

# FEATURES

Standard and Optional



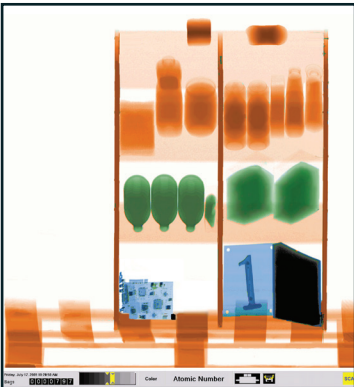
# STANDARD FEATURES

Astrophysics' features, especially in combination with each other, allow operators to make quick, informed decisions, for a more efficient and effective screening process.

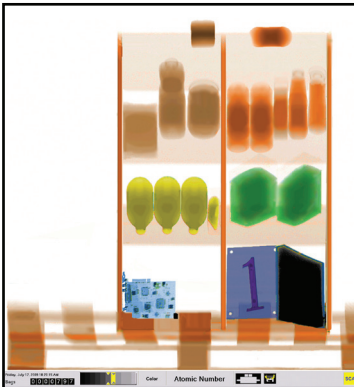
| Z-Number | Material Type  | 3 Color | 6 Color | Examples          | Possible Threats            |
|----------|----------------|---------|---------|-------------------|-----------------------------|
| 0-8      | Organic        | Orange  | Brown   | Wood, oil         | C-4, TNT, Semtex            |
| 8-10     | Low Inorganic  | Orange  | Orange  | Paper             | Cocaine, Heroin             |
| 10-12    | High Inorganic | Green   | Yellow  | Glass             | Propellants                 |
| 12-17    | Light Metals   | Green   | Green   | Aluminum, Silicon | Gunpowder, Trigger Devices  |
| 17-29    | Heavy Metals   | Blue    | Blue    | Iron, Steel       | Guns, Bullets, Knives       |
| 29+      | Dense Metals   | Blue    | Violet  | Gold, Silver      | High-Value Contraband       |
| -        | Impenetrable   | Black   | Black   | Lead              | Shielding for Above Threats |

## 6 Color Imaging

This imaging feature uses imaging analysis to assign colors based on the effective atomic number. 6 Color offers better differentiation of items which may have similar composition. Each screened object appears in one of the 6 colors based upon a specific range of atomic numbers. 3 Color Imaging simply does not provide the operator with as much information as 6 Color Imaging. 6 Color can distinguish between objects that systems only utilizing 3 Color cannot, dramatically improving an operator's material discrimination. 6 Color provides the operator more information in order to decipher between threat and non-threat items, the operator is therefore able to interpret the x-ray image more quickly and isolate threats with better precision. This increases both throughput and detection accuracy. 6 Color is most effective when used in combination with Astrophysics' Optional Feature, Screener Assist.



3 Color Image



6 Color Image



3 Color Image

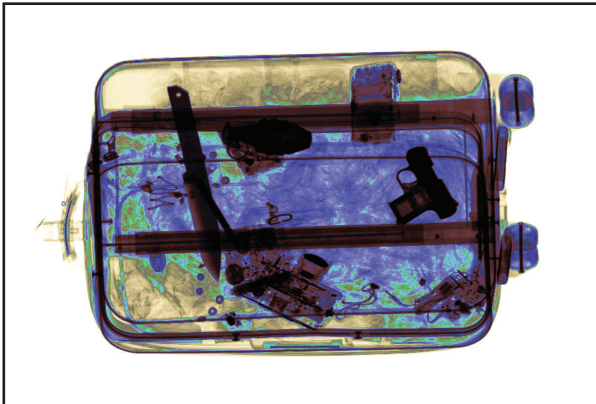


6 Color Image

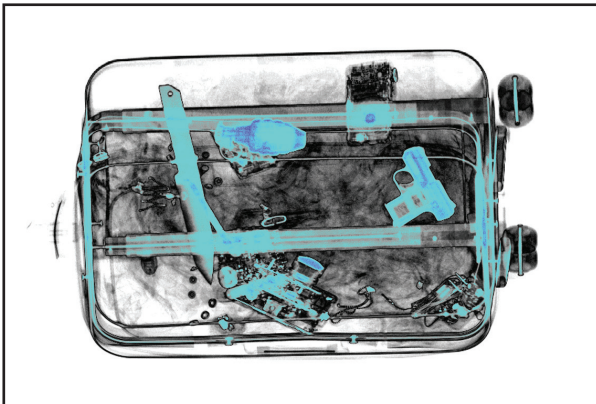
Notice how the explosive appears light brown in the screened image on the bottom right using 6 Color Imaging, the same explosive remains orange in 3 Color Imaging. Another example is the glass cup appears yellow while utilizing 6 Color, but remains green in 3 Color. The additional colors shown in the screened images are a few examples of how 6 Color Imaging adds a unique image differentiation. Advantages of 6 Color Imaging versus 3 Color are numerous and may vary by application. With minimal time to identify the various threats common to the field or area, the utilization of 6 Color Imaging enables high security threats to be more easily identified by operators.

## Pseudo Color

This color feature applies multiple color palettes to the screened image for additional color differentiation. The operator may scroll through available color options using the contrast button on the Advanced Operator Control Panel (AOCP) to create unique image representations. Pseudo Color is another useful feature that provides operators an alternative imaging perspective to analyze screened objects.



Pseudo Color 1



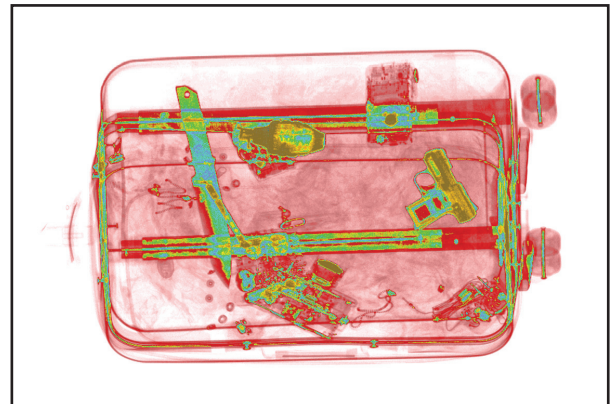
Pseudo Color 3

## Light/Dark

Operators can adjust the contrast of the image to either lighten or darken an area for improved image assessment.

## Real-Time Image Manipulation

Most image manipulation occurs in real time. Operators have access to all function tools with an immediate system software response.



Pseudo Color 2



Pseudo Color 4

## 9 Quadrant Zoom

This zoom function divides the x-ray image into 9 quadrants. Each quadrant location on the image screen corresponds to a number on the AOCP keypad. This function permits operators to quickly and easily zoom in on individual quadrants for immediate image manipulation.

## Bag Counter

The system Interface Task Bar includes a baggage counter.



Bag Counter

# STANDARD FEATURES

## Black and White

The Black and White color feature provides a standard grey scale display of the image. The Reverse Black and White option displays the screened objects in a reverse grey scale. This feature allows the operator to easily distinguish between items. Highly dense items will appear black on the screen. This signals the operator that they should focus their attention on this area of the bag.



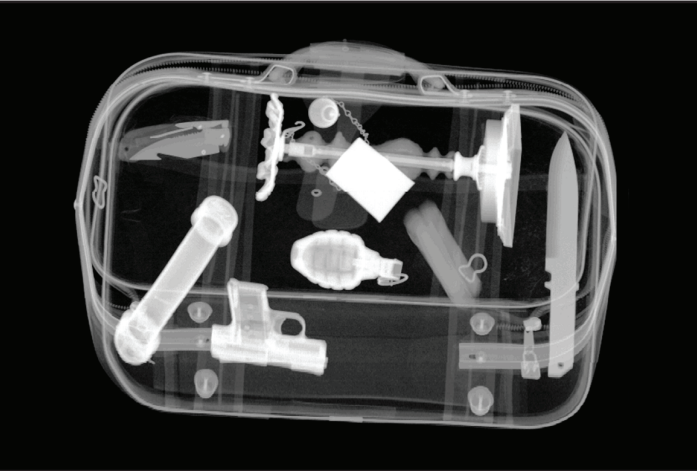
Black and White

## Picture Perfect

This imaging feature analyzes image data to present a refined, high contrast, more detailed image. When Picture Perfect is activated, an image containing multiple, layered objects will become clear and defined for increased object visibility. Picture Perfect can be used in either color mode, black and white, or reverse black and white mode and is often the best feature to enhance overall image clarity and object identification.



Picture Perfect



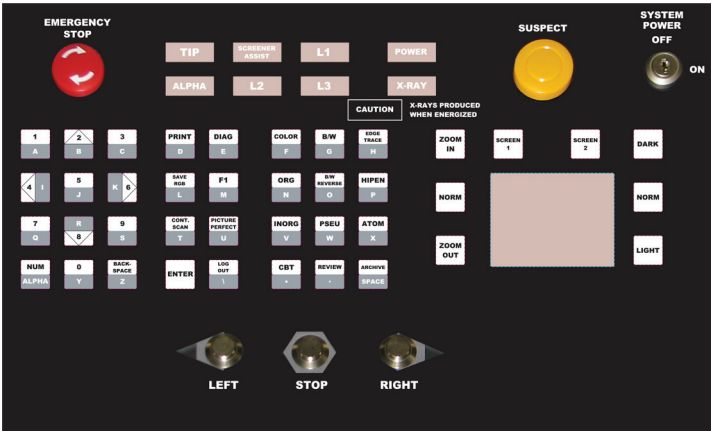
Reverse Black and White

## Continuous Zoom

Operators may want to zoom in on a particular object or region of the x-ray image for greater clarity or object identification. With Continuous Zoom, operators can place the zoom cursor over the region of the x-ray image to zoom in up to 64X.

## Advanced Operator Control Panel (AOCP)

The operator controls the system with the AOCP. It has an ergonomic, alphanumeric design with a touch pad mouse and multiple buttons dedicated to all the different image manipulation options and features. The control panel power is initiated by a key switch. Lights display the status of the machine and a speaker can be used for audible alarms.



Advanced Operator Control Panel

## Atomic Number Measurement

Operators can use the touchpad mouse on the AOCF to drag-select a box around an object and accurately generate the object's atomic number. Based on the atomic number, operators can more accurately identify questionable material groups and assess threat objects with precision.



## Standard Operator Training

At system installation, a Field Service Technician will walk the operator through basic system parts, common operation errors and use of the AOCF, including software functionality and image manipulation. An extensive Operator's Manual and a complimentary Computer Based Training (CBT) Tutorial with a small program and pre-scanned image library are included with each system. Astrophysics includes the Operator's Manual, basic training, and CBT Tutorial to ensure the operators gain a general understanding of the system.

## Uninterrupted Power Supply (UPS)

UPS ensures the power to the PC and electronics is not damaged or disturbed in case of a power outage or power surge. UPS is programmed to initiate the PC to shutdown and to preserve the battery after a pre-determined time has elapsed. Once power is restored, the PC restarts normally and the UPS is reset automatically.

## Image Annotation

This innovative feature allows operators to draw a box frame around a suspicious object or area of an image and then enter 3 alphanumeric characters, such as "GUN," for gun, "WPN," for weapon, "EXP" for explosive, etc., as a reference. Operators can then either save the image or transmit it to a Secondary Review or Supervisor Workstation. Image Annotation is useful for evaluating images for training, later review, or to highlight a suspicious area of a scanned image and send for additional review. Image Annotation is also effective in alerting a Supervisor of a threat.



## Hi Pen

The High Penetration option allows the operator to adjust the darker regions of the image for better contrast and visibility with a single push of a button on the AOCF.



# STANDARD FEATURES

## Image Review

The system permits operators to review previously scanned images. The Administrator can configure how many images the operator can review.

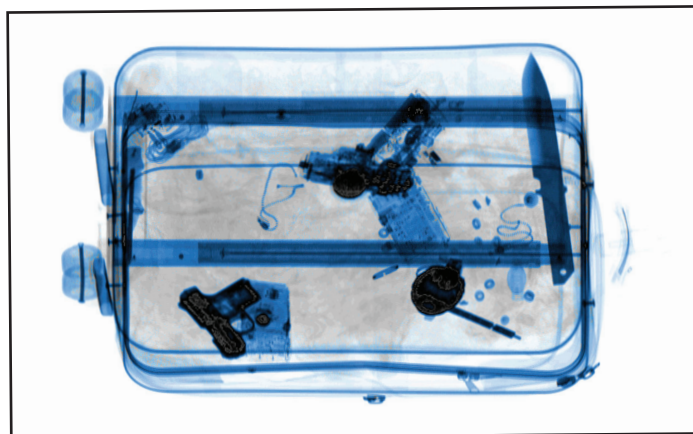
## Organic/Inorganic Imaging

This imaging feature allows the operator to emphasize organic or inorganic portions of the image. Organic Imaging displays only the organic objects in orange while all other objects appear in grey. Inorganic Imaging allows all inorganic objects to appear in blue while all other objects remain grey.

The Organic/Inorganic Imaging feature is effective when operators wish to target the presence of particular organic or inorganic materials, such as explosives or narcotics.



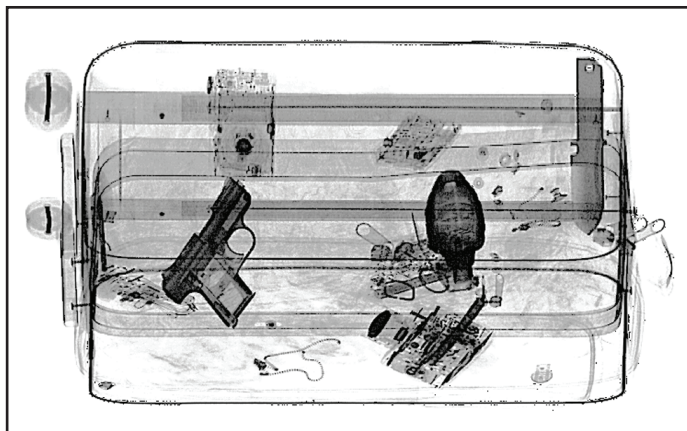
Organic Imaging



Inorganic Imaging

## Edge Enhancement

Edge Enhancement instantly improves the outline and shape of each object in the x-ray screen. This feature helps the operator to separate objects in the screened image and to quickly process if they represent a potential threat.



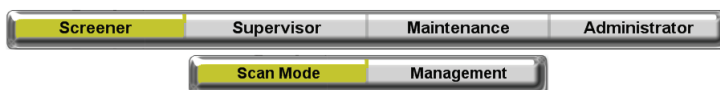
Edge Enhancement

## Continuous Scanning

Normally, the x-ray generator is only triggered when the photo-sensors located at the tunnel entry and exit identify an object's presence on the conveyor belt. Small, thin objects and/or mail occasionally fail to trigger the photo-sensors, therefore the objects do not scan. The Continuous Scanning feature will automatically activate the x-ray generator to scan smaller, lighter objects.

## Multi-Tier Accessibility

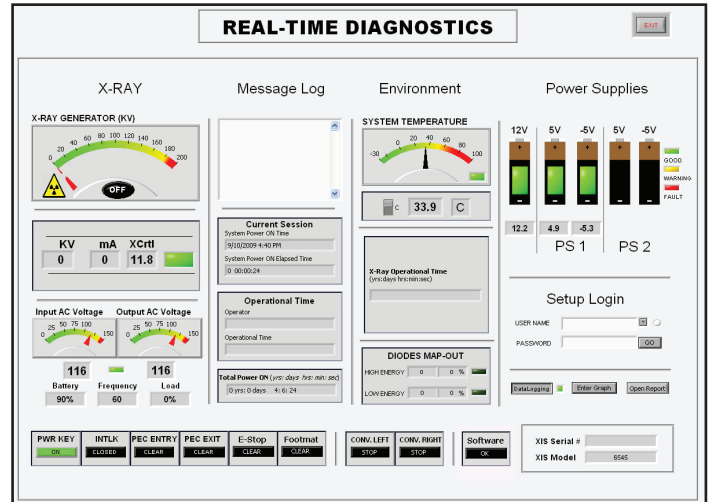
The Astrophysics interface features a separate login for Operators, Supervisors and Administrators with unique programmable passwords. The Multi-Tier Accessibility allows the customer to tailor each system with different levels of accessibility and functionality depending on their needs.



Multi-Tier Accessibility

## Real-Time Diagnostics

All Astrophysics systems are equipped with Real-Time Diagnostics. This diagnostics program continuously monitors system components including: power supply input voltage, x-ray generator, e-stop status, entry/exit sensors, temperature, and more. The Real-Time Diagnostics screen is fully accessible for Supervisors and Administrators to review the overall system health and print status reports. In case of a system fault, the word "FAULT" will appear on the display task bar and a description of the fault will appear in the Message Log on the Diagnostics Screen. As a safety precaution, the conveyor belt will stop automatically until the fault is resolved. Real-Time Diagnostics permits system owners to monitor the system, and can prevent and/or resolve simple faults themselves, or if needed, via Astrophysics technical phone support.



Real-Time Diagnostics

## Auto Image Archiving

The system will automatically archive the last hundred thousand images scanned. This large archive library enables operators to review previous bags as a training exercise. Auto Image Archiving also permits Supervisors and Administrators to access previously scanned bags as needed. When the capacity is reached, the system will start deleting the oldest images to allow storage for the new images.

## Save Image (RGB)

Operators can manually save multiple images to a folder on the hard drive of the system. This allows operators to review the selected images at a later time.



Save Image (RGB)

## Print Image Capable

All systems are network ready via a standard USB connection. The system features a print function that allows operators to print the current image at the push of a button. The system is compatible with most printers. Although a printer is not included as standard, Astrophysics can include a compatible printer with your machine upon request.

## Internet Call Center (ICC)

Astrophysics is the only company in the industry to offer such a comprehensive and efficient approach to customer service. The ICC features direct video conferencing, remote system connectivity, and facilitates fast service support and expedited parts ordering. The development of the ICC demonstrates Astrophysics' ongoing commitment to improve response time and customer service.

## Video Conferencing

Video Conferencing enables a Certified Service Technician to speak with the operator in real time and visually assess the machine.

## Remote Connectivity

The ICC Technician can electronically connect with your x-ray machine via the Internet and remotely assess potential system faults and properly diagnose a solution to reduce false rates. With this capability, ICC Technicians can more rapidly assess potential system faults, diagnose a solution and many times make necessary repairs.

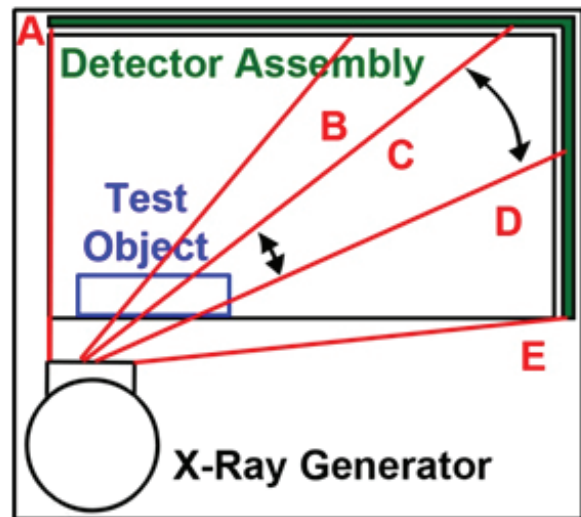
## Service Support and Parts Ordering

The ICC Technician can immediately dispatch a Field Service Technician or order necessary replacement parts, if necessary.

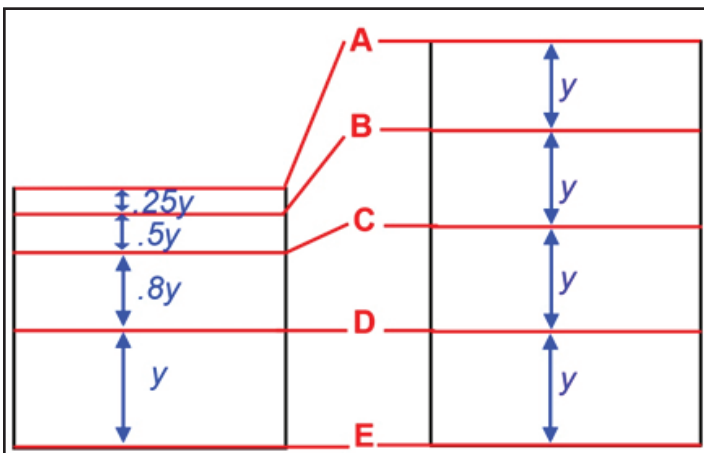
## STANDARD FEATURES

### Distortion Correction

The Detector Assembly is L-Shaped. If left uncorrected, the displayed image would present a skewed object due to the variable distance from the x-ray generator. As the Detector Assembly diagram shows, the closer the object is to the generator, the more compressed the image becomes. The On-board PC automatically performs distortion correction to prevent the image from appearing skewed or distorted. Notice how in the Distortion Illustration, the image on the left without the distortion correction is bent and noticeably smaller than the corrected image on the right.

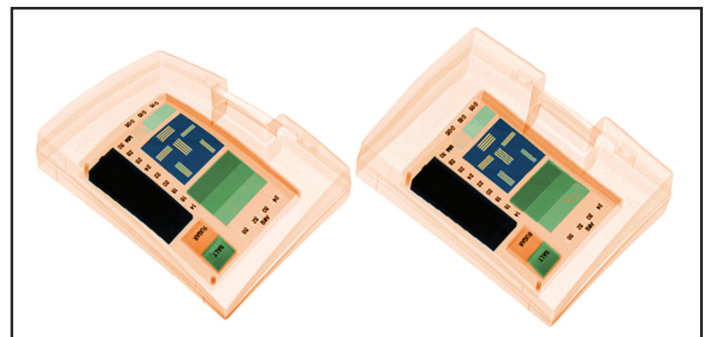


Detector Assembly (Not to Scale)



Geometric Distortion

Geometric Distortion With Correction

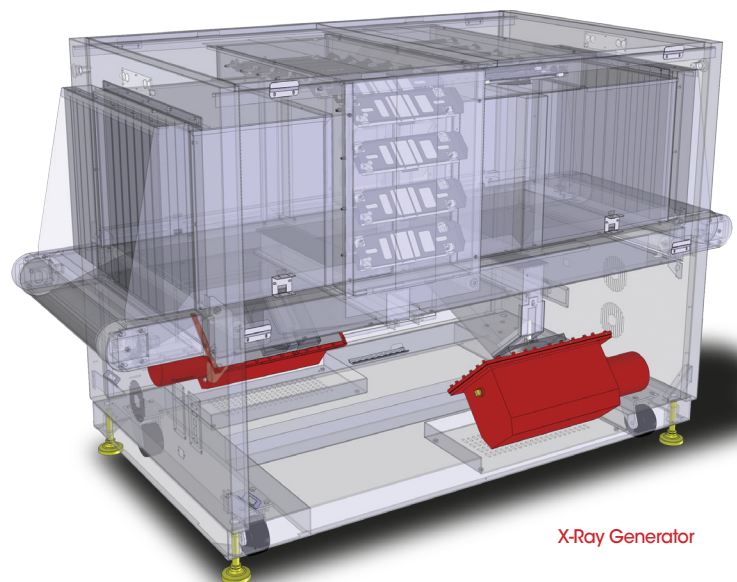


No Geometric Correction

Automatic Geometric Correction

### Generator

X-ray generators are the heart of all Astrophysics x-ray systems. Astrophysics uses sophisticated, encapsulated “single-block” x-ray generators. Astrophysics’ generators are the durable and reliable x-ray source of the system. The generator combines the x-ray tube, voltage multiplier circuit, x-ray port window and radiation shielding all into a single package. This simplifies reliability, minimizes x-ray leakage and increases overall reliability. Astrophysics x-ray generators are available in a variety of outputs including 90kV, 160kV, 180kV, 200kV and 320kV.



X-Ray Generator

## Computer Based Training (CBT)

CBT includes a comprehensive 2-4 hour Operator Training Course as well as a 5-10 hour Simulation Course. The program covers x-ray screening fundamentals, a step-by-step walkthrough of Astrophysics software features, as well as detailed training reports and records management. Utilizing an extensive image library of over 1000 benign and threat objects, CBT exposes operators to diverse images and improves their detection accuracy. CBT can be activated on an x-ray system or any standard computer.



Computer Based Training

## Custom Paint

Customers may specify a particular paint scheme to customize the exterior appearance of the x-ray machine. Customizing the paint allows the x-ray system to blend into its surroundings.

## Entry/Exit Roller Tables

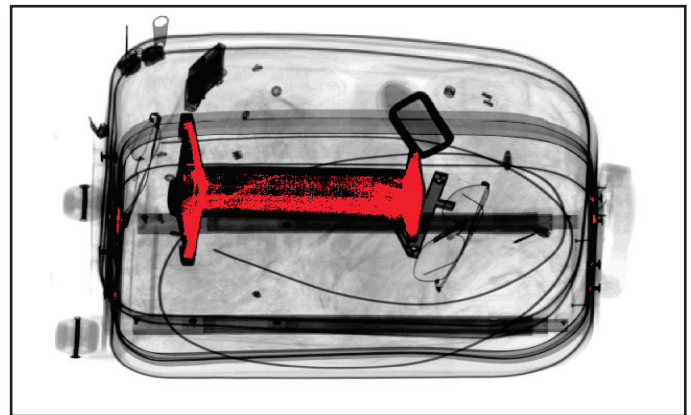
The system may be supplemented with entry or exit roller tables which can be made with rubber rollers and/or motorized, depending on the needs of the customer.

## Extended Conveyor

Customers can enhance the system with extended conveyors for longer clearance, larger objects, or more baggage storage.

## Density Alert

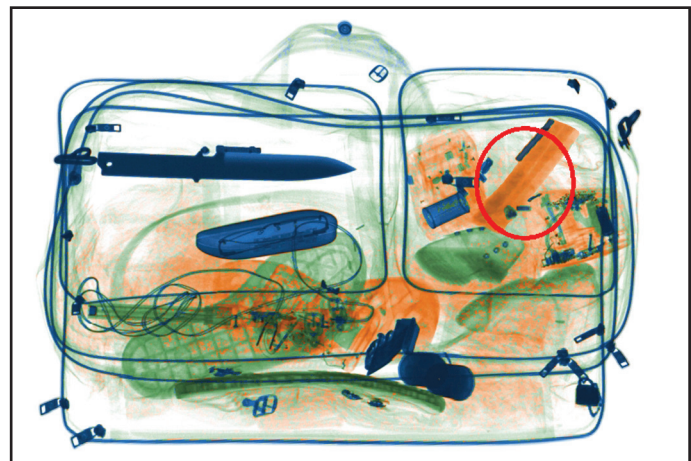
Density Alert draws the operator's attention to suspicious materials and the potential of a hidden threat. In regular or 6 Color Imaging, any object or region that is impenetrable by the x-ray will appear in black. This occurs because the object or region has a high atomic number or density and is attenuating to x-ray. In all other display modes, when the Density Alert is activated the impenetrable object or region appears in red. When Density Alert is activated, the system can be set to sound an alarm or stop the conveyor belt.



Density Alert

## Screener Assist

This advanced software is a real-time detection tool designed to aid operators in identifying difficult threats, such as explosives or drugs, which are commonly mistaken for other organic materials. The Screener Assist software analyzes each screened image and automatically identifies potential threats with an ellipse.



Screener Assist

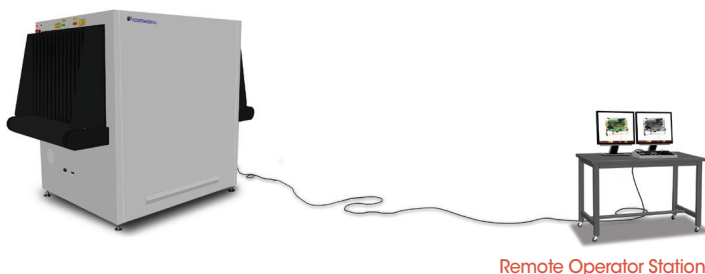
# OPTIONAL FEATURES

## Remote Workstation

Astrophysics offers a variety of workstations, including the Remote Operator Station, Remote Workstation, Secondary Review Workstation, and Supervisor Workstation. Remote Workstations can be added to any Astrophysics system for added screening security and efficiency.

### Remote Operator Station

The Remote Operator Station is an additional work station which can be added to any Astrophysics system. It comes equipped with an Advanced Operator Control Panel (AOC), Monitor\*, and Work Table. The Remote Operator Station can be operated at a distance of up to 5 meters (15') away and maintains full control of the system. The Remote Operator Station comes standard on the XIS-7858 and larger.

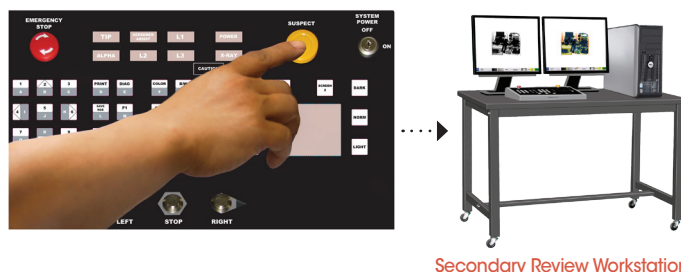


### Remote Workstation

A Remote Workstation can be added to any Astrophysics system. The Remote Workstation is connected to the system via an Ethernet cable and allows the screener to operate the machine at distances greater than 5 meter (15'). This allows for greater flexibility when designing the overall layout of a screening area. It comes equipped with an AOC, Monitor\*, Computer, and Work Table.

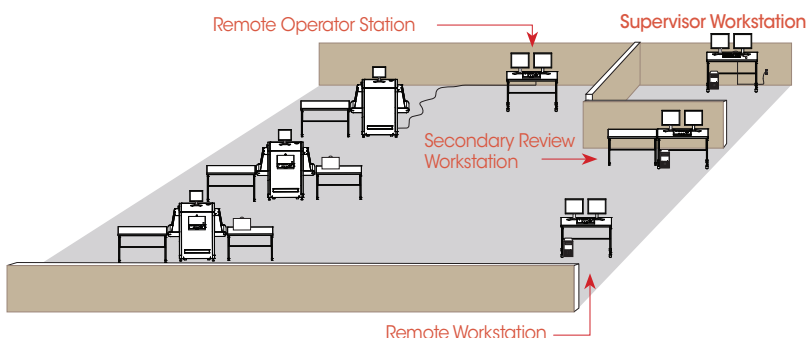
## Secondary Review Workstation

A Secondary Review Workstation can be added to any Astrophysics system. It comes equipped with an AOC, Monitor\*, Computer, and Work Table. If an operator detects a possible threat, they can send the image to the Secondary Review Workstation for further analysis by pressing the "Suspect" button on the AOC. The operator at the Secondary Review Workstation can further scrutinize the image using all the image manipulation features Astrophysics offers. Similar to the Remote Workstation, the Secondary Review Workstation is attached to the system via an Ethernet cable and can be situated at distances greater than 5 meters (5').



## Supervisor Workstation

The Supervisor Workstation gives Supervisors and Administrators the ability to monitor multiple x-ray systems. This allows Supervisors to ensure that the screening is done in the most efficient and effective means possible. Supervisors have access to all systems and can modify the permission levels of users, add or remove Operators, as well as create or change passwords. The Supervisor can also adjust the percentage and variation of TIP utilized on the System. Included in the Supervisor Workstation is a Monitor\*, Keyboard, Mouse, Work Table, and Computer.



\*Size and quantity of monitor varies by system.

### Threat Image Projection (TIP)

TIP software utilizes a large image library with a range of threat objects and operates by periodically inserting a threat object into a scanned image. When a threat object is detected, operators push the “Suspect” button on the AOCP to signify they recognize the threat. If the operator fails to identify a threat, the system will pause and the threat object will flash on the screen to notify the operator of the missed threat. TIP exposes operators to various threat objects and challenges the operator's threat identification skills. Moreover, TIP enables Administrators to evaluate the threat detection capabilities of their operators and ensure they are screening effectively. TIP is a invaluable training and testing tool for operators. TIP software may be disabled from the Administrator menu as desired.

### Extreme Environment Operating Kit

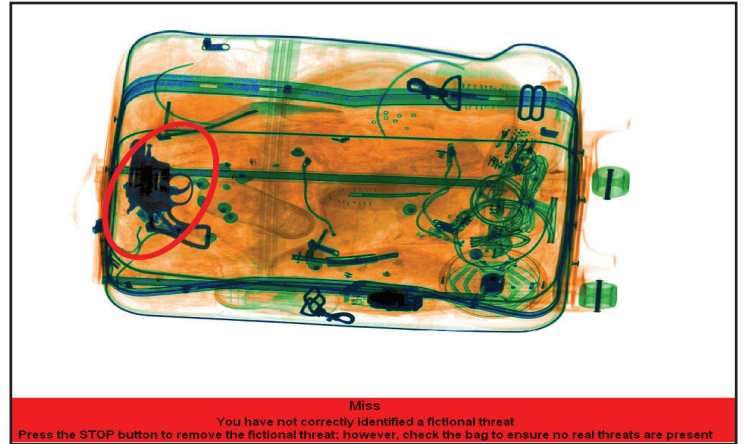
Astrophysics offers two harsh environmental kits, the Polar Kit and the Tropical Kit. The Polar Kit features a generator mounted heating pad. The Tropical Kit includes an additional fan and multiple humidity control devices within the system. These kits are designed to improve system performance and efficiency in extreme climates.

### Radiation Meter

Customers may choose from a range of radiation meters as an add-on option in order to perform on-site safety checks and ensure compliance with radiation safety regulations.

### Operator Footmat

An “interlock” is a pre-set safety device that prevents the system from operation in an unsafe condition. Astrophysics’ systems have multiple standard interlocks on doors and panels, such as sensors that identify if the protective lead panels are in place. With the Operator Footmat Interlock, the system is programmed not to activate unless the operator places a foot on the footmat. This feature provides an additional safety measure to ensure that the operator is present during system operation.



Threat Image Projection

### Test Kit

Test kits enable customers to perform on-site checks for consistency, performance, and reliability the system. Customers may choose from a variety of test kits, including:

- Astrophysics Steel Stepwedge
- Astrophysics Wire Resolution Case
- EW STP Test Case
- ASTM F792-08 Test Case
- ASTM F792-88 Test Case
- Standard Test Piece (STP) Test Case



Test Kit

### Local Language Support

Astrophysics can provide the AOCP and operator interface software in multiple languages. These languages include Arabic, Chinese, English, French, Italian, Japanese and Spanish. Additional languages are available upon request.



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