Rapiscan systems

An OSI Systems Company

6xx XR
Security X-ray System
Operator's Manual

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1.0 Introduction

1.1 Scope

This manual covers the operation of the Rapiscan Systems 6xx XR Windows-based Security X-ray system.

1.2 Windows-Based Software: Features

The Windows-based operating system features a graphic interface that includes Programmable Function Buttons, and features real time image manipulation, allowing an operator to enhance an image while it is scrolling across the screen without having to stop that image.

The Windows-based machine also includes additional hardware. This manual, however, will concentrate on the software and those aspects of it that are of concern to an operator, as well as the upgraded Operator Control Panel (Figure 1-1).

NOTE: The Rapiscan control panel has two configurations. The standard configuration features an "SE" (SEARCH) button (Figure 1-1). The optional configuration features a "SUSPECT" button. Both buttons perform the same function; it is simply a matter of terminology based on client preference. The buttons will be referred to as the "SUSPECT/SE" button throughout this manual.

Figure 1-1: Operator Control Panel

Figure 1-2: 620 XR

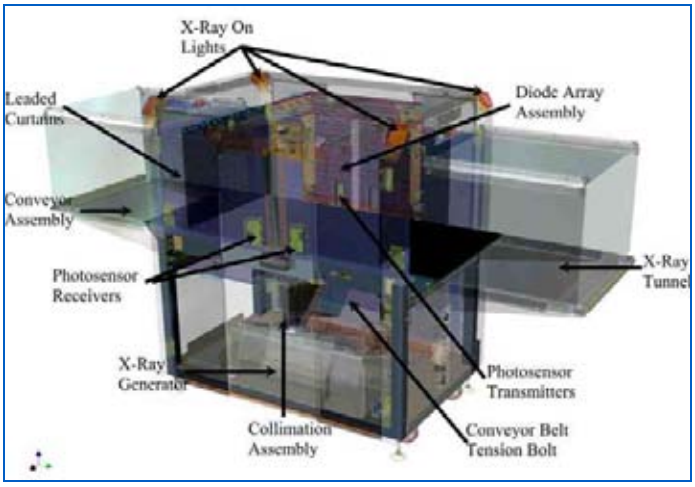

Figure 1-3: 6xx XR Interior

1.3 System Description

The following sections describe the general layout, operating principles and safety measures of the Rapiscan Systems' 600 series security X-ray machine that Rapiscan Systems' proprietary Windows-based operating system runs on. These systems consist of the following components:

- X-ray generator
- Detector system (diode array)
- Frame and tunnel assembly

- Leaded curtains,
- Conveyor assembly
- Photosensors to detect the presence of baggage in the system
- Power distribution system
- Signal distribution system
- Operator Control panel
- Computers and monitor
- The proprietary Rapiscan Systems software that controls the entire system and allows the operator to view images in various modes, enhancing the Operator's detection capabilities.

Rapiscan Systems security X-ray machines provide:

- Stringent safety measures including X-ray tunnels covered by conveyor shrouds that prevent passenger access to the tunnel.
- Design and color schemes fully compatible with modern airport terminals.
- Advanced detector circuits using minimal X-ray energy to protect photographic film.
- A dual-energy type machine configured to display images with different colors according to the density of the objects being scanned.

1.4 Imaging Sequence

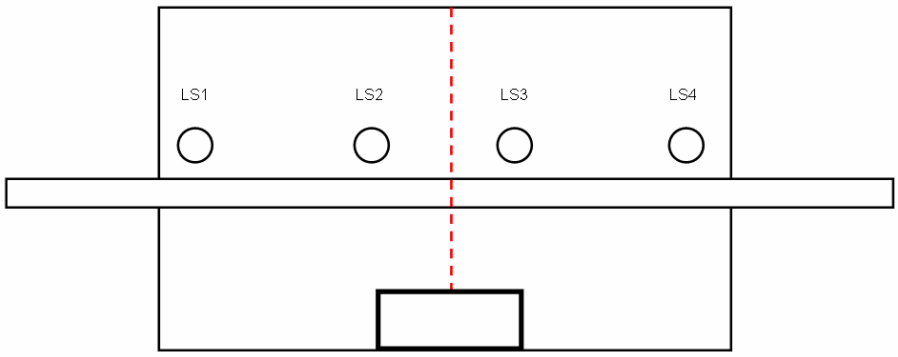

Figure 1-4: Imaging Sequence

1. While the system is idle, the scan engine is always running and collecting detector signals without X-ray. This signal is called Dark Current.
2. The conveyor moves and brings baggage into the tunnel.
3. The baggage blocks PS1 (photosensor 1) and the software turns on X-rays.
4. After a delay to ensure that the X-ray generator is fully operational, the unit's software begins to collect data for a full-dose signal. This signal is called Light Current.

5. After enough Light Current is collected, the software will calculate the correcting factor for each channel. This whole process of Dark Current, Light Current and correcting factor is called Calibration.
6. When baggage reaches PS2, the system begins to make an image. If Calibration is incomplete, the system will use the results of the previous calibration. The system will then continue the Light Current collection.
7. While the system is creating an image, pressing STOP on the control panel will STOP the conveyor. Clicking FW (Forward) after this will result in a small movement in reverse by the conveyor; the system will then energize the X-rays and move the conveyor forward. This is done to compensate for X-ray and conveyor ramping time in order to create a "cut-free" image.
8. After baggage travels a certain distance past PS2, the software will stop generating an image but will still keep X-rays ON.
9. If, during the time X-rays are still ON, new baggage reaches PS1, the system will continue image processing without re-calibration. This is done to prevent repeatedly turning the X-ray generator ON and OFF, and thus will prolong the life of the generator.
10. After some extra delay, if no other baggage enters the tunnel, the system turns off X-rays. After a delay, to ensure X-rays are fully off, the system will begin Dark Current collection.

1.5 Films

Rapiscan X-ray systems are film safe. A comprehensive range of independent scientific tests was carried out by the British Photographers' Liaison Committee and the B.A.A. on X-ray machines at Heathrow Airport. The test films were subjected to 32 passes through an X-ray machine, then processed and analyzed by Kodak Limited. A news release was issued together with comprehensive data and test descriptions. Copies of these documents are available from Rapiscan Systems.

A short extract from the news release follows:

"A new series of independent scientific tests has revealed that UK airport X-ray machines have no visible effect on the current types of still camera film subjected to routine hand baggage X-ray examination under normal traveling conditions."

"Over 300 films from all the major manufacturers were used in the tests. These films ranged from those typically used by holidaymakers and amateurs, such as ISO100 color negative film for prints, to high speed, high quality professional films. These ranged from ISO64 slide film to black and white film which was push processed to an exposure index of EI 3200."

"To test the effects of multiple exposures to X-rays, several rolls of each type of film were used. Each roll was passed through the X-ray machine a different number of times, ranging from zero to 32."

"The results showed that none of the films suffered any visible effects when viewed on a light box, even after multiple exposures to X-rays."

1.6 Drugs and Food

The very low levels of radiation used in Rapiscan systems will not cause any hazard to health for food or medicines subjected to X-ray inspections.

1.7 Diagnostics

Rapiscan's security X-ray systems include extensive diagnostic facilities, commencing with a comprehensive power-on self-test.

1.8 Self Test

On power up, a comprehensive self-testing routine is performed prior to 'System Ready'. Automatic fault indication is displayed on the screen.

1.9 Approval for Use

All X-ray equipment, whether used for airport security, industrial applications or medical use, is subject to approval by the end user's National Regulatory Authority. The end user is responsible for applying for a license and obtaining approval to operate the X-ray inspection system. The equipment meets the requirements of the Health and Safety Executive Statutory Requirement: The Ionizing Radiations Regulations, No. 1333. These regulations are more stringent than those stipulated in other countries; for instance, the U.K. regulations state that the surface radiation should not exceed 1µSv/hr (0.1mRem/hr) whereas other countries stipulate 5µSv/hr (0.5mRem/hr).

1.10 Imaging

Rapiscan Systems 'ssecurity X-ray systems provide clear, high-resolution monochrome and color images of inspected items. Images may be enhanced by keyboard selection of High Penetration, 'Inverse' video, toggle to B & W image, Crystal Clear (CC) for computer optimized image, and 'Zoom' for 9-sector magnification. Further processing and enhancements include 'Variable Gamma', 'Variable Zoom', 'Variable Color Stripping' and 'Variable Edge Enhancement'. On special systems Rapiscan also provides Image Archival (Automatic or Manual) and Remote-Image-Testing (RIT).

In situation where X-rays cannot penetrate an object due to a combination of thickness and/or density, the image color will bewill appear black.

1.11 Limitation on Liability and Warranty

Rapiscan Systems will not accept liability for damage or personal injury caused directly or indirectly by either incorrect or poor quality termination of the local main power supply or power cables. Rapiscan Systems is not responsible for damage or injury caused by unauthorized modification, maintenance, operation or tampering with this equipment.

Service of Rapiscan machines shall be performed only by Rapiscan Systems authorized service personnel. Any modification/alteration made to the system after purchase, by the customers or their agents without written authorization from Rapiscan Systems Management will void any warranty issued to the customer. Additionally Rapiscan Systems is not liable for any damage that might be caused by any unapproved changes.

Rapiscan Systems is an ISO9001:2000 compliant company and adheres to the guidelines for inspection and testing for all materials prior to assembly. Rapiscan MVXR (multi-view X-ray) machines meet stringent quality control and testing criteria at both the component and system level.

Rapiscan Systems maintains sales and service offices worldwide. If you have questions or need assistance with any Rapiscan Systems product contact one of the offices listed under "Service Departments" (page 1-7) or Sales Offices" (page 1-9).

1.12 Accessories

Rapiscan Systems has made available a wide range of accessories for use with X-ray machines to assist airport security staff with baggage handling- from simple off-load devices to fully integrated transfer tables and search bench systems. Choose from standard items available, or contact Rapiscan Systems for custom-designed solutions.

For questions concerning options and accessories, please contact our sales department (below). For questions concerning servicing and maintenance of Rapiscan systems, please contact the Service department nearest you:

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2.0 Safety

2.1 X-ray System Safety Features

- "X-ray On" warning lights located on the keyboard (Figure 4-38) and at all four corner of the machine to indicate that the X-ray generator is switched on.
- Emergency Stop switches to switch off the power (Figure 4-34).
- Circuit Breaker for the mains supply to the unit.
- Removing of the Diode Array box covers operate a safety interlock that ceases and prevents further generation of X-rays until the covers are replaced and the unit is reset.
- A safety interlock on the X-ray generator.
- Lead impregnated curtains at the entrance and exit of the unit reduce scattered radiation to less than 1µSv/h.
- Conveyor shrouds to prevent insertion of hands into the tunnel.

2.1.1 Safety Warnings

WARNING: This X-ray inspection system is designed to provide safe and efficient operation. All X-ray inspection systems have inherent dangers and must be operated with safety in mind: Only trained operators should handle the equipment, and the following precautions should always be observed:

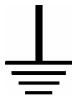
- Verify that no people or animals are on or near the conveyor or inside the inspection tunnel, before turning on the Rapiscan system.
- Do not insert any part of the body into the inspection tunnel while X-rays are on. Turn off system power before reaching inside the tunnel to clear jammed items.
- When dangerous objects such as explosives, guns or other weapons are identified in the X-ray image, follow the procedure established at your facility to safely resolve such events.
- Keep hands away from the edges of the conveyor.
- Do not stand, sit or attempt to ride on the conveyor.
- Ensure that warning notices, lamps and signals are installed and in good working condition before operating the unit.
- High voltages and X-rays are present in the system. Do not remove any unit cover during operation.
- A qualified service technician must perform all maintenance functions.
- Follow local regulations regarding the use of cabinet X-ray inspection systems.

- Rapiscan X-ray systems are designed to provide safe and reliable operation. While the X-rays are on, the level of radiation outside the unit is less than 1 µSv /h (0.1 mRem/h) measured at the surface of the unit.

NOTE: The typical radiation dose for a chest X-ray is 300 µSv/h (30 mRem/h).

WARNING: To minimize the risk of fire an approved type of power connector and cable must be fitted. Since different connectors are used in different countries, the safety approval varies. Following is a list of approval marks that are relevant. Do not fit power connectors that are unmarked or from unknown manufacturers.

2.1.2 Machine Labeling

	Radiation symbol This symbol indicates that the unit has components that emit X-radiation.
	X-ray Radiation symbol (Canada) This symbol indicates that the unit has components that emit X-radiation.
	High Voltage symbol This symbol indicates that hazardous voltages are present.
	Book symbol This symbol indicates that the operator manual should be read.
	Warning symbol This symbol indicates a warning or alert.
	Earth symbol This symbol indicates that this is the safety earth point for the system, or a sub-system.
	Anti-Static symbol This symbol indicates that anti-static electricity precautions should be used to prevent damage occurring to components.
	The CE mark is the official marking required by the European Community for all Electric and Electronic equipment that will be sold, or put into service for the first time, anywhere in the European community.
	The UL mark is a mark showing compliance with the safety standards of Underwriters Laboratories Inc., an independent, not-for-profit product-safety testing and certification organization in the United States of America (USA).

2.2 Approval Marks

To minimize the risk of fire, an approved type of power connector and cable must be fitted. Since different connectors are used in different countries, the safety approval varies.

Following is a list of **approval marks** that are relevant. Do not fit power connectors that are unmarked or from unknown manufacturers.

Argentina	Finland	Korea
Australia	France	Norway
Austria	Germany	South Africa
Belgium	Holland	Sweden
Canada	Israel	Switzerland
China	Italy	U.K.
Denmark	Japan	U.S.A.

2.3 Safety Standards

Figure 2-1 below shows the maximum radiation doses measured in µSv/h (mRem/h) allowed by most national and international authorities. These doses are allowed for 40 hours/week, 50 weeks per year.

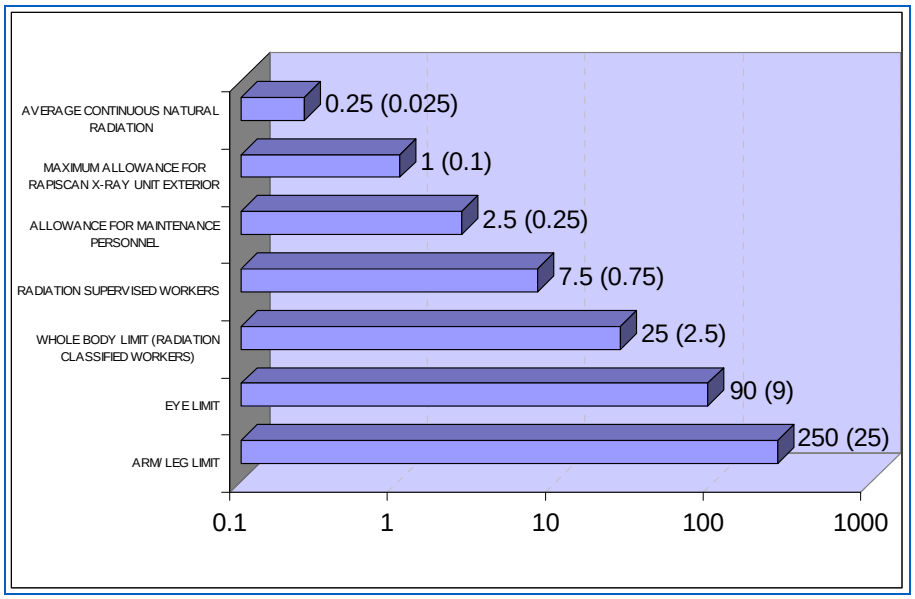


Figure 2-1: Maximum allowed radiation doses measured in µSv/h (mRem/h)

Warning: Never insert an arm or any other part of the body into the scanning area if X-rays are on. If the operator must be within the scanning area for a legitimate reason, press the emergency STOP button before entering the scanning area and ensure that no one can release that button while the operator is in the scanning area. The operator MUST caution all material handlers about this requirement.

Warning: Do not modify the equipment in any way.

Warning: Shock hazard: do not touch electrical wire terminals by hand or with a conductive tool.

2.4 X-ray Safety

While Rapiscan systems are designed for completely safe operation, they do emit X-rays and caution is advised when performing maintenance operation.

If any modification is made to the X-ray unit such that it impacts the integrity of the unit's radiation shielding, interlocks or any other component that controls or potentially affects radiation output, the unit must be checked with a radiation meter. This instrument must be calibrated in µSv/hr or mRem/hr - not counts/sec. It must also have a valid calibration certificate, which must be renewed every year.

2.5 Electrical Rating

618, 620, 622	230V a.c. nominal, 3A	50/60Hz
	115V a.c. nominal, 6A	50/60Hz
624, 626	230V a.c. nominal, 5A	50/60Hz
	115V a.c. nominal, 10A	50/60Hz
627, 628	230V a.c. nominal, 7.5A	50/60Hz
	115V a.c. nominal, 15A	50/60Hz
632, 638	230V a.c. nominal, 8A	50/60Hz
	115V a.c. nominal, 16A	50/60Hz

The machine is designed to function at 230V or 115V +/-10% to compensate for variations in supply voltage. Supply voltage fluctuations are not to exceed +/-10% of the nominal voltage

2.6 Sensors, Interlocks and Radiation Safety

Rapiscan X-ray systems provide various sensors and interlocks to ensure proper sequence of operation of the various X-ray system models. These interlocks act automatically to shut off X-ray generation whenever a panel or cover is opened that might lead to radiation exposure.

In general, the various models have the following safety features:

- X-RAYS ON warning lights located on the control panel and at each of the unit's four corners to indicate that the X-ray generator is switched on.
- Circuit breaker for the electricity supply to each unit.
- Removal of the Diode Array box covers operate a safety interlock that prevents the generation of X-rays.

- Lead impregnated curtains at the entrance and exit of the unit reduce scattered radiation to less than 1µSv/h.
- Emergency Stop switch to switch off the power.

2.7 Optional Safety Equipment

Among the optional safety equipment offered by is a safety footmat. The machine will turn on only when an operator is standing on the footmat and will shut down within a specified number of seconds of the operator removing his or her weight from the footmat.

Warning: The footmat must not be bypassed by placing heavy objects on it to simulate the presence of an operator. This not only damages the footmat but also, more importantly, allows an operator to keep the X-ray machine operating without an Operator being at the controls. Thus an Operator might place himself in danger while the machine is still operating: placing a limb, for example, inside the X-ray machine tunnel or touching the rollers while they are still rolling. Again, never place anything on the footmat other than the Operator's own weight and never do anything to circumvent the footmat.

Another optional safety device is a trip tray. This is a device present on some of Rapiscan's auxiliary roller tables -- either entry or exit tables. If anything becomes wedged in the gap between the X-ray machine's conveyor and the roller table, a special "pop-up" roller will pop up, causing the trip tray microswitch to activate, turning off the conveyor and thus helping prevent further damage or injury.

WARNING: If a nip point is created by either fitting input or output accessories to the ends of the conveyor or installing the conveyor close to a table or other structure, then an approved safety trip tray or pop-up roller must be fitted. If the X-ray machine is used without input and output accessories, it is the user's responsibility to take care that objects do not fall from the conveyor and cause injury.

If the X-ray machine is used together with an accessory such as a motorized conveyor, the motorized conveyor must be fully operational when using the X-ray machine. If a fault occurs with the motorized conveyor that causes a nip point, the X-ray machine must be shut down and not used until the problem is resolved.

2.8 Employer's Responsibility regarding X-ray Equipment

2.8.1 Approval for Use

2.8.2 United States Compliance

The X-ray system is in compliance with CFR 21 Part 1020.40 of U.S. Food and Drug Administration: Performance Standards for Ionizing Radiation Emitting Products - Cabinet X-ray Systems.

2.8.3 European Community Compliance

The Ionizing Radiations Regulations 1999 were issued in order to comply with the European Community requirements outlined in the Euratom Directives on Radiation Protection. IRR99 applies to all work places in the UK where any radiation equipment is used. Various sections of the document make particular reference to the employer's responsibility towards his employees when operating or working with X-ray equipment.

The Customer should be aware of the following obligations: -

(i) The Health and Safety Executive (HSE) must be notified of the intention to install radiation equipment (regulation [6, (2)] refers to 28 days notice prior to installation or such shorter times as may be agreed).

(ii) New equipment or equipment that has been significantly modified, or moved to another location, must undergo a Critical Examination of the way it has been installed. This examination must be carried out in collaboration with a Radiation Protection Advisor (RPA), appointed under these regulations either by himself or by his client (Reg. [31, (2)]).

(iii) The employer is required to appoint one or more of his employees as Radiation Protection Supervisors (RPS). The RPS will play a key role in achieving and maintaining compliance with the overall requirements of IRR99. On behalf of the employer, the RPS shall take all responsible steps to ensure that relevant procedures, which should be identified in 'Local Rules', are observed. (Reg. [17, (4)]).

(iv) The employer is required to set down in writing a list of 'Local Rules' in order to ensure that employees working with radiation equipment are fully aware of, and adhere to work practices, which comply with the requirements of IRR99. This is referred to in regulation [17, (1)].

(v) The employer using the equipment must identify what routine checks are to be made to ensure its ongoing safety. In particular how the requirements for checking the adequacy of X-ray shielding will be met. This is referred to in regulation [19, (1)].

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3.0 Starting the X-ray System

3.1 System Check

Before switch-on:

- Check that the power switch is activated on the monitor.
- Check that all service panels are closed and locked.
- Check that no lead curtains are torn or missing.
- Check that all emergency switches are in their released or out position.
- Check that there are no objects in the inspection tunnel.
- Check that the circuit breaker switch is set to the on position.

3.2 Power Connection

Every Rapiscan X-ray system has a rating plate or label which is located near the power inlet. Ensure the voltage and frequency marked on the plate or label is appropriate for your power supply before connecting.

Warning: The apparatus must have an earth connection. This is normally supplied through the power cord.

Connect the power lead to your supply, and turn the supply on. Rapiscan X-ray machines are normally fitted with a circuit breaker; this device has a switch that must be in the up position.

Check that the control panel and monitor are connected, and the monitor power switch is on.

3.3 Switching On

Rotate the keyswitch on the power control panel (Figure 3-1) and press the green button.

The green "Power On" light should come on, and the X-ray system will begin its power-up sequence. The Power On light at the end of the machine should also light.

The X-rays will be turned on briefly, to calibrate the system.

NOTE: that if there is baggage inside the tunnel, calibration will be performed incorrectly, and errors may be reported. Subsequent images may also be incorrectly displayed. Ensure there is no baggage inside the tunnel before switching on.

If the X-ray lamps turn on, but there is no picture, try adjusting the brightness and contrast controls on the monitors. Check that the connectors on the cables to the monitors are secure.

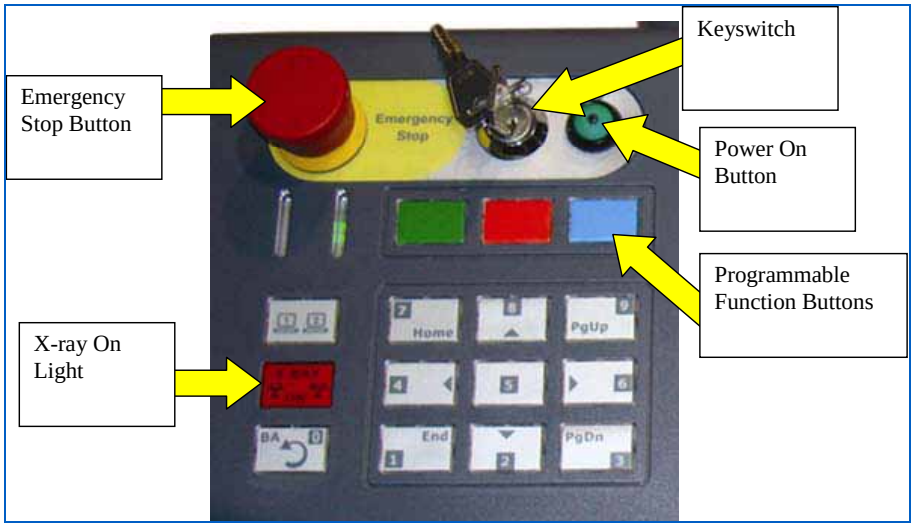

Figure 3-1: Emergency Stop, Keyswitch, Indicator Lights and Keypad

If no lamps illuminate, check your electricity supply, the power lead and circuit breaker.

3.4 Logging On

After calibration, the log on screen appears (Figure 3-2).

NOTE: it may be as long as 3 minutes before the log-on screen appears after switching the system on.

Figure 3-2: Log On Screen

The Log-on screen contains fields for User ID and Password, both of which must be correctly filled in order for the operator to access the main operator screen.

The Log-on screen also contains information in the lower right-hand corner about the software version, machine serial number and model number of the Rapiscan X-ray machine that the software is running on.

Finally, the Log-on screen contains two buttons in the lower left hand corner of the screen, one green, the other red. These buttons perform the following functions.

- Green: This button allows the operator to shift from the W to the Y and from the X to the Z on the Tracking (TR) and Suspect/SE keys on the Operator Control Panel.
- Red: Backspace

The operator should type in his or her User ID and Password.

3.5 Main Operator's Screen

Once the Operator has entered his or her ID and Password, the main operation screen will appear as shown in Figure 3-3.

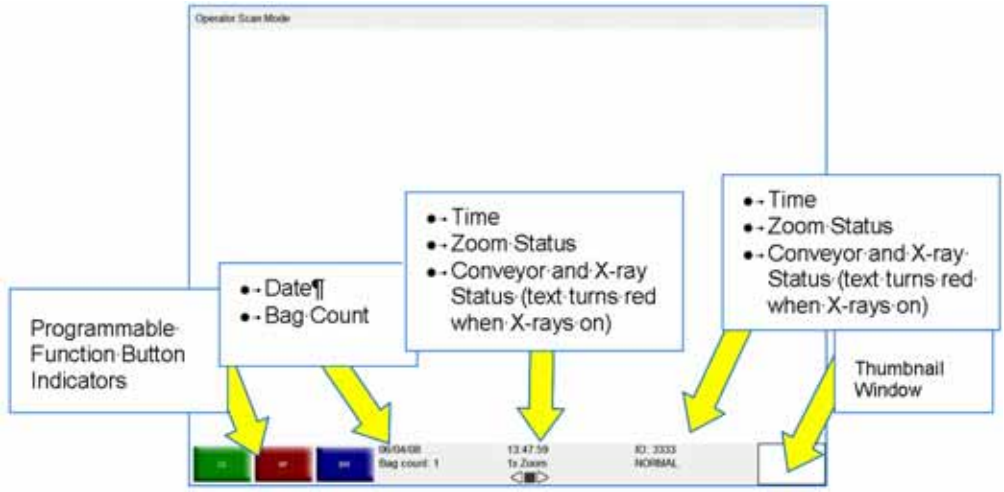

Figure 3-3: Main Operation Screen

The Main Operator's Screen displays:

- The system's current mode of operation, as indicated at the top left corner of the screen. The panel at the top of the screen is called the Mode Indicator Panel. Figure 3-3 shows that the machine is in the Operator Scan Mode.
- Three Programmable Function button indicators.
- Date.
- Bag count.
- Time.
- Zoom status (2x, 4x, 8x, all the way up to 64x).
- Operator ID.
- Image Enhancement mode (e.g. Normal, Crystal Clear, Black and White, et al).
- Conveyor status, i.e. Stop, Reverse or Forward, (see Figure 3-4 and Figure 3-5).
- Thumbnail Window (see empty window in Figure 3-3and thumbnail in window on Figure 3-4).

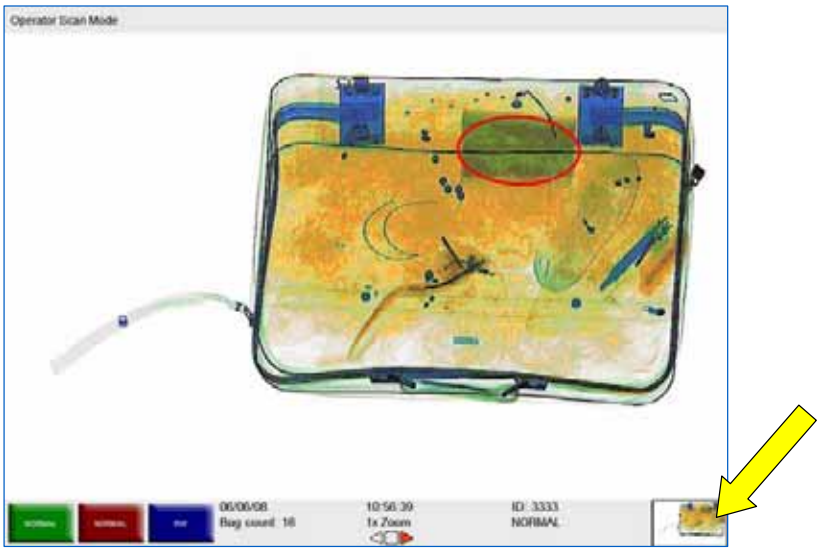

Figure 3-4: Forward / Thumbnail Window

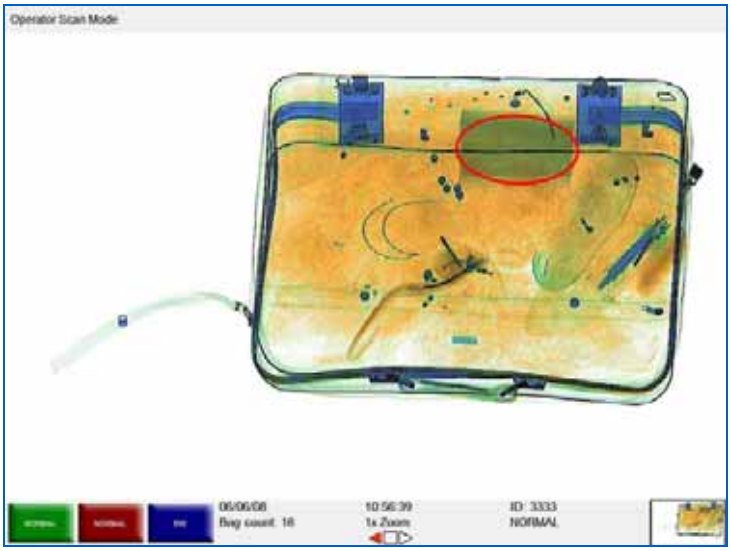

Figure 3-5: Reverse

3.6 Programmable Function Buttons

In addition to the ID and Password fields, the main operation screen contains "Programmable Function Button Indicators." These consist of three programmable on-screen buttons (Figure 3-6): green, red and blue.

Figure 3-6: Programmable Function Buttons on Control Panel

The function of each of these three buttons will be configured for the User by Rapiscan Systems or by a site supervisor so as to reflect the functions most often used by specific operators. For example, Figure 3-6 shows the three programmable button functions as:

- Green: Crystal Clear (CC)
- Red: High Penetration (HP)
- Blue: Black and White (BW)

If these are the three most used functions by a particular user, then they are easily available to that user. If another user wanted different functions assigned to those three buttons, a Site Supervisor can reprogram them.

In addition, each button can actually perform multiple functions. For example, the green button can be programmed to perform Crystal Clear, High Penetration and Black and White simultaneously (see page 4-16).

3.7 Scanning Baggage

The system is now ready to accept a bag to be scanned. Objects to be scanned should be placed lengthwise on the conveyor belt with all straps and projections underneath (if possible) to get the best image.

Press the "S" button (Forward) on the operator control panel (Figure 3-7).

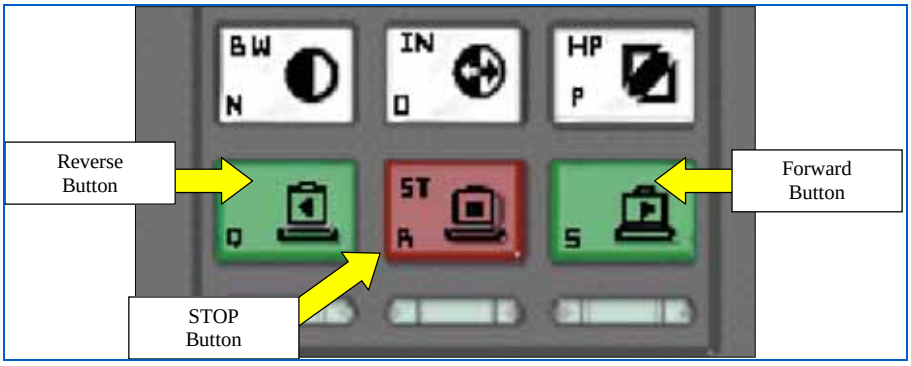

Figure 3-7: Conveyor Control Buttons

The conveyor will run forwards until the R button (Stop, Figure 3-7) is pressed. When the bag reaches the center of the tunnel, the X-rays will be turned on, and an image of the bag will be displayed on the screen. When the bag has emerged from the output end of the system, press the R button. A typical image is shown Figure 3-8.

Figure 3-8: Typical Scanned Image

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4.0 Control Panel Operation/Operator Menu

Figure 4-1: Operator Control Panel

4.1 General

The Rapiscan Control Panel (keyboard) uses high reliability, rugged switches. It has a high resistance to liquid spills, and can be cleaned easily by wiping with a damp cloth. Inside the control panel a printed circuit board contains a micro controller that communicates with the X-ray system computer rack using a serial interface. The control panel can be screwed down to the console by removing two of the screws from the plastic case. Two holes are provided in the console for the screws to be passed through, up into the control panel case.

NOTE: The Operator Control Panel does not support multiple simultaneous key presses.

4.2 Function Keys

The 6xx operator control panel includes three colored function keys (Figure 4-2).

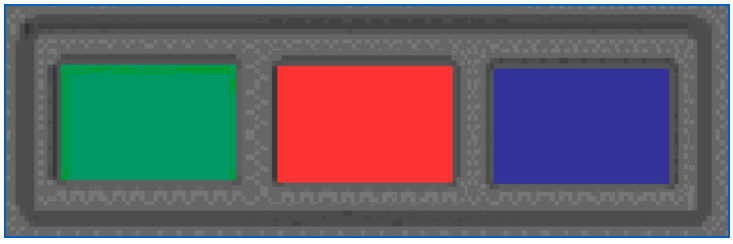


Figure 4-2: Function Keys

These keys are assigned the following functions:

- The Green Key performs the functions of the back space key.
- The Red Key performs the functions of the shift key.
- The Blue Key performs the functions of the Enter Key

4.3 Conveyor Controls

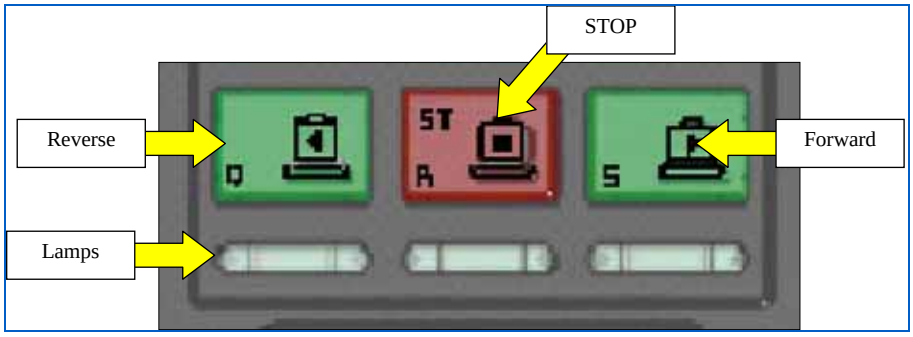
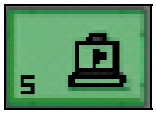


Figure 4-3: Conveyor Controls

4.3.1 Forward button



When this button is pressed, the conveyor will start and any objects on the belt will proceed to the inspection tunnel for scanning.

4.3.2 Forward lamp

Located beneath the Forward ("S") Button. This lamp lights when the conveyor is traveling in the forward direction.

4.3.3 Stop button

When this button is pressed, the conveyor belt will halt. Note: If this button is pressed during scanning of an object, the belt will stop then reverse a few centimeters. This is to ensure that when 'forward' is selected again, no part of the object is missing from the image. If the X-rayed image is being viewed with an image processing function, the ST button will cancel the function.

4.3.4 Stop lamp

Located beneath the Stop ("R") Button. This lamp lights when the conveyor belt is stationary.

4.3.5 Reverse button

When this button is pressed, the conveyor belt will travel in the reverse direction. Any objects on the belt will reverse through the tunnel, although no X-ray scanning will take place. Note: Reverse- scanning X-ray machines are available to special order.

4.3.6 Reverse, Stop and Forward Lamps

Located beneath the Reverse (Q), Stop (R) and Forward (S) Buttons (Figure 4-3).

4.3.7 X-ray lamps

This lamp lights when X-rays are being produced from the X-ray generator.

4.4 Image Processing Keypad

Figure 4-4 shows the image processing keypad on the Operator Control Panel. Those buttons are described in the following paragraphs.

NOTE: All image processing functions can be applied to images whether the bags have been stopped on the belt and the images are stopped on the operator's screen, or when the bags are still moving through the X-ray tunnel, the images scrolling across the operator's screen.

Figure 4-4: Image Processing Buttons

4.4.1 Organic Material button

Operation of the Organic Material Stripping button has the effect of removing the color information of all groups except for Group 1 (organic). See "Material Groups" on 4-12.

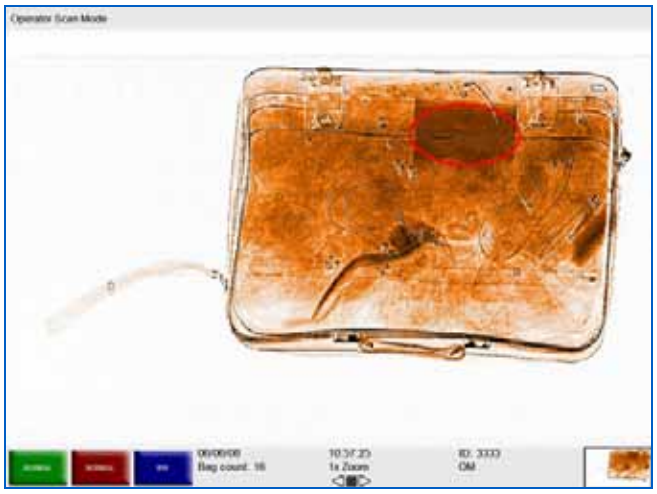


Figure 4-5: Organic

4.4.2 Inorganic Material button

Operation of the Inorganic Material Stripping button has the effect of removing the color information of all groups except for Group 3 (inorganic). See "Material Groups" on 4-12.

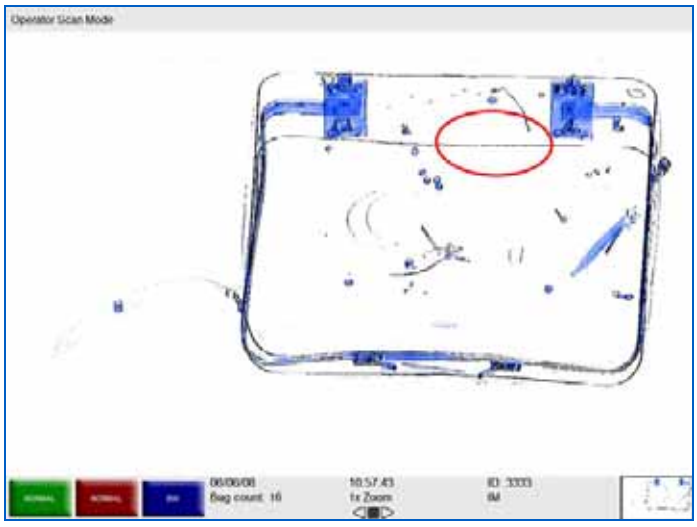


Figure 4-6: IM

4.4.3 Crystal Clear button

Crystal Clear brings out the detail in both light and dark areas simultaneously.

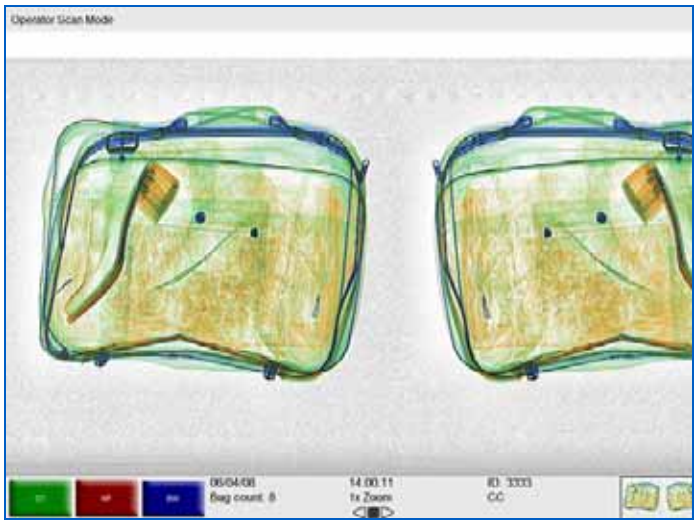


Figure 4-7: CC

4.4.4 Black and White button

When this button is pressed, all color information from the image is removed.

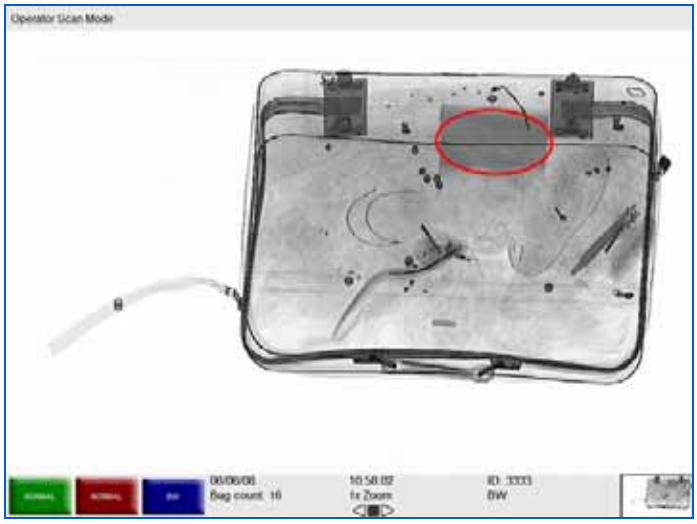


Figure 4-8: B&W

4.4.5 Inverse button

When this button is pressed, the image is displayed in reverse i.e. black becomes white and vice-versa.

Figure 4-9: IN

4.4.6 High Penetration button

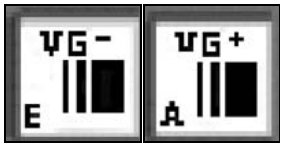
When this button is pressed, the presentation of high-density objects is enhanced.

Figure 4-10: HP

4.4.7 Suspect/SE button

If this button is pressed, when the bag exits the tunnel the "Search" lamp will illuminate and a buzzer will sound. This indicates to security personnel that the bag at the exit of the tunnel needs to be searched. **NOTE:** Which button your particular operator control panel will have depends on the specific model of the X-ray machine and the requirements of the client at the time of purchase.

4.4.8 Variable Gamma



The Variable Gamma function allows the operator to alter the brightness of the image. Use buttons VG+ and VG-.Multiple keystrokes on the VG- or VG+ button will either increase or decrease image brightness.

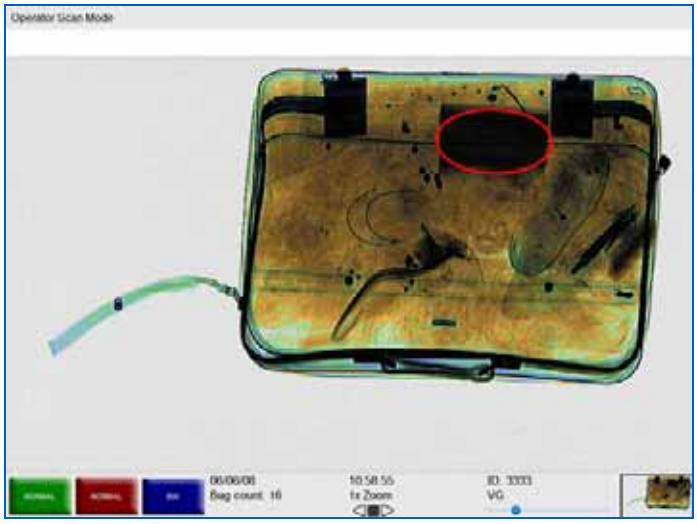


Figure 4-11: VG-

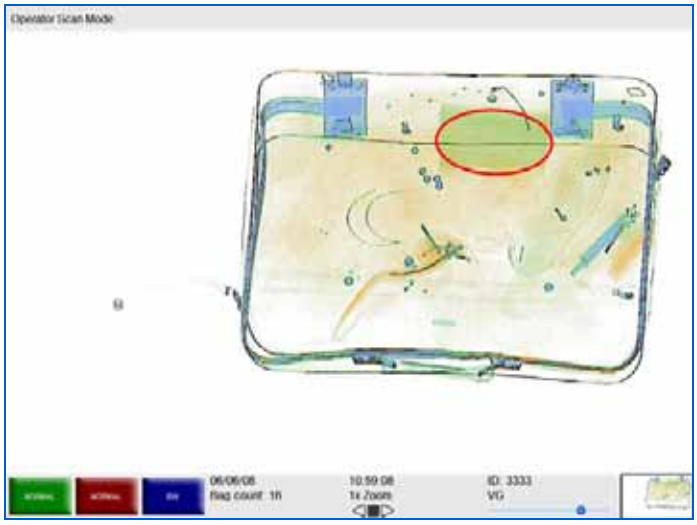
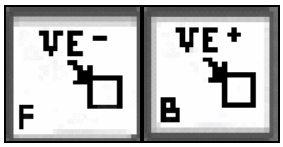


Figure 4-12: VG+

4.4.9 Variable Edge Enhancement



The Variable Edge Enhancement buttons show the center of enhancement, which causes objects' boundaries to become sharper. This remains active until RS, BG, BC or VD is pressed

Multiple keystrokes on the VE- or VE+ button will increase or decrease the sharpness of boundaries within the scanned objects.

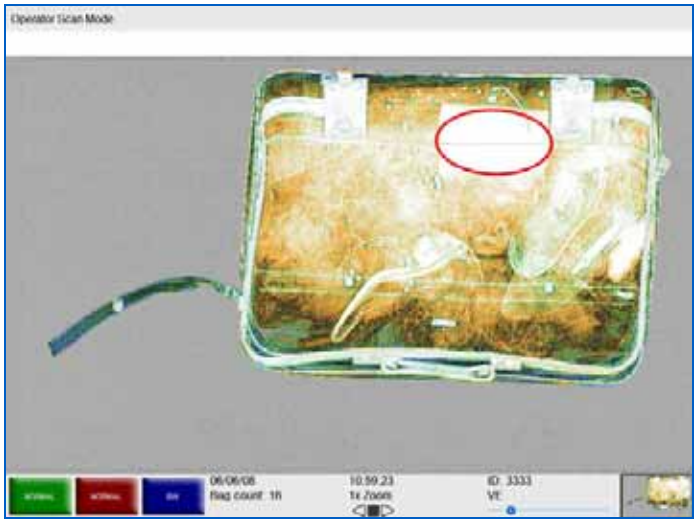


Figure 4-13: VE-

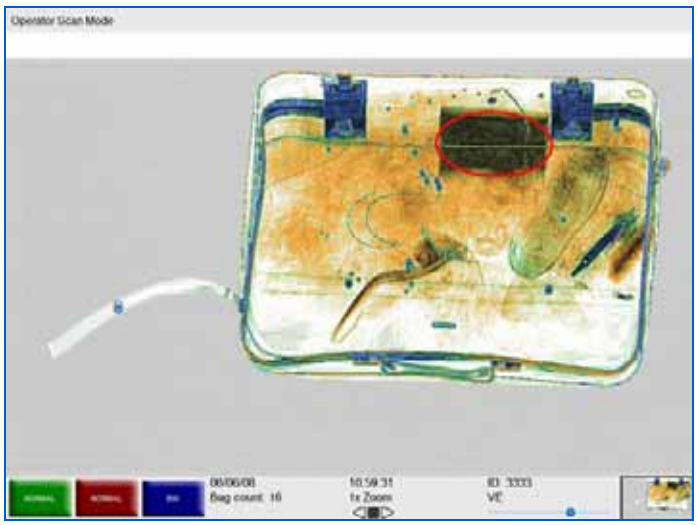
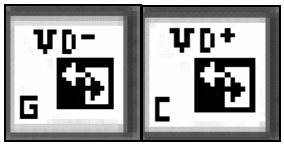


Figure 4-14: VE+

4.4.10 Variable Density



The Variable Density function allows the operator to exaggerate the difference in color brightness between objects having similar X-ray penetration properties. To adjust this facility, use buttons VD+ and VD.

Multiple keystrokes on the VD- or VD+ button will either increase or decrease the difference in color brightness.

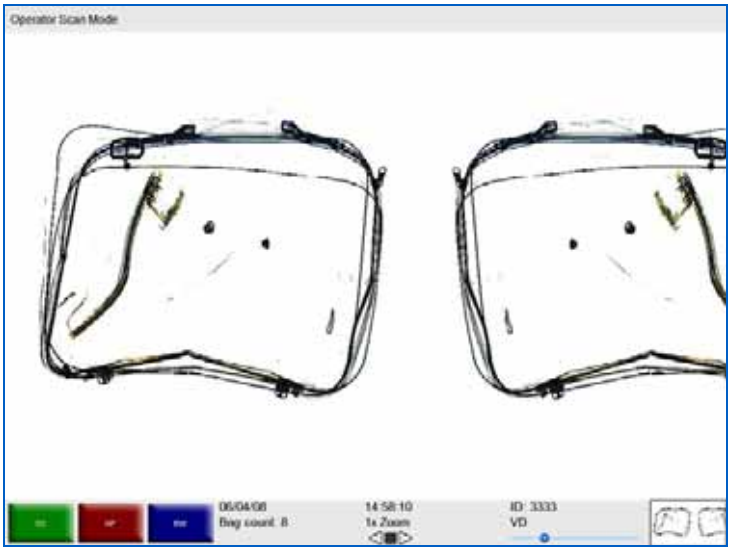


Figure 4-15: VD-

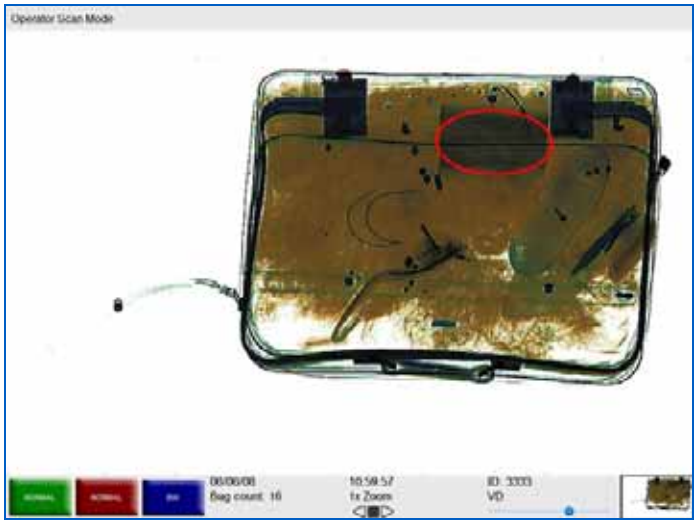
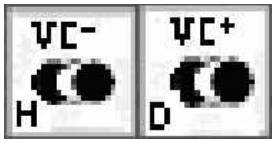


Figure 4-16: VD+

4.4.11 Variable Color



In this mode, highlighted materials will show in their original colors while the rest of the objects display in grayscale. The VC+ and VC- buttons are used to highlight the differences between the material groups.

Multiple keystrokes on the VC- or VC+ button will highlight different material groups, increasing the difference or contrast between the material group colors.

Figure 4-17: VC-

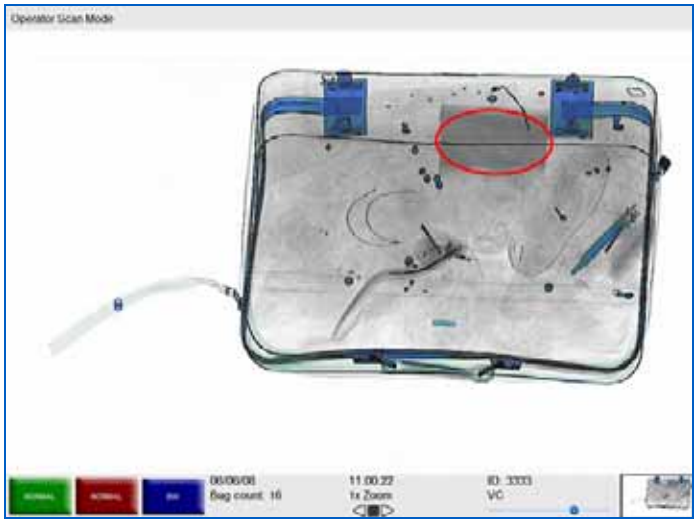


Figure 4-18: VC+

4.4.12 Material Groups

Organic substances composed of light chemical elements that have an atomic weight of less than ten (irrespective of their molecular structure) are displayed in orange on the operator's screen. The most important elements in this category are hydrogen, carbon, nitrogen and oxygen.

Most explosives are made of a combination of these elements. Explosives like nitro-glycerin and Semtex belong to this group.

Materials such as drugs, paper, wood, water and plastics will also be displayed in orange.

Objects composed of a medium heavy element such as aluminum are displayed in green. This also applies to overlapping objects of organic and inorganic substances. This group is termed the 'mixed' group.

The final group is composed of inorganic substances such as zinc, tin, copper and steel. If a material is too dense to be penetrated by X-rays, it is shown in black.

4.4.13 Previous Bag and Next Bag

In this mode the operator is able to scroll forward or in reverse to view previous bags or to scroll back to the latest bag.

NOTE: the Mode Indicator Panel reads: "Scanned Image Review Mode" which is the mode the system enters when allowing review of previous and next bags.

4.4.13.1 Previous Bag

Accessed by the Operator pressing the "PB" (Previous Bag) button. Reverse all these directions when operating in Reverse mode. When "PB" is pressed, the Previous bag will scroll back until it is completely on screen.

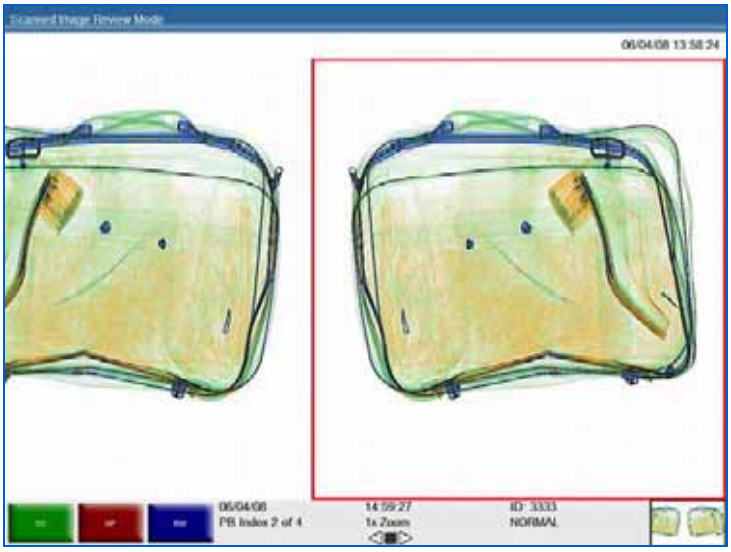


Figure 4-19: Previous Bag

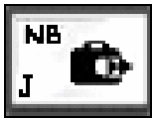
Figure 4-19 shows how the screen looks when Previous Bag (the "I" or "PB" key on the operator control panel) is pressed.

NOTE: the previous bag is outlined in red once it is chosen, and moves onto the screen from right to left. The Previous bag will be any previous bag's image that is completely or partially on screen.

A message reading: "End of Image Review Buffer. Press the NB/J button to clear this message box" will appear on screen once the operator has reached the end of the image review buffer when in Previous Bag mode. As indicated in that message, the operator can press the "J" or "NB" key on the operator control board to clear the message, but the message will disappear automatically after 5 seconds.

The "R" or Stop button can be used to exit the Previous Bag or Next Bag mode (i.e. the Scanned Image Review Mode) and return to the Normal mode.

4.4.14 Next Bag



Accessed by pressing "NB." When "NB" is pressed, the Next bag will scroll back until it is completely on screen. The current bag can be restored with this function.

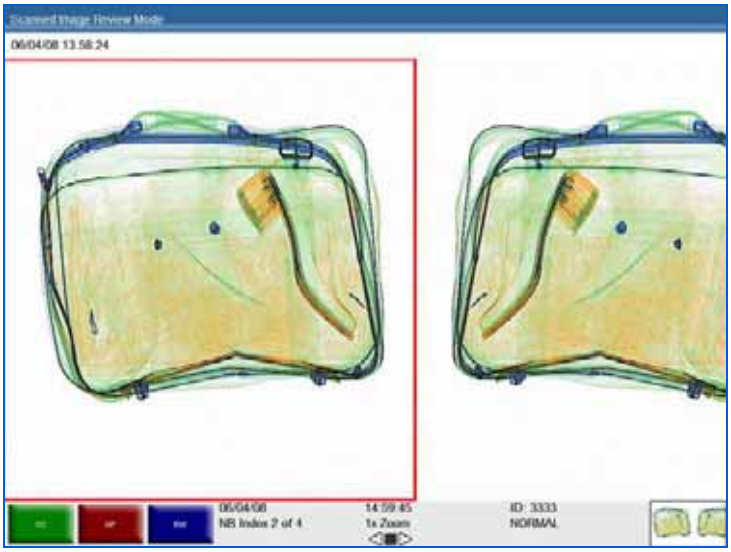


Figure 4-20: Next Bag

Figure 4-20 shows how the screen looks when Next Bag (the "J" or "NB" key on the operator control panel) is pressed.

NOTE: the next bag is outlined in red once it is chosen, and moves onto the screen from left to right.

Once the operator has reached the end of the image review buffer, a message will appear, reading: "Press the PJ/I button to clear this message box". As indicated in that message, the operator can press the "J" or "NB" key on the operator control board to clear the message. If those keys are not pressed, the message will disappear automatically after 5 seconds. The "R" or Stop button can be used to exit the Previous Bag or Next Bag mode (i.e. the Scanned Image Review Mode) and return to the Normal mode.

NOTE: Each bag in Previous Bag or Next Bag mode has a date/stamp indicator above the bag's image on screen.

Everything gets reversed, of course, if the conveyor belt is traveling in Reverse. In that case the "previous" bag now becomes the "next" bag and vice versa.

4.4.15 Archive

This function allows one of the most recently scanned bags that are still on-screen to be stored on the hard disk of the computer.

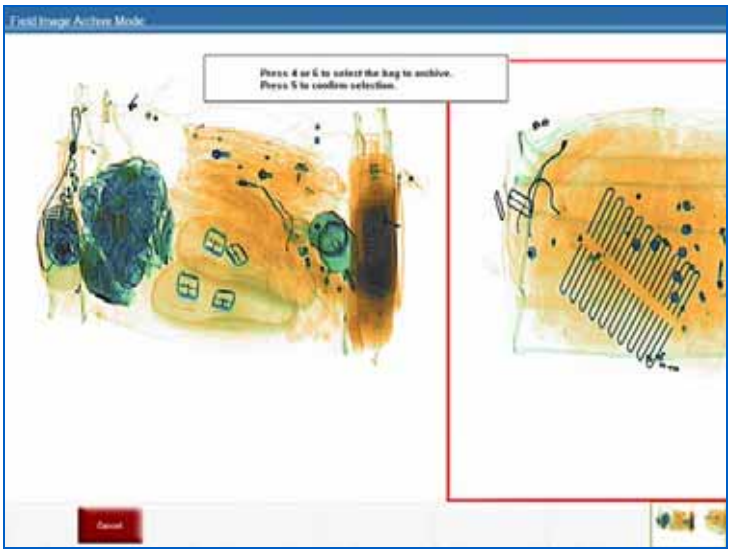


Figure 4-21: Archive Message

Error! Reference source not found. shows what the Operator will see upon pressing the "V" or "AR" key on the operator control panel whenever the system is in stop mode.

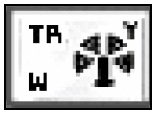
NOTE: the image to be archived will be outlined in red. In addition, a message appears above the image.

Pressing 4 on the operator control panel numeric keypad causes the red square to move to the left. Pressing 6 will cause the red square to move to the right. The Operator must press 5 in order to confirm the selection of the bag to be archived. A message confirming selection will appear briefly.

This option may not be present in some systems. The number of images that can be archived is limited to hard disk space or to a configurable allowable maximum disk space, whichever is smaller.

It is possible to retrieve archived images but this can only be done in Supervisor mode.

4.4.16 Transmit



This function is applicable when the X-ray machine is part of a network and allows images to be transmitted to other machines in the network.

4.4.17 Reset

This button allows the operator to return to "normal" mode from image enhancement and zoom modes.

4.4.18 Combined Function

The system software also allows the operator to use more than one image enhancement feature simultaneously. Figure 4-23, for example, shows an image that is being enhanced with Crystal Clear, Black and White and High Penetration

4.4.18.1 Programmable Function Buttons

The system software allows a supervisor to program each of the programmable function buttons for any of the image processing functions, such as Crystal Clear, Variable Gamma and Variable Edge Enhancement. The Supervisor can also program any or all of the programmable buttons to include several functions simultaneously, as seen in Figure 4-22.

Figure 4-22: Multiple Functions on Programmable Buttons

Figure 4-23 shows the result of applying more than one kind of image enhancement to a scanned image, in this case Black & White, Crystal Clear and High Penetration.

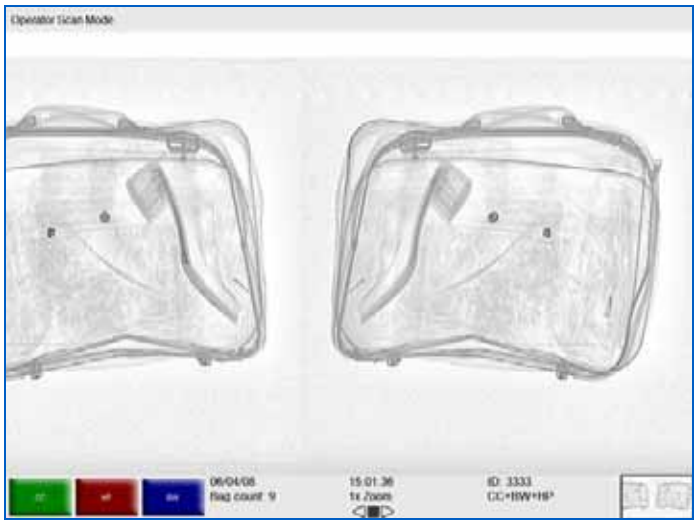


Figure 4-23: CC+ BW + HP

NOTE: Applying too many image enhancement functions to an image can actually have the opposite effect and distort the image beyond the operator's ability to spot possible threats.

4.4.19 Real Time Mode

Rapiscan's Windows-based operating system allows the operator to use image enhancement on images as they scroll across the screen. Previously images/bags would have to be stopped in order to use image enhancement on them. Thus, the operator can use CC, Black and White, Inverse, etc. on the image without having to stop it.

The Windows-based software allows the operator to enhance images even when the images are scrolling across the screen in reverse. Figure 4-24 shows a screen in Reverse mode, with Variable Gamma enabled.

Figure 4-24: Reverse Mode with VG Enabled

4.5 Keyboard Equivalents

The table in **Error! Reference source not found.** shows the keyboard equivalents between the Rapiscan Icon operator control panel and corresponding PC keyboard keys. The Icon control panel buttons are labeled with and are mapped to the corresponding PC keyboard keys.

DESCRIPTION	ICON CONTROL PANEL	PC KEY
Inorganic Material	IM	M
Black & White	BW	N

Inverse	IN	O
Organic Material	OM	L
Crystal Clear	CC	K
High Penetration	HP	P
Suspect/SE	SE	X
View Previous Bag	PB	I
View Current Bag	NB	J
Reset	RS	U
Reverse	RE	Q
Stop	ST	R
Forward	FW	S
Increase Variable Gamma	VG+	A
Decrease Variable Gamma	VG-	E
Increase Edge Enhancement	VE+	B
Decrease Edge Enhancement	VE-	F
Increase Density Zoom	VD+	C
Decrease Density Zoom	VD-	G
Increase Color Stripping	VC+	D
Decrease Color Stripping	VC-	H
Target Detection (AEPX)	TA	T
Archive Image	AR	V
Transmit Image	TR	W
Fixed Zoom	1 → 9	1 → 9
Undo Fixed Zoom	0	0
Back Space	<Red>	Backspace, F2
Enter	Right Touchpad Button	Enter, F1
Shift Mode/Text Entry	<Green>	F3
Enter ID (or Password)	Right Touchpad Button	xxxx<ENTER>
Main Menu	Right Touchpad Button	N/A
Move up (for review modes)	Up Arrow	Up Arrow on keypad
Move down (for review modes)	Down Arrow	Down Arrow on keypad
Move left (for review modes)	Left Arrow	Left Arrow on keypad
Move right (for review modes)	Right Arrow	Right Arrow on keypad

Text characters	0 → 9, A → Z	0 → 9, A → Z
Character "Y" (text mode)	<Green> <TR>	Y
Character "Z" (text mode)	<Green> <SE>	Z

Figure 4-25: Icon Control Panel/PC Keyboard Equivalents

4.6 Zoom Keypad

Figure 4-26 shows a typical screen divided by NON-EXISTANT lines into nine segments, each corresponding to a button on the Operator Control Panel zoom/numerical keypad (Figure 4-27).

NOTE: These nine segments actually overlap somewhat rather than being evenly divided. This ensures complete coverage of all the objects on screen.

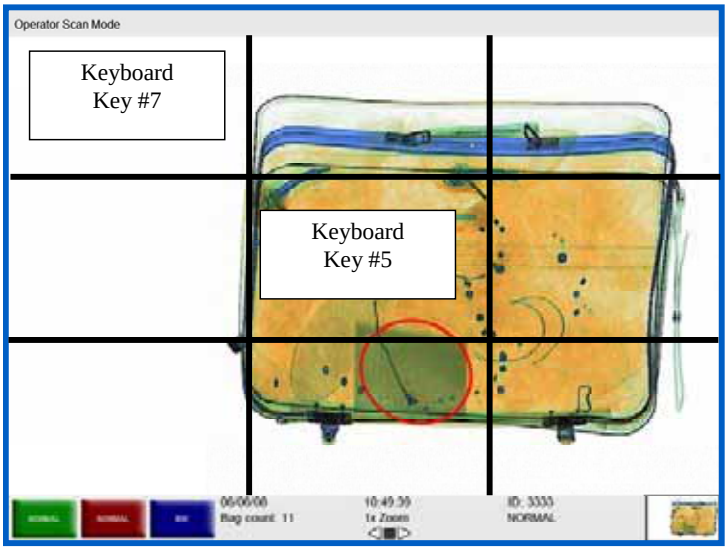


Figure 4-26: Screen Divided into Nine Segments

For example, the top left corner of the screen corresponds to #7 on the Control Panel Numeric Keypad; the center square corresponds to #5 on the Control Panel Numeric Keypad (Figure 4-26).

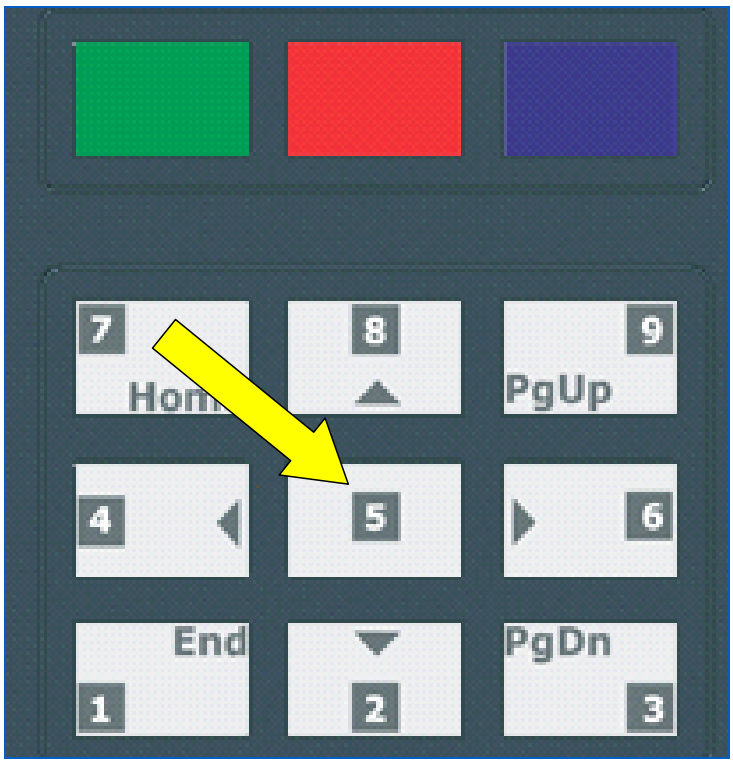


Figure 4-27: Keyboard Selection

When the #5 button on the zoom keyboard is pressed (Figure 4-27) which corresponds to the center area of the screen (Figure 4-28), the system zooms into that quadrant of the screen (Figure 4-29) to a power of 2 (2X Zoom).

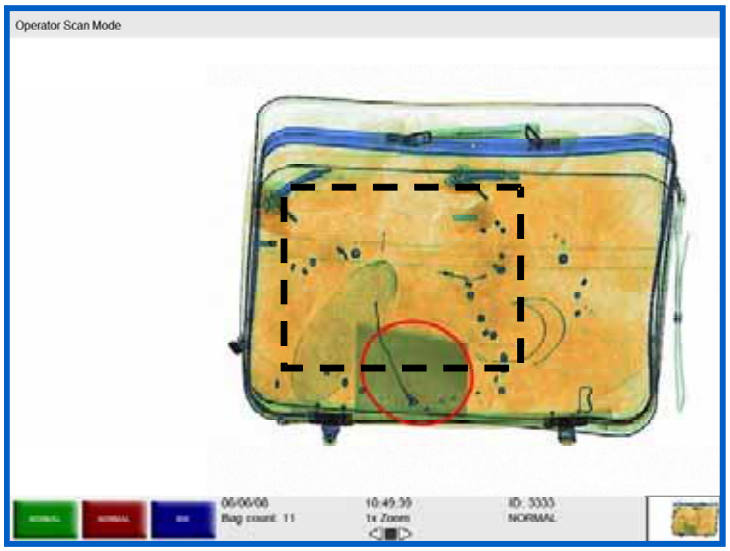


Figure 4-28: Center Selected (Button #5 on Operator Control Panel)

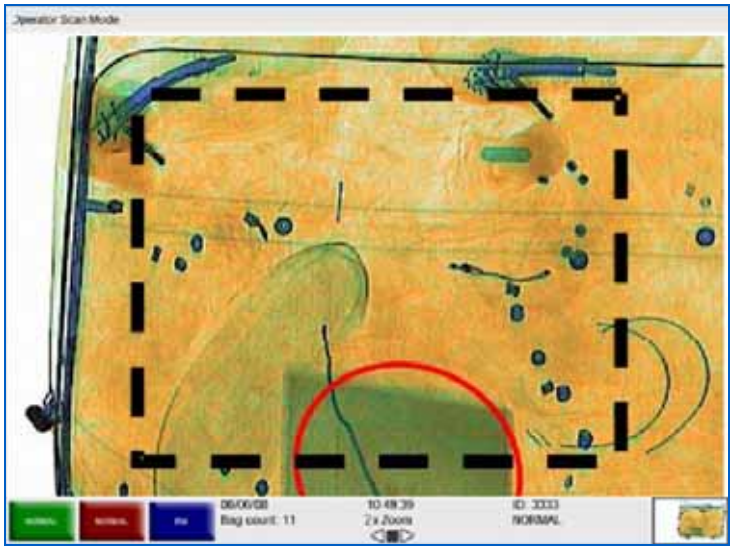


Figure 4-29: 2 x zoom

Press #5 on the zoom keypad again, the same area of the screen is increased to 4X Zoom (Figure 4-30).

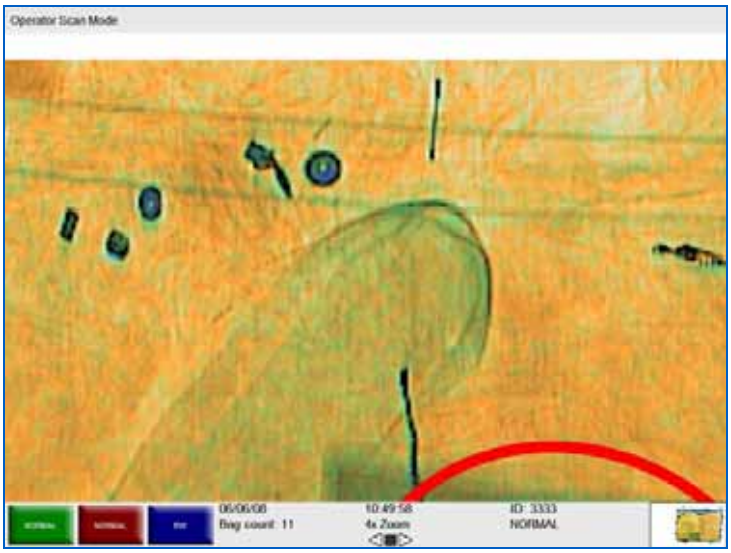


Figure 4-30: 4 x zoom

Pressing the same button zooms the same area to a power of 8 (Figure 4-31), and 16 (Figure 4-32), with a maximum possible zoom of 64X.

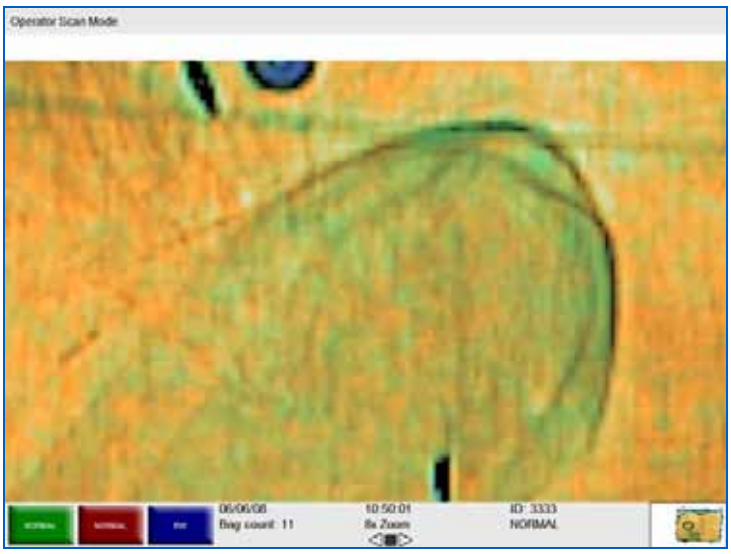


Figure 4-31: 8 x zoom

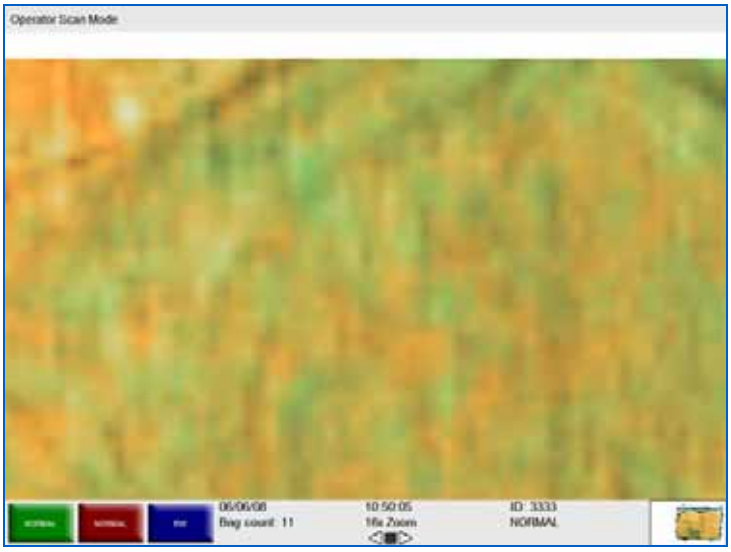


Figure 4-32: 16 x zoom

The Back to Normal button returns the image to a normal "full" size.

Figure 4-33: Back-to-Normal and Zero Button

4.7 Other Control Panel Functions

4.7.1 Emergency Stop

As the name implies, this button will immediately stop the unit from generating x-rays or moving the conveyor belt.

Figure 4-34: Emergency Stop Switch, Keyswitch and Power Button

When the E-stop is pressed, a warning message will appear (see Figure 4-35).

Figure 4-35: E-Stop Initial Message

If the STOP button on the Operator Control Panel is pressed before the E-stop is released, the message in Figure 4-36 will appear.

Figure 4-36: E-Stop Release Message

The operator must release the E-stop and then press the Operator Control Panel STOP button again. At that point the following message will appear:

Figure 4-37: E-Stop "Wait for System" Message

4.7.2 Indicator Lights

The Operator Control Panel features five indicator lights. Figure 4-38 shows two of those lights: X-rays On and System On. Figure 4-39 shows the indicator lights at the base of the Image Processing Keypad (NOTE the SE button. These lights are for the Reverse (RE), Stop (ST) and Forward (FW) conveyor buttons and indicate when the respective buttons have been pushed.

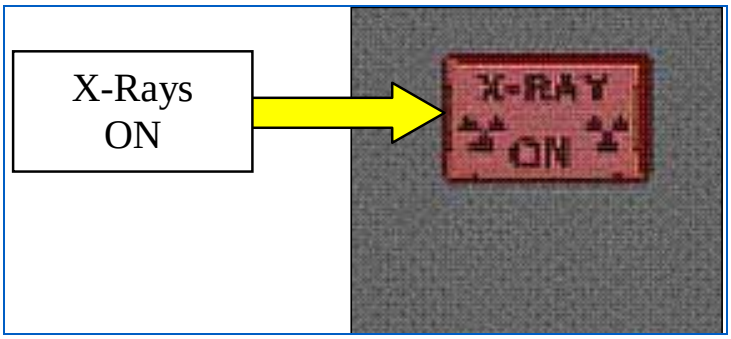


Figure 4-38: X-rays On Light

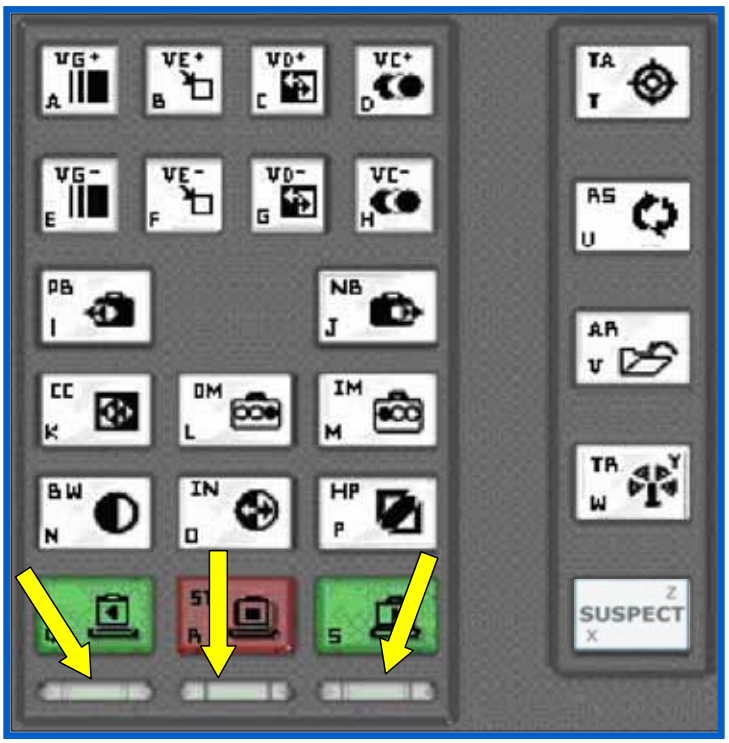


Figure 4-39: Conveyor Indicator Lights

4.7.3 Operator's Menu

Figure 4-40 shows the Operator's Menu. There are four functions on the main menu:

- Bag Count
- Help Manuals
- Machine Serial Number
- Log Off

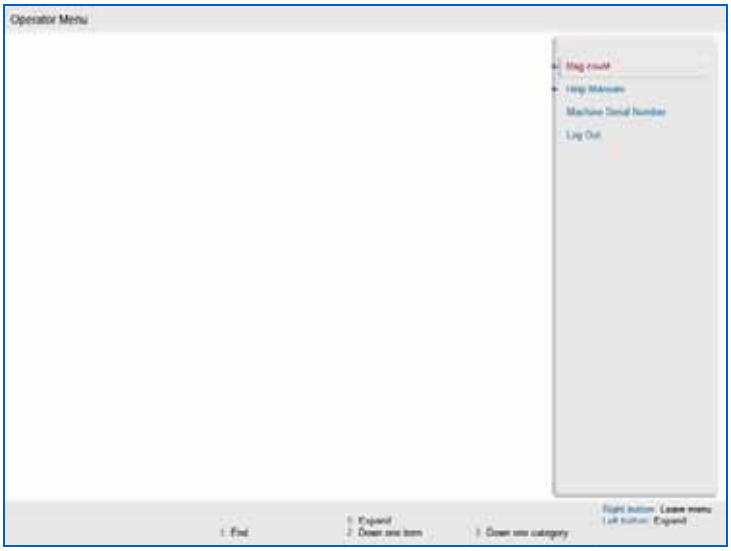


Figure 4-40: Operator's Main Menu

Selecting "Bag Count" brings up the "Total Number" of bags as shown in Figure 4-41. Total Bag Count (Figure 4-41) displays the number of bags scanned since the Machine first operated at the factory. This number cannot be changed.

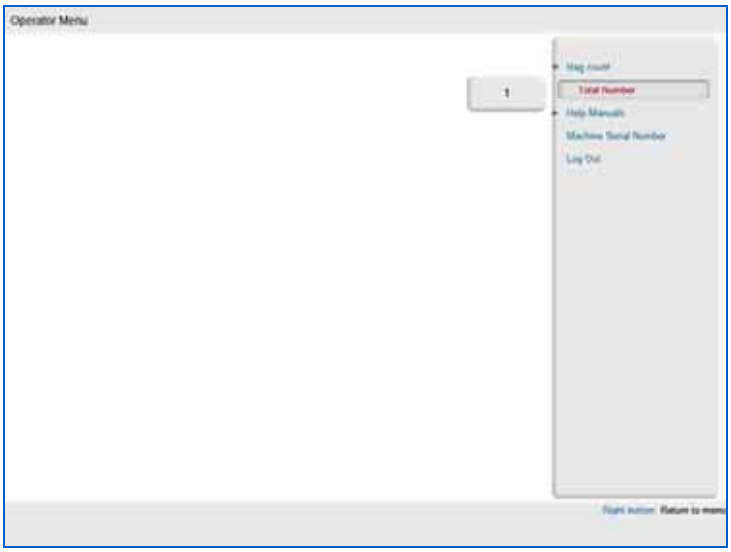


Figure 4-41: Bag Count

Figure 4-42 shows the Help Manuals menu option and the Operator and Supervisor Manual suboption. When selected, this brings up the Help Manuals screen (Figure 4-43).

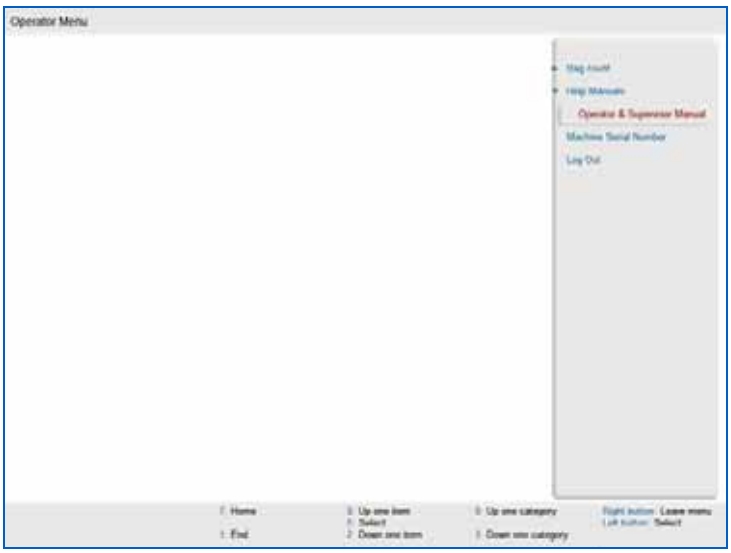


Figure 4-42: Operator & Supervisor Manual option

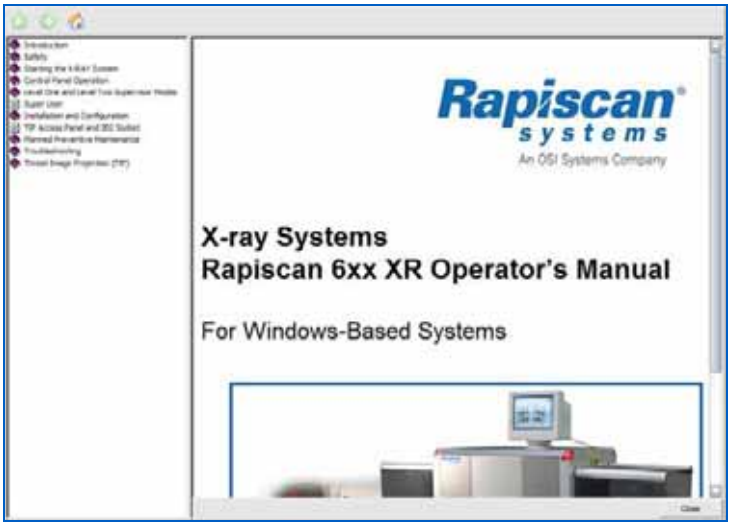


Figure 4-43: Operator & Supervisor Manual screen

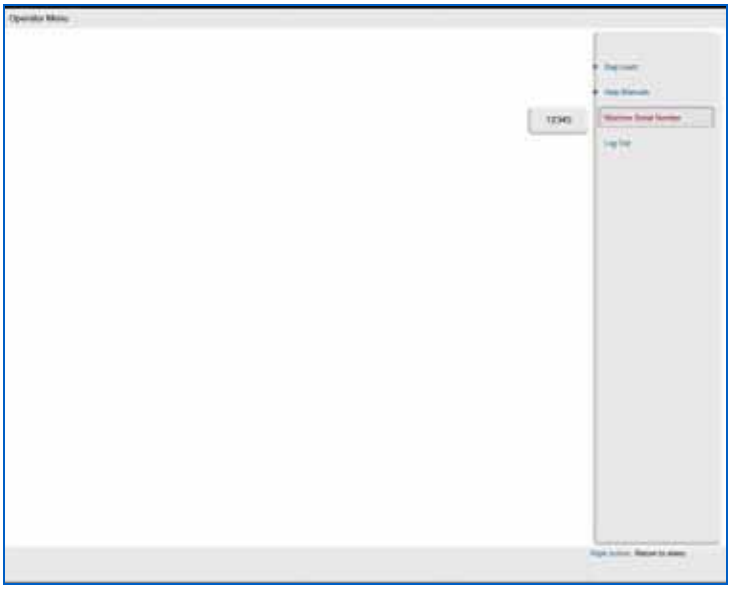


Figure 4-44: Machine Serial Number

Figure 4-44 shows the Machine Serial Number option. It is important to know the service and maintenance history of a machine and the machine's serial number is the best way to be able to match a machine with its service/maintenance history.

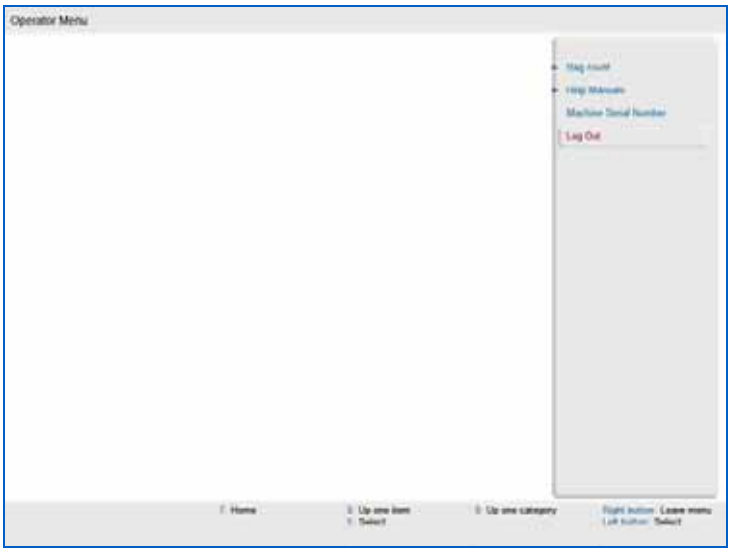
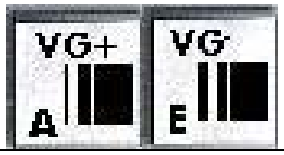
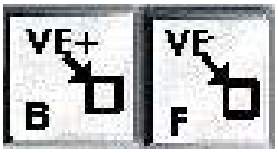
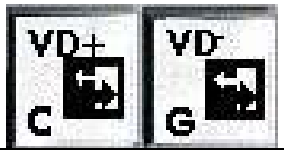
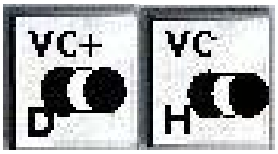


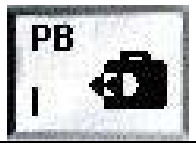
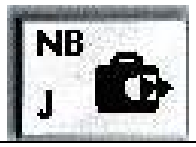
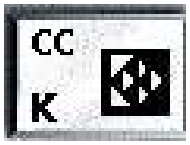
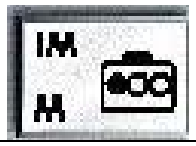
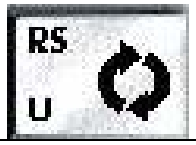
Figure 4-45: Log Off option

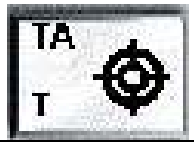
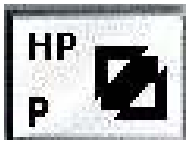
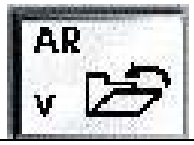
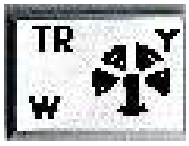
Figure 4-45 shows the log-off option. When selected, it brings the user back to the Login screen as shown in Figure 4-46.

Figure 4-46: Login Screen

Following is a table describing the Image Enhancement functions.

BUTTON	NAME OF FUNCTION	BRIEF DESCRIPTION
	**VARIABLE GAMMA** (ON and OFF)	These buttons alter the brightness of the image. This remains active until ST button is pressed.
	**VARIABLE EDGE ENHANCEMENT** (ON and OFF)	These buttons show the centre of enhancement, which causes objects boundaries to become sharper and easier to see. This remains active until ST is pressed.
	**VARIABLE DENSITY ZOOM** (ON and OFF)	These buttons place correlate an image's brightness with the scanned object's density.
	**VARIABLE COLOR STRIPPING** (ON and OFF	These buttons progressively strip away color from inorganic matter in an image, defining the shape of objects within the blue/black color scheme. Blue shades represent inorganic materials namely metals, while the green shades the low-density materials.

	**PREVIOUS BAG**	This button allows the Operator to go back to a previous bag stored in the buffer.
	**NEXT BAG**	This button allows an Operator to view the next bag in line stored in the buffer.
	**CRYSTAL CLEAR**	Crystal Clear brings out the detail in both light and dark areas simultaneously. This remains active until ST or F button is pressed.
	ORGANIC MATERIAL	This button toggles between showing all material and showing organic material only.
	INORGANIC MATERIAL	This button toggles between showing all material in the bag and showing inorganic material only
	**BLACK AND WHITE**	When this button is pressed, all color information from the image is removed.
	**INVERSE**	When this button is pressed, the image is displayed in reverse i.e. black becomes white and vice-versa.
	**RESET**	This button allows the operator to return to "normal" mode from image enhancement and zoom modes.
	**REVERSE**	When this button is pressed, the conveyor belt will travel in the reverse direction. Any objects on the belt will reverse through the tunnel, although no X-ray scanning will take place.

	**STOP**	This button will stop the unit from generating x-rays or moving the conveyor belt. **NOTE:** If this button is pressed during scanning of an object, the belt will stop then reverse a few centimeters. This is to ensure that when 'forward' is selected again, no part of the object is missing from the image. This button is used to control any image enhancements that have been selected.
	**FORWARD**	Moves the conveyor belt forward, allowing X-ray scanning to take place.
	**TARGET**	This button causes an ellipse to be drawn around a suspected threat or contraband, if Target is installed.
	**HIGH PENETRATION**	When this button is pressed, the presentation of high-density object is enhanced. This remains active until ST or H button is pressed.
	**ARCHIVE**	Allows the scanned image to be stored on the computer. The image can be recalled later but only in Supervisor mode.
	**TRANSMIT**	This function is applicable when the X-ray machine is part of a network and allows images to be transmitted to other machines in the network.

	**SUSPECT/SE**	An Operator, who suspects there may be a threat or contraband in a particular bag, should press the "Suspect/SE" button, and then follow the security procedures used at his/her place of employment.

Figure 4-47: Image Enhancement Functions

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5.0 Technician Menu

Figure 5-3 shows the Login screen. To access the Technician Menu, type in your User ID and Password in the appropriate fields on the Login screen. This will cause the main screen to appear as shown in Figure 5-2.

Figure 5-1: Login Screen

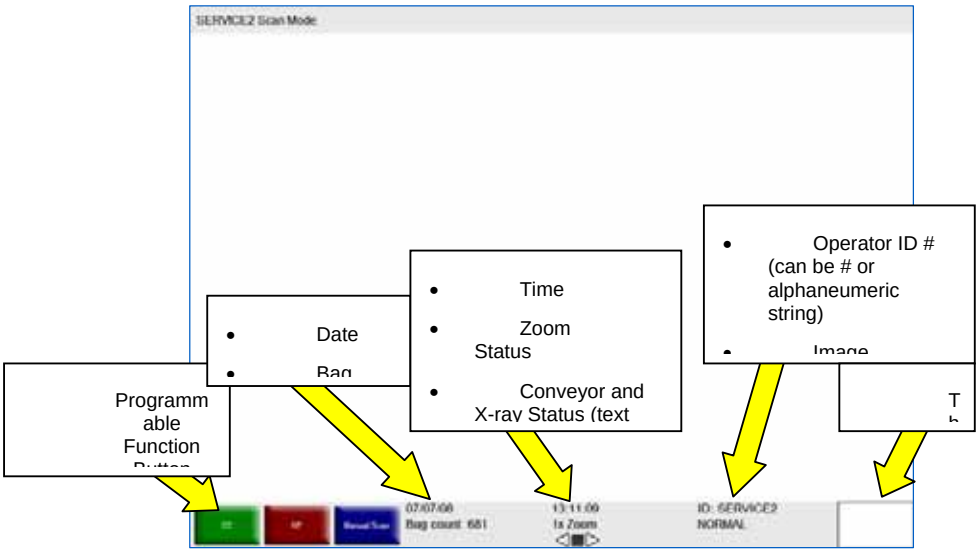

Figure 5-2: Main Operation Screen

Left-clicking on the main screen (Figure 5-2) brings up the Technician menu (Figure 5-3). This menu allows the supervisor to change specific settings for the 6xx XR. Right-clicking on the screen will collapse a menu item one step at a time.

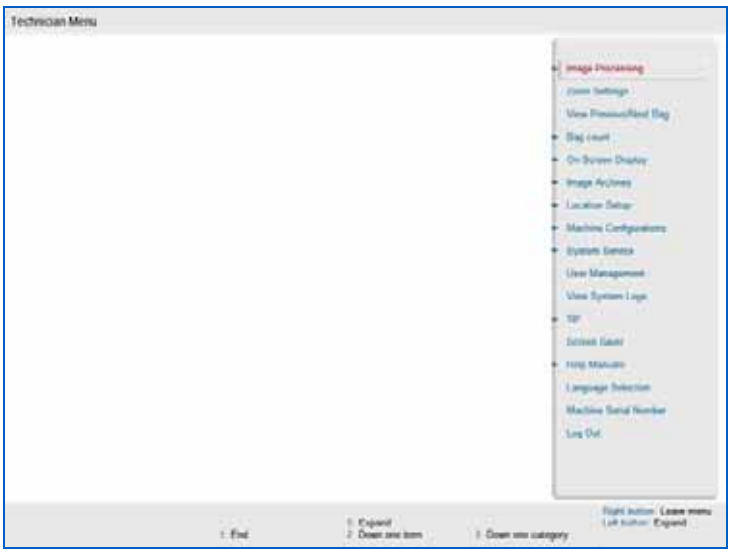

Figure 5-3: Technician Menu

5.1 Image Processing Mode

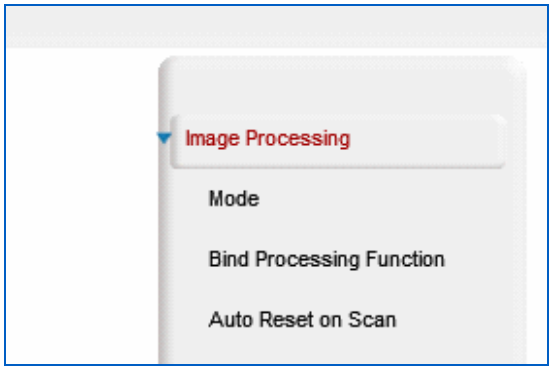

Figure 5-4: Image Processing

Figure 5-4 shows the first item in the Supervisor menu, "Image Processing Mode." Selecting "Image Processing" expands that section to show "Mode," "Bind Processing Functions" and "Auto Reset On Scan." Selecting "Mode" is brings you to the screen shown in Figure 5-5.

5.1.1 Mode

Figure 5-5: Image Processing – Mode

"Mode" includes a number of menu items that control the appearance of a scanned image:

- High Penetration
- Black & White
- Crystal Clear
- Inorganic Material
- Organic Material
- Inverse Color
- Edge Enhancement
- Gamma
- Color Stripping
- Density Zoom

Each of these menu items, when selected, offer three choices:

- Stop mode
- Disable/Enable
- Real-Time Mode

This determines whether a particular image enhancement, such as High Penetration, operates only in stop mode or in both stop mode and "real-time" mode and also whether the enhancement is enabled or disabled altogether.

5.1.2 Bind Processing Function

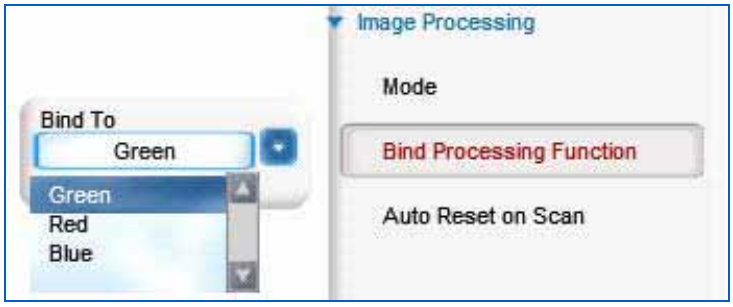

Figure 5-6: Image Processing – Bind Processing Functions

The Bind Processing Functions button (Figure 5-6) allows the Operator to assign multiple image processing functions to individual function keys. Figure 5-7 shows a scanned image with CC, BW and HP applied simultaneously.

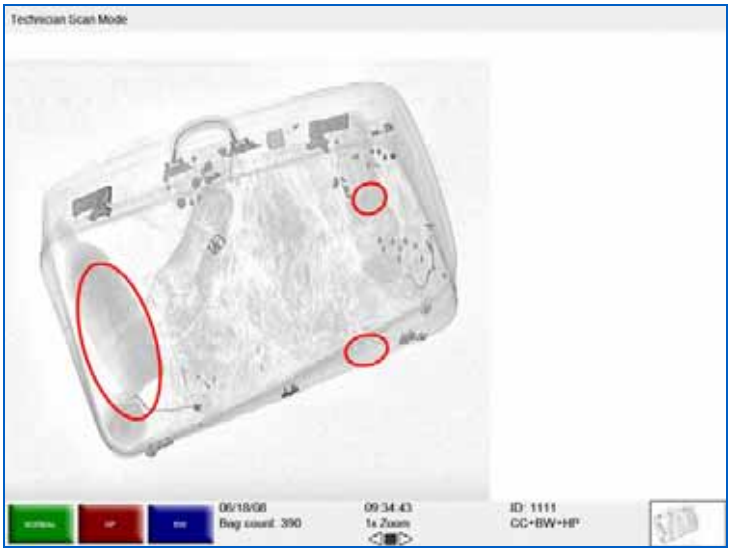

Figure 5-7: Scanned Image with CC, BW and HP Applied

To make use of the Bind Processing Functions function:

1. Obtain a scanned image.
2, Apply one or more image processing functions to the image. For example, apply CC, BW and HP to the image as shown in Figure 5-7.
3. Click the left Touchpad button, which brings up the Technician Menu (Figure 5-3).

Figure 5-8: Bind Processing Function

4. Using the touchpad, move the cursor down to highlight Image Processing.
5. Select "Image Processing." The full Image Processing menu will be revealed, including the Bind Processing Functions button.
6. Using the Touchpad, move down to highlight the Bind Processing Functions button.
7. Select Bind Processing Functions and the drop down menu will appear (Figure 5-9).

Figure 5-9: Image Processing – Bind Processing Functions

8. Choose the colored button to which you want to assign the image functions you've just applied to the scanned image (Green, Red or Blue). Figure 5-9 shows that Green is being chosen.

9. Right-click until you return to the main screen (without the main menu showing) where you'll see that the functions you chose have been assigned to the function button you selected (Figure 5-10, note the green function button now reads: CC+BW+HP).

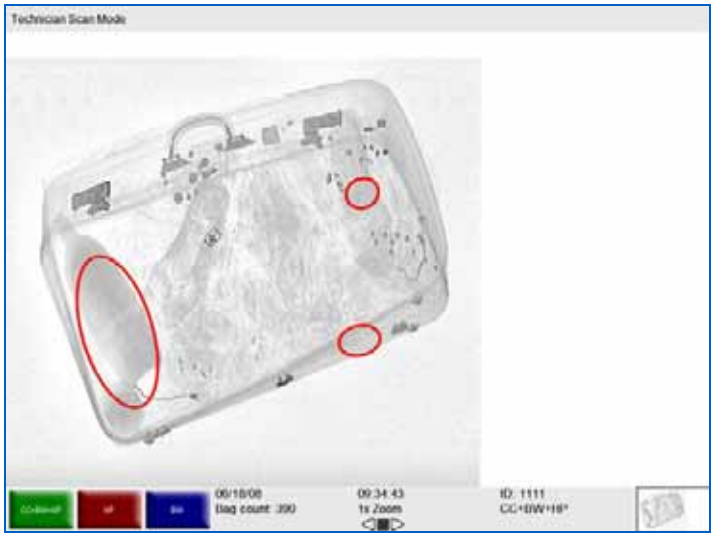

Figure 5-10: Multiple Image Processing Functions

10. To reverse the procedure, press the RS button to remove the image enhancement functions. Return to the Bind Processing Function menu as described above. Select the Green button to apply the Normal function to. Return to the main screen and you will see that the Green Button now has only the Normal function applied to it.

NOTE: Assigning too many functions(e.g. CC, IM, OM, BW) may prove counterproductive to the quality of the actual image the operator's ability to discern possible threats in the image.

5.1.3 Auto Reset on Scan

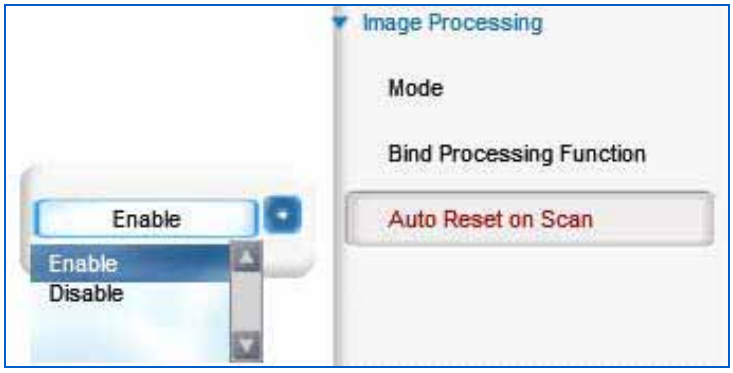

Figure 5-11: Image Processing – Auto Reset on Scan

Figure 5-11 shows the third and final item under "Image Processing," and that is the Auto Reset on Scan function. When enabled, this function resets the image processing functions to normal each time a new item is scanned. Note the Enable and Disable options.

5.2 Zoom Settings

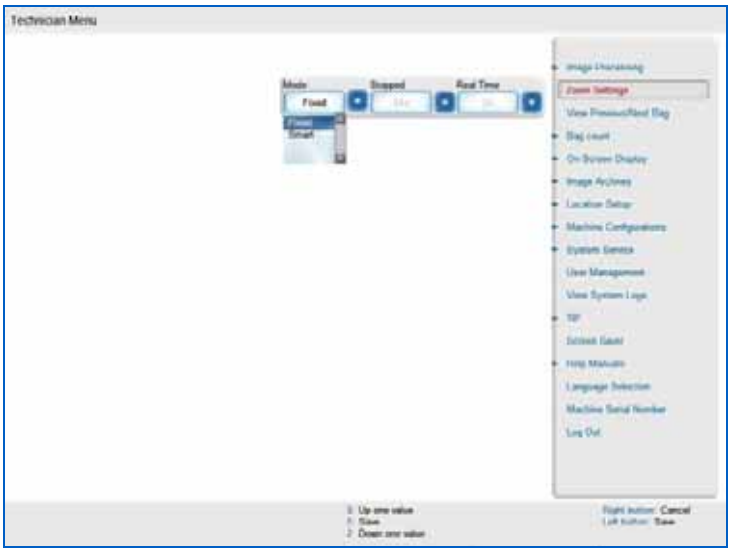

Figure 5-12: Zoom Settings

Figure 5-12 shows the Zoom Settings option. When in the "Fixed" zoom mode, clicking a number will take you to that quadrant of the screen (e.g. clicking "5" will take you to the center quadrant of the screen, and clicking "7" will take you to the upper left quadrant of the screen). When in "Smart" mode, if there is only one image on the screen, clicking a number will take you to the corresponding quadrant of that image rather than of the screen.

5.3 View Previous/Next Bag

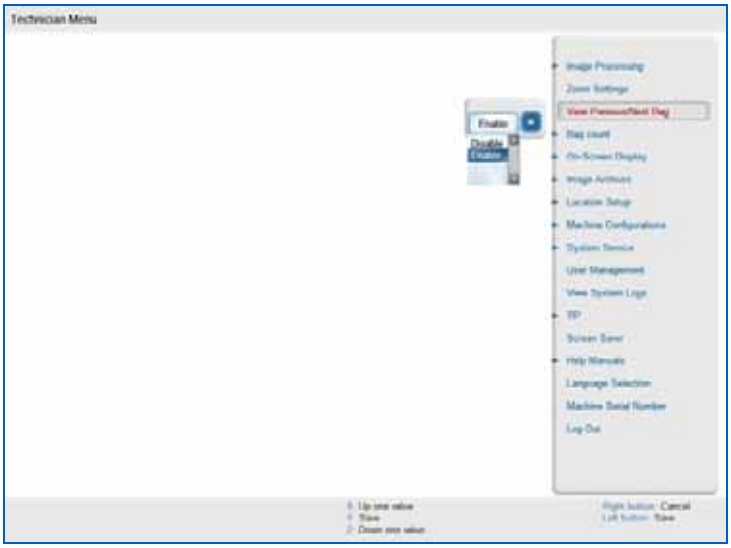

Figure 5-13: View Previous/Next Bag

View Previous/Next Bag can be either disabled or enabled (Figure 5-13). As the name implies, this feature allows the operator to move back to previously scanned bags and then, by using the Next Bag feature, to move back toward the most recently scanned bag.

5.4 Bag Count

Bag Count (Figure 5-14) includes two sub options: Total Number and Reset Total.

5.4.1 Total Number

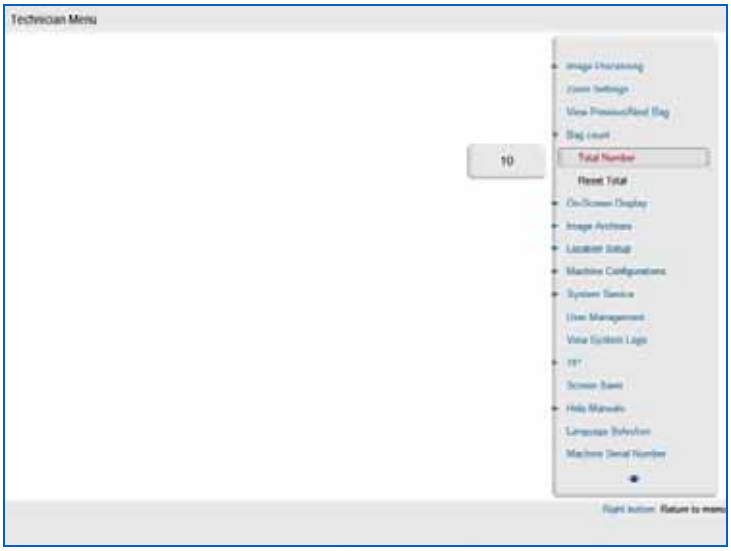

Figure 5-14: Bag Count – Total Number

Total Number displays the number of bags scanned since the Machine first operated at the factory. This number cannot be changed.

5.4.2 Reset Total

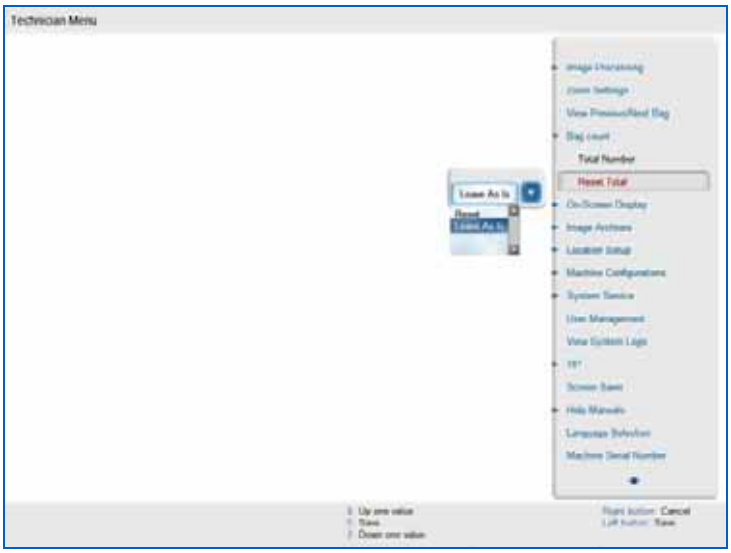

Figure 5-15: Reset Total

The Bag Count Reset Total (Figure 5-15) is a bag count that can be reset or left as is, as opposed to the fixed "Total Bag Count" that accumulates and cannot be adjusted in this mode.

5.5 On-Screen Display

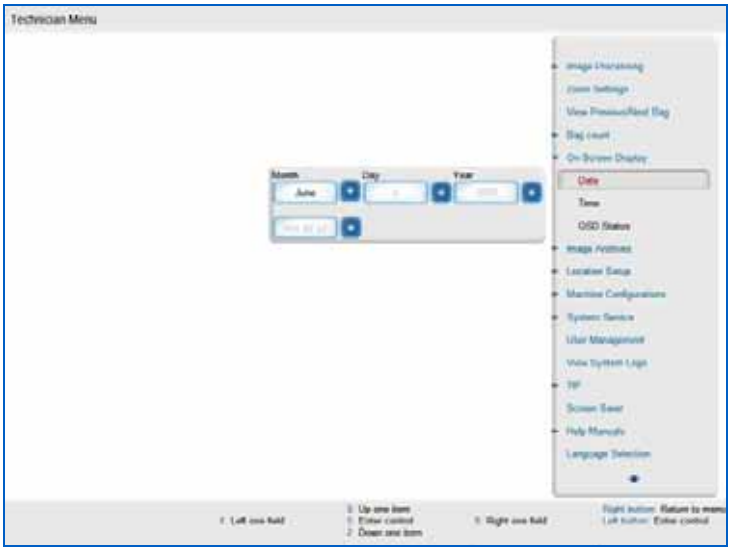

Figure 5-16: On-Screen Display

Figure 5-16 shows the On-Screen Display option and the "Date," "Time" and "OSD Status" suboptions.

5.5.1 Date

Figure 5-17: On-Screen Display, Date

Figure 5-17 shows the Date readout, which can be displayed on screen in one of three formats.

5.5.2 Time

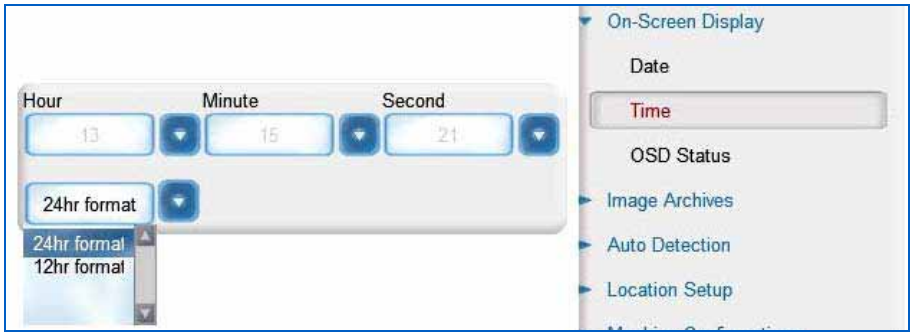

Figure 5-18: On-Screen Display, Time

Figure 5-18 shows On-Screen Display: Time. The time can be displayed in 12 hour or 24 hour format.

5.5.3 OSD Status

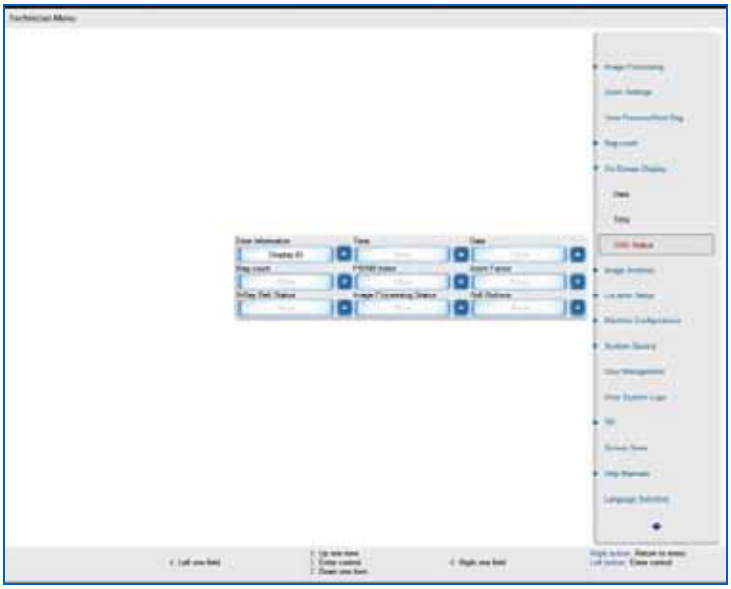

Figure 5-19: OSD Status

Figure 5-19 shows the OSD (On Screen Display) Status button (with the Image Processing Status drop down menu open), which allows control over a number of types of information that can be shown or not shown on screen:

- User Information
- Time
- Date
- Bag Count

- PB/NB Index
- Zoom Factor
- X-Ray Belt Status
- Image Processing Status
- Soft Buttons

5.6 Image Archives

Figure 5-20: Image Archives

Figure 5-20 shows the Image Archives option and the three associated suboptions.

5.6.1 Review Manual Archives

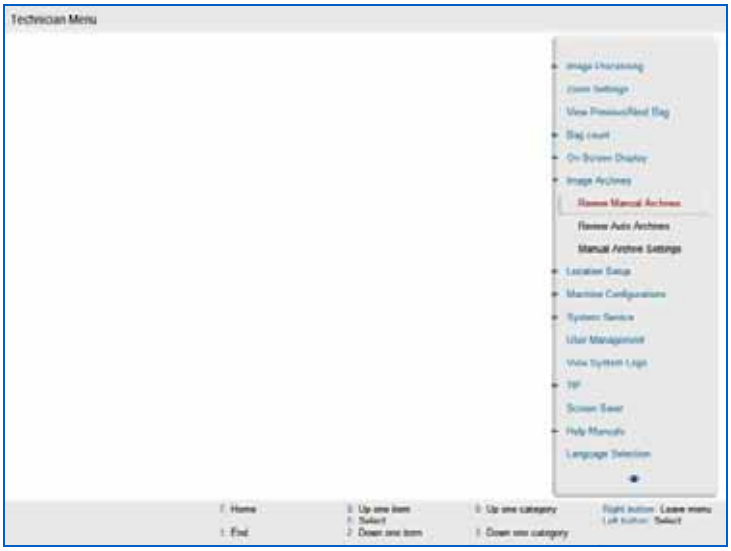

Figure 5-21: Review Manual Archives

Figure 5-21 shows the Review Manual Archives option. When selected, the "Filter Options" screen appears (Figure 5-22). This allows you to determine the criteria that can be used to search the manually archived images – such as operator ID, Site and Date options. This function allows you to search only those images that were manually archived at the time of scanning.

Figure 5-22: Filter Options

5.6.2 Review Auto Archives

Figure 5-23 shows the Review Auto Archives function. As with the Review Manual Archives option, selecting this option brings you to the Filter Options screen (Figure 5-22) where you can set the search criteria, this time for searching only automatically archived images.

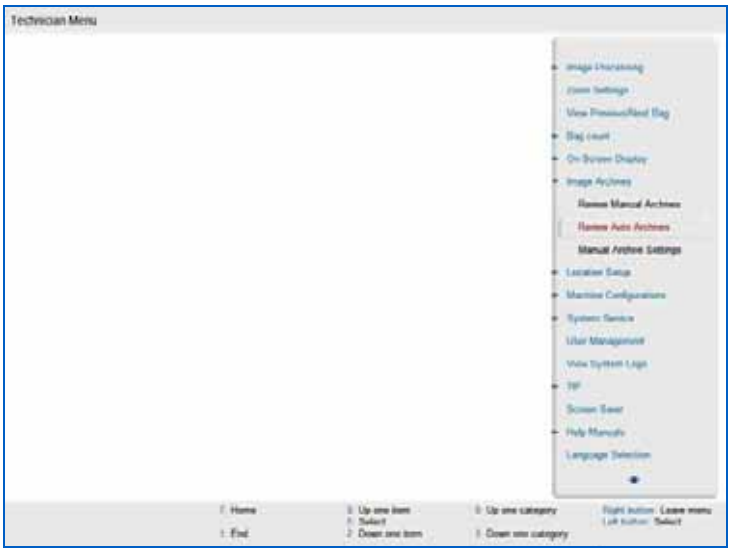

Figure 5-23: Review Auto Archives

5.6.3 Manual Archive Settings

Figure 5-24 shows the Manual Archive Settings option. This option allows you to set the default image format to PNG, bitmap or RCF, as well as to simply enable or disable the manual archive setting option.

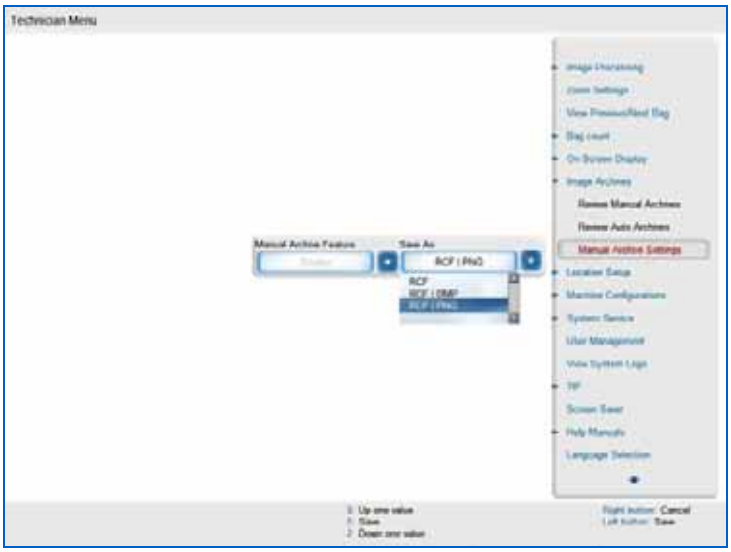

Figure 5-24: Manual Archive Settings

5.7 Location Setup

Figure 5-25 shows the Location Setup option with its three suboptions: Site; Station and; Station Settings.

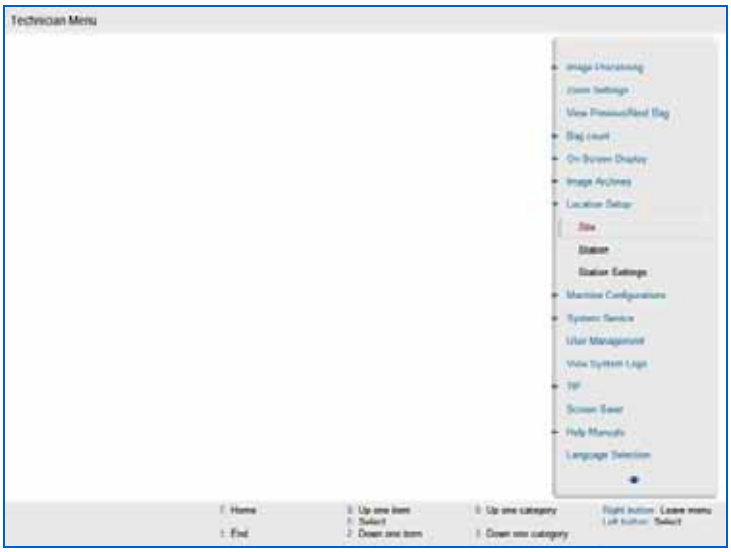

Figure 5-25: Location Setup

5.7.1 Site

Figure 5-26 shows the Site screen, which allows for the modification of site data. Selecting "modify" will bring you to the screen shown in Figure 5-27. Selecting "modify" on this screen will bring you to the screen where the actual modifications to the site data can be done.

Figure 5-26: Site

Selecting "Modify" on the "Modify Site" screen shown Figure 5-27 brings you to Figure 5-28 where changes can be made to Site data.

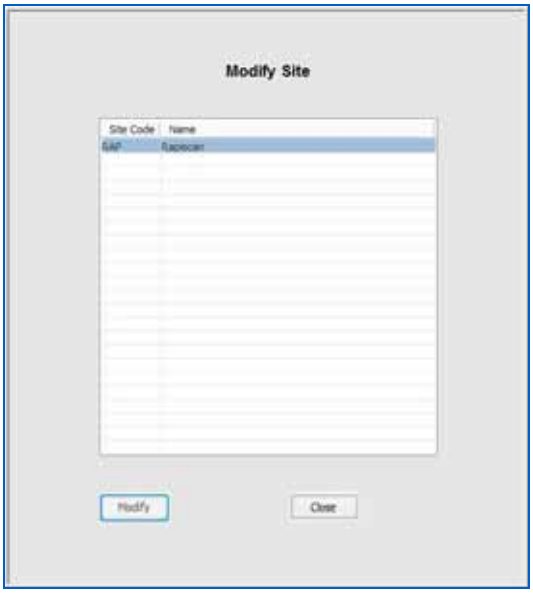

Figure 5-27: Modify Site

Figure 5-28: Modify site

Selecting "List All" on the screen shown in Figure 5-26 brings you to the screen shown in Figure 5-29.

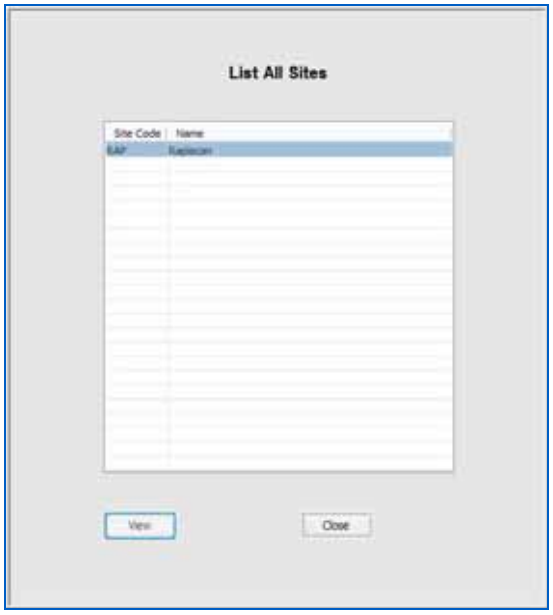

Figure 5-29: List All Sites

Selecting "View" on the screen shown in Figure 5-29 (with a site selected from the list of sites on the screen) brings you to the screen shown in Figure 5-30 where you can read the Site Data.

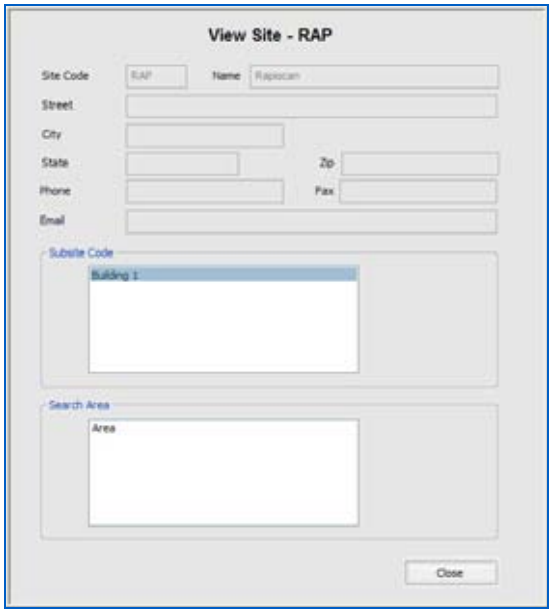

Figure 5-30: View Site

5.7.2 Station

Figure 5-31 shows the "Station" option. Selecting this option brings you to the screen shown in Figure 5-32.

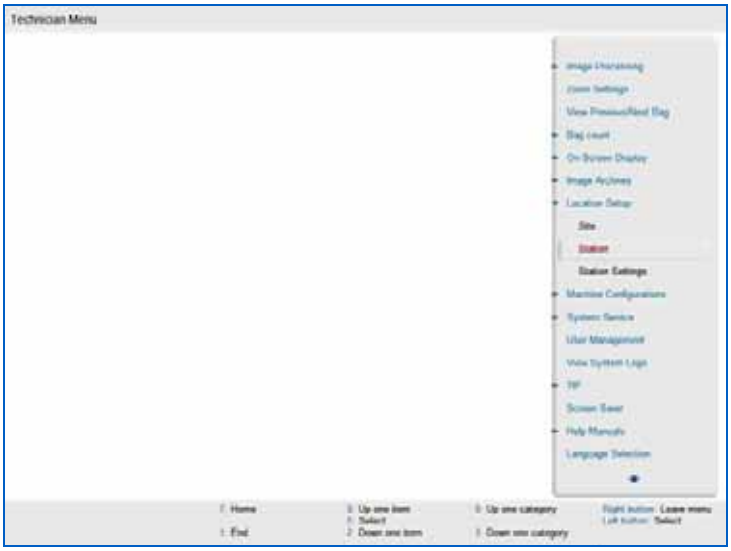

Figure 5-31: Station

Figure 5-32: Station

Selecting "Modify" on the screen shown in Figure 5-32 brings you to the Modify Station screen shown in Figure 5-33.

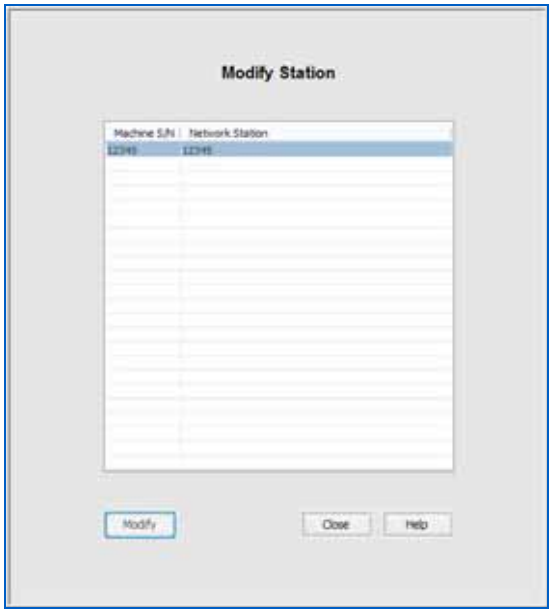

Figure 5-33: Modify Station

Selecting "Modify" on the "Modify Station" screen (Figure 5-33) Modify Station screen where data is modified (Figure 5-34).

Figure 5-34: Modify Station data screen

Selecting "List All" on the screen shown in Figure 5-32 brings you to the screen shown in Figure 5-35.

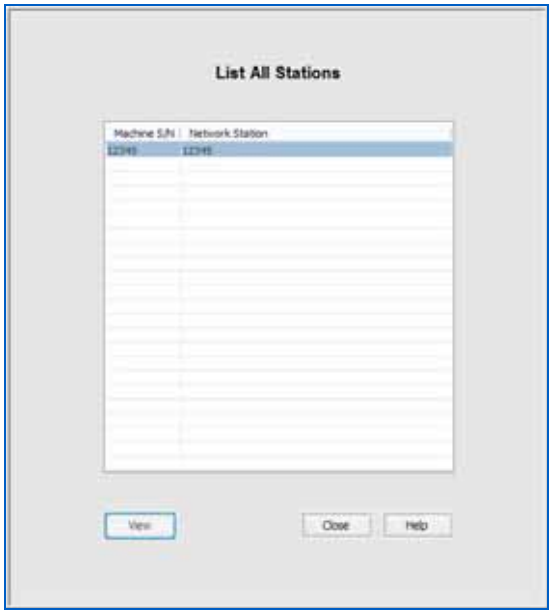

Figure 5-35: List All Stations

Selecting "View" from the screen shown in Figure 5-35 brings you to the screen shown in Figure 5-36.

Figure 5-36: View Station

5.7.3 Station Settings

Selecting "Station Settings" on the screen shown in Figure 5-31 brings you to the screen shown in Figure 5-37 where modifications can be made to various Station Settings.

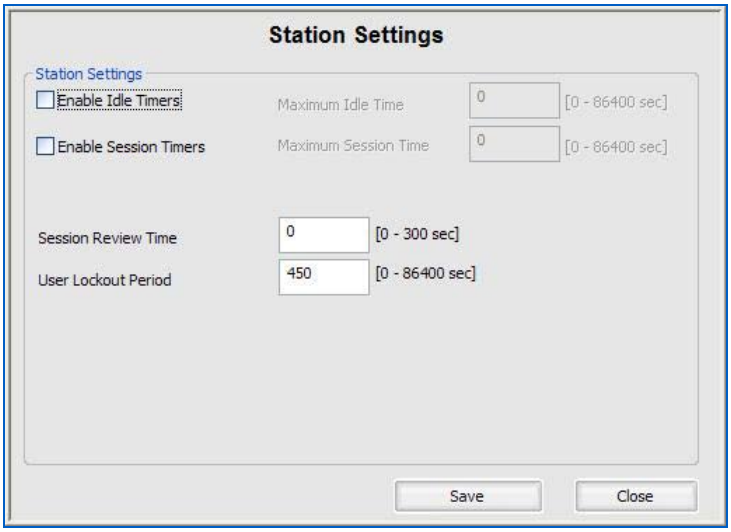

Figure 5-37: Station Settings

Figure 5-38 shows the Machine Configurations option.

5.8 Machine Configurations

Figure 5-38: Machine Configurations

5.8.1 Main Conveyor

Figure 5-39 shows the Main Conveyor option which controls Swap/Unswap Belt, Scan Direction and Scroll Direction.

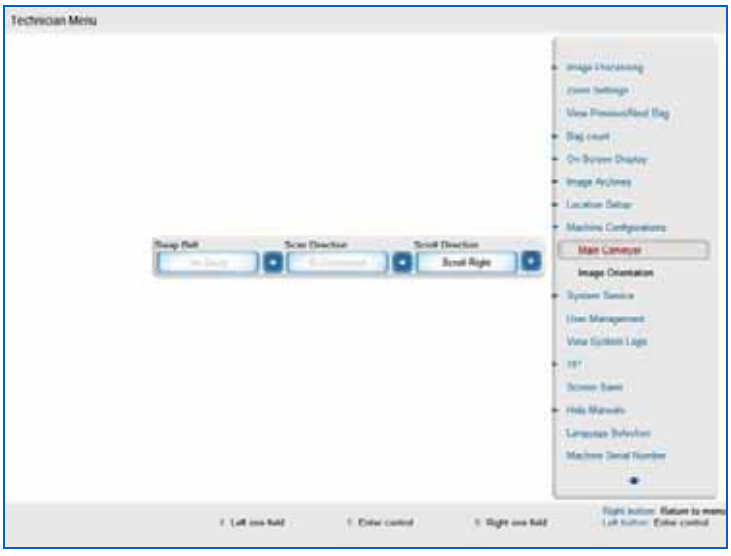

Figure 5-39: Main Conveyor

5.8.2 Image Orientation

Figure 5-40 shows the Image Orientation option. This determines whether an image is in a normal or vertically flipped orientation.

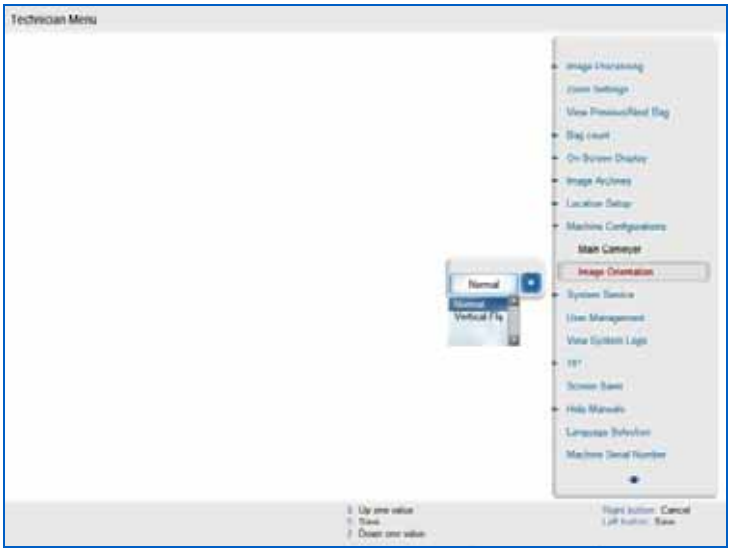

Figure 5-40: Image Orientation

5.9 System Service

Figure 5-41 shows the System Service option and the Diagnostics suboption.

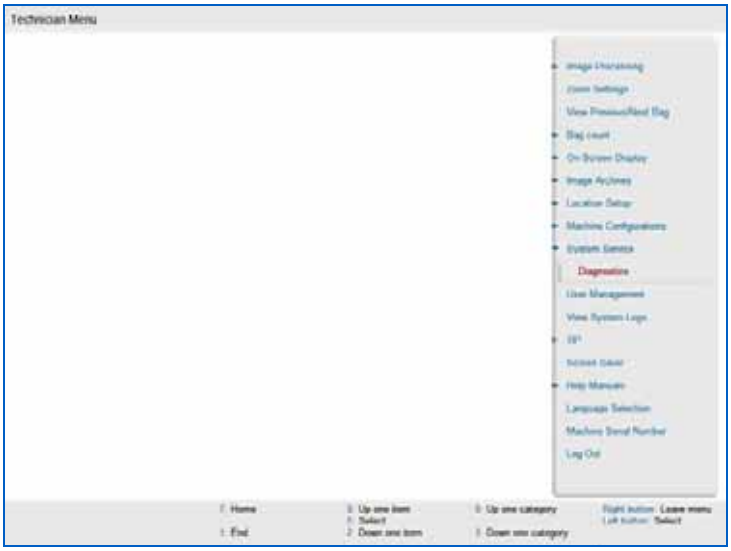

Figure 5-41: System Service/ Diagnostics

5.9.1 Diagnostics

Selecting "Diagnostics" on the screen shown in Figure 5-41 leads to the screen shown in Figure 5-42, which is not the Diagnostics screen but rather the Radiation Survey, which is a simple set of directions for doing a radiation survey.

The reason that "Diagnostics" defaults to Radiation Survey is simply because this is by far the most common function accessed through the Diagnostics link. To access the full Diagnostics menu, click on the green "Exit Radiation Survey" button in the lower left-hand corner of the screen.

Figure 5-42: Radiation Survey

Selecting "Exit Radiation Survey" from Figure 5-42 brings you to the screen shown in Figure 5-43, which is the full Diagnostics menu.

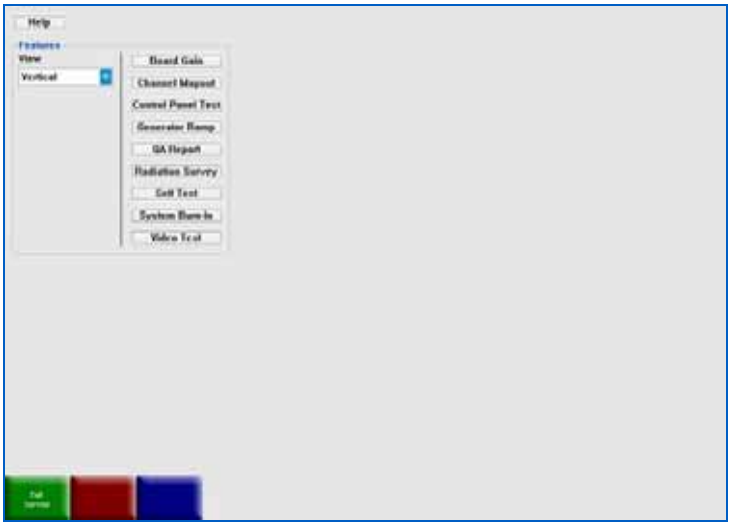

Figure 5-43: Diagnostics Menu

The first option on the Diagnostics menu is "Board Gain." To set gain:

1. Select "board gain" from the top left corner of the Diagnostics Menu (Figure 5-43).
2. Once in the board gain mode:
3. Use "P" key on the control panel to select the energy (high or low energy). Only data from the selected energy will be displayed.
4. Use the "2" or "8" key on the control panel to select the appropriate DAB for gain adjustment. The signal of the selected DAB will be highlighted in light green.
5. Use the "4" key to lower the gain of the selected DAB.
6. Use the "6" key to increase the gain of the selected DAB.
7. Use the "Save Gain" (green) button to save the current setting of the DAB's gain.
8. Use "Cancel Gain" (red button) to discard current changes.
9. It is suggested to set gain of the DAB to shift its signal to the right side without making saturation. The recommended setting is 85% of full screen signal.

Figure 5-44: Board Gain

If a line is observed on the screen while scanning an object, this can indicate a faulty channel. It is possible that the auto map-out software does not detect the problem, but a manual map-out can be performed (Figure 5-45).

Figure 5-45: Channel Mapout

There is a very thin yellow line at the top of the channel mapout screen (Figure 5-45).

Manually mapping out a channel involves using the up and down arrow buttons on the operator control panel to move the yellow line one channel at a time or using the Page Up and Page Down buttons to move 64 channels each time.

To manually map out a channel:

1. Use P to select the energy (high or low).
2. Use 2 or 8 to select the channel to be mapped out. A yellow cross will point out the data of selected channel.
3. When only one energy is displayed, the cross hair will be at the data of the selected channel.
4. When both energies are displayed, the cross hair will be in the middle of data of the two energies.
5. Use 5 to map out the channel at the cross hair.
6. The position of the mapped out channel will be highlighted by a black horizontal line (Figure 5-46 shows both the moved yellow line and two black lines from previously mapped channels).

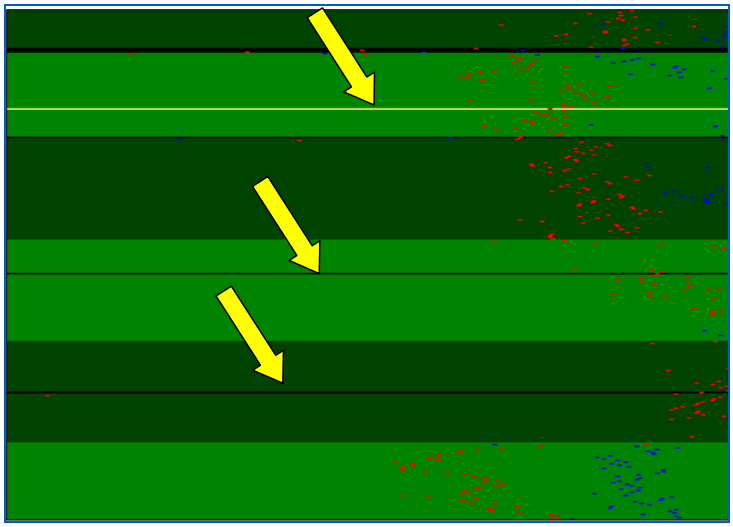

Figure 5-46: Mapped Channels

7. Use "Save Gain" (green button) to save the current setting of the DAB's gain.
8. Use "Cancel Gain" (red button) to discard the current changes.

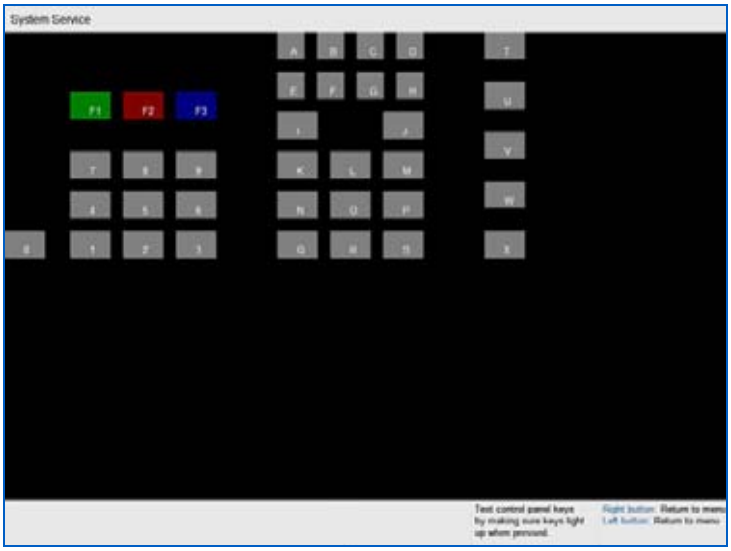

Figure 5-47: Control Panel Test

Figure 5-47 shows the control panel test screen. To test the control panel and the panel's individual keys, press each key on the control panel one at a time, each time checking to see if that key flashes on the control panel test screen. The flashing of the corresponding key on the screen indicates that that key and its associated function are operative.

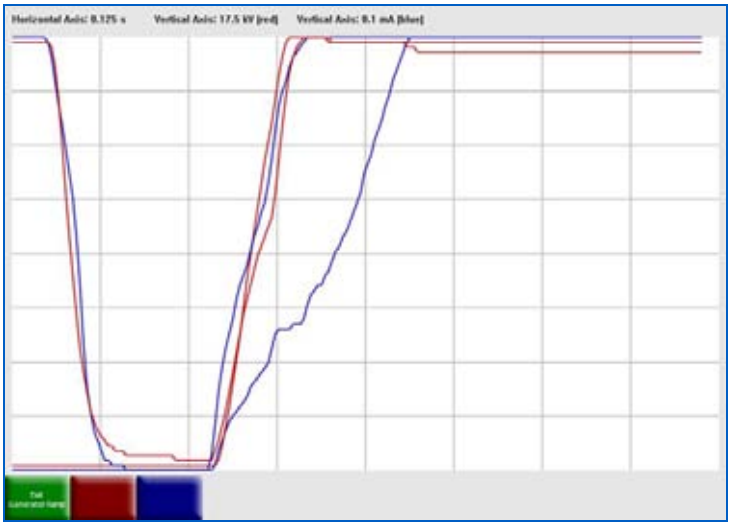

Figure 5-48: Generator Ramp

Figure 5-48 shows the Generator Ramp screen. This screen measures the ramp up time for the X-ray generator's kV and mA when the generator begins generating X-rays. Most Rapiscan 6xx series X-ray machines use 140kV generators. If a customer requests it, a 160kV generator is used instead. If a 140kV generator takes significantly longer than .5 seconds to ramp up, this is an indication of a malfunction with the generator. If a 160kV generator takes significantly longer than .75 seconds to ramp up, this is also an indication of a malfunctioning generator.

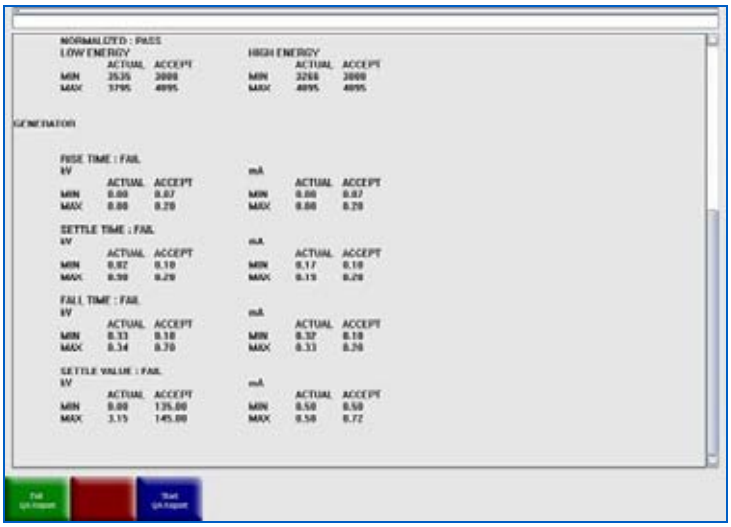

Figure 5-49: QA Report

Figure 5-49 shows the QA Report screen. This report shows the actual and acceptable values for a number of generator functions, including Rise Time, Settle Time, Fall Time and Settle Value.

Figure 5-50: Radiation Survey

Figure 5-50 shows the Radiation Survey which is a simple set of instructions for carrying out such a survey.

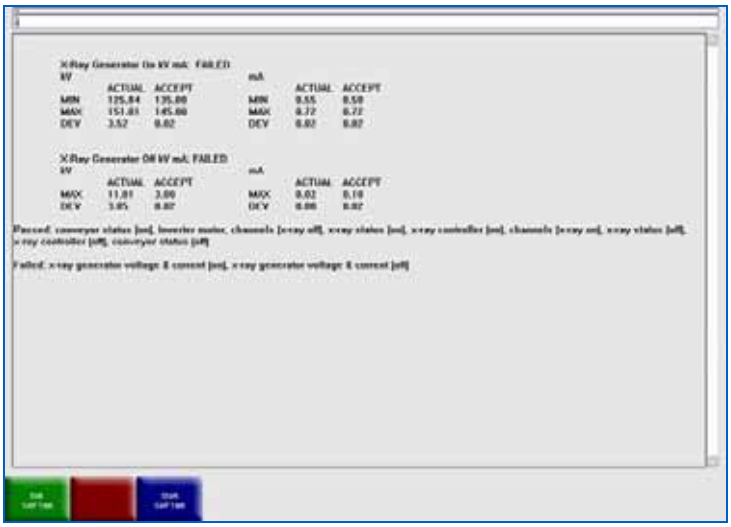

Figure 5-51: Self Test

Figure 5-51 shows the Self Test screen. This shows the actual and acceptable X-ray Generator kV and ma values while the generator is on and when it's off. It also lists a pass/fail report for various components such as inverter motor, channels (with x-rays off), x-ray controller and conveyor.

Figure 5-52: System Burn-in

Figure 5-52 shows the System Burn-in screen. Selecting the "Start Burn-in" button will cause the system to begin the burn-in process. The burn-in process lasts 24 hours once it is started, although it is possible to terminate the burn-in at anytime and obtain a partial burn-in report.

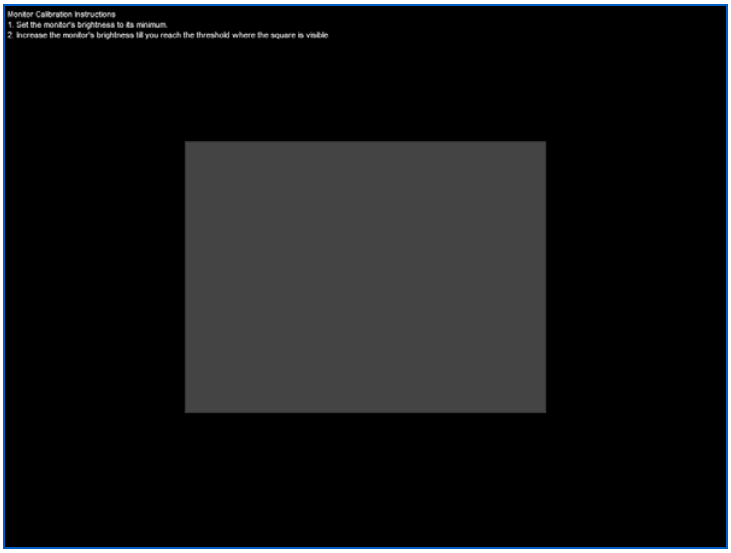

Figure 5-53: Video Test Screen

Figure 5-53 shows the Video Test Screen along with instructions on how to adjust your monitor's image clarity by using the test screen.

5.10 User Management

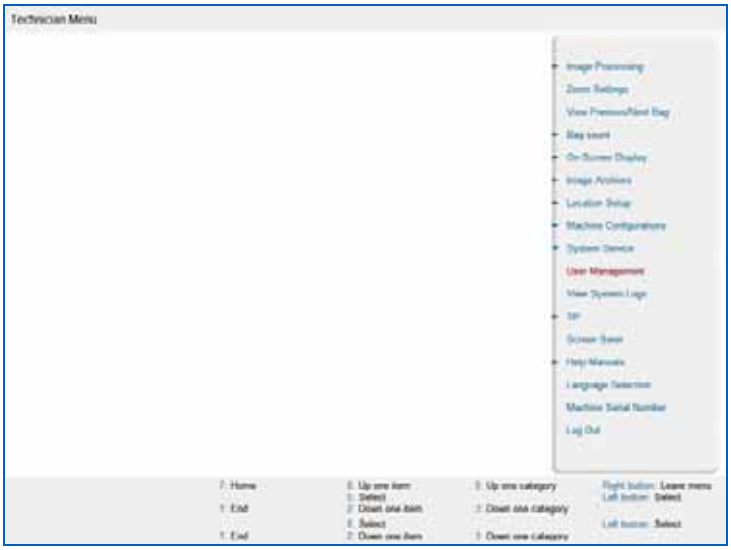

Figure 5-54: User Management

Figure 5-54 shows the User Management option. Selecting this option brings you to the screen shown in Figure 5-55. The Users Window allows users' info to be added, deactivated, modified, activated, deleted, listed, imported and exported (Figure 5-56, Figure 5-57, Figure 5-58, Figure 5-59).

Figure 5-55: Users

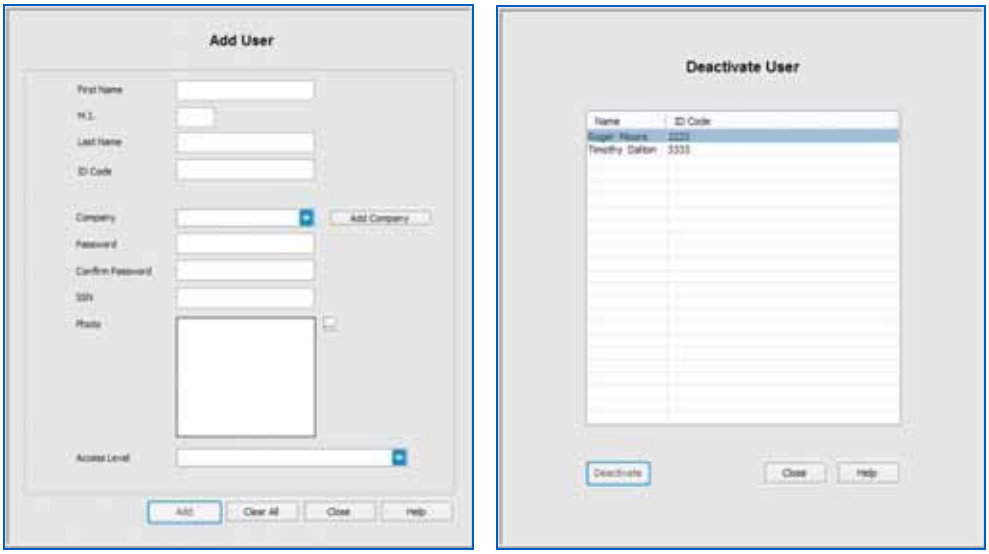

Figure 5-56: Add User / Deactivate User

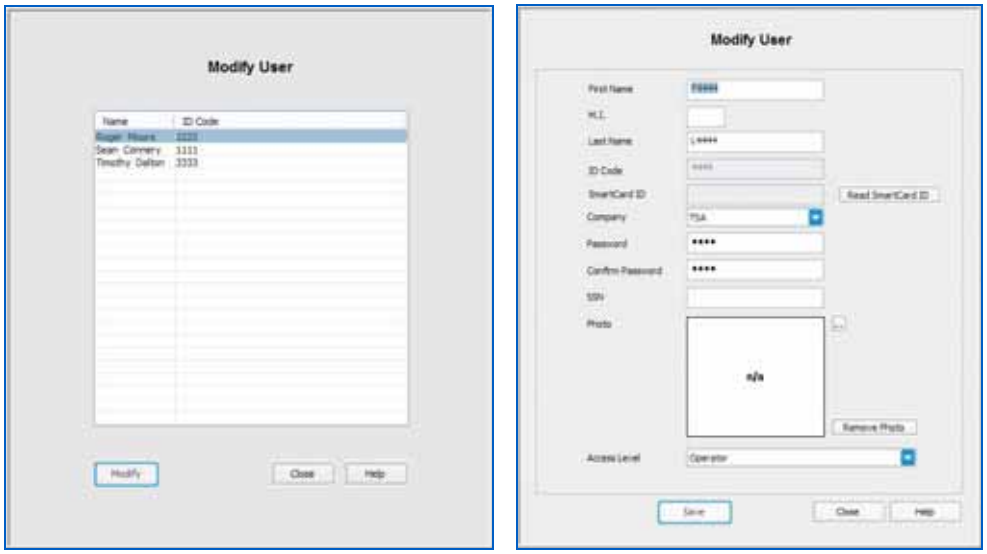

Figure 5-57: Modify User

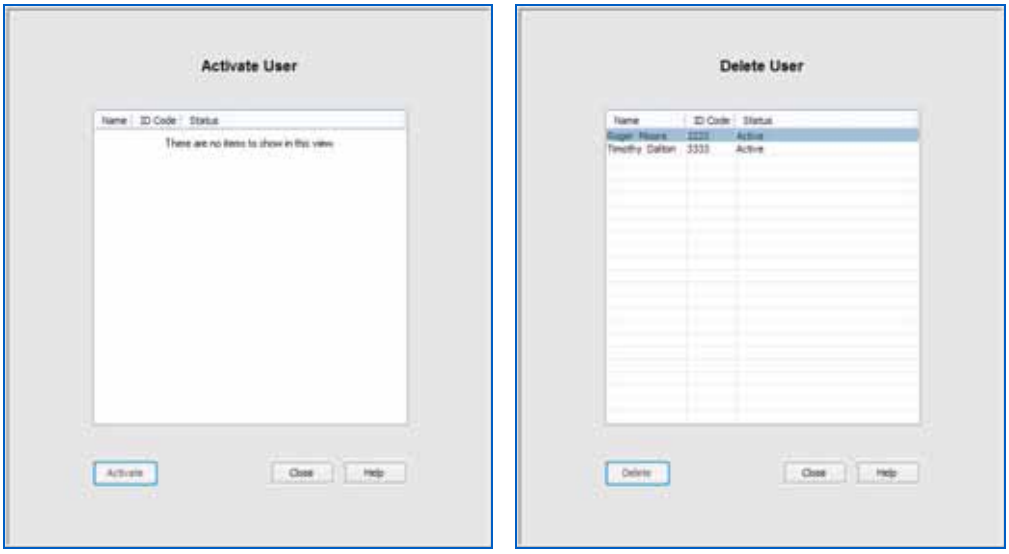

Figure 5-58: Activate/Delete User

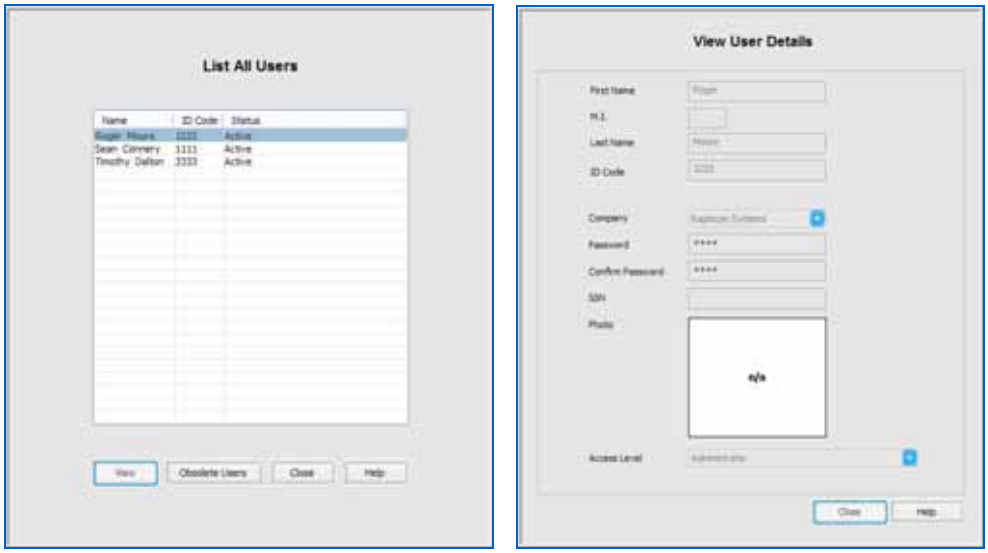

Figure 5-59: List/View User

5.11 View System Logs

Figure 5-60: View system Logs

Figure 5-60 shows the View System Logs option. When selected, this option leads to the View System Logs screen (Figure 5-61), which contains reports on the system status, such as X-ray on or off, System Calibration and belt on or off.

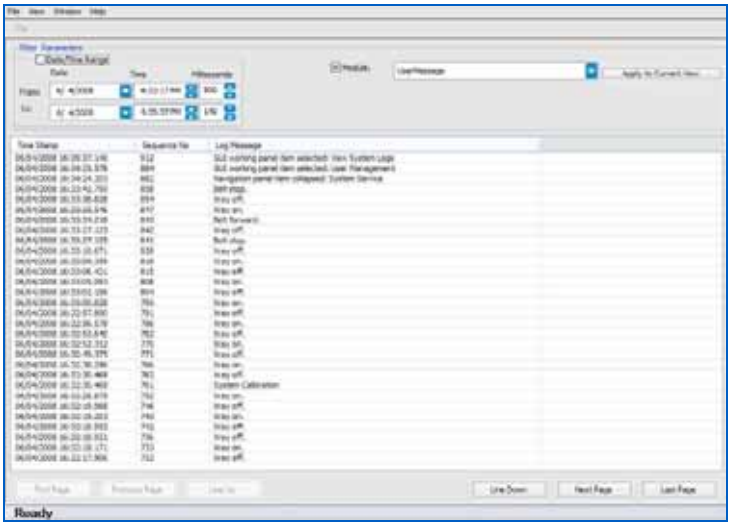

Figure 5-61: View System Logs Screen

5.12 TIP

Figure 5-62 shows the TIP (Threat Image Projection) option. Selecting the Manage Report Data suboption leads to the screen shown in Figure 5-63.

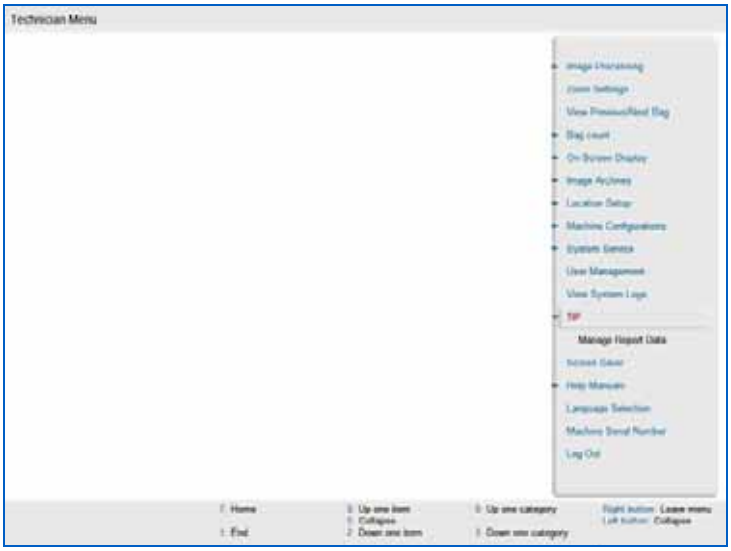

Figure 5-62: TIP

5.12.1 Manage Report Data

Figure 5-63 shows the Report Data screen. Selecting "Download Data Files" brings up the screen shown in Figure 5-64.

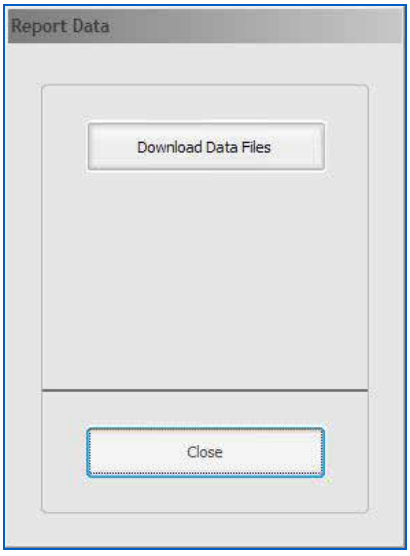

Figure 5-63: Report Data

Figure 5-64 shows the screen that allows the user to download reports from:

- Screener log report
- Individual screener performance report
- Screener comparison report
- Threat detection by category report
- Access history report
- All reports

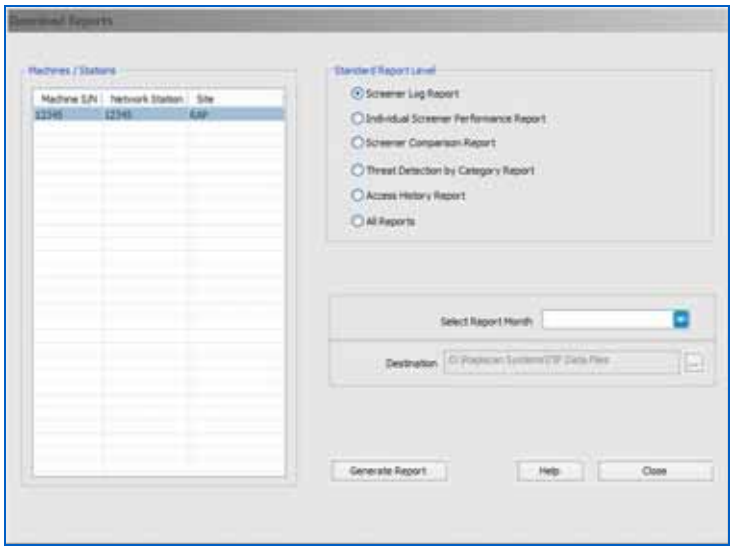

Figure 5-64: Download Reports

5.13 Screen Saver

Figure 5-65 shows the Screen Saver option which allows the user to disable or enable the "require login" function and to either disable or set the login wait function.

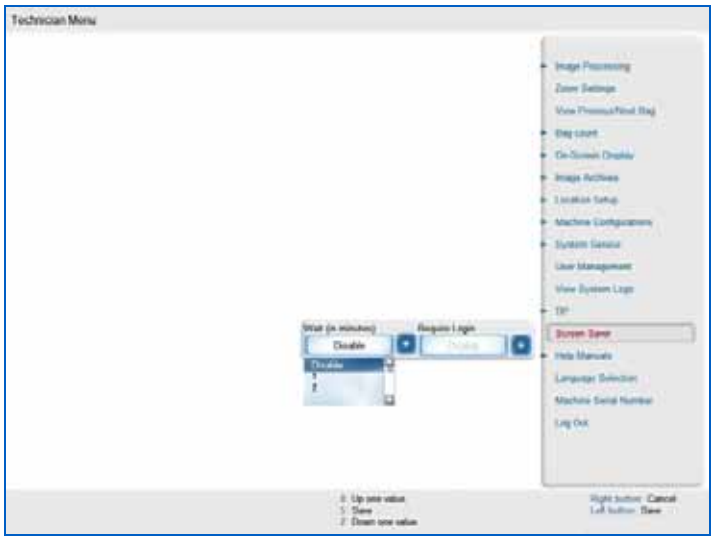

Figure 5-65: Screen Saver

5.14 Help Manuals

Figure 5-66 shows the Help Manuals option and the "Operator and Supervisor Manual" suboption.

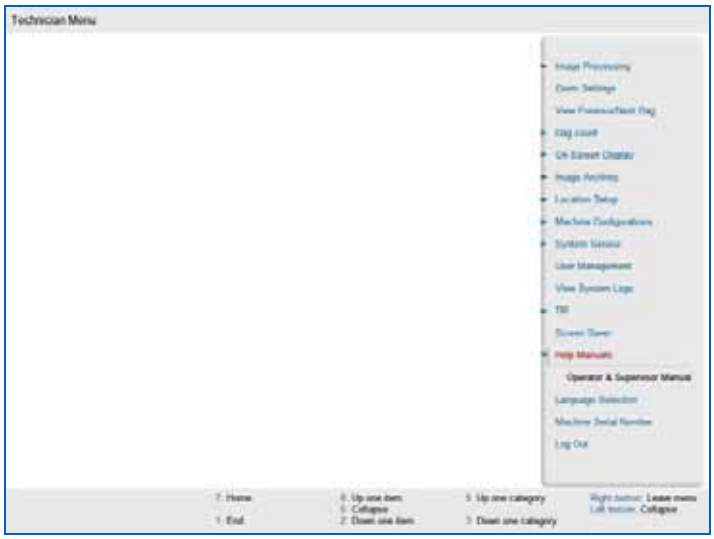

Figure 5-66: Help Manuals

5.14.1 Operator & Supervisor Manual

Selecting "Operator and Supervisor Manual" takes you to the screen shown in Figure 5-67, in this case the Operator's Manual for the 6xx XR machine.

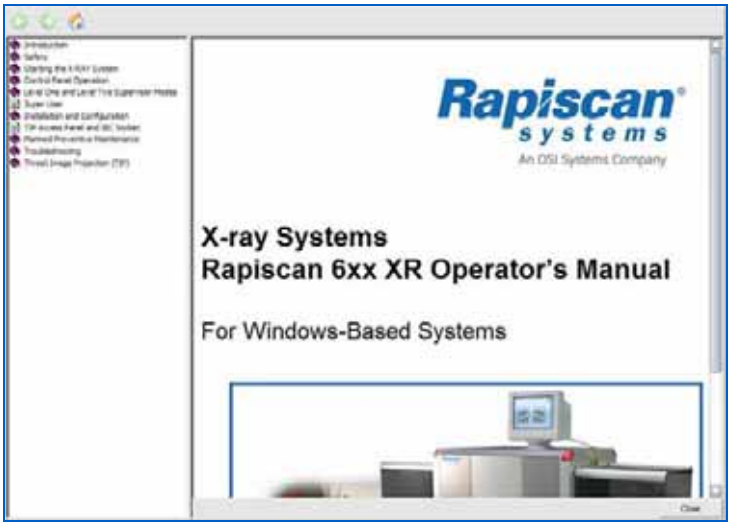

Figure 5-67: Operator's Manual

5.15 Language Selection

Figure 5-68 shows the Language Selection option and the drop down menu of available languages. Contact Rapiscan for the most current list of available languages.

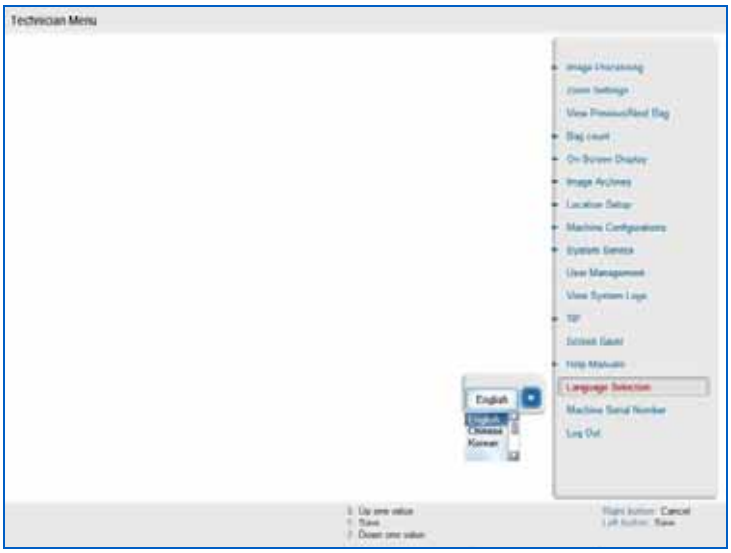

Figure 5-68: Language Selection

5.16 Machine Serial Number

Figure 5-69 shows the Machine Serial Number option. It is important to know this number for record keeping purposes – it is important to know the service and maintenance history of a machine and the machine's serial number is the best way to be able to match a machine with its service/maintenance history.

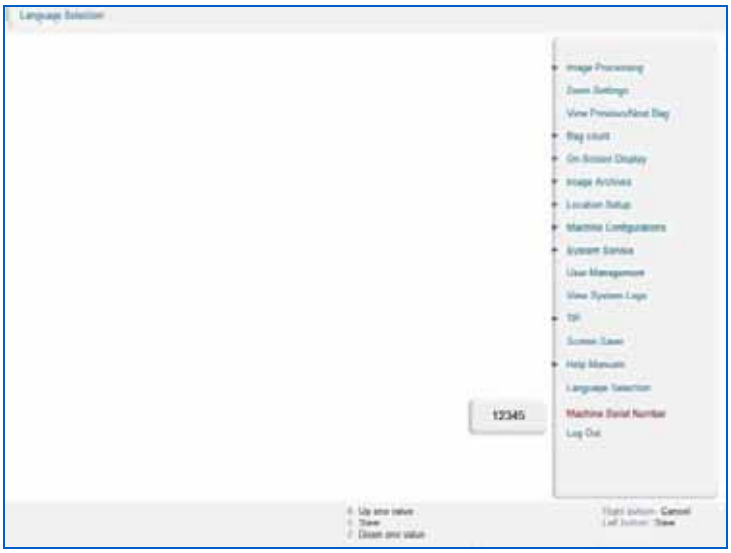

Figure 5-69: Machine serial number

5.17 Log Out

Figure 5-70 shows the Log Out option which logs the user out of the Technician Mode.

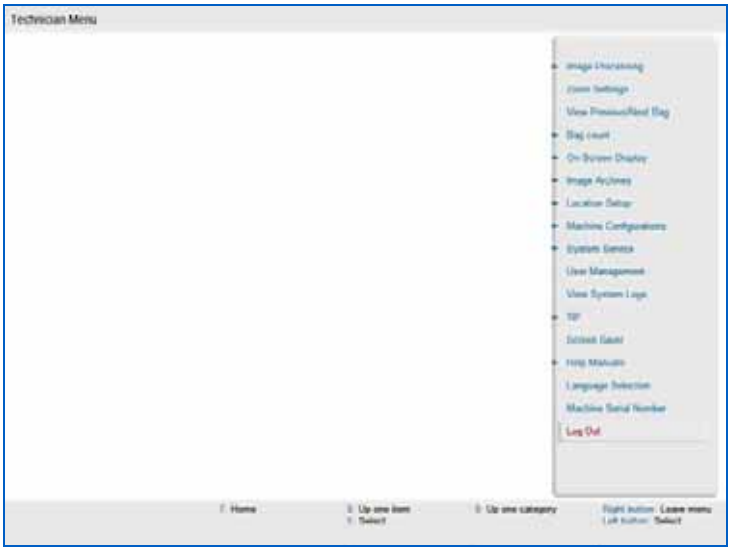

Figure 5-70: Log Out

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6.0 Administrator Menu

Figure 6-1 shows the Login screen. To access the Administrator Menu, type in your Administrator ID and Password in the appropriate fields on the Login screen. This will cause the main screen to appear as shown in Figure 6-2.

Figure 6-1: Login Screen

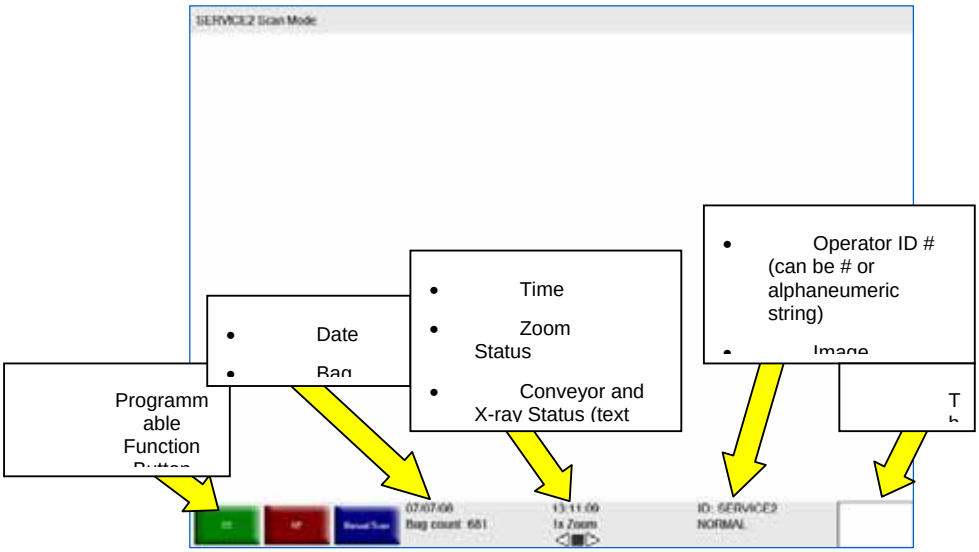

Figure 6-2: Main Operation Screen

Left-clicking on the main screen (Figure 6-2: Main Operation Screen) brings up the Administrator menu (Figure 6-3: Administrator Menu). This menu allows the supervisor to change specific settings for the 6xx XR. Right-clicking on the screen will collapse a menu item one step at a time.

6.1 Image Processing

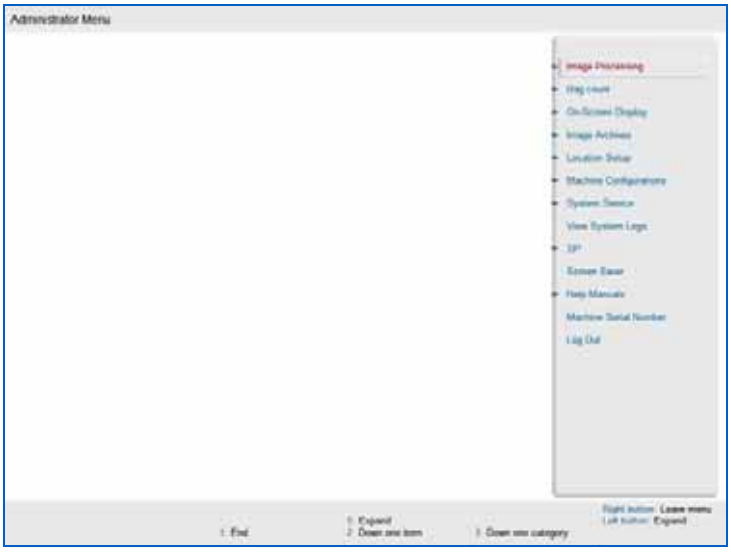

Figure 6-3: Administrator Menu

Figure 6-4 shows the first item in the Supervisor menu, "Image Processing Mode."

6.1.1 Mode

Selecting "Image Processing" expands that section to show "Mode," "Bind Processing Functions" and "Auto Reset On Scan." Selecting "Mode" is brings you to the screen shown in Figure 6-5: Image Processing – Mode.

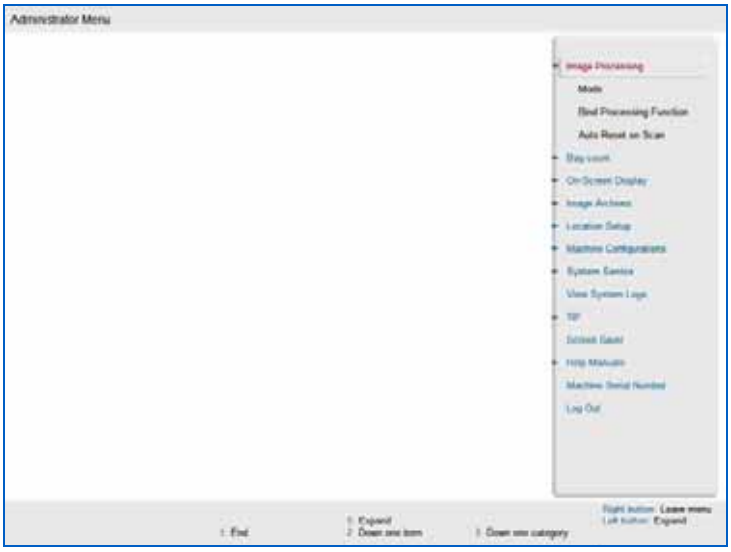

Figure 6-4: Image Processing

"Mode" includes a number of menu items that control the appearance of a scanned image:

- High Penetration
- Black & White
- Crystal Clear
- Inorganic Material
- Organic Material
- Inverse Color
- Edge Enhancement
- Gamma
- Color Stripping
- Density Zoom

Each of these menu items, when selected, offer three choices:

- Stop mode
- Disable/Enable
- Real-Time Mode

This determines whether a particular image enhancement, such as High Penetration, operates only in stop mode or in both stop mode and "real-time" mode and also whether the enhancement is enabled or disabled altogether.

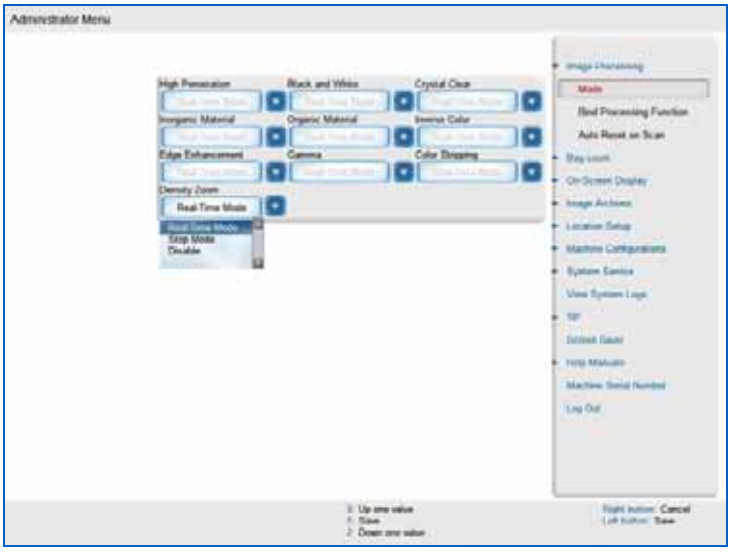

Figure 6-5: Image Processing – Mode

6.1.2 Bind Processing Function

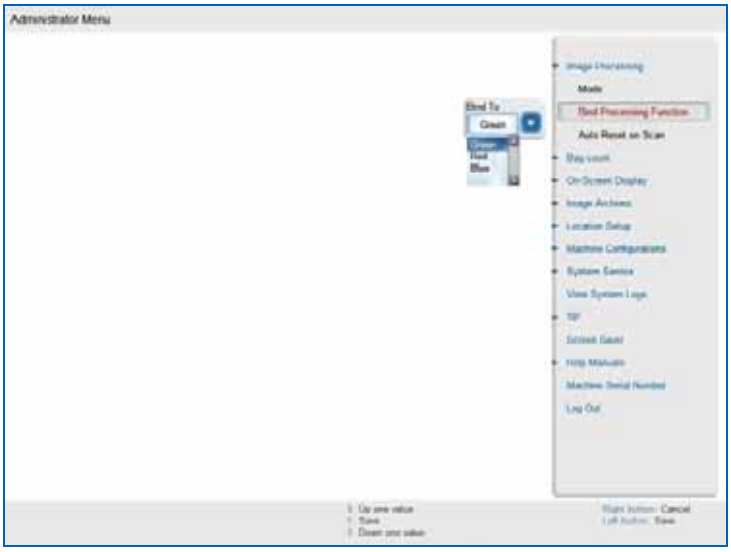

Figure 6-6: Image Processing – Bind Processing Function

The Bind Processing Functions button (Figure 6-6) allows the Operator to assign multiple image processing functions to individual function keys.

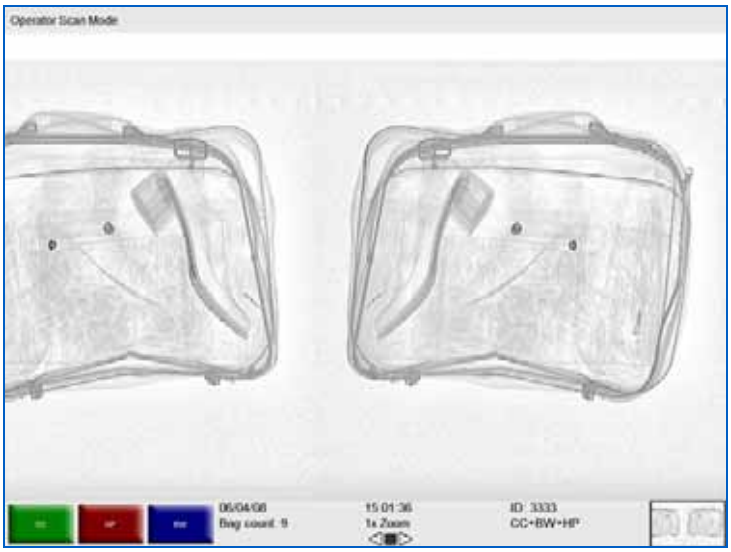

Figure 6-7: Scanned Image

To make use of the Bind Processing Functions function:

1. Obtain a scanned image.
2. Apply one or more image processing functions to the image. In Figure 6-7, for example, the operator here has applied CC, BW and HP to the image.

3. Click the left Touchpad button, which brings up the Administrator Menu (Figure 6-3).
4. Using the Touchpad, move the cursor down to highlight Image Processing.
5. Select "Image Processing." The full Image Processing menu will be revealed, including the Bind Processing Functions button (Figure 6-8).
6. Using the Touchpad, move down to highlight the Bind Processing Functions button.
7. Select Bind Processing Functions and the drop down menu will appear (Figure 6-8).

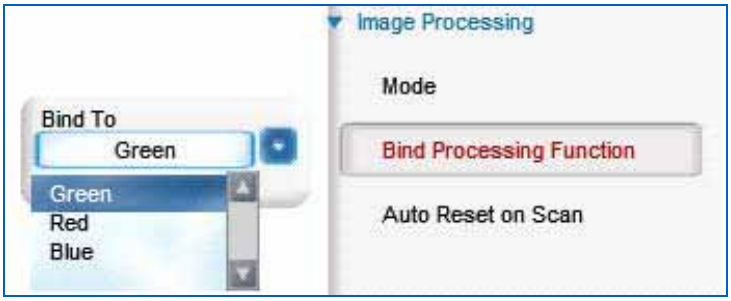

Figure 6-8: Image Processing – Bind Processing Functions

8. Choose the colored button to which you want to assign the image functions you've just applied to the scanned image (Green, Red or Blue).
9. Right-click until you return to the main screen (without the main menu showing) where you'll see that the functions you chose have been assigned to the function button you selected.

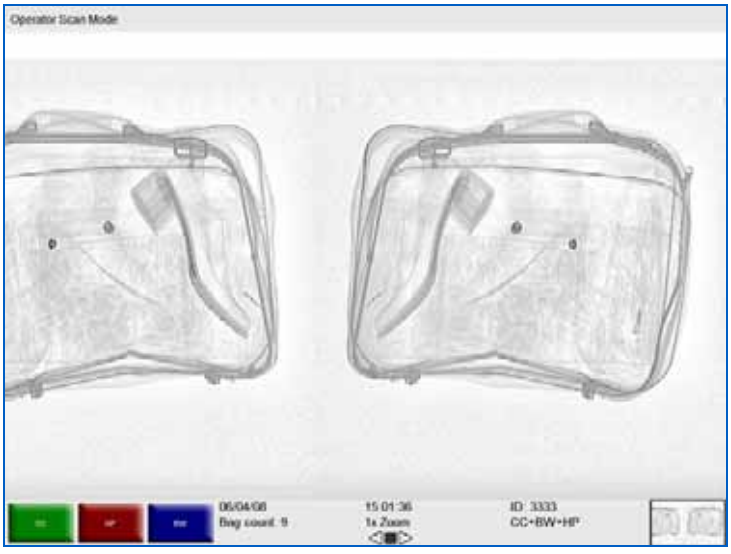

Figure 6-9: Multiple Image Processing Functions

Figure 6-9 shows the blue button now representing the CC, B&W and HP functions. Now all three of those functions will be applied to the scanned image whenever the

blue button is selected. Of course an administrator may choose any number of functions to assign to any one of these buttons.

NOTE: Assigning too many functions may prove counterproductive to the quality of the actual image the operator's ability to discern possible threats in the image.

6.1.3 Auto Reset on Scan

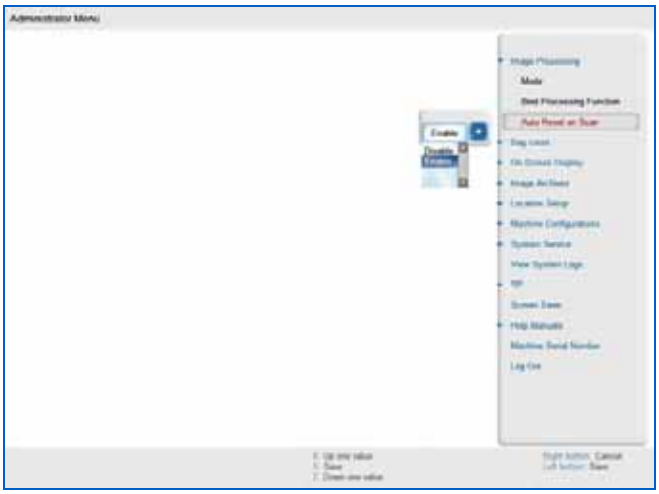

Figure 6-10: Image Processing – Auto Reset on Scan

Figure 6-10 shows the third and final item under "Image Processing," and that is the Auto Reset on Scan function. When enabled, this function resets the image processing functions to normal each time a new item is scanned. Note the Enable and Disable options.

6.2 Bag Count

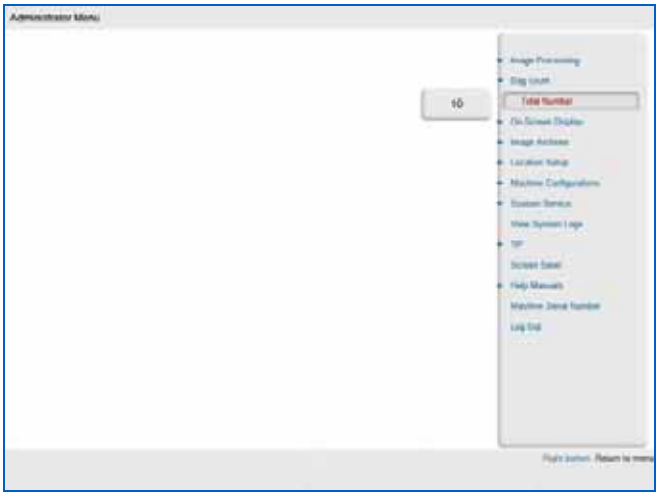

Figure 6-11: Bag Count - Total Number

6.2.1 Total Number

Figure 6-11 shows the Bag Count – Total Number option. The Total Number option is fixed; it accumulates and cannot be adjusted in this mode.

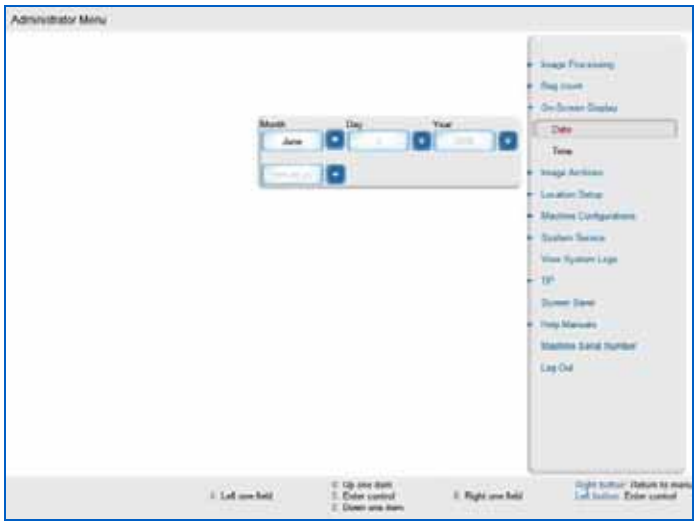

Figure 6-12: On-Screen Display – Date

6.3 On-Screen Display

6.3.1 Date

Figure 6-12 shows the On-Screen Display - Date readout, which can be displayed on screen in one of three formats: month/day/year; year/month/day and; day/month/year.

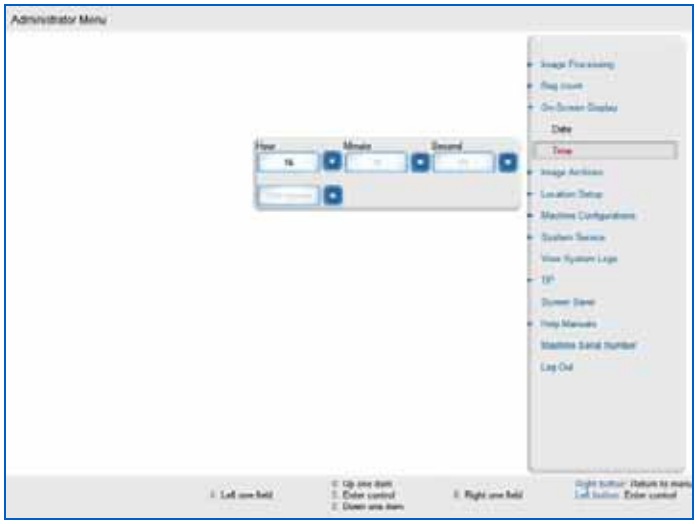

Figure 6-13: On-Screen Display – Time

6.3.2 Time

Figure 6-13 shows On-Screen Display: Time. The time can be displayed in 12 hour or 24 hour format.

6.4 Image Archives

Figure 6-14 shows the Image Archives option and the four associated suboptions.

NOTE: Auto Archive is an optional program that automatically archives scanned images, as opposed to having to Manual Archive which is a standard feature.

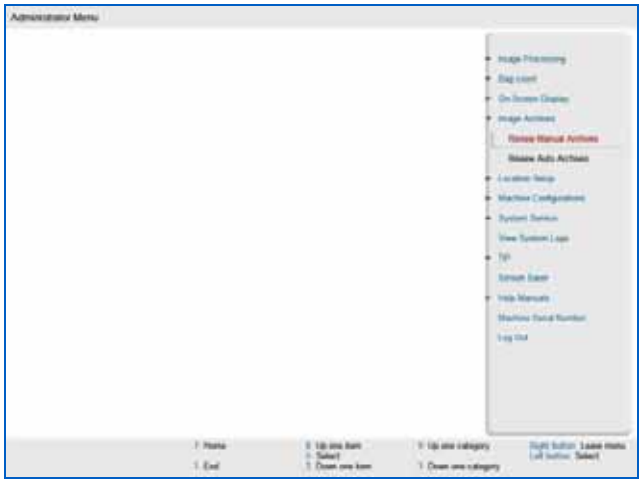

Figure 6-14: Review Manual Archives

6.4.1 Review Manual Archives and Review Auto Archives

Selecting either option will cause the Filter Options screen shown in Figure 6-15 to appear. This screen allows you to determine the criteria that can be used to search the manually or auto archived images – such as operator ID, Site and Date options.

NOTE: Auto Archive is an optional program that automatically archives scanned images, as opposed to having to Manual Archive which is a standard feature.

Figure 6-15: Filter Options

Selecting "OK" on the Filter Options screen (whether in Review Manual Archives or Review Auto Archives mode) brings you to the Archive Reviewer screen shown in Figure 6-16.

Figure 6-16: Archive Review screen

Left clicking on the mouse button brings up the Archive Reviewer menu as shown in Figure 6-17.

Figure 6-17: Archive Review mode menu

Figure 6-17 shows the Image Information option highlighted. Selecting this option brings up the Image Information screen shown in Figure 6-18 which includes Operator ID, name, site, machine serial number, etc.

Figure 6-18: Image Information screen

Figure 6-19 shows the Export Images option highlighted. Selecting this option brings you to the Export Images screen shown in Figure 6-20.

Figure 6-19: Export Images option

Figure 6-20 shows the Export Images screen which allows you to choose which images and which types of images you export. Click "Browse" to select the directory or medium to which to export the images.

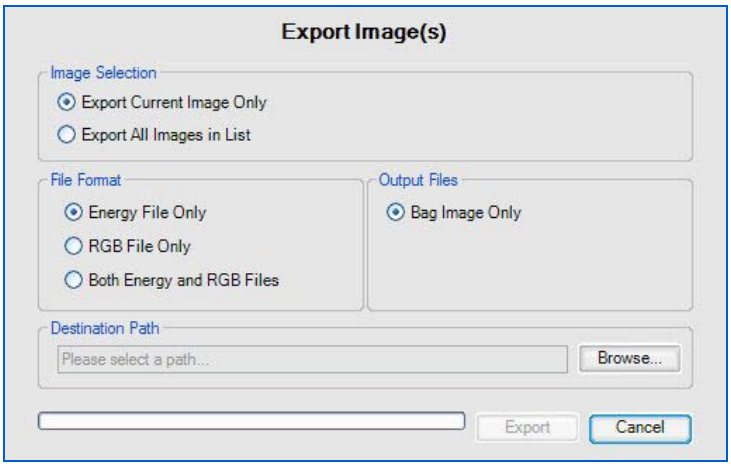

Figure 6-20: Export Images screen

If there are no archived images, you will see a blank screen in Review Archive mode. Left clicking on that screen will bring up the menu shown in Figure 6-21.

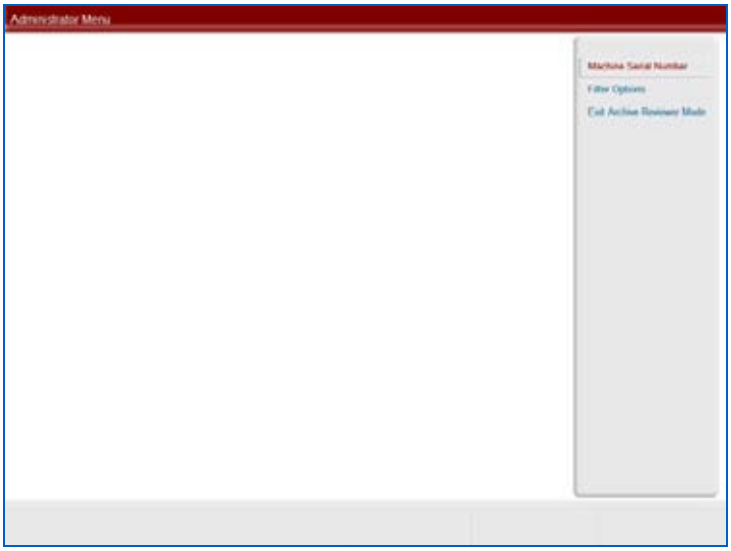

Figure 6-21: Archive Reviewer Mode

6.5 Location Setup

Figure 6-22 shows the Location Setup option.

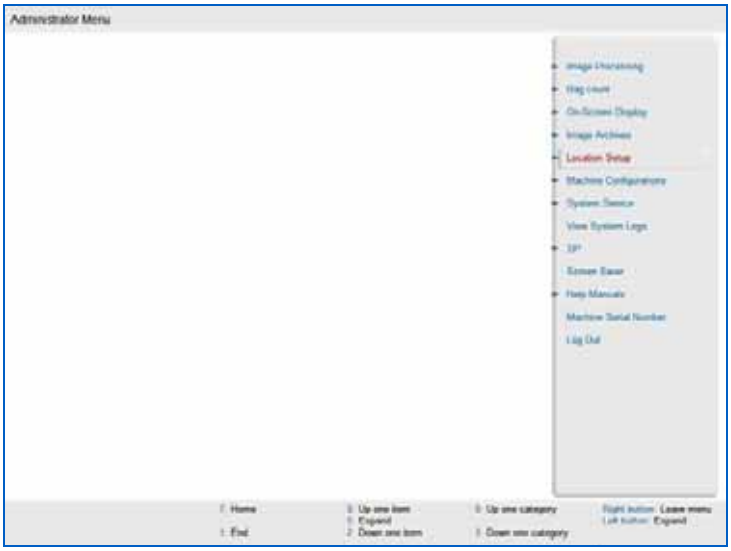

Figure 6-22: Location Setup

Figure 6-23 shows the Site and Station suboptions.

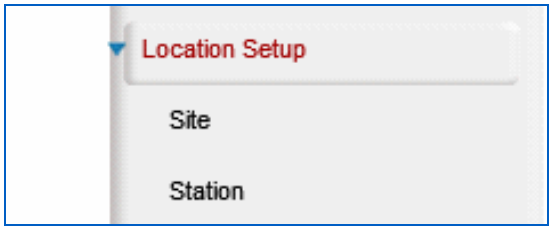

Figure 6-23: Location Setup Suboptions

6.5.1 Site

Selecting "Site" brings you to the screen shown in Figure 6-24.

Figure 6-24: Site

Selecting "Modify" brings you to the screen shown in Figure 6-25. Selecting "Modify" again brings you to the screen shown in Figure 6-26.

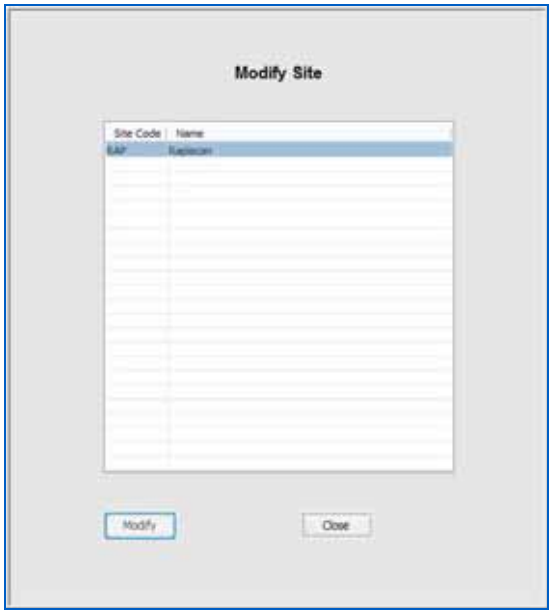

Figure 6-25: Modify Site

Figure 6-26 shows the screen on which modifications can be made to the Site data.

Figure 6-26: Modify Site

Selecting "List All" from the screen shown in Figure 6-24 brings you to the screen shown in Figure 6-27.

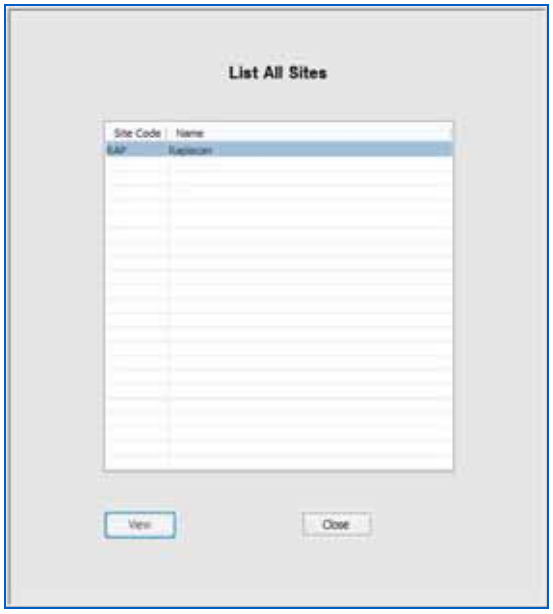

Figure 6-27: List All Sites

Selecting "View" brings you to the screen shown in Figure 6-28 which allows the user to view site data.

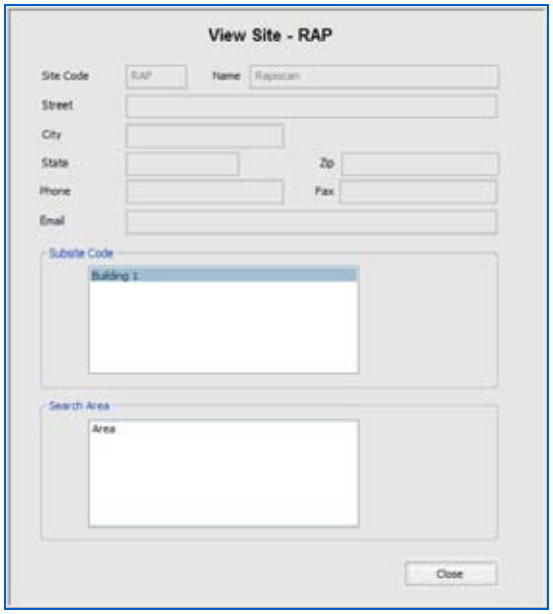

Figure 6-28: View Site

6.5.2 Station

Selecting "Station" from the screen shown in Figure 6-23 brings you to the screen shown in Figure 6-29.

Figure 6-29: Station

Selecting "Modify" on the screen shown in Figure 6-29 and then on the screen shown in Figure 6-30 brings you to the screen shown in Figure 6-31, where the modifications to Station data can be made.

Figure 6-30: Modify Station

Figure 6-31: Modify Station

6.6 Machine Configurations

Figure 6-32 shows the Machine Configurations option.

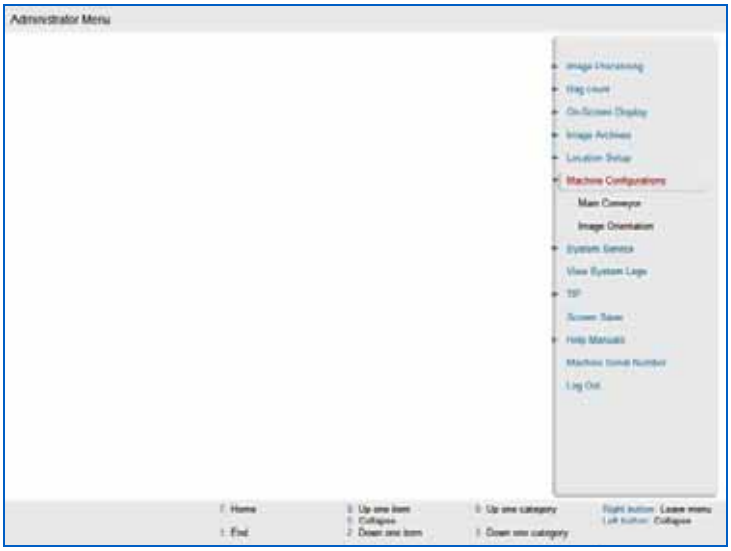

Figure 6-32: Machine Configurations

6.6.1 Main Conveyor

Figure 6-33 shows the Main Conveyor option which controls Swap/Unswap Belt, Scan Direction and Scroll Direction.

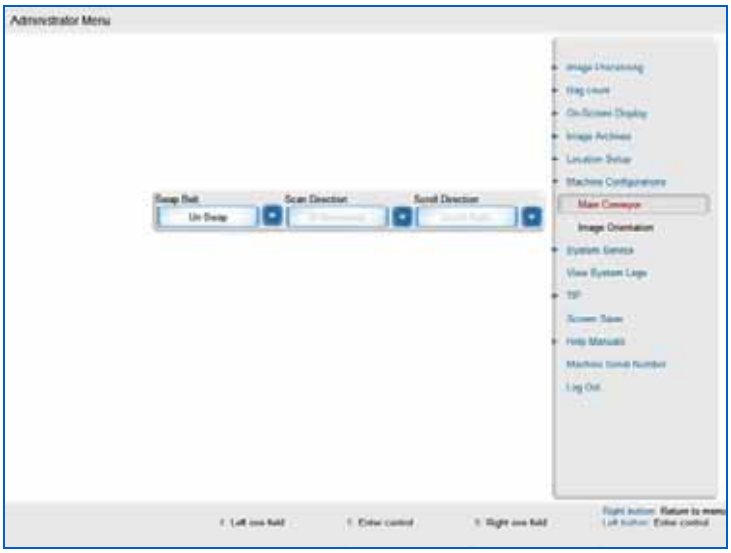

Figure 6-33: Main Conveyor

6.6.2 Image Orientation

Figure 6-34 shows the Image Orientation option. This determines whether an image is in a normal or vertically flipped orientation.

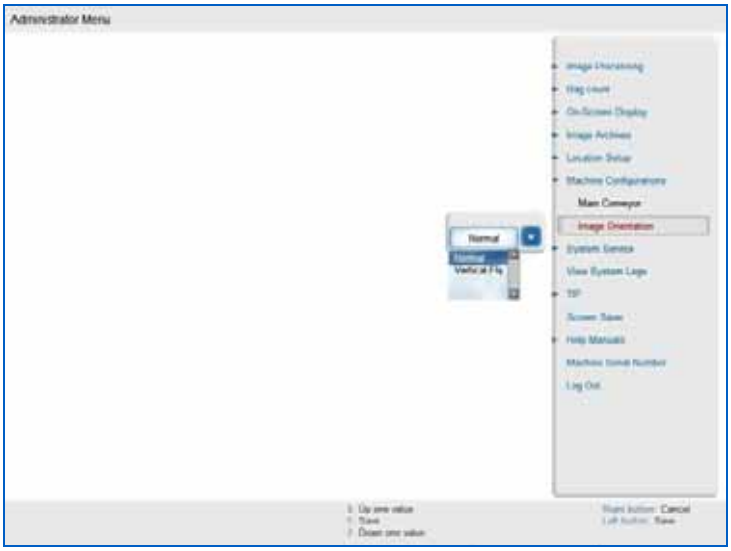

Figure 6-34: Image Orientation

6.7 System Service

Figure 6-35 shows the System Service / Diagnostics option.

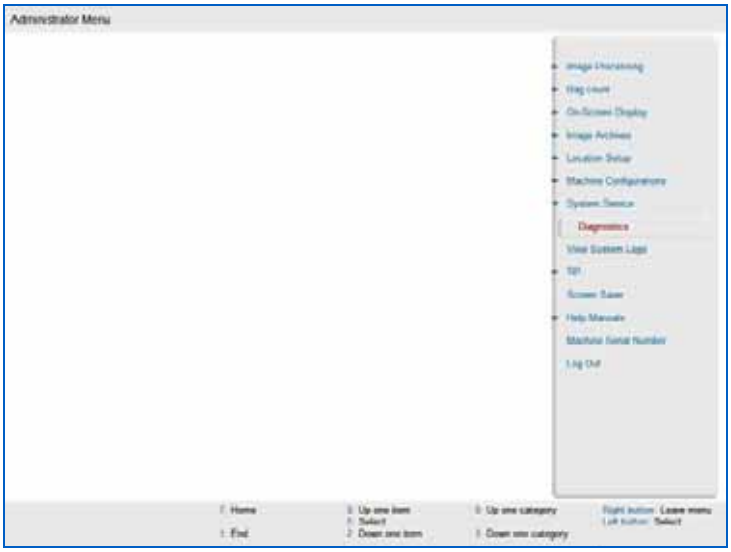

Figure 6-35: System Service - Diagnostics

Selecting "Diagnostics" on the screen shown in Figure 6-35 leads to the screen shown in Figure 6-36, which is not the Diagnostics screen but rather the Radiation Survey, which is a simple set of directions for doing a radiation survey.

The reason that "Diagnostics" defaults to Radiation Survey is that this is the most common function accessed through the Diagnostics link. To access the full Diagnostics menu, click on the green "Exit Radiation Survey" button in the lower left-hand corner of the screen.

Figure 6-36: Radiation survey

6.8 View System Logs

Figure 6-37 shows the System Logs option. Selecting this option brings you to the screen shown in Figure 6-38.

Figure 6-37: View System Logs

Figure 6-38: System Logs

6.9 TIP

Figure 6-39 shows the TIP option along with the TIP Configurations and Library Configurations suboptions.

Figure 6-39: TIP - TIP Configurations

6.10 TIP Configurations

Figure 6-40 shows the TIP Configurations screen. Selecting "Frequency" takes you to the screen shown in Figure 6-41

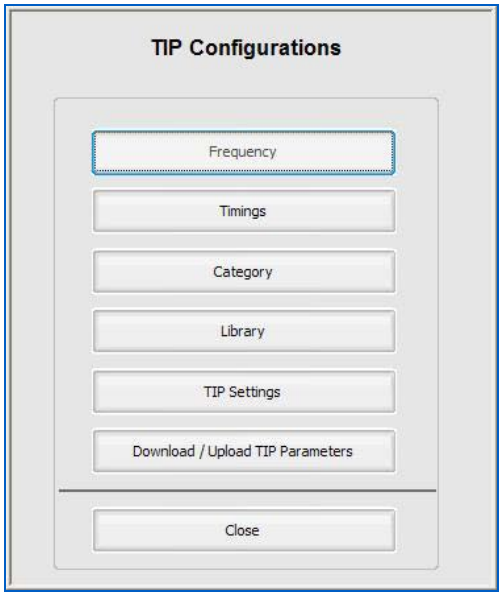

Figure 6-40: TIP Configurations

Figure 6-41 shows the Frequency Configurations screen which allows input for TIP frequency rate, bag range and random ratio.

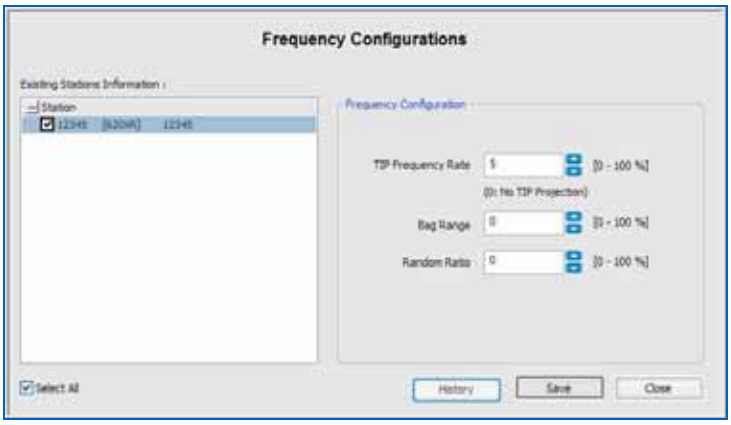

Figure 6-41: Frequency Configurations

Selecting "History" on the screen shown in Figure 6-41 brings up the screen shown in Figure 6-42. This screen shows the frequency rate, bag range and random ratios for each station, as well as a history of when each station was last modified and by whom.

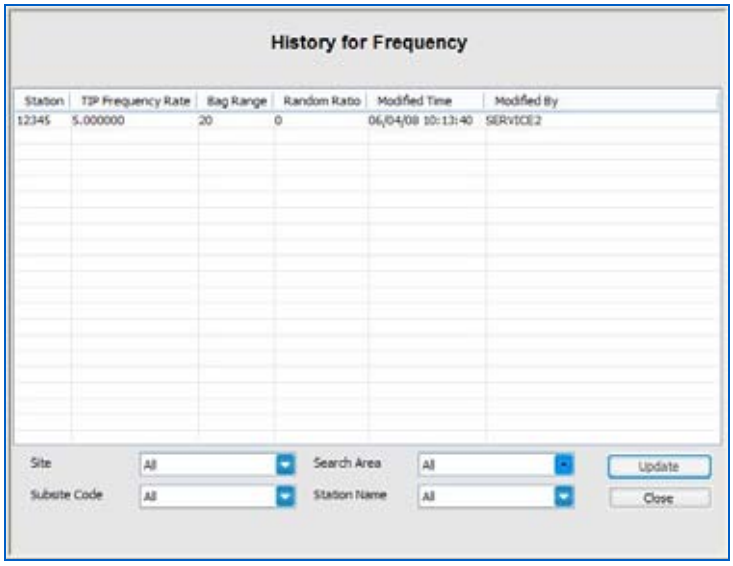

Figure 6-42: History for Frequency

Selecting "Timings" from the TIP Configurations screen shown in Figure 6-40 brings up the screen shown in Figure 6-43. This screen allows manipulation of various timings including:

- Initial Decision Time
- Secondary Decision Time Out
- Response Buffer

- Non-TIP Event Time Out

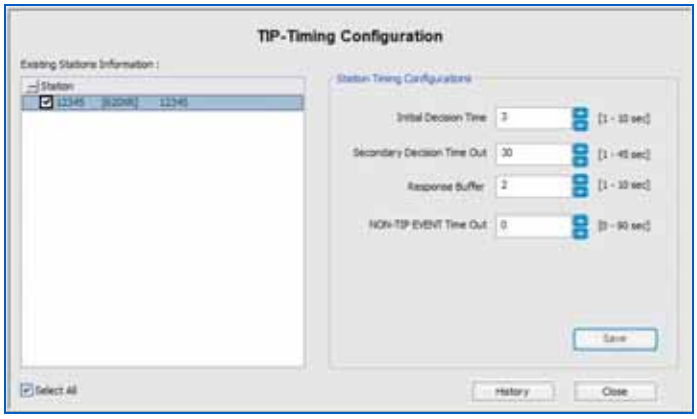

Figure 6-43: TIP Timing Configuration

Selecting "History" brings up the screen shown in Figure 6-44. This screen shows the history of changes made in timings on each station.

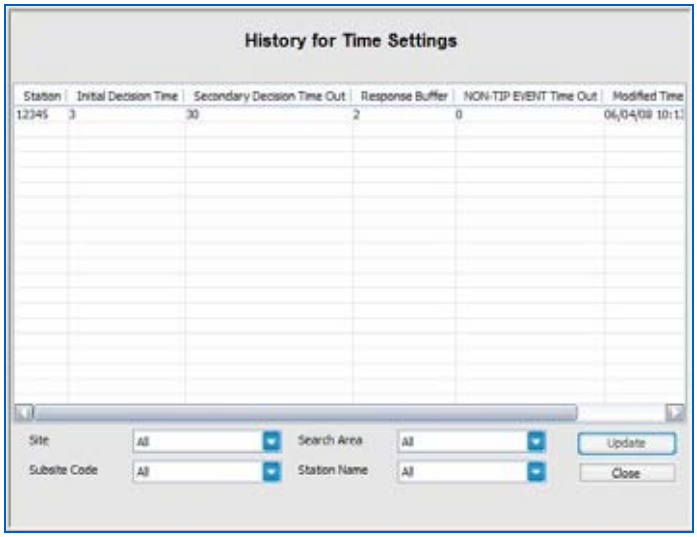

Figure 6-44: History for Time Settings

Selecting "Category" from the TIP Configurations screen (Figure 6-40) brings you to the Station Category Configurations screen shown in Figure 6-45. This screen allows the Administrator to determine ratios of guns to knives to IEDs (Improvised Explosive Device) used in TIP.

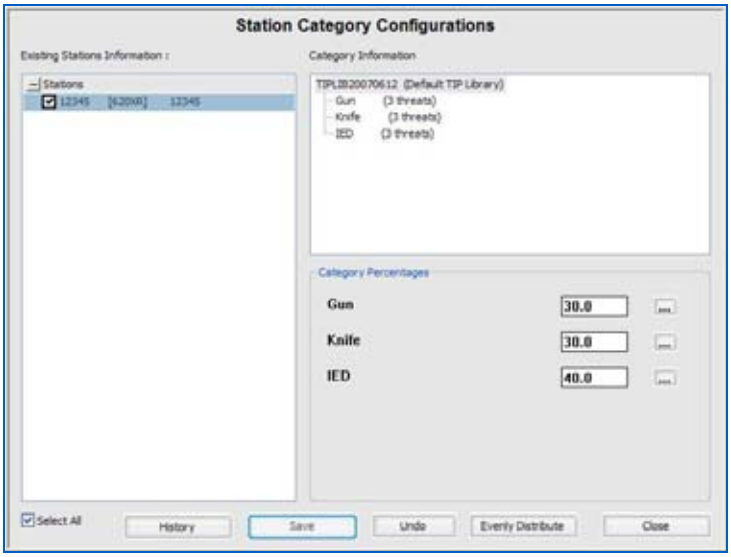

Figure 6-45: Station Category Configurations

Selecting "History" brings up the screen shown in Figure 6-46 which shows the history of changes in category settings per station.

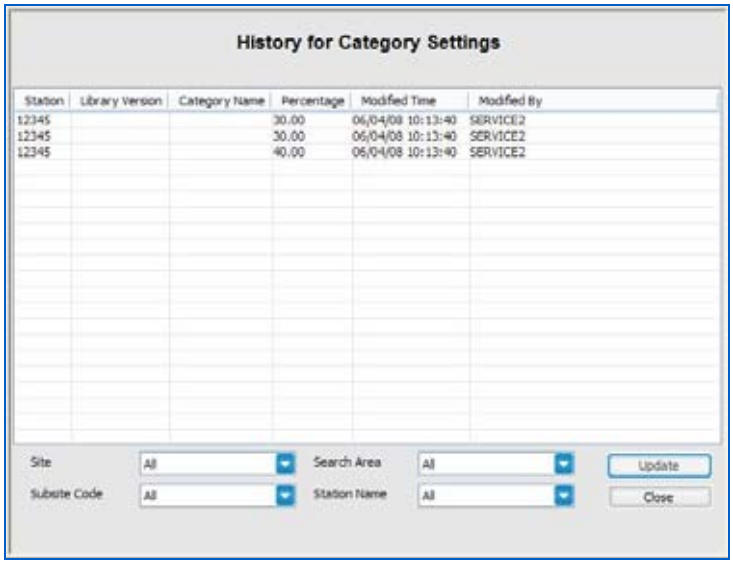

Figure 6-46: History for Category Settings

Selecting "Library" from the TIP Configurations screen shown in Figure 6-40 brings up the screen shown in Figure 6-47. This screen allows the administrator to choose which TIP library is in use on a station-by-station basis.

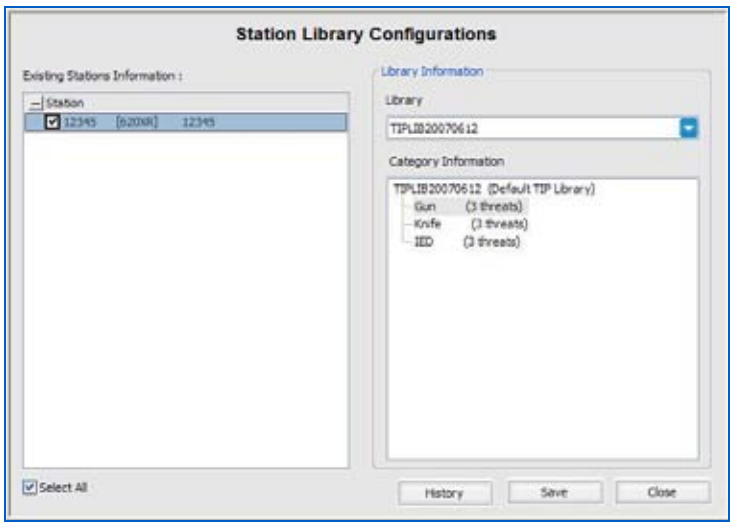

Figure 6-47: Station Library Configurations

Selecting history from the screen shown in Figure 6-47 brings up the screen shown in Figure 6-48

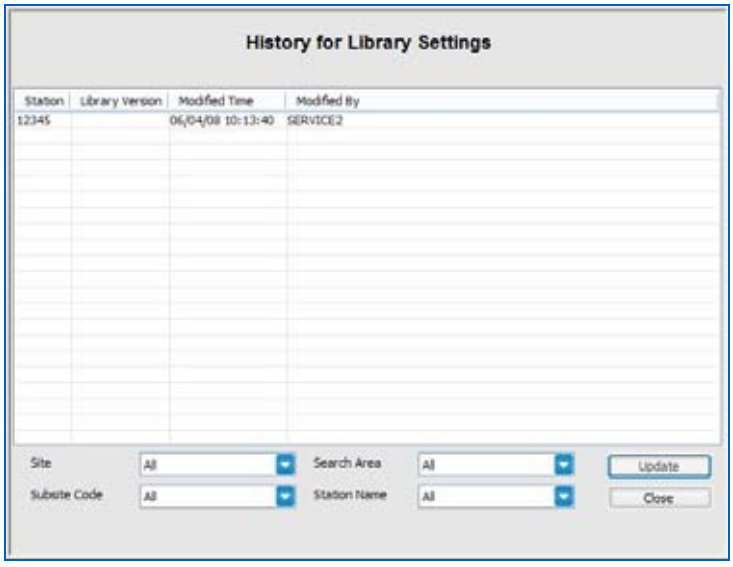

Figure 6-48: History for Library Settings

Selecting "TIP Settings" from the TIP Configurations screen (Figure 6-40) brings up the screen shown in Figure 6-49, which allows an administrator to designate Image Archive and Threat Image Archive Directories per station, enabling or disabling TIP Profiling, Activating Missed TIP Mode and Missed TIP Mode Off Time, as well as Number of Missed TIP Images to keep. Selecting "History" brings up the screen shown in Figure 6-50.

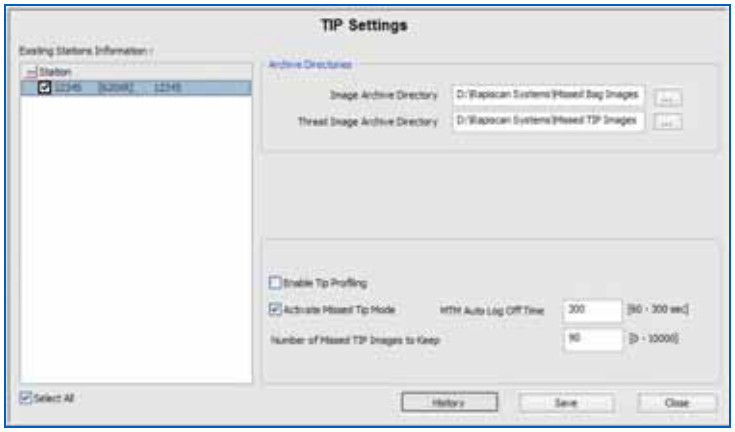

Figure 6-49: TIP Settings

Figure 6-50 shows the screen used to display the history of TIP Setting changes.

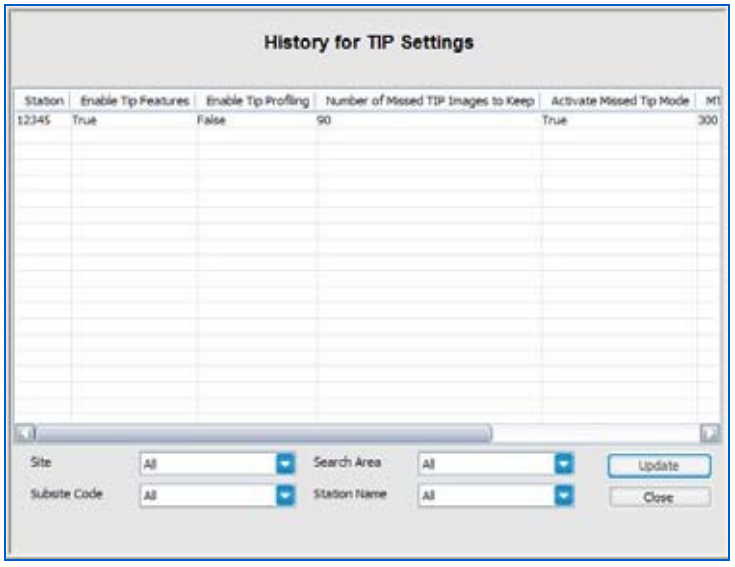

Figure 6-50: History for TIP Settings

Selecting "Download/Upload TIP Parameters" on the screen shown in Figure 6-40 brings up the screen shown in Figure 6-51, which allows an administrator to upload or download Station Configurations from and to individual stations.

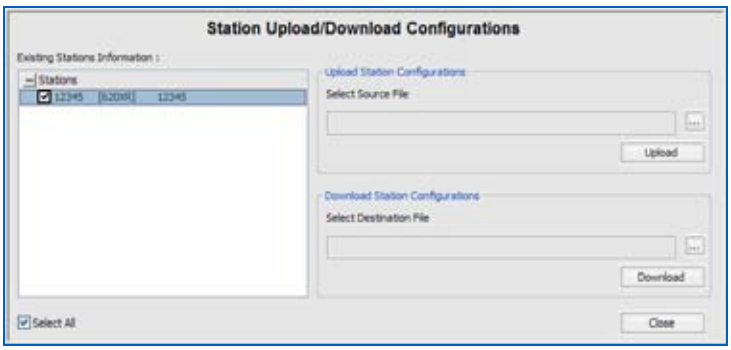

Figure 6-51: Station Upload/Download Configurations

6.10.1 Library Configurations

Selecting Library Configuration from the screen shown in Figure 6-39 brings up the screen shown in Figure 6-52.

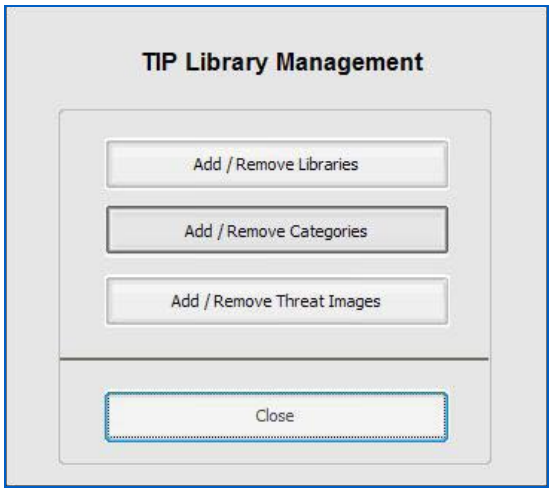

Figure 6-52: TIP Library Management

Selecting "Add/Remove Libraries" from the screen shown in Figure 6-52 brings up the screen shown in Figure 6-53.

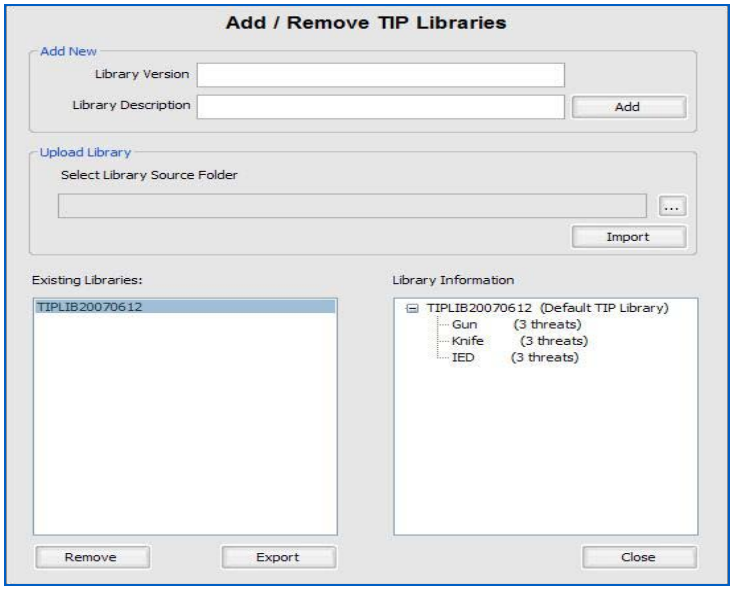

Figure 6-53: Add/Remove TIP Libraries

Selecting "Add/Remove Categories" from the screen shown in Figure 6-52 brings up the screen shown in Figure 6-54.

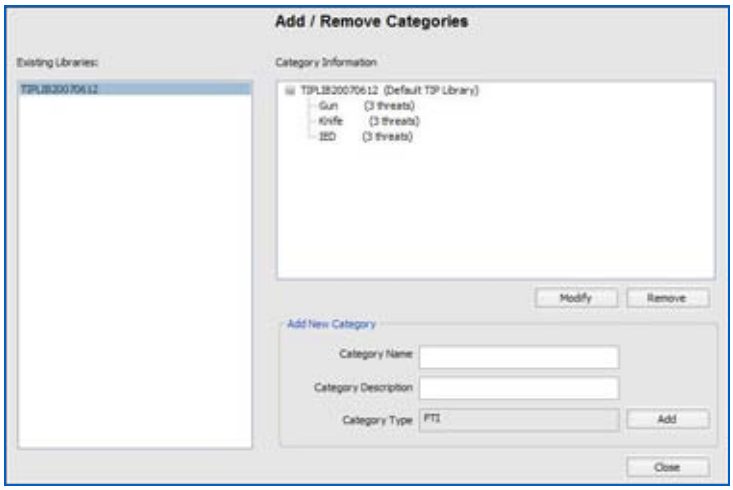

Figure 6-54: Add/Remove Categories

Selecting "Add/Remove Threat Images" from the screen shown in Figure 6-52 brings up the screen shown in Figure 6-55.

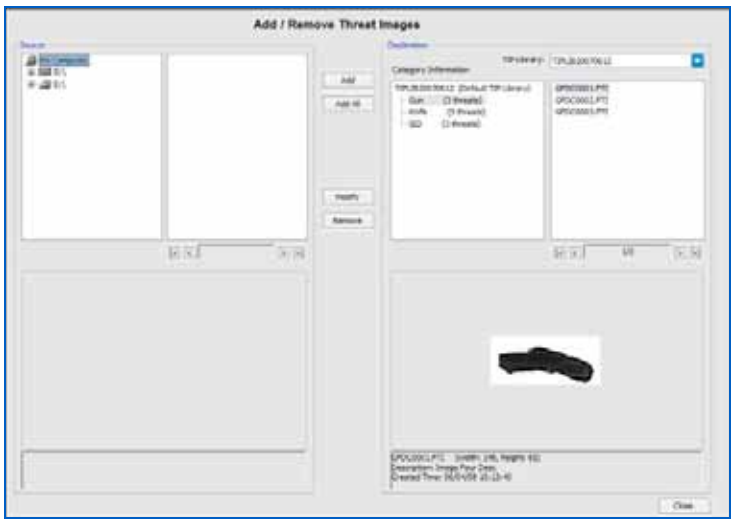

Figure 6-55: Add/Remove Threat Images

Selecting "Modify" from the screen shown in Figure 6-55 brings up the screen shown in Figure 6-56.

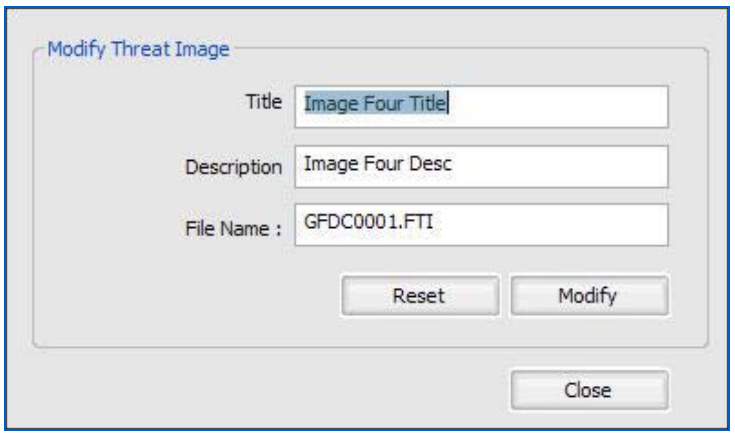

Figure 6-56: Modify Threat Image

6.11 Screen Saver

Figure 6-57 shows the Screen Saver menu. The screen saver can be disabled or made one of two screensavers represented by "1" and "2" on the drop-down menu.

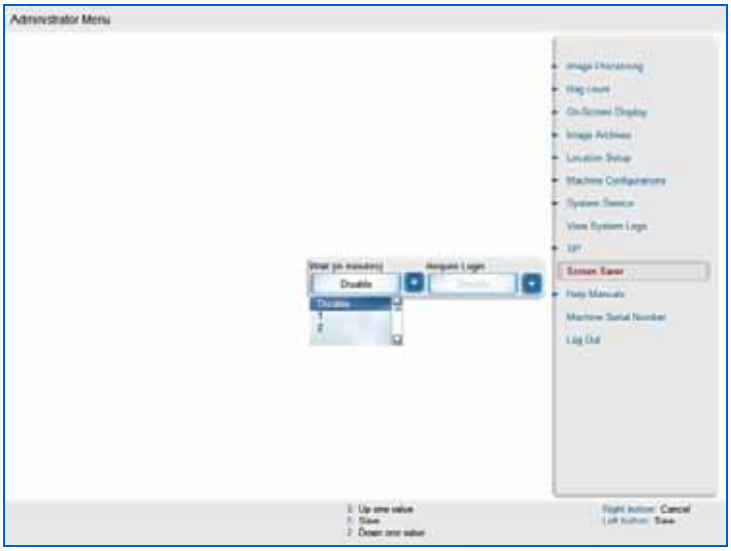

Figure 6-57: Screen Saver

6.12 Help Manuals

Figure 6-58 shows the Help Manuals button and the Operator and Supervisor Manual option. When selected, this brings up the Help Manuals screen (Figure 6-59).

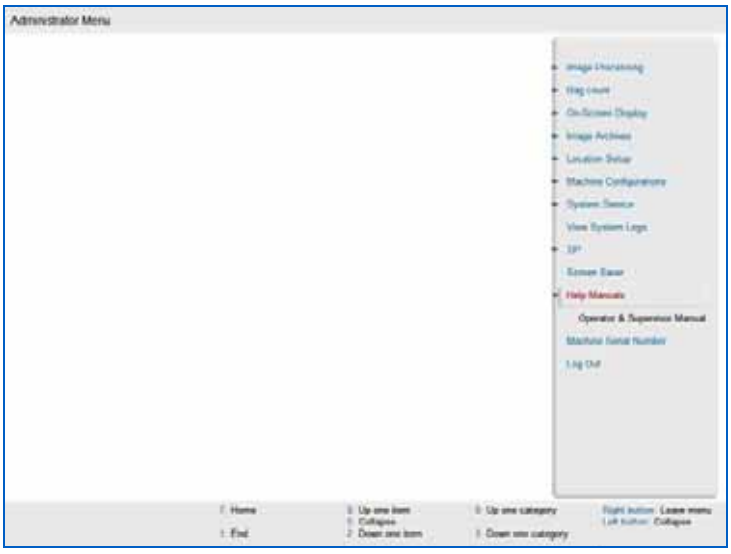

Figure 6-58: Help Manuals

The help screen shown in Figure 6-59 contains links to sections from the Rapiscan 6xx XR Operator's Manual, such as "Introduction," "Safety," and "Starting the X-ray System." It also contains sections from the Service Manual such as "Troubleshooting" and "Installation and Configuration." There are also icons that help the user navigate the site, such as "Home," "Index," "Next" and "Back."

The user can expand the various help categories by clicking on the + sign to the left of each section heading.

The user can also click on the name itself, which is also a link (e.g. "Introduction" or "Starting the X-ray System." This expands the topics within the larger viewing window.

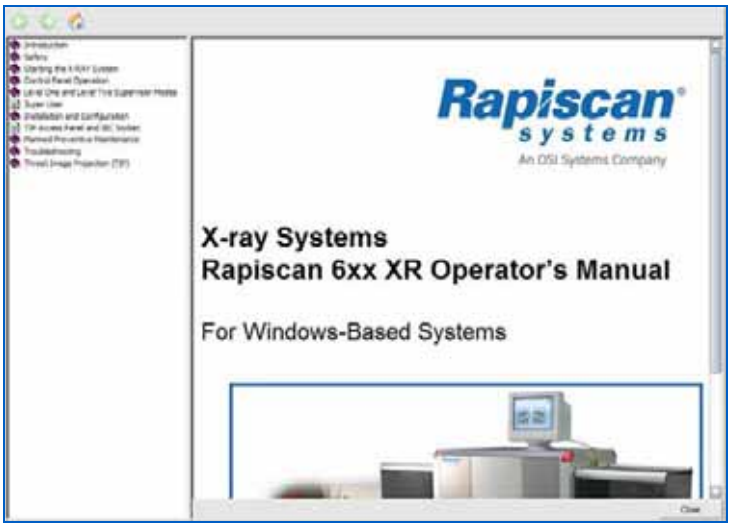

Figure 6-59: Operator Manual

6.13 Machine Serial Number

Figure 6-60 shows the Machine Serial Number option. It is important to know this number for record keeping purposes – it is important to know the service and maintenance history of a machine and the machine's serial number is the best way to be able to match a machine with its service/maintenance history.

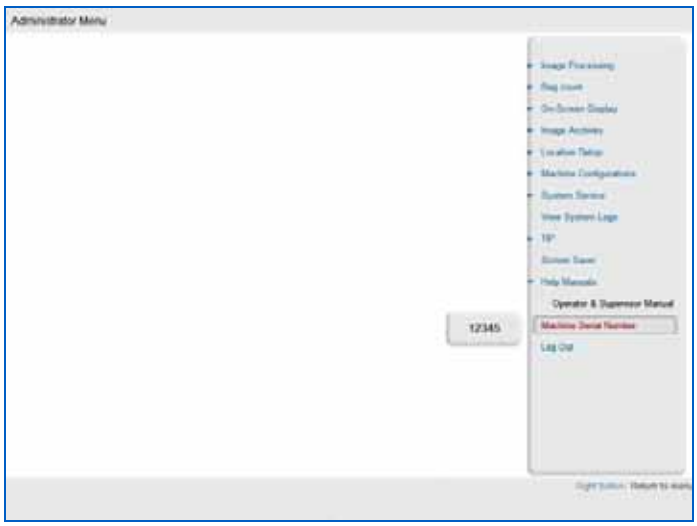

Figure 6-60: Machine Serial Number

6.14 Log Off

Figure 6-61 shows the Log Off option. When selected, it brings the user back to the Login screen.

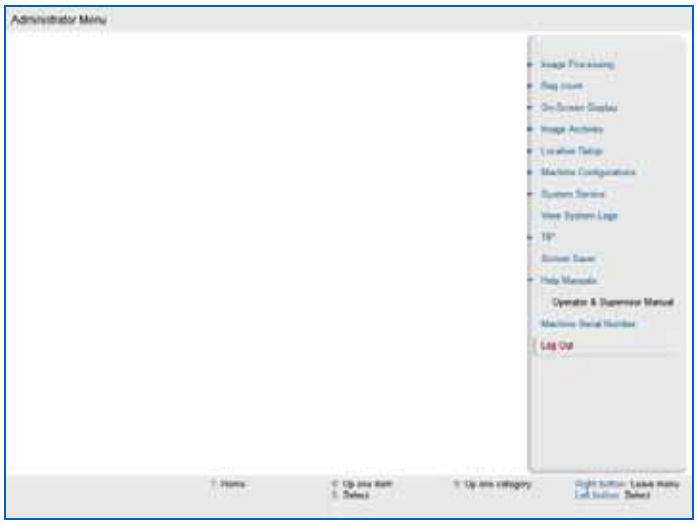

Figure 6-61: Log Out

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7.0 Installation and Configuration

7.1 General

Rapiscan Systems does not accept liability for damage to this or any other equipment or materials or personal injury caused directly or indirectly by or as a result of either incorrect or poor quality termination of local power supply cables or unauthorized modifications to this equipment or tampering with this equipment by unauthorized personnel.

If the equipment provided is not used in the manner specified by Rapiscan Systems, the protection provided by the equipment may be impaired.

7.1.1 Hand Baggage Systems

A level floor site should be chosen with sufficient space to enable clear access to the conveyor system at both ends of the unit, and enough room to open the panels at the side of the machine. With the unit in its desired position, screw the feet down at each corner of the chassis to prevent further movement (a reduction in vibration effects when the feet are extended may result in an improvement in the quality of the image.)

Unpack the monitor, and place it on the console or on top of the machine. There are two connectors, power and signal. The signal connector plugs into the free D-type socket (15-way) that will be found near the monitor cable exit hole on the top of the machine. In the case of a console, the connector will be found underneath the desktop. Secure the plug to the socket by using a screwdriver to mate the jackscrews. The power connector will be found in the same place as the signal connector.

Unpack the control panel, and place it on the console (if supplied). The connector must be attached to the free D-type socket (9-way) that will be found in the same place as the monitor cables. The Touchpad connector is a free D-type plug, located in the same place.

7.1.2 Hold Baggage & Cargo Systems

These systems are often installed as part of a conveyor run. In the case of special interface requirements, instructions for installation will be provided separately.

7.1.3 Electrical Specification

The following specifications apply to their respective Rapiscan 6xx XR series X-ray machines. Mobile systems or machines built to special order may have different parameters to those shown.

618, 620, 622	230V a.c. nominal, 3A	50/60Hz
	115V a.c. nominal, 6A	50/60Hz

624, 626	230V a.c. nominal, 5A	50/60Hz
	115V a.c. nominal, 10A	50/60Hz

627, 628	230V a.c. nominal, 7.5A	50/60Hz
	115V a.c. nominal, 15A	50/60Hz

632, 638	230V a.c. nominal, 8A	50/60Hz
	115V a.c. nominal, 16A	50/60Hz

The machine is designed to function at 230V or 115V +/-10% to compensate for variations in supply voltage. Supply voltage fluctuations are not to exceed +/-10% of the nominal voltage

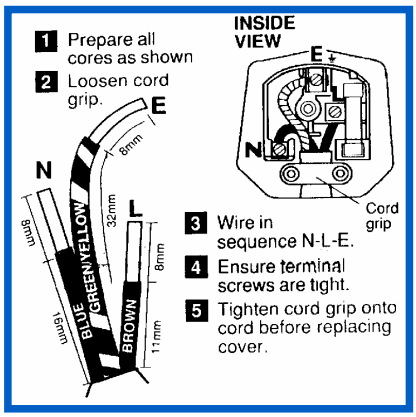
7.1.4 Environmental Specification

The following specifications apply to a standard Rapiscan 6xx XR series X-ray machine. Mobile systems or machines built to special order may have different parameters to those shown.

Altitude	2000m maximum	
Operating Temperature	0ºC to 40ºC	
Storage Temperature	-20ºC to 50ºC	
Relative Humidity	5% to 95 %	Non-condensing
Operation	Indoor use only	
Installation category	II	
Pollution Degree	II	

7.2 U.K. Power Cord

Rapiscan X-ray systems are normally supplied with a power cord that is fitted with the appropriate plug for the country of destination. If a different plug is required to be fitted, the wiring of the cable is as follows:



Live: Brown

Neutral: Blue

Earth: Green/Yellow

The plug should be rated at least 10 amps and be approved by the applicable safety standard in the country of installation.

Countries using the United Kingdom type plug fitted to the power cord should wire the plug according to the diagram. A 10A 1-inch fuse must be fitted.

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8.0 TIP Access Panel and IEC Socket

The supply power for the Rapiscan X-ray system enters the machine via the 3-pin IEC socket on the end panel (Figure 8-1).

Figure 8-1: End Panel, Circuit Breaker, IEC Socket

Figure 8-1 shows the end panel with a circuit breaker, IEC socket, two USB ports, LAN port, and an optional High Speed Conveyor Terminal.

WARNING: Voltage is present in the high speed conveyor terminal, handle with caution.

CAUTION: Do not block this side of the machine, because access to it is needed to plug in the power cable and to access fuses and the circuit breaker.

Some models of the 6xx XR security X-ray machine have a "TIP Acess Panel" that contains an IEC socket, USB port, serial port, LAN/Network port and keyboard port.

Figure 8-2: TIP Access Panel Door

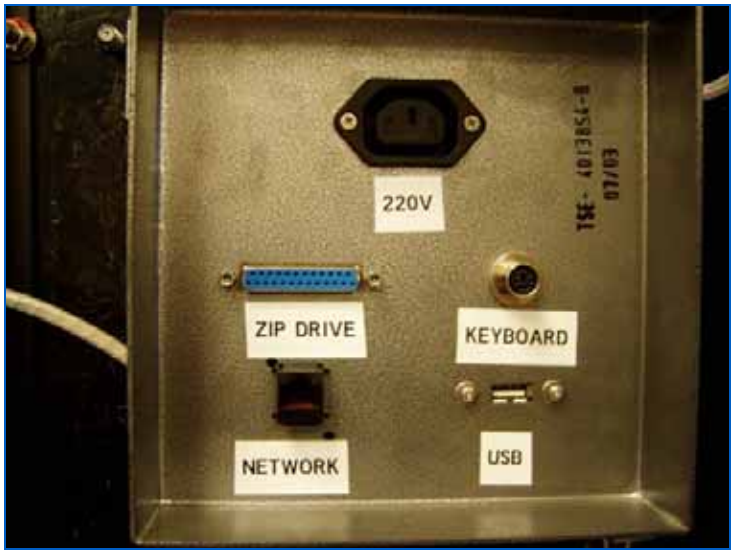

Figure 8-3: TIP Access Panel

The TIP system is fully documented in Rapiscan Systems' separate TIP manuals that are provided when this software option is ordered. The TIP Retrofit Access Panel installation is described in document SD 4038.

When a ZIP drive is connected to the access panel port, it appears as an extra drive in the Windows operating system. To copy files from the hard disk of the X-ray system to the ZIP drive, use Windows Explorer.

CAUTION: Do not attempt file operations unless you are trained in the use of the Windows operating system. The X-ray machine may malfunction if Rapiscan system files are altered or deleted. The system files cannot easily be repaired or reloaded.

9.0 Planned Preventive Maintenance

WARNING: Care must be taken to prevent water or any other liquid entering the system. Make sure any cleaning cloth is wrung out before use.

If the system is to be dismantled in any way, or if an internal inspection of the tunnel is necessary, then the system must be switched off and disconnected from the mains supply. The keyboard key is to be in the possession of the maintenance engineer.

Some parts of the X-ray system are heavy and require two persons during removal.

9.1 Weekly Maintenance

The weekly maintenance routines are mainly concerned with visual inspection and cleanliness of the system; they are detailed in sequential order. If the operating environment warrants it, they should be performed more regularly.

9.1.1 Preparation

- Read the warnings at the beginning of this chapter before proceeding.
- Switch off the system and remove the keyboard key.
- Remove the mains supply to the system.

CAUTION: Care must be taken to prevent water or any other liquid entering the system. Make sure any cleaning cloth is wrung out before use.

9.1.2 Visual Inspection

Visually inspect all the covers and panels for damage and security- damaged covers and panels and any missing fasteners must be replaced.

9.1.3 Conveyor Belt and Video Monitor casing

Using a damp lint-free cloth (soap suds may be used if required) wipe clean the surface of the conveyor belt and the casing of the monitor. Dry all surfaces that have been cleaned with a dry lint free cloth.

9.1.4 Video Monitor Screen

Clean the screen with an anti-static spray or liquid and a lint-free cloth.

9.2 Three Month Maintenance

9.2.1 Preparation

Read the warnings at the beginning of this chapter before proceeding. Switch off the system and remove the keyboard key. Remove the mains supply to the system.

CAUTION: Care must be taken to prevent water or any other liquid entering the system. Make sure any cleaning cloth is wrung out before use.

9.2.2 System housing

Using a damp lint-free cloth (soap suds may be used if required) wipe clean the surface of the system housing. Dry all surfaces that have been cleaned with a dry lint free cloth.

9.2.3 Lead Curtains

Visually inspect the lead curtains screening at the entrance and exit of the inspection tunnel for damage. Replace any strips found to be damaged.

9.2.4 Conveyor Visual Inspection

Visually inspect the conveyor belt for tears and holes, replace the belt if excessive damage is found.

Visually inspect the rollers of the discharge conveyor (if fitted) for signs of damage.

9.2.5 Conveyor Motion Checks

Press the forward button ("S") on the operator control panel, and observe that the associated indicator is lit and the conveyor moves in the forward direction.

Check for excessive noise from each roller bearing- this will indicate that the bearing is defective.

Check the conveyor belt central deviation at each end. The maximum deviation allowable is 20mm.

Press the STOP button ("R") on the operator control panel.

Press the reverse button ("Q") on the operator control panel, and observe that the associated indicator is lit and the conveyor moves in the reverse direction.

Check the conveyor belt central deviation at each end. The maximum deviation allowable is 20mm.

9.2.6 Radiation Leakage

Using a high sensitivity dosimeter, e.g. Victoreen 450p or Victoreen 451p, measure the surface leakage of the system when the X-rays are on. Normally, the surface leakage lies within the range of natural radiation. The limit for radiation is 1 microSv/hour externally and 2.5 microSv/hour internally.

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10.0 Troubleshooting

10.1 Warranty

The customer must obtain written authorization from Rapiscan Systems before making any modifications to any Rapiscan Systems X-ray unit in order to prevent voiding the Rapiscan Systems warranty.

The Rapiscan X-ray System has been designed for a long service life and reliable operation. Some reasons for malfunction can be checked and rectified by on-site maintenance personnel without the need to call for a service engineer.

If the system does not switch on, please see the section on installation.

If you have followed the instructions in that section but the system still does not switch on, the following checks can be made. If the system does power up, please enter 'Maintenance Mode' to test each component separately.

Warning: The following checks are to be carried out by a trained and qualified maintenance technician only. No maintenance panel is to be opened while the system is connected to the power supply since hazardous voltages exist on circuit boards inside the system. Remove the power lead from the wall socket before opening any panel.

10.2 General

Rapiscan X-ray machines perform an extensive power-on self-test that will report problems on the monitor if any are found.

Before attempting to replace or repair parts, the Rapiscan Service Department should be contacted since they can help with complex issues and have the most up-to-date knowledge regarding common problems.

10.3 Error Messages

10.3.1 'Bad signals or X-Ray is blocked. Press R to ignore or S/Q to clear the tunnel'

Probable Cause: Some or all of the X-ray sensors are not detecting any X-rays.

1. There might be something blocking the X-ray beam inside the machine. Run the conveyor to try and remove the blockage. If this does not cure the fault, switch the machine off and wait for it to shut down. Remove the power cord from the machine then look inside the tunnel for an obstruction.
2. Log in as SERVICE2. Enter System Service and turn X-rays on. If the diode array shows no signals, check the cables to the diode array and the power supplies. Check the analog to digital converter card cables.

10.3.2 'Interlock Violation'

Probable Cause: There is a problem with the X-ray interlock switches inside the machine.

1. Remove the side panel and locate the electronics chassis. Check the cable connected to PL4 of the Power Distribution and Interface Board.
2. Switch the machine off and remove the diode array box lids. Check the micro-switches operate correctly.

10.3.3 'Trip Tray Violation'

Probable Cause: Check pop-up roller, trip-tray or trip-bar, if this option is fitted.

1. There might be an obstruction in the trip-tray at the end of the conveyor. Turn the machine off, remove the obstruction and check that the trip-tray is free to move. The trip-tray operates micro-switches that should click when they activate. If the trip-tray is not fitted, check the Machine Configurations menu trip tray option, which should be disabled.
2. Check cable connected to PL4 of the Power Distribution and Interface Board.

10.3.4 'Foot Mat Violation'

Probable Cause: The conveyor has been asked to run when the foot-mat is not being activated.

1. Check the foot-mat is plugged in correctly and the cable is not damaged. If the foot-mat is not fitted, check the Machine Configurations menu foot-mat option, which should be disabled.

10.3.5 'Inverter Fault'

Probable Cause: There is a problem with the conveyor drive inside the machine.

1. Try turning the machine off, (wait for it to power down) remove the power cord, then reapply the power.
2. Check cable from the inverter to the Control Interface board J21.
3. Check the inverter has power from SK5 on the Power Distribution and Interface Board.
4. Check the drive roller and cable.

10.3.6 'X-Ray Control Fault'

Probable Cause: There is possibly a problem with the X-ray generator or associated cables inside the machine.

1. Try turning the machine off, (wait for it to power down) remove the power cord, then reapply the power.
2. Check the cables connected to the Control Interface board J16 and Power Distribution and Interface board SK3.

3. Check fuses on the X-ray generator and Power Distribution and Interface board.

10.4 System Does Not Switch On

Check:

- Power-On key on the input end of the system (or on the console) is turned clockwise.
- Power cable is connected firmly to power inlet, and other end is connected to a live power socket.
- Trip indicator on circuit breaker is set correctly.
- The fuse in the power plug is O.K. (if fitted)
- All emergency stop switches (if fitted) are not activated i.e. rotated to the 'out' position.
- Connectors to the icon control panel are mated properly.

Remove the power cable from the mains supply, and unlock the access panels to reveal the electronics chassis.

Check:

- Check the +12V power supply on the electronics chassis.
- Fuse FS 1 on the Main Circuit Breaker Panel (MCB) is O.K.
- Voltage selector is set correctly.

If this switch is set incorrectly, check your serial number plate to make sure you have the appropriate voltage and frequency machine for your supply.

10.5 X-rays Do Not Come On

Warning: Remove the power cable from the power supply, and unlock the access panels.

Check:

- Fuse FS 7 is O.K. on the MCB panel.
- X-ray Control board Fuses FS 1 and FS 2 are O.K.
- Array box door micro-switches are secure.

10.6 Conveyor Does Not Operate

The X-ray machine software should display an error message if the conveyor does not run. Please see the 'Inverter Fault' error above.

Check:

- Trip trays are not activated (if fitted).

Remove the power cable from the supply, and unlock the access panel. Check::

- Fuse FS3 on the MCB is O.K.

Operation of the 'REV' and 'FWD' pushbuttons on the Main Control board / Signals Interface board should start the drive roller manually if the system is switched on.

Some drive rollers have a thermal trip that stops the motor from overheating. If this trip has operated, the conveyor may start again after it has cooled. The cause of the overheating must be found and rectified by service personnel.

10.7 Poor Image Quality

Please see the section on the diode array for troubleshooting poor image quality. The system may need collimating if the image quality is poor.

10.8 Machine Does Not Calibrate

The opto-sensors on the tunnel entry initiate the diode array calibration procedure. If the sensor is blocked or faulty this will prevent calibration. The image quality may deteriorate over time if calibration is not performed.

10.9 Objects Do Not Stay On The Screen

Normally, bags scroll on from the side of the screen and stop there until the next item enters the tunnel. If they do not stay on the screen, check the opto-sensor inside the tunnel near the X-ray beam is not blocked or faulty.

10.10 X-rays Do Not Turn Off

Opto sensors PS1 (and PS4 in the other direction) detect objects entering the tunnel and cause X-rays to turn on. When the object has left the tunnel, X-rays should turn off. If the sensor is misaligned or dirty, the X-rays will remain on even though all objects have left the tunnel.

10.11 Fuse Values

The system's fuses are in the electronics chassis to the left of the r supplies, timer and relays (Figure 10-1). One fuse is 5 amperes; the other fuse is 15 amperes.

Figure 10-1: Fuses

620/622 XR machines' control interface board controls the drive motor and mains power distribution circuitry. It also has circuitry connected to the "Power On" switch, diode array door microswitches and E-stop switches. The main control PCB for the 620/622 XR machine is the 2110712 interface board.

The power must be disconnected before attempting to change any fuse. Always fit the correct rating and type of fuse. All fuses are 250V 20mm type T, which indicates an anti-surge fuse. The most up-to-date rating information for the fuses is documented on the Product Test Record that is located in the document wallet provided inside the X-ray machine. This document also takes into account any special features and options that the machine might have.

10.11.1 X-ray Control PCB

All machines

FS1 800mA

FS2 5A

10.11.2 X-ray Head PSU PCB Fuse

All machines FS1 1A

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11.0 Options

The following features are optional features available on Rapiscan 6xx XR machines upon customer request and at additional cost.

11.1 TIP (Threat Image Projection)

Threat Image Projection software (TIP) allows fictional images of threats (e.g. guns, knives, bombs) to be projected onto displayed images of real carry-on passenger baggage.

TIP was created to improve screener threat detection skills by providing more exposure to threats on a regular basis, and to track screener performance by providing reports of HIT, MISS AND NON-TIP EVENT (false alarm) rates for projected threats.

Screener performance is tracked by supervisors, airport security staff, and Transportation Security Administration (TSQ) personnel.

For more information, see Rapiscan's Threat Image Projection manual, part number 9210734.

11.2 TIPNET and TMAS

TIPNET consists of three layers: a hardware system layer; a system configuration layer; and an application software layer, and includes one or more security X-ray machines connected to a TMAS (TIP Management Server).

For more information, see Rapiscan's TIPNET and TMAS manual, part number 9210732.

11.3 Network Display Station

Netscan is a management software system developed by Rapiscan Systems to allow the distribution of images of baggage (scanned by a high-speed security X-ray system) to a number of remote operators. The number of operators (and machines) can vary depending on the workload.

For more information, see Rapiscan's Network Display manual, part number 9270347.

11.4 DTA (Density Threat Alert

The Density Threat Alert (DTA) highlights any areas that exceed a set density by coloring them purple. A setting of 0 turns the DTA off. The setting for the DTA varies according to machine type and items to be scanned. A typical value to highlight areas of non-penetration would be 20.

11.5 Auto Archive

An optional program that automatically archives scanned images of baggage, allowing those images to be recalled using criteria such as date, station and operator.

Figure 11-1 shows the Review Auto Archives option which is under the Image Archives menu.

Figure 11-1: Review Auto Archives

Selecting The Review Auto Archives option brings up the Filter Options screen shown in Figure 11-2. This screen allows you to determine the criteria to be used to search the auto archived images – such as operator ID, Site and Date options.

Figure 11-2: Filter Options

Selecting "OK" on the Filter Options screen brings you to the Archive Reviewer screen shown in Figure 11-3.

Figure 11-3: Archive Reviewer Mode

Left clicking on the mouse button brings up the Archive Reviewer menu as shown in Figure 11-4.

Figure 11-4: Archive Review Mode menu

Figure 11-4 shows the Image Information option highlighted. Selecting this option brings up the Image Information screen shown in Figure 11-5 which includes Operator ID, name, site, machine serial number, etc.

Figure 11-5: Image Information

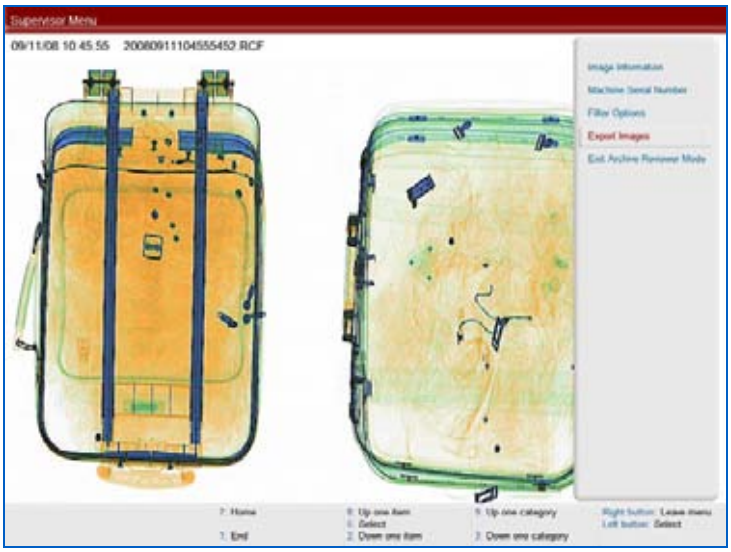

Figure 11-6 shows the Export Images option which brings up the screen shown in Figure 11-7.

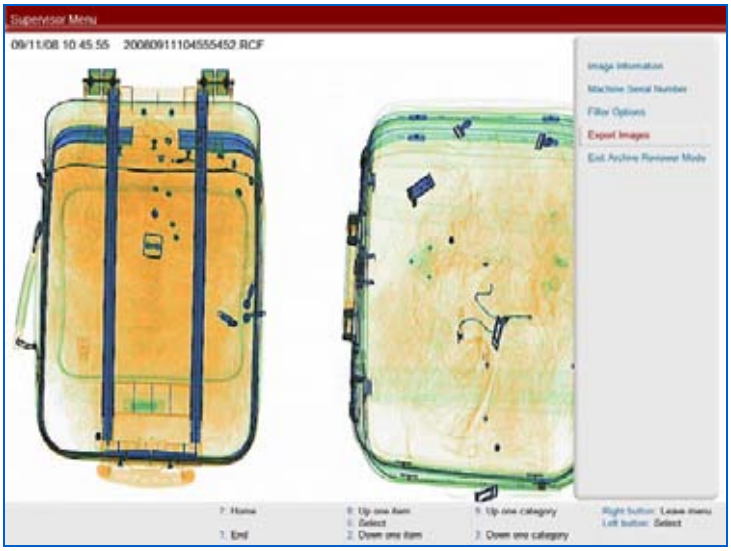

Figure 11-6: Export Images

Figure 11-7 shows the Export Images screen. Select the export criteria you wish to use, then click "browse" to select the target directory/medium to which to export the images.

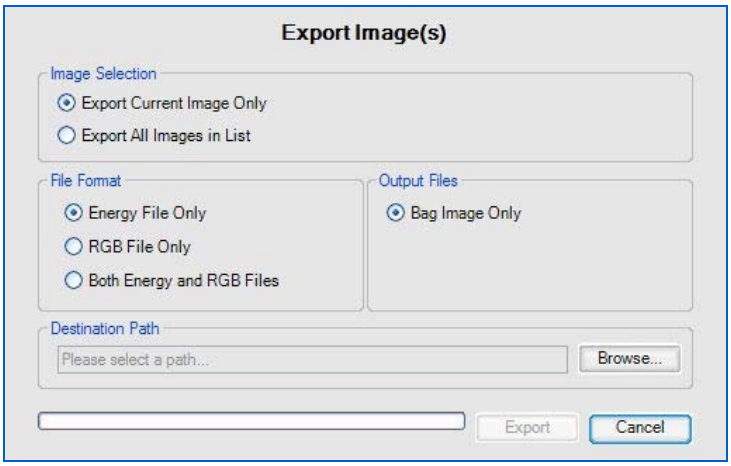

Figure 11-7: Export Images screen

If there are no archived images you will see a blank screen in Review Archive mode. Left clicking on that screen will bring up the menu shown in Figure 11-8.

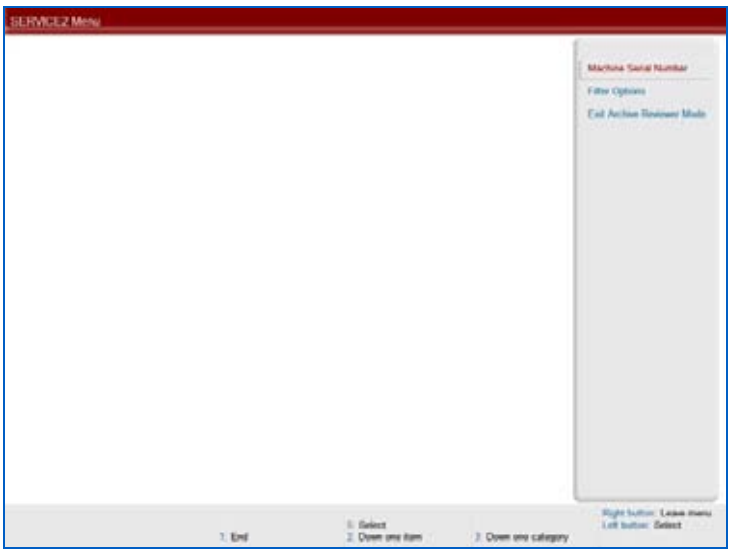

Figure 11-8: Archive Reviewer Mode

11.6 Operator Training Program (OTP)

OTP (Operator Training Program) is a software program that creates a virtual scanning environment for training purposes. Scanned images are "scanned" and scroll onto the user's screen as if the conveyor belt is moving baggage through the security X-ray machine's tunnels, but it is completely virtual without conveyors moving or X-rays being generated.

Figure 11-9 shows a screen shot of an OTP session, the two bags in the image having just scrolled onto the user's screen as if scanned images of bags actually being moved into and through the X-ray tunnel.

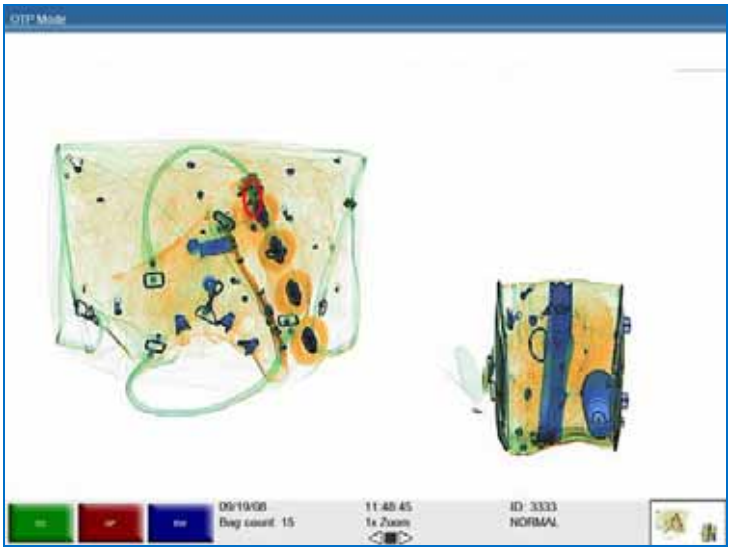

Figure 11-9: OTP Mode

11.7 Manual Scan

This optional feature allows the operator to manually scan baggage, meaning that the operator uses the function to turn X-rays on and they remain on until the ST (STOP) button is pushed. This allows the operator to bypass the photosensors and allows for the scanning of extra-long or oddly shaped baggage that normally might not trigger the photosensors and X-ray generator.

Figure 1-1 shows the Manual Scan Mode screen.

Figure 11-10: Manual Scan Mode

11.8 Smart Card

This optional feature allows a user to store their User ID on a smart card. Placing the smart card on or in a smart card reader will cause the User's ID to automatically appear in the "User ID" field on the log-in page.

For more information, see Rapiscan's Smart Card manual, part number 9270348.

11.9 Target (Automatic Target)

Target is the function which automatically detects and highlights potential explosives threats by surrounding those threats with a red circle.

For more information, see Rapiscan's Target, Interactive Target and Liquid Threat manual, part number 9210733.

11.10 Interactive Target

Interactive Target allows the operator to manually apply the Target algorithms to objects that automatic Target may have "missed," in order to determine if the object is in fact a potential threat.

For more information, see Rapiscan's Target, Interactive Target and Liquid Threat manual, part number 9210733.