calibration has not been performed, you will be prompted with the screen as shown in Figure 10-36. If you calibrate now, the screen will return after calibration to the screen shown in Figure 10-37.*

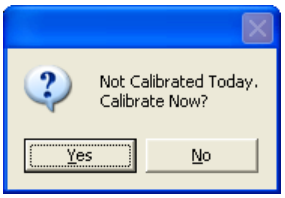


Figure 10-36

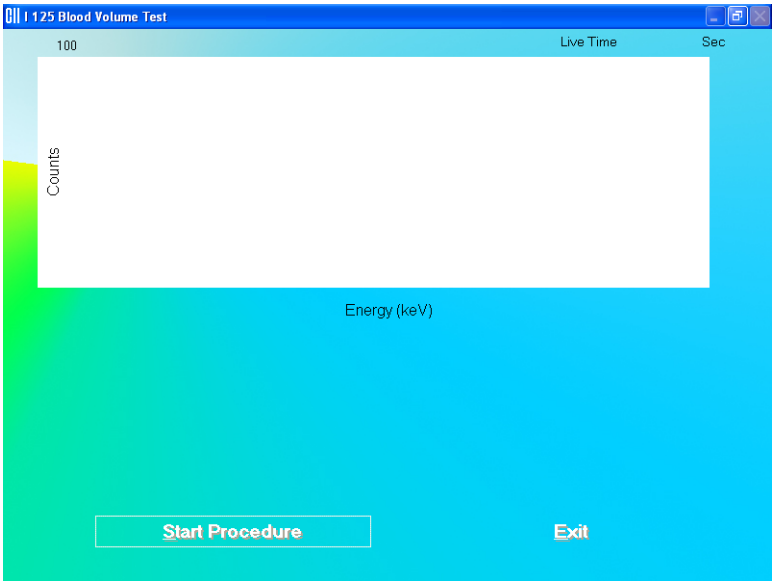


Figure 10-37

3. Click the Start Procedure button or press *Alt+S* to begin the test. Figure 10-38 will appear confirming the selected patient. To cancel the test or if the incorrect patient was selected, click the No button to return to Figure 10-31, otherwise click Yes to continue.

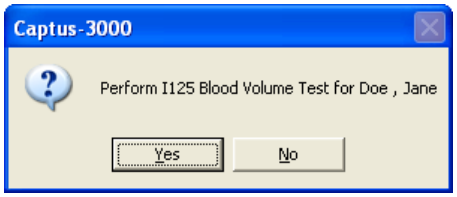


Figure 10-38

4. First, the screen prompts you to measure background counts as shown in Figure 10-40.

   Note: If the background has recently been counted, then the screen shown in Figure 10-39 will appear. To skip counting the background again and proceed to step 5, click the Yes button or press the *Y* key. To re-measure the background,

click the No button or press the *N* key. The screen shown in Figure 10-40 will appear.

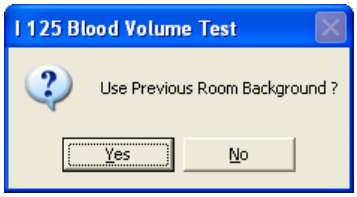


Figure 10-39

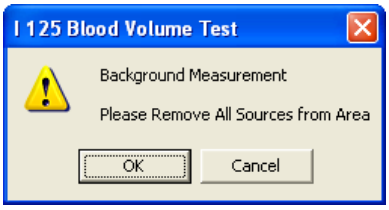


Figure 10-40

To begin counting, verify that there are no radioactive sources nearby and click the OK button. To abort the measurement, click the Cancel button and the screen will return to that shown in Figure 10-37. To exit to the Main I 125 Blood Volume Test Screen, click the Exit button or press *Alt+E*. To begin the test again, click the Start Procedure button or press *Alt+S*.

5. The screen then appears as shown in Figure 10-41, prompting measurement of the whole blood standard.

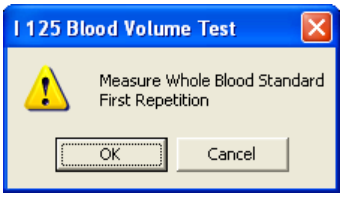


Figure 10-41

To begin counting, place the standard in the well and click the OK button. To quit counting, click the Cancel button. This will give a prompt to abort the test for the patient, as shown in Figure 10-42.

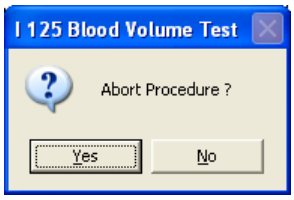


Figure 10-42

To abort the procedure, click the Yes button or press the *Y* key. Collected data will be discarded and the screen will return to the I 125 Blood Volume Test measurement screen. To resume the test, click the No button or press the *N* key.

6. The next screen appears as shown in Figure 10-43, prompting you to measure the whole blood sample.

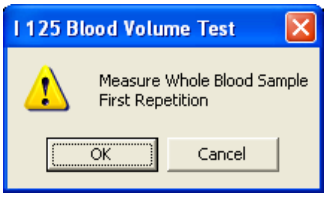


Figure 10-43

To measure the patient sample, place the whole blood sample in the well and click the OK button. To quit counting, click the Cancel button and Figure 10-42 will appear.

7. The screen appears as shown in Figure 10-44, prompting measurement of the patient plasma sample.

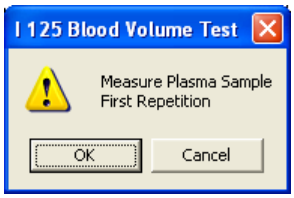


Figure 10-44

To measure the plasma sample, place that sample in the well and click the OK button. To quit counting, click the Cancel button and Figure 10-43 will appear.

8. Click the Exit button or press *Alt+E* after the cycle of measurements is completed to return to the Main I 125 Blood Volume Test Screen. The **Patient Status** box will show the

calculated results for the test. For a detailed report, refer to **Patients Reports** in this chapter.

Test Results

Once the measurement process for a patient is complete, clicking on the patient in the **Patient Directory** on the Main I 125 Blood Volume Test Screen will show the latest test result in the **Patient Status** box. Test results are calculated as follows:

$$\text{Plasma Volume} = \frac{W \times D \times A}{L}$$

$$\text{Whole Blood Volume} = \frac{W \times D \times A}{S}$$

$$\text{Red Cell Volume} = \text{Whole Blood Volume} - \text{Plasma Volume}$$

$$\text{Radioactive Hematocrit} = \frac{\text{Red Cell Volume}}{\text{Whole Blood Volume}}$$

where W = Net standard count rate
D = Administered to standard ratio
A = Sample size
L = Net patient plasma sample count rate
S = Net patient whole blood sample count rate

Patients Reports

Patient reports can be obtained as described in Schilling Test **Patients Reports** section on page 10-15.

Cr51 BLOOD VOLUME TEST

Note: *The CAPTUS 3000 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.

Click the Cr51 Blood Volume Test button or press *Alt+C* on Figure 10-1 Lab Tests Main Screen. Figure 10-45 Cr51 Blood Volume Test Main Screen will appear. The **Patient Directory** box will be empty if there are currently no existing patients in the database. Each added patient will appear in this box with their name and ID number along with the time and

date the last test was performed. The **Patient Status** box will show the data status on the patient.

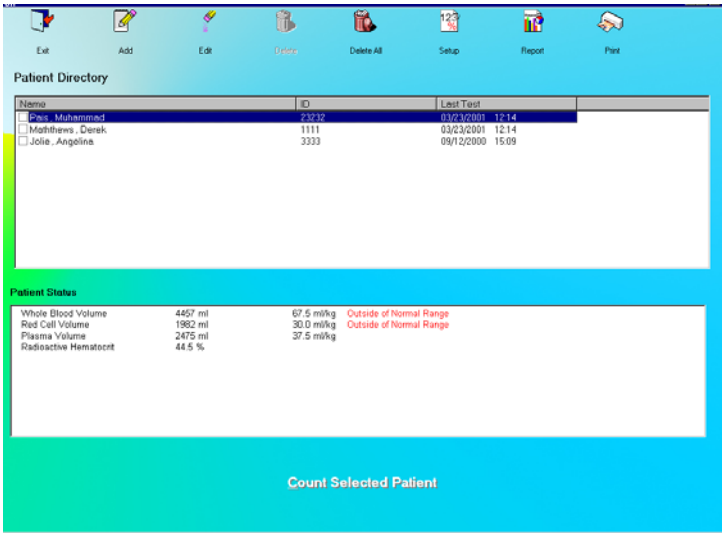


Figure 10-45 Cr51 Blood Volume Test Main Screen

To return to the CAPTUS 3000 Main screen from here, click the

icon or press the *Esc* key. Click the **Exit** button or press the *Esc* key again.

Setup Counting Parameters

1. Click the

icon on Figure 10-45 Cr51 Blood Volume Test Main Screen. The screen appears as shown in Figure 10-46. This screen allows the user to enter counting parameters, which will be the default settings each time a patient is entered into the Cr51 Blood Volume Test Patient Directory. These settings may be changed as needed for any individual patient or patients.

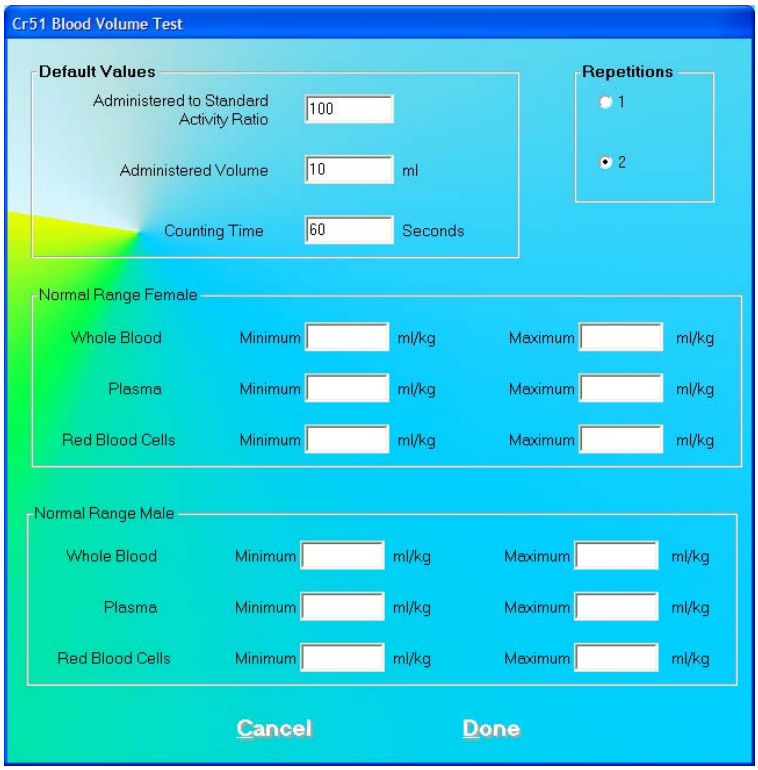


Figure 10-46

Default Values frame

Administered to Standard Activity Ratio – This is the standard dilution factor, which for this procedure is 100.

Administered Volume – This is the volume injected into the patient.

Counting Time – This is the duration for counting, in seconds, each time a measurement is performed. The default value is set to 60 seconds.

Repetitions frame – This is the number of repetitions each time a measurement is made. For two repetitions, the average value is used in calculations. The second repetition may be skipped during the measurement procedure, if so desired.

Normal Range (Female / Male) frames – **Minimum** and **Maximum** (ml/kg) for **Whole Blood, Plasma** and **Red Blood Cells** – These numbers will define a range of values for blood, plasma and red blood cell volumes respectively, for Females and Males, that can be considered as medically normal for the patient's weight. They are entered as seen fit by the doctors. Out of range results indicate a medical condition and will be flagged in the report. Entering these values is optional.

2. To input values in any frame, click in the appropriate text box or radio button or use the *Tab* key to move from one selection to another.

3. Click the Done button to save changes or click the Cancel button to discard the changes and return Figure 10-45 Cr51 Blood Volume Test Main Screen.

QUICK TIPS:

- The **Administered to Standard Activity Ratio**, **Administered Volume** and **Counting Time** fields appear again while adding a patient for Cr51 Blood Volume Test. Any changes made on the Add Patient screen will override the default values entered in the Setup.
- For greater flexibility, set **Repetitions** to 2, as the second repetition may be skipped if desired, while performing the measurements.
- To return to previous screen without saving changes press the *Esc* key.

Adding Patients

Note: *All fields in **bold** are required before you can begin the Cr51 Blood Volume Test. However, you may enter the **Patient Name**, Date **of Birth** and **Patient ID** alone, click the* Done *button and enter the remaining information later. The **Patient Status** box on the main Cr51 Blood Volume Test screen will display the message "Data Partially Entered".*

1. Click the Add icon on Figure 10-45 Cr51 Blood Volume Test Main Screen. The Patient Information screen appears as shown in Figure 10-47, with information to be entered in three sections.

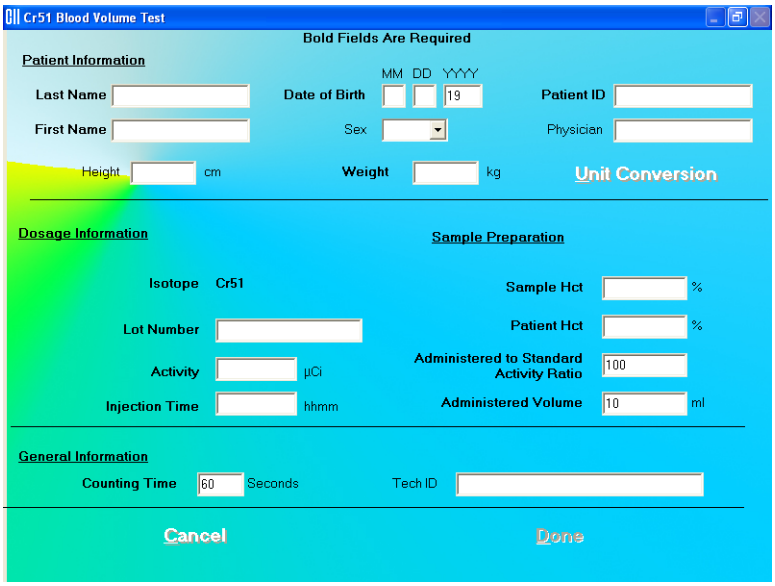


Figure 10-47

QUICK TIPS:

- Click in the text box or use the *Tab* key to move from one text box to another.

To select from drop-down list use ↓ or ↑ keys.

2. Enter the **Patient Information**.
   - Input the **Last Name**, **First Name**, **Date of Birth**, **Patient ID** and **Physician**.
   - In the **Sex** box, select male or female from the drop-down list or press the *M* or *F* key.

   Note: *Any combination of up to 20 alphanumeric characters can be used for the First Name, Last Name, ID and Physician. Fields not in bold are optional.*

3. Input the **Weight** in kg (If weight is only known in pounds then click the Unit Conversion button or press *Alt+U* to convert weight from lb to kg). The screen appears as shown in Figure 10-48.

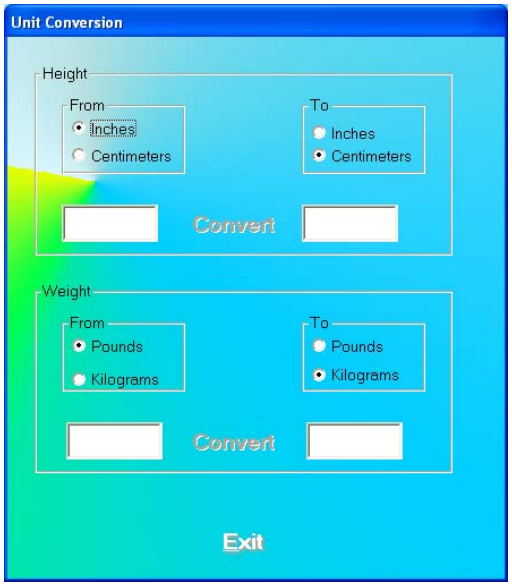


Figure 10-48

This screen converts units for height and weight.

a. Click the appropriate radio button in the **From** and **To** frames to convert height or weight from one unit to another.
b. Click in the text box to enter height or weight that is to be converted.
c. Then click the Convert button to convert the entered value into the other unit.
d. Repeat Steps a, b and c to do more conversions if needed.
e. Click the Exit button or press *Alt+E* to return to Figure 10-47.

4. Next, enter the **Dosage Information**.
   - The name of the isotope used for the procedure, Cr51, appears on the screen.
   - The **Lot Number** and **Activity** may be determined from your measurements of the dose in a dose calibrator or from the previously prepared dose label.

5. In the **Sample Preparation** section, input the hematocrit result for the Sample and Patient as percentages in the **Sample HCT** and **Patient HCT** boxes, respectively, which will be used in the calculation of the results. The other two text boxes will show the default values from setup. You may alter them if necessary.

6. Click in a **General Information** text box if you wish to change the default value for **Counting Time** or enter the ID number of the technician performing the procedure.

7. When finished adding patient data, click the Done button to save the entered information, or the Cancel button to discard the changes.

8. To add more patients, click the Add icon on Figure 10-45 Cr51 Blood Volume Test Main Screen.

Editing Patient Information

Note: *Once the test has begun, none of the Dosage Information fields, Sample Preparation fields or Counting Time can be changed.*

1. To select (highlight) a patient to be edited, use the ↑ ↓ keys or *Page Up* and *Page Down* keys to move up or down in the patient list. If the list is long, the scroll bar is also available. To reach a particular patient, press the first letter of the patient name. Press the ↓ key if necessary, to go further down (Figure 10-49).

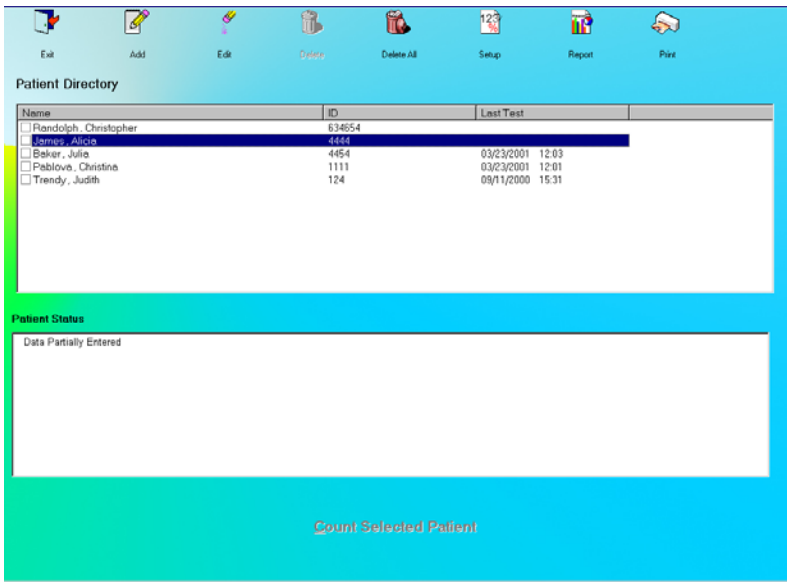


Figure 10-49

Selecting a patient with partially entered data will prompt you with the screen below (Figure 10-50). Click the Yes button or press the *Y* key to update the patient

information or click the No button or press the *N* key to return to Figure 10-45 Cr51 Blood Volume Test Main Screen.

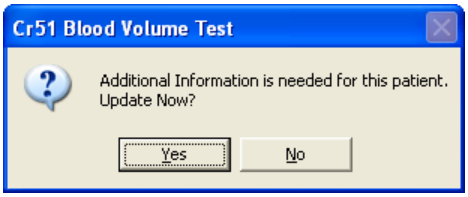


Figure 10-50

2. Click the Edit icon. The screen appears as shown in Figure 10-47.

3. Click in the text box to be edited and type over the existing information.

   Note: *All fields in **bold** are required before you can begin the test.*

4. Click the Done button to save changes or click the Cancel button to discard the changes and Figure 10-45 Cr51 Blood Volume Test Main Screen.

Deleting Patient Information

Note: *If you wish to save patient information before deleting, refer to CHAPTER 14: ARCHIVE.*

1. To select one or more patients for deletion, click in the check box to the left of the patient name in the **Patient Directory** box on the main Cr51 Blood Volume Test screen (Figure 10-51). A check mark should appear in the check box to indicate it has been selected. To deselect a patient, click in their check box again and the check will be removed from the check box.

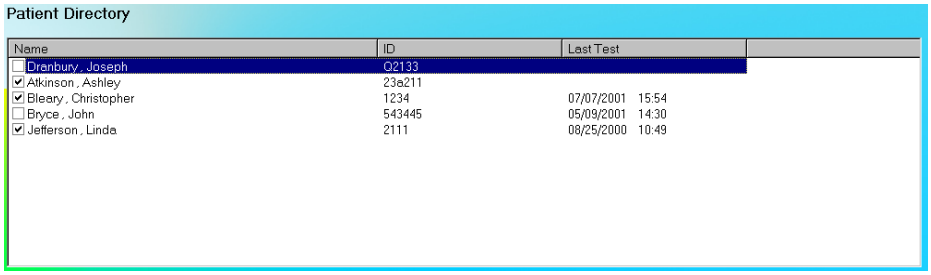


Figure 10-51

2. Click the Delete icon. Figure 10-52 will appear.

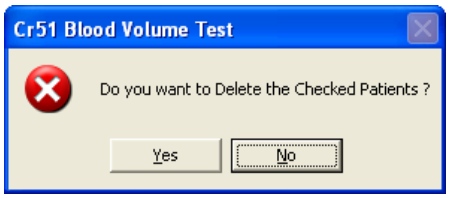


Figure 10-52

3. Click the Yes button or press the *Y* key to confirm the deletion or click the No button or press the *N* key to cancel.

4. To delete all the patients at once, simply click the Delete All icon. You will be prompted to confirm the deletion. Figure 10-53 will appear.

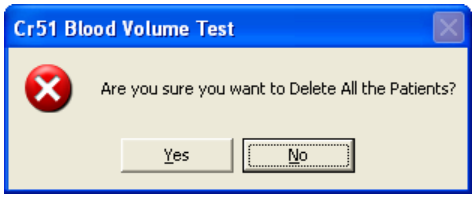


Figure 10-53

5. Click the Yes button or press the *Y* key to confirm the deletion. Otherwise, click the No button or press the *N* key.

Making Measurements

CAUTION: Calibration is recommended before making any measurements. Refer to CHAPTER 5: QUALITY ASSURANCE TESTS; SECTION: AUTO CALIBRATION.

- Before making any measurements on a patient, verify that all required patient information has been entered.
- Make sure the default settings on Edit Patient screen and the Setup screen are appropriate. The values on Edit Patient screen override those on the Setup screen.

1. To select a patient for the test, click on that record in the **Patient Directory** box on Figure 10-45 Cr51 Blood Volume Test Main Screen. The **Patient Status** box will show the current status of the patient. If this box reads, “All Data has been entered”, the Count Selected Patient button at the bottom of the screen is accessible and the test can be started. If data is partially entered, the Count Selected Patient button is inaccessible.

Note: *If the **Patient Status** box shows "Data Partially Entered", no measurements can be made until all the required information is entered. Refer to **Editing Patient Information** on page 10-35.*

2. To begin the measurements, click the Count Selected Patient button or press *Alt+C*. The screen appears as shown in Figure 10-54.

Note: *If calibration has not been performed, you will be prompted with the screen as shown in Figure 10-54. After the calibration is complete, the program will return to the Schilling Test measurement screen shown in Figure 10-55.*

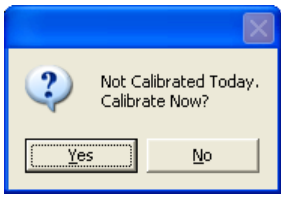


Figure 10-54

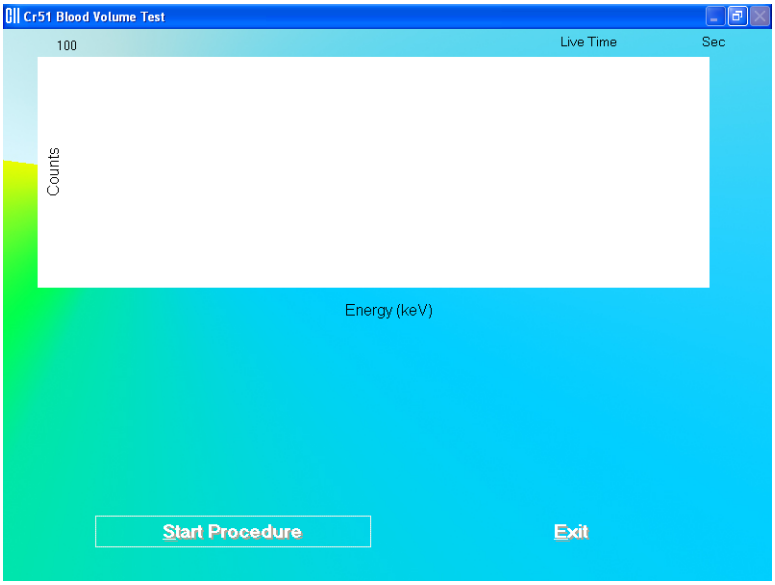


Figure 10-55

3. Click the Start Procedure button or press *Alt+S* to begin the test. Figure 10-56 will appear confirming the selected patient. To cancel the test or if the incorrect patient was selected, click the No button to return to Figure 10-49, otherwise click Yes to continue.

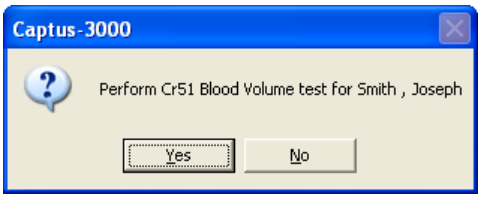


Figure 10-56

4. First, the screen prompts you to measure background counts as shown in Figure 10-58.

   Note: *If the background has recently been counted, then the screen shown in Figure 10-57 will appear. To skip counting the background again and proceed to step 5, click the* Yes *button or press the Y key. To re-measure the background, click the* No *button or press the N key. The screen shown in Figure 10-58 will appear.*

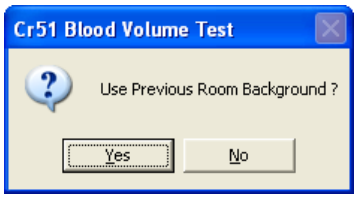


Figure 10-57

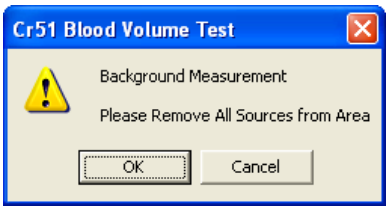


Figure 10-58

To begin counting, verify that there are no radioactive sources nearby and click the OK button. To abort the measurement, click the Cancel button and the screen will return to that shown in Figure 10-55. To exit to main Cr51 Blood Volume test screen, click the Exit button or press *Alt+E*. To begin the test again, click the Start Procedure button or press *Alt+S*.

5. The screen appears as shown in Figure 10-59, prompting you to measure the whole blood standard.

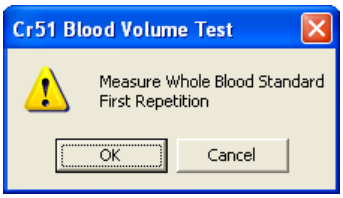


Figure 10-59

To begin counting, place the standard in the well and click the OK button. To quit counting, click the Cancel button. This will provide a prompt to abort the patient test, as shown in Figure 10-60.

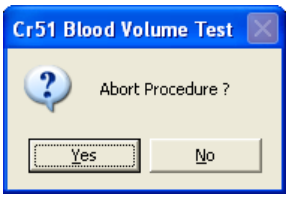


Figure 10-60

To abort the procedure, click the Yes button or press the *Y* key. Collected data will be discarded and the screen will return to Figure 10-45 Cr51 Blood Volume Test Main Screen. To resume the test, click the No button or press the *N* key.

6. Next the screen appears as in Figure 10-61, prompting you to measure the plasma standard.

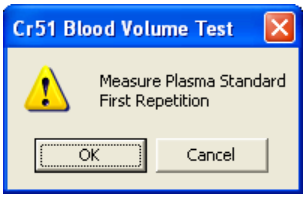


Figure 10-61

To measure, place the plasma standard in the Well and then click the OK button. To quit counting, click the Cancel button and Figure 10-60 will appear.

7. The screen will appear as shown in Figure 10-62, prompting you to measure the whole blood sample.

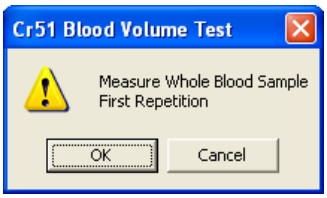


Figure 10-62

To measure, place the whole blood sample in the well and click the OK button. To stop counting, click the Cancel button and see Step 5 above.

8. The screen appears as shown in Figure 10-63, prompting you to measure the patient plasma sample

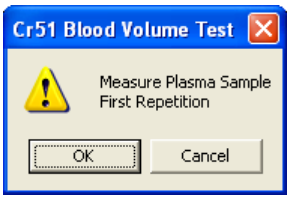


Figure 10-63

To measure the plasma sample, place that sample in the well and click the OK button. To stop counting, click the Cancel button and see Step 5 above.

9. Click the Exit button or press *Alt+E* after the cycle of measurements is completed to return to Figure 10-45 Cr51 Blood Volume Test Main Screen. The **Patient Status** box will show the calculated results for the test. For a detailed report, refer to **Patients Reports** on page 10-42.

Test Results

Once the measurement process for a patient is complete, clicking on the patient in the **Patient Directory** on the Main Cr51 Blood Volume Test Screen will show the latest test results in the **Patient Status** box. Test results are expressed in ml and ml/kg weight of the patient. They are calculated as follows:

$$\text{Red Cell Volume} = \frac{[W - P \times (1 - H)] \times C \times D \times A}{S - L \times (1 - C)}$$

$$\text{Whole Blood Volume} = \frac{\text{Red Cell Volume}}{C}$$

$$\text{Plasma Volume} = \text{Whole Blood Volume} - \text{Red Cell Volume}$$

where W = Net whole blood standard count rate
P = Net plasma standard count rate
H = Hematocrit of standard
C = Hematocrit of patient
D = Administered to standard ratio
A = Administered Volume
S = Net patient whole blood sample count rate
L = Net patient plasma sample count rate

Patients Reports

Patient reports can be obtained as described in **Schilling Test Patients Reports** section on page 10-15.

RBC SURVIVAL TEST

Note: *The CAPTUS 3000 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) measurement. The subsequent samples are corrected for any differences in hematocrit.

Click the

button or press *Alt+R* on Figure 10-1 Lab Tests Main Screen. Figure 10-64 RBC Survival Test Main Screen will appear. The **Patient Directory** box will be empty if there are currently no existing patients in the database. Each added patient will appear in this box with their name and ID number along with the time and date of the injection given to the patient. The **Patient Status** box will show the data status of the patient if test has not yet been performed, or the latest test results.

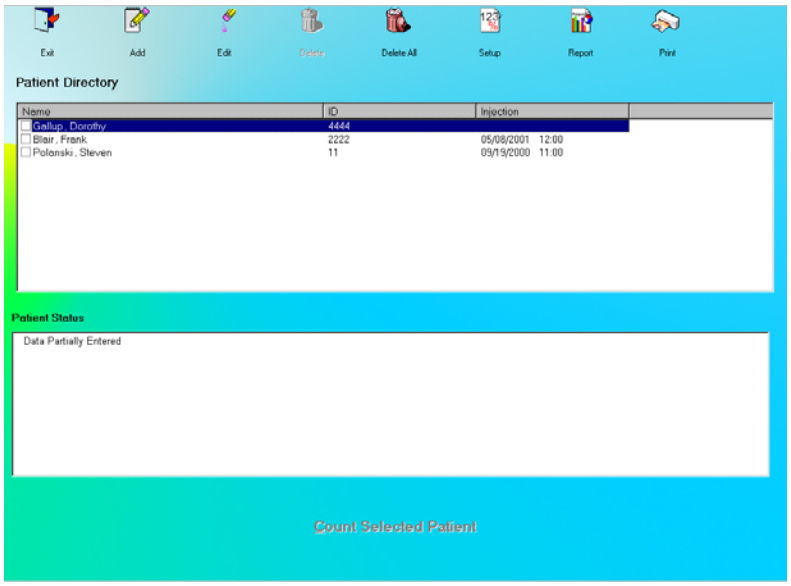


Figure 10-64 RBC Survival Test Main Screen

To return to the CAPTUS 3000 Main screen from here, click the

icon or press the *Esc* key. Click the **Exit** button or press the *Esc* key again.

Setup Counting Parameters

1. Click the

icon on the RBC Survival Test screen. The screen appears as shown in Figure 10-65. This screen allows the user to enter counting parameters that will appear as default settings each time a patient is entered into the RBC Survival Test Patient Directory. These settings may be changed as needed for any individual patient or patients.

Figure 10-65

Default Values frame – **Counting Time** – This is duration for counting in seconds each time a measurement is done. The default is set to 60 seconds.

Repetitions frame – This is number of repetitions each time a measurement is made. For two repetitions, the average value is used in calculations. The second repetition may be skipped during the measurement procedure if so desired.

Normal Range for 50% Survival frame – **Minimum** and **Maximum Days** – These numbers will define a range for number of days over which 50% RBCs surviving can be considered as normal. They are entered as seen fit by the doctors. Out of range results indicate a medical condition and will be flagged in the report. Entering these values is optional.

2. To enter new values in any frame, click in the appropriate text box or radio button or use the *Tab* key to move from one selection to another.

3. Click the Done button to save changes or click the Cancel button to discard the changes and return to Figure 10-64 RBC Survival Test Main Screen.

QUICK TIPS:

- **Counting Time** field appears again, while adding a patient for the RBC Survival Test. Any changes made on the Add Patient screen will override the default values entered in the Setup.
- For greater flexibility, set **Repetitions** to 2, as the second repetition may be skipped if desired, while performing the measurements.
- To return to previous screen without saving changes press the *Esc* key.

Adding Patients

Note: All fields in **bold** are required before you can begin the RBC Survival Test. However, you may enter the **Patient Name** and ID alone, click the Done button and enter the remaining information later. The **Patient Status** box on the main RBC Survival screen will display the message “Data Partially Entered”.

1. Click the Add icon on Figure 10-64 RBC Survival Test Main Screen. The screen appears as shown in Figure 10-66, with information to be entered in three sections.

Figure 10-66

QUICK TIPS:

- Click in the text box or use the *Tab* key to move from one text box to another. To select from drop-down list use ↓ or ↑ keys.

2. Enter the **Patient Information**.
   - Input the **Last Name**, **First Name**, **Date of Birth**, **Patient ID** and **Physician**.
   - In the **Sex** box, select male or female from the drop-down list or press the *M* or *F* key.

   Note: *Any combination of up to 20 alphanumeric characters can be used for the First Name, Last Name, ID and Physician. Fields not in bold are optional.*

3. Next, input the **Dosage Information**.
   - The name of the isotope used for the procedure, Cr51, appears on the screen.
   - The **Lot Number**, **Calibration Date**, **Calibration Time** and **Activity** for the dose to be injected can be taken from the kit label. Activity may also be determined from your measurements of the dose in a dose calibrator. Input the time of injection using a 24-hour clock time, for example enter 3:15 p.m. as 1515.

4. Click in a **General Information** text box if you wish to change the default value for **Counting Time** or enter the ID number of the technician performing the procedure.

5. When finished adding patient data, click the Done button to save the entered information, or the Cancel button to discard the changes made.

6. To add more patients, click the Add icon on Figure 10-64 RBC Survival Test Main Screen.

Editing Patient Information

Note: *Once the test has begun, neither the Dosage Information fields nor the Counting Time can be changed.*

1. To select (highlight) a patient to be edited, use the ↑ ↓ keys or *Page Up* and *Page Down* keys to move up or down in the patient list. If the list is long, the scroll bar is also available. To reach a particular patient, press the first letter of the patient name. Press the ↓ key if necessary, to go further down (Figure 10-67).

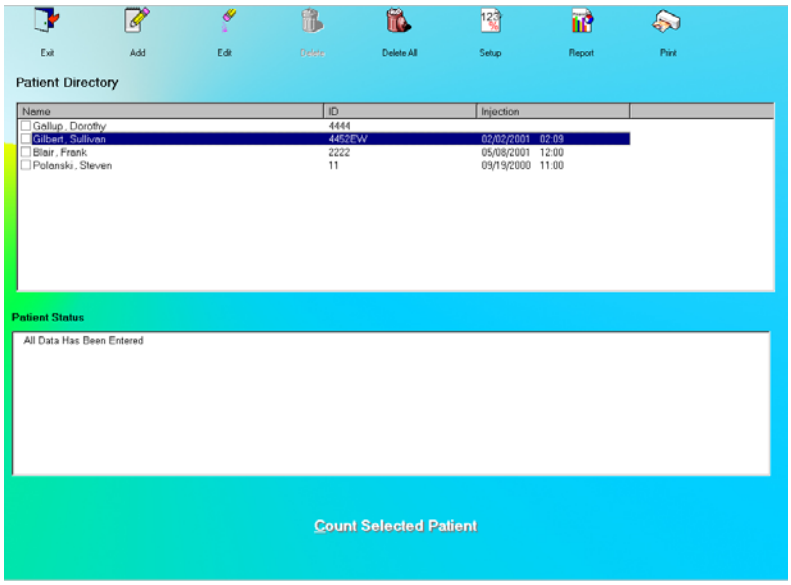


Figure 10-67

Selecting a patient with partially entered data will prompt you with the screen shown below (Figure 10-68). Click the Yes button or press the *Y* key to update the patient information or click the No button or press the *N* key to return to the Main RBC Survival Test screen (Figure 10-67).

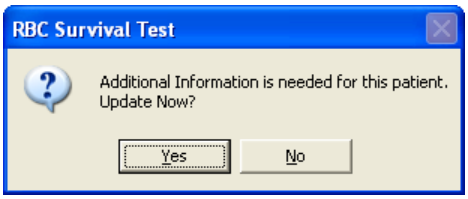


Figure 10-68

2. Click the Edit icon. The screen appears as shown in Figure 10-66.

3. Click in the text box to be edited and type over the existing information.

Note: *All fields in **bold** are required before you can begin the test.*

4. Click the Done button to save changes or click the Cancel button to discard the changes and return to Figure 10-64 RBC Survival Test Main Screen.

Deleting Patient Information

Note: *If you wish to save patient information before deleting, refer to CHAPTER 14: ARCHIVE.*

1. To select one or more patients for deletion, click in the check box to the left of the patient name in the **Patient Directory** box on the main RBC Survival Test screen (Figure 10-69). A check mark should appear in the check box to indicate it has been selected. To deselect a patient, click in their check box again and the check will be removed from the check box.

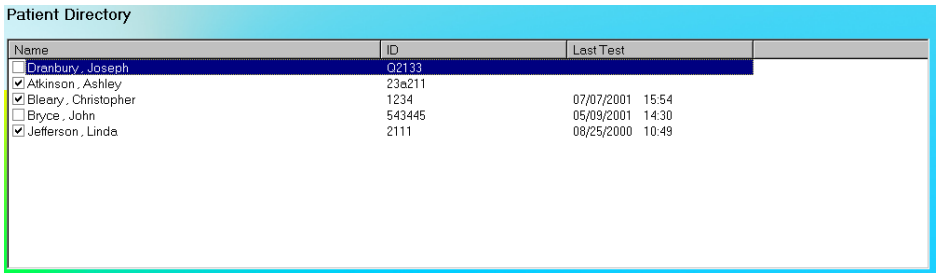


Figure 10-69

2. Click the Delete icon. Figure 10-70 will appear.

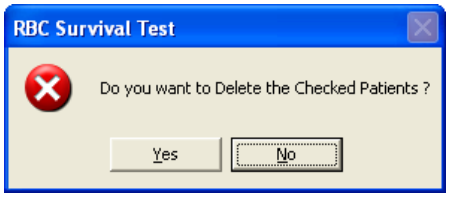


Figure 10-70

3. Click the Yes button or press the *Y* key to confirm the deletion or click the No button or press the *N* key to cancel.

4. To delete all the patients at once, simply click the Delete All icon. You will be prompted to confirm the deletion. Figure 10-71 will appear.

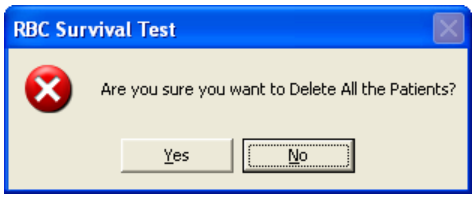


Figure 10-71

5. Click the Yes button or press the *Y* key to confirm the deletion. Otherwise, click the No button or press the *N* key.

Making Measurements

CAUTION: Calibration is recommended before making any measurements. Refer to CHAPTER 5: QUALITY ASSURANCE TESTS; SECTION: AUTO CALIBRATION.

- Before making any measurements on a patient, verify that all required patient information has been entered.
- Make sure the default settings on Edit Patient screen and the Setup screen are appropriate. The values on Edit Patient screen override those on the Setup screen.

1. To select a patient for the test, click on that record in the **Patient Directory** box on Figure 10-64 RBC Survival Test Main Screen. The **Patient Status** box will show the current status of the patient. If this box reads, “All Data has been entered”, the Count Selected Patient button at the bottom of the screen is accessible and the test can be started. If data is partially entered, the Count Selected Patient button is inaccessible.

   Note: *If the **Patient Status** box shows “Data Partially Entered”, no measurements can be made until all the required information is entered. Refer to **Editing Patient Information** on page 10-46.*

2. To begin the measurements, click the Count Selected Patient button or press *Alt+C*. The screen appears as shown in Figure 10-73.

   Note: *If calibration has not been performed, you will be prompted with the screen shown in Figure 10-72. After the calibration is complete, the program will return to the Schilling Test measurement screen shown in Figure 10-73.*

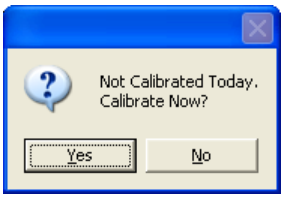


Figure 10-72

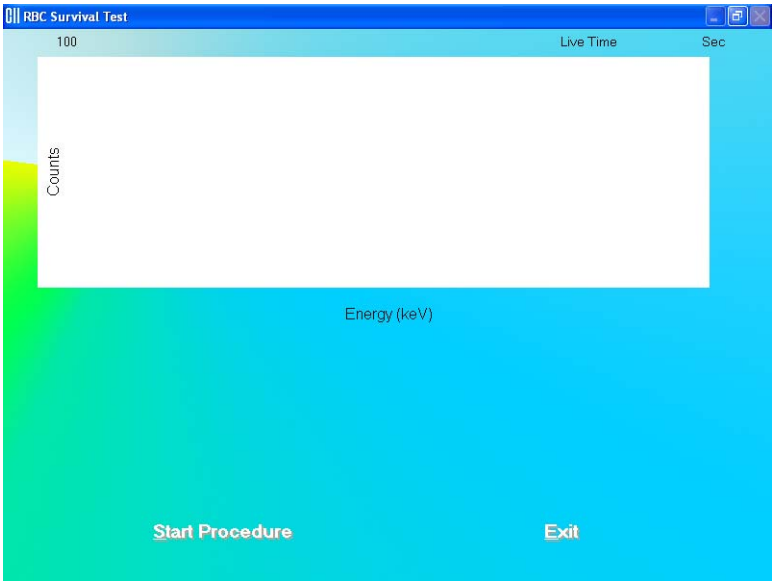


Figure 10-73

3. Click the Start Procedure button or press *Alt+S* to begin the test. Figure 10-74 will appear confirming the selected patient. To cancel the test or if the incorrect patient was selected, click the No button to return to Figure 10-67, otherwise click Yes to continue.

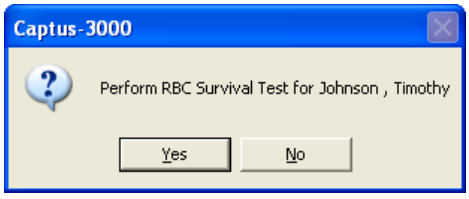


Figure 10-74

4. First, the screen prompts you to input the hematocrit value in % for the patient, as shown in Figure 10-75. Input the value and click the Done button or press *Alt+D*.

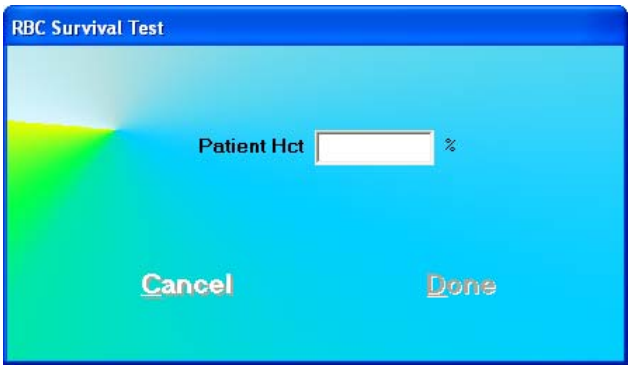


Figure 10-75

5. Next, the screen prompts you to measure background counts as shown in Figure 10-76.

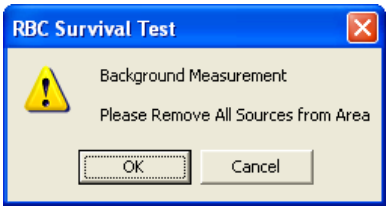


Figure 10-76

To begin counting, verify that there are no radioactive sources nearby and click the OK button. To abort the measurement, click the Cancel button and the screen will return to that shown in Figure 10-78. To exit to Figure 10-64 RBC Survival Test Main Screen, click the Exit button or press *Alt+E*. To begin the test again, click the Start Procedure button or press *Alt+S*.

6. The screen appears as shown in Figure 10-77, prompting you to measure the patient sample.

Figure 10-77

To begin counting, place the sample in the well and click the OK button. To quit counting, click the Cancel button. This will give a prompt to abort the test for the patient, as in Figure 10-78.

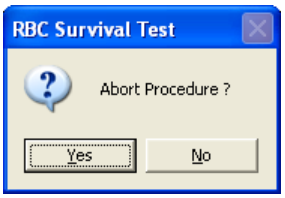


Figure 10-78

To abort the procedure, click the Yes button or press the *Y* key. Collected data will be discarded and the screen will return to the RBC Survival Test measurement screen (Figure 10-73). To resume the test, click the No button or press the *N* key.

7. To return to Figure 10-64 RBC Survival Test Main Screen click the Exit button or press *ALT+E* after the cycle of measurements is completed. The **Patient Status** box will show the number of measurements made till then.

8. To measure patient samples at desired intervals of time, repeat steps 1 through 7. After at least four measurements have been made, the number of days required for 50% RBC Survival is calculated and shown in the **Patient Status** box.

   Note: *The sample volume must remain the same for all of the samples counted throughout the RBC Survival study.*

Test Results

Once the measurement process for a patient is started, clicking on the patient in the **Patient Directory** on the main RBC Survival Test screen will show the number of times measurement has been performed to date and the number of days taken for 50% RBC cells to remain, if available.

The calculations are based on using the 24-hour sample as 100% and making it the starting point. All other samples are calculated as a percent of the 24-hour sample, and indicate the percent remaining. If later samples have a hematocrit value that differs from the 24-hour sample, then a correction is made as below:

$$\%\,\text{Remaining} = \frac{\text{Net whole blood count rate(each sample)} \times \text{HCT(at 24 hours)} \times 100}{\text{Net whole blood count rate(at 24 hours)} \times \text{HCT(each sample)}}$$

Patients Reports

1. Click on a patient in the **Patient Directory** box on the main RBC Survival Test screen to select for viewing or printing the report.

2. Click on the

icon. The screen appears as in Figure 10-79, showing a typical patient report. It contains the patient's demographic data, dosage and sample information, count data and calculated results (HCT % and RBC Remaining %) for each measurement made. If **Normal Range** values have been entered in the setup, any results outside of these limits will be flagged.

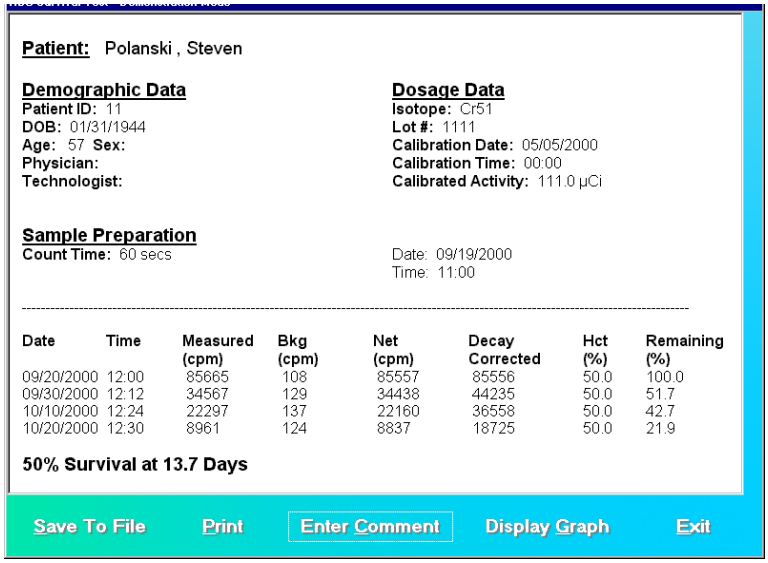


Figure 10-79

3. To save the report on the screen, click the

button or press *ALT+S*. The Save As box appears as in Figure 10-80. Reports are saved as an RTF file in the Captus3000_2\Reports\ folder by default.

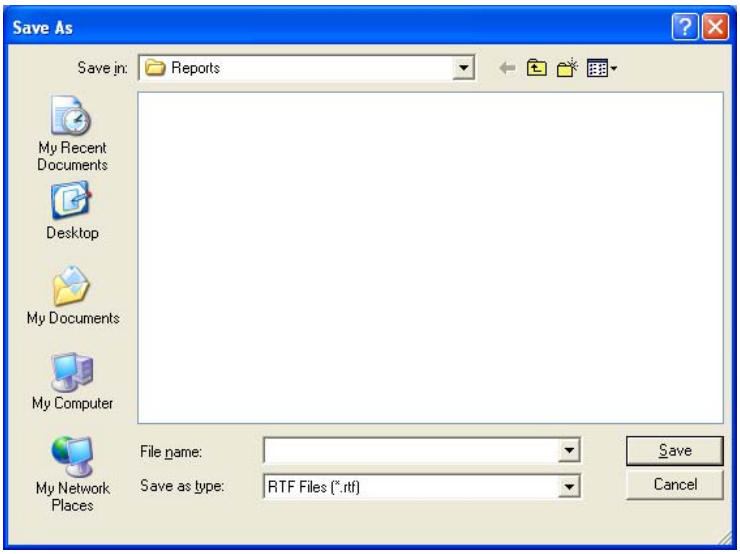


Figure 10-80

4. To print the report on the screen, click the Print button or press *ALT+P*.

5. To view a graph of percentage RBC Remaining vs. Days passed after the injection time, click the Display Graph button or press *ALT+G*. The screen appears as in Figure 10-81.

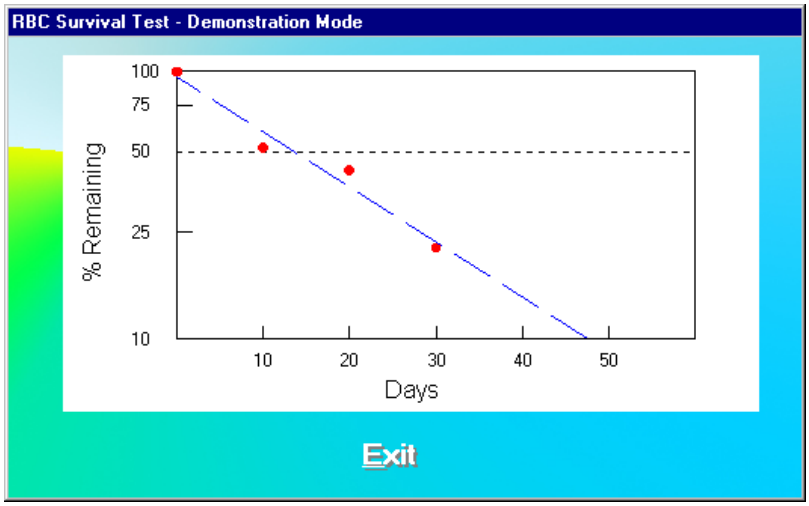


Figure 10-81

The results are plotted on a semi-logarithmic scale. A best-fit straight line through the data points is calculated using a least squares linear regression. Click the Exit button or press *ALT+E* to exit to the report screen.

6. To add comments to the report, click the Enter Comment button or press *ALT+C*. The screen appears as in Figure 10-82.

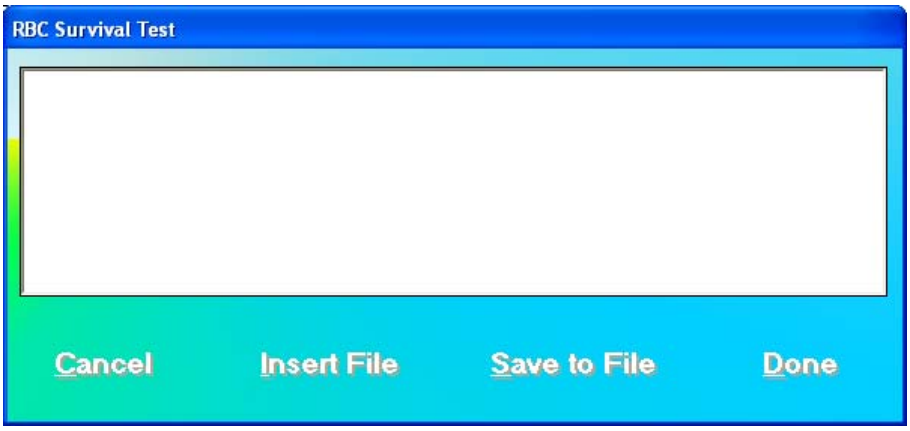


Figure 10-82

Type in the comments or click the Insert File button or press *ALT+I* to insert comments from a text file (Notepad or .txt files only).

To save the comments as a .txt file, click the Save to File button or press *Alt+S*.

To quit adding comments without saving, click the Cancel button or press *Alt+C*.

To finish adding comments, click the Done button or press *Alt+D*.

7. To exit to the main RBC Survival Test screen, click the Exit button or press *ALT+E*.

QUICK TIPS:

- To quickly print a patient report, click on the patient in the **Patient Directory** box and click on the

icon. This will print all details for each measurement and the graph.

CHAPTER 11

BIOASSAY

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CAUTION: To ensure optimum performance of the CAPTUS 3000, before using the **Bioassay** module, perform the System Setup Procedures as outlined in CHAPTER 4: GENERAL SETUP.

INTRODUCTION

Bioassays are generally performed whenever radiation workers are occupationally exposed to unsealed or high activity sources of I 131, I 125 and I 123 on a regular basis. This test is used to monitor exposure levels for these workers. Any measured activity outside the normal limits will be flagged. As part of the procedure, it also determines the system efficiency for these isotopes.

Notes: *Staff Members can only be added or removed by the Administrator. The Administrator has access to all Staff Members' Bioassay data.*

Staff Members can only access his/her own Bioassay data. Each Staff Member must be added to the Users by the Administrator before he/she can access their Bioassay data.

Users who are not Staff Members cannot access Bioassay data.

To access the Bioassay module, click the Bioassay button or press *Alt+B* on the CAPTUS 3000 Main screen. Figure 11-1 Main Bioassay Screen will appear. The **Staff Member Directory** box will be empty if there are currently no existing staff members in the database. Added staff members will appear in this box with their name, the Staff ID and date of birth. By default, the first record is selected. The **Latest Results** box below shows the results of the most recent measurements performed on the selected staff member. The icons at the top of the screen provide functions to add, edit or delete data, to change measurement setup and to view test reports.

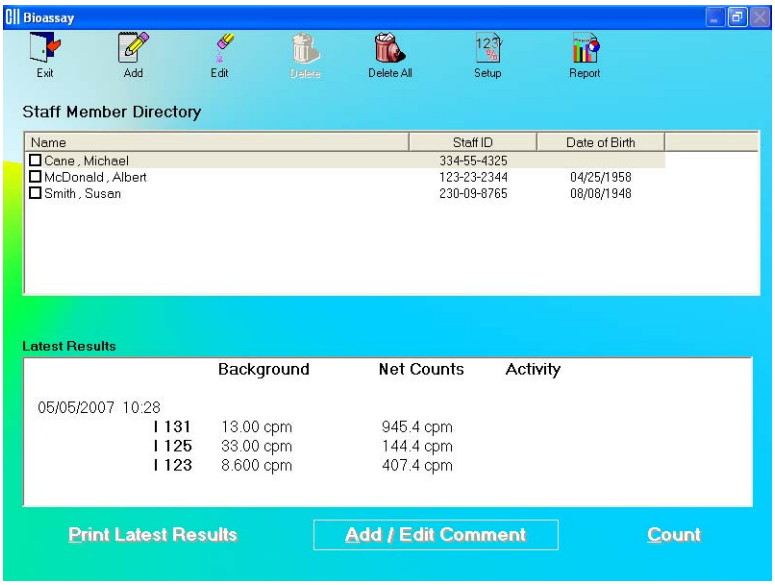


Figure 11-1 Main Bioassay Screen

To return to the CAPTUS 3000 Main screen from this screen, click the

icon or press the *Esc* key.

BIOASSAY SETUP

Note: *The Administrator must be logged into the CAPTUS 3000 in order to set up Bioassay.*

1. Click the

icon on Figure 11-1 Main Bioassay Screen. The Setup screen appears as shown in Figure 11-2.

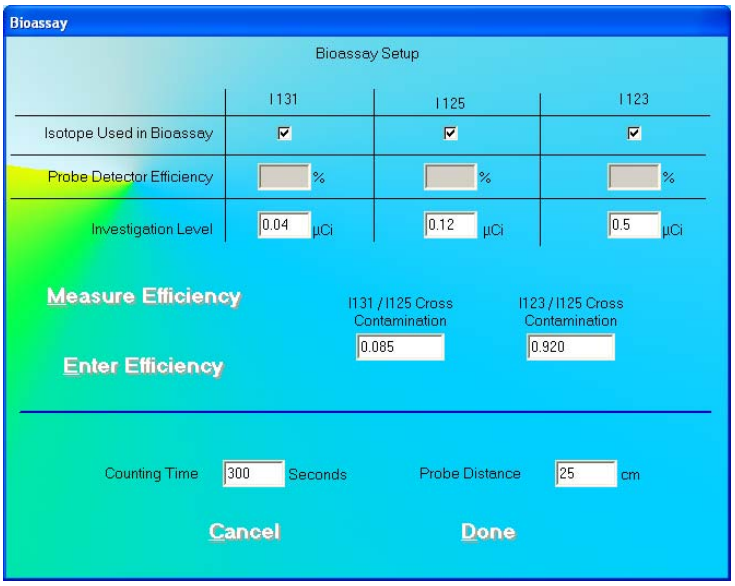


Figure 11-2

Note: *No values can be entered directly into the grayed text boxes.*

2. In the section **Isotope Used in Bioassay**, select which Isotopes are to be used for the Bioassay Test by placing a check in the corresponding check box of the appropriate isotopes (I 131, I 125 and I 123).

3. Click in the appropriate boxes mentioned below to input new values if desired.

   Investigation Level – The upper limit on the acceptable level of activity measured for each of the three isotopes. Measured activities above this level are flagged.

   Counting Time – This is the duration for counting, in seconds, each time a measurement is performed.

   Probe Distance – The distance of the Probe from the Staff Member to be measured in centimeters (cm).

4. Measure or Enter efficiency.

   a. To measure the efficiency of any one or all of the isotopes, click the **Measure Efficiency** button or press *Alt+M*. The screen appears as shown in Figure 11-3 below. Note that none of the isotopes have been selected (e.g. no check mark is in the box) and therefore, the boxes below each isotope are gray and inaccessible.

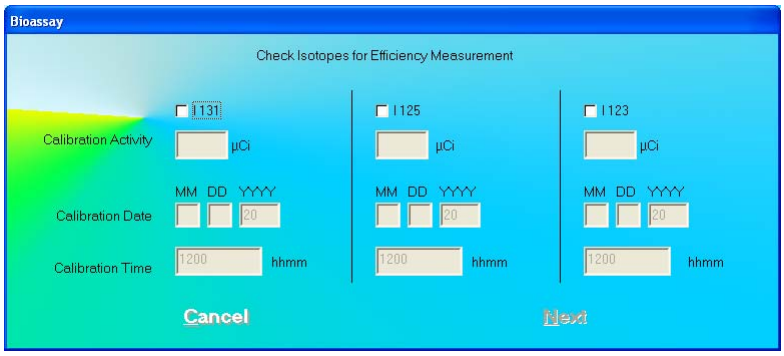


Figure 11-3

i. Click in the check box to select one or more isotopes for efficiency measurement (a check should appear in the box). Depending on the isotopes selected, the boxes below (**Calibration Activity**, **Calibration Date**, **Calibration Time**) the selected isotope become active.
ii. For each isotope selected enter the Calibration Activity, Date and Time from the source label.
iii. Click the Next button or press *Alt+N*. The screen appears as shown in Figure 11-5.

Note: *If calibration has not been performed, you will be prompted with the screen as shown in Figure 11-4. After the calibration is complete, the program will return to the screen shown in Figure 11-5.*

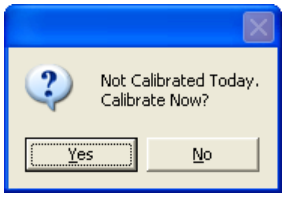


Figure 11-4

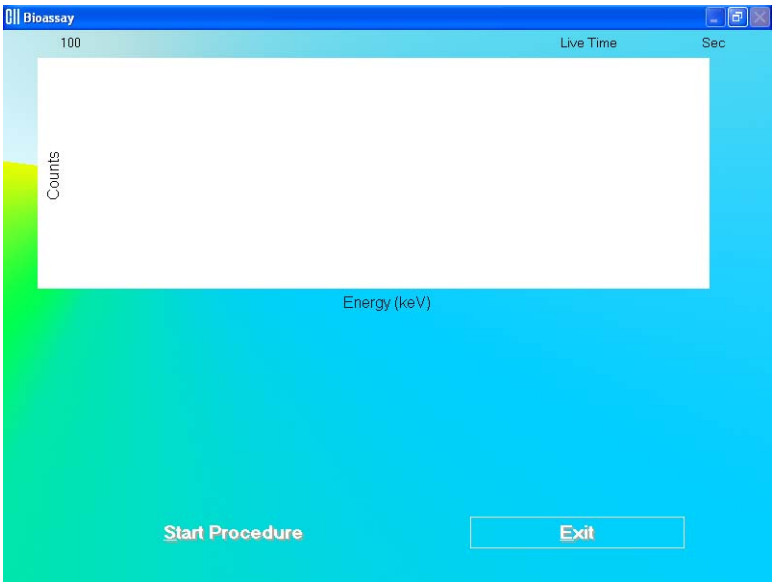


Figure 11-5

iv. Click the Start Procedure button or press *Alt+S* to start measurements, or click the Exit button or press *Alt+E* to return to the Bioassay Setup screen (Figure 11-2).

When the procedure is started, the program will lead you through a sequence of measurements. Simply follow the on-screen instructions to complete the efficiency measurement. The first screen to appear is Figure 11-6.

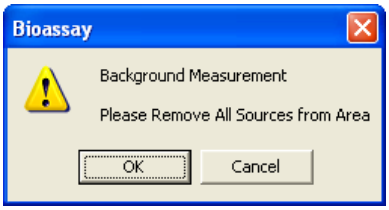


Figure 11-6

v. Verify that there are no radioactive sources in the area and click the OK button to measure background counts. The Data Acquisition screen (Figure 11-7) is displayed.

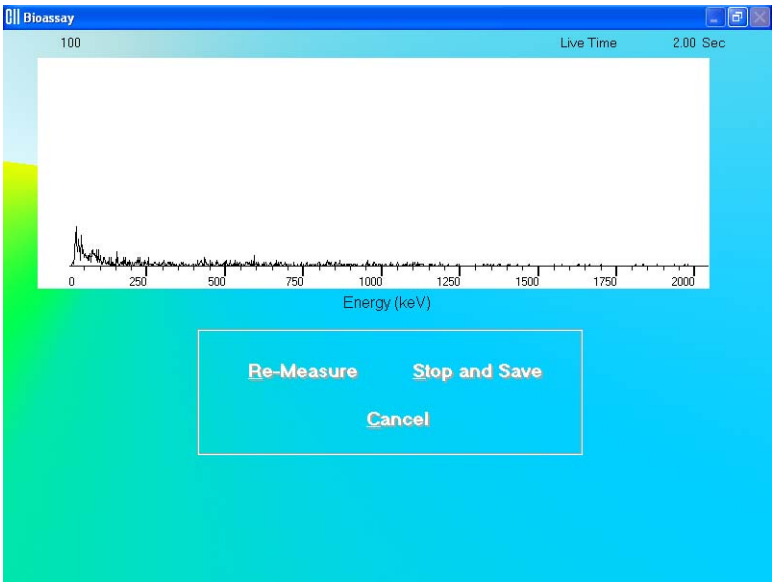


Figure 11-7

vi. The screen shown in Figure 11-8 appears next, prompting you to measure the selected isotope for efficiency measurement.

Figure 11-8

To measure the isotope, place the isotope standard in the Neck Phantom exactly simulating the geometry used in the bioassay measurement and click the OK button. Data collection begins as shown in Figure 11-7 above. To stop the measurement, click the Cancel button. The screen then appears as shown in Figure 11-9.

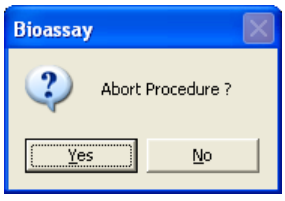


Figure 11-9

To abort the procedure, click the Yes button or press the *Y* key. Figure 11-5 will re-appear. Click the Start Procedure button to restart the measurement or the Exit button to return to the Bioassay Setup screen (Figure 11-2).

vii. If more than one isotope was selected for the efficiency measurement, you will be returned to Figure 11-8 and prompted to measure the next isotope.

viii. After all measurements are completed, the screen shown in Figure 11-10 will appear. The results in the lower part of the screen show all measured counts and calculated values for activity and cross contamination.

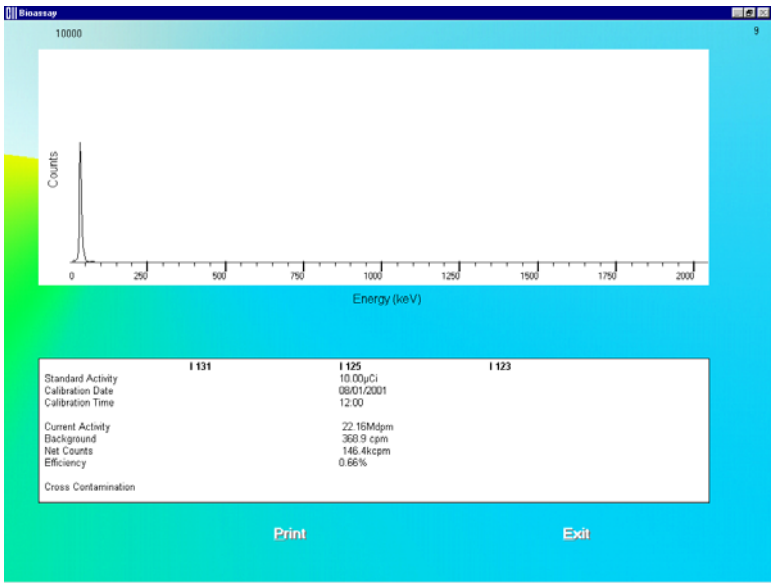


Figure 11-10

ix. To print the results on the screen, click the Print button or press *Alt+P*.

x. To exit and return to the main Bioassay Setup screen (Figure 11-2), click the Exit button or press *Alt+E*.

b. To directly enter the **Efficiency** of a selected isotope or **Cross Contamination** ratio, follow the steps below:

i. Click the Enter Efficiency button or press *Alt+E*. The screen appears as shown in Figure 11-11.

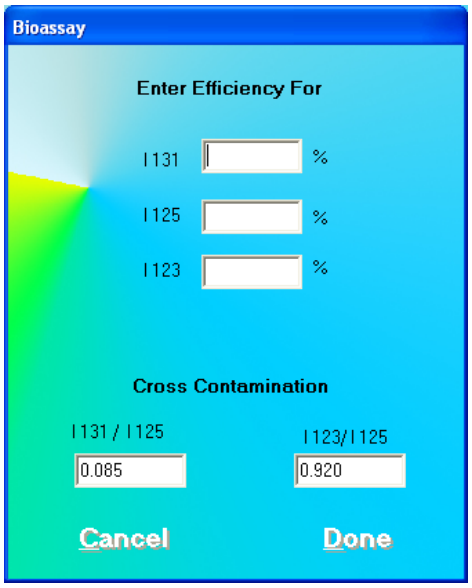


Figure 11-11

ii. To input the Isotope Efficiency, click in the appropriate text box (**I 131**, **I 125** or **I 123**) and input the known efficiency value.
iii. To input the **I 131/ I 125** or **I 123/I 125** Cross Contamination ratios, click in the appropriate text box and input the known ratio.
iv. To save the added information and return to the Bioassay Setup screen, click the Done button or press *Alt+D*. Otherwise, click the Cancel button or press *Alt+C* to return to the Bioassay Setup screen without saving the changes.

Note: *Input for **Cross Contamination** ratios is required. If these boxes are left blank, the Done button is inaccessible.*

c. To save the information on the Bioassay Setup screen and return to the main Bioassay screen, click the Done button or press *Alt+D*. Otherwise, click the Cancel button or press *Alt+C* to return to the main Bioassay screen without saving the changes.

Note: *The following fields are <u>required</u> before the Done button is accessible: **Investigation Level** for each selected isotope, **Counting Time** and **Probe Distance**.*

***Efficiency** for all selected isotopes must be set in the Setup so that Bioassay report results will be in units of activity. If **Efficiency** fields are left blank, Bioassay results will appear as counts per minute (cpm) only.*

QUICK TIPS:

- To return to the CAPTUS 3000 Main screen from the main Bioassay screen, click the

icon or press the *ESC* key.

I 131/I 125 and I 123/1 125 Cross Contamination

The CAPTUS 3000 system, when measuring I 131 and I 123, generate counts that also appear in the I 125 ROI. This is generally referred to as “spillover” or “cross contamination.” Counts for I 125 will automatically be corrected for spillover from I 131 and I 123.

$$R = \frac{cpm(I125\,ROI)}{cpm(I131\,ROI)} \qquad Cor = cpm(I125) - cpm(I131\,ROI) \times R$$

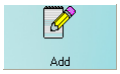
where R = spillover ratio
Cor = correction factor for I 125 counts

These values are automatically calculated when isotope efficiency measurements are made. If the isotope efficiencies are manually entered, then the spillover must also be manually entered.

ADDING STAFF MEMBERS

Note: *Staff Members can only be added by the Administrator.*

Note: *All fields appearing in **bold** are required to perform a Bioassay procedure on a Staff Member.*

1. Click the 

icon on Figure 11-1 Main Bioassay Screen. The screen appears as shown in Figure 11-12.

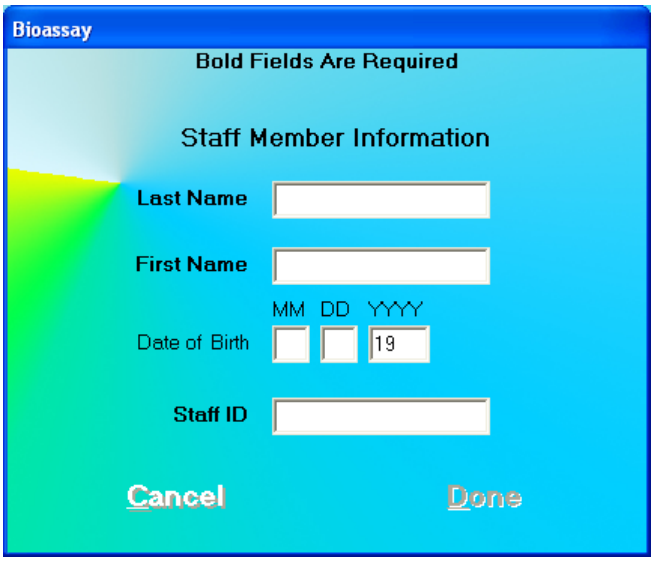


Figure 11-12

2. Click in the appropriate text boxes to enter the Staff Member's **Name**, **Date of Birth** (optional) and **Staff ID**.

   Note: *Each Staff Member being added must have a unique **Staff ID** corresponding only to that particular Staff Member. Examples would be the Staff Member's social security number, employee number, etc.*

3. When finished adding Staff Member data, click the Done button or press *Alt+D* to save the entered information, or the Cancel button or press *Alt+C* to discard the changes. Note that the Done button is active only after all the required fields are entered.

4. To add more staff members, repeat steps 1 to 3.

QUICK TIPS:

- To return to the CAPTUS 3000 Main screen from the Main Bioassay screen, click the Exit icon or press the *ESC* key.

EDITING STAFF MEMBER INFORMATION

Note: *Staff Members can only be edited by the Administrator.*

1. To select (highlight) a staff member to be edited, use the ↑ ↓ keys or *Page Up* and *Page Down* keys to move up or down in the staff member list. If the list is long, the scroll bar is

also available. To reach a particular staff member, press the first letter of the staff member name. Press the ↓ key if necessary, to go further down (Figure 11-13).

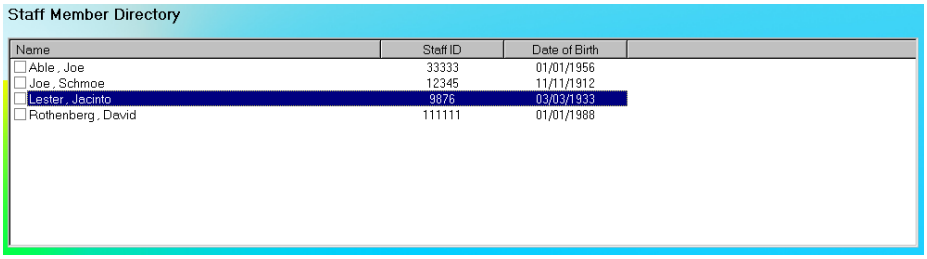
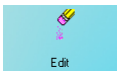


Figure 11-13

2. Click the 

icon. The screen appears as shown in Figure 11-12.

3. Click in the text box to be edited and type over the existing information.

   Note: *All fields in **bold** are required before you can begin the test.*

   Note: *Each Staff Member being edited must have a unique **Staff ID** corresponding only to that particular Staff Member. Examples would be the Staff Member's social security number, employee number, etc.*

4. Click the

button or press *Alt+D* to save changes or click the

button to discard the changes and return to Figure 11-1 Main Bioassay Screen.

DELETING STAFF MEMBER

Note: *Staff Members can only be deleted by the Administrator.*

Note: *If you wish to save Staff Member information before deleting, refer to CHAPTER 14: ARCHIVE.*

1. To select one or more staff members for deletion, click in the check box to the left of the staff member name in the **Staff Member Directory** box on the Main Bioassay screen (Figure 11-14). A check should appear in the check box to indicate it has been selected. To deselect a staff member, click in their check box again and the check will be removed from the check box.

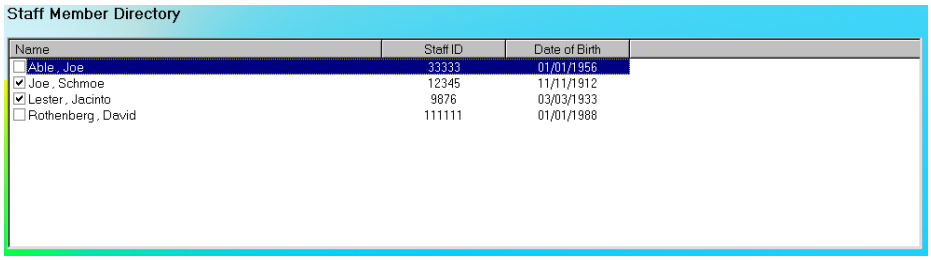
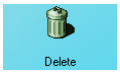


Figure 11-14

2. Click the 

icon. Figure 11-15 will appear.

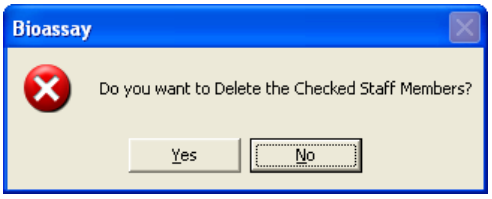
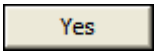
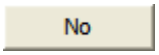
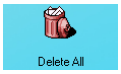


Figure 11-15

3. Click the 

button or press the *Y* key to confirm the deletion. Otherwise, click the 

button or press the *N* key to cancel the deletion.

4. To delete all the staff members at once, simply click the 

icon. You will be prompted to confirm the deletion. Figure 11-16 will appear.

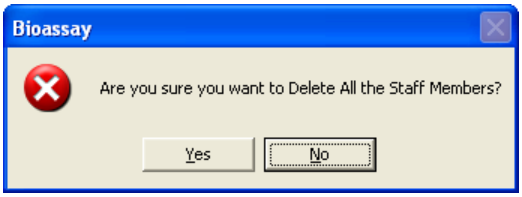
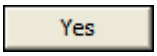
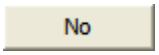


Figure 11-16

5. Click the 

button or press the *Y* key to confirm the deletion. Otherwise, click the 

button or press the *N* key.

MAKING MEASUREMENTS

CAUTION: Calibration is recommended before making any measurements. Refer to CHAPTER 5: QUALITY ASSURANCE TESTS; SECTION: AUTO CALIBRATION.

Note: *The Administrator has access to all Staff Members' Bioassay data. Staff Members can only access his/her own Bioassay data. Each Staff Member must be added to the Users by the Administrator before he/she can access their Bioassay data.*

- Before making any Bioassay measurements on a Staff Member, verify that all required Staff Member information has been entered.
- Make sure the default settings on Edit Staff Member screen and the Setup screen are appropriate. The values on Edit Staff Member screen override those on the Setup screen.

1. To select a member for the Bioassay measurement, highlight the Staff Member in the **Staff Member Directory** box in the Main Bioassay screen using the ↓ and ↑ keys on the keyboard as shown in Figure 11-17.

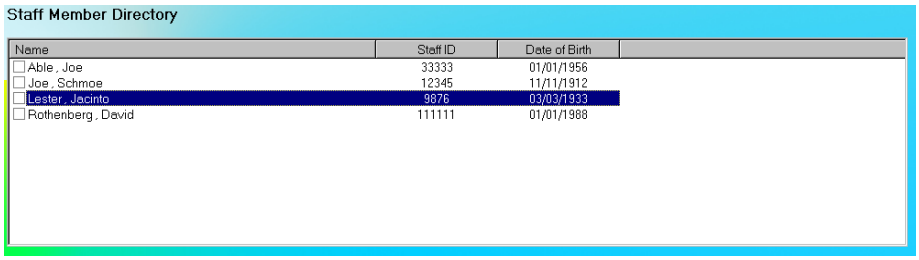


Figure 11-17

2. To begin the measurements, click the Count button. The Main Bioassay Measurement screen appears as shown in Figure 11-18.

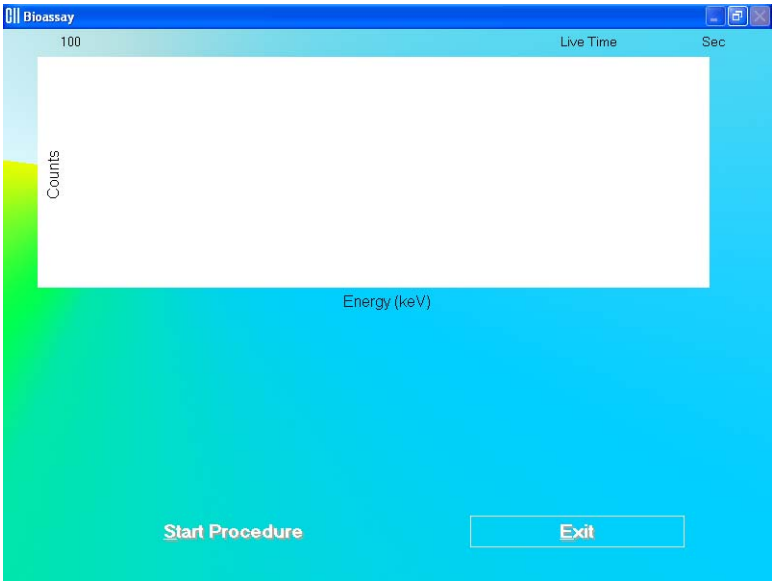


Figure 11-18

Note: If calibration has not been performed, you will be prompted with the screen as shown in Figure 11-19. After the calibration is complete, the program will return to the Schilling Test measurement screen shown in Figure 11-18.

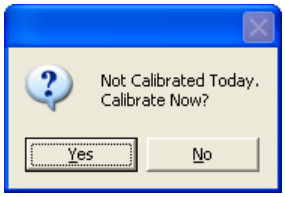


Figure 11-19

3. To start the measurement, click the Start Procedure button or press *Alt*+*S*. The screen appears as shown in Figure 11-20.

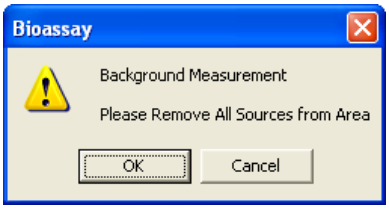


Figure 11-20

Beginning from here, the program leads you through a sequence of measurements. Simply follow the on-screen instructions as explained below.

a. Verify that there are no radioactive sources in the area and click the OK button to measure background counts. The screen appears as shown in Figure 11-21.

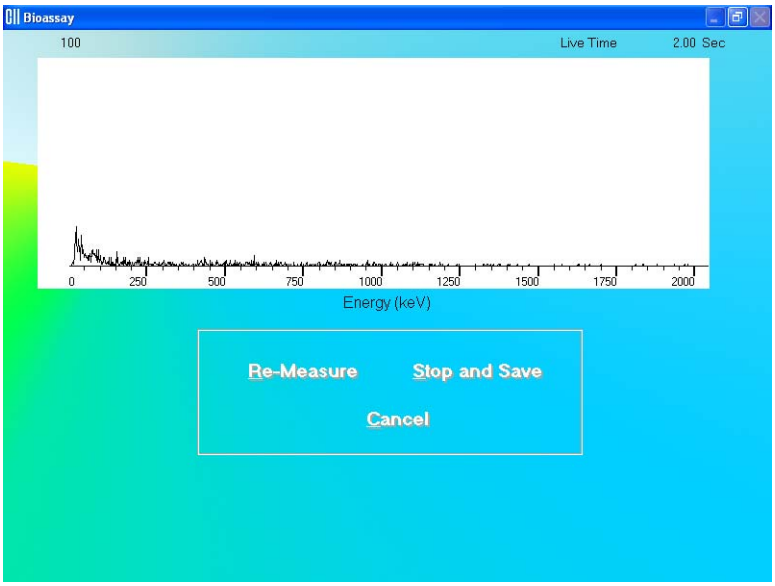


Figure 11-21

Note: *Background counts must be measured everyday **at least once**, before measuring any Staff Member. You may re-measure the background as often as required. The last set of background data will be used to calculate net activity.*

b. The screen shown in Figure 11-22 appears next, prompting you to measure the Staff Member.

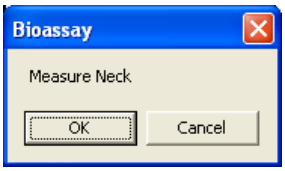


Figure 11-22

To begin counting, click the OK button. The spectrum is displayed as shown in Figure 11-21 above. To cancel measurements, click the Cancel button. The screen then appears as shown in Figure 11-23.

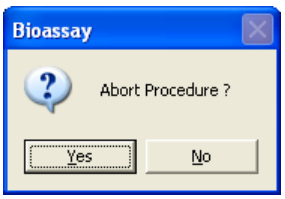


Figure 11-23

Click the Yes button or press the *Y* key to exit the measurement cycle. The Main Bioassay Measurement screen appears as shown in Figure 11-18. To restart the measurement for the selected Staff Member, click the Start Procedure button or press *Alt+S*.

4. To exit and return to the Main Bioassay screen, click the Exit button or press *Alt+E*. The results for the procedure will appear in the **Latest Results** box.

QUICK TIPS:

- To print the latest results for the selected patient, click the Print Latest Results button or press *Alt+P* on the Main Bioassay screen.
- To view or print results for all the Bioassay tests done on the selected member, click the Report icon.
- To add comments about the latest test results for the selected member, click the Add / Edit Comment button or press *Alt+A*.

VIEWING AND PRINTING REPORTS

1. To view or print a report for a selected Staff Member, highlight the Staff Member in the **Staff Member Directory** box in the Main Bioassay screen using the ↓ and ↑ keys on the keyboard.

2. Click the Report icon. The screen appears as shown in Figure 11-24, which displays the Bioassay report of the selected Staff Member.

3. The top section displays the **Staff Member Directory** box with the previously selected Staff Member highlighted and the Staff Member's report in the lower section. To view another Staff Member's report, click on that Staff Member in the upper section.

   The lower section of the screen contains
   - the Staff Member's name,
   - staff ID,
   - count data,
   - calculated activity (if efficiency was entered in the setup),
   - the date of test for each Bioassay test done.

   If a measured activity is out of Investigational Level specified limit, it will be flagged. To view the complete report, scroll down the report screen.

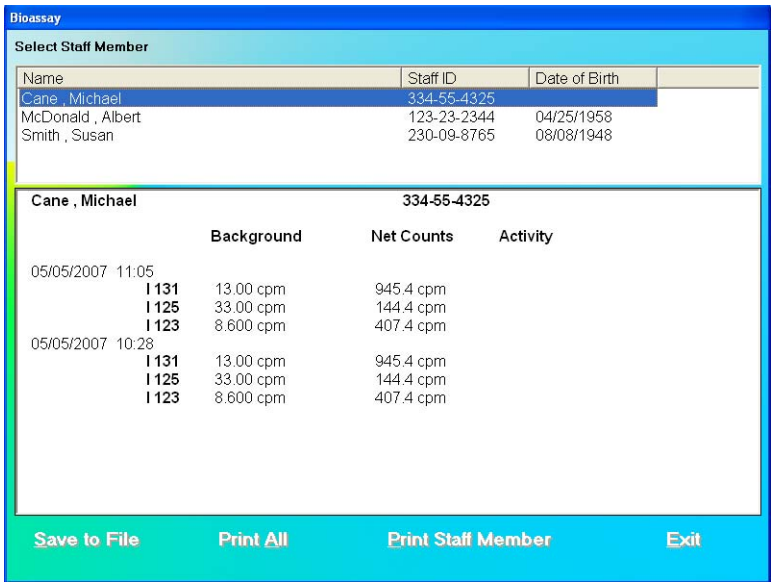


Figure 11-24

4. To save the report displayed on the screen, click the Save to File button or press *Alt+S*. The Save As box appears as shown in Figure 11-25. Reports are saved as a rich text format file (.rtf file) in the Captus3000_2\Reports\ folder by default. They can be opened in WordPad or MS Word.

   Note: *It is recommended that the* ***Save as type:*** *is not changed from RTF Files (*.rtf)*

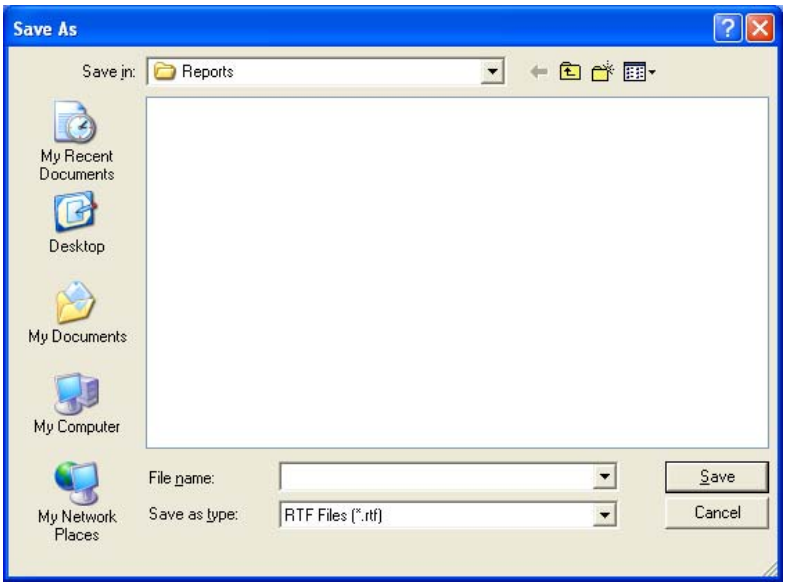


Figure 11-25

5. To print the report displayed on the screen, click the Print Staff Member button or press *Alt+P*.
6. To print reports for all the staff members, click the Print All button or press *Alt+A*.
7. To exit to the main Bioassay screen, click the Exit button or press *Alt+E*.

QUICK TIPS:

- To view another Staff Member's report, click on that staff member in the upper section of Report screen (Figure 11-24).
- To print results for only the latest test for a Staff Member, go to the Main Bioassay screen, click on the Staff Member in **Staff Member Directory** box and click the Print Latest Results button or press *Alt+P*.
- To add comments to the latest results for a Staff Member, go to the Main Bioassay screen, click on the Staff Member in **Staff Member Directory** box and click the Add / Edit Comment button or press *Alt+A*.

CHAPTER 12

TIME ACTIVITY ANALYSIS

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SETTING UP PARAMETERS.....12-2
MAKING MEASUREMENTS 12-5
Saving the Results 12-7
VIEWING PREVIOUSLY SAVED RESULTS 12-8

INTRODUCTION

Time Activity Analysis (TAA) permits the user to make repeated measurements at timed intervals. It provides control over ROI, live time and real time for counting. The data can be viewed as raw counts or decay corrected and displayed either in a graph or tabular form.

To access this module, click the Time Activity Analysis button or press *Alt+T* on the CAPTUS 3000 Main screen. Figure 12-1 Time Activity Analysis screen will appear. The functions at the bottom of the screen are disabled until the required parameters have been entered. When counting is started, a live spectrum is displayed in the upper half of the screen. The elapsed real and live time is displayed at the upper right of the screen as the counting progresses. Below the displayed time, there are options for viewing and displaying the data.

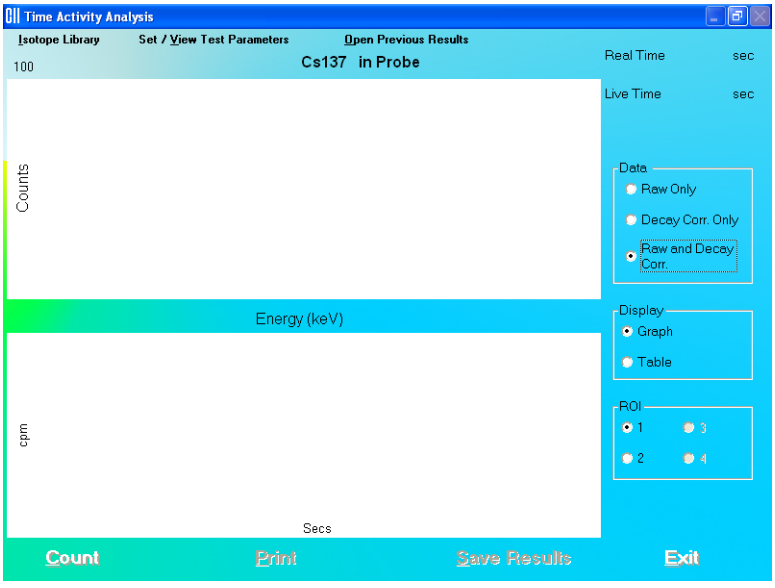

Figure 12-1 Time Activity Analysis screen

To return to the CAPTUS 3000 Main screen from the Time Activity Analysis screen, click the Exit button or press *Alt+E* or press the *Esc* key.

SETTING UP PARAMETERS

Note: *All fields in* ***bold*** *are required.*

1. Click the Set / View Test Parameters button on the menu bar or press *Alt+V*. The screen appears as shown in Figure 12-2.

Figure 12-2

a. To input parameters from a previously saved .tim file, click the Load from File button or press *Alt+L*. The screen appears as shown in Figure 12-3. Click on the file name to open it. Parameters are automatically entered into the appropriate boxes.

   Note: *Only* ***.tim*** *files can be loaded on this screen.*

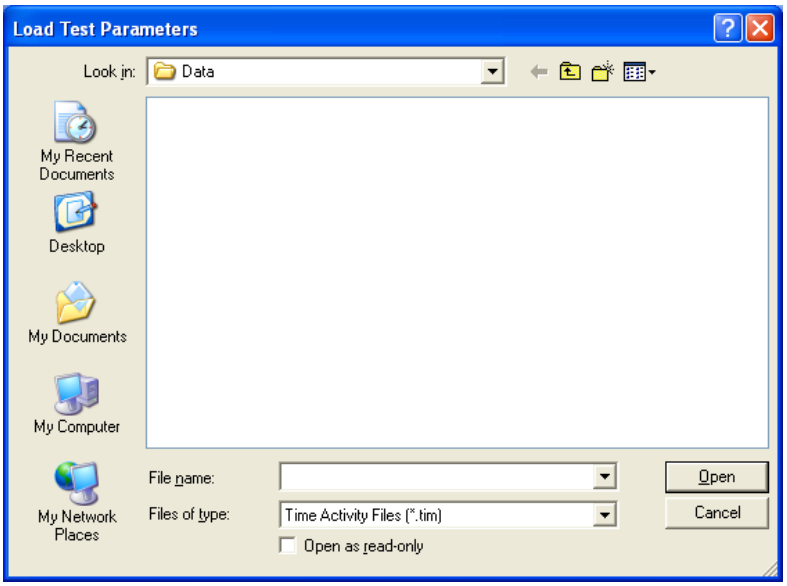

Figure 12-3

b. To manually input parameters, perform the following steps:
   i. To enter a brief comment about the test being performed, click in the **ID** text box and type in the text. This field is not required and the description can be any combination of alphanumeric characters to a maximum of 40 characters

   ii. Select an isotope for counting by clicking inside the **Select Isotope** drop-down box. A drop-down list appears. To view the entire list, use the scroll bar. To select, click on the isotope or press the first letter of the isotope and press the ↓ key if needed. This is a required filed and must be set.

   Note: *If the desired isotope is not in the drop-down list, you can add that isotope to the Isotope Library. To do so, click the* **Isotope Library** *button on the menu bar or press Alt+I on the Time Activity screen. Upon exiting from the Isotopes module, the screen returns back to Time Activity screen. The added isotope will be present in the drop-down list in the Set/View Test Parameters screen.*

   iii. To change the default detector selection from **Probe** to **Well**, click the appropriate radio button in the **Detector** frame.

   iv. The **ROI** values according to the peaks of the selected isotope will automatically appear in the text boxes contained in the **ROI Information** section. To change any ROI value, click in the appropriate text box and type in the new number. At least one ROI is required.

   v. In the **Counting Parameters** section, click in the appropriate text boxes and input the following numbers:
      - **Live Counting Time** – The live time for which each repetition will be counted (1-32767).

- **Repetitions** – The number of times counting is to be repeated (1-1,000,000).
- **Time Between Measurements** – The clock time between the start of one repetition and the start of the next repetition (0-59652).

To change the Time Between Measurements default unit of time from seconds to minutes or hours, click in **min** or **hour** radio button in the **Counting Parameters** section.

vi. To save the settings on the current screen to a file, click the Save to File button or press *Alt+S*. The screen appears as shown in Figure 12-4.

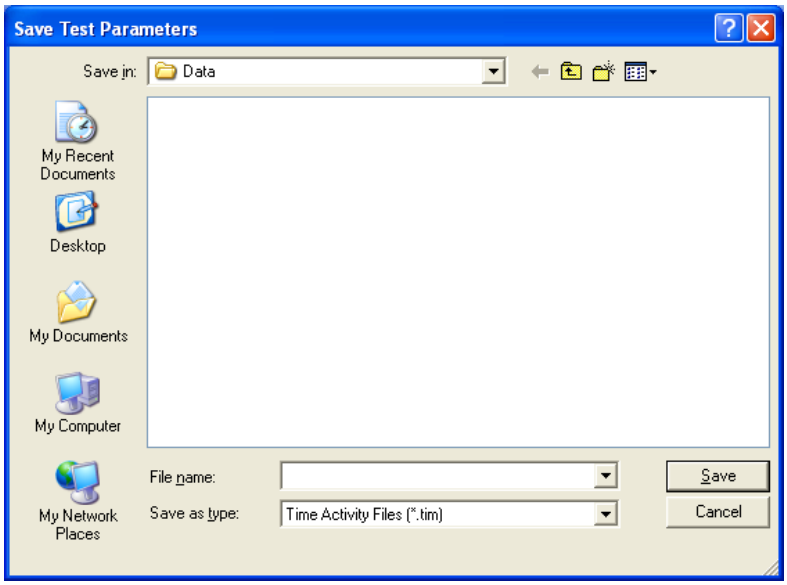

Figure 12-4

The default folder for saving this file is Captus3000_2\Data\. The setup will be saved with .tim extension. Type in the file name and click the Save button or press *Alt+S* to save.

Note: *It is recommended that the **Save as type:** is not changed from Time Activity Files (*.tim)*

vii. Click the Done button to save changes or click the Cancel button to discard the changes and return to Figure 12-1 Time Activity Analysis screen.

QUICK TIPS:

- To select an isotope, when the **Select Isotope** drop-down list box is active, press the first letter of the isotope.
- To move between data fields use the *Tab* key and to change the detector while in the **Detector** frame, use ↓ or ↑ keys.
- To load saved parameters into the setup screen, click the Load from File button or press *Alt+L*.

- To return to the CAPTUS 3000 Main screen from the Time Activity Analysis screen, click the Exit button or press *Alt+E* or press the *Esc* key.

MAKING MEASUREMENTS

CAUTION: Calibration is recommended before making any measurements. Refer to CHAPTER 5: QUALITY ASSURANCE TESTS; SECTION: AUTO CALIBRATION.

1. Click the Count button or press *Alt+C* on Figure 12-1 Time Activity Analysis screen.

   Note: *If calibration has not been performed, you will be prompted with the screen as shown in Figure 12-5. After the calibration is complete, the program will return to Figure 12-1 Time Activity Analysis screen.*

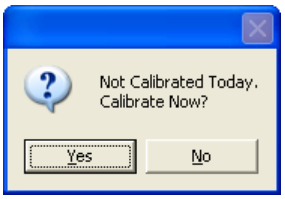

Figure 12-5

2. The screen shown in Figure 12-6 will appear.

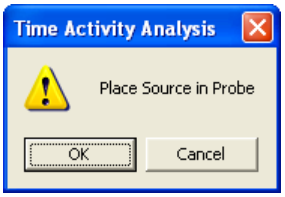

Figure 12-6

3. Place the isotope source in the designated detector and click the OK button. As counting progresses, Real Time and Live Time for each repetition is displayed in the upper right of the screen as shown in Figure 12-7. The number of measurement repetitions (spectra) remaining is displayed below the Live time.

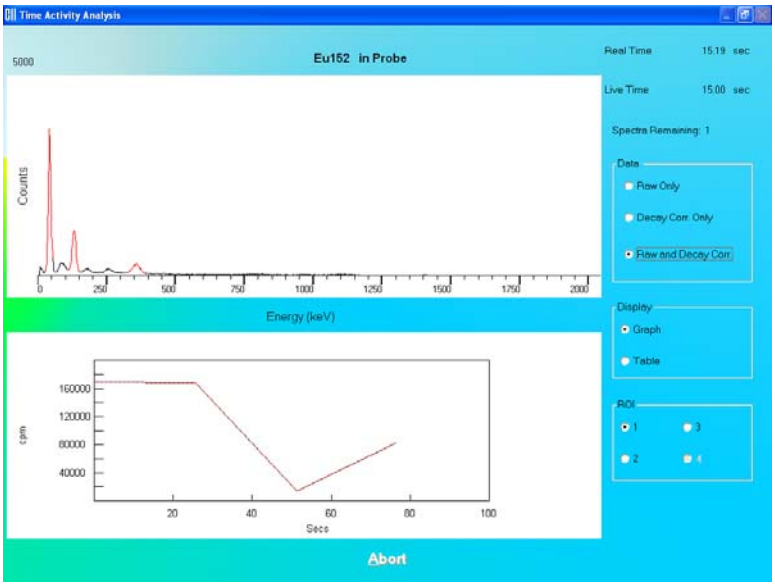

Figure 12-7

4. To stop the counting, click the Abort button or press *Alt+A*. The collected data is discarded.

5. After the counting is complete, results are shown in the default Data mode. These data modes are:
   - **Raw Only** – To view raw data only.
   - **Decay Corr Only** – To view decay corrected data only.
   - **Raw and Decay Corr** – To view both (*default*).

   To change the Data mode, click the appropriate radio button in the **Data** frame.

   The data can be displayed as either a graph (*default*) or as a table.
   - **Graph** – The data counts collected are displayed as a function of real time. The solid line represents the Raw data and the dashed line represents the Decay Corrected data.
   - **Table** – Displays the measured counts in all ROIs in a tabular mode.

   To change the Display mode, click the appropriate radio button in the **Display** frame.

   The data can also be displayed over various ROIs (ROI 1 (*default*), 2, 3, 4). To change the ROI, click the appropriate radio button in the **ROI** frame.

6. To print the results, click the Print button or press *Alt+P*. Raw and decay corrected data for all ROIs is printed in the table format along with graphs for each ROI.

7. To exit the Time Activity Analysis module and return to the CAPTUS 3000 Main screen, click the Exit button or press *Alt+E*.

Saving the Results

1. To save the measured data, click the Save Results button or press *Alt+S* on the Time Activity Analysis screen. A pop-up menu (Figure 12-8) with two options is displayed:

Figure 12-8

- **Save** – This option saves all the results and the spectrum on the screen as a TAA file (.taa file). These files can be reopened in the Time Activity Analysis module, by clicking the Open Previous Results button on the menu bar or pressing *Alt+O*.
- **Export** – This option saves the raw and corrected results in tabular form in an MS Excel file (.xls file). These results can be viewed and plotted through MS Excel only.

a. If you click on **Save**, the screen appears as shown in Figure 12-9.

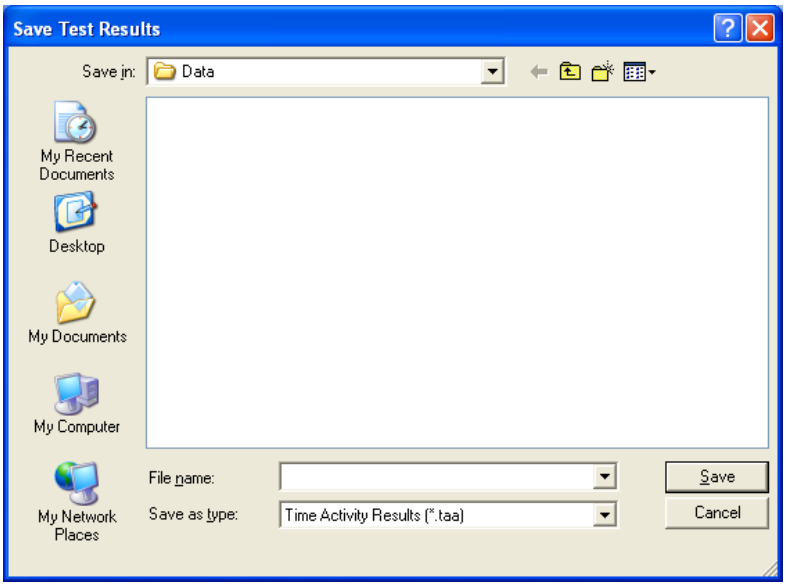

Figure 12-9

The default folder for saving the file is Captus3000_2\Data\ folder. Type in the file name and click the Save button or press *Alt+S* to save as .taa file.

Note: *It is recommended that the* ***Save as type:*** *is not changed from Time Activity Results (*.taa)*

b. If you click on **Export**, the screen appears as in Figure 12-10.

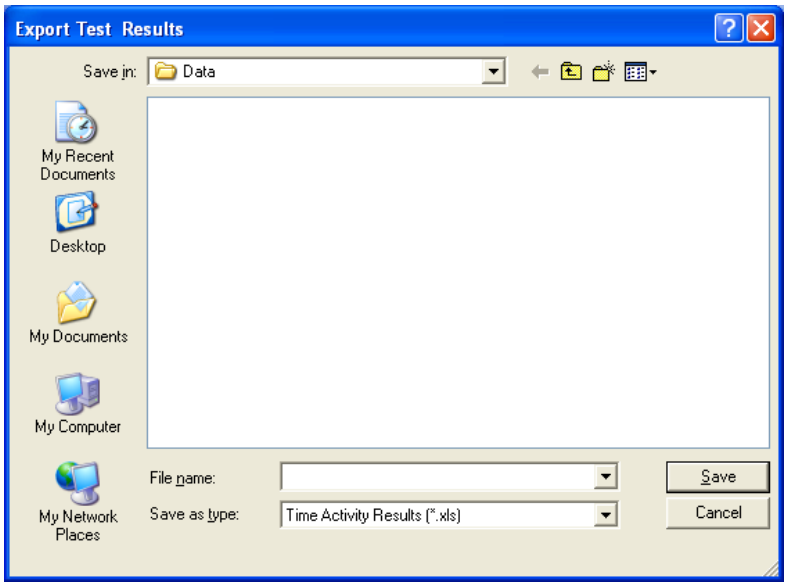

Figure 12-10

The default folder for saving the file is Captus3000_2\Data\. Type in the file name and click the Save button or press *Alt+S* to save as .xls file.

Note: *It is recommended that the **Save as type:** is not changed from Time Activity Results (*.xls)*

Time Activity results cannot be archived.

VIEWING PREVIOUSLY SAVED RESULTS

Note: *Only **.taa** files can be opened from the Time Activity Analysis screen.*

1. Click the Open Previous Results button on the menu bar or press *Alt+O* on Figure 12-1 Time Activity Analysis screen. The screen appears as shown in Figure 12-11.

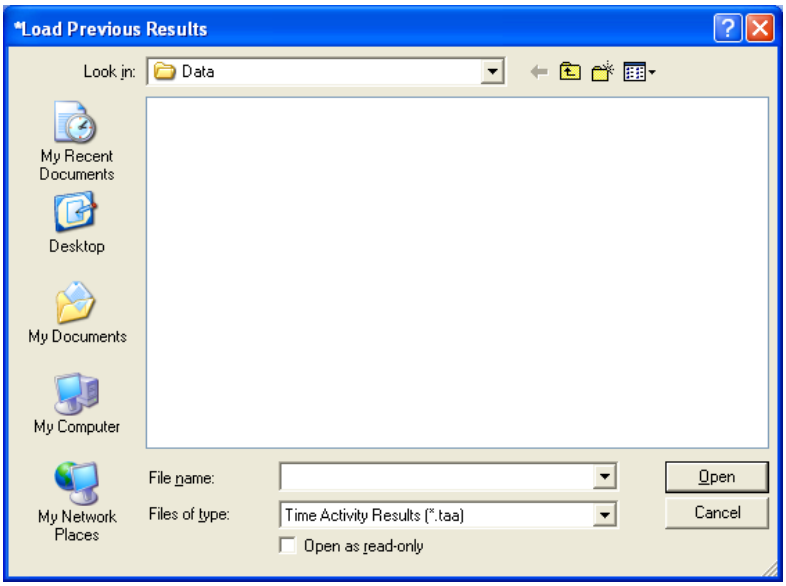

Figure 12-11

2. Click on the file to be opened. The saved results and spectrum will appear on the Time Activity Analysis screen.

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CHAPTER 13

MCA

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INTRODUCTION

The CAPTUS 3000 includes a fully functional multichannel analyzer (MCA) board. The **MCA Module** provides custom control of the MCA parameters and data acquisition for special applications:

- All MCA parameters are software controlled.
- Up to 16 Regions of Interest (ROI) can be defined at one time.
- Counting can be performed using live time, real time, or peak counts.
- Spectral data and MCA settings can be saved to hard disk.
- Count data and the spectrum can be printed.

Click the MCA button or press *Alt+M* on the CAPTUS 3000 Main screen to access the MCA Module. Figure 13-1 MCA Main Screen will appear.

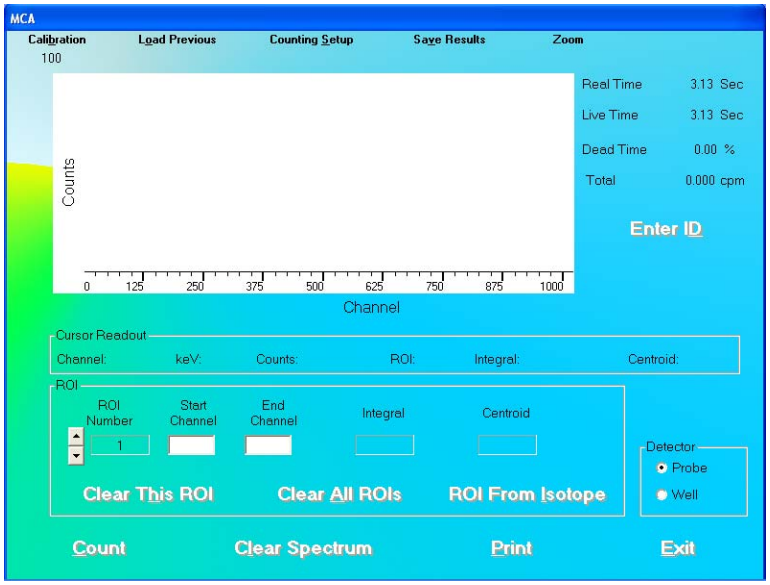

Figure 13-1 MCA Main Screen

ACQUISITION AND COUNT DATA

The MCA Main Screen provides all controls necessary for data acquisition. To begin the acquisition process, click the Count button. The live counting data will appear in the MCA display. The elapsed real time, elapsed live time, percentage of dead time and counting rate will be displayed in the upper right of the display screen. The counts full-scale value is shown at the upper left edge of the display area. All displayed counting values are updated at approximately 1-second intervals.

Channel Data Display – Place the pointing device's indicator over the MCA screen. The indicator will be displayed as a double-headed vertical arrow ↕. The channel number, energy, and total number of counts in the selected channel will be displayed directly beneath the arrow in the **Cursor Readout** frame. If an ROI has been defined, placing the arrow ↕ inside the red highlighted ROI area will cause the ROI number, total integral counts, and peak centroid channel to be displayed in the **Cursor Readout** frame. To stop acquisition, click the Stop button (displayed only when counting). To clear the displayed spectrum from the display area, click the Clear Spectrum button.

CHANGING DETECTORS

To switch detectors, simply select the desired detector from the **Detector** frame on the lower right side of Figure 13-1 MCA Main Screen. The program will automatically switch the signal input to the selected detector, and reset the stored calibration settings for that detector.

SPECTRUM SCALE & ZOOMING

The MCA screen will automatically change vertical scale range so that the entire spectrum is displayed at all times.

The spectrum can be zoomed in vertically or horizontally by clicking the Zoom button on the menu bar. A pop-up menu with three options is displayed:

- **Vertical Zoom** – This selection will allow zooming of the full-count vertical scale.
- **Horizontal Zoom** – This selection will allow zooming of the horizontal scale.
- **Auto Range** – This selection will restore the spectrum the original automatic settings.

Vertical Zoom

The vertical scale can be expanded to a (minimum) full-scale count of 100. The example spectrum shown in Figure 13-2 is of Cs137 and a vertical full-scale count of 500.

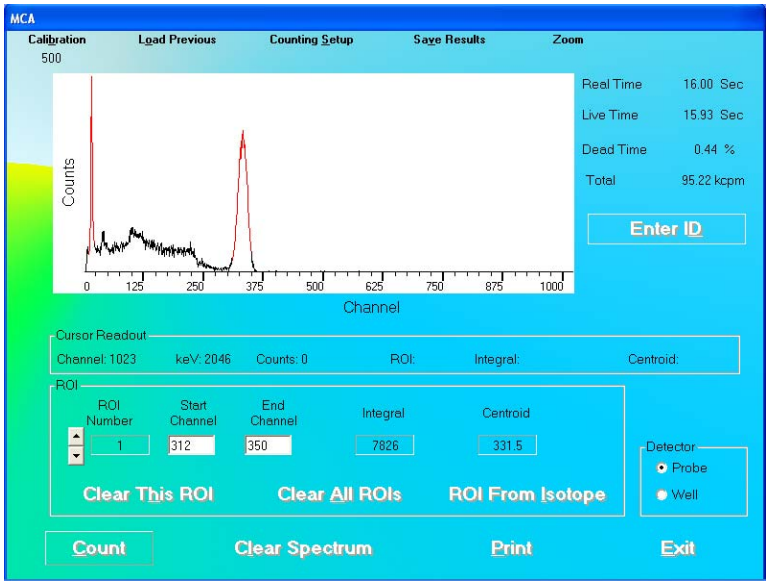

Figure 13-2

To expand the vertical scale, from Figure 13-2, click the Zoom button on the menu bar and, from the pop-up menu, select Vertical Zoom. This sequence can be repeated until the full-scale count is at 100 as shown in Figure 13-3.

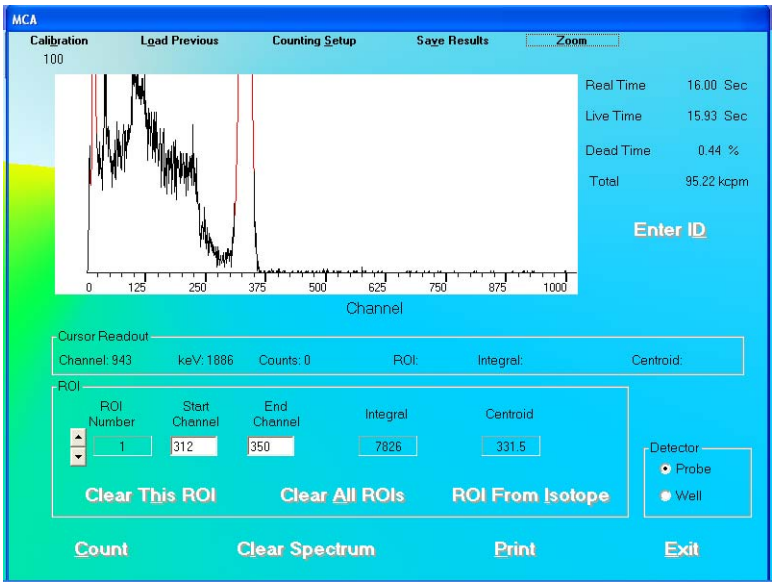

Figure 13-3

Horizontal Zoom

The Horizontal scale can be zoomed in two ways:

- Pre-defined channel ranges, or
- User selectable range

Pre-Defined Channel Ranges

There are four pre-defined channel ranges built into the CAPTUS 3000: 0-255, 256-511, 512-767, and 768-1023.

To expand the spectrum to one of the pre-defined channel ranges, from Figure 13-2, click the Zoom button on the menu bar and, from the pop-up menu, pause on Horizontal Zoom. Another pop-up menu will appear showing the available channel ranges.

Select one of the channel ranges and the spectrum will update to show the selected channel range. In the example shown in Figure 13-4, channels 256-511 were selected.

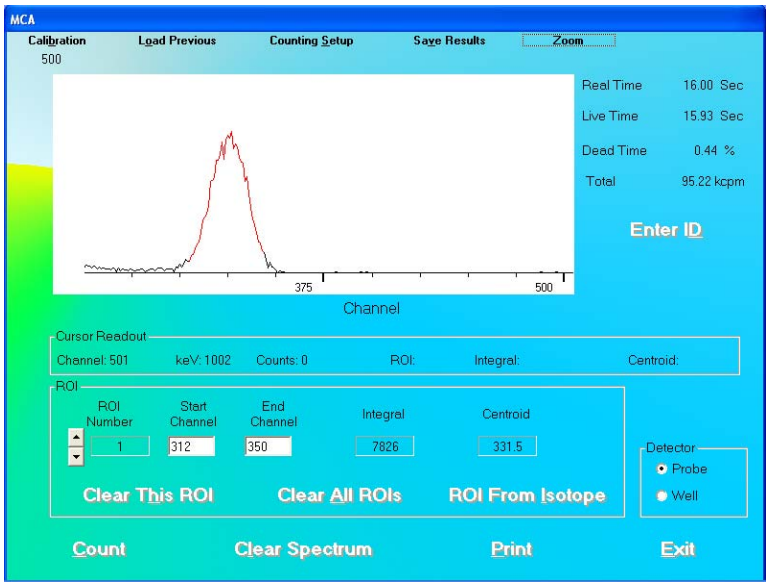

Figure 13-4

User Selectable Range

The user can select any area within the spectrum to zoom. To expand the horizontal scale to a particular area, right click in the spectrum window as follows (Refer to Figure 13-5):

1. Right-click at the minimum channel for the zoomed view.

2. Right-click at the maximum channel for the zoomed view. The spectrum will appear similar to that shown in Figure 13-6.

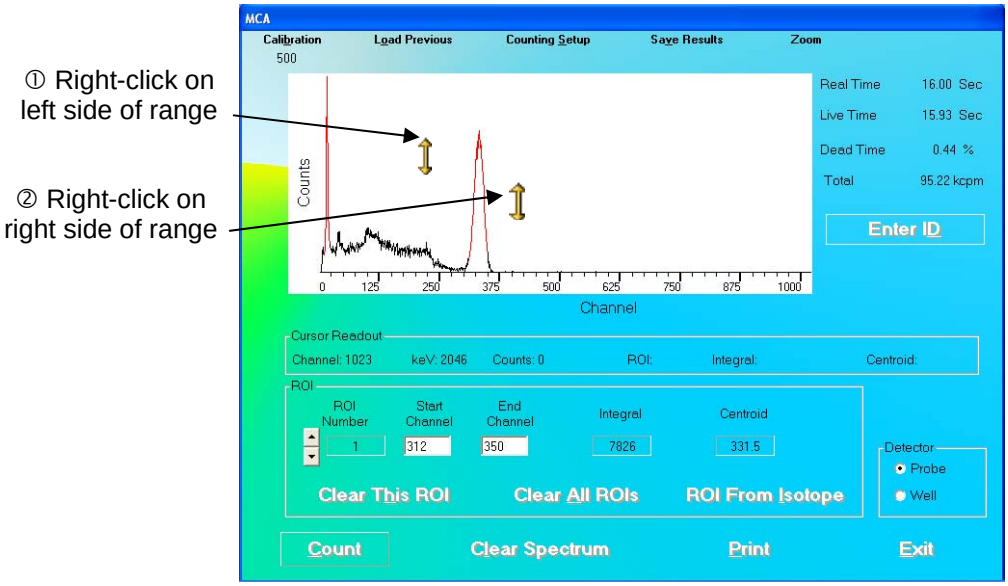

Figure 13-5

3. To restore the horizontal scale to the default value (0 to 1023), right-click anywhere in the spectrum window as shown in Figure 13-6.

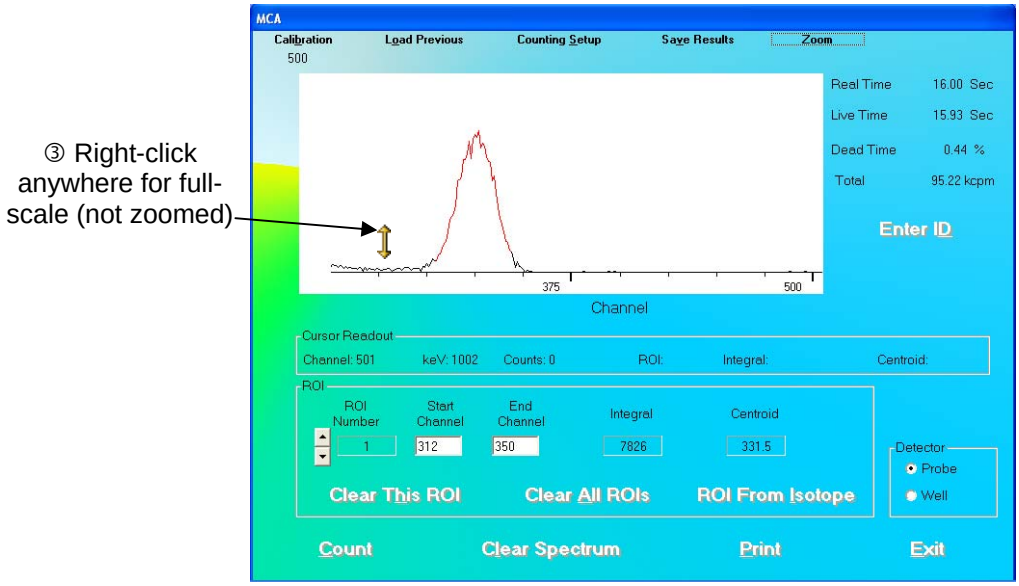

Figure 13-6

COUNTING SETUP

The acquisition may be automatically stopped by preset live time, real time, or peak counts. After selecting the Counting Setup button on the menu bar, the screen illustrated in Figure 13-7 will appear.

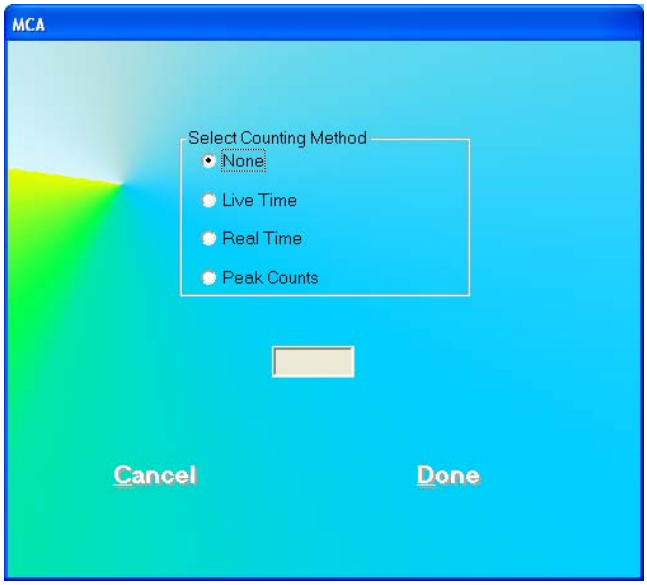

Figure 13-7

The following selections are available:

- **None** – no preset counting limit is set.
- **Live Time** – Count until the preset live time is reached.
- **Real Time** – Count until the predefined number of seconds has elapsed.
- **Peak Counts** – Count until the specified number of counts is reached in any spectrum channel.

Input the time (in seconds) or counts in numerical characters without any commas.

During acquisition, both elapsed live time and elapsed real time will be displayed in the upper right hand corner of the MCA display.

SPECTRUM ID (NAME)

The displayed spectrum can be identified with a description that will be saved with the spectrum, printed on the MCA report, and exported to Excel.

To input an ID or Name of the spectrum, select the Enter ID button on Figure 13-1 MCA Main Screen. Figure 13-8 will appear.

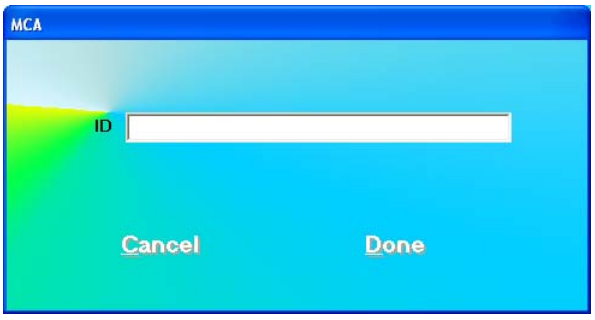

Figure 13-8

Input the identifying information into the text box. The description can be any combination of alphanumeric characters to a maximum of 40 characters Click the Done button or press *Alt+D* to save the ID or click the Cancel button or press *Alt+C*, to cancel the ID and return to Figure 13-1 MCA Main Screen.

REGIONS OF INTEREST (ROI)

Up to 16 Regions of Interest (ROIs) are available at any one time. Each ROI will be highlighted in red in the spectral display area. ROIs may overlap, or one ROI may be defined inside another ROI, if required.

To view active ROIs, look in the **ROI** frame on the MCA screen. One ROI is displayed at a time. To scroll through the ROI list, click the up and down arrow buttons to the left of the **ROI Number** box. Figure 13-9 illustrates two ROIs.

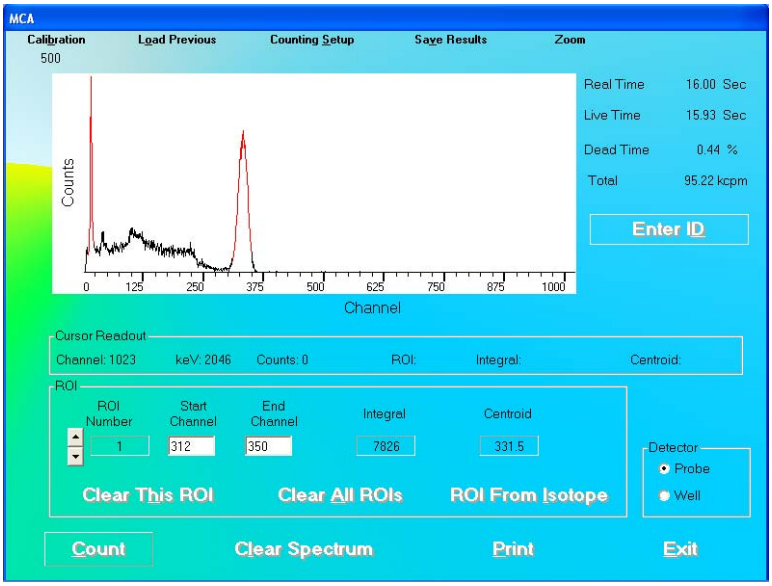

Figure 13-9

To define an ROI, scroll through the ROI list to find the ROI number to add or modify. ROIs can be entered in three ways:

- **Define an ROI by typing** – Input the lowest channel of the ROI in the **Start Channel** text box, and the highest channel in the **End Channel** text box.
- **Define an ROI by clicking in the spectrum window** – Place the arrow on the left side of the ROI and left-click. The channel number will appear in the **Start Channel** text box. Place the arrow on the right side of the ROI and left-click. The channel number will appear in the **End Channel** text box.
- **Define an ROI from an Isotope** – Click the ROI From Isotope button on Figure 13-1 MCA Main Screen. The screen shown in Figure 13-10 will appear.

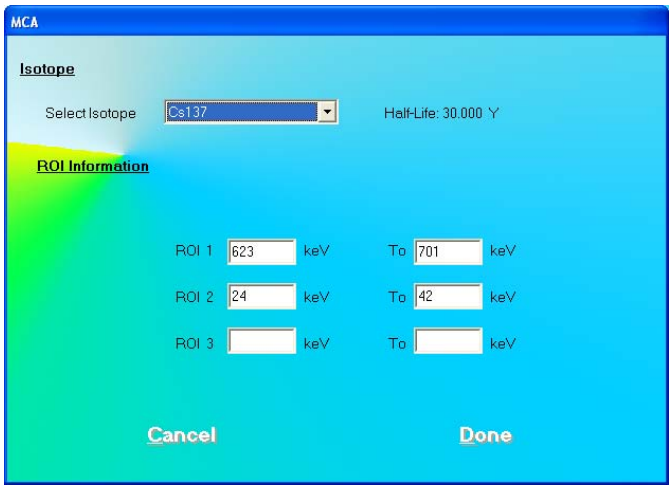

Figure 13-10

Select the desired isotope by clicking on the down arrow in the **Select Isotope** drop-down box to view the isotope list. Click the Done button to enter the displayed ROIs into the MCA ROI list on Figure 13-1 MCA Main Screen. (Note: any previous MCA ROI entries will be deleted).

After both start and end channel numbers have been defined, the total number of counts in the ROI will appear in the box labeled **Integral** contained in the **ROI** frame. The ROI will be displayed in red on the MCA Measurement screen as shown in Figure 13-2.

To delete an ROI that has already been defined, use the up and down arrow keys beside the ROI number box to select the correct ROI number. Click the Clear This ROI button. All ROIs can be deleted with the Clear All ROIs button.

ROIs are retained only while in the MCA module. They are not transferred to any other module. ROIs defined in the MCA mode must be saved to disk and recalled for future use. Detailed instructions for saving and recalling count data or MCA settings are provided in the Error! Reference source not found. section below. The count data and ROI information are also printed on the hard copy report of any spectrum.

SAVE AND RESTORE COUNT DATA OR MCA SETTINGS

Spectral count data and MCA settings may be saved and recalled for future evaluation and use.

Note: *Saving a spectrum stores the spectrum and the MCA settings. Saving MCA settings stores only the settings and not the spectrum. If you recall a spectrum, the MCA settings for its acquisition will automatically be restored.*

In order to export data or save settings, click the **Save Results** button on the menu bar. A pop-up menu will appear with 5 export/save functions as illustrated in Figure 13-11.

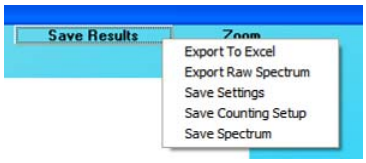

Figure 13-11

In order to load previously saved data or settings, click the **Load Previous** button on the menu bar. A pop-up menu will appear with 4 load functions as illustrated in Figure 13-12.

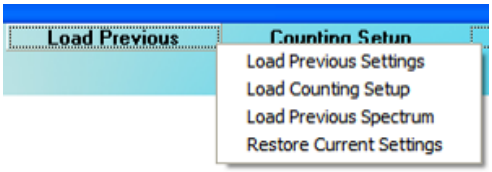

Figure 13-12

Export, Save and Load functions are described in the following sections.

Save Spectrum

After acquisition has been stopped, choose **Save Spectrum** from the **Save Results** button on the menu bar. The Save Spectrum dialog box will appear, as shown in Figure 13-13.

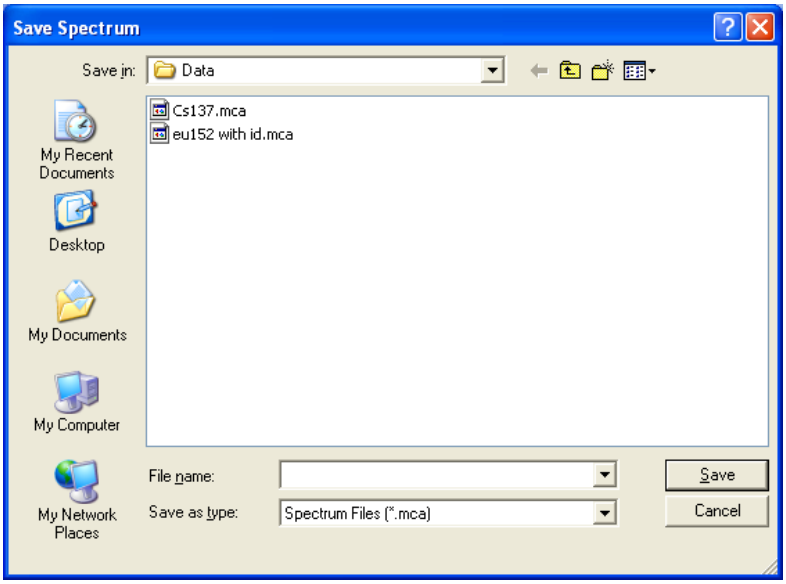

Figure 13-13

Input the desired file name for the spectrum. The default folder will be C:\Captus3000_2\Data, with a **.mca** file name extension. To save the data to another folder, browse to the desired location, then input the file name. To save the spectrum, click the Save button.

Note: *It is recommended that the **Save as type:** is not changed from Spectrum Files (*.mca)*

Recall Spectrum

To retrieve a previously stored spectrum, choose **Load Previous Spectrum** from the Load Previous button on the menu bar. The Select Spectrum dialog box will appear, as shown in Figure 13-14.

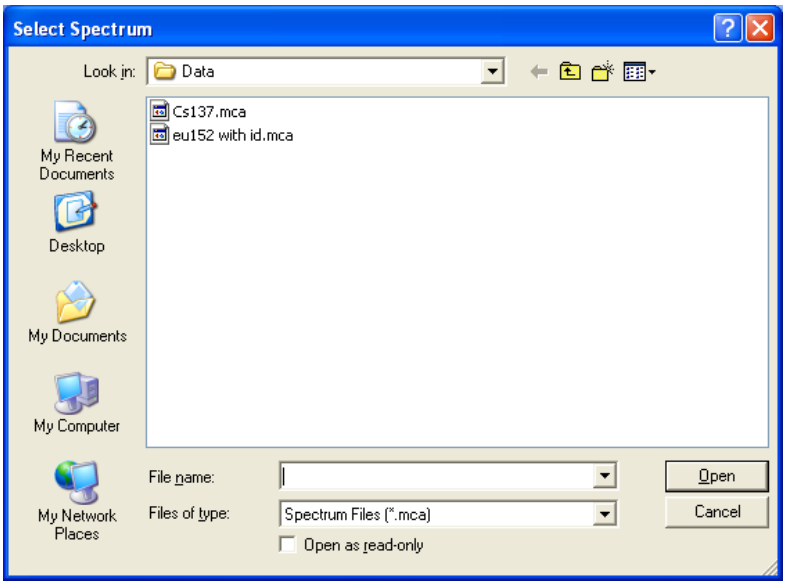

Figure 13-14

Select the desired spectrum from the list. The default folder will be C:\Captus3000_2\Data. To load a spectrum from a different folder or disk, browse to the desired location, and then select the file name. To load the spectrum, click the Open button.

Export to Excel

An MCA result summary can be exported to Excel format. This includes counts in the active ROIs (it does not include the raw spectrum count data). To export summary data, choose **Export to Excel** from the Save Results button on the menu bar. A dialog box similar to the Save Spectrum dialog box will appear (as shown in Figure 13-13), but the file extension will be **.xls**. Figure 13-15 illustrates the exported data when opened in Excel.

Note: *It is recommended that the* ***Save as type:*** *is not changed from MCA Spectra (*.xls)*

	A	B	C	D	E	F	G
1	Spectrum Data						
2	ID	Sample					
3	Acquisition Date	10/01/2001					
4	Acquisition Time	11:41					
5	Real Time	4.29	Sec				
6	Live Time	4.19	Sec				
7	Measured In	Probe					
8	High Voltage	1000	V				
9	Gain	7.32					
10	Zero Offset	31.69	%				
11	Threshold	1.2	%				
12	FWHM	6.6	%				
13	Total Counts	17154					
14	Total Spectrum Counting Rate	245.6	kcpm				
15							
16		ROI #	Start Chan	End Chan	Integral	Centroid	cpm
17		1	311	350	4568	332.7	65.41k
18		2	11	22	2386	17.1	34.17k
19							

Figure 13-15

Export Raw Spectrum

The MCA the raw spectrum count data can be exported to Excel format. This includes counts in all channels (it does not include the active ROIs). To export the raw spectrum data, choose **Export Raw Spectrum** from the Save Results button on the menu bar. A dialog box similar to the Save Spectrum dialog box will appear (as shown in Figure 13-13), but the file extension will be **.xls**.

Note: *It is recommended that the* ***Save as type:*** *is not changed from MCA Spectra (*.xls)*

Save MCA Settings

In order to store the MCA settings for later retrieval and use, choose **Save Settings** from the Save Results button on the menu bar. A dialog box similar to the Save Spectrum dialog box will appear (as shown in Figure 13-13), but the file extension will be **.set**.

Input the desired file name for the settings. The default folder will be C:\Captus3000_2\Data. To save the data to another folder, browse to the desired location, then input the file name.

To save the settings, click the Save button.

Note: *It is recommended that the* ***Save as type:*** *is not changed from MCA Settings Files (*.set)*

The MCA settings, such as voltage, gain, zero, threshold, and defined ROIs will be stored in the file.

Recall MCA Settings

To retrieve stored MCA settings, choose **Load Previous Settings** from the Load Previous button on the menu bar. A dialog box similar to the Load Spectrum dialog box will appear (as shown in Figure 13-14), but the file extension will be **.set**.

Select the desired settings file from the list. The default folder will be C:\Captus3000_2\Data. To load a spectrum from a different folder, browse to the desired location, and then select the file name. To load the settings, click the Open button.

Save Counting Setup

The counting setup parameters can be saved without saving the calibration settings (such as voltage, gain, zero, threshold) so that the "Out of Calibration" message window will not appear.

In order to store the Counting Setup for later retrieval and use, choose **Save Counting Setup** from the Save Results button on the menu bar. A dialog box similar to the Save Spectrum dialog box will appear (as shown in Figure 13-13), but the file extension will be **.csu**.

Input the desired file name for the settings. The default folder will be C:\Captus3000_2\Data. To save the data to another folder, browse to the desired location, then input the file name. To save the settings, click the Save button.

Note: *It is recommended that the **Save as type:** is not changed from Counting Setup Files (*.csu)*

The MCA settings stored in the file will be the Counting Method, Counting Time/Counts and defined ROIs.

Recall Counting Setup

To retrieve stored counting setup, choose **Load Counting Setup** from the Load Previous button on the menu bar. A dialog box similar to the Load Spectrum dialog box will appear (as shown in Figure 13-14), but the file extension will be **.csu**.

Select the desired settings file from the list. The default folder will be C:\Captus3000_2\Data. To load a spectrum from a different folder, browse to the desired location, and then select the file name. To load the settings, click the Open button.

PRINTING MCA DATA

To print an MCA spectrum report, select the Print button on Figure 13-1 MCA Main Screen. The printout will contain the spectrum shown on the screen, with ID information, date and time of acquisition, real and live times, gain, voltage, and detector settings. For each active ROI, total counts and total count rate, as well as starting and ending channels, integral counts, and peak centroid channel will be printed.

CUSTOMIZING MCA SETTINGS

The MCA module provides full control over MCA settings used to acquire a spectrum. The initial settings, determined in Autocalibration, are automatically transferred to the MCA module, so that the 1024 channels are calibrated at about 2 keV/channel. However, these can be changed using the following procedures.

Note: *When the MCA mode is exited, the automatic calibration settings are restored. This is to assure correct definition of any ROIs used in the clinical modules of the CAPTUS 3000.*

To alter the automatic calibration settings, select the **Calibration** button from the menu bar located at the top of Figure 13-1 MCA Main Screen. The Calibration Settings frame will appear in the MCA Main Screen as shown in Figure 13-16.

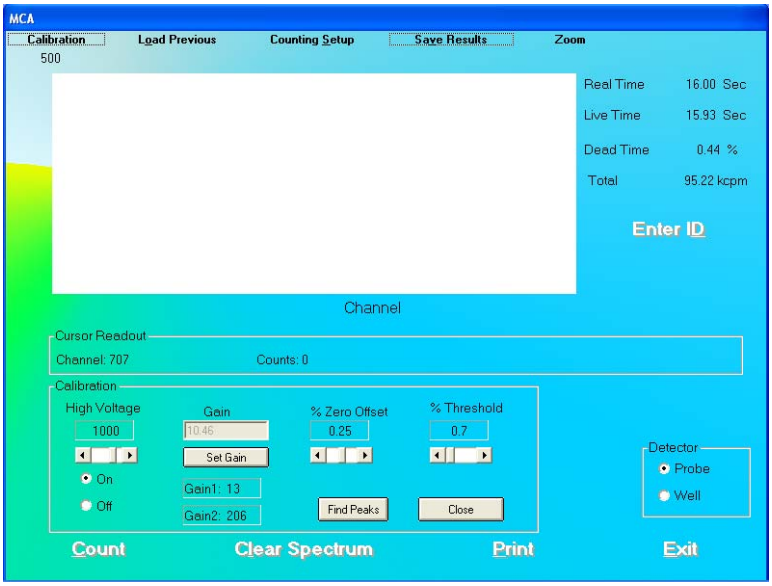

Figure 13-16

High Voltage

The voltage level may be changed to a value between 0 and 1250 Volts. Use the scroll bar below the High Voltage indicator to adjust the value. Either click the right (+) and left (-) arrows, or drag the scroll bar.

Note: *The voltage from the single power supply is applied concurrently to both detectors in a two-detector system.*

The High Voltage can be turned on or off by clicking the appropriate radio button below the high voltage slider.

Gain

The MCA card installed in the system defines the System Gain range. MCA cards supported by the software have two amplifiers: coarse (Gain1) and fine (Gain2) gain. The system chooses the optimal combination of coarse and fine gains for the desired system gain. System gain is the arithmetic product of coarse and fine gains.

To change the coarse (Gain1) and fine (Gain2) gain values, click the Set Gain button. Figure 13-17 will appear.

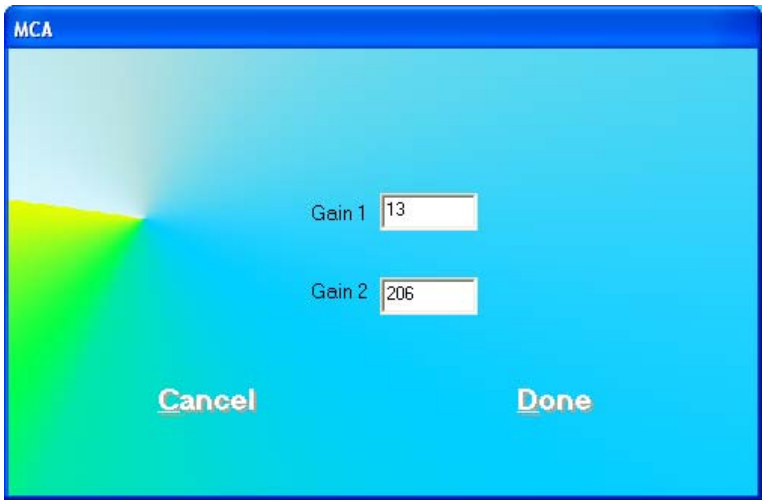

Figure 13-17

Gain is adjusted by typing the desired gain into in one or both of the Gain text boxes (Gain range is 1 to 256).

In order to activate the newly entered gain, click the Done button or press *Alt+D* to return to Figure 13-16. The System Gain number will update. This will set the gain until the MCA mode is exited.

Click the Cancel button or press *Alt+C* to discard the changes and return to Figure 13-16.

Zero Offset

The Zero Offset sets the channel location of zero keV. It is defined as percentage full-scale with a range dependent on the installed MCA board (Zero Offset range is -20.00 to +20.00%).

Use the scroll bar below the **% Zero Offset** indicator to adjust the value. Either click the right (+) and left (-) arrows, or drag the scroll bar.

Threshold

The Threshold is set to eliminate any extraneous electronic noise while allowing counts of the lowest possible energy to be detected. It is equivalent to a Lower Level Discriminator (LLD). It is defined as percentage full-scale with a range dependent on the installed MCA board (Threshold range is 0.0 to 25.0%).

Use the scroll bar below the **% Threshold** indicator to adjust the value. Either click the right (+) and left (-) arrows, or drag the scroll bar.

Note: *The CAPTUS 3000 does not have a setting for ULD. The ULD is defined as displayed spectrum full-scale (i.e., channel 1024, or 2MeV).*

QUICK TIPS:

- To provide a **different energy calibration** ratio, use the Cesium 137 rod source to provide two peaks of known energy. Use the Gain control to adjust the location of the 662 keV peak to a desired channel. Then use the Zero offset adjust controls to position the 32 keV peak into a second desired channel. For example, to manually calibrate the MCA for 3 keV/channel, place the 662 keV peak of Cs137 in channel 221, and the 32 keV peak in channel 11. If the gain and Zero adjustments are unable to position the peaks correctly, adjust the voltage. Repeat this energy calibration procedure until the peaks are positioned as required.
- To **restore calibration settings**, exit the MCA mode, and re-enter from the CAPTUS 3000 Main Screen.

MANUAL CALIBRATION

MCA mode can also be displayed from the Autocalibration screen (CHAPTER 5: QUALITY ASSURANCE). If Autocalibration is not successful click the Manual Calibration button or press *Alt+M* on the Auto Calibration screen. The MCA mode screen for Manual Calibration will appear as illustrated in Figure 13-18.

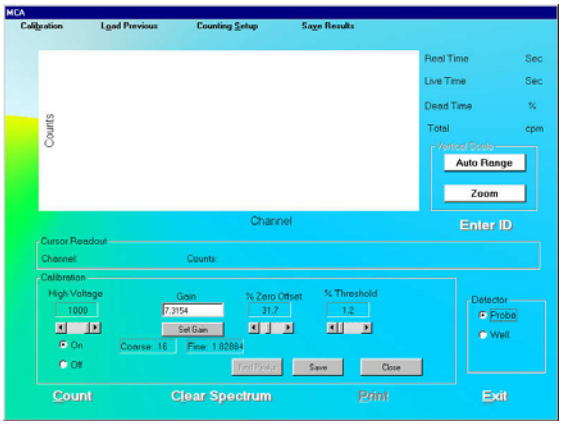

Figure 13-18

To perform calibration, use the Cesium 137 rod source to provide two peaks of known energy. To acquire and clear spectra, click the Count and Clear Spectrum buttons. Set the Gain and Zero Offset at low values. Gradually increase the Gain until the 662 keV peak is near channel 331. Adjust the Zero Offset so that the 32 keV peak is visible. Several iterations of Gain and Zero Offset adjustments may be required. If the Gain and Zero Offset adjustments are unable to position the peaks correctly, adjust the High Voltage. Repeat this energy calibration procedure until the peaks are positioned as required.

Click the Save button to store the calibrated settings for all modules of the CAPTUS 3000 system. Settings will be saved for the selected detector only.

Note: *Once calibration settings are saved in the **MCA for Manual Calibration Screen**, these will serve as a baseline for Autocalibration, which can be reattempted if it failed initially. These settings will only serve as a baseline for Autocalibration. They will not apply to other program modules.*

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CHAPTER 14

ARCHIVE

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INTRODUCTION

The CAPTUS 3000 software provides the user with an archive database feature to easily save all the current data files at one time. The archived files can be sorted according to test groups, viewed and printed selectively. Archiving should be performed periodically to provide a system backup or before deleting old patient files and records.

Note: *Archived files are only available for viewing and report printing. They cannot be accessed for editing or additional data collection.*

To access the Archive module, click the **Archive** button or press *Alt+A* on the CAPTUS 3000 Main screen. Figure 14-1 Main Archive Screen will appear.

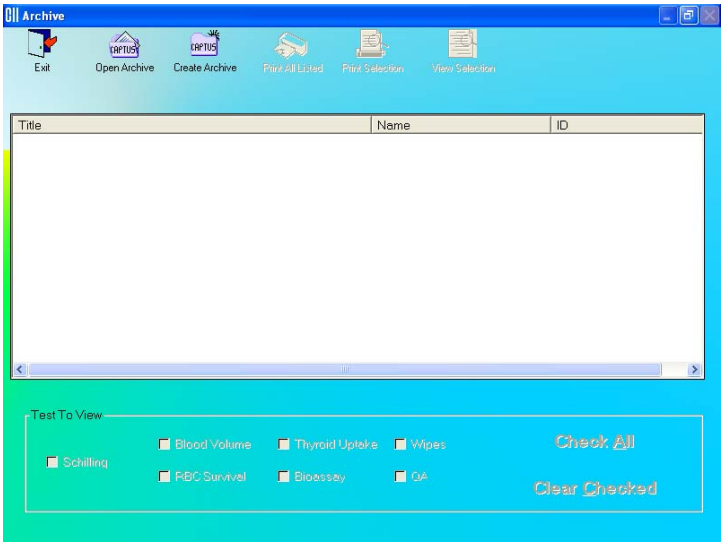


Figure 14-1 Main Archive Screen

The empty box in the middle of the screen will display saved data when an archive file is opened. Each record appears with the name of the test performed, name and ID (if applicable) of the subject. Icons at the top of the screen provide functions to create a new archive, open an existing archive and print and view records in detail. The **Test to View** frame at the bottom of the screen lets you select or unselect particular test modules you may wish to view and/or print.

To return to the CAPTUS 3000 Main Screen from the, click the

icon or press the *Esc* key.

DOING SYSTEM BACKUP (CREATING AN ARCHIVE)

1. Click the

icon. The screen appears as shown in Figure 14-2.

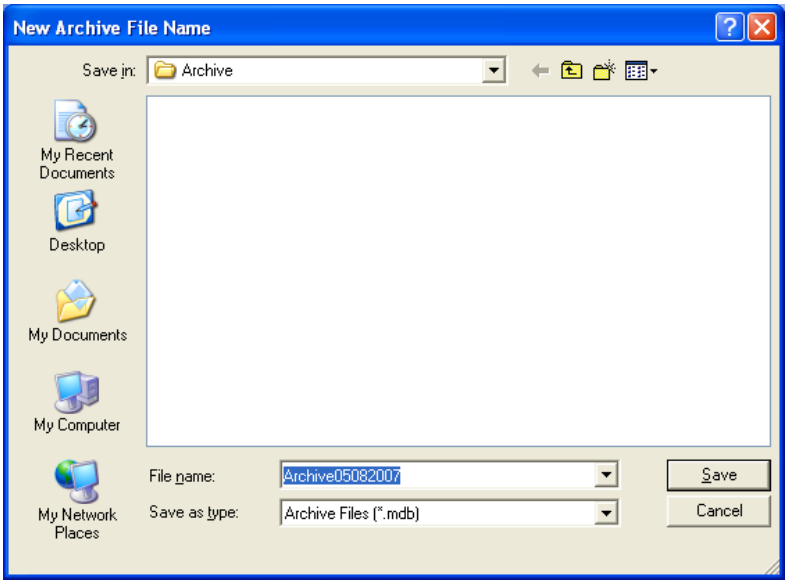
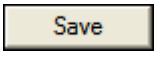
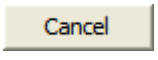


Figure 14-2

2. The default file name appears in the **File name** box as ArchiveMMDDYYYY (*if* the default for date format in system setup is MMDDYYYY), where MMDDYYYY is the current date or the date of archive creation. For example, the archive above, Archive05082007, is being created on 05/08/07. The file is saved as a database file with a **.mdb** extension. The default folder for saving archive files is Captus3000_2\Archive\. The file name and default folder can be changed by clicking in the respective boxes.

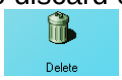
3. Click the 

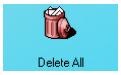
button or press *Alt+S* to create the archive or click the 

button to return to Figure 14-1 Main Archive Screen without creating an archive. Once an archive has been created, all the data collected in all the test modules will be saved

under the given file name and folder. After returning to Figure 14-1 Main Archive Screen, archived data will appear in the box.

QUICK TIPS:

- The default file name and folder are designed to make record keeping easy. It is recommended not to change these defaults.
- Once system backup is performed, the archive files now contain all the data collected in all the modules (except Time Activity Analysis). To discard old records from module screens, go to each module and use the 

or 

icons as desired. The archived data will not be affected.

OPENING AN ARCHIVE

1. Click the

icon to open an archive. The screen appears as shown in Figure 14-3.

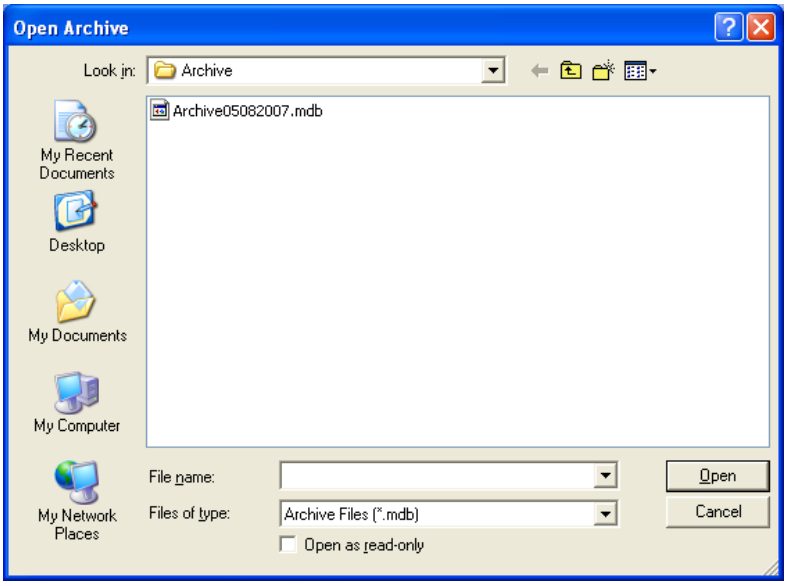


Figure 14-3

2. The screen shows existing archive files in the default Captus3000_2\Archive folder. Click on the file name to open it or type in the filename in **File name** box and click the Open button or press *Alt+O*.

3. To return to Figure 14-1 Main Archive Screen without opening any file, click the Cancel button or press the *Esc* key.

VIEWING AND PRINTING RECORDS FROM ARCHIVE

Selecting Tests for Viewing

Once an archive is opened, the records stored there are listed in the box on the middle of the Archive screen as shown below in Figure 14-4. The name of the archive file appears at the top of the box. By default, all test modules in the **Test To View** frame are checked or selected (i.e., records from all the test modules appear on the screen by default). Records belonging to the same test module are grouped together and arranged alphabetically by **Name**.

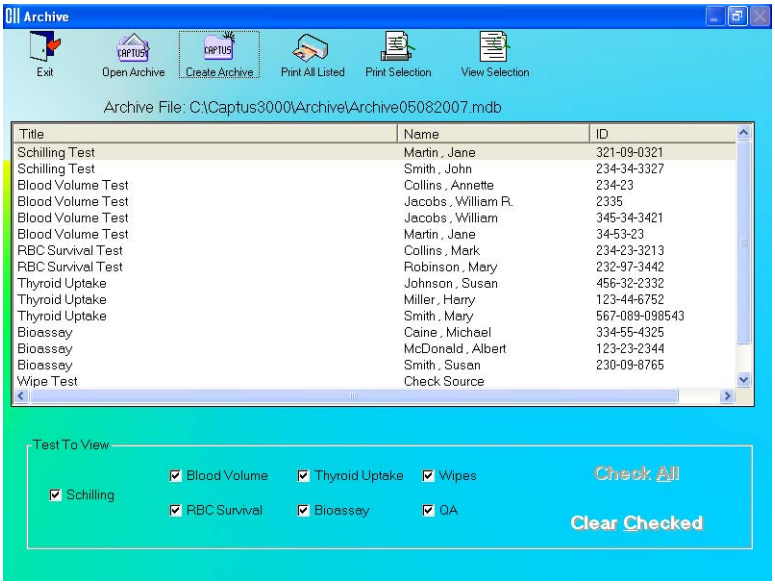


Figure 14-4

1. Click the **Clear Checked** button or press *Alt+C* to deselect all the tests. All records will disappear.

2. Next, click in the check box of one or more tests to select the ones you wish to view. The records from these tests will appear in the box. For example, in the Figure 14-5 below, only Blood Volume and Thyroid Uptake tests are checked and therefore, only results from these tests appear in the box.

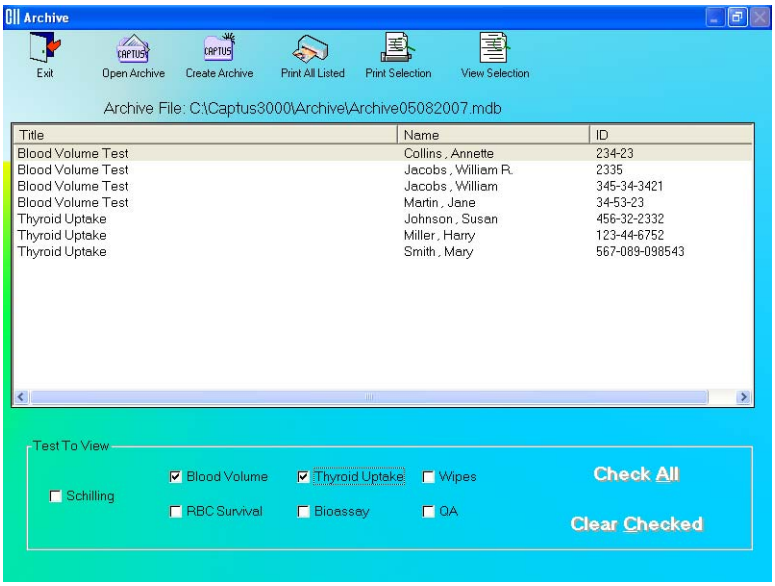


Figure 14-5

3. To select all the tests at once, click the Check All button or press *Alt+A*. Clicking in the check boxes again, will uncheck or deselect the test.

Viewing or Printing a Record

1. Open an archive.

2. Select a specific test module for viewing its records. The records are arranged alphabetically by **Name**.

3. Click on the scroll bar to move up or down the list of records as needed. To view a specific record, click on that record as shown in Figure 14-6 below.

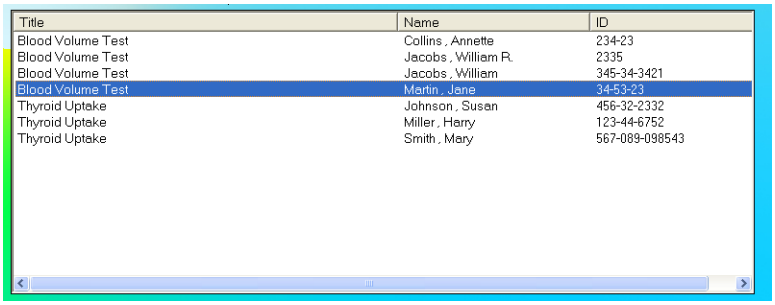


Figure 14-6

4. Click the View Selection icon to view a detailed report of the selected record as in Figure 14-7. All information on the subject, collected counts data and calculated results appear.

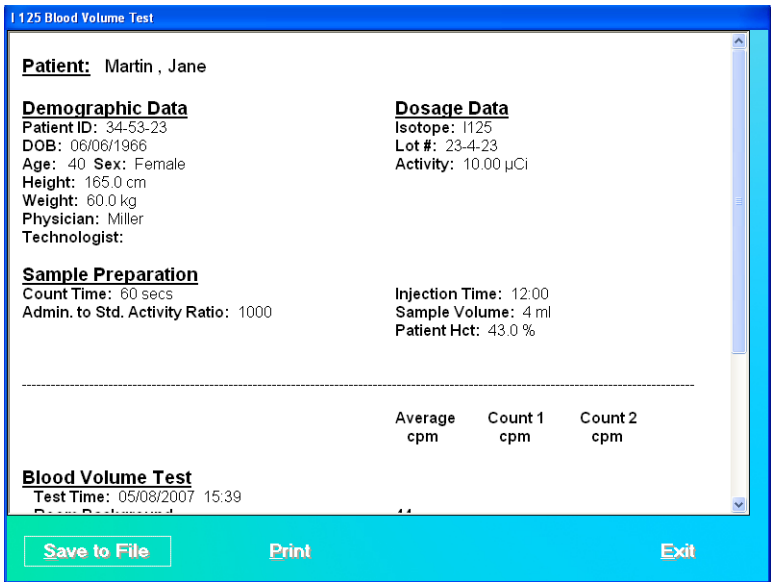


Figure 14-7

5. To save the report on your screen to another file, click the Save to File button or press *Alt+S*. The Save As screen appears as shown in Figure 14-8.

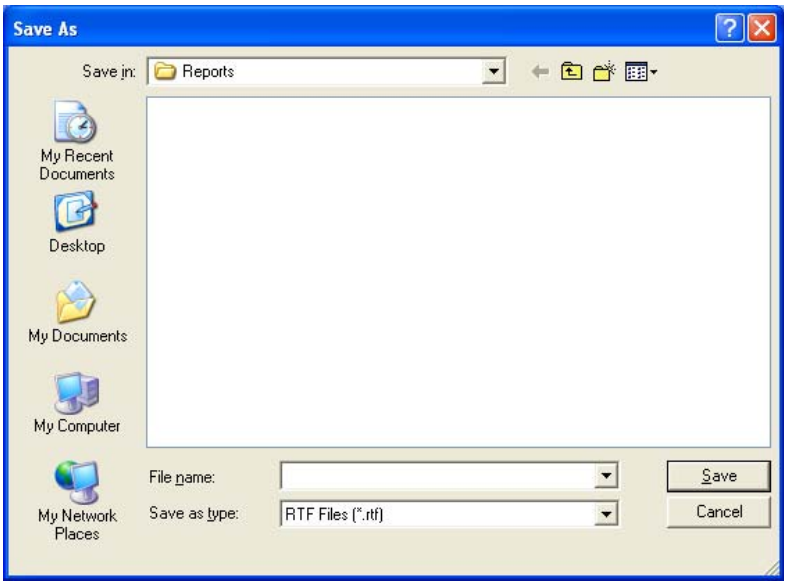


Figure 14-8

6. To print the report on your screen, click the Print button or press *Alt+P*.

7. To return to Figure 14-1 Main Archive Screen, click the Exit button or press *Alt+E*.

QUICK TIPS:

- For a quick print of the selection without viewing the detailed report on the screen, click the

icon at the top of Figure 14-1 Main Archive Screen.
- To print detailed reports of all the listed records on the current Archive screen, click the

icon.

Printing All Records in Selected Tests

1. Open an archive.
2. Select one or more test modules records of which you wish to print.
3. Click the

icon. A detailed report of all the records listed on the Archive screen at that time will be printed.

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CHAPTER 15

CLEANING AND MAINTENANCE

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CLEANING and DISINFECTING **15-2**
Cleaning Instructions **15-2**
Disinfecting Instructions **15-3**
PREVENTIVE MAINTENANCE **15-3**
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SERVICING **15-5**
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ACCESSORIES AND REPLACEMENT PARTS **15-8**
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INTRODUCTION

This chapter provides the information necessary for the user to perform the basic maintenance of instrument cleaning, fuse replacement 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 three to five years) re-calibration of the CAPTUS® 3000 Portable be performed only by Capintec's Authorized Service Center to guarantee the instrument's high reliability is maintained. Contact Capintec's only 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 CAPTUS® 3000, NEVER ALLOW WATER OR LIQUIDS TO PENETRATE THE DETECTOR HOUSINGS OR THE COMPUTER SYSTEM ENCLOSURES.
- 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

- **PORTABLE STAND** – Use a soft cloth lightly dampened with water, window cleaner, or a mild detergent. Wipe the surfaces as necessary to remove dust or smudges.

- **DETECTORS** – Use a soft cloth lightly dampened with water, window cleaner or mild detergent. Wipe the front surface and or the well as necessary to remove smudges of surface contamination.

  Note: *If contamination is suspected, dispose of the cleaning cloth in an approved container for contaminated materials.*

- **POINTER ASSEMBLY** – Use a soft cloth dampened with propanol alcohol to sterilize or clean the black pointer and assembly.

- **KEYBOARD** – Use a can of compressed air with a narrow, straw-like extension to blow away any trapped particles from under the keys. If you spill liquid on the keyboard, shut down the computer immediately. Turn the computer upside down to allow the liquid to drain and dry overnight before you attempt to use it again. If the keyboard fails to function after drying, it will have to be replaced.

- **COMPUTER SCREEN** – Use a soft cloth lightly dampened with water. Wipe the screen as necessary to remove dust, fingerprints, and/or smudges.

- **COMPUTER CASE** – Use a soft cloth lightly dampened with water. Wipe the surfaces of the case and the keyboard keys as necessary to remove dust, fingerprints, and/or smudges.

- **PRINTER** – Use a soft cloth lightly dampened with water, window cleaner or mild detergent. Wipe the outside surfaces of the printer case to remove dust, smudges, and stains. The interior of the printer does not require cleaning.

- **PRINTER CARTRIDGES** – Clean the print cartridges when you notice that lines or dots are missing or smudged on the printed text or graphics. Refer to the Printer's User Guide for instructions on cleaning the Print Cartridges. Align the print cartridges

when you notice that color ink does not properly line up with black ink. Refer to the Printer's User Guide for instructions on aligning the print cartridges.

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 CAPTUS® 3000 without the Well Counter liner in place. Liners are inexpensive and easy to replace. A contaminated Well Counter is a very costly mistake.

Printer

Refer to the printer owner's manual for proper cleaning procedures.

PREVENTIVE 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 5: 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 are necessary.

⚠ **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 collimator or 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.*

If the unit fails to pass the Auto Calibration or any other test, the user **should not** attempt to perform any adjustments to the system. In such an event, please contact Capintec's only Authorized Service Center for further assistance.

Quality Assurance tests should be immediately performed if:

- The equipment has been subjected to extreme physical stress,
- Liquids enter the computer/monitor, and/or probe and well detectors, or
- Any cable shows signed 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.

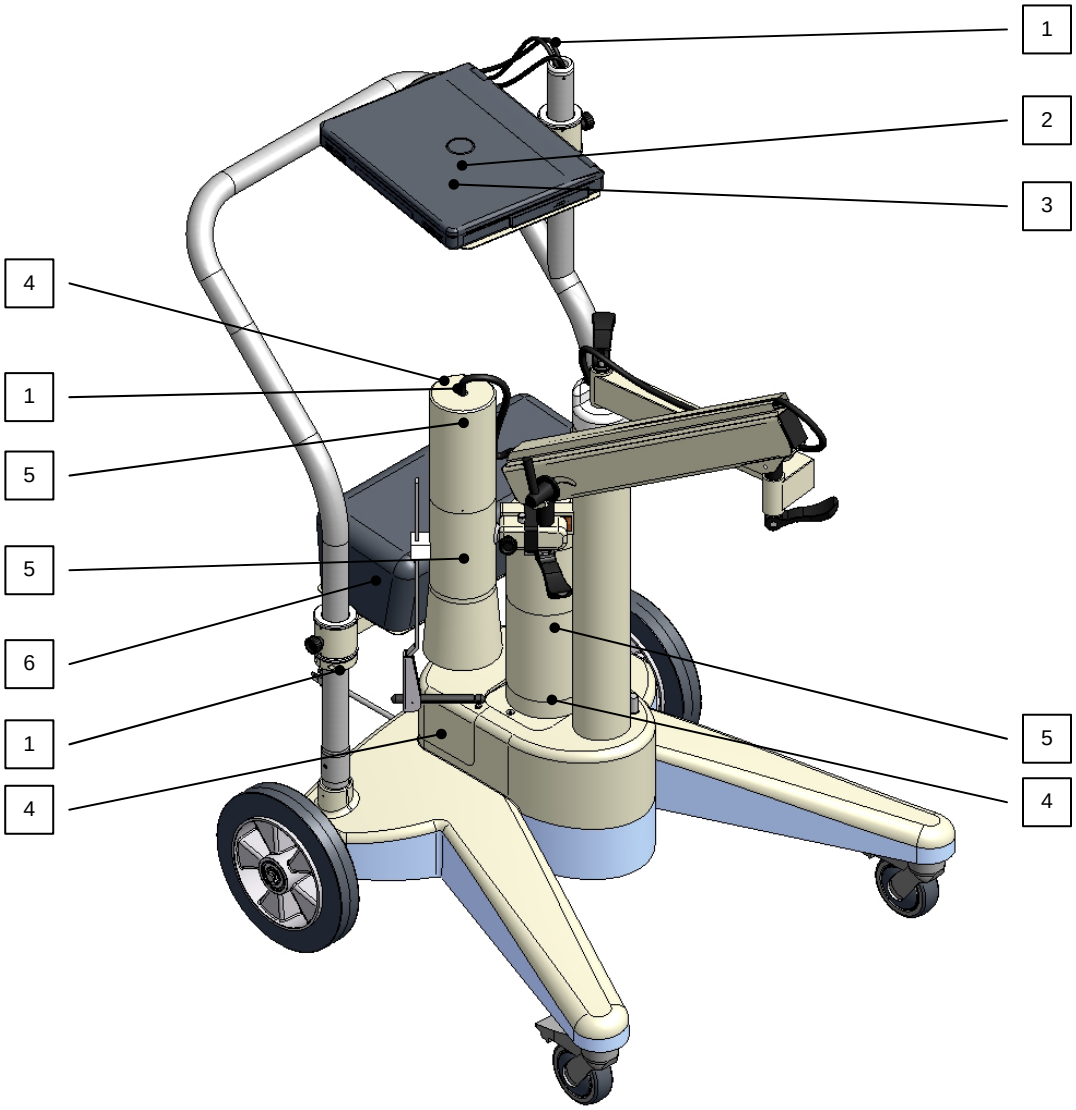

Figure 15-1

No.	Recycling/Material Code	Important Information
1	External Electrical Cables	
2	Lithium Battery	Contained in the Computer.
3	Laptop Computer	Contact computer manufacturer for disposal instructions.
4	Printed Circuit Boards	MCA Card, Main and Dynode Boards
5	Lead	Lead Shielding inside Collimator and on Probe Detector Base and optional Well Counter
6	Printer	Contact printer manufacturer for disposal instructions.

SERVICING

The system is covered by a one year limited warranty, under normal conditions of use.

Other than the internal Isolation Transformer's fuses (reference FUSE SERVICING on page 15-7), there are no user serviceable parts contained in the system.

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

Collimator Block Inspection

Once a year, the Collimator Mounting Block (1) should be inspected for the following:

- excessive play between the Spring-Arm shaft (2) and the Collimator Mounting Block,
- excessive play between the Collimator pin (3) and the Collimator Mounting Block.

If there is excessive play or the knob(s) cannot be tightened, contact Capintec's only Authorized Service Center for information on replacement items, instructions or on-site service.

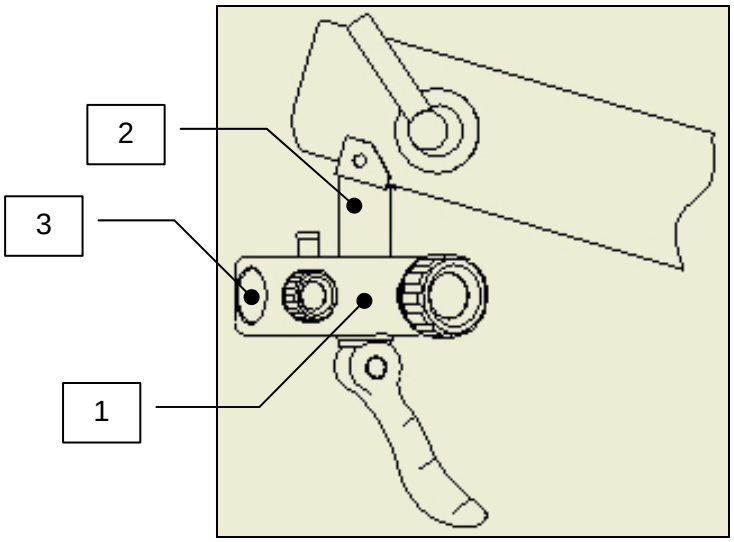

Figure 15-2

⚠ **WARNING:** FAILURE TO FOLLOW THE INSPECTION REQUIREMENTS FOR THE COLLIMATOR BLOCK COULD RESULT IN SERIOUS INJURY OR PRODUCT MALFUNCTION.

Spring-Arm Inspection

Note: *Before inspection, loosen the Spring-Arm Positioning Handle (rotate counter-clockwise) located on the side of the Spring-Arm until the Spring-Arm moves up and down freely.*

Once a year, the Spring-Arm should be inspected for the following:

- The Spring-Arm should move smoothly without excessive force between the upper and the lower limits of its vertical travel.

If the Spring-Arm does not move smoothly, contact Capintec's only Authorized Service Center for information on replacement items, instructions or on-site service.

Computer Battery Replacement

To replace the computer's battery, please contact the computer manufacturer for proper procedure and battery type.

FUSE SERVICING

CAUTION: FOR CONTINUED PROTECTION, REPLACE ONLY WITH SAME TYPE AND RATING OF FUSE(S). A FIRE HAZARD MAY EXIST IF THE WRONG SIZE OF FUSE IS INSTALLED.

Power Line Fuses

The power line fuses are located at the rear of the Portable Stand Base directly below the main power cord connector. The type and rating of these 2 fuses are listed on the label that is located beside the main power cord connector.

To change these fuses:

1. Turn off the power to the computer and printer.
2. Remove main power from the system by unplugging the main power cable from the medical grade wall socket.
3. Unplug the main power cord connected at the rear of the stand base.
4. Use a small screwdriver to pry open the tab of the fuse drawer that is located directly below the power cord connector. The drawer will drop down to expose the ends of the 2 fuses. (Refer to Figure 15-3)
5. Remove the blown fuse(s) from the holder and replace it/them with the fuses specified on the label.
6. Rotate the fuse drawer to the upright position and push the drawer back into the fuse holder.

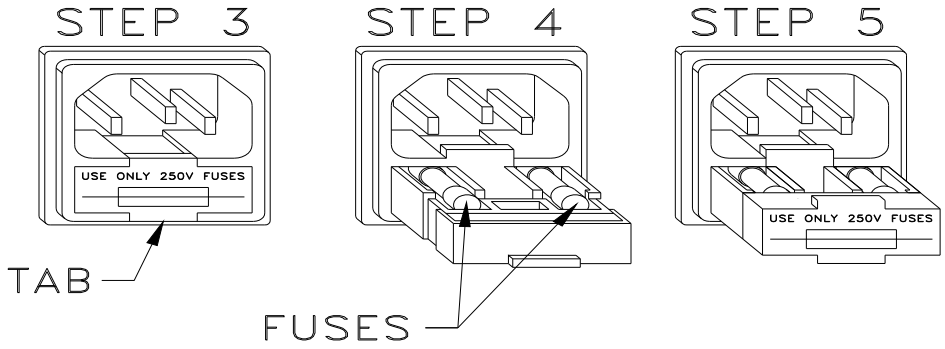

Figure 15-3

7. Reconnect the main power cord at the rear of the stand base.
8. Reconnect the main power to the system by plugging the main power cord into a medical grade wall socket.
9. Turn on the computer power. The system will proceed through the computer boot up sequence, and display the Windows® desktop screen. Once the computer is at the desktop screen, turn on the printer.

10. Verify that the CAPTUS® 3000 System is functioning correctly by performing the daily tests.

ACCESSORIES AND REPLACEMENT PARTS

The following accessories and replacement parts are available form Capintec. Contact Capintec at 1-800-227-6832 for answers to your questions or to place an order.

- CAP-MCA Module 5430-2128
- Custom Protocol Software Module 0960-0152
- Cap-DICOM Interface Kit 5450-0003
- Flat Face Detector, 2M2/2 type 1200-0028
- Drilled Well Detector, 2MW2/2 type 1200-0029
- Detector Base Assembly, PM-600/3000 5420-2126
- Well Detector, 1" Shielding 5420-2033
- Well Liners – 5 per package. 5120-0176
- Rod Source, Cs137 (0.5 µCi) 0970-137R
- Rod Source, Eu152 (0.5 µCi) 0970-152R
- Rod Source Holder 7315-1850
- Detector Cable, coaxial 10 feet long. 8400-2236
- Power Cable, hospital grade, 15 feet long 8125-0024
- Fuse, T 2.5AH, 250 Volt. (115 Power line) 2 Req. 2110-0079
- Fuse, T 2.0AH, 250 Volt. (230 Power line) 2 Req. 2110-0076
- Additional copies of Owner's Manual 9250-0132

SHIPPING

If for any reason the CAPTUS® 3000 must be returned to Capintec, the shipping carton must contain the following or equivalent labeling as shown in Figure 15-4. Label stipulating the maximum environmental conditions for safe storage and shipment.

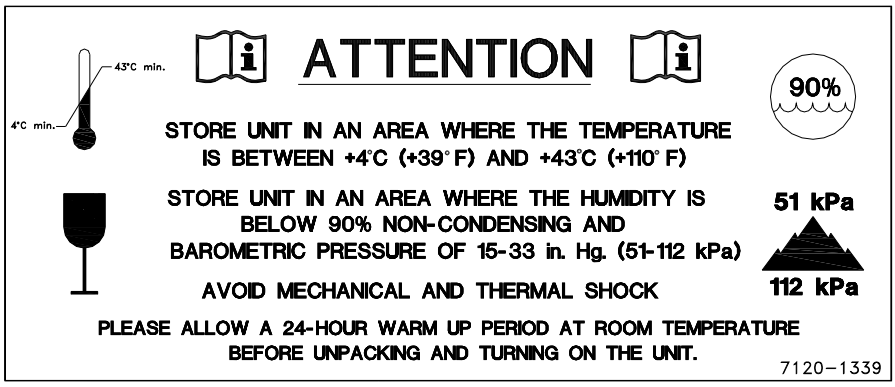

Figure 15-4

CHAPTER 16

CUSTOM PROTOCOLS

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Note: *This is an Optional Module which must be purchased in addition to the CAPTUS 3000 system.*

INTRODUCTION

The Custom Protocols Module is used to perform tests which are not included in other CAPTUS 3000 program modules. It is ideal for facilities needing to perform repeated protocols that are not widely adopted. This advanced module provides the flexibility needed to collect almost any type of data required for the study, perform simple or complex data analysis, and create standard reports.

The analysis of the data and report generation is performed in Microsoft Excel. The Excel Workbook is tightly integrated with the CAPTUS 3000 application so that in daily use, reports can be generated from Excel transparently to the user.

Integration with Excel allows the analysis of data and reporting to be at any level of complexity – and completely user defined. Capintec provides a sophisticated Excel Workbook that handles importing all the data from the protocol automatically. There are worksheets in the workbook that are used for data access, user-defined data analysis (formulas are entered on these sheets), and reporting. Analysis sheets are hidden during daily use to avoid confusion and/or alteration by the technologist. A report workbook takes

the data from the analysis sheet, and prints a customized report for the study that can be included in the patient record. The initial configuration of the workbook requires some basic knowledge of Microsoft Excel (such as creating formulas, linking data from one worksheet to another, etc.). Once the workbook is configured, no knowledge of Excel is required to perform the study.

If the workbook is opened directly (normally the CAPTUS 3000 program activates the Workbook), the user is prompted with a patient list for that particular protocol.

For each custom protocol desired, a different Workbook is required.

The user must set up the protocol(s) before making any measurements. In order to avoid setup difficulties, it is important to have a **clearly defined protocol** with a list of every data element needed for the protocol (from patient name, through each measurement required).

STARTING CUSTOM PROTOCOLS

Click the Custom Protocols button or press *ALT+C* on the Main screen. Figure 16-1 Main Custom Protocols Screen will appear. The **Patient Directory** list box will be empty if there are no existing patients in the database at that time. Each added patient will appear in this box with its name, Protocol name, maximum number of measurements for the protocol and number of measurements that have been performed.

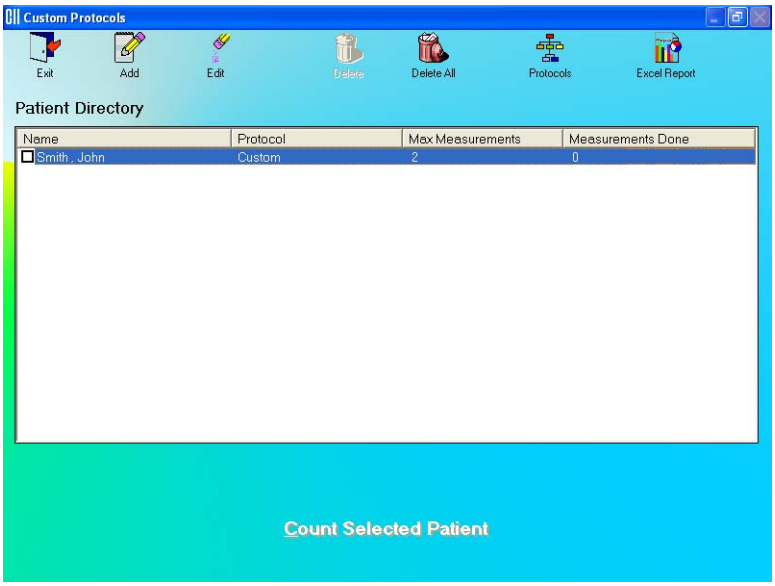
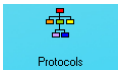


Figure 16-1 Main Custom Protocols Screen

To return to CAPTUS 3000 Main Screen from the Main Custom Protocols Screen, click the Exit icon or press *Esc* key. Click the Exit button or press *Esc* key again.

PROTOCOLS

To Add, View, or Delete Protocols, click the 

icon on Figure 16-1 Main Custom Protocols Screen. Figure 16-2 Main Protocol Screen will appear.

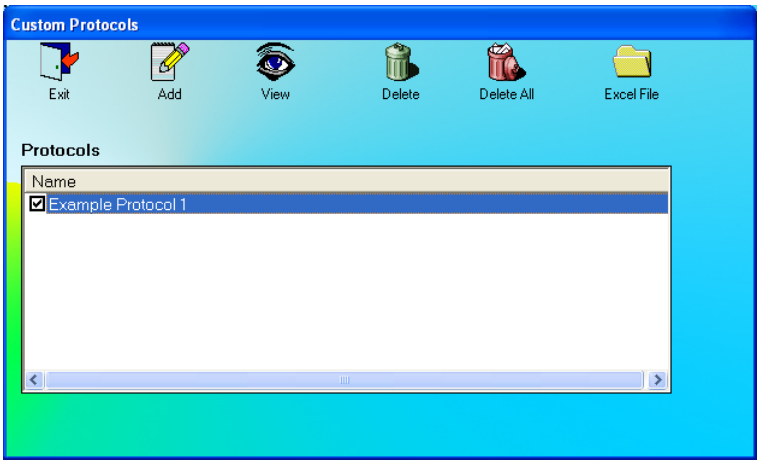


Figure 16-2 Main Protocol Screen

Adding Protocols

1. Click the

icon on Figure 16-2 Main Protocol Screen. The Protocol Setup screen will appear as shown in Figure 16-3.

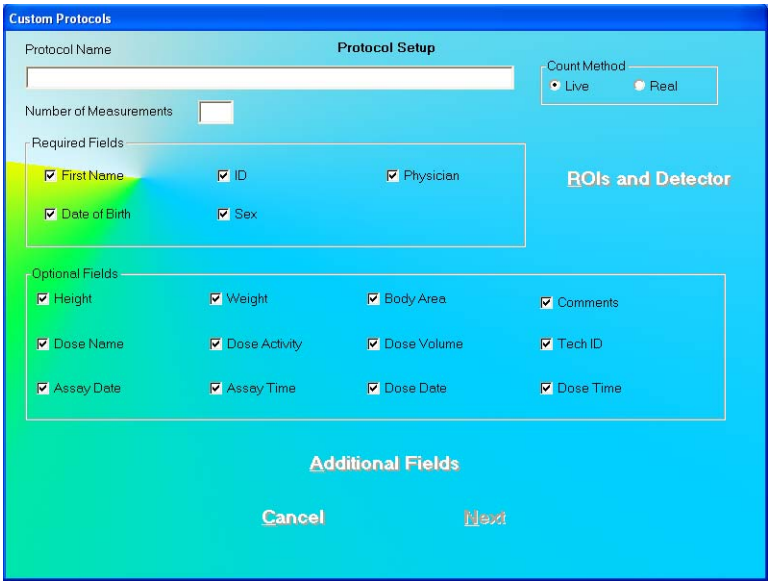


Figure 16-3

2. Input a descriptive name for the protocol being defined in the **Protocol Name** text box. (32 characters max)

3. Input the number of measurements that will be made for the protocol in the **Number of Measurements** text box. (1 to 50)

4. Click the appropriate radio button in the **Count Method** frame to select a count method (Live time counting or Real time counting).

5. Click the appropriate check box(es) in the **Required Fields** frame to select the demographic fields that will be required. Fields that are not checked will be optional entries when adding or editing a patient.

6. Click the appropriate check box(es) in the **Optional Fields** frame to select any of the optional fields, which will be needed for the protocol. Optional fields, which are checked, will appear when adding or editing a patient and will be required entries. Optional fields, which are not checked, will not appear on the Patient entry form.

7. If your protocol needs values, which are not displayed, click the Additional Fields button. The screen will appear as shown in Figure 16-4.

Figure 16-4

8. Up to 5 additional fields may be entered. These are all numeric fields. Input a name (32 characters max) for each field that will be needed. Fields that are named will be available when a patient is entered. If a name is not entered for a field, it will not be displayed when a patient is entered.

9. Click the ROIs and Detector button. The screen will appear as shown in Figure 16-5.

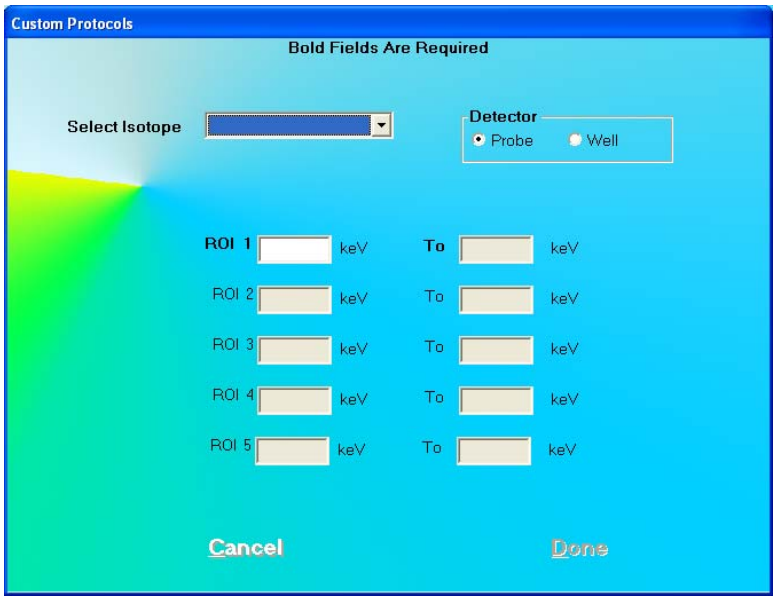


Figure 16-5

10. Click the appropriate radio button in the **Detector** frame to select the detector (Probe or Well) that will be used for the measurements.

11. In the **Select Isotope** drop-down list box, select the Isotope that will be measured. The ROIs appropriate for the detector and isotope will be filled in. These ROIs may be edited or added to.

12. Click the Done button or press *ALT+D* to save the entries and return to the previous (Protocol Setup) screen (Figure 16-3).

13. On Figure 16-3, click the Next button or press *ALT+N* when all the entries have been made. The measurement setup window for the first measurement will appear as shown in Figure 16-6.

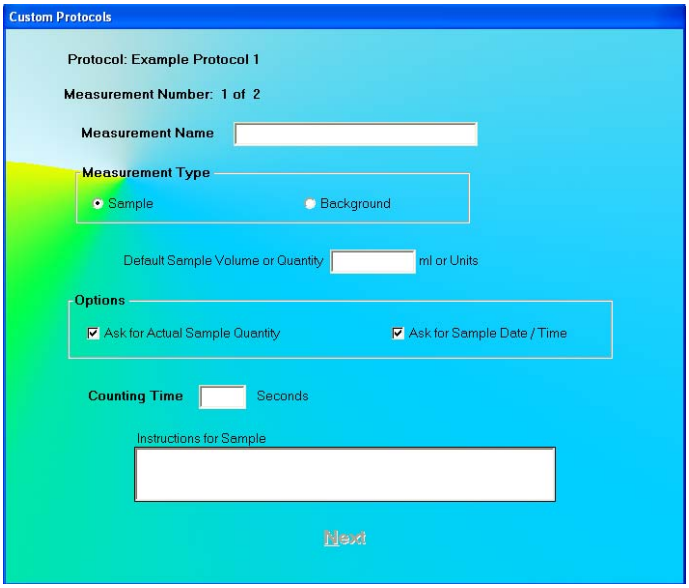


Figure 16-6

14. In the **Measurement Name** text box, input a name for the measurement (e.g. Sample 1). (32 characters max)

15. Click the appropriate radio button in the **Measurement Type** frame to select a Measurement Type. The default is Sample.

16. Input the Default Sample Volume or Quantity. This field is optional. The value cannot be entered if the Measurement Type is Background.

17. The **Options** frame is only active when the Measurement Type is Sample. Check *Ask for Actual Sample Quantity* if the user is to input the Sample Quantity for the measurement. Check *Ask for Sample Date / Time* if the user is to input the date and time the sample was collected.

18. In the **Counting Time** text box, input the counting time in seconds. (10 – 9999 seconds)

19. If special instructions are to be displayed for the measurement, type these instructions in the **Instructions for Sample** text box.

20. When all the fields are entered, click the Next button or press *ALT+N* to enter data for the next measurement. For the last measurement, click the Done button or press *ALT+D* to end the protocol entry.

    Note: *The number of measurement setup screens that appear depends upon the number of measurements entered in step 3 above.*

Viewing Protocols

Click the

icon on Figure 16-2 Main Protocol Screen. You can then step through the screens described in Adding Protocols and view the details of the protocol.

Deleting Protocols

On the Main Protocol Screen, check the Protocols that you want to delete. Click the

icon on Figure 16-2 Main Protocol Screen. You will be asked to verify the deletion(s).

Note: *You will not be allowed to delete a protocol if there is a patient test in progress using the protocol.*

Deleting All Protocols

Click the

icon on Figure 16-2 Main Protocol Screen. You will be asked to verify the deletion(s).

Note: *You will not be allowed to delete a protocol if there is a patient test in progress using the protocol.*

Selecting the Excel Workbook for the Protocol

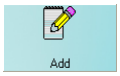
Note: *Before selecting a workbook for the protocol, the protocol must be set up in the CAPTUS 3000 program then the steps outlined in section **CUSTOM PROTOCOLS EXCEL WORKBOOK** on page 16-14 must be performed.*

Click the

icon on Figure 16-2 Main Protocol Screen to input or change the name of the workbook to be used to analyze the data for the protocol. If the selected workbook has already been assigned to a protocol, an error message will appear.

PATIENT DATA

Adding Patients

1. Click the 

icon on Figure 16-1 Main Custom Protocols Screen.

2. If there is more than 1 protocol, the Protocol Selection Screen will appear as shown in Figure 16-7.

Figure 16-7

3. Select the desired protocol from the drop-down list.

4. Click the Done button or press *ALT+D* to go to the Add Patient Screen as shown in Figure 16-8. Click the Cancel button or press *ALT+C* to return to Figure 16-1 Main Custom Protocols Screen.

   The Patient Entry screen is shown below for the case where all the optional fields have been selected for the protocol.

Figure 16-8

5. Click in the field box or use *Tab* key to move from one field box to another

6. Input the Patient Information. In the **Sex** drop-down list box, select from the list or press the *M* or *F* key. Remember that bold fields are required.

7. Input the data for all the optional fields that are shown.

8. If additional fields have been entered for the patient, click the Additional Fields button to input those values. (If there were no additional fields, this button will not be displayed). In the example shown in Figure 16-9, there are 3 additional fields. Input the numeric data and click the Done button or press *ALT+D* to save the data and return to Figure 16-8.

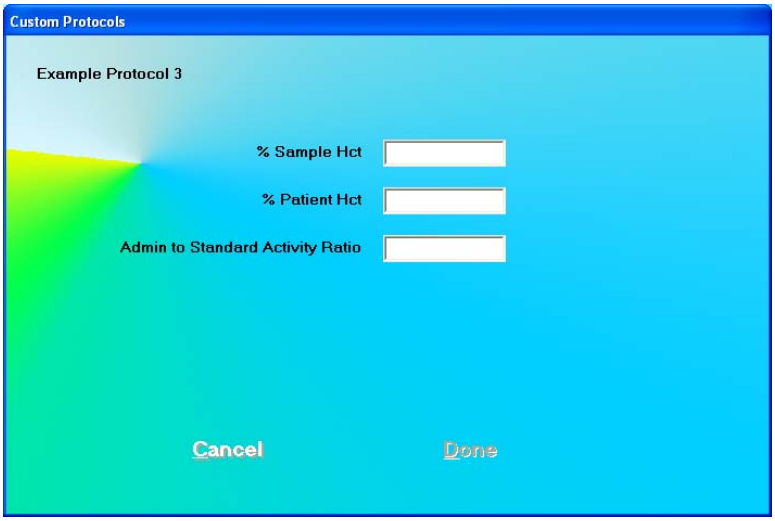


Figure 16-9

9. In the **Comment** text box, enter a comment if desired.

10. Click the Done button or press *ALT+D* to save the data. Click the Cancel button or press *ALT+C* to discard the data and return to Figure 16-1 Main Custom Protocols Screen.

Editing Patient Information

1. To select a patient to be edited, use the ↑ ↓ keys or *Page Up* and *Page Down* keys to move up or down in the patient list in the **Patient Directory** list box. If the list is long, the scroll bar is also available. To reach a particular patient, press the first letter of the patient name. Press the ↓ key if necessary, to go further down (Figure 16-10).

2. Click the Edit icon. The Patient Data Screen (Figure 16-8) will appear.

3. Click in the text box to be edited or use Tab keys to move around. Type over the existing information wherever needed.

4. Click the Done button to save changes or click the Cancel button to discard the changes and return to Figure 16-1 Main Custom Protocols Screen.

Deleting Patient Information

1. To select one or more patients for deletion, click in the check box on the left end of the patient in the **Patient Directory** list box on the main Custom Protocols screen (16-10). To deselect a patient, click in its check box again

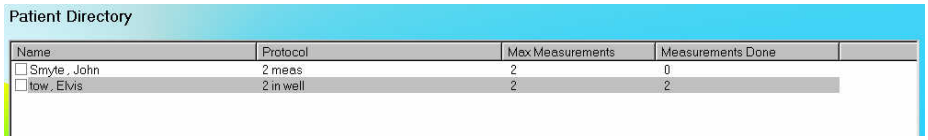
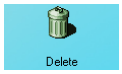


Figure 16-10

2. Click the 

icon. Figure 16-11 will appear.

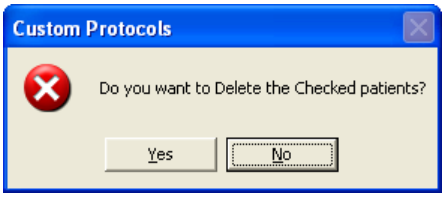
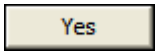
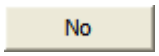


Figure 16-11

3. Click the 

button or press the *Y* key to confirm the deletion. Otherwise, click the 

button or press the *N* key.

MAKING MEASUREMENTS

⚠ **CAUTION:** Before making any measurements, calibrate the instrument for more accurate results. Calibration is recommended everyday. Refer to CHAPTER 5: QUALITY ASSURANCE, for the procedure.

1. To select a patient for the test, click on that record in the **Patient Directory** list box Figure 16-1 Main Custom Protocols Screen.

2. To begin the measurements, click the

button or press *ALT+C*. The Screen appears as shown in Figure 16-14.

Note: *If calibration has not been done that day, you will be prompted with the screen as in Figure 16-12. If you calibrate now, the screen will return after calibration to the screen shown in Figure 16-13.*

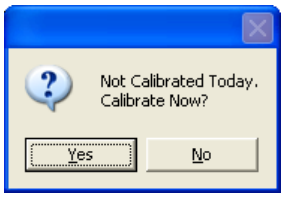


Figure 16-12

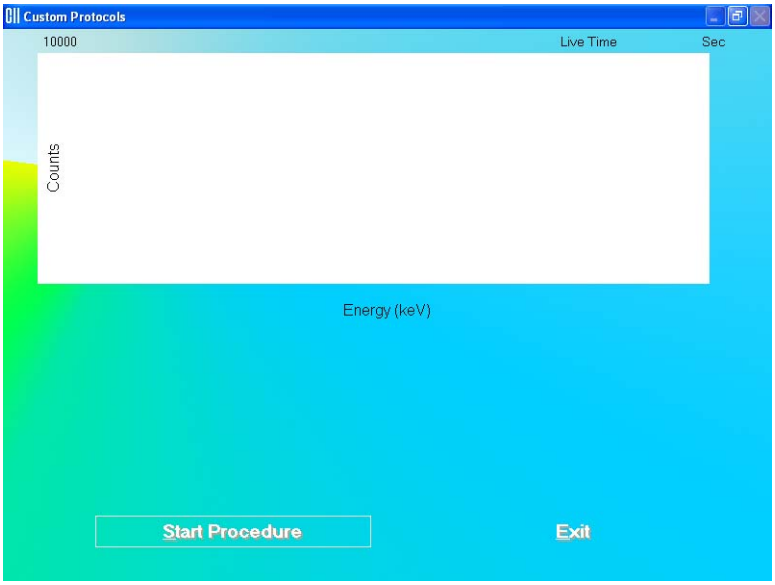


Figure 16-13

3. If one or more options were checked for the current measurement, the Measurement Input Screen will be shown as in Figure 16-14. In the example, both Actual Sample Volume and Sample Date and Time have been selected for Measurement Number 1.

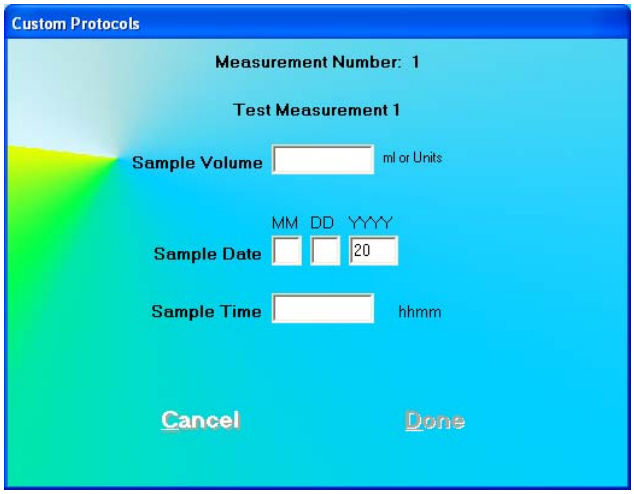


Figure 16-14

4. Input the necessary information and click the Done button to continue with the measurement or else click the Cancel button to return to Figure 16-1 Main Custom Protocols Screen without making the measurement.

5. Click the Start Procedure button or press *ALT+S* to begin the measurement.

6. The Default Volume will be displayed for Sample Volume. Input the actual volume if it is not the same as the default.

7. Input the date and time at which the sample was collected.

8. Click the Done button to continue with the measurement or else click the Cancel button to return Figure 16-1 Main Custom Protocols Screen without making the measurement.

9. The instructions for the current measurement will be displayed. The Measurement Name and any additional Instructions For Sample will be shown.

Data Acquisition

The data acquisition screen appears as shown in Figure 16-15, with the live spectrum displayed as counts are being collected.

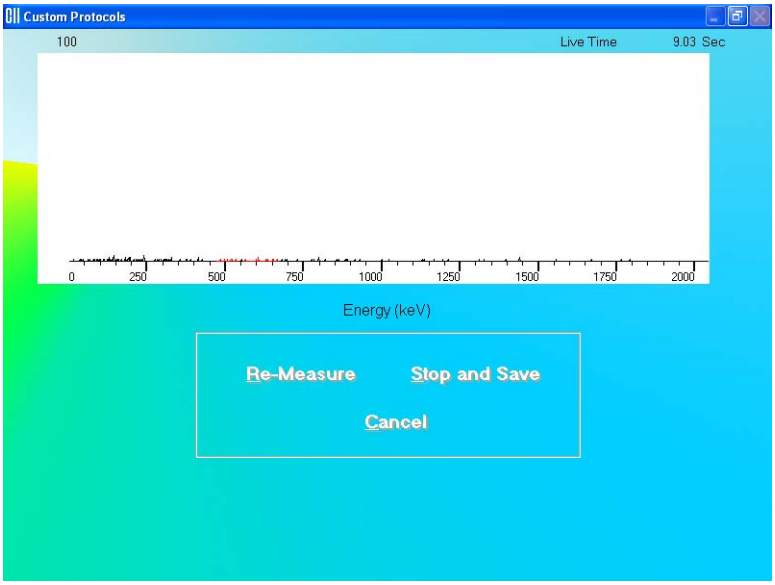


Figure 16-15

To stop the counting midway and begin counting again, click the Re-Measure button or press *Alt+R*.

To stop the counting midway and save collected data and move to the next step, click the Stop and Save button or press *Alt+S*.

To stop the counting midway and quit without saving, click the Cancel button or press *Alt+C*.

After count collection is done, the screen appears as shown in Figure 16-16.

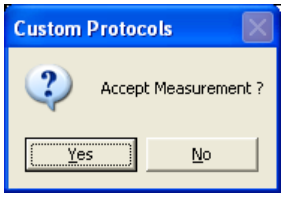


Figure 16-16

To accept the measurements and continue with the next step, click the Yes button or press the *Y* key. To discard and recount the current measurement, click the No button or press the *N* key.

After Counting

After the measurement has been made, a summary of the results is shown. In the example below (Figure 16-17), 3 ROIs were selected and the measurement was background.

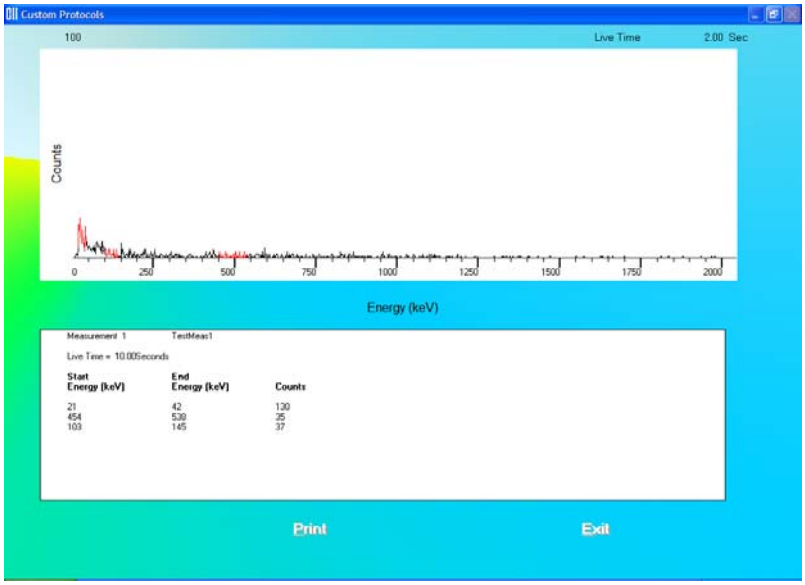


Figure 16-17

Click the Print button or press *ALT+P* to print the spectrum and the summary.

Click the Exit button or press *ALT+E* to return to Figure 16-1 Main Custom Protocols Screen.

Report

The report is obtained from the previously prepared Excel workbook.

On Figure 16-1 Main Custom Protocols Screen, select the patient and click the Excel Report icon.

Note: *If the workbook has not been previously assigned, an error message will appear. Click the Protocols icon to assign the workbook.*

The workbook will open to the Report sheet with data for the selected patient displayed.

To print a report, select Print from the File menu or click on the printer icon.

Exit from Excel. You will be returned to the CAPTUS program.

CUSTOM PROTOCOLS EXCEL WORKBOOK

An Excel Workbook must be set up for each protocol. The protocol must first be set up in the CAPTUS 3000 program.

In order to accurately create formulas for the protocol, a dummy patient should be entered and all the measurements simulated (e.g. using a rod source).

Note: *The Custom Protocols module can support multiple protocols. However,* ***each protocol requires a separate Excel Workbook****. When the master workbook (CustomCap.xls) is opened, you will be prompted to save the file with a unique file name. Create a descriptive name so the workbook can be easily identified.*

Creating a Workbook for a Protocol (Setup Mode)

Exit the CAPTUS 3000 program. Open Windows Explorer and open the Captus3000_2\Data folder. A display similar to that shown in Figure 16-18 should appear.

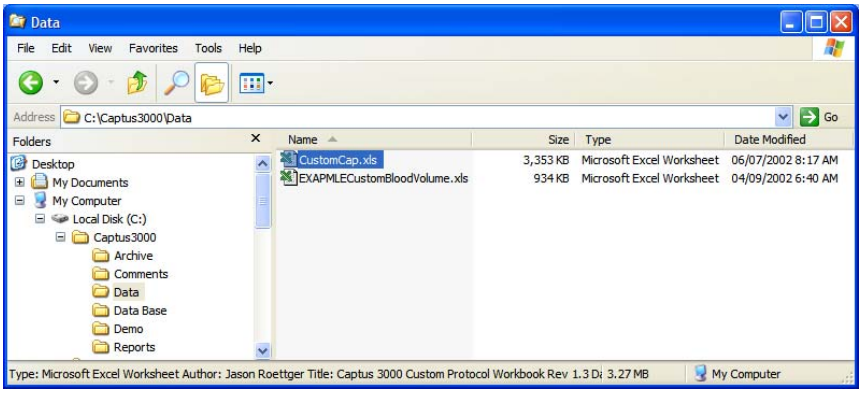


Figure 16-18

Double-click on CustomCap.xls file to open it. The Custom Protocol Workbook Splash Screen (Figure 16-19) will appear.

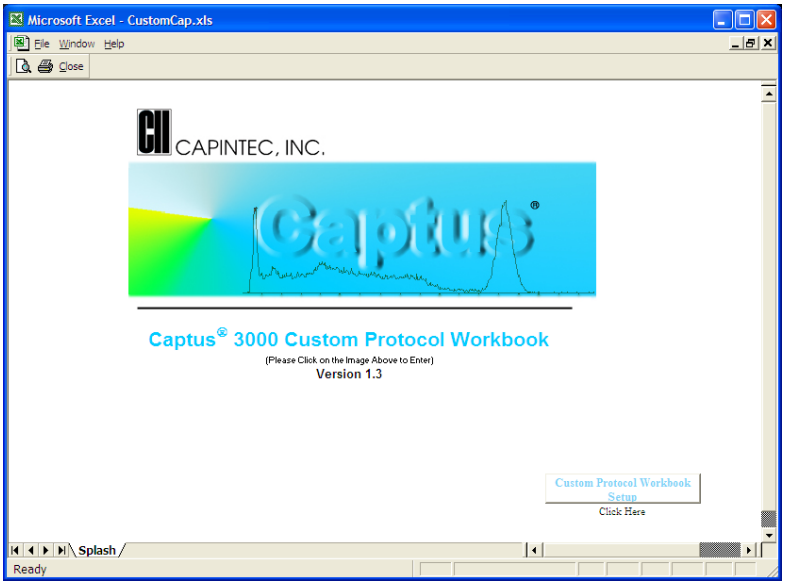


Figure 16-19

From the Custom Protocol Workbook Splash Screen (Figure 16-19), click on the Custom Protocol Workbook Setup button (Figure 16-24). The message box shown in Figure 16-20 will appear.

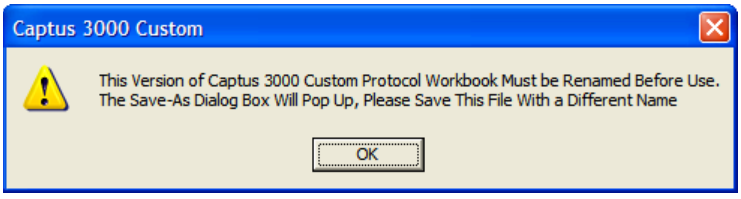


Figure 16-20

Click the OK button and select a file name for the protocol (example will be CustomMeasurement.xls). The new name will appear at the top of the workbook. Create a descriptive name so the workbook can be easily identified from within the CAPTUS 3000 application when the link from CAPTUS 3000 to the Workbook is made. Click the Save button. Figure 16-21 will appear for verification.

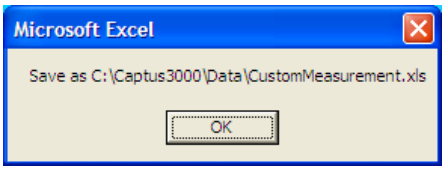


Figure 16-21

Click the OK button. The message box shown in Figure 16-22 will appear.

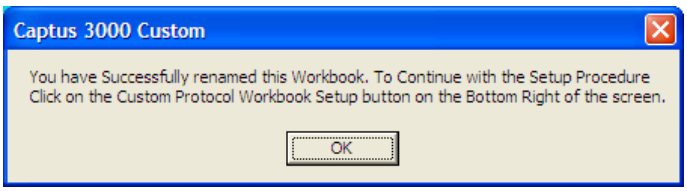


Figure 16-22

You may continue the Setup procedure now or exit and return later. If you choose to exit now and continue the Setup procedure later, when you re-open the CustomMeasurement.xls workbook, the message box in Figure 16-23 will appear.

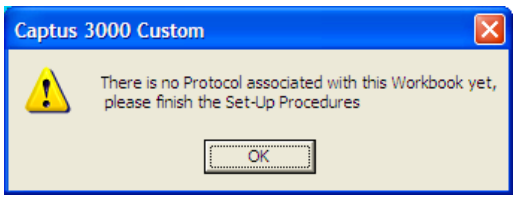


Figure 16-23

Click the OK button and Figure 16-19 will re-appear showing the new name at the top of the workbook.

Setting Up the Workbook

To enter Setup from the Custom Protocols Workbook Splash Screen, click on the Custom Protocol Workbook Setup button (Figure 16-24) in the lower right hand corner of the workbook shown in Figure 16-19:

Figure 16-24

Protocol Selection

The Protocol Selection Sheet (Figure 16-25) will appear.

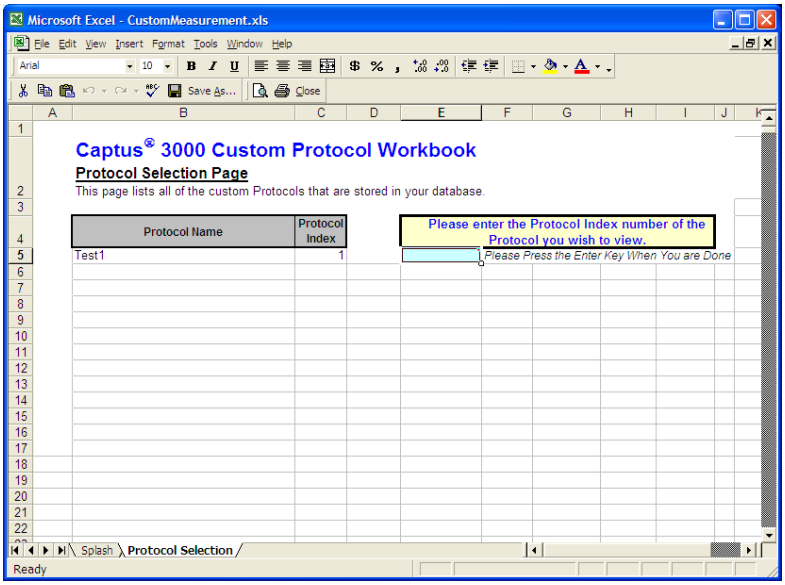


Figure 16-25

Input the Protocol Index for the desired Protocol in the indicated box and press the *ENTER* key. The message in Figure 16-26 will appear.

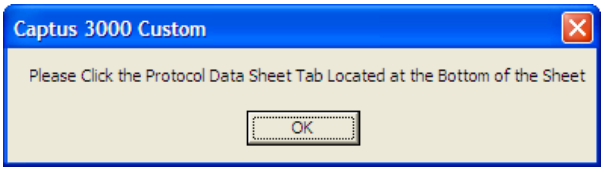


Figure 16-26

Entering an incorrect Protocol Index number will cause the error message in Figure 16-27 to appear.

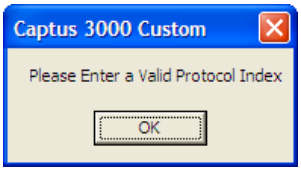


Figure 16-27

Click the OK button and then click on the Protocol Data tab on the bottom of the page. The Protocol Data sheet is opened and the details of the protocol will then be shown (Figure 16-28). This sheet is for reference only.

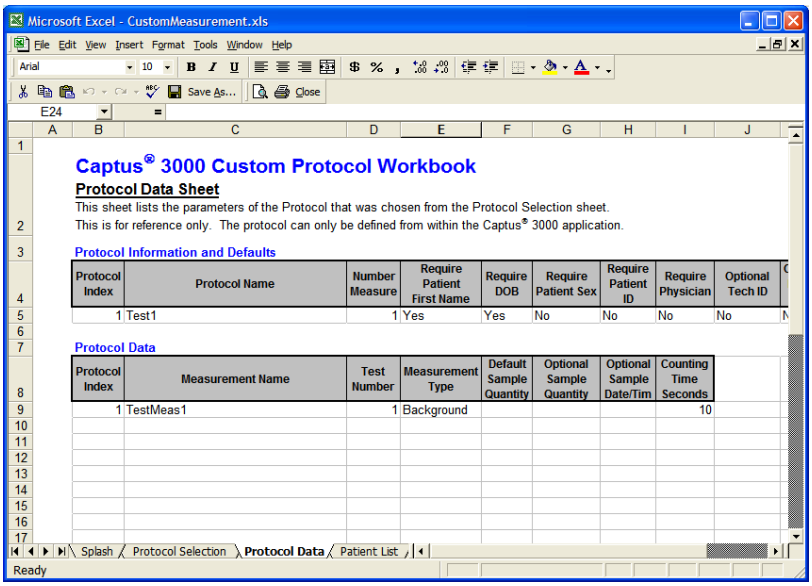


Figure 16-28

Also note that the Patient List sheet tab is visible on the bottom of the workbook.

Patient Selection

Click on the Patient List tab on the bottom of the sheet.

If there are no Patients associated with the selected protocol, the message box shown in Figure 16-29 will be displayed.

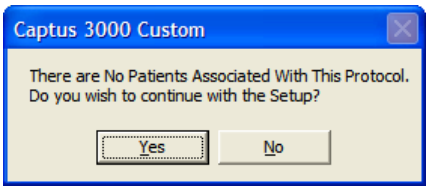


Figure 16-29

Clicking the Yes button will allow you to continue with the Setup and clicking the No button will return you to the Protocol Data sheet (Figure 16-28).

If there are patients associated with the protocol, a list of the patients for the protocol will be displayed (Figure 16-30).

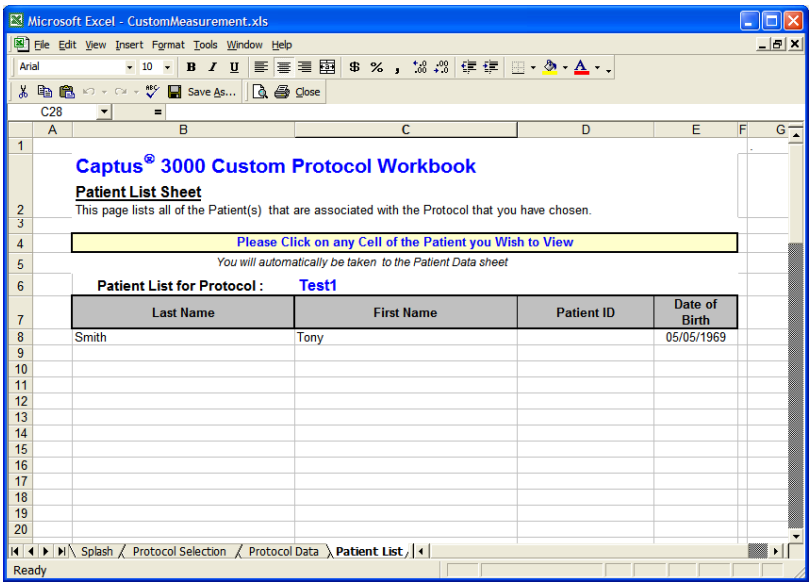


Figure 16-30

Click on any cell of the patient to be viewed. The Patient Data Sheet for that patient will be displayed (Figure 16-31).

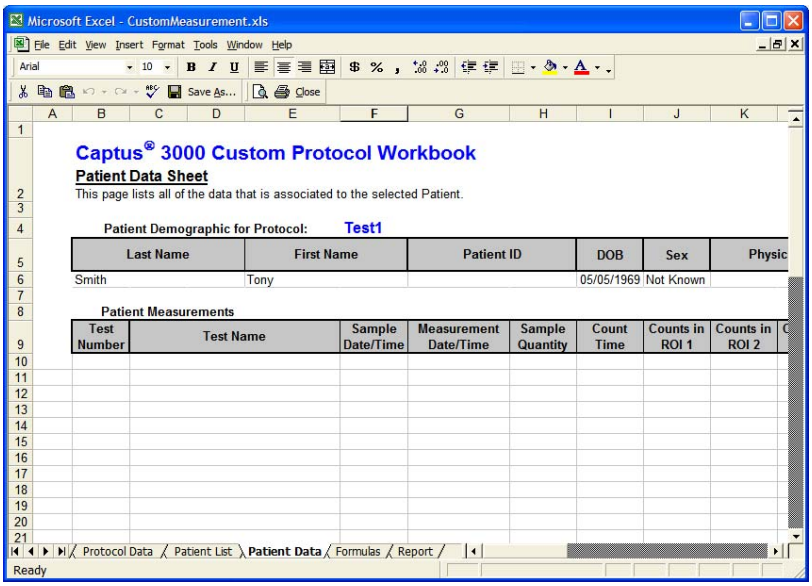


Figure 16-31

If the selected patient has no measurements then the message box shown in Figure 16-32 will be displayed.

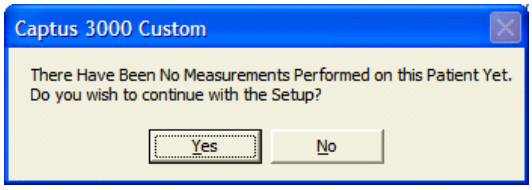


Figure 16-32

Clicking the Yes button will allow you to continue with the Setup and clicking the No button will return you to the Patient List sheet.

Entering Formulas

To enter formulas for calculating measurement results, click on the Formulas tab on the bottom of the sheet. The Formulas sheet will be shown (Figure 16-33).

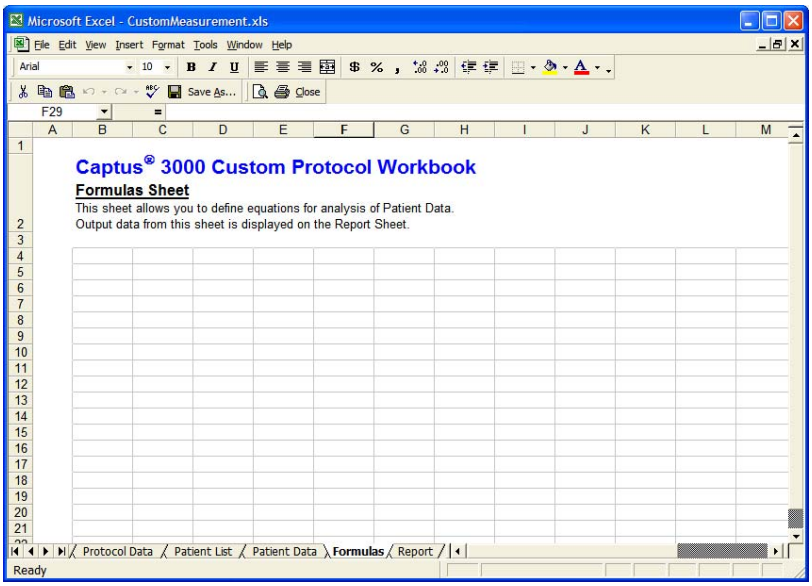


Figure 16-33

Calculations may be made using data from the Patient Data Sheet. For example, if the count time for the first test is needed, it would be referred to as ‘Patient Data’!I10.

Creating a Report

To set up a report, click on the Report tab on the bottom of the sheet. The Report sheet will be shown. Information can be taken from the Patient Data sheet, the Protocol Data sheet and the Formulas sheet.

An example of the start of a report is shown in Figure 16-34.

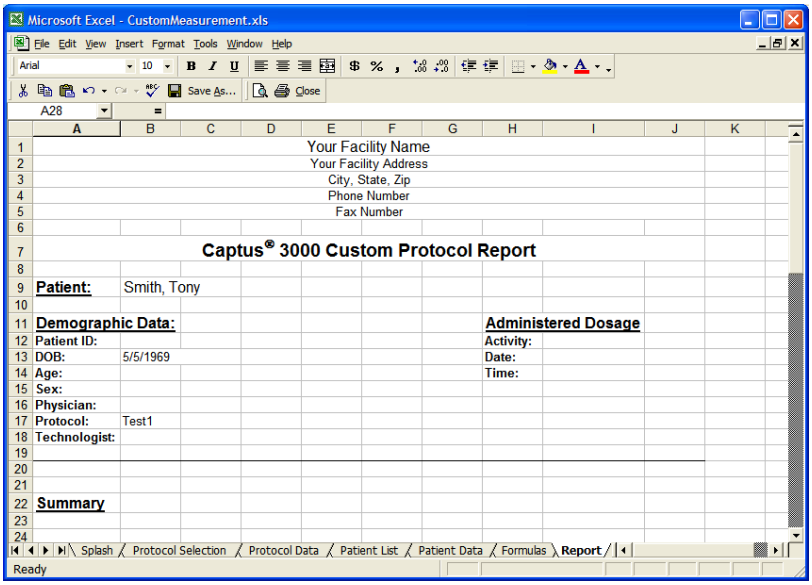


Figure 16-34

In the example above, headings have been entered explicitly. The Patient Name and Patient Date of Birth have been taken from the Patient Data sheet. The protocol name has been taken from the Protocol Data sheet.

Note: *Make sure you save the workbook before exiting and after any changes have been made.*

Note: *Re-entering the Excel workbook in Setup mode and entering a Protocol Index number different from the one that was previously saved with the workbook will cause the message box shown in Figure 16-35 to appear.*

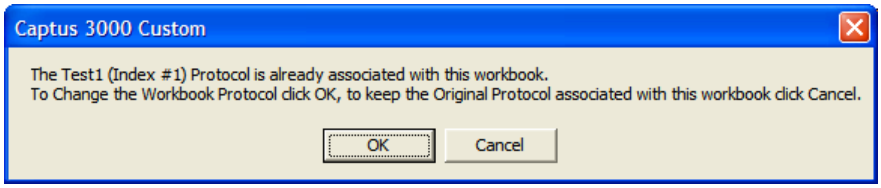


Figure 16-35

Clicking the OK button will change the Protocol that was previously saved with the Workbook. Clicking the Cancel button will keep the original saved Protocol associated with the workbook.

Viewing Patients from Workbook (User Mode)

In addition to viewing patient report from the CAPTUS 3000 program, patient reports can be viewed from the Excel workbook. This might be more convenient if several patients with the same protocol are to be viewed.

1. Open the workbook for the protocol.

2. Click on the Captus logo (Figure 16-36). When you are in the correct area of the workbook, the mouse pointer will change from a plus to an arrow.

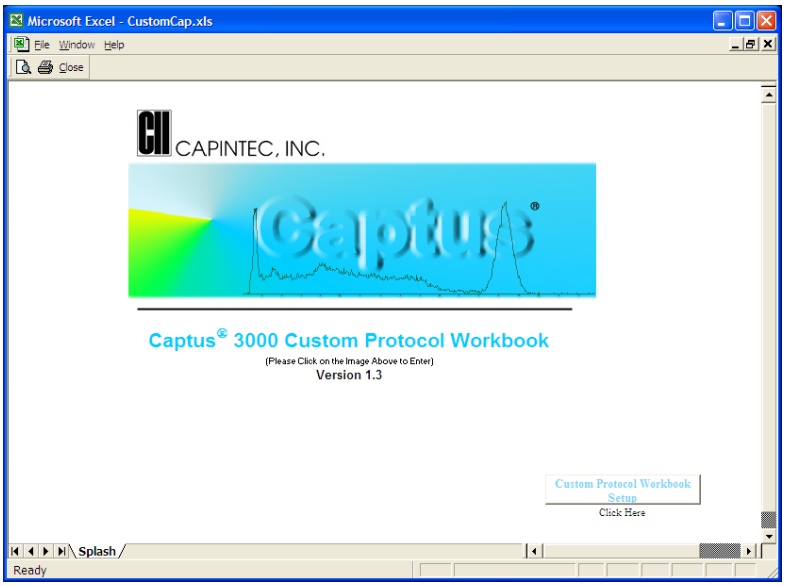


Figure 16-36

3. The Patient list will be displayed (Figure 16-37).

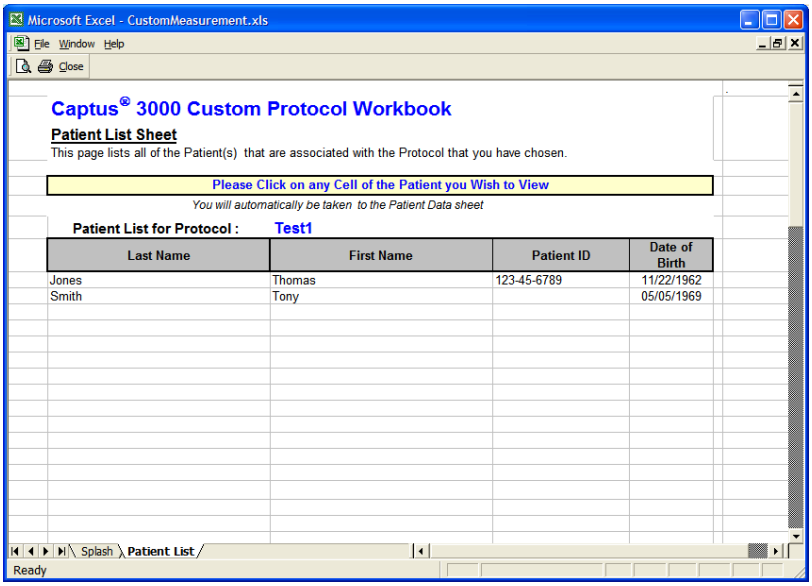


Figure 16-37

4. Click on any cell of the patient to be viewed. The Patient Data Sheet (Figure 16-31) will be displayed.

5. Click on the Report tab on the bottom of the sheet. The report for the patient will be displayed. A report can now be printed.

   Note: *If you try to type in any cell in the Formulas or Report sheet, the message in Figure 16-38 will appear. The sheet is protected and can only be changed when the workbook is entered from Setup. Please ignore the second sentence in the message; it is a built-in Excel message.*

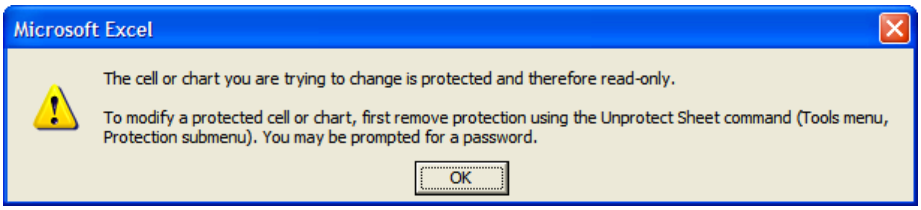


Figure 16-38

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NEW PRODUCT WARRANTY

Conditions and Limitations

CAPINTEC warrants our products to be free from defects in material and workmanship for a period of 12 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.

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CAPINTEC, INC.

DECLARATION OF CONFORMITY
THE EC DIRECTIVE AND CE MARKING

We, Capintec, Inc.
6 Arrow Road
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Capintec, Inc.
620 Alpha Drive
Pittsburgh, PA 15238
Phone: 412-963-1988
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declare under our sole responsibility that the product CAPTUS 3000 PORTABLE THYROID UPTAKE SYSTEM (including use with the Hewlett-Packard DeskJet printer) to which this declaration relates is in conformity with the MDD 93/42/EEC as transposed into Swedish national law LVFS 2003:11.

This product is in conformity with the following standards or other normative documents following:

1. IEC 60601-1
2. IEC 60601-1-2
3. IEC 60601-1-6

Certified to Annex II of the Directive 93/42/EEC on Medical Devices
Thyroid Uptake Systems, Class IIa
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CE 0413

The Technical Construction File is maintained at:

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The authorized representative located within the Community is:

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Date of issue: 5/16/12

Place of issue:

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Mary Anne Dell

Mary Anne Dell, Vice President & General Manager