

Absorbed Dose ALERT System®

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EMERGENCY SCREENING SYSTEM

OWNER'S MANUAL

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WARRANTY

DECLARATION OF CONFORMITY

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PREFACE

GENERAL

Thank you for purchasing the Capintec Absorbed Dose ALERT System (ADAS). 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:

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

SYSTEM DESCRIPTION

Please take a moment to review your system. The 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
- Laptop Computer with software installed to perform multi-channel analysis and emergency screening
- Cables for connecting the Detector, CAP-MCA, etc.
- 15 foot power cord with hospital grade plug
- Windows XP or later, Manuals and Distribution Disks
- ADAS Software Installation CD including Owner's Manual
- Ability to connect optional external printer

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 ADAS measurement system has been carefully designed to provide 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

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

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CHAPTER 1












SAFETY



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GENERAL

These warnings and instructions form an integral part of the Absorbed Dose ALERT 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

	<p>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.</p>
	<p>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.</p>

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 latched 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.

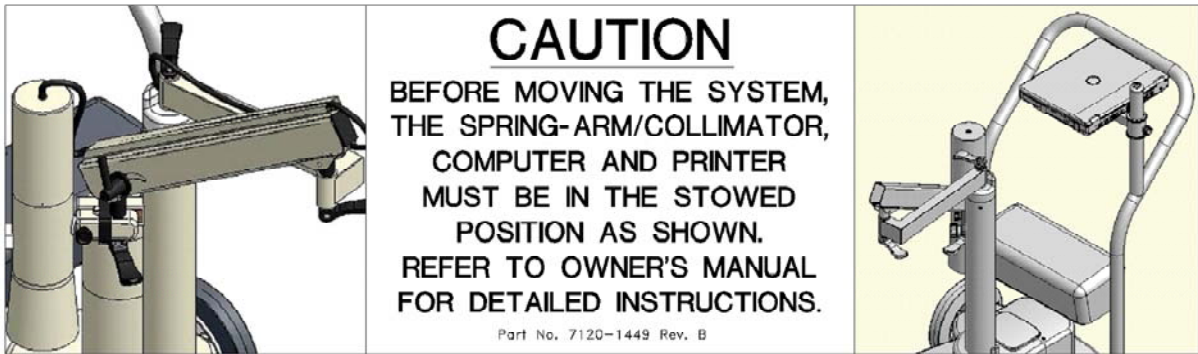


Figure 1-3

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

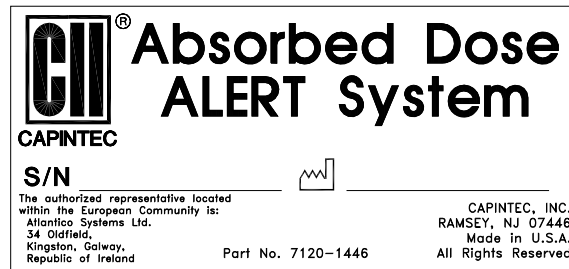


Figure 1-4

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.

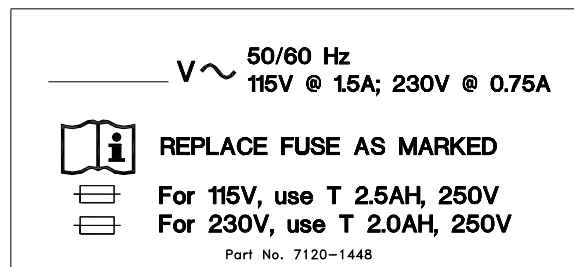


Figure 1-5



CAUTION: Please reference CHAPTER 12: CLEANING AND MAINTENANCE for instructions on how to change the fuses on the Stand Base.



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

CAUTIONS AND NOTES



CAUTION: Changing the date or time while a timed test is in progress 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 Detector (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: 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 detector than that supplied by Capintec are used, the safety of the unit may be compromised or other devices located in the same general area as the Absorbed Dose ALERT System 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 detector 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 12: 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 to rough handling or rapid temperature changes, as the NaI Scintillation Crystal can be damaged.

CHAPTER 2

FUNCTIONAL & TECHNICAL DESCRIPTION

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INTENDED USE

The Absorbed Dose ALERT System is intended to be used by trained Nuclear Medicine Technologists for performing Emergency Screening procedures and Thyroid Bioassay.

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 Absorbed Dose ALERT System also performs Pulse Height Analysis, isotope identification, radioisotope decay corrections, efficiency calculations, and maintains a database for storage and easy retrieval of patient demographic data and measurement results.

OPERATOR PROFILE

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

- **Education:**
 - 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 Absorbed Dose ALERT System.

FUNCTIONAL DESCRIPTION

Absorbed Dose ALERT

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 identify individuals with significant amounts of internal contamination. The Absorbed Dose ALERT System software includes an emergency screening module (Absorbed Dose ALERT) 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.

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 Absorbed Dose ALERT System 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 Absorbed Dose ALERT System is a PC based application running on the Windows[®] operating system.

The Absorbed Dose ALERT System consists of the following:

- Portable Stand with Collimator and internal Isolation Transformer
- CAP-MCA Multi-Channel Analyzer
- NaI (Sodium Iodide) Detector with Detector Socket Base
- 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
- Absorbed Dose ALERT System Software Installation CD including Owner's Manual
- Ability to connect optional external printer

Detector

Your Absorbed Dose ALERT System is equipped with a NaI (TI) (Thallium-activated Sodium Iodide) crystal and photomultiplier tube detector assembly, 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 Absorbed Dose ALERT System 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 Absorbed Dose ALERT System application software.

Floor Stand

A Rugged portable stand with heavy duty locking wheels and an articulating arm for the positioning of Detector/Collimator. A shelf is provided for the Absorbed Dose ALERT System 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 54.4 kg (120 lb)

Isolation Transformer

An isolation transformer is provided internally with the Absorbed Dose ALERT 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

SHV connector for TU Probe Detector

Absorbed Dose ALERT Software Package

Stores and prints all test data results
Reference library for isotopes
User definable normal ranges on printout
Absorbed Dose ALERT
MCA

Probe Detector

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

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

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

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 Absorbed Dose ALERT System.

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 Absorbed Dose ALERT System 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

CHAPTER 3

GENERAL OPERATING INSTRUCTIONS

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INTRODUCTION

The Absorbed Dose ALERT System 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 Absorbed Dose ALERT System 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 Absorbed Dose ALERT System, 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.

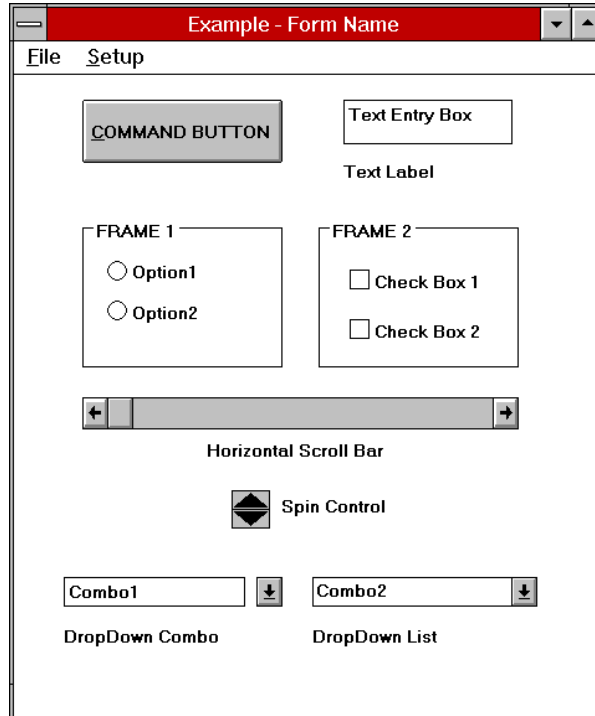


Figure 3-1

Command Button

The most common control in the Absorbed Dose ALERT System is the command button, for example the **Count** 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 (\uparrow \downarrow) 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:

Probe - Selected
 Well - Unselected

Check Box

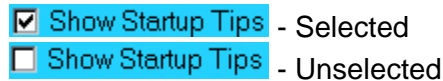
Check boxes are also used to select or enable various options; however, check boxes work as individual controls not in groups. When a check box is true a “√” will appear in the box.

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:



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 Absorbed Dose ALERT System 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 ArrowMoves the slider a small change to the left or down
HomeMoves the slider all the way to the left or down
EndMoves 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 Absorbed Dose ALERT System. 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.

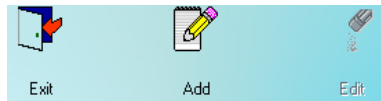
To select an entry from the list, use the pointing device left button to click the down arrow. The list will appear. If there are more items on the list than can be shown vertical scroll bars will appear on the right edge of the list. Place the pointer over the desired entry and double-click the left 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 Absorbed Dose ALERT System can be accomplished from keyboard control in this manner.

ADAS SCREENS

The Absorbed Dose ALERT System Main screen appears as shown in Figure 3-2. This screen provides access to all the user modules (Quality Assurance, MCA, Time Activity Analysis, Bioassay). 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.

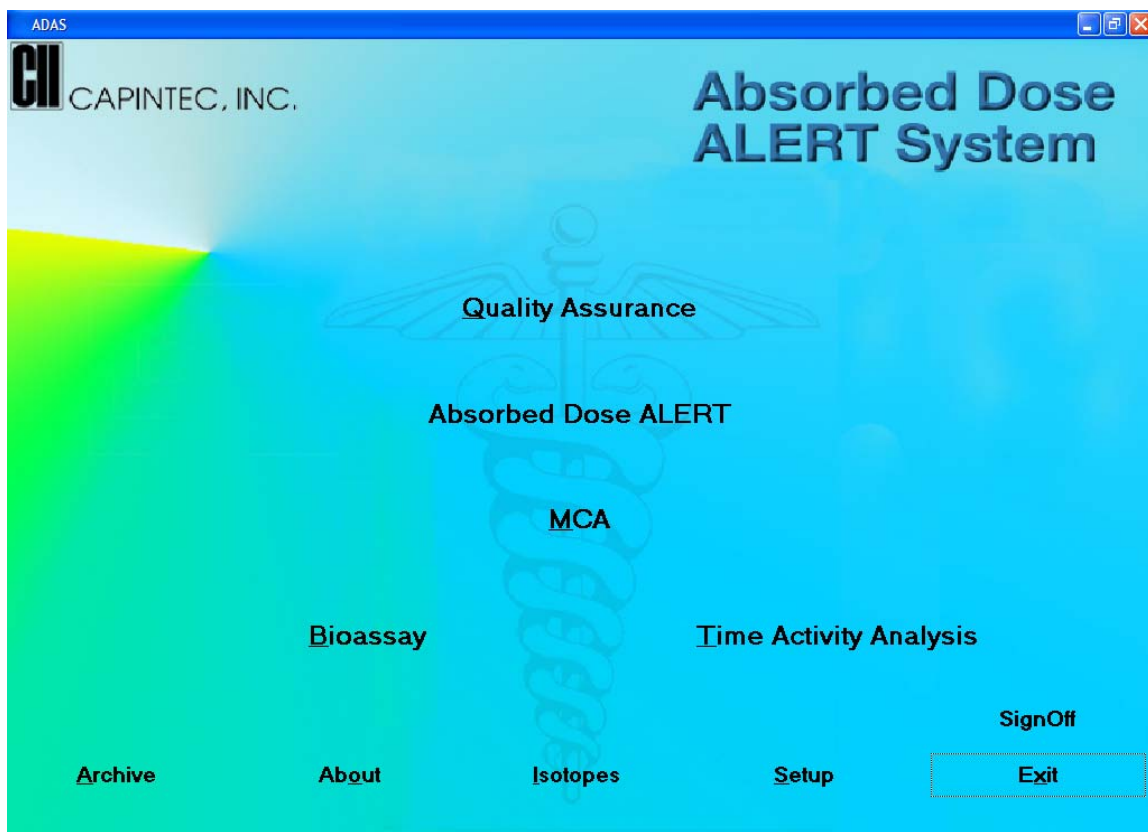


Figure 3-2

Typical Test Screen

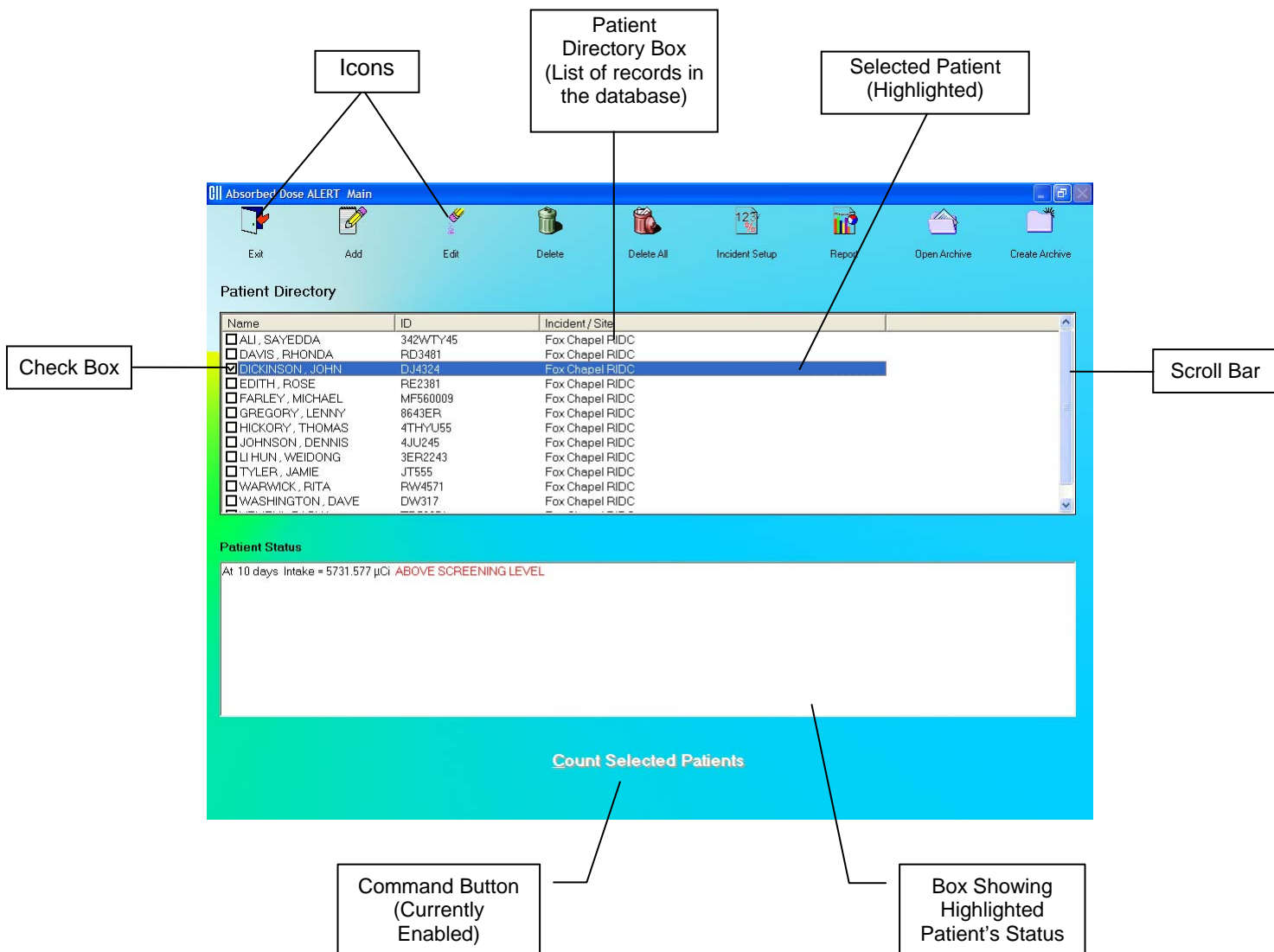


Figure 3-3

Typical Input Screen

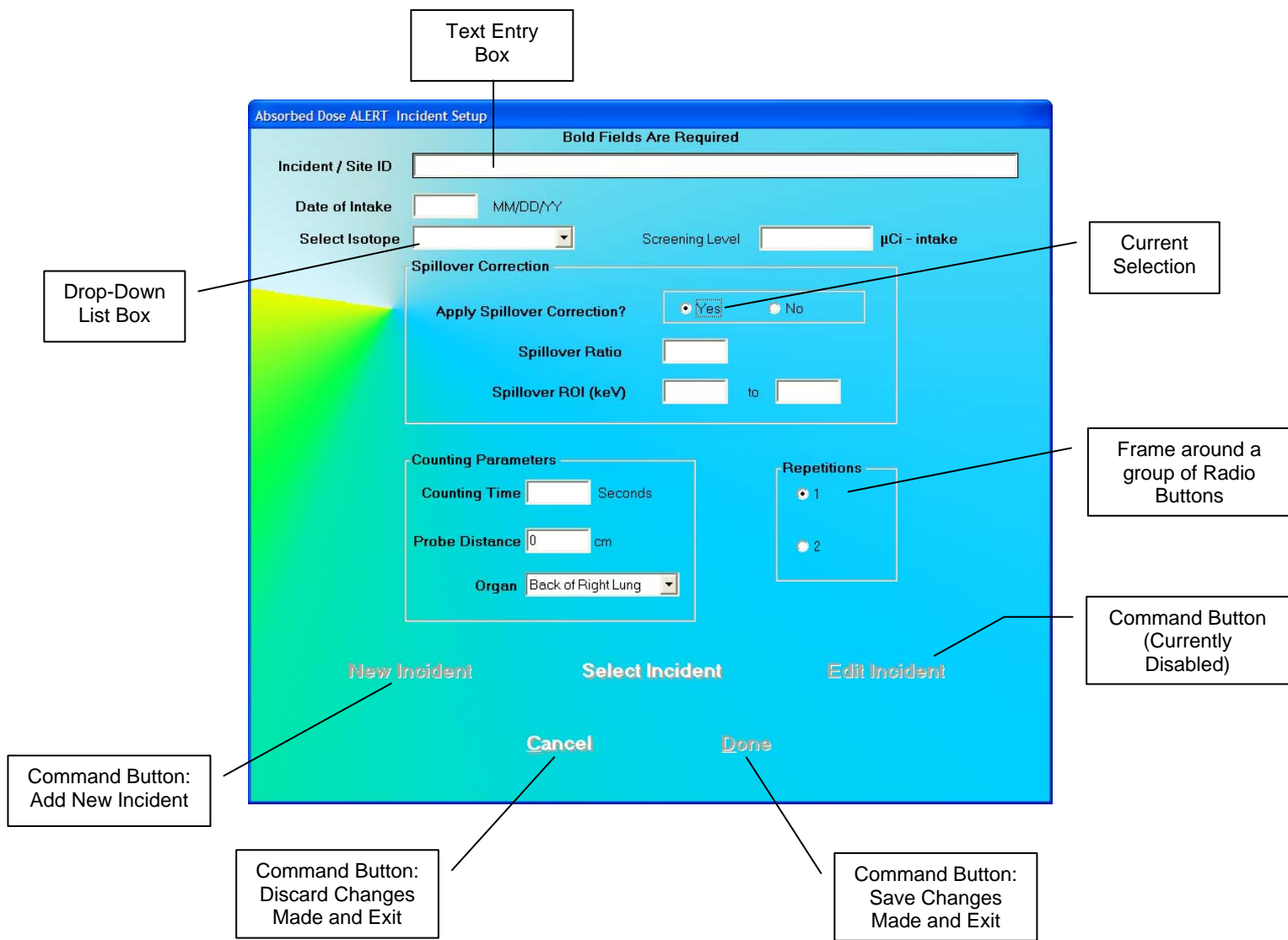


Figure 3-4

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.

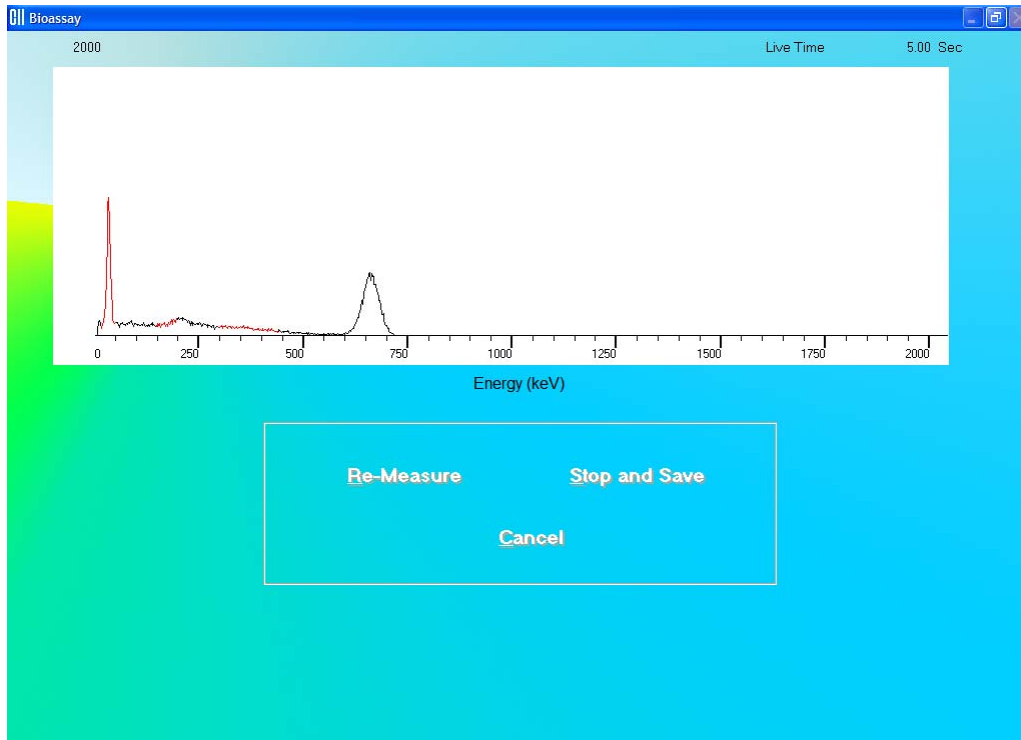


Figure 3-5

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.

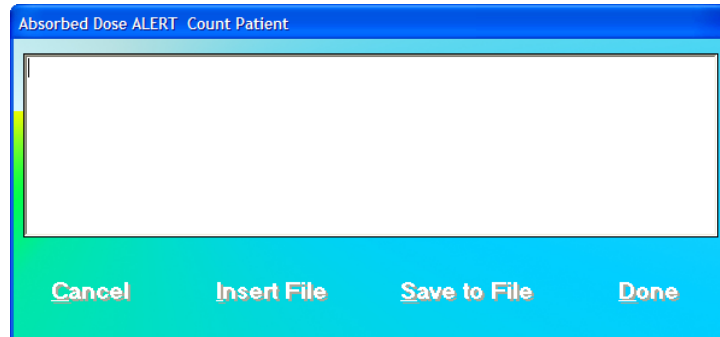


Figure 3-6

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.

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 Absorbed Dose ALERT 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 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

To run the Absorbed Dose ALERT System software, double-click on the ADAS icon. When the program is launched, Figure 4-1 Log On Sign In Window will appear:

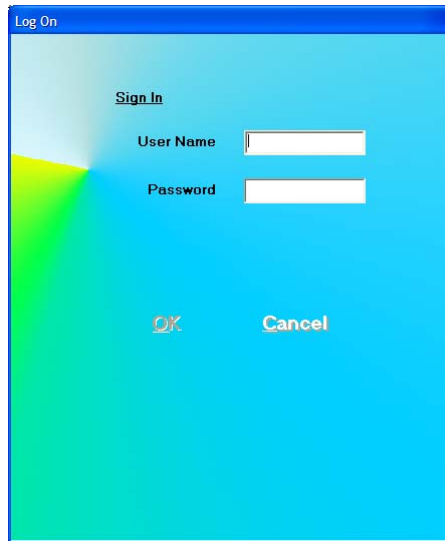




Figure 4-1 Log On Sign In Window

Sign In

Users must set up by the Administrator prior to logging on to the Absorbed Dose ALERT System. 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 4-11 Main Screen will appear.

Note: *If the Startup Tips option is enabled in Setup, Figure 4-8 Startup Tips Window will appear instead of Figure 4-11 Main Screen.*

Sign Off

After signing in to the Absorbed Dose ALERT System, a user may sign off by clicking the **SignOff** button located on the Main Screen above the **Exit** button (Refer to Figure 4-11 Main Screen). Clicking this button will end the session for the currently logged on user and return to Figure 4-1 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.*

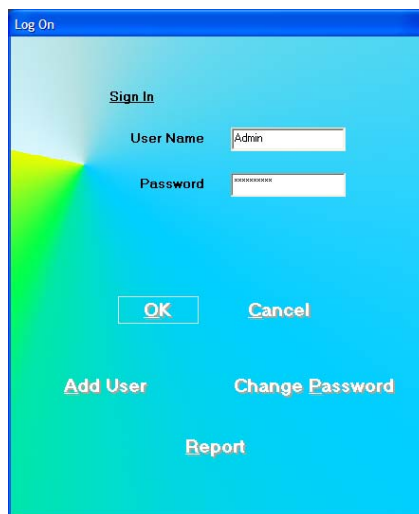


Figure 4-2 Admin Log On Sign In Window

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

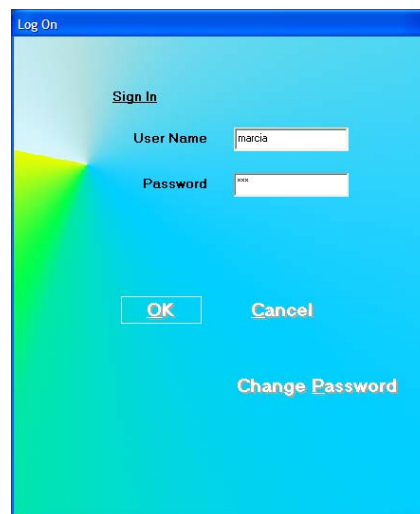
Once the Admin sets up a user, the user may log on to the Absorbed Dose ALERT program.

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.



The screenshot shows a window titled "Log On" with a light blue background. At the top, it says "Sign In". Below that, there are two text input fields: "User Name" with the text "marcia" and "Password" with the text "1234". Below the input fields are two buttons: "OK" and "Cancel". At the bottom right of the window, there is a button labeled "Change Password".

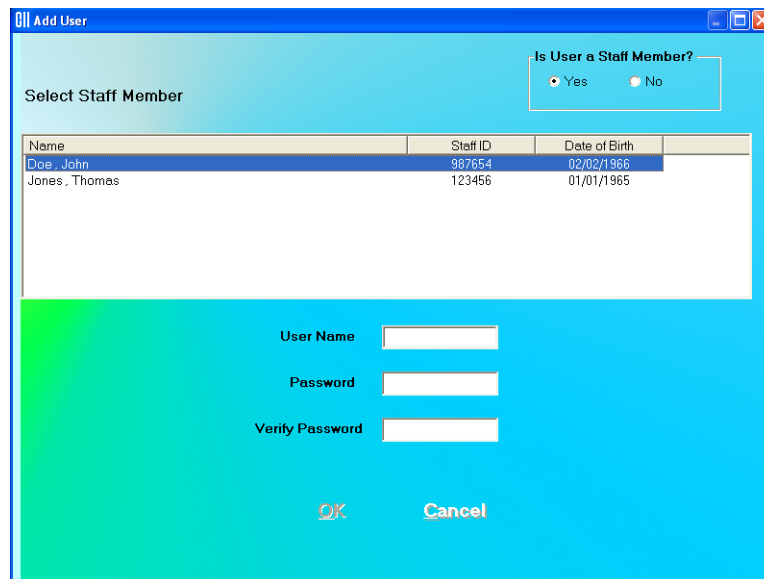
Figure 4-3 User Log On Sign In Window

ADD USER

From Figure 4-2 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 4-4 Add User (Staff Member) Window will appear.



The screenshot shows a window titled "Add User" with a blue header. In the top right corner, there is a section titled "Is User a Staff Member?" with two radio buttons: "Yes" (selected) and "No". Below this is a table titled "Select Staff Member" with three columns: Name, Staff ID, and Date of Birth. The table contains two rows: "Doe, John" with Staff ID 987654 and Date of Birth 02/02/1966, and "Jones, Thomas" with Staff ID 123456 and Date of Birth 01/01/1965. Below the table are three input fields labeled "User Name", "Password", and "Verify Password". At the bottom of the window are "OK" and "Cancel" buttons.

Name	Staff ID	Date of Birth
Doe, John	987654	02/02/1966
Jones, Thomas	123456	01/01/1965

Figure 4-4 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 Absorbed Dose ALERT 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 4-2 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 4-5 Add User (Not a Staff Member) Window will appear.

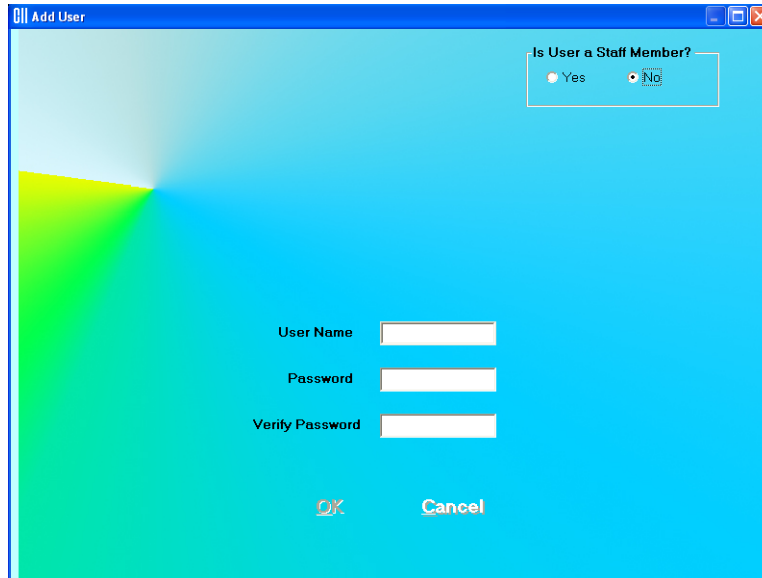


Figure 4-5 Add User (Not a Staff Member) Window

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 4-2 Admin Log On Sign In Window will re-appear.

CHANGE PASSWORD

From Figure 4-2 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 4-3 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 4-6 Change Password Window will appear.



Log On

Change Password

User Name: Admin

New Password: []


Verify Password: []

OK Cancel

Figure 4-6 Change Password Window


The current User Name is displayed and cannot be changed.

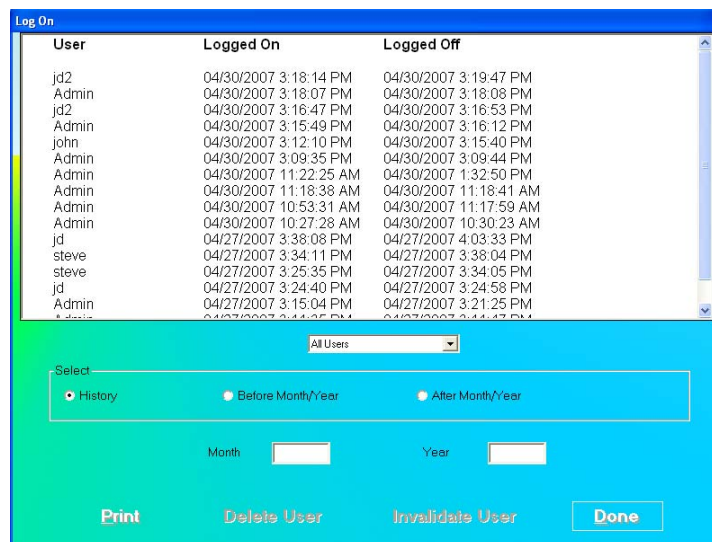
Input the New Password and then re-input it again for verification.

Click the  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 4-2 Admin Log On Sign In Window), the Log On Report may be viewed by clicking the  button. Figure 4-7 Log On Report Window will appear.



Log On

User	Logged On	Logged Off
jd2	04/30/2007 3:18:14 PM	04/30/2007 3:19:47 PM
Admin	04/30/2007 3:18:07 PM	04/30/2007 3:18:08 PM
jd2	04/30/2007 3:16:47 PM	04/30/2007 3:16:53 PM
Admin	04/30/2007 3:15:49 PM	04/30/2007 3:16:12 PM
john	04/30/2007 3:12:10 PM	04/30/2007 3:15:40 PM
Admin	04/30/2007 3:09:35 PM	04/30/2007 3:09:44 PM
Admin	04/30/2007 11:22:25 AM	04/30/2007 1:32:50 PM
Admin	04/30/2007 11:18:38 AM	04/30/2007 11:18:41 AM
Admin	04/30/2007 10:53:31 AM	04/30/2007 11:17:59 AM
Admin	04/30/2007 10:27:28 AM	04/30/2007 10:30:23 AM
jd	04/27/2007 3:38:08 PM	04/27/2007 4:03:33 PM
steve	04/27/2007 3:34:11 PM	04/27/2007 3:38:04 PM
steve	04/27/2007 3:25:35 PM	04/27/2007 3:34:05 PM
jd	04/27/2007 3:24:40 PM	04/27/2007 3:24:58 PM
Admin	04/27/2007 3:15:04 PM	04/27/2007 3:21:25 PM

Select: All Users

History
 Before Month/Year
 After Month/Year

Month: [] Year: []

Print Delete User Invalidate User Done

Figure 4-7 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  button.

Exiting

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

FIRST TIME STARTUP

If this is the first time the Absorbed Dose ALERT software is run, the Startup Tips window will be displayed as shown in Figure 4-8 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.

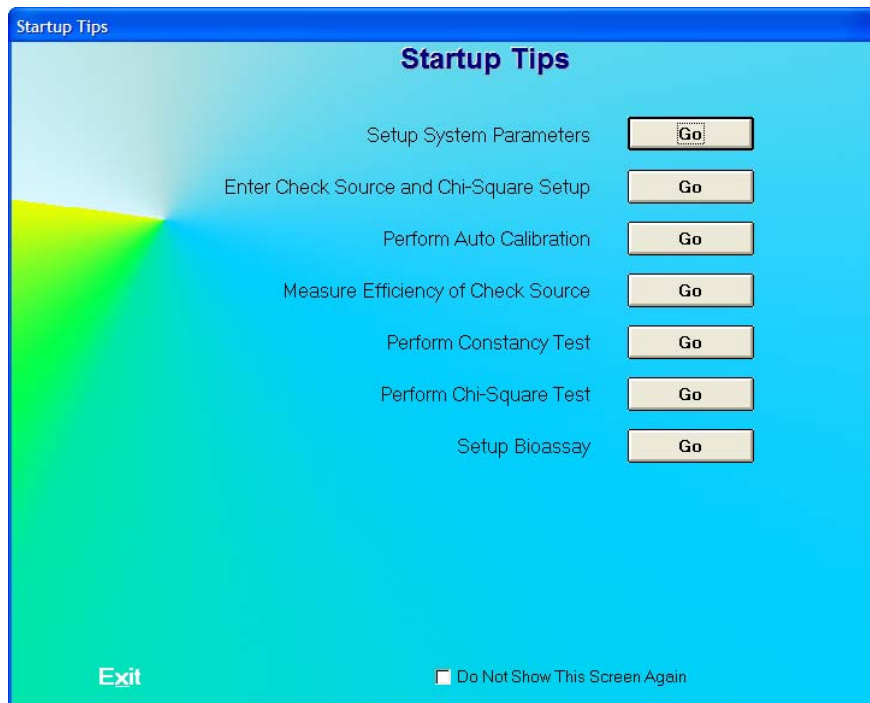



Figure 4-8 Startup Tips Window

The system parameters for the Absorbed Dose ALERT software can be altered through the Setup module. The Setup module (Figure 4-9 Setup Module Screen) standardizes units of measurement and date format 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 Absorbed Dose ALERT software is started.

System Parameters

1. Click the  button beside “Setup System Parameters”. Figure 4-9 Setup Module Screen will appear.

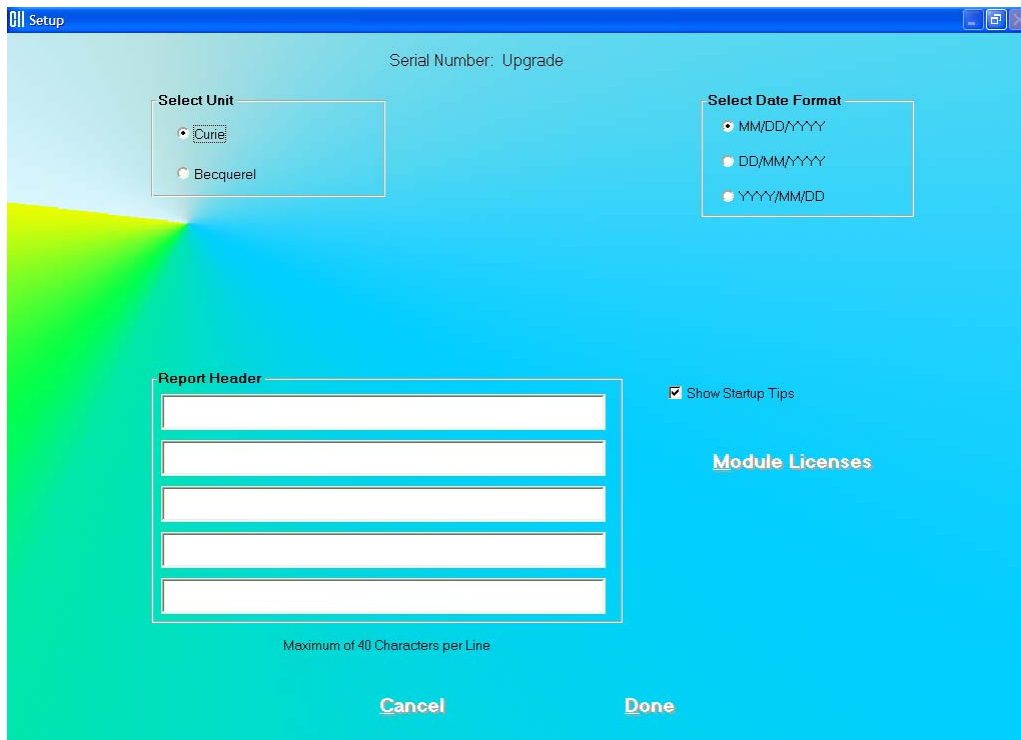


Figure 4-9 Setup Module Screen

Except for the report header, the 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 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.*

- 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 4-10 Report Header Frame. This header will appear centered at the top of each report printout.

The image shows a 'Report Header' window with five text input fields. The first field contains 'JAMES WOODWARD HOSPITAL', the second 'RADIOLOGY MEDICINE WARD', the third '1243 STEVENSON AVE.', and the fourth 'BALTIMORE, MD 67312'. The fifth field is empty.

Figure 4-10 Report Header Frame

- 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 4-8 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. The Bioassay Measurement Setup needs only to be performed if required.*

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

- Click the **Go** button beside “Enter Check Source and Chi-Square Setup”.
- Enter the required fields. For details on the screen, see the pages listed in **Reference Pages** below.
- 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., Perform Auto Calibration).
5. Repeat steps 1-4 for each remaining test (Measure Efficiency of Check Source, Perform Constancy Test, and Perform Chi-Square Test).
6. If you do not wish to perform the Bioassay Measurement Setup at this time, click the  button or press *Alt+E* to close the Startup Tips window. Otherwise, continue to the Bioassay Measurements Setup section.

Note: *If you do not want the Startup Tips window to appear the next time Absorbed Dose ALERT 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.*

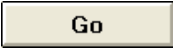

Reference Pages

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 5-4
- Measure Efficiency of Check Source..... 6-6
- Perform Constancy Test..... 5-11
- Perform Chi-Square Test 5-15

Bioassay Measurement Setup

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

1. Click the  button beside “Setup Bioassay”.
2. Enter the required fields. For details on the screen, refer to CHAPTER 8: BIOASSAY, SECTION: BIOASSAY SETUP.
3. Upon exiting the Bioassay Setup window, you will be automatically returned to the Startup Tips window.
4. Click the  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 Absorbed Dose ALERT 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.

NORMAL STARTUP

To run the Absorbed Dose ALERT System software, double-click on the ADAS icon. If the Startup Tips window was disabled, the Main screen will appear as shown in Figure 4-11 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.

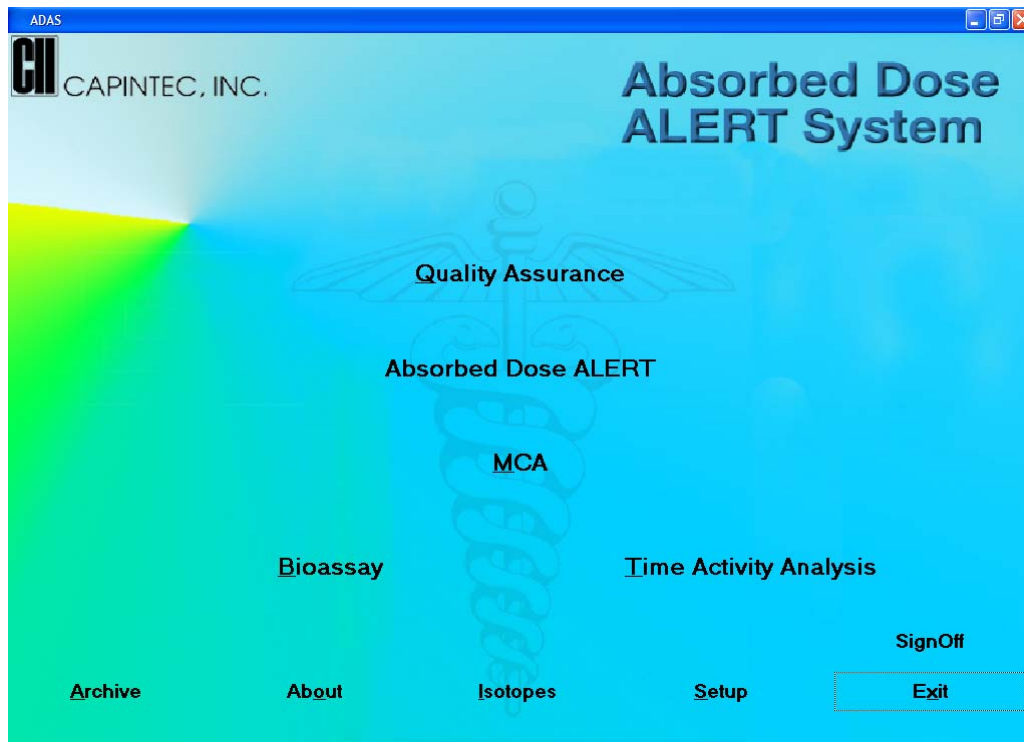


Figure 4-11 Main Screen

The software version installed on your Absorbed Dose ALERT System 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 Absorbed Dose ALERT Main screen.

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CHAPTER 5

QUALITY ASSURANCE

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INTRODUCTION

There are several Quality Assurance tests that should be performed periodically on the Absorbed Dose ALERT 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 Absorbed Dose ALERT System performs all these tests quickly and automatically using the two 0.5 μ Ci reference sources, Cs137 and Eu152, supplied with the system. The software automatically saves all the results from these tests.

Recommended Routine

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 5-4)
- c. CONSTANCY TEST----- *Daily, before the first procedure* (page 5-11)
- 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.
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** on page 5-22). These are all the default values used while doing various measurements (Quality Assurance, Bioassay, 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** on page 5-24).

SETTING UP QA PARAMETERS

To access the QA tests, click the **Quality Assurance** button or press *Alt+Q* on the Absorbed Dose ALERT Main screen. Figure 5-1 Quality Assurance Main Screen appears as shown.

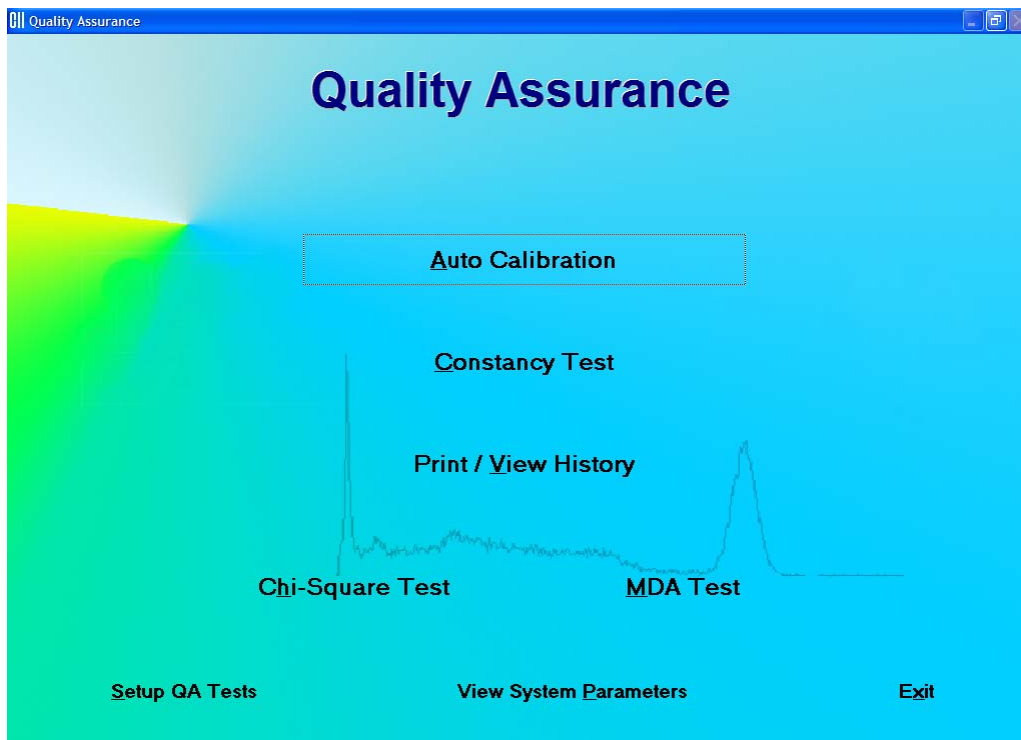


Figure 5-1 Quality Assurance Main Screen

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 Absorbed Dose ALERT 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

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

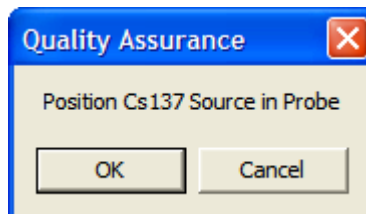


Figure 5-4

- Place the Cs137 rod source in the Probe. 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 Probe.*

- 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.
- 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*.
- After calibration is completed, the results will display “Calibration Successful” as shown in Figure 5-5 below.

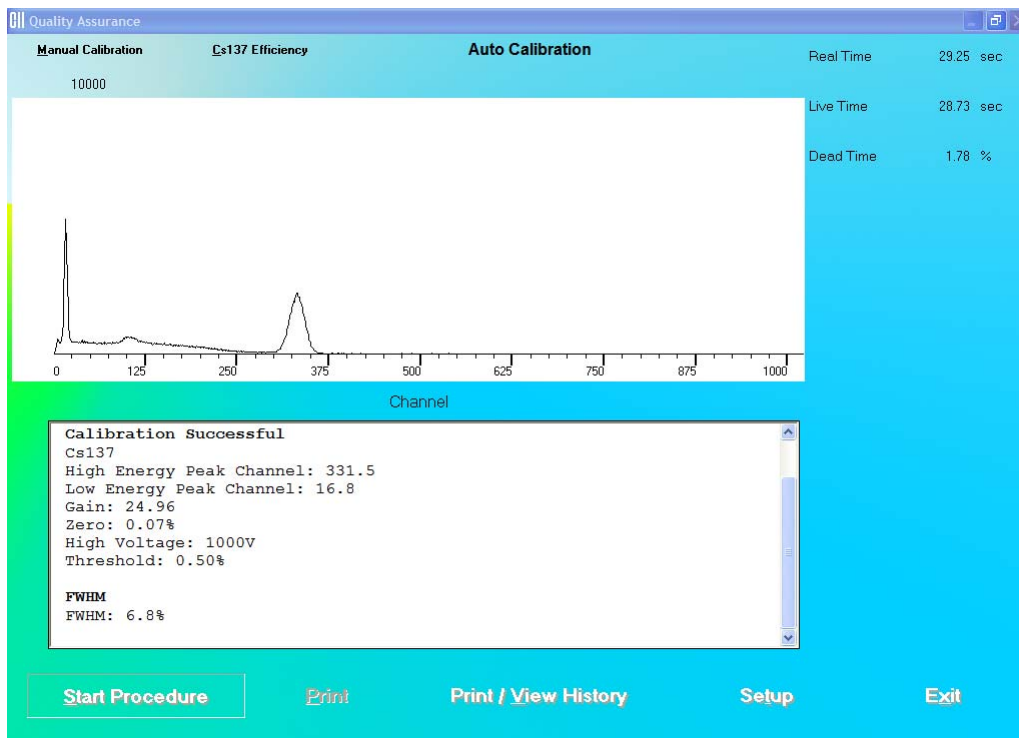


Figure 5-5

- 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.

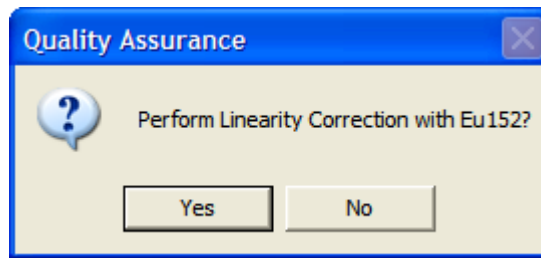


Figure 5-6

8. Click the button or press the *Y* key to proceed with further calibration. Otherwise click the button or press the *N* key to stop here.
9. 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 button.

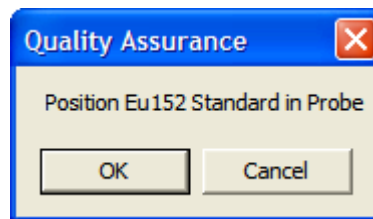


Figure 5-7

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 button or press *Alt+M* on the Auto Calibration screen. The MCA module is started. Refer to *CHAPTER 10: MCA*. If this does not correct the problem, contact Capintec's only Authorized Service Center for service.

10. 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 button or press the *Y* key to proceed. Otherwise, click the 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 button or press the *N* key and perform the Constancy Test as described in the **CONSTANCY TEST** section on page 5-11.

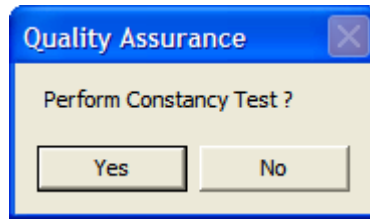


Figure 5-8

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

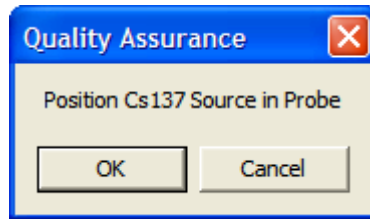
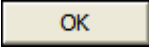
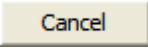




Figure 5-9

11. 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.
12. Click the  button to proceed with the test, or else click the  button to stop the process. As the counting progresses, the live spectra and measurement times are displayed.
13. To stop the counting, click the  button or press *Alt+A*. The collected data is discarded. To re-start the process, click the  button or press *Alt+S*.
14. 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.

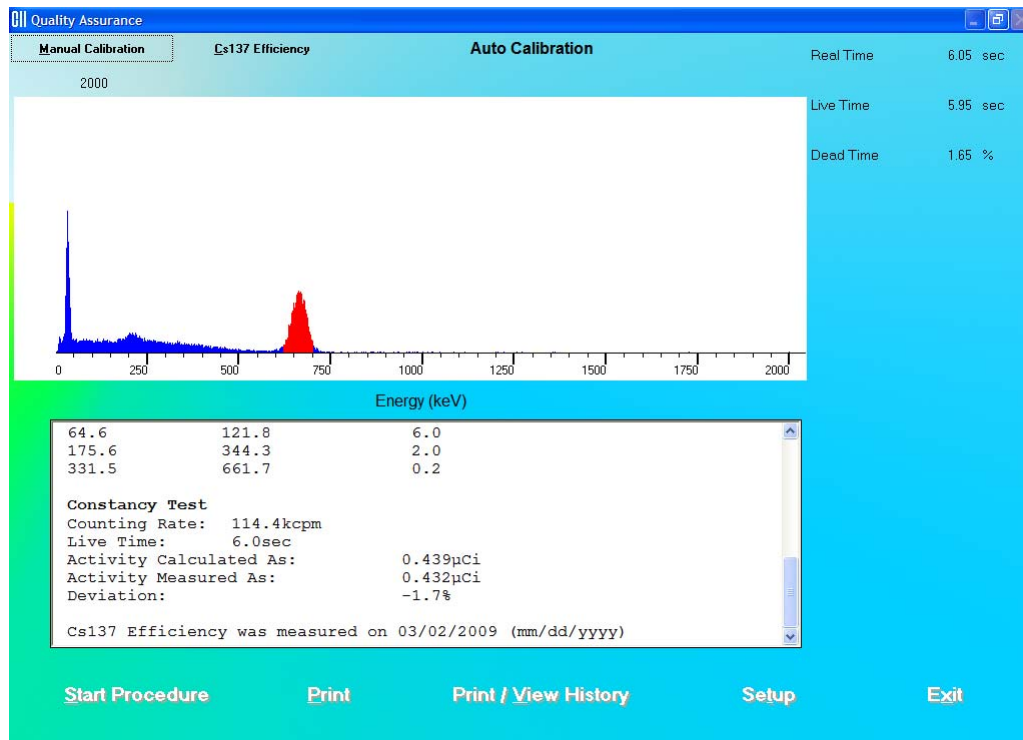


Figure 5-10

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

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

- Verify that the Efficiency Measured Date indicated on the screen is not longer than 6 months from the current date. If it is, then the Efficiency of the Cs137 standard should be re-measured.
- The positioning of the rod source.
- Ensure that there are no other sources (including dosed patients) in the area.
- Click the **Setup** button at the bottom of the Calibration screen or press *Alt+T*. Calibrated Activity and Calibration Date should match your Cs137 standard.

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

If no problems are found with the above items, contact Capintec's only Authorized Service Center for service.

15. Click the **Exit** button or press *Alt+X* 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 on page 5-24).

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 Absorbed Dose ALERT 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 are based on the energy ranges defined by the Eu152 calibration. In addition, the automatic peak identification program, which is accessed in the Absorbed Dose ALERT 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 2.35σ . For flat-faced detectors the resolution should be ≤ 8 percent measured at the Cs137 662 keV peak. 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 $\pm 10\%$. If the deviation is outside $\pm 10\%$, 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** on page 5-2 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.

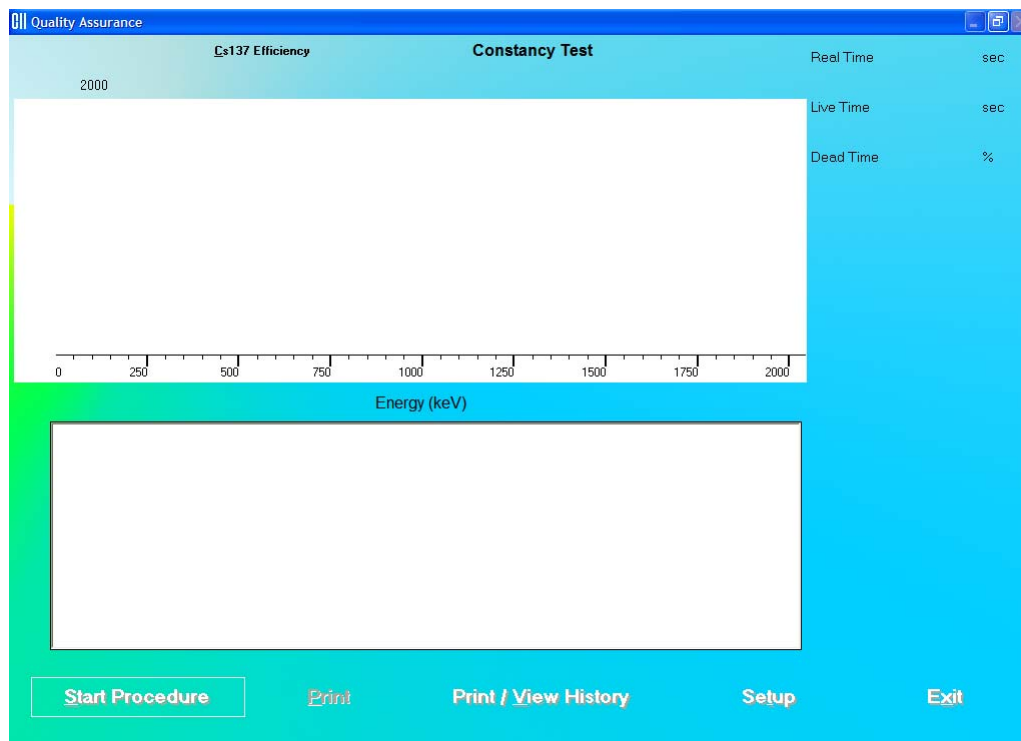


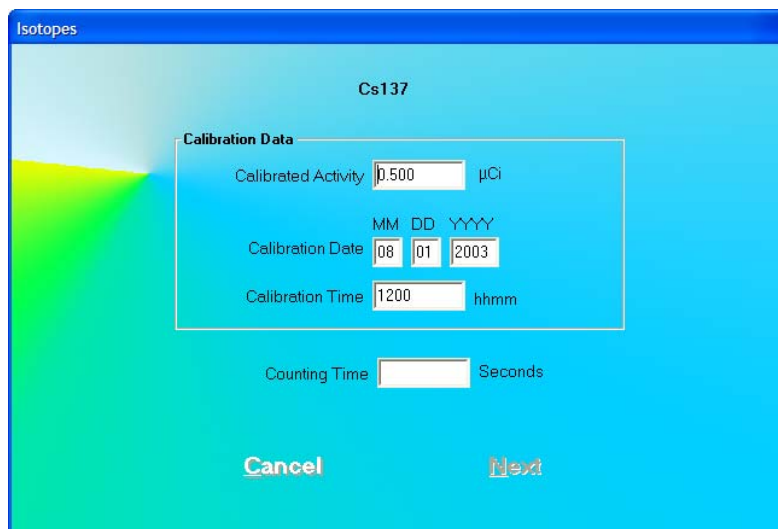
Figure 5-11 Constancy Test Main Screen

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 procedure should be repeated at a minimum of once a year or if the Cs137 standard source is changed or when the 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: The **Cs137 Efficiency** button is enabled only after Auto Calibration has been performed the current day.



The screenshot shows a software window titled "Isotopes" with a sub-header "Cs137". A "Calibration Data" dialog box is open, containing the following fields:

- Calibrated Activity: 0.500 μCi
- Calibration Date: MM (08) DD (01) YYYY (2003)
- Calibration Time: 1200 hhmm
- Counting Time: [] Seconds

At the bottom of the dialog box are two buttons: "Cancel" and "Next".

Figure 5-12

- b. Input the Counting Time in seconds.
- c. Click the **Next** button. Figure 5-13 will appear.

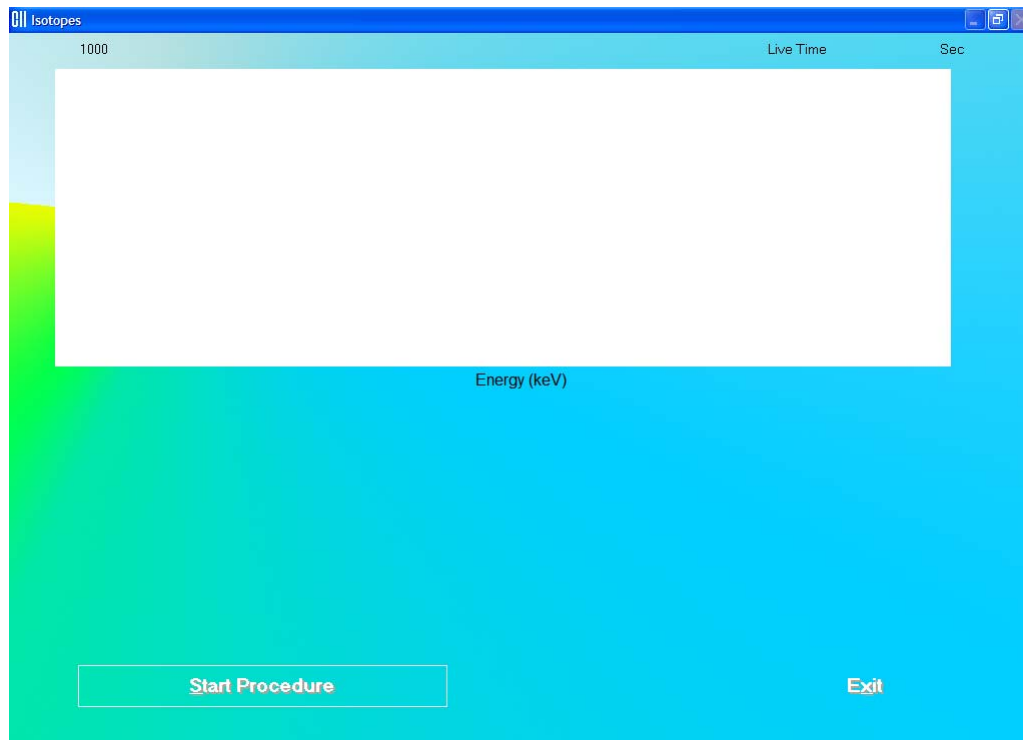


Figure 5-13

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

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

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

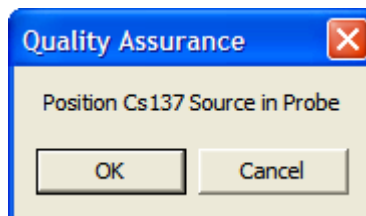
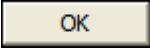
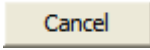




Figure 5-14

5. 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.
6. Click the  button to proceed with the test, or else click the  button to stop the process. As the count progresses, the live spectra and measurement times are displayed.
7. To stop the counting, click the  button or press *Alt+A*. The collected data is discarded. To re-start the process, click the  button or press *Alt+S*.
8. 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.

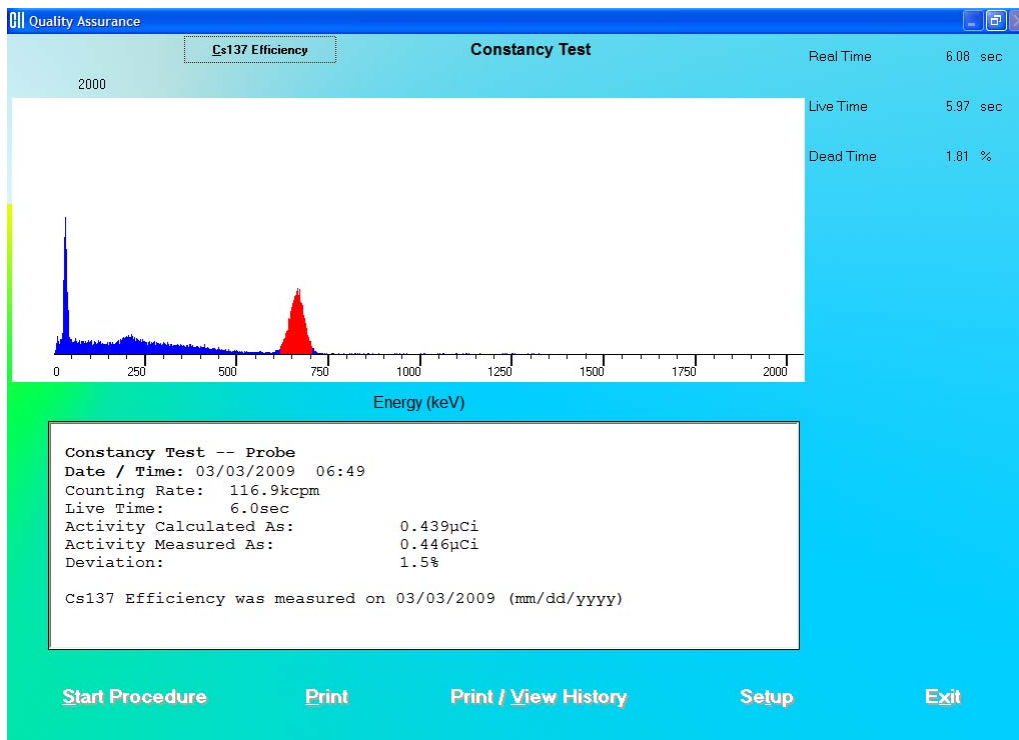


Figure 5-15 Constancy Test Results Screen

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

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

- Verify that the Efficiency Measured Date indicated on the screen is not longer than 6 months from the current date. If it is, then the Efficiency of the Cs137 standard should be re-measured.
- The positioning of the rod source.
- 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 items above, then correct the problem and repeat the Constancy Test.

If no problems are found with the above items, contact Capintec's only Authorized Service Center for service.

- Click the **Exit** button or press *Alt+X* 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** on page 5-24).

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:

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

where x_i = counts for measurement i

x_{av} = average for the n measurements

This equation is the same as the following:

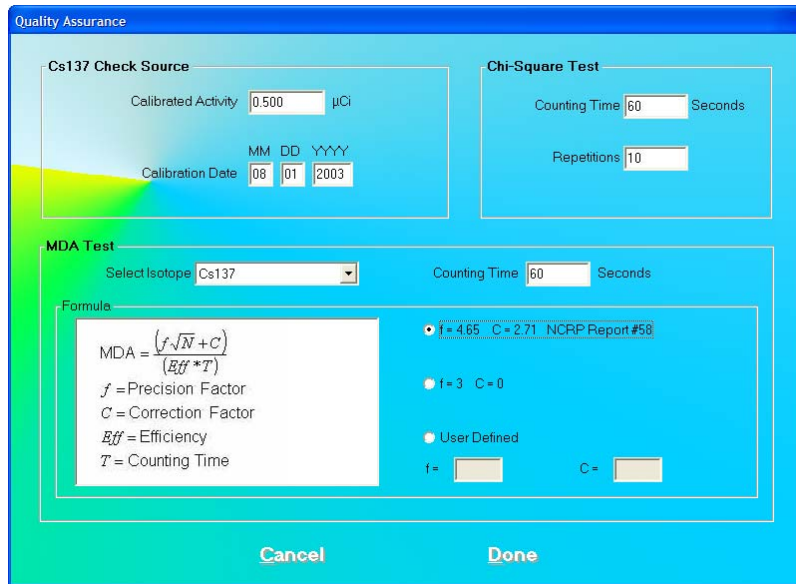
$$\chi^2 = \frac{1}{x_{av}} \left\{ (x_1 - x_{av})^2 + (x_2 - x_{av})^2 + \dots + (x_n - x_{av})^2 \right\}$$

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. 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.



The Quality Assurance Setup Screen is divided into three main sections:

- Cs137 Check Source:** Contains a text box for "Calibrated Activity" (0.500 μ Ci) and a date selection box for "Calibration Date" (MM DD YYYY) set to 08/01/2003.
- Chi-Square Test:** Contains a "Counting Time" text box (60 Seconds) and a "Repetitions" text box (10).
- MDA Test:** Contains a "Select Isotope" dropdown menu (Cs137), a "Counting Time" text box (60 Seconds), and a "Formula" section. The formula is $MDA = \frac{f\sqrt{N} + C}{Eff * T}$. Below the formula are definitions: f = Precision Factor, C = Correction Factor, Eff = Efficiency, and T = Counting Time. To the right of the formula are radio buttons for "f = 4.65 C = 2.71 NCRP Report #58" (selected), "f = 3 C = 0", and "User Defined". Below these are text boxes for "f =" and "C =".

At the bottom of the screen are "Cancel" and "Done" buttons.

Figure 5-17 Quality Setup Screen

- To change the default values in **Chi-Square Test** frame in Setup, click in the text boxes and input the new values.
- 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.
- Click the **Start Procedure** button or press *Alt+S* to start the test. The screen appears as shown in Figure 5-18.

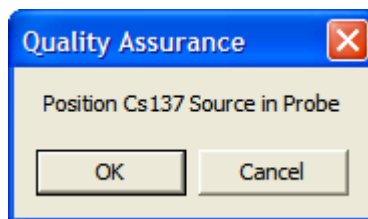


Figure 5-18

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

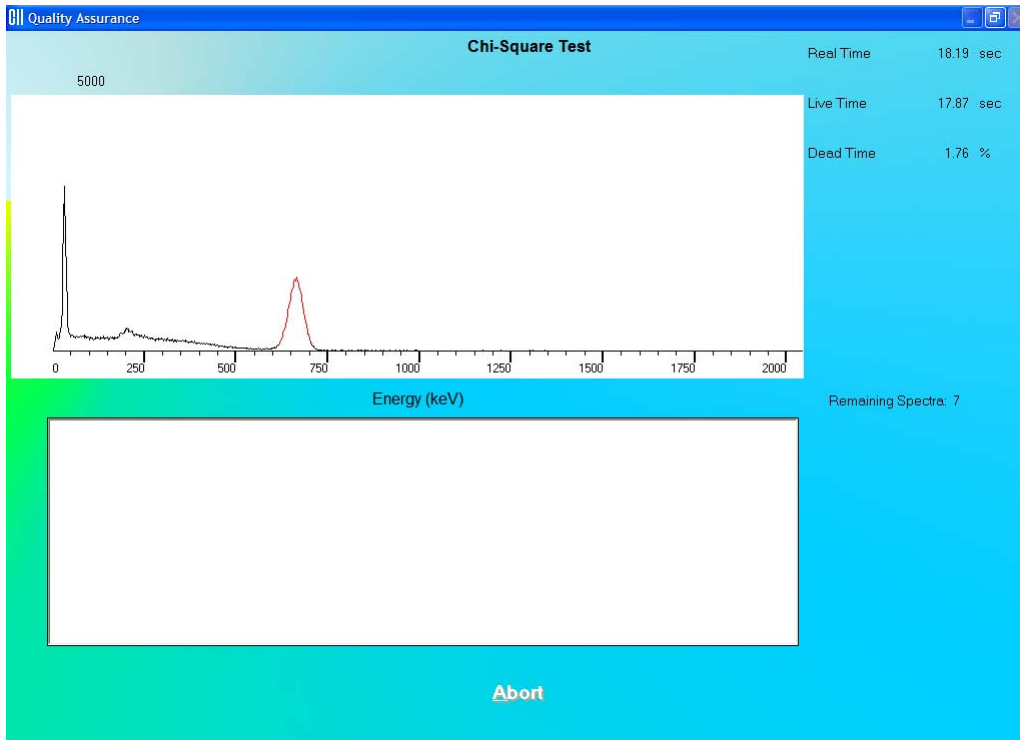


Figure 5-19

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 5-20. Note the Chi-Square value.

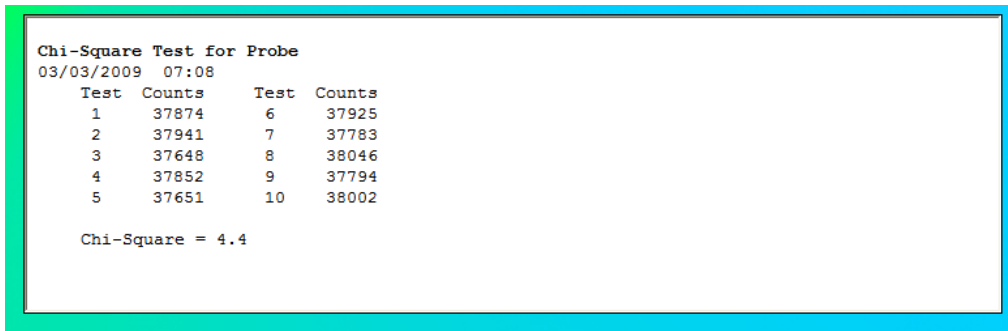


Figure 5-20

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

If a problem is found with any of the 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** on page 5-24).

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. 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.

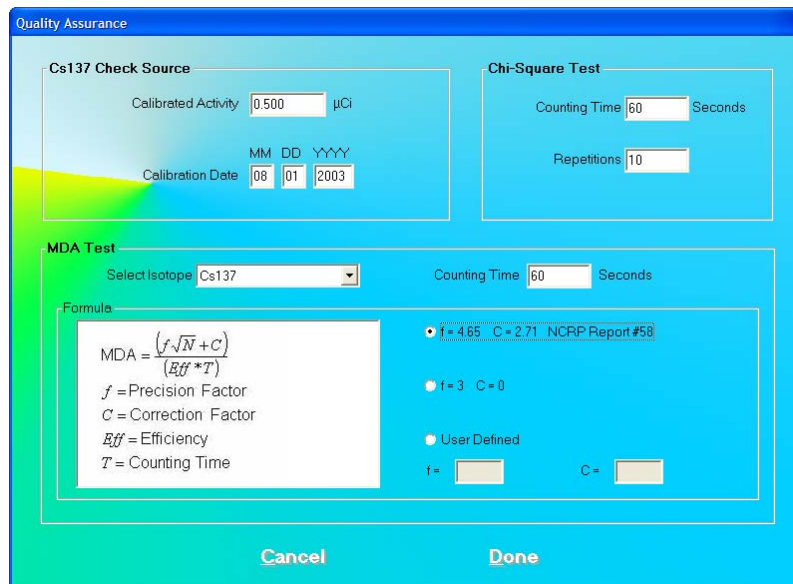


Figure 5-22 Quality Setup Screen

3. 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.
4. To change the **Counting Time** click in the text box and input the new value.
5. To alter values used in the formula for MDA calculation, click in the desired radio button in **Formula** frame.
6. 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.
7. Click the **Start Procedure** button or press *Alt+S* to start the test. The screen appears as shown in Figure 5-23.

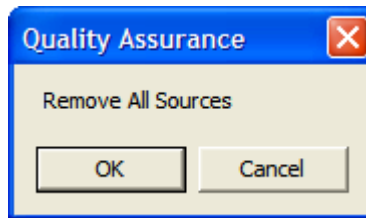


Figure 5-23

8. 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.
9. 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.

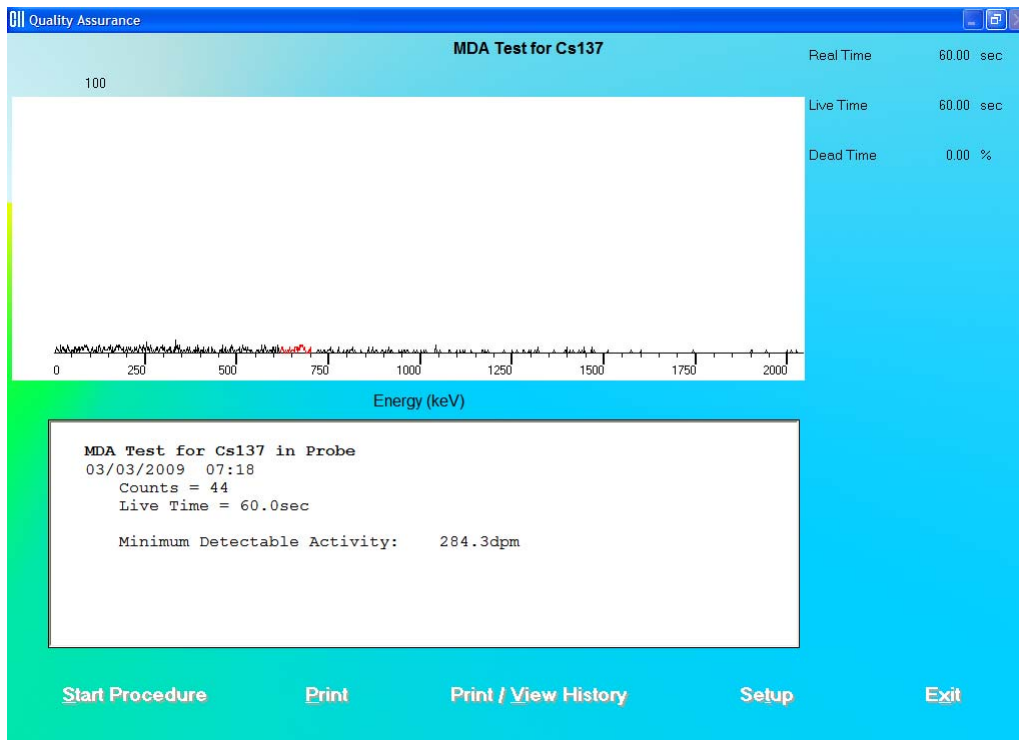


Figure 5-24

**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** on page 5-24).

VIEWING SYSTEM PARAMETERS

This function provides access to all the parameters used for the measurements and calculations of results in all procedures provided by the Absorbed Dose ALERT 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

- 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 ADAS\Reports. Data is saved in rich text format (.rtf), which may be viewed in a word processor (such as WordPad).

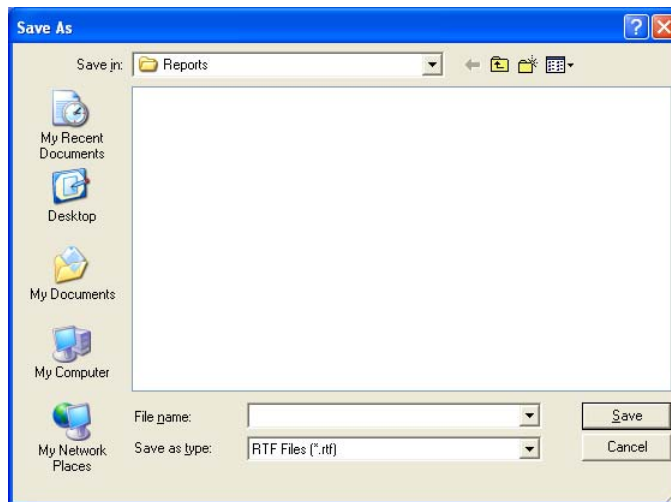


Figure 5-26

- Type in an appropriate file name and click the **Save** button or press *Alt+S*.
- To print all the parameters, click the **Print** button or press *Alt+P*.

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

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.

- 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.

Quality Assurance					
Tests for 03/03/2009					
Calibration & Constancy	High Voltage	Gain	Zero Offset (%)	FWHM (%)	Constancy Deviation(%)
	1000	25.08	0.04	7.0	1.5
Chi-Square	Tests	Secs	Chi-Square		
	10	20.0	4.4		
MDA Test	Isotope	Secs	MDA (dpm)		
	Cs137	60.0	284.3		

Selection

Today's Tests
 Probe History
 Chi-Square Test
 MDA Test

Save to File **Print** **Delete** **Delete Last Test** **Exit**

Figure 5-27

- To view all the results of each Auto Calibration and Constancy Test performed to date on the Probe detector, click the **Probe History** radio button.
- 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 print the results on the current screen, click the **Print** button or press *Alt+P*.
- To save the results on the current screen, click the **Save to File** button or press *Alt+S*.

- 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.

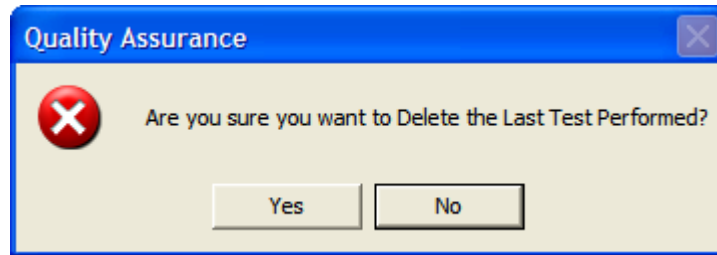


Figure 5-28

- 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 11: ARCHIVE*.

- 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+X*.

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CHAPTER 6

ISOTOPES

INTRODUCTION	6-1
VIEWING AND PRINTING ISOTOPE LIBRARY	6-2
ADDING A NEW ISOTOPE TO THE LIBRARY	6-3
EDITING ISOTOPE INFORMATION.....	6-4
DELETING AN ISOTOPE	6-5
MEASURING EFFICIENCY	6-6
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CAUTION: To ensure optimum performance of the Absorbed Dose ALERT System, before using the **Isotopes** module, perform the System Setup Procedures as outlined in CHAPTER 4: GENERAL SETUP.

INTRODUCTION

The Absorbed Dose ALERT System has an extensive reference library of over 75 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, 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+/* on the Absorbed Dose ALERT Main screen. Figure 6-1 Isotopes Main Screen will appear.

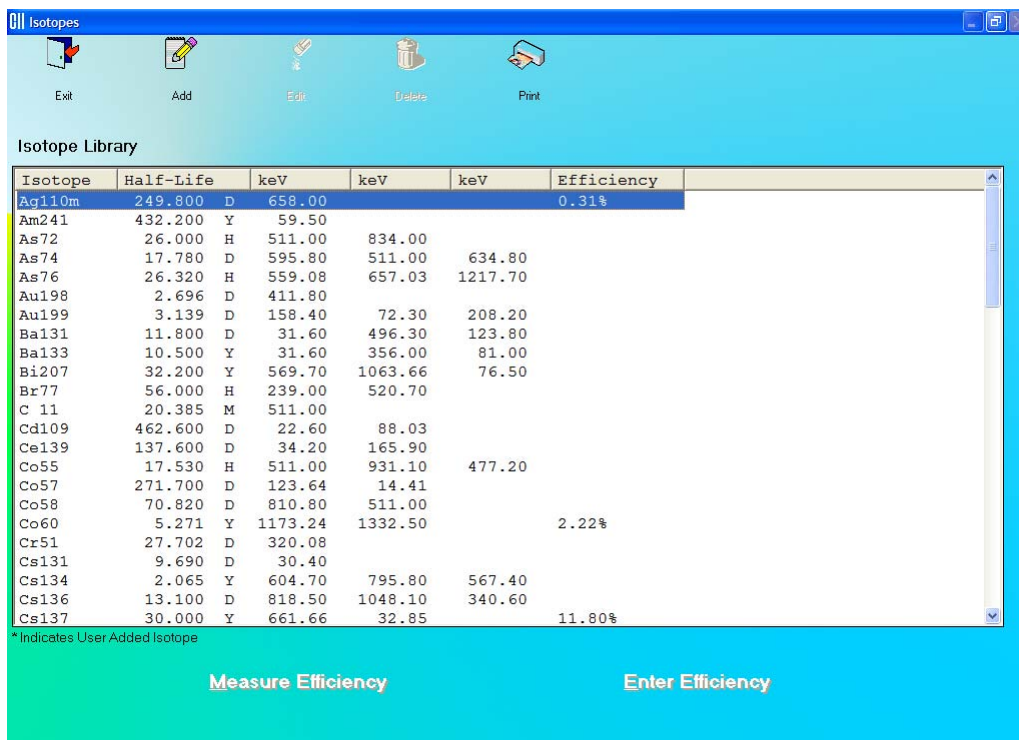


Figure 6-1 Isotopes Main Screen


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 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.

This will be referred to as the Main Isotopes screen. To return to the Absorbed Dose ALERT

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*, \uparrow and \downarrow 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 \downarrow 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  icon on Figure 6-1 Isotopes Main Screen. Figure 6-2 will appear.

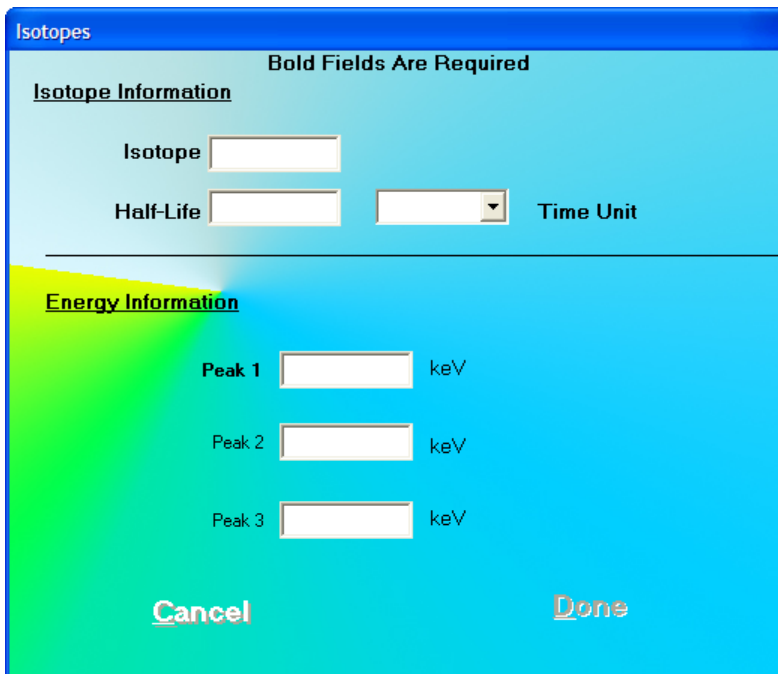



Figure 6-2

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 type a space between the character and the number. If the element symbol is two characters, do not type in a space between the character and numbers. If entered otherwise, an error message will appear as shown in Figure 6-3.

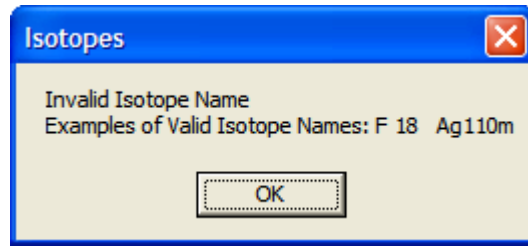


Figure 6-3

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 Absorbed Dose ALERT Main screen from the Isotopes Main

screen, click the  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.

Isotopes

Exit Add Edit Delete Print

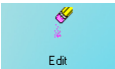


Isotope Library

Isotope	Half-Life		keV	keV	keV	Efficiency
Ir192	73.830	D	310.64	468.10		
K 42	12.360	H	1524.67			
K 43	22.300	H	375.55	617.49	593.40	
Mn52	5.591	D	1434.10	935.50	744.20	
Mn52m	21.100	M	511.00	1434.06		
Mn54	312.140	D	834.84			
Mo99	65.920	H	140.51	749.65	181.05	
N 13	9.965	M	511.00			
Na22	2.602	Y	511.00	1274.54		
Na24	14.959	H	1368.00			
Nd147	10.980	D	39.60	91.20	531.00	
Np239	2.355	D	105.70			
Pb203	51.880	H	74.40	279.20		
Pb212	10.640	H	238.60	78.70		
Ra226	1600.000	Y	609.00	352.00	79.20	
Rb81	4.576	H	511.00	446.10	190.30	
Rb84	32.770	D	881.61	511.00		
Rm125 *	1.000	Y	239.00			
Sb122	2.700	D	564.24	692.65		
Sb124	60.200	D	602.73	1690.98	720.17	
Sc46	83.790	D	889.25	1120.51		
Se75	119.770	D	269.10	1120.51		
Sn113	115.100	D	391.70			

* Indicates User Added Isotope

Measure Efficiency Enter Efficiency

Figure 6-4

- Click the  icon. Figure 6-2 will appear.
- Click in the text box or use the *Tab* key to move around. Type over the existing information.
- Click the  button or press *Alt+D* to save changes or click the  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.

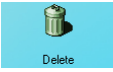
DELETING AN ISOTOPE

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

- 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  icon. The screen appears as shown in Figure 6-5.

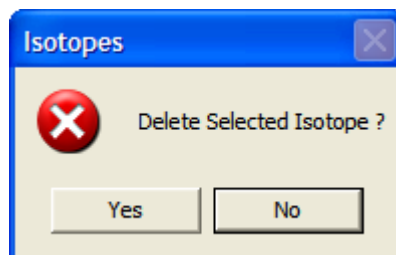
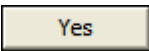
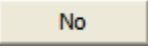


Figure 6-5


4. Click the  button or press the *Y* key to confirm the deletion. Alternatively, click the  button or press the *N* key to cancel the deletion.

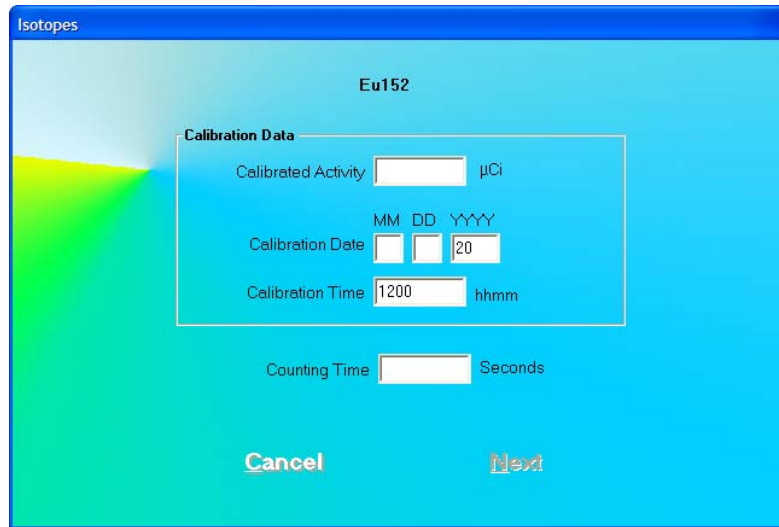


QUICK TIPS:

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



The screenshot shows a software window titled "Isotopes" with a sub-header "Eu152". A "Calibration Data" dialog box is open, containing the following fields:

- Calibrated Activity: μCi
- Calibration Date: MM DD YYYY, with the year field containing "20".
- Calibration Time: 1200 hhmm
- Counting Time: Seconds

At the bottom of the dialog are "Cancel" and "Next" buttons.

Figure 6-6

- 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.
- Click the **Next** button or press *Alt+N*. The screen appears as shown in Figure 6-8.

Note: If calibration has not been performed for the current day, you will be prompted with the screen as shown in Figure 6-7. If calibration is performed now, the program will return to Figure 6-8 after calibration is complete.

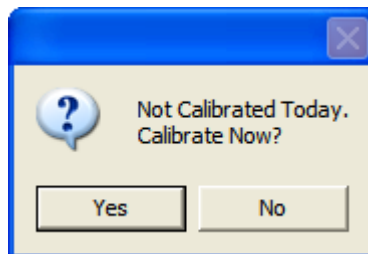


Figure 6-7

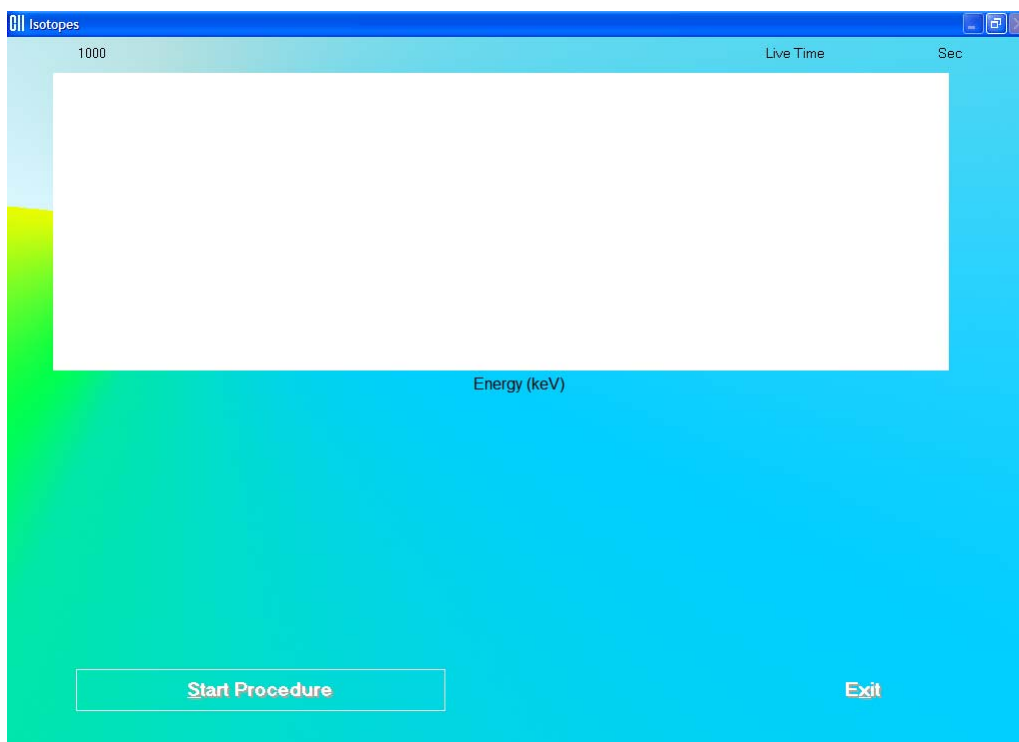


Figure 6-8

6. Click the **Start Procedure** button or press *Alt+S* to start measurements. Alternatively, click the **Exit** button or press *Alt+X* to return to Figure 6-1 Isotopes Main Screen.
7. When the procedure is started, the screen appears as shown in Figure 6-9.

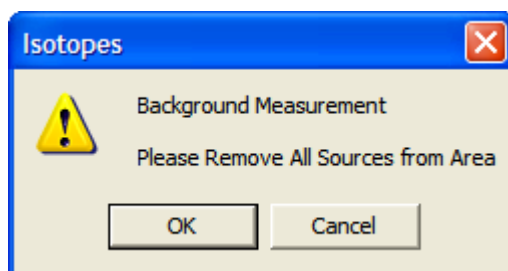


Figure 6-9

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 6-10.

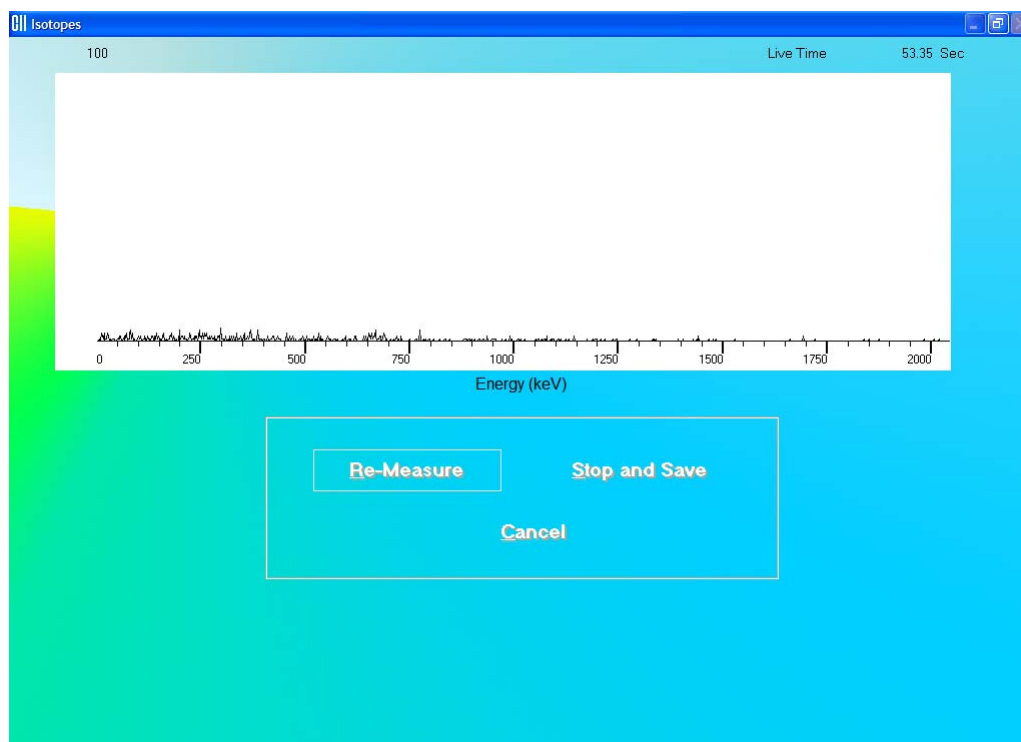


Figure 6-10

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 6-13.

After count collection is completed, the screen appears as shown in Figure 6-11.

8. Next, the screen appears as shown in Figure 6-12, asking you if you want to accept the measurement.

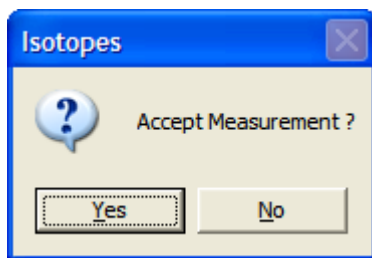
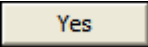
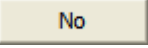


Figure 6-11

To accept the measurement and continue with the next step, click the  button or press the *Y* key. Figure 6-12 will appear. To discard and recount the current measurement, click the  button or press the *N* key. Figure 6-9 will re-appear.

- Next, the screen appears as shown in Figure 6-12, prompting you to measure the isotope selected for efficiency measurement.

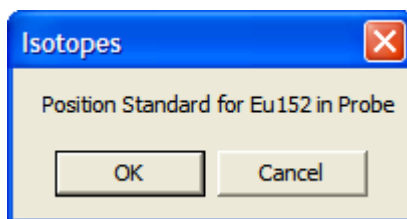
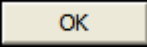
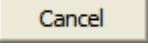


Figure 6-12

To measure the isotope, place the isotope standard in the Probe and click the  button. Data collection begins as shown in Figure 6-10 above. To stop the measurement, click the  button. The screen then appears as shown in Figure 6-13.

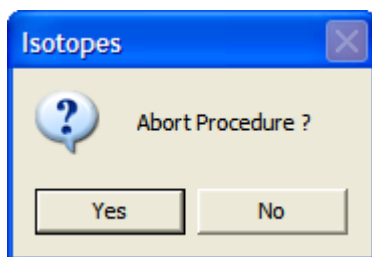
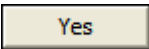




Figure 6-13

Click the  button or press the *Y* key to end the procedure. The screen appears as shown in Figure 6-8. Click the  button to start again or click the  button to quit.

10. After the measurement is completed, the screen appears as shown in Figure 6-14. The results in the lower part of the screen show measured counts and calculated values for activity and efficiency.

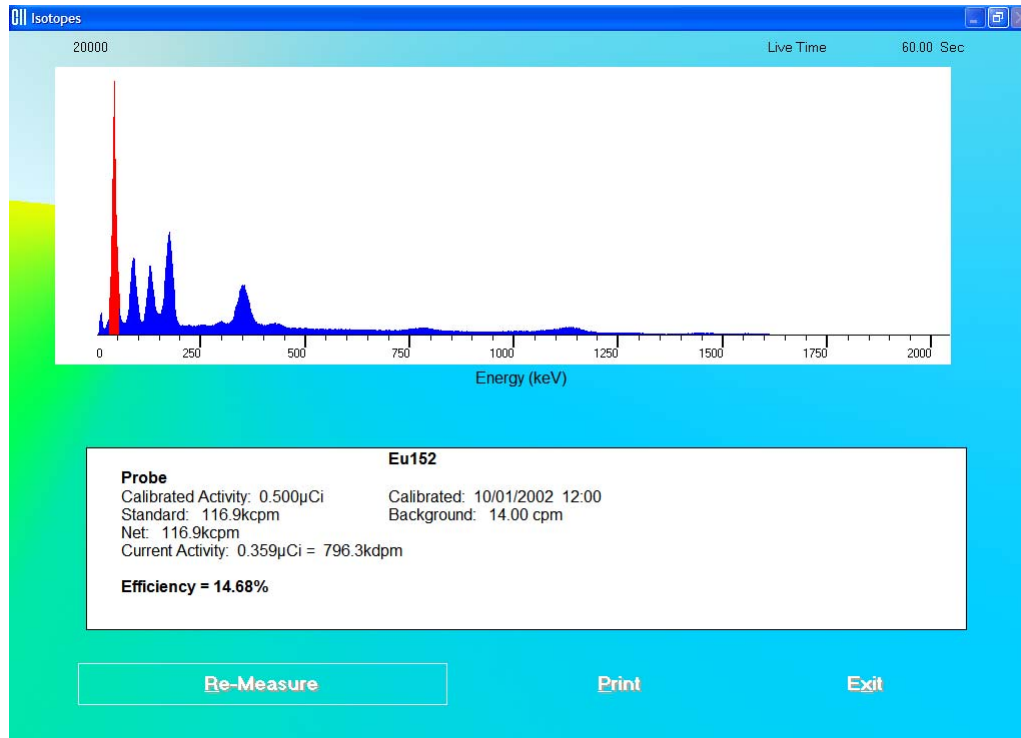


Figure 6-14

11. To repeat the efficiency measurement for the same isotope, click the **Re-Measure** button or press *Alt+R*. Steps 7 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+X*.

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 6-15. The name of the isotope appears at the top. Efficiency values may or may not already exist.



Figure 6-15

4. Click in the text box or use the *Tab* key to move around. Input the new efficiency value.
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

ABSORBED DOSE ALERT

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CAUTION: To ensure optimum performance of the Absorbed Dose ALERT System, 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 identify individuals with significant amounts of internal contamination. The Absorbed Dose ALERT module of the Absorbed Dose ALERT System 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 Absorbed Dose ALERT System 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 Absorbed Dose ALERT System physical measurement data and proprietary collimator design were simulated using MCNP5, [Los Alamos Monte Carlo N-Particle Transport Code].
- The Absorbed Dose ALERT System was modeled to respond to six body types using MIRD¹ [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 Absorbed Dose ALERT module 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 Absorbed Dose ALERT System Main screen. You will be asked to verify the current date as shown in Figure 7-1 Date Verification Screen.

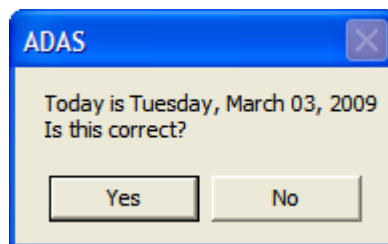


Figure 7-1 Date Verification Screen

If is pressed, Figure 7-3 Absorbed Dose ALERT Main Screen will appear.

If is pressed, Figure 7-2 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.

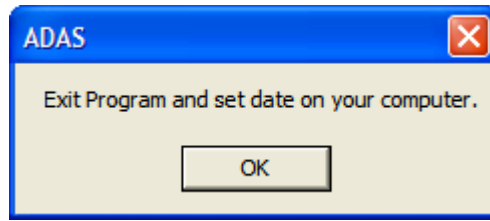


Figure 7-2

The user will remain on the Absorbed Dose ALERT System 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.

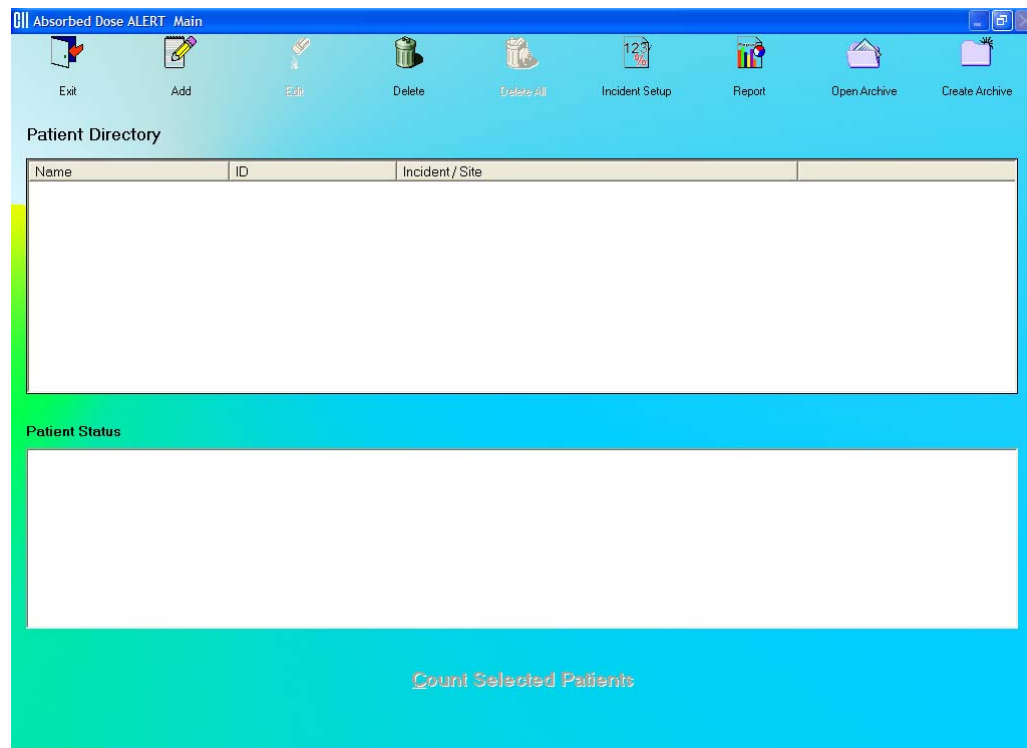



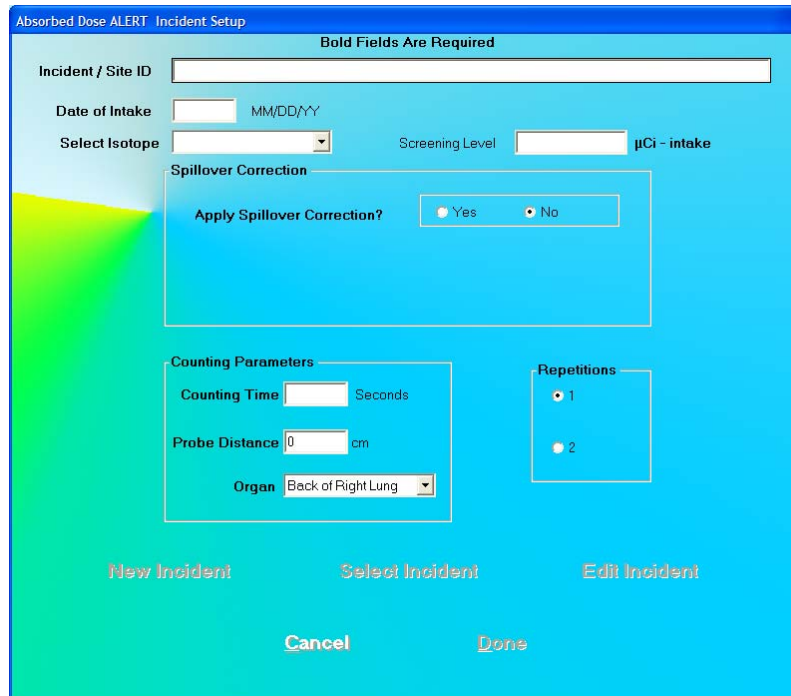
Figure 7-3 Absorbed Dose ALERT Main Screen

To return to the Absorbed Dose ALERT System Main Screen from here, click the



INCIDENT SETUP

Click the  icon on Figure 7-3 Absorbed Dose ALERT Main Screen. Figure 7-4 Incident Setup Screen will appear.



Absorbed Dose ALERT Incident Setup
Bold Fields Are Required

Incident / Site ID

Date of Intake MM/DD/YY

Select Isotope Screening Level $\mu\text{Ci} - \text{intake}$

Spillover Correction
Apply Spillover Correction? Yes No

Counting Parameters
Counting Time Seconds
Probe Distance cm
Organ Back of Right Lung

Repetitions
 1
 2

New Incident Select Incident Edit Incident
Cancel Done

Figure 7-4 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 field 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 7-5 Spillover Correction Frame.

Figure 7-5 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 7-3 Absorbed Dose ALERT Main Screen.



QUICK TIP:

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

New Incident


Click the  icon on Figure 7-3 Absorbed Dose ALERT Main Screen. Figure 7-6 will appear.

Figure 7-6

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

Click the **New Incident** button. Figure 7-4 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 7-3 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 7-3 Absorbed Dose ALERT Main Screen. Figure 7-7 will appear.

Figure 7-7

1. Click the **Select Incident** button. Figure 7-8 Incident Selection Screen will appear.

Figure 7-8 Incident Selection Screen

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

- To select an incident, click on the incident name in the list box on Figure 7-8 Incident Selection Screen. The Incident name will become highlighted and the **Select Incident** and **Delete Incident** buttons will become enabled as shown in Figure 7-9.

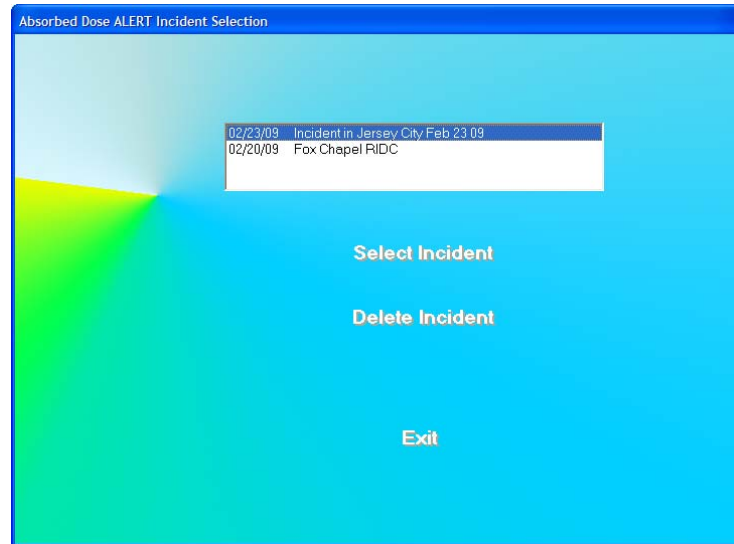


Figure 7-9

- Click the **Select Incident** button to set the highlighted incident as the currently active incident. The Incident Setup Screen (Figure 7-7) 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.

- 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 7-10 will appear.

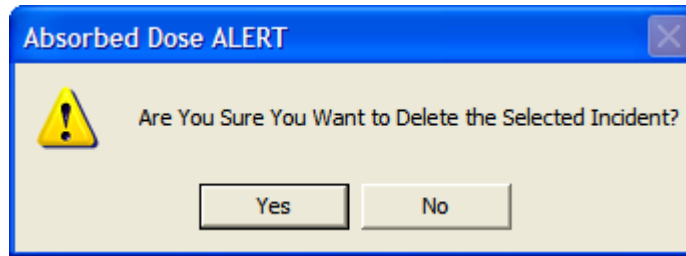


Figure 7-10

2. Click the button or press the *Y* key to confirm the deletion. Otherwise, click the 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 7-11 will appear.

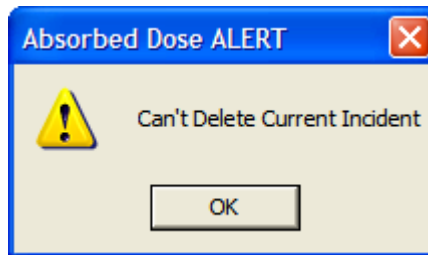


Figure 7-11

4. Click the button to dismiss the dialog window.


To delete the currently active incident, select (highlight) a different incident and click the button. The Incident Setup Screen will re-appear displaying the parameters for the selected incident. Click the button on the Incident Setup Screen. Figure 7-8 Incident Selection Screen will re-appear. Highlight the desired incident and press the button. Figure 7-10 will appear.

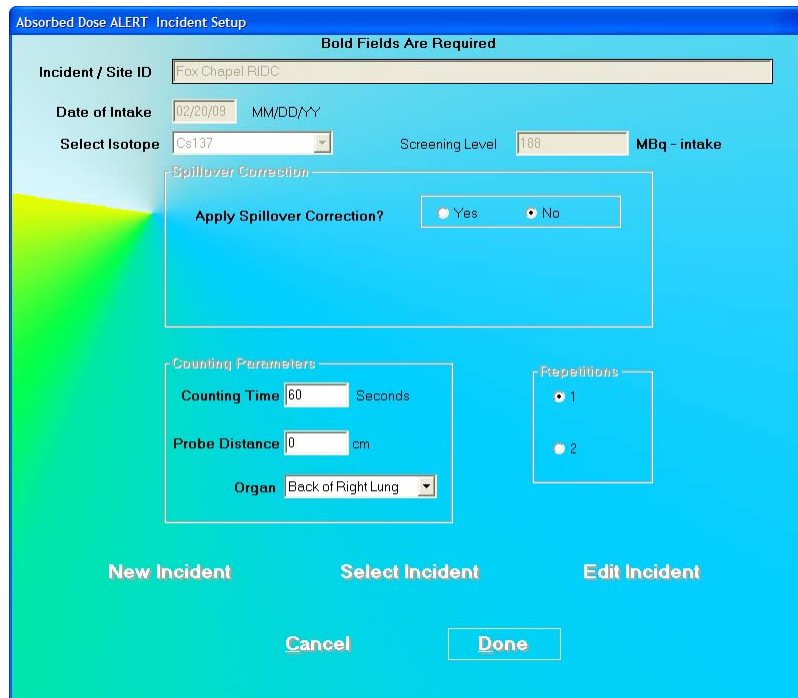
**QUICK TIP:**

- 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 7-3 Absorbed Dose ALERT Main Screen. Figure 7-12 will appear.



Absorbed Dose ALERT Incident Setup

Bold Fields Are Required

Incident / Site ID: Fox Chapel RIDC

Date of Intake: 02/20/09 MM/DD/YY

Select Isotope: Cs137 Screening Level: 100 MBq - intake

Spillover Correction

Apply Spillover Correction? Yes No

Counting Parameters

Counting Time: 60 Seconds

Probe Distance: 0 cm

Organ: Back of Right Lung


Repetitions

1 2

New Incident Select Incident Edit Incident

Cancel Done

Figure 7-12

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


Click the  button. The Incident Setup Screen will appear as shown in Figure 7-13.

Figure 7-13

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 7-3 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 7-3 Absorbed Dose ALERT Main Screen. Figure 7-14 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.

Absorbed Dose ALERT Patient Data

Bold Fields Are Required

Incident / Site ID Fox Chapel RIDC

Patient Information

Patient ID Sex Date of Intake 02/20/09 MM/DD/YY

Last Name First Name Age

Address Phone

Body Information

Height cm Weight kg Body Type

Measurement Information

Select Isotope Cs137

Screening Level MBq - intake

Select Organ Back of Right Lung

Spillover Correction

Apply Spillover Correction? Yes No

General Information

Tech ID

Probe Distance cm Counting Time 60 Seconds

Change Setup Values Cancel Done Count

Figure 7-14 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 \uparrow or \downarrow 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:

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

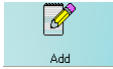
- **Body Type:** If the patient's age has been input, the Body Type will be displayed in the drop-down list box. The Body Types are Adult, Adult 1X, and Pediatric.

The Body Type is selected by the following criteria:

- Pediatric Age < 15 or Weight < 100 lb
- Adult 1X BMI = 30 or greater
- 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 7-21 Count Patient Measurement Screen will appear.

10. To add more patients, click the  icon on Figure 7-3 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.**

- 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 7-15).

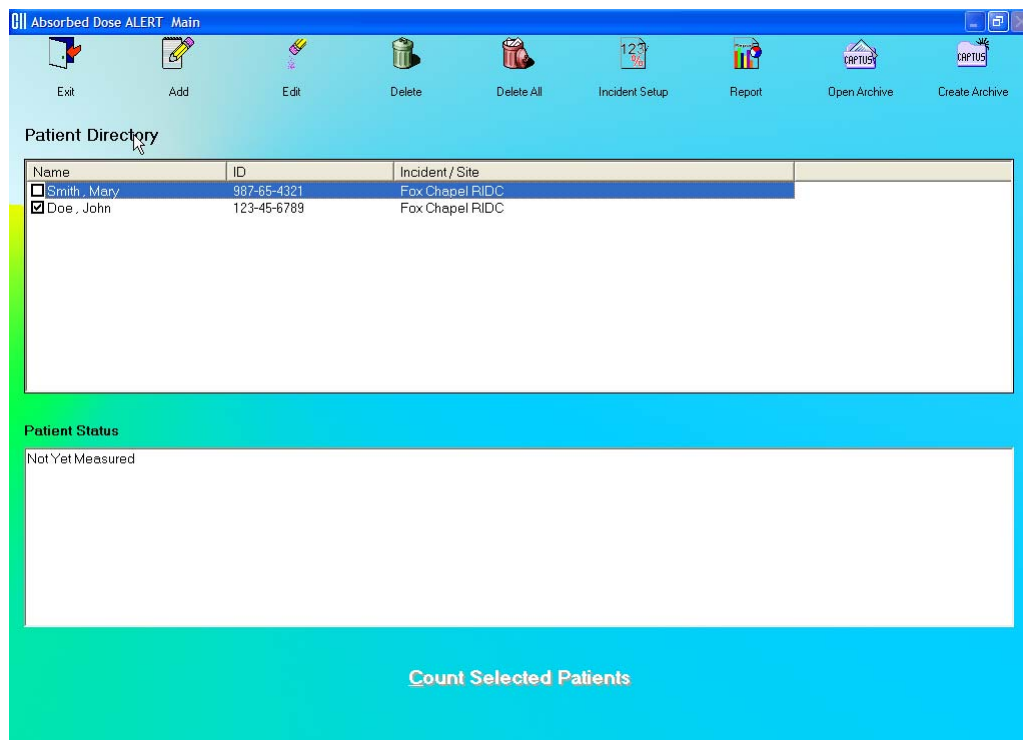


Figure 7-15

- Click the  icon. The screen appears as shown in Figure 7-16.

Absorbed Dose ALERT Patient Data

Incident / Site ID: Fox Chapel RIDC

Patient Information

Patient ID: 123-45-6789 Sex: Male Date of Intake: 02/20/09 MM/DD/YY

Last Name: Doe First Name: John Age: 44

Address: 123 Main Street Any Town, ST 12345 Phone: 123-456-7890

Body Information

Height: 167 cm Weight: 70 kg BMI: 25.1 Body Type: Adult

Measurement Information

Select Isotope: Cs137

Screening Level: MBq - intake

Select Organ: Back of Right Lung

Spillover Correction: Apply Spillover Correction? Yes No

General Information

Tech ID: SCC123

Probe Distance: 0 cm Counting Time: 60 Seconds

Change Setup Values Cancel Done Count

Figure 7-16

- 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.

- When finished editing the patient data, click the **Done** button to save the entered information, or the **Cancel** button to discard the changes.
- To measure this patient now, click the **Count** button. Figure 7-21 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 7-23 and **OPENING AN ARCHIVE** on page 7-24.

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 7-17). 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.

Patient Directory

Name	ID	Incident / Site
<input type="checkbox"/> Smith, Mary	987-65-4321	Fox Chapel RIDC
<input checked="" type="checkbox"/> Doe, John	123-45-6789	Fox Chapel RIDC

Figure 7-17

1. Click the  icon. Figure 7-18 will appear.

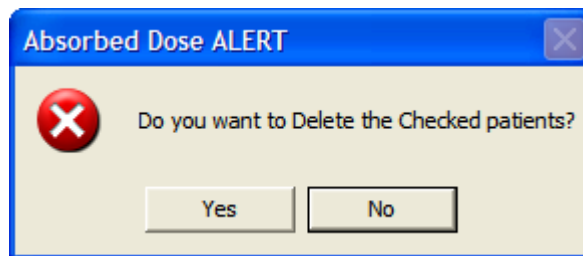
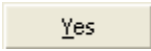
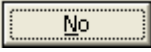
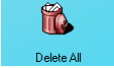


Figure 7-18

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 7-19 will appear.

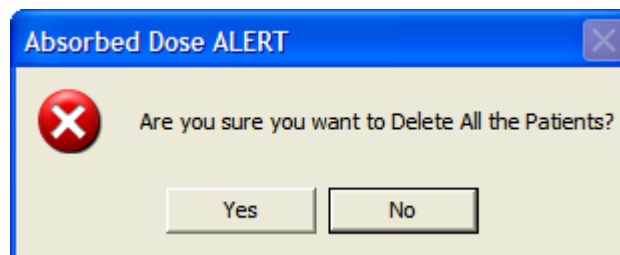
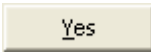



Figure 7-19

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 7-3 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 7-21 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 7-20. After the calibration is complete, the program will return to the Emergency Screening Count Patient screen shown in Figure 7-21 Count Patient Measurement Screen.*

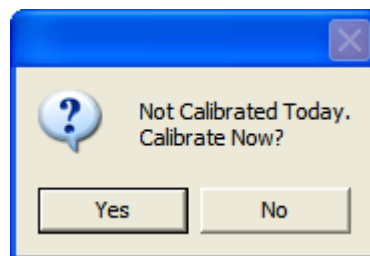


Figure 7-20

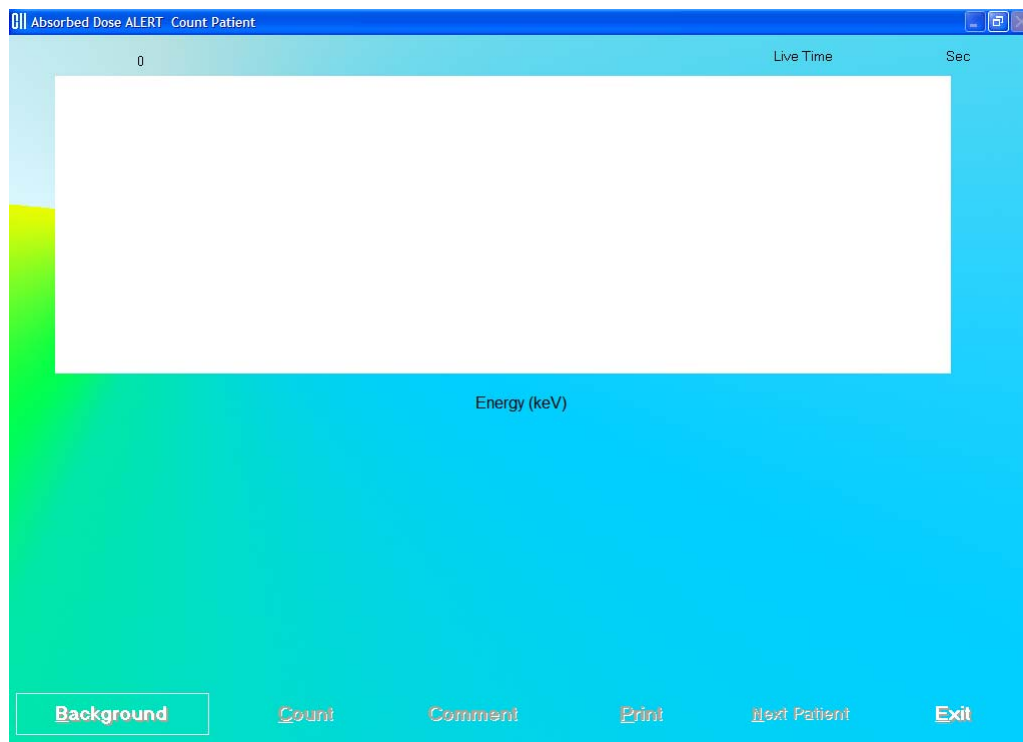


Figure 7-21 Count Patient Measurement Screen

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 7-22 will appear.

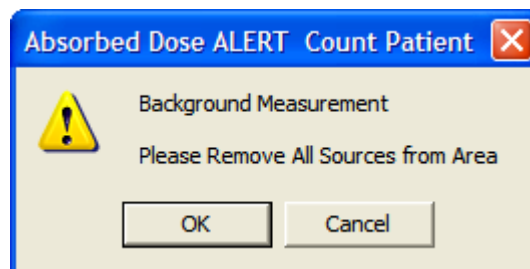


Figure 7-22

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.

- Click the **Count** button to begin counting the selected patient. Figure 7-23 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.

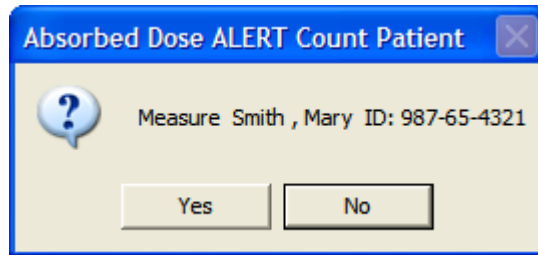


Figure 7-23

- You will be prompted to measure the correct organ as shown in Figure 7-24.

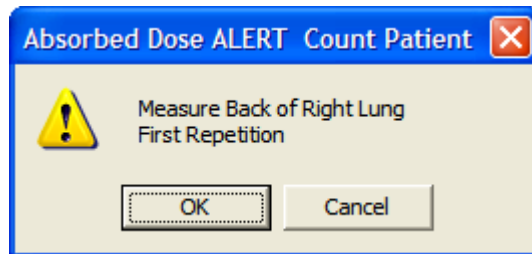


Figure 7-24

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 7-25.

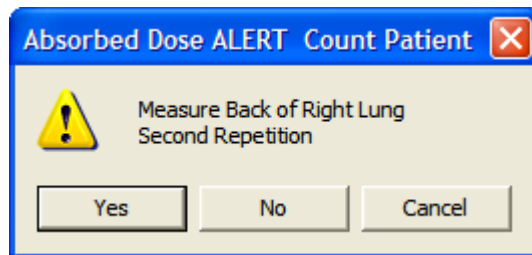


Figure 7-25

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 7-26.

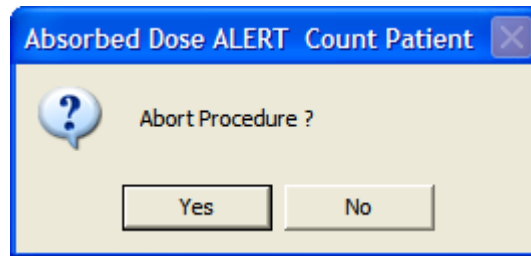


Figure 7-26

- 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.
- To add comments to the report, click the **Comment** button. The Comment window will appear as shown in Figure 7-27. Refer to CHAPTER 3: GENERAL OPERATING INSTRUCTIONS; SECTION: ADD COMMENTS SCREEN.

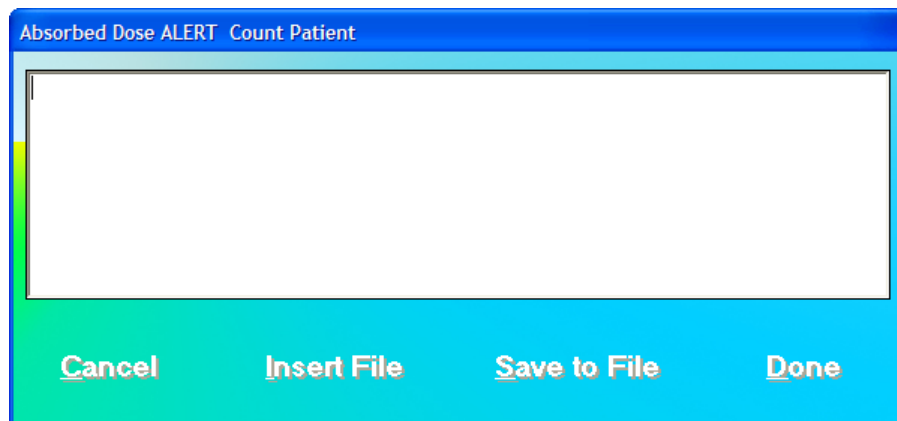


Figure 7-27

- If more than one patient was selected, the **Next Patient** button will be enabled. Press this button to measure the next patient.

- Click the **Exit** button or press *Alt+E* after all the patients have been measured to return to Figure 7-3 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 7-28 Data Acquisition Screen, which displays the live spectrum as counts are being collected.

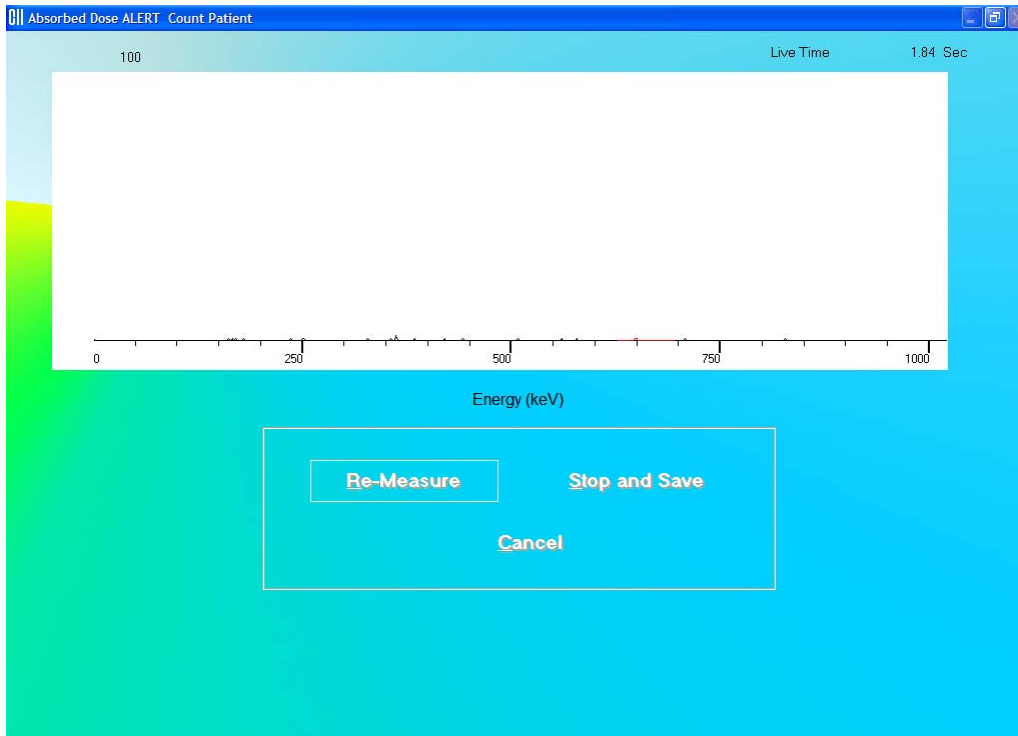


Figure 7-28 Data Acquisition Screen

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 7-26.

After count collection is completed, the screen appears as shown in Figure 7-29.

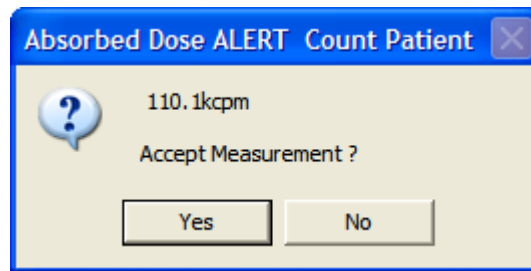
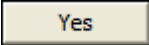
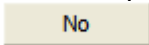


Figure 7-29

To accept the measurements and continue with the next step, click the  button or press the *Y* key. To discard and recount the current measurement, click the  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 7-3 Absorbed Dose ALERT Main Screen, click the  icon. The Create Archive dialog, Figure 7-30, will appear.

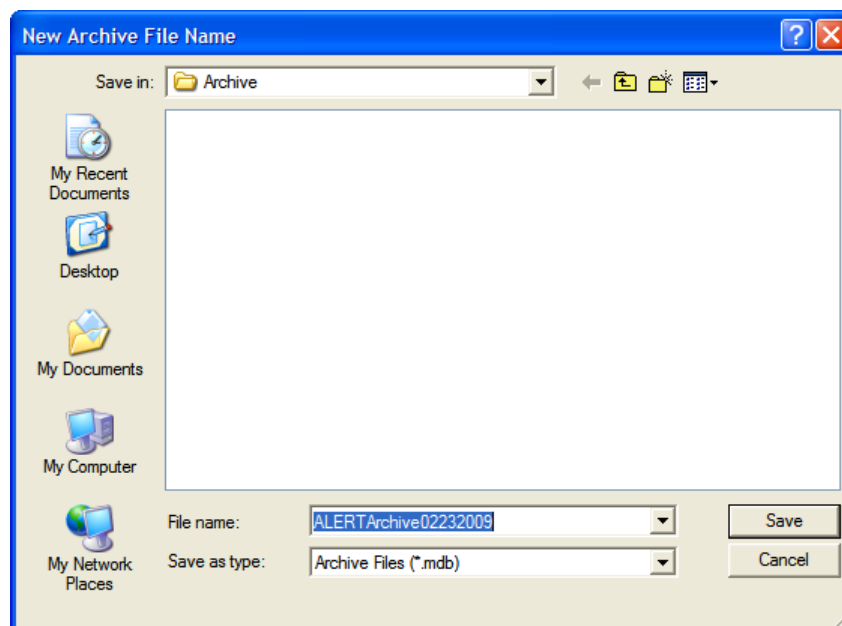

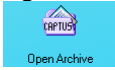


Figure 7-30

- The default filename is ALERTArchive followed by the current date. The filename can be changed. When the filename is correct, click the  button.

OPENING AN ARCHIVE

Reports can be viewed and printed from a previously archived database.

- To open an existing archived database, on Figure 7-3 Absorbed Dose ALERT Main Screen, click the  icon. The Open Archive dialog Figure 7-31 will appear.

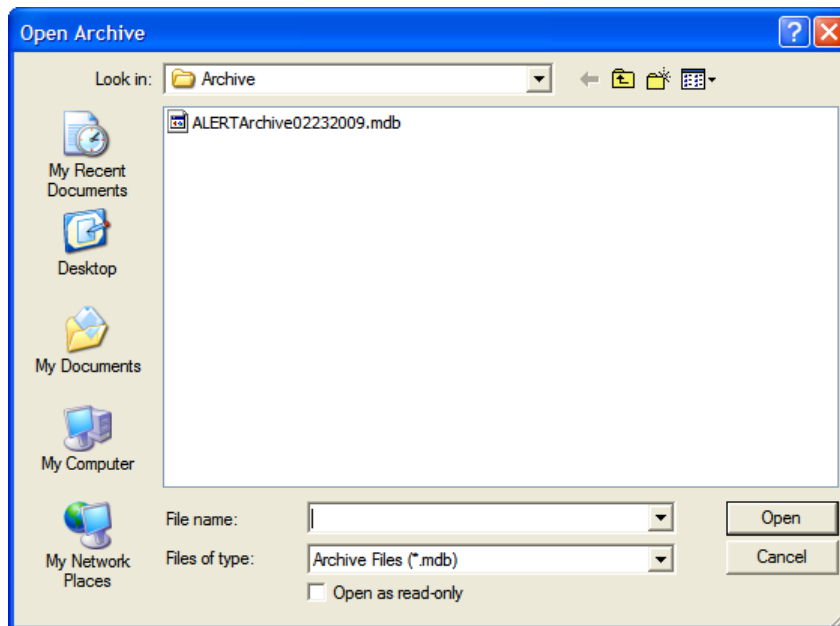
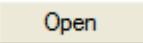


Figure 7-31

- Select the desired database and click the  button. The Absorbed Dose ALERT Main Screen will appear similar to that shown in Figure 7-32 with the patient list from the opened database displayed.

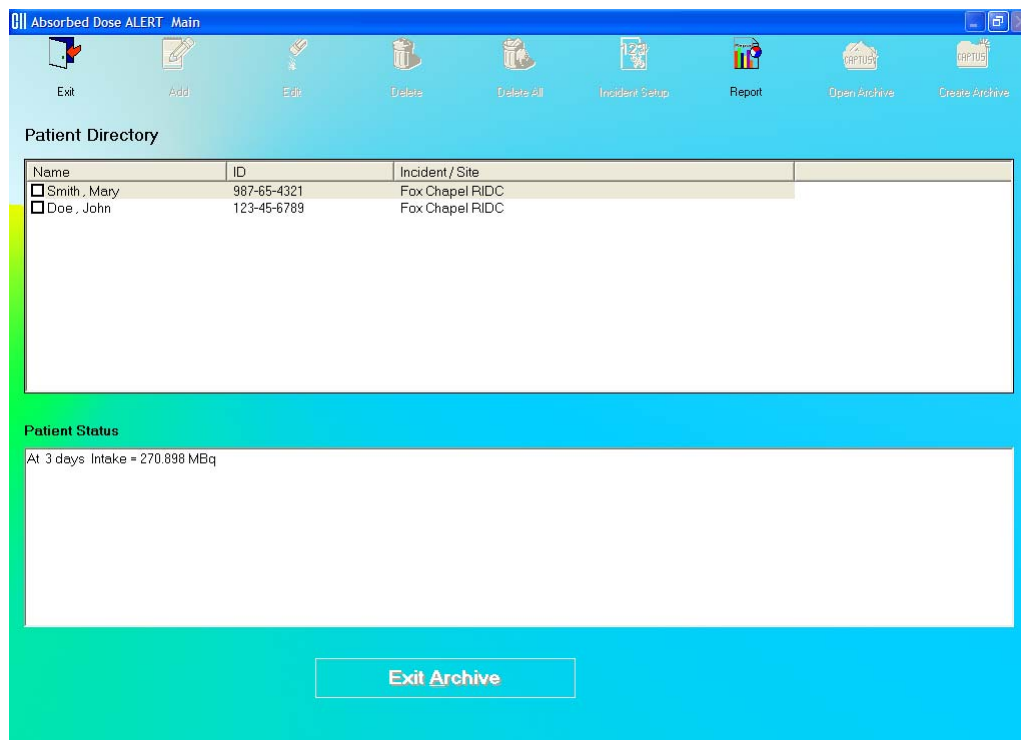




Figure 7-32

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 7-33, 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.

Absorbed Dose ALERT Report

Fox Chapel RIDC
 Michaels , Douglas 789-56-1234
 Intake On: 02/20/09 Measured: 02/23/09 12:37 (MM/DD/YY)
 3 days Back of Right Lung Cs137
 1807cps.net 274.806 MBq ***ABOVE SCREENING LEVEL***
 Comment: None

Fox Chapel RIDC
 Michaels , Douglas 789-56-1234
 Intake On: 02/20/09 Measured: 02/23/09 12:38 (MM/DD/YY)
 3 days Back of Right Lung Cs137
 143cps.net 21.674 MBq ***BELOW SCREENING LEVEL***
 Comment: None

Fox Chapel RIDC
 Smith , Mary 987-65-4321
 Intake On: 02/20/09 Measured: 02/23/09 09:56 (MM/DD/YY)
 3 days Back of Right Lung Cs137

Select Incident
 All Incidents

Select Patient
 All Patients By Date By Name

Save to File Export Print Export Selection Print Selection Exit

Figure 7-33

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.

Absorbed Dose ALERT Report

Fox Chapel RIDC

Demographic Data		Measurement Setup	
Patient:	DICKINSON, JOHN	Intake On:	02/20/09 (MM/DD/YY)
ID:	DJ4324	Organ:	Back of Right Lung
Address:		Isotope:	Cs137
Phone:		Screening Level:	5000 μ Ci
Height:	5 ft 7 in	Average cpm	Count 1 cpm
Weight:	165 lb		Count 2 cpm
Sex:	Male		
Age:	55		
BMI:	25.8		
Body Type:	ADULT		
Technologist:			

Measurement at 10 days

Time: 03/02/09 08:44 (MM/DD/YY)
Factor: 13.2 cpm per μ Ci - intake
Room Background: 19
Back of Right Lung (net): 75657 75657
Comment: None

Intake = 5731.577 μ Ci *ABOVE SCREENING LEVEL*****

Select Incident:
All Incidents

Select Patient:
DICKINSON, JOHN DJ4324 By Date By Name

Save to File Export Print Export Selection Print Selection Exit

Figure 7-34 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/ μ Ci; (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 μ Ci (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 7-35. Reports are saved as an RTF file in the Reports folder by default.

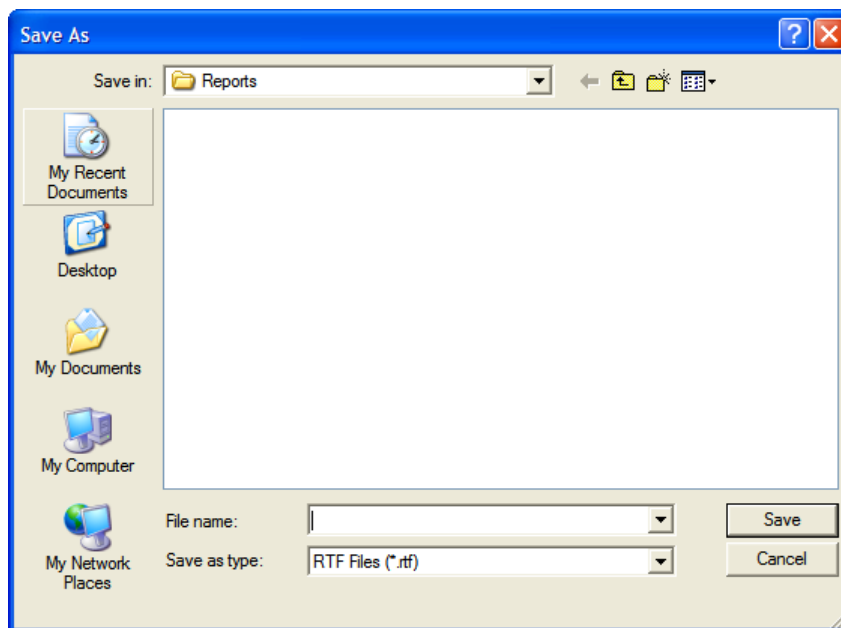




Figure 7-35

9. Click the  button or press *Alt+X* to return to Figure 7-3 Absorbed Dose ALERT Main Screen.

Exporting

1. On the Absorbed Dose ALERT Main Screen, click the  icon. The screen appears as shown in Figure 7-36, 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.

Absorbed Dose ALERT Report

Fox Chapel RIDC
Michaels, Douglas 789-56-1234
Intake On: 02/20/09 Measured: 02/23/09 12:37 (MM/DD/YY)
3 days Back of Right Lung Cs137
1807cps.net 274.806 MBq ***ABOVE SCREENING LEVEL***
Comment: None

Fox Chapel RIDC
Michaels, Douglas 789-56-1234
Intake On: 02/20/09 Measured: 02/23/09 12:38 (MM/DD/YY)
3 days Back of Right Lung Cs137
143cps.net 21.674 MBq ***BELOW SCREENING LEVEL***
Comment: None

Fox Chapel RIDC
Smith, Mary 987-65-4321
Intake On: 02/20/09 Measured: 02/23/09 09:56 (MM/DD/YY)
3 days Back of Right Lung Cs137
170.000 MBq

Select Incident
All Incidents

Select Patient
All Patients By Date By Name

Save to File Export Print Export Selection Print Selection Exit

Figure 7-36

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.

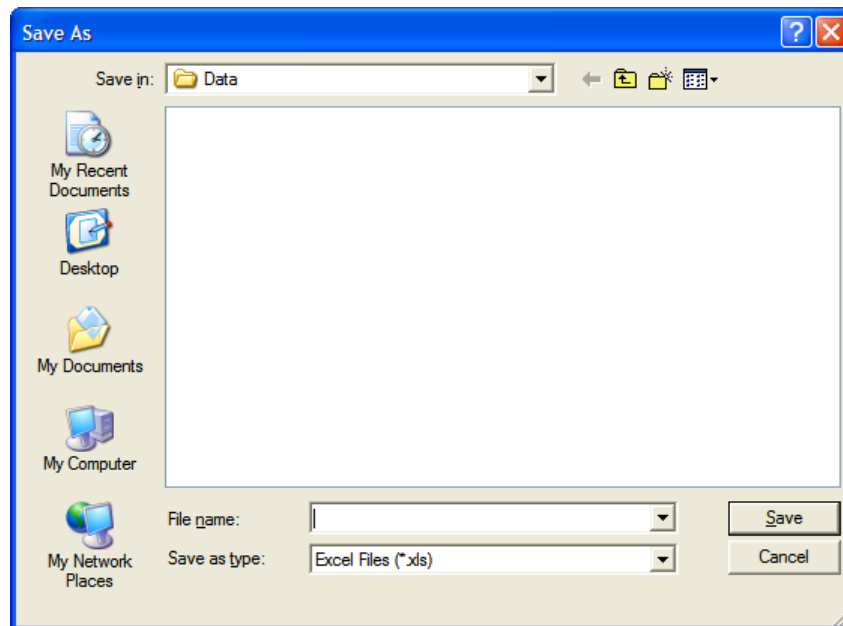


Figure 7-37 Selecting Excel File

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 7-37 Selecting Excel File.
6. Click the **Exit** button or press *Alt+X* to return to Figure 7-3 Absorbed Dose ALERT Main Screen.

CHAPTER 8

BIOASSAY

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CAUTION: To ensure optimum performance of the Absorbed Dose ALERT System, 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  button or press *Alt+B* on the Absorbed Dose ALERT System Main screen. Figure 8-1 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.

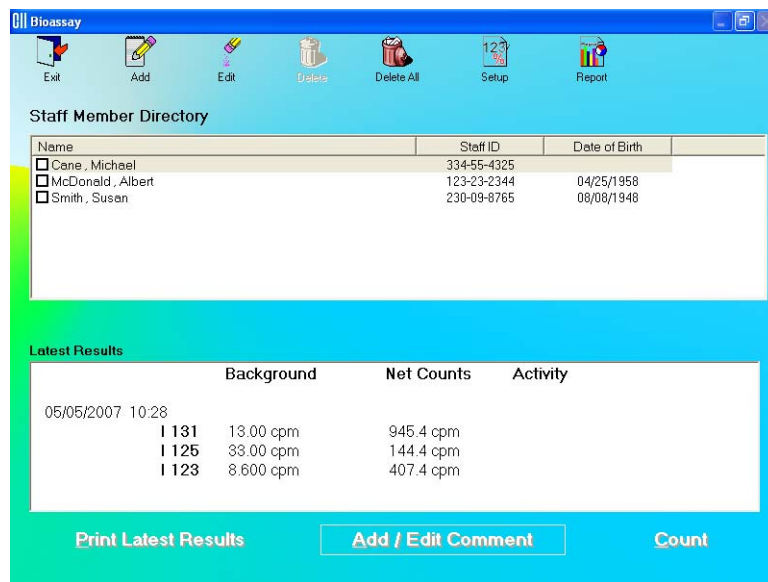
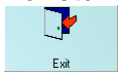


Figure 8-1 Main Bioassay Screen

To return to the Absorbed Dose ALERT System Main screen from this screen, click the




icon or press the *Esc* key.

BIOASSAY SETUP

Note: The Administrator must be logged into the Absorbed Dose ALERT System in order to set up Bioassay.



1. Click the  icon on Figure 8-1 Main Bioassay Screen. The Setup screen appears as shown in Figure 8-2.

	I 131	I 125	I 123
Isotope Used in Bioassay	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Probe Detector Efficiency	<input type="text"/> %	<input type="text"/> %	<input type="text"/> %
Investigation Level	<input type="text"/> 0.04 μ Ci	<input type="text"/> 0.12 μ Ci	<input type="text"/> 0.5 μ Ci
Measure Efficiency	I131 / I125 Cross Contamination		I123 / I125 Cross Contamination
Enter Efficiency	<input type="text"/> 0.085		<input type="text"/> 0.920
Counting Time	<input type="text"/> 300 Seconds	Probe Distance	<input type="text"/> 25 cm

Figure 8-2

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 8-3 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.

The screenshot shows a software window titled "Bioassay" with a sub-header "Check Isotopes for Efficiency Measurement". The interface is divided into three columns for isotopes ¹³¹I, ¹²⁵I, and ¹¹³I. Each column contains a checkbox, a "Calibration Activity" input field (with a unit of μCi), a "Calibration Date" input field (with MM, DD, and YYYY sub-fields), and a "Calibration Time" input field (with hhmm sub-fields). A "Counting Time" input field is located at the bottom left, with a "Seconds" label. At the bottom right, there are "Cancel" and "Next" buttons. The "Next" button is highlighted in blue.

Figure 8-3

- 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. In the Counting Time text box, input the counting time in seconds. This counting time is only used for the Efficiency measurement.
- iv. Click the **Next** button or press *Alt+N*. The screen appears as shown in Figure 8-5.

Note: If calibration has not been performed, you will be prompted with the screen as shown in Figure 8-4. After the calibration is complete, the program will return to the screen shown in Figure 8-5.

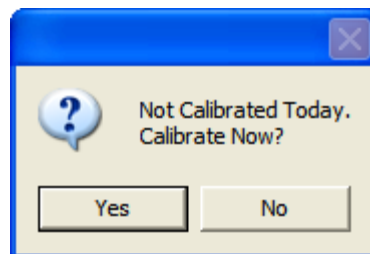


Figure 8-4

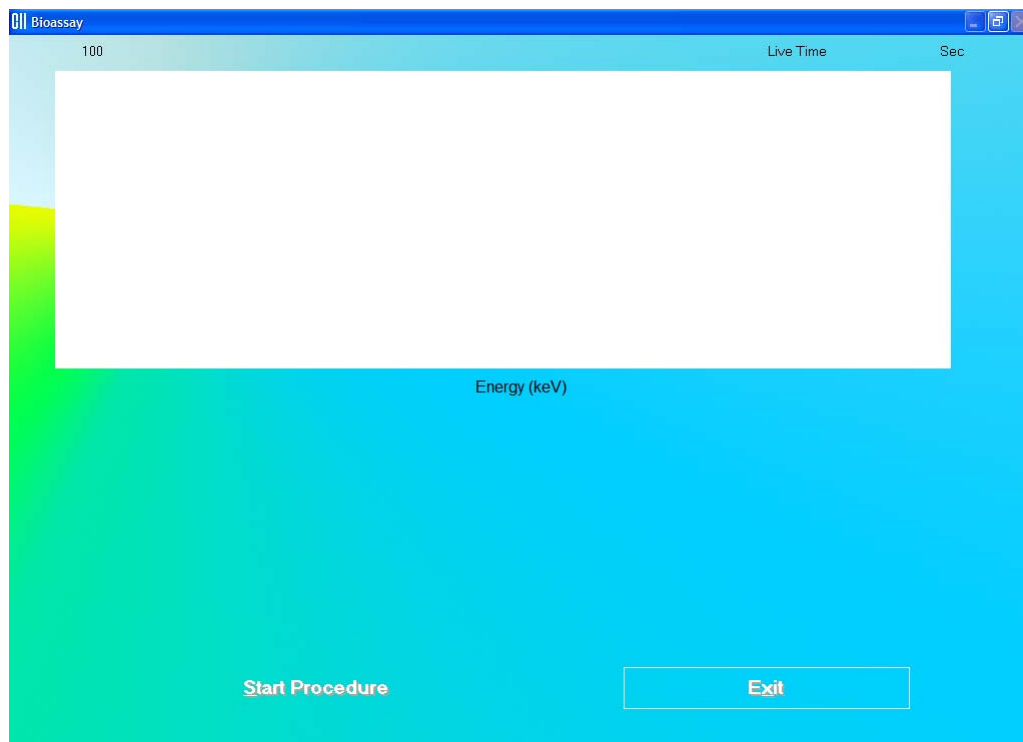




Figure 8-5

- v. Click the  button or press *Alt+S* to start measurements, or click the  button or press *Alt+X* to return to the Bioassay Setup screen (Figure 8-2).

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 8-6.

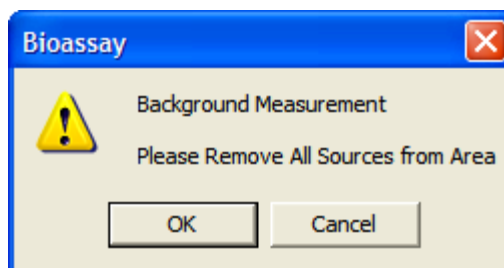
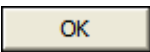


Figure 8-6

- vi. Verify that there are no radioactive sources in the area and click the  button to measure background counts. The Data Acquisition screen (Figure 8-7) is displayed.

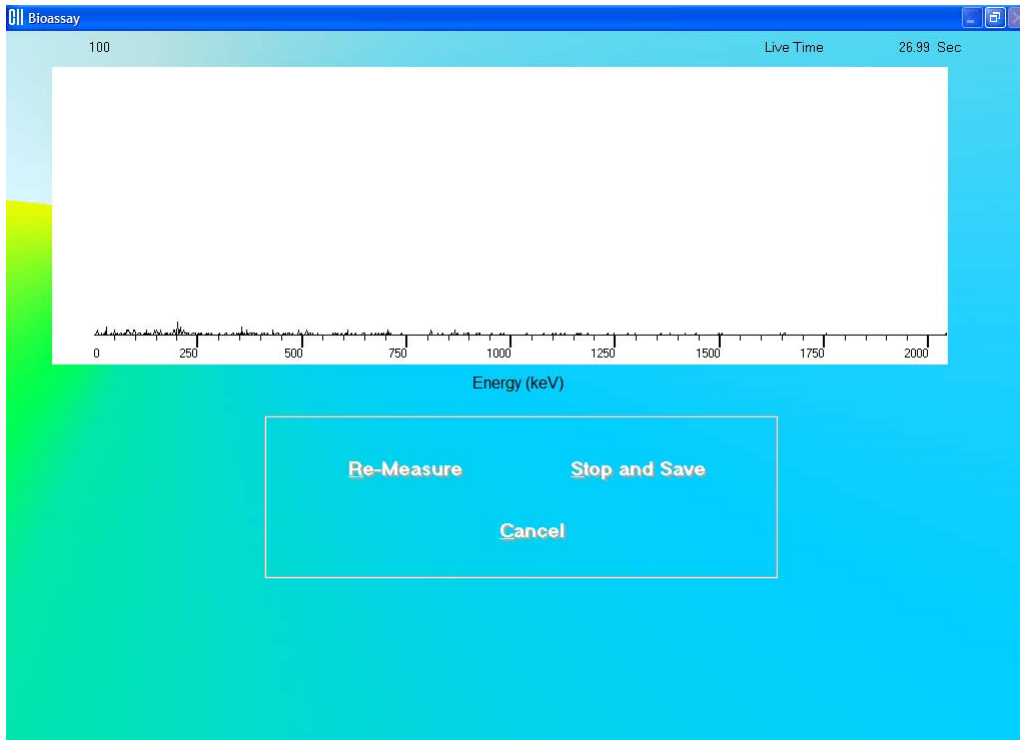


Figure 8-7

- vii. Next, the screen appears as shown in Figure 8-8, asking you if you want to accept the measurement.

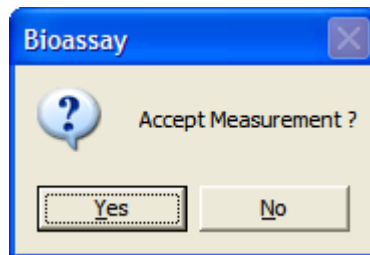


Figure 8-8

To accept the measurement and continue with the next step, click the button or press the *Y* key. Figure 8-9 will appear. To discard and recount the current measurement, click the button or press the *N* key. Figure 8-6 will re-appear.

- viii. The screen shown in Figure 8-9 appears next, prompting you to measure the selected isotope for efficiency measurement.

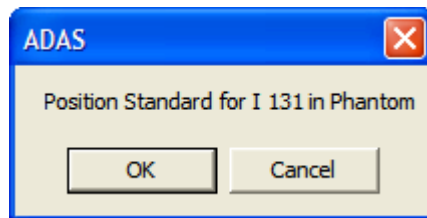


Figure 8-9

To measure the isotope, place the isotope standard in the Neck Phantom exactly simulating the geometry used in the bioassay measurement and click the button. Data collection begins as shown in Figure 8-7 above. To stop the measurement, click the button. The screen then appears as shown in Figure 8-10.

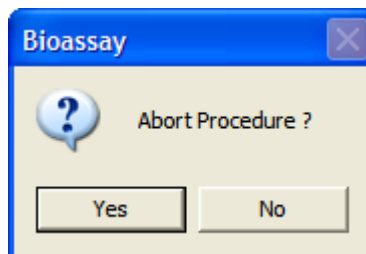


Figure 8-10

To abort the procedure, click the button or press the Y key. Figure 8-5 will re-appear. Click the button to restart the measurement or the button to return to the Bioassay Setup screen (Figure 8-2).

- ix. If more than one isotope was selected for the efficiency measurement, you will be returned to Figure 8-9 and prompted to measure the next isotope.
- x. After all measurements are completed, the screen shown in Figure 8-11 will appear. The results in the lower part of the screen show all measured counts and calculated values for activity and cross contamination.

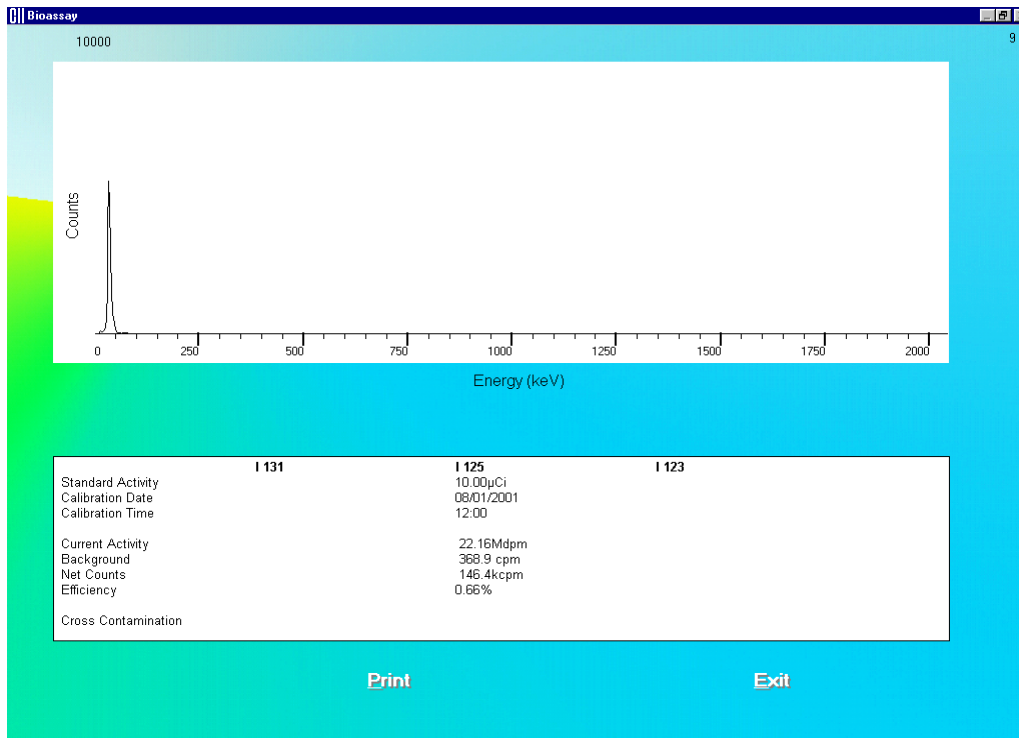


Figure 8-11

- xi. To print the results on the screen, click the **Print** button or press *Alt+P*.
 - xii. To exit and return to the main Bioassay Setup screen (Figure 8-2), click the **Exit** button or press *Alt+X*.
- 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 8-12.

The screenshot shows a window titled "Bioassay" with a light blue background. At the top, it says "Enter Efficiency For". Below this are three input fields: "I 131" with a percentage sign, "I 125" with a percentage sign, and "I 123" with a percentage sign. Each field has a small white box for input. Below these is a section titled "Cross Contamination". It contains two input fields: "I 131 / I 125" with the value "0.0850" and "I 123 / I 125" with the value "0.9200". At the bottom, there are two buttons: "Cancel" and "Done".

Figure 8-12

- 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 required 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 Absorbed Dose ALERT System Main screen from the main

Bioassay screen, click the  icon or press the *ESC* key.

I 131/I 125 and I 123/I 125 Cross Contamination

The Absorbed Dose ALERT 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.

$$R = \frac{\text{cpm(I125 ROI)}}{\text{cpm(I131 ROI)}} \quad \text{Cor} = \text{cpm(I125)} - \text{cpm(I131 ROI)} \times R$$

where R = spillover ratio

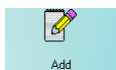
Cor = correction factor for I 125 counts

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.*



- Click the  icon on Figure 8-1 Main Bioassay Screen. The screen appears as shown in Figure 8-13.

Figure 8-13

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 Absorbed Dose ALERT System Main screen from the Main Bioassay screen, click the  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 8-14).

Staff Member Directory



Name	Staff ID	Date of Birth
<input type="checkbox"/> Able, Joe	33333	01/01/1956
<input type="checkbox"/> Joe, Schmoe	12345	11/11/1912
<input checked="" type="checkbox"/> Lester, Jacinto	9876	03/03/1933
<input type="checkbox"/> Rothenberg, David	111111	01/01/1988

Figure 8-14

- Click the  icon. The screen appears as shown in Figure 8-13.
- 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.

- Click the  button or press *Alt+D* to save changes or click the  button to discard the changes and return to Figure 8-1 Main Bioassay Screen.

DELETING STAFF MEMBER

Note: Staff Members can only be deleted by the Administrator.

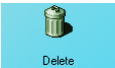
Note: If you wish to save Staff Member information before deleting, refer to CHAPTER 14: ARCHIVE.

- 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 8-15). 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.

Staff Member Directory

Name	Staff ID	Date of Birth
<input type="checkbox"/> Able, Joe	33333	01/01/1956
<input checked="" type="checkbox"/> Joe, Schmoe	12345	11/11/1912
<input checked="" type="checkbox"/> Lester, Jacinto	9876	03/03/1933
<input type="checkbox"/> Rothenberg, David	111111	01/01/1988

Figure 8-15

2. Click the  icon. Figure 8-16 will appear.

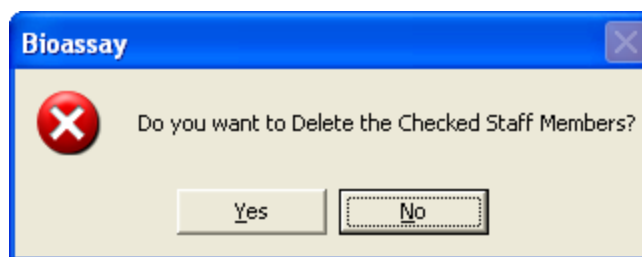
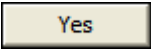
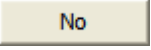
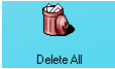


Figure 8-16

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 8-17 will appear.

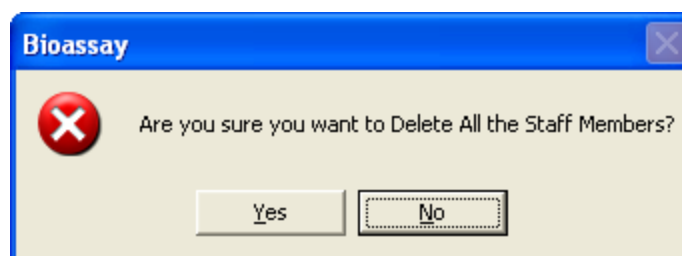
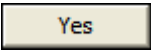
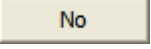


Figure 8-17

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 8-18.

Name	Staff ID	Date of Birth
<input type="checkbox"/> Able, Joe	33333	01/01/1956
<input type="checkbox"/> Joe, Schmoie	12345	11/11/1912
<input checked="" type="checkbox"/> Lester, Jacinto	9876	03/03/1933
<input type="checkbox"/> Rothenberg, David	11111	01/01/1988

Figure 8-18

2. To begin the measurements, click the  button. The Main Bioassay Measurement screen appears as shown in Figure 8-19.

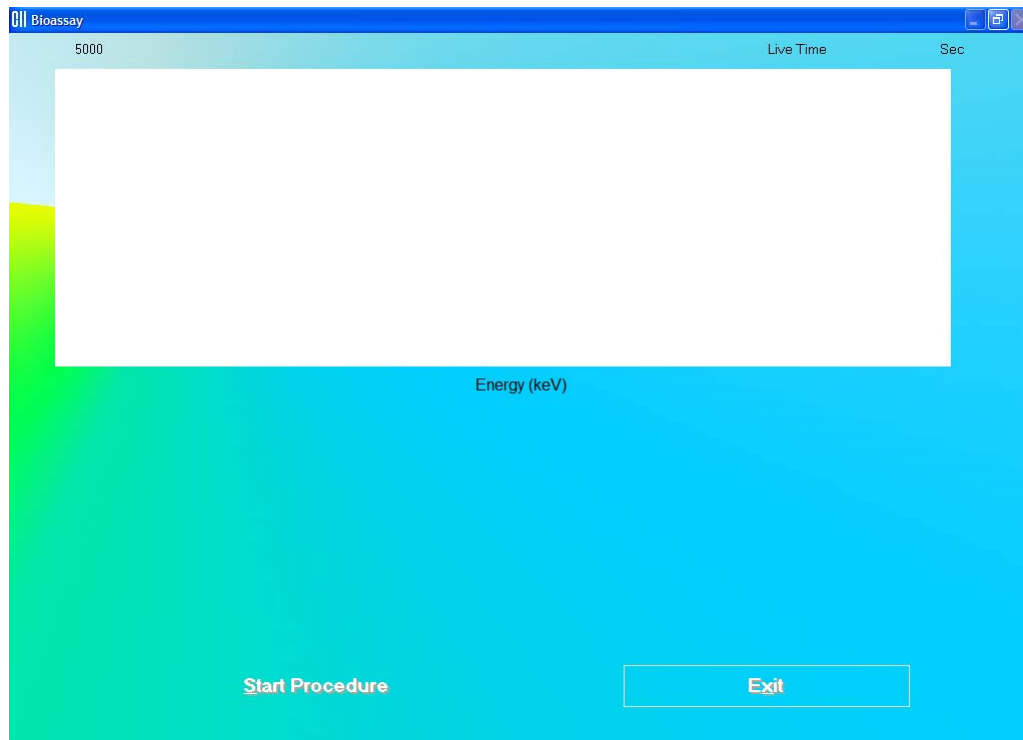


Figure 8-19

Note: If calibration has not been performed, you will be prompted with the screen as shown in Figure 8-20. After the calibration is complete, the program will return to the Schilling Test measurement screen shown in Figure 8-19.

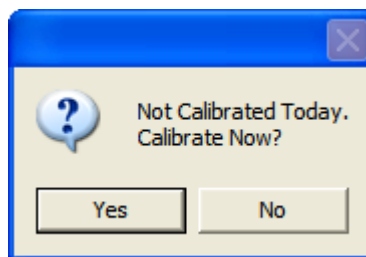


Figure 8-20

3. To start the measurement, click the **Start Procedure** button or press *Alt+S*. The screen appears as shown in Figure 8-21.

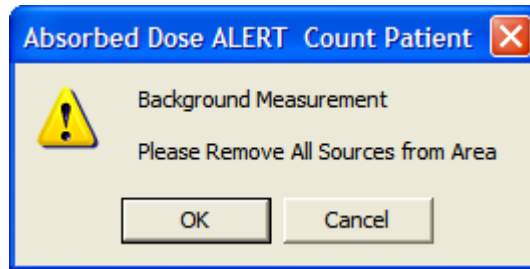
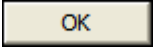


Figure 8-21

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  button to measure background counts. The screen appears as shown in Figure 8-22.

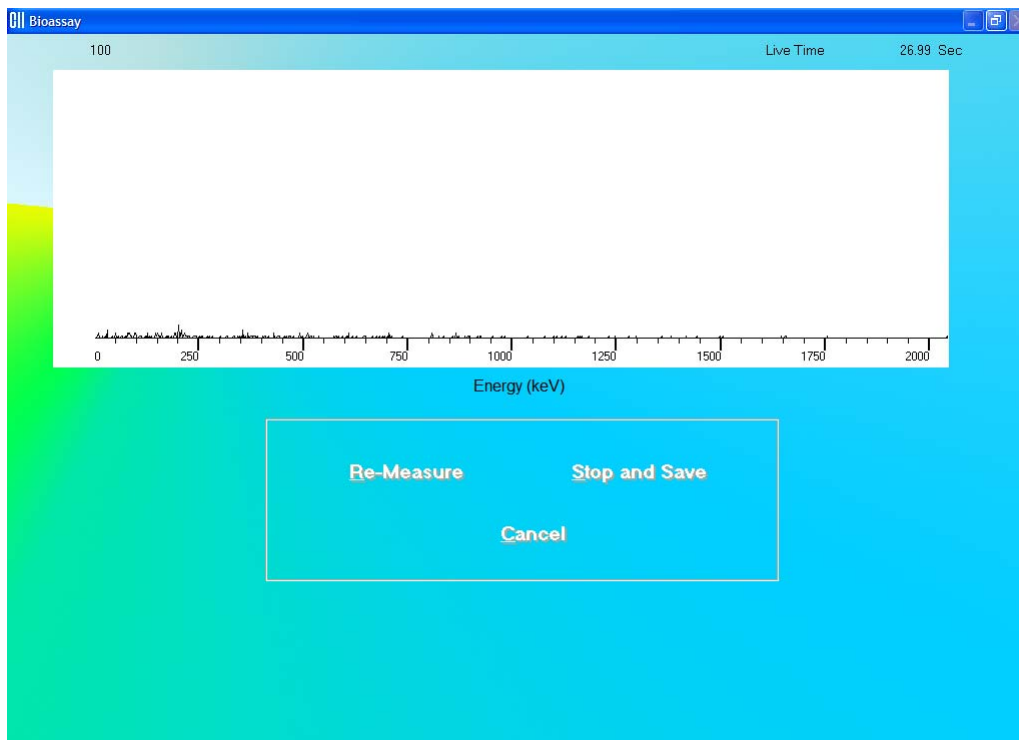


Figure 8-22

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 8-23 appears next, prompting you to measure the Staff Member.

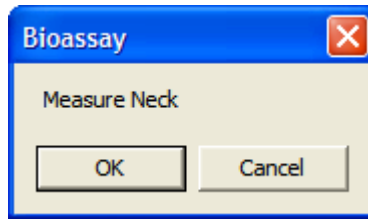
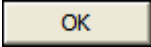
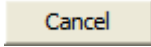


Figure 8-23

To begin counting, click the  button. The spectrum is displayed as shown in Figure 8-22 above. To cancel measurements, click the  button. The screen then appears as shown in Figure 8-24.

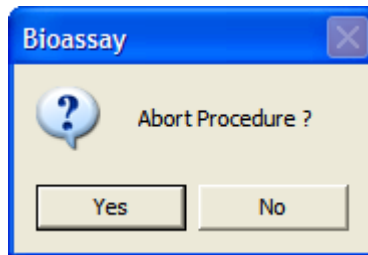








Figure 8-24

Click the  button or press the Y key to exit the measurement cycle. The Main Bioassay Measurement screen appears as shown in Figure 8-19. To restart the measurement for the selected Staff Member, click the  button or press *Alt+S*.

4. To exit and return to the Main Bioassay screen, click the  button or press *Alt+X*. 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  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  icon.
- To add comments about the latest test results for the selected member, click the  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  icon. The screen appears as shown in Figure 8-25, 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.

Bioassay			
Select Staff Member			
Name	Staff ID	Date of Birth	
Cane, Michael	334-55-4325		
McDonald, Albert	123-23-2344	04/25/1958	
Smith, Susan	230-09-8765	08/08/1948	

Cane, Michael		334-55-4325	
	Background	Net Counts	Activity
05/05/2007 11:05			
1131	13.00 cpm	945.4 cpm	
1125	33.00 cpm	144.4 cpm	
1123	8.600 cpm	407.4 cpm	
05/05/2007 10:28			
1131	13.00 cpm	945.4 cpm	
1125	33.00 cpm	144.4 cpm	
1123	8.600 cpm	407.4 cpm	

Save to File	Print All	Print Staff Member	Exit
--------------	-----------	--------------------	------

Figure 8-25

4. To save the report displayed on the screen, click the  button or press **Alt+S**. The Save As box appears as shown in Figure 8-26. Reports are saved as a rich

text format file (.rtf file) in the ADAS\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 8-26

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+X*.



QUICK TIPS:

- To view another Staff Member's report, click on that staff member in the upper section of Report screen (Figure 8-25).
- 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*.

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CHAPTER 9

TIME ACTIVITY ANALYSIS

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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  button or press *Alt+T* on the Absorbed Dose ALERT System Main screen. Figure 9-1 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.

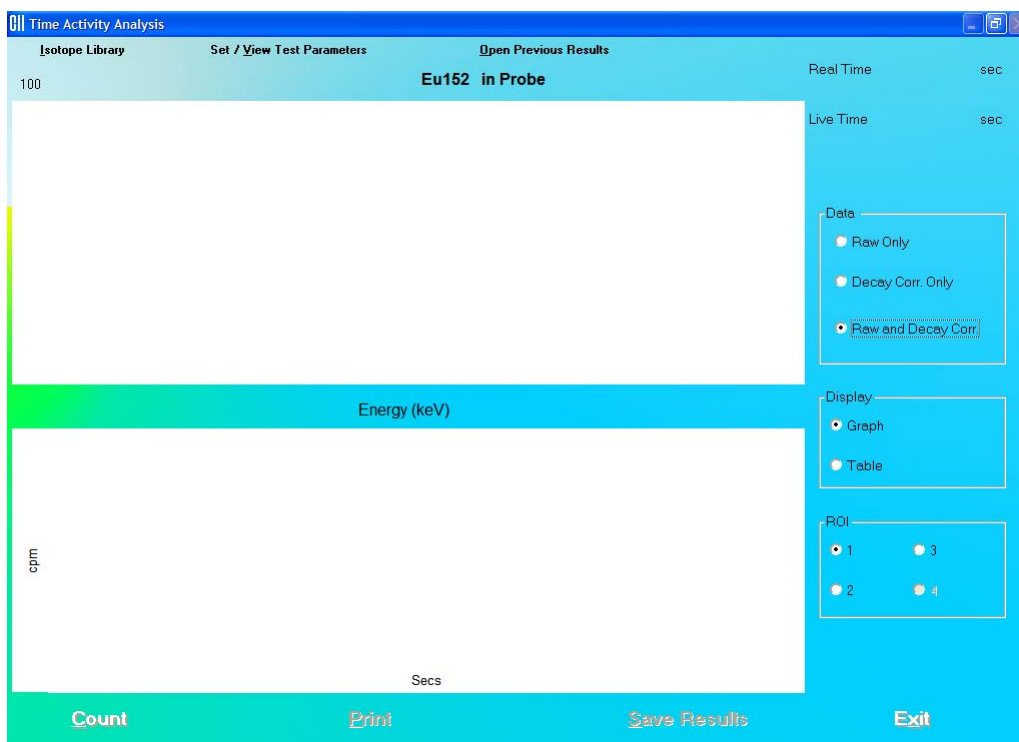


Figure 9-1 Time Activity Analysis screen

To return to the Absorbed Dose ALERT System Main screen from the Time Activity Analysis screen, click the **Exit** button or press *Alt+X* 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 9-2.



Figure 9-2

- 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 9-3. 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.

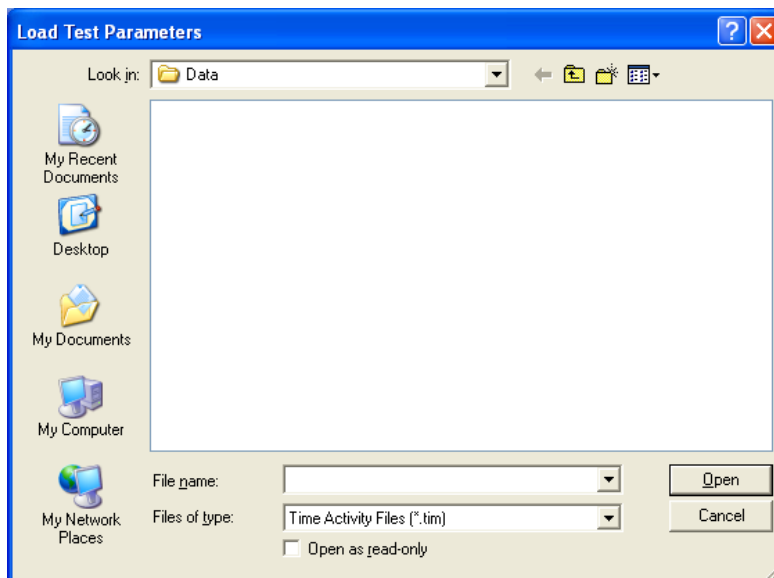


Figure 9-3

- 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 field 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 Parameters screen.*

- iii. 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.
- iv. 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.
 - **Repetitions** – The number of times counting is to be repeated.
 - **Real Time Counting Interval** – The clock time between the start of one repetition and the start of the next repetition.

To change the default unit of time from seconds to minutes or hours, click in **min** or **hour** radio button in the **Counting Parameters** section.

- v. 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 9-4.

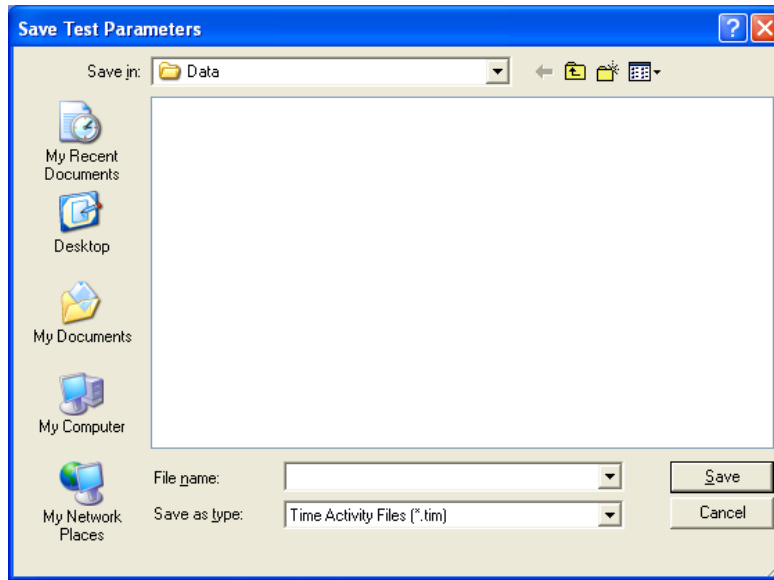


Figure 9-4

The default folder for saving this file is ADAS\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)*


- vi. Click the **Done** button to save changes or click the **Cancel** button to discard the changes and return to Figure 9-1 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 Absorbed Dose ALERT System Main screen from the Time Activity Analysis screen, click the **Exit** button or press *Alt+X* 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  button or press *Alt+C* on Figure 9-1 Time Activity Analysis screen.

Note: *If calibration has not been performed, you will be prompted with the screen as shown in Figure 9-5. After the calibration is complete, the program will return to Figure 9-1 Time Activity Analysis screen.*

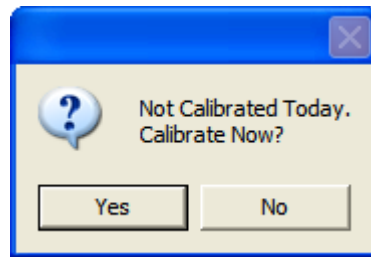


Figure 9-5

2. The screen shown in Figure 9-6 will appear.

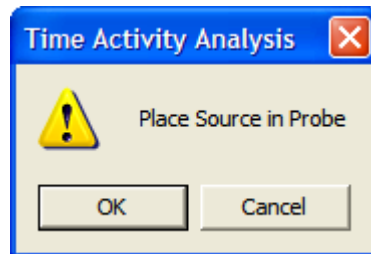



Figure 9-6

3. Place the isotope source in the designated detector and click the  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 9-7. The number of measurement repetitions (spectra) remaining is displayed below the Live time.

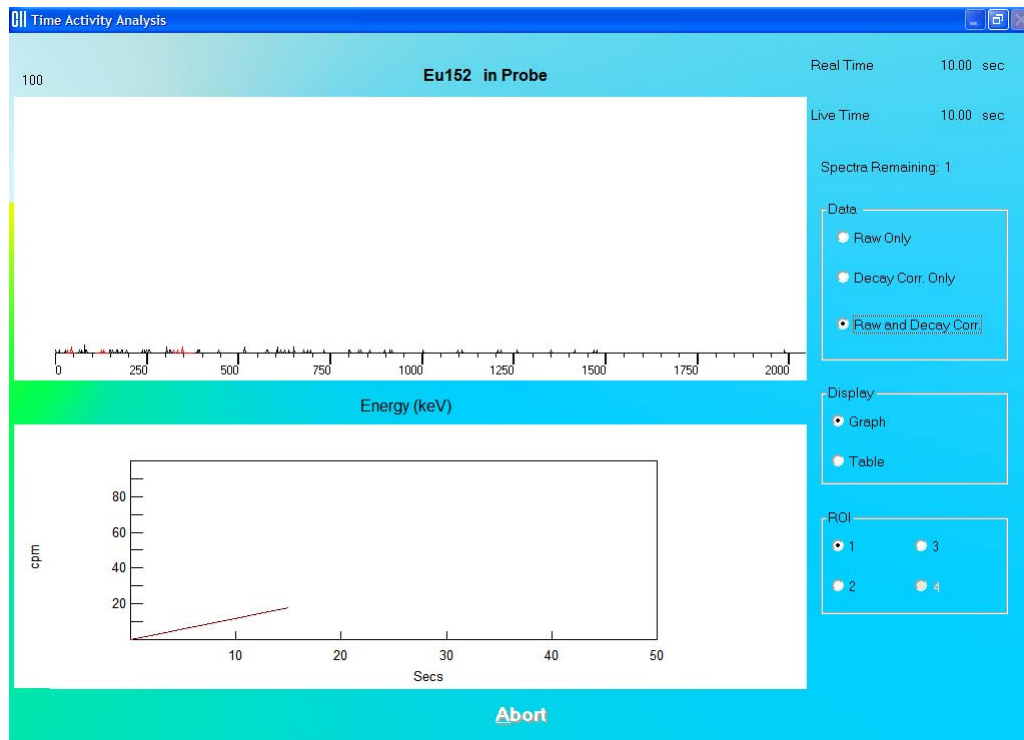


Figure 9-7

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.

- 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.
- To exit the Time Activity Analysis module and return to the Absorbed Dose ALERT System Main screen, click the **Exit** button or press *Alt+X*.

Saving the Results

- To save the measured data, click the **Save Results** button or press *Alt+S* on the Time Activity Analysis screen. A pop-up window with two options is displayed:
 - 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.
- If you click on **Save**, the screen appears as shown in Figure 9-8.

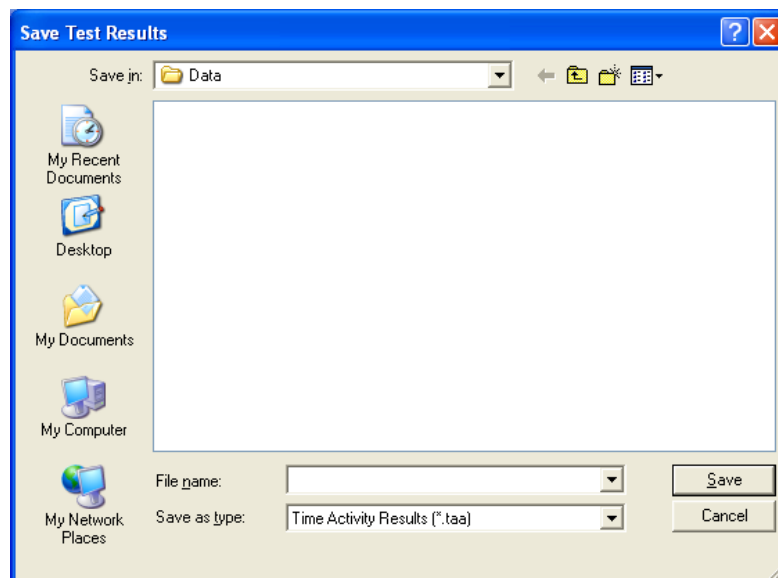


Figure 9-8

The default folder for saving the file is ADAS\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)

- If you click on **Export**, the screen appears as in Figure 9-9.

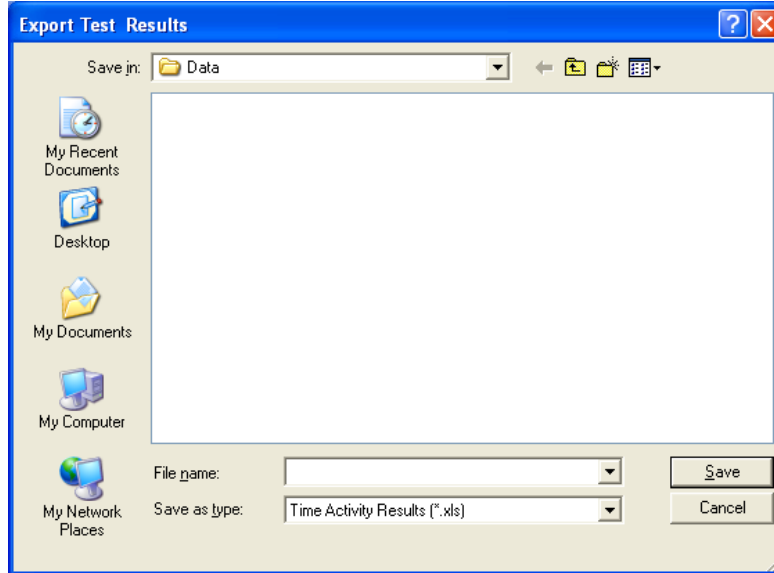


Figure 9-9

The default folder for saving the file is ADAS\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 9-1 Time Activity Analysis screen. The screen appears as shown in Figure 9-10.

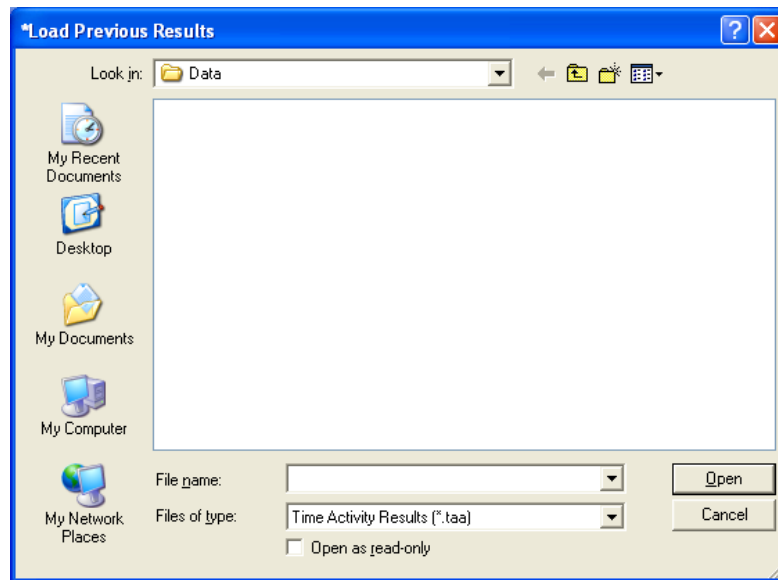


Figure 9-10

2. Click on the file to be opened. The saved results and spectrum will appear on the Time Activity Analysis screen.

CHAPTER 10

MCA

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INTRODUCTION

The Absorbed Dose ALERT System 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  button or press *Alt+M* on the Absorbed Dose ALERT System Main screen to access the MCA Module. Figure 10-1 MCA Main Screen will appear.



Figure 10-1 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 \updownarrow . 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 \updownarrow 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.

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 10-2 is of Cs137 and a vertical full-scale count of 500.



Figure 10-2

To expand the vertical scale, from Figure 10-2, 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 10-3.

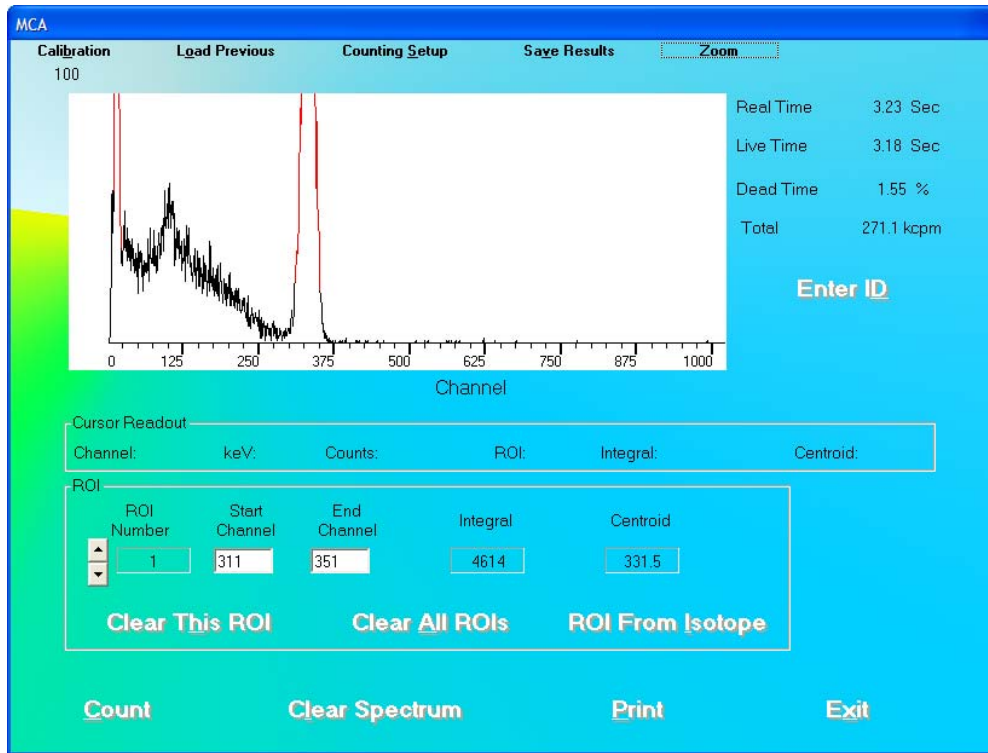


Figure 10-3

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 Absorbed Dose ALERT System: 0-255, 256-511, 512-767, and 768-1023.

To expand the spectrum to one of the pre-defined channel ranges, from Figure 10-2, 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 10-4, channels 256-511 were selected.

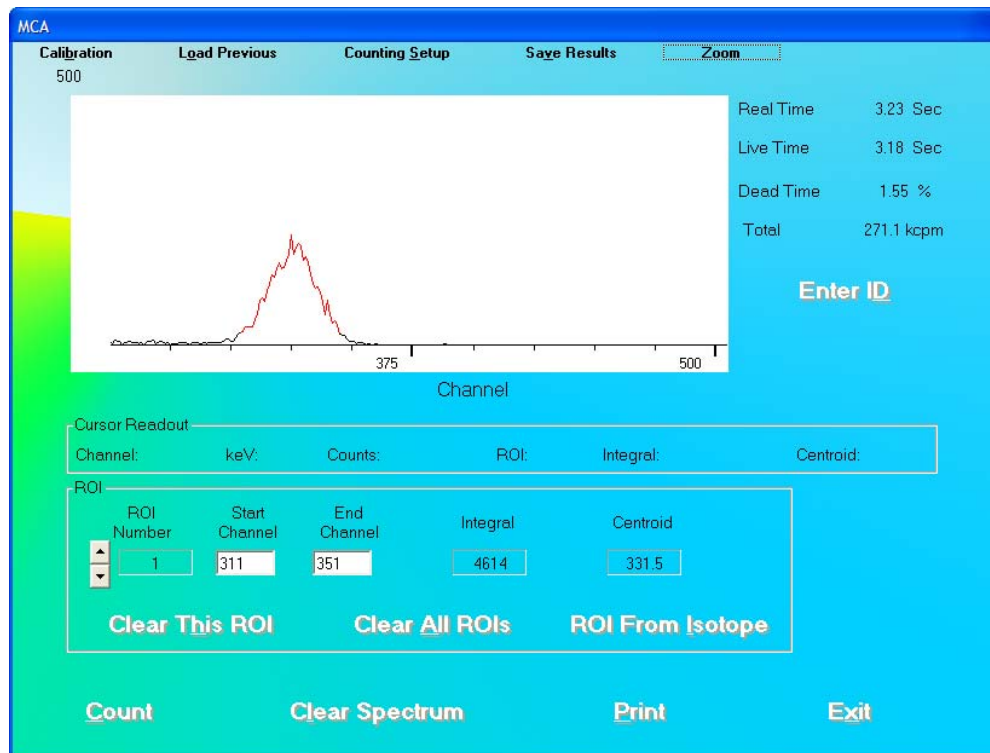


Figure 10-4

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 10-5):

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 10-6.

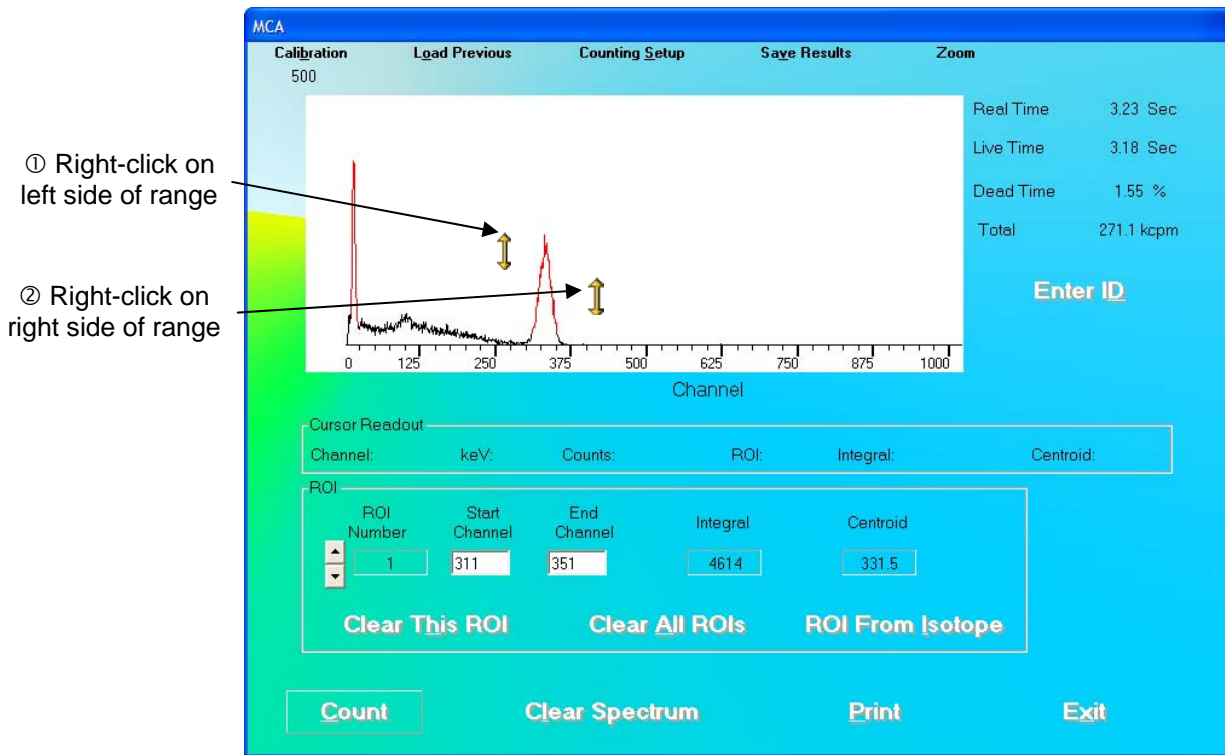


Figure 10-5

- To restore the horizontal scale to the default value (0 to 1023), right-click anywhere in the spectrum window as shown in Figure 10-6.

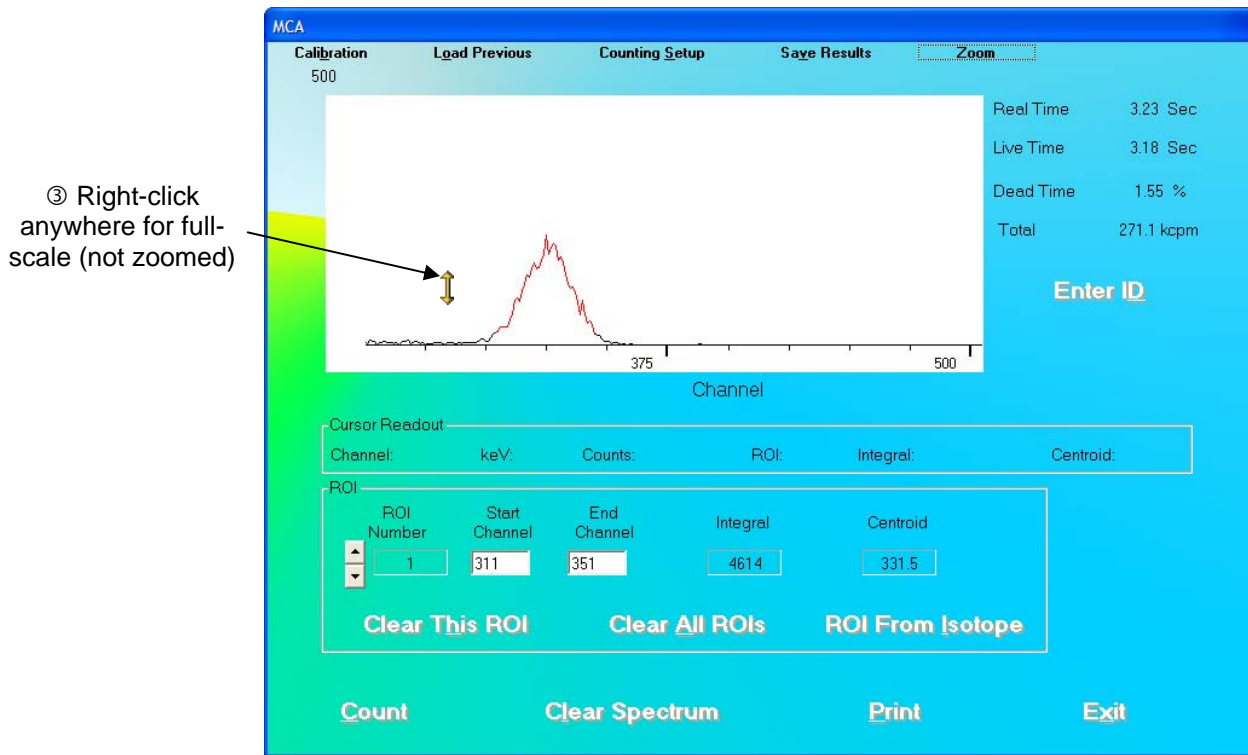


Figure 10-6

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 10-7 will appear.

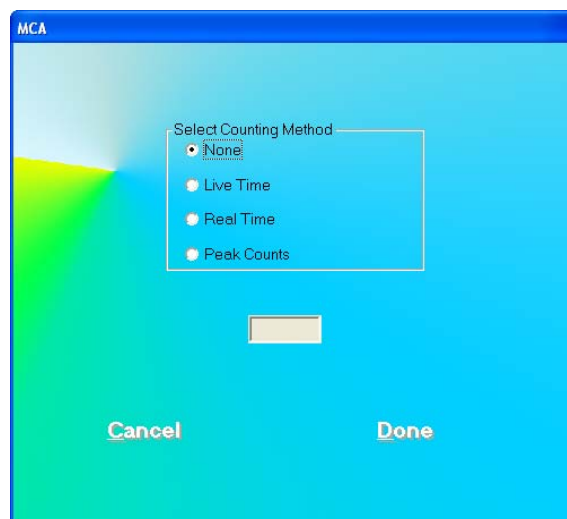


Figure 10-7

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 10-1 MCA Main Screen. Figure 10-8 will appear.

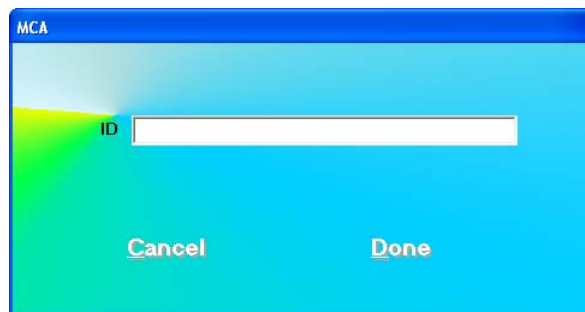


Figure 10-8

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 10-1 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 10-9 illustrates two ROIs.



Figure 10-9

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 10-1 MCA Main Screen. The screen shown in Figure 10-10 will appear.

The screenshot shows the MCA software interface. At the top, there is a title bar with 'MCA'. Below it, the 'Isotope' section has a 'Select Isotope' dropdown menu with 'Cs137' selected and a 'Half-Life: 30.000 Y' label. The 'ROI Information' section contains three rows of input fields. The first row shows 'ROI 1' with a value of '623' keV and 'To' with a value of '701' keV. The second row shows 'ROI 2' with a value of '24' keV and 'To' with a value of '42' keV. The third row shows 'ROI 3' with empty input fields for both 'keV' and 'To'. At the bottom of the window, there are 'Cancel' and 'Done' buttons.

Figure 10-10

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 10-1 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 10-2.

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 save or export data, click the **Save Results** button on the menu bar. A pop-up menu will appear with 4 save/export functions as illustrated in Figure 10-11.

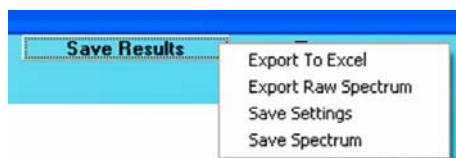


Figure 10-11

In order to load previously saved data, click the **Load Previous** button on the menu bar. A pop-up menu will appear with 3 load functions as illustrated in Figure 10-12.

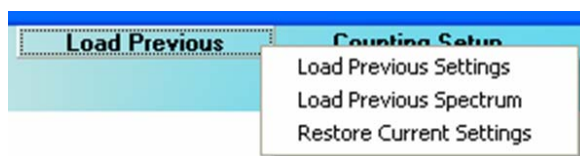


Figure 10-12

Saving, exporting, 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 10-13.

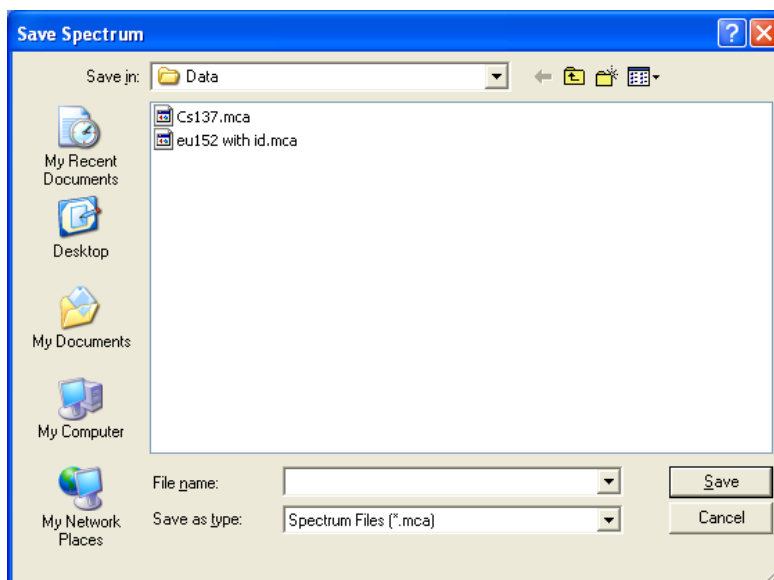
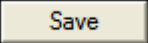



Figure 10-13

Input the desired file name for the spectrum. The default folder will be C:\ADAS\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  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  button on the menu bar. The Select Spectrum dialog box will appear, as shown in Figure 10-14.

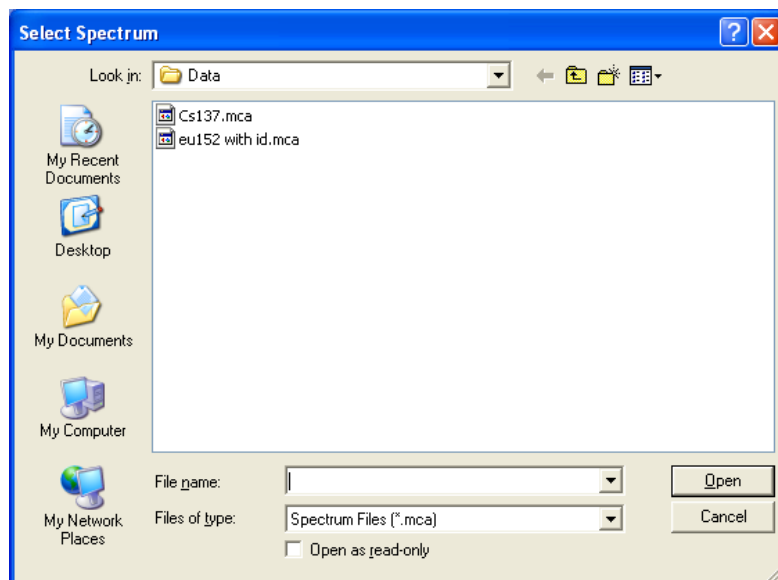
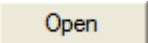



Figure 10-14

Select the desired spectrum from the list. The default folder will be C:\ADAS\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  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  button on the menu bar. A dialog box similar to the Save Spectrum dialog box will appear (as shown in Figure 10-13), but the file extension will be .xls. Figure 10-15 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 10-15

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 10-13), but the file extension will be **.set**.

Input the desired file name for the settings. The default folder will be C:\ADAS\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 10-14), but the file extension will be **.set**.

Select the desired settings file from the list. The default folder will be C:\ADAS\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 10-1 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 other modules of the Absorbed Dose ALERT System.

To alter the automatic calibration settings, select the **Calibration** button from the menu bar located at the top of Figure 10-1 MCA Main Screen. The Calibration Settings frame will appear in the MCA Main Screen as shown in Figure 10-16.

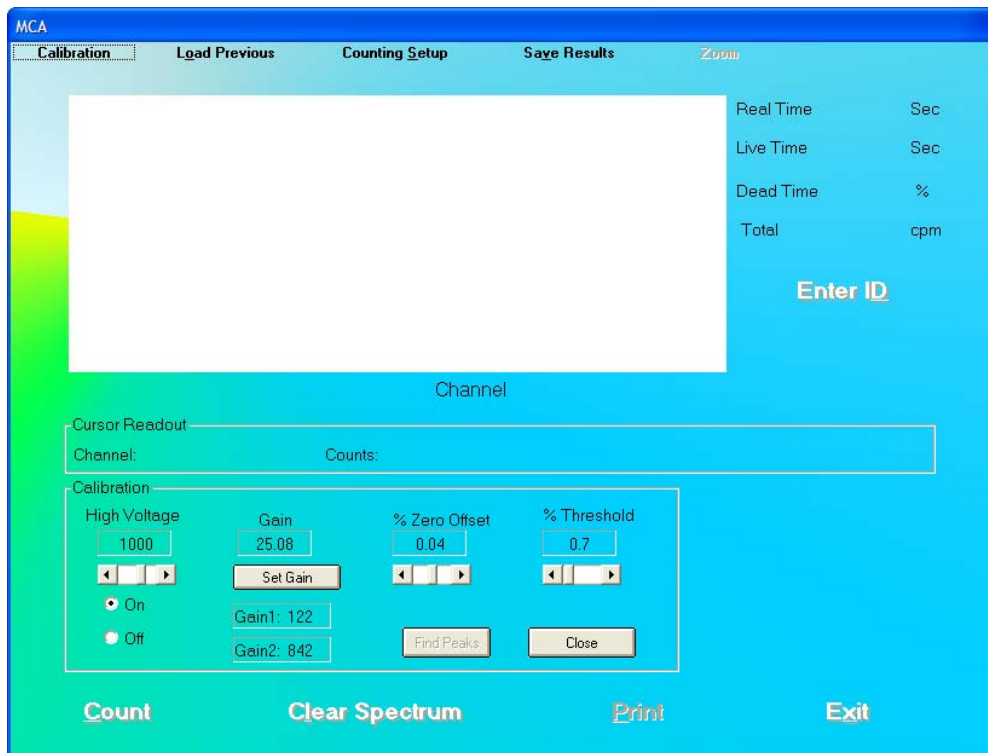


Figure 10-16

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  button. Figure 10-17 will appear.

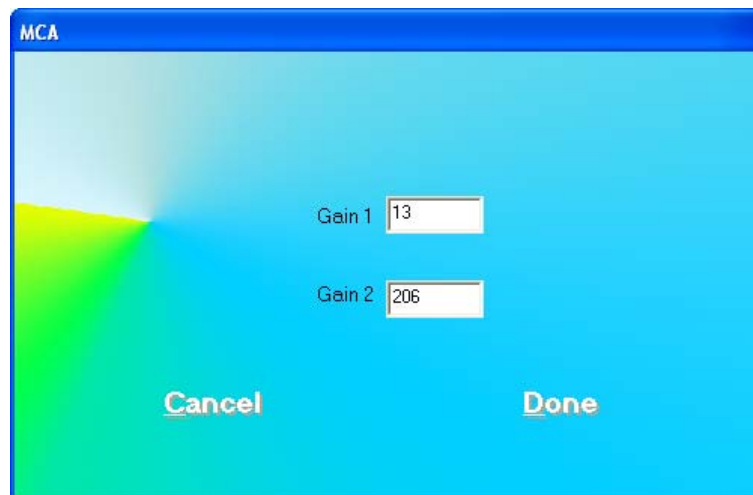




Figure 10-17

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  button or press *Alt+D* to return to Figure 10-16. The System Gain number will update. This will set the gain until the MCA mode is exited.

Click the  button or press *Alt+C* to discard the changes and return to Figure 10-16.

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.

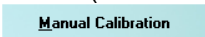
Note: *The Absorbed Dose ALERT System does not have a setting for ULD. The ULD is defined as displayed spectrum full-scale (i.e., channel 1024, or 2MeV).*



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 Absorbed Dose ALERT System 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  button or press *Alt+M* on the Auto Calibration screen. The MCA mode screen for Manual Calibration will appear as illustrated in Figure 10-18.

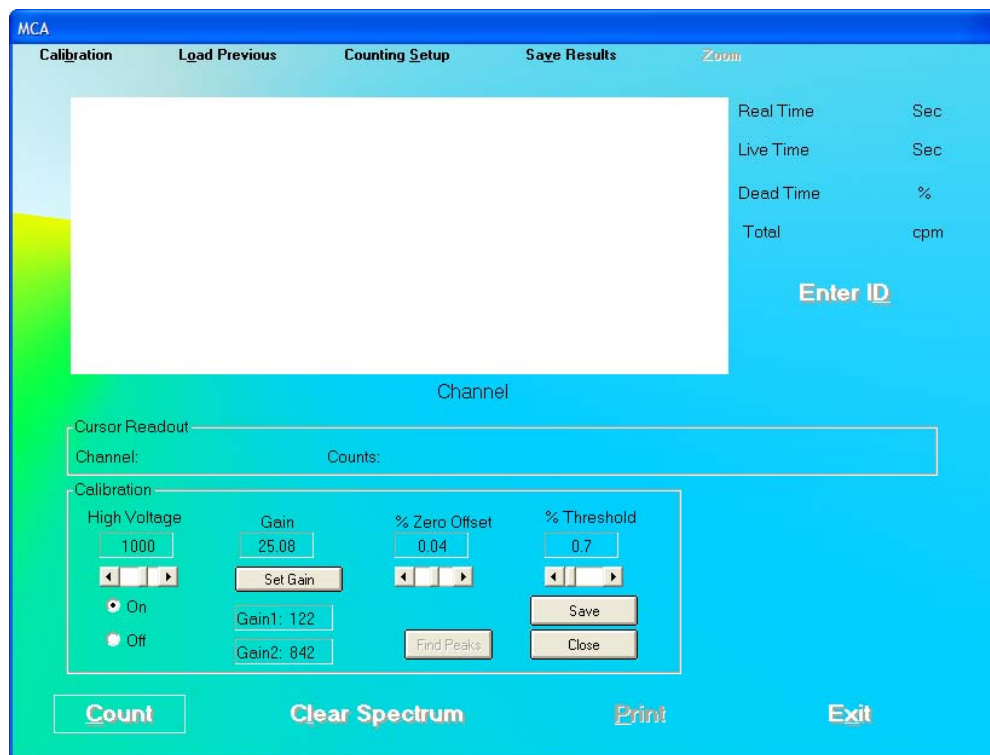


Figure 10-18

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 Absorbed Dose ALERT 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 11

ARCHIVE

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OPENING AN ARCHIVE.....	11-4
VIEWING AND PRINTING RECORDS FROM ARCHIVE	11-5
Selecting Tests for Viewing	11-5
Viewing or Printing a Record	11-6
Printing All Records in Selected Tests	11-8

INTRODUCTION

The Absorbed Dose ALERT System 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  button or press *Alt+A* on the Absorbed Dose ALERT System Main screen. Figure 11-1 Main Archive Screen will appear.

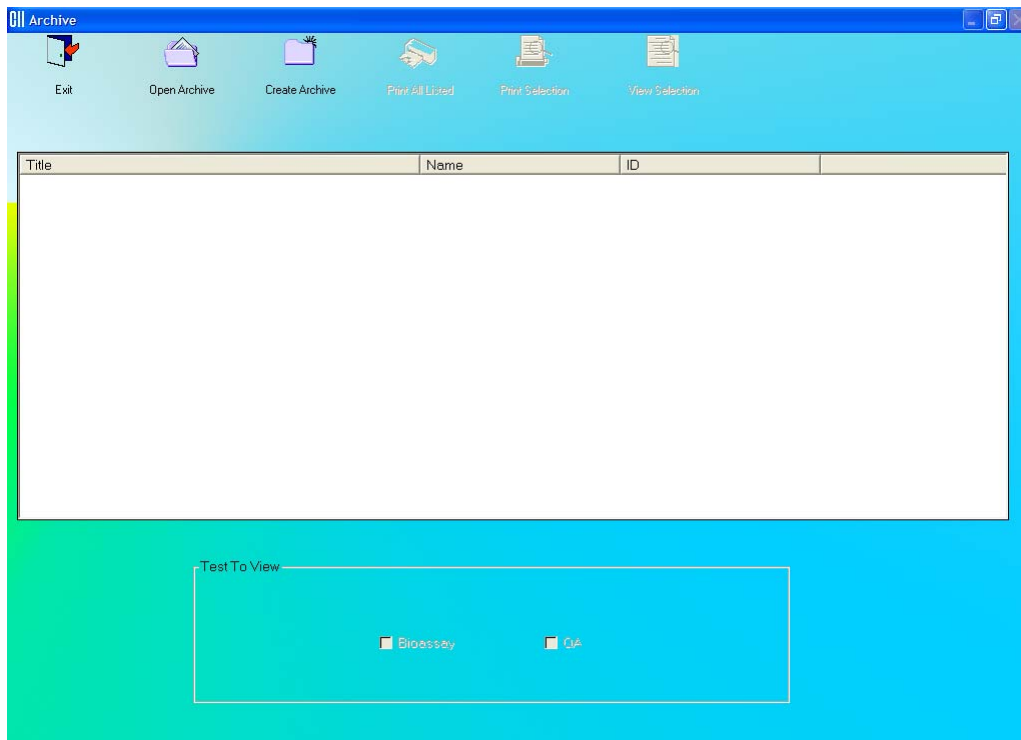


Figure 11-1 Main Archive Screen

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 Absorbed Dose ALERT System Main Screen from the, click the



DOING SYSTEM BACKUP (CREATING AN ARCHIVE)

1. Click the  icon. The screen appears as shown in Figure 11-2.

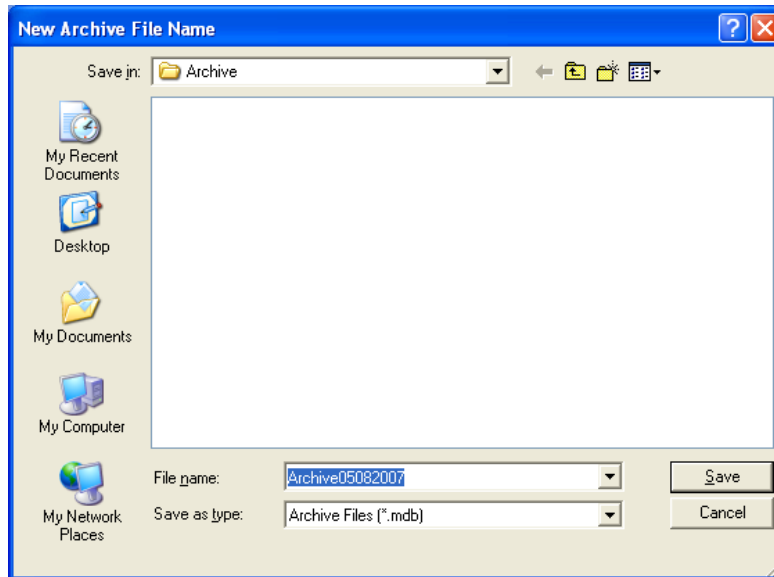
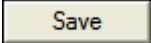
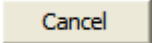



Figure 11-2

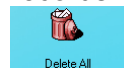
2. The default file name appears in the **File name** box as ArchiveMMDDYYYY (if the default for date format in system setup is MMDDYYYY), where MMDDYYYY is the current date or the date of archive creation. For example, the archive above, Archive05082007, is being created on 05/08/07. The file is saved as a database file with a **.mdb** extension. The default folder for saving archive files is ADAS\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 11-1 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 11-1 Main Archive Screen, archived data will appear in the box.



QUICK TIPS:

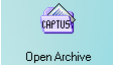
- The default file name and folder are designed to make record keeping easy. It is recommended not to change these defaults.
- Once system backup is performed, the archive files now contain all the data collected in all the modules (except Time Activity Analysis). To discard old

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 11-3.

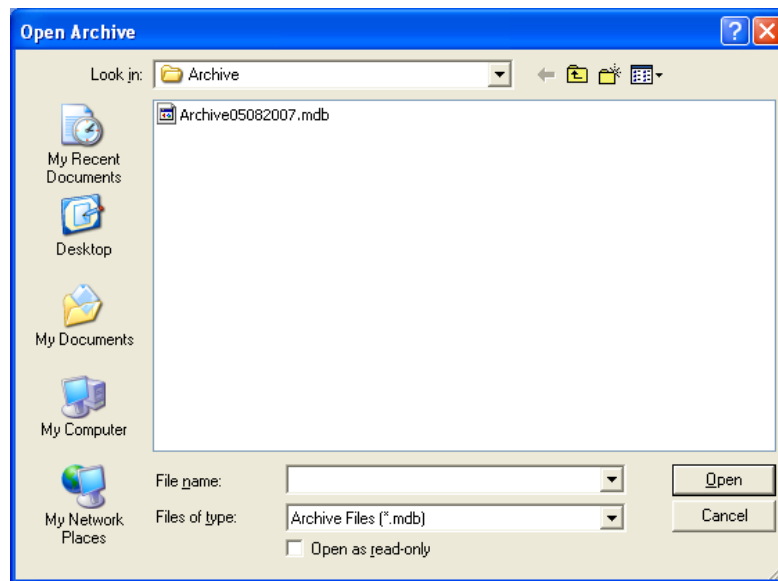
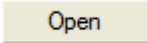
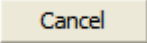


Figure 11-3

2. The screen shows existing archive files in the default ADAS\Archive folder. Click on the file name to open it or type in the filename in **File name** box and click the  button or press *Alt+O*.
3. To return to Figure 11-1 Main Archive Screen without opening any file, click the  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 11-4. 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**.

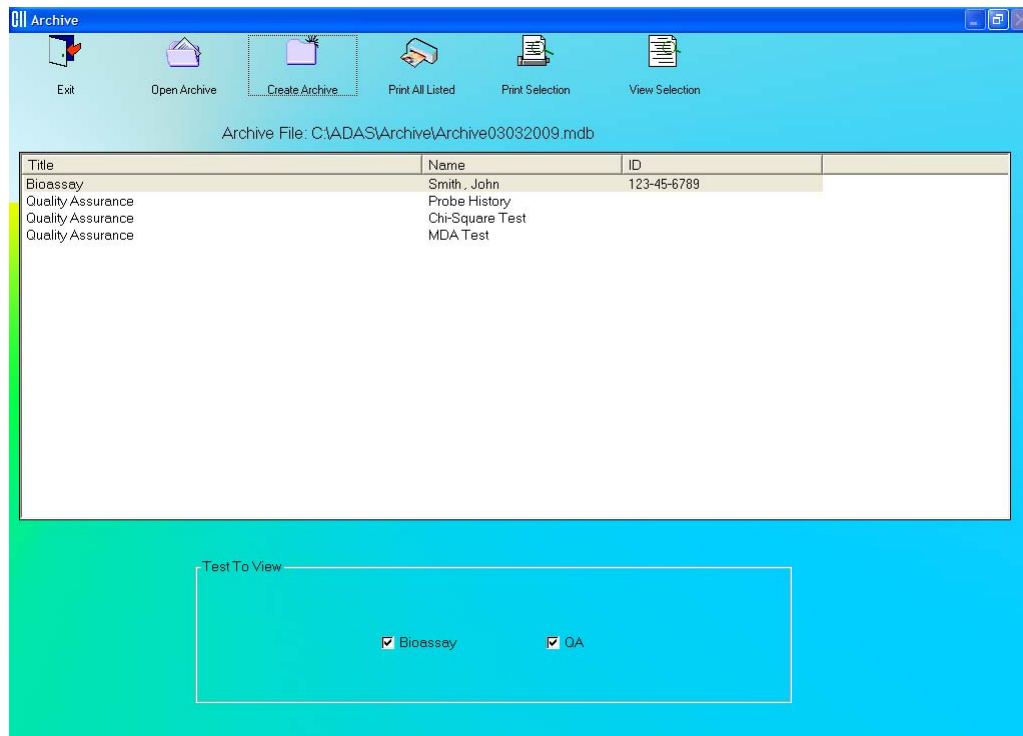


Figure 11-4

1. 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 11-5 below, only Bioassay tests are checked and therefore, only results from these tests appear in the box.

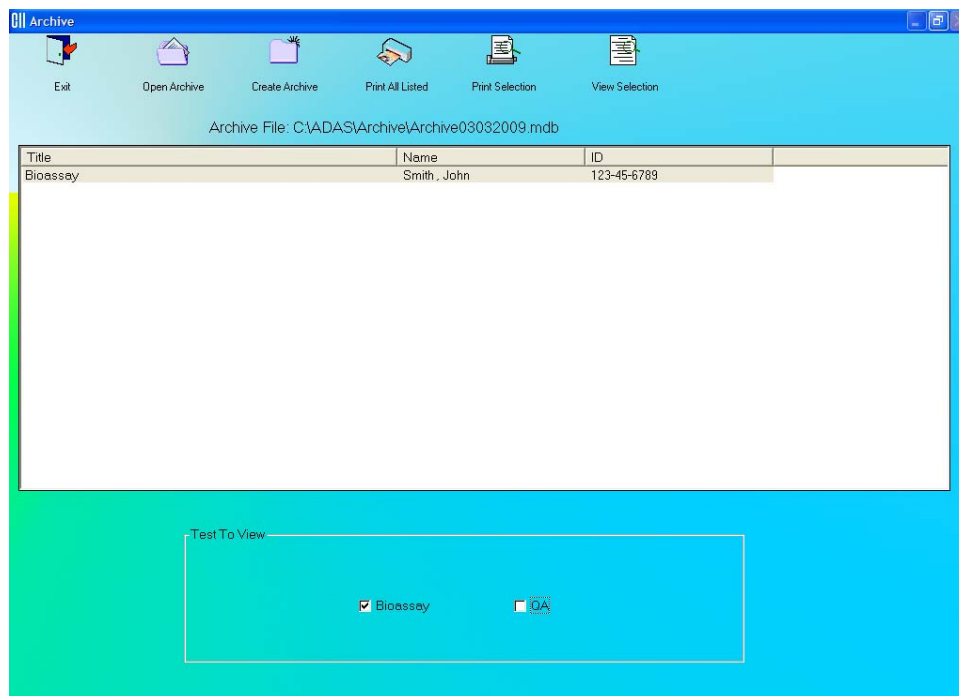


Figure 11-5

- To view all the tests at once, click the QA Checkbox. Clicking in the check boxes again, will uncheck or deselect the test.

Viewing or Printing a Record

- Open an archive.
- Select a specific test module for viewing its records. The records are arranged alphabetically by **Name**.
- 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 11-6 below.

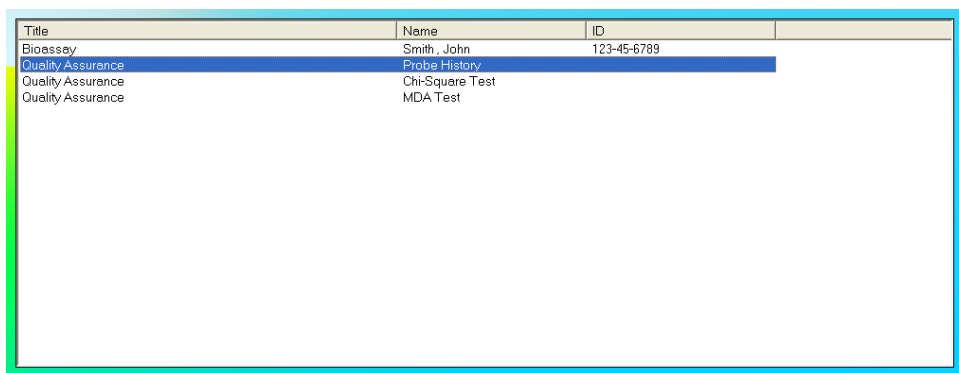

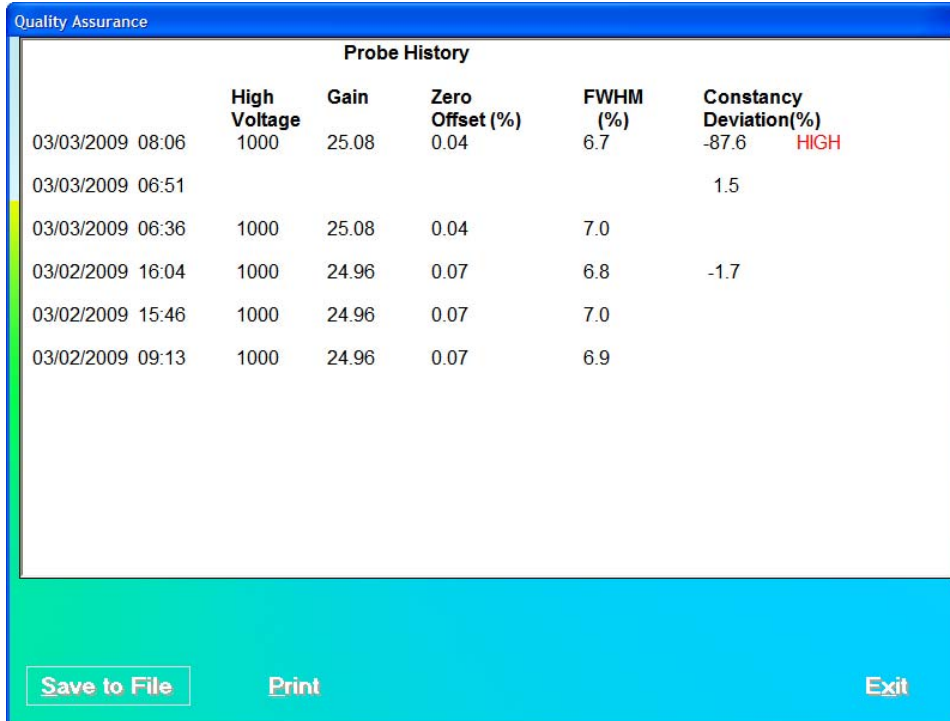


Figure 11-6

4. Click the  icon to view a detailed report of the selected record as in Figure 11-7. All information on the subject, collected counts data and calculated results appear.




The screenshot shows a window titled "Quality Assurance" with a "Probe History" table. The table has columns for date/time, High Voltage, Gain, Zero Offset (%), FWHM (%), and Constancy Deviation(%). The first row shows a high deviation of -87.6% labeled as "HIGH".

	High Voltage	Gain	Zero Offset (%)	FWHM (%)	Constancy Deviation(%)
03/03/2009 08:06	1000	25.08	0.04	6.7	-87.6 HIGH
03/03/2009 06:51					1.5
03/03/2009 06:36	1000	25.08	0.04	7.0	
03/02/2009 16:04	1000	24.96	0.07	6.8	-1.7
03/02/2009 15:46	1000	24.96	0.07	7.0	
03/02/2009 09:13	1000	24.96	0.07	6.9	

Buttons at the bottom: Save to File, Print, Exit

Figure 11-7

5. To save the report on your screen to another file, click the  button or press *Alt+S*. The Save As screen appears as shown in Figure 11-8.

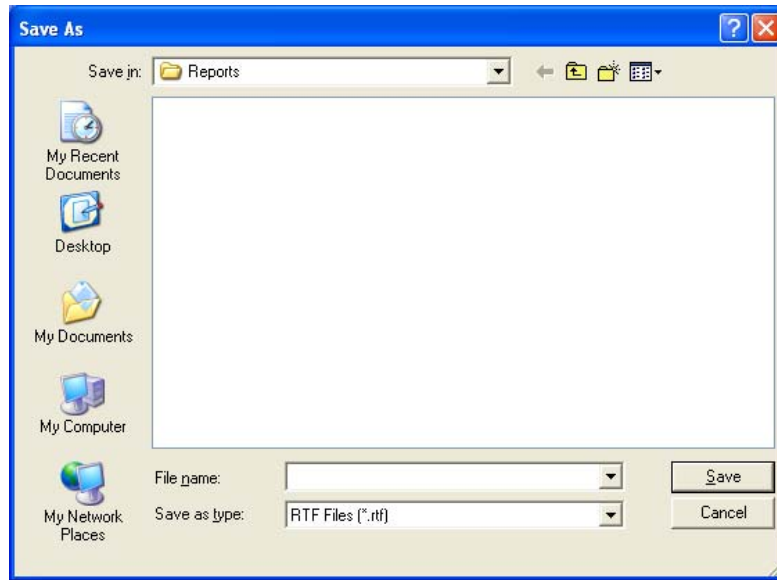







Figure 11-8

6. To print the report on your screen, click the  button or press *Alt+P*.
7. To return to Figure 11-1 Main Archive Screen, click the  button or press *Alt+X*.

**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 11-1 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.

CHAPTER 12

CLEANING AND MAINTENANCE

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INTRODUCTION

This chapter provides the information necessary to perform basic maintenance of instrument cleaning, fuse replacement, and general preventive maintenance. No internal adjustments or calibration settings done by the user falls within the conditions of the warranty.



CAUTION: REFER ALL SERVICING TO A QUALIFIED SERVICE REPRESENTATIVE!

It is recommended that periodic (every five years) re-calibration of the Absorbed Dose ALERT System 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 ABSORBED DOSE ALERT SYSTEM, 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.
- **DETECTOR** – Use a soft cloth lightly dampened with water, window cleaner or mild detergent. Wipe the front surface 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.

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.

PREVENTIVE MAINTENANCE

There is no preventative maintenance required other than general cleaning 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. 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.*

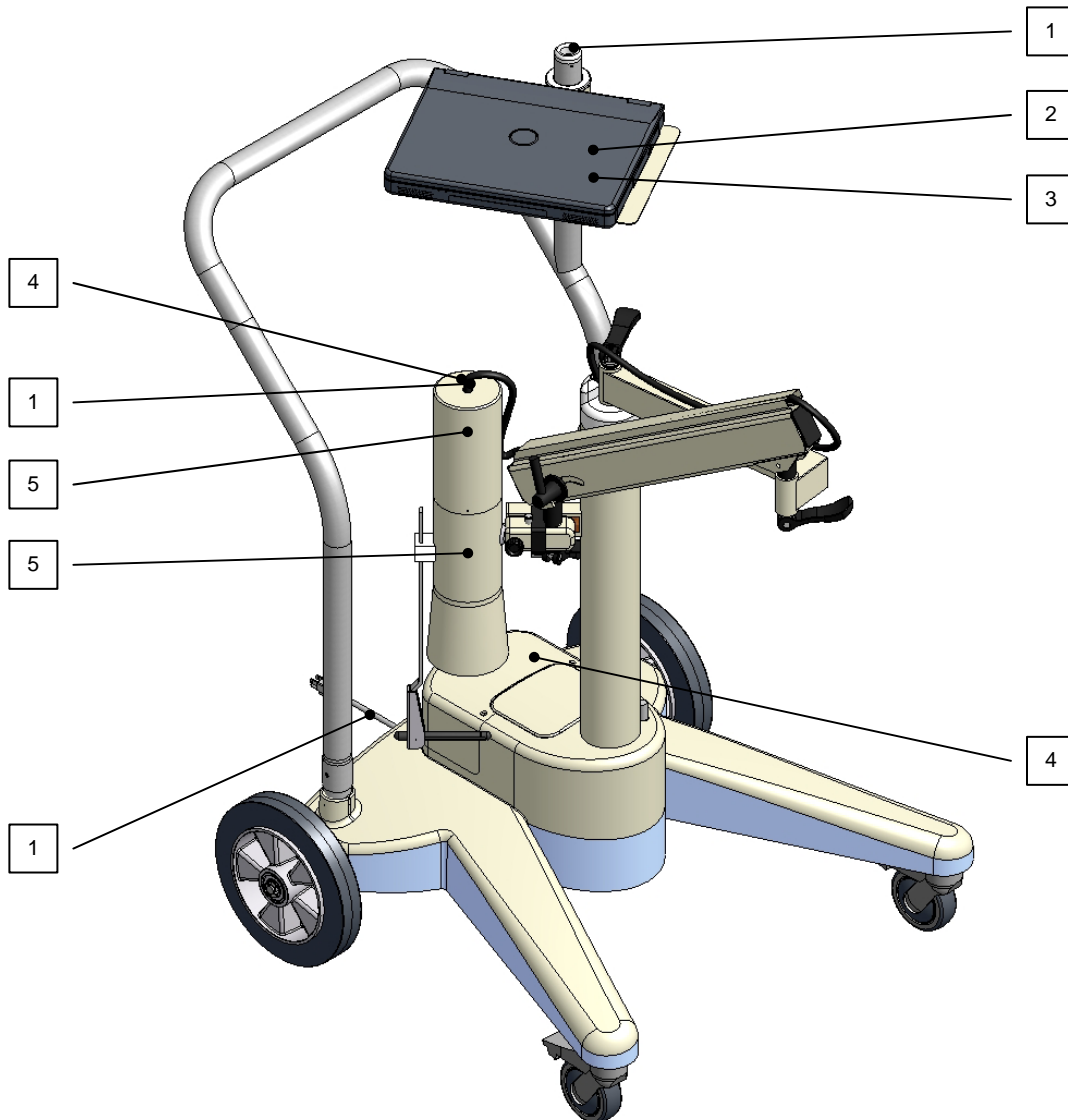
If the unit fails to pass the Auto Calibration or any other test, the user **should not** attempt to perform any adjustments to the system. In such an event, please contact Capintec's only Authorized Service Center for further assistance.

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 detector, or
- Any cable shows signs of damage.

DISPOSAL

The following items should be taken into consideration before disposing. These items should be disposed of in accordance with local and national regulations. Please contact Capintec, Inc. or an authorized disposal company to decommission your equipment.



No.	Recycling/Material Code	Important Information
1	External Electrical 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
6	Printer (optional)	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 12-6), 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.

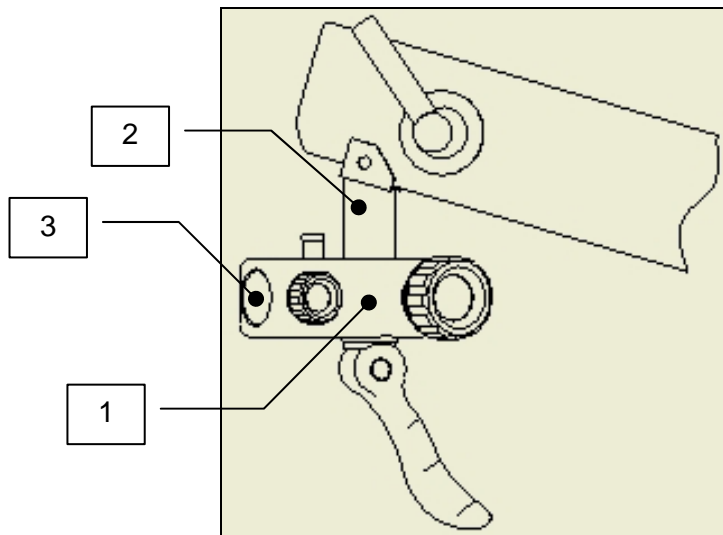


Figure 12-1



WARNING: FAILURE TO FOLLOW THE INSPECTION REQUIREMENTS FOR THE COLLIMATOR BLOCK COULD RESULT IN SERIOUS INJURY OR PRODUCT MALFUNCTION.

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 12-2)
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.

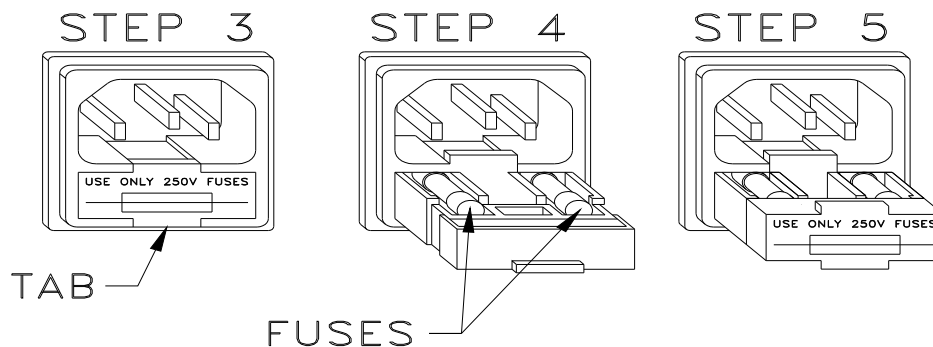


Figure 12-2

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 Absorbed Dose ALERT System is functioning correctly by performing the daily tests.

ACCESSORIES AND REPLACEMENT PARTS

The following accessories and replacement parts are available from 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
- Detector Base Assembly, PM-600/3000..... 5420-2126
- Rod Source, Cs137 (0.5 μ Ci) 0970-137R
- Rod Source, Eu152 (0.5 μ Ci) 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. 2110-0084
- Absorbed Dose ALERT System Owner's Manual 9250-0133

SHIPPING

If for any reason the Absorbed Dose ALERT System must be returned to Capintec, the shipping carton must contain the following or equivalent labeling as shown in Figure 12-3. Label stipulating the maximum environmental conditions for safe storage and shipment.

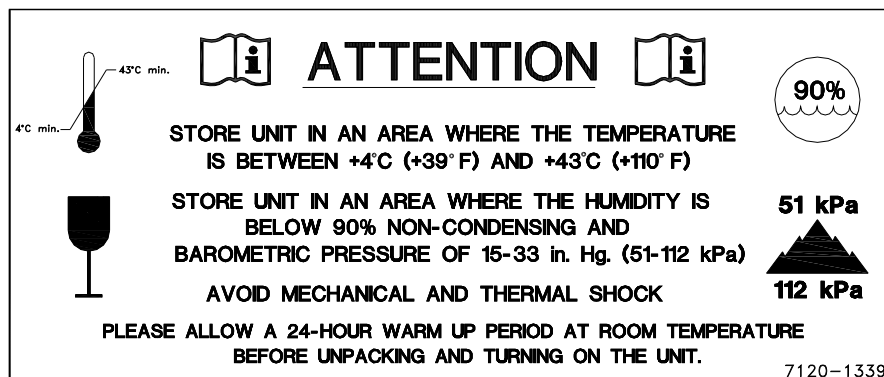


Figure 12-3

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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 be 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
Ramsey, NJ 07466
Phone: 800-631-3826
Fax: 201-825-1336

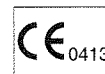
Capintec, Inc.
620 Alpha Drive
Pittsburgh, PA 15238
Phone: 412-963-1988
Fax: 412-963-0610

declare under our sole responsibility that the product Absorbed Dose ALERT System (ADAS) 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
Certified through Intertek Semko AB, Notified Body MDD
CE Mark as shown denotes conformance to the above statement.



The Technical Construction File is maintained at:

Capintec, Inc.
620 Alpha Drive
Pittsburgh, PA 15238

Phone: 412-963-1988
Fax: 412-963-0610

The authorized representative located within the Community is:

Atlantico Systems Ltd.
34 Oldfield, Kingston, Galway, Republic of Ireland

Date of issue: 5/16/12

Place of issue:

Capintec, Inc.
620 Alpha Drive
Pittsburgh, PA 15238

Mary Anne Dell, Vice President & General Manager

