



X-ray Security Inspection Equipment



Preface

The company developed single X-ray security inspection equipment is a kind of using X-ray penetration of luggage, goods fast not out of the examination system. Single X-ray security inspection equipment is advanced X-ray image detection system, the equipment combines efficient semiconductor detector, digital image processing technology and the advantages of computer image display, provides users with an efficient and reliable and has the function of the service of high quality image processing system. The device depending on the hard disk capacity can store any number of high-definition images, with functions of hazardous reliable automatic alarm and automatic check maintenance function, using simple humanized operation design, the user operation more convenient and quick.

In order to make the customers to our company in the production of this product have a comprehensive understanding, but also to provide the necessary for maintenance personnel maintenance resources, the write the single X-ray security inspection equipment user manual. This manual fully introduces the working principle of single X-ray security inspection equipment and how to operation, adjustment, maintenance, and maintenance. Before installation and use of this product, please read this manual, the user does not comply with the requirements and damage to the equipment, the company does not undertake any responsibility.

Because single check with the single X-ray security inspection system and the dose of radiation leak is extremely low, national standard for 5 $\mu\text{Gy/h}$, and my company to provide equipment leakage is less than 0.1 $\mu\text{Gy/h}$, this product is for all operators, carried

by passengers and their commercial film is absolutely safe. Even so, it is recommended to use this product, carefully read the user manual, this manual contains about the safe use of single X-ray security inspection equipment of important information. This product should be formal training of personnel, in any case, the operator must strictly abide by the rules of radiation protection, in order to avoid cause radiation hazard, only after radiation safety and system operation training staff to use the single X-ray security inspection equipment.

Since time is limited, the hard to avoid the manual have defects and deficiencies, please the masses of users and experts to give correct me criticism.

The company's products in the continuous improvement, this manual change, without prior notice.

Contents

Preface

Contents

The first chapter system overview of 1

1.1 system working principle 1

1.2 product characteristics 1

1.3 type and composition of three representative significance

1.4 main purpose and scope of 3

The second chapter operation safety guide to 5

2.1 comply with the regulatory requirements of 5

2.2 basic safety rules

2.3 safety inspection equipment 6

2.4 X-ray security protection

2.5 informed of 7

The third chapter 8 system structure

3.1 system composed of 8

3.2 system components and sub components

3.3 system function of child widgets

3.2.1 X-ray source 9

3.2.2 detector array box of 9

3.2.3 electronic control box

3.2.4 10 image processing system

3.2.5 display unit 10

3.2.6 conveyor devices 10

3.3 system software

3.3.1 software running environment

3.3.2 rainfall distribution on 10-12 software introduced 11

The fourth chapter equipment electrical structure of 12

4.1 electric control 12

4.2 over-current protection 12

4.3 emergency protection of 13

4.4 access control, 13

4.5 remote start control 13

4.6 A key to 4.6 shutdown control 13

4.7 motor and reversing control 13

4.8 the motor thermal protection 14

4.9 the switch 14

4.10 the light is 14

4.11 14 terminal module

The fifth chapter image processing and software operating guidelines for 15

5.1 on 15

5.2 check the 15 items

5.3 15 image processing

5.3.1 16 color/black and white

5.3.2 image color 17

5.3.3 edge enhancement, edge to add) 17

5.3.4 Local enhancement (bureau) 18 5.3.4 images

5.3.5 high-trust strengthen (wear) 19

5.3.6 Strengthen (low wear) 20 5.3.6 low penetration

5.3.7 highlighted organic matter (organic) 20

5.3.8 inorganic highlighted (inorganic) 21

5.3.9 image magnification 21

5.3.10 gray scan sweep (ash) 23

5.4 turned off out of 23

5.5 Operational guidelines for school official cites use 23 5.5 software

5.5.1 24 image display interface

5.5.2 operation menu

5.5.3 The user login 25

5.5.4 set 25 images

5.5.5 file Settings

5.5.6 27 points set

5.5.7 real-time curve

5.5.8 function Settings

5.5.9 hardware configuration

The sixth chapter maintenance, maintenance and common troubleshooting 30

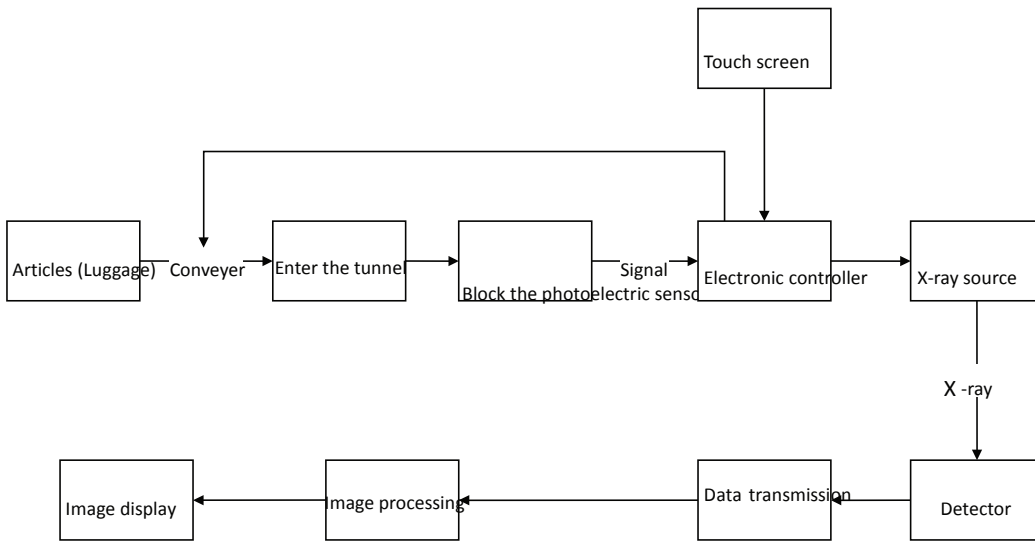
6.1	the daily maintenance and maintenance of	30
6.2	maintenance security considerations,	31
6.3	replacement roller and conveyor belt,	32
6.4	change and adjust the light barrier	32
6.5	change and adjust the X-ray source and	32
6.6	X-ray source tube	33
6.7	common faults and its screening	33
6.7.1	to a power supply failure	
6.7.2	system control	35
6.7.3	X-ray control	
6.7.4	images show	37
6.8	storage conditions, storage time and matters needing attention of	39
Chapter	after-sale service	
7.1	factory guarantee	41
7.2	equipment acceptance	41
7.3	technical support and training	41
7.4	after-sales service items	41
	Security product certification	42
	Security product warranty	43
	Security products warranty	44

Chapter I system overview

1.1 system works

Single X-ray security inspection equipment by the baggage conveyor part, X-ray source part and control part, signal collection and processing and transmission, image processing and electric control part. Single X-ray security inspection equipment is with the aid of the conveyor belt will be checked baggage into caterpillar channel. After the goods into the channel, detection device will related information sent to the control unit, X-ray source emission X-ray is triggered by the control unit. X-ray after collimator formation is very narrow fan-shaped beam, through the items of luggage on the conveyor belt to the detector and the probe X-ray into electrical signals, it receives the very weak electric current signals were enlarged

quantitative, through the universal serial bus transferred to the industrial control computer for further processing, after dealing with the complex operation and imaging to get high quality images. The operating principle is shown as below:



1.2 product features

This product has the following characteristics, to provide users with more convenient and quick service.

1. Lead painted green shade, shade appearance through certain processing, wear-resisting, environmental protection, prolong service life
2. Taken the network interface: can connect LAN, multiple terminals at the same time check baggage
3. rays more secure: ray emission control automatically, avoid emission by mistake
4. a key shutdown control: turn it off when only the key, a rotating equipment automatic safety shutdown, concise and easy
5. Taken the dynamic image processing functions: some function keys in dynamic real-time processing

1.3 technical indicators

The technical index of the comprehensive products are as follows:

Being the basic parameters:

- The channel size 500 * 300
- The conveyor belt speed 0.20 m/s
- Conveyor belt, the rated load 200 kg
- Penetration 32 mm steel plate;
- Film safety ISO1600 film
- Leak dose ≤0.1 Gy/h or less

X ray generator:

The bottom of the beam direction according to type

Tube voltage 80-160 kv (adjustable)

Ray beam spread Angle 80 °

Sealed oil cold / 100% cooling/working cycle

Image processing system:

X ray sensor L photo diode array detector, 12 bit depth

Display high resolution 19 inch monitor

Color image display according to the material is qualitative, 24 true color display

Edge enhanced object contour edge clearer

Super image enhancement image detail more clearly

High penetration according to improve the contrast of images in the bright area, make easy penetration area more clearly.

Low penetration according to improve the contrast of images in the dark area, make difficult to penetrate area more clearly.

Magnifying glass local amplification function, dynamic display

Brighten up/down now to increase the brightness of the image/dimming the brightness of the image

Image back to pull/before the show's 20 images, and the current image can be any image processing

Image restoration image back to its initial state

To save any image real-time image storage and arbitrary image processing, can be saved for continuous work.

Color Organic matter showed to orange, inorganic displayed as blue, mixture display for the green

use the environment:

Working temperature/humidity 0 °C ~ 45 °C / 20% ~ 95% (condensate)

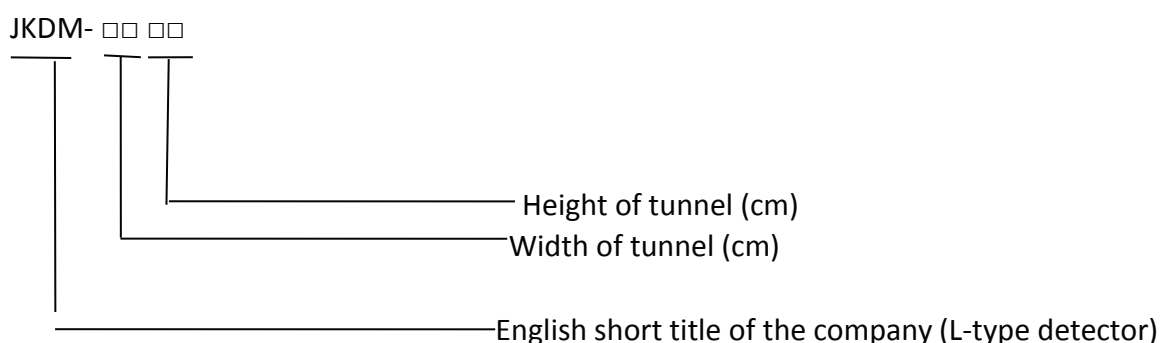
Storage temperature/humidity -20 °C ~ 60 °C / 20% ~ 95% (condensate)

Working voltage 220VAC(±10%) 50±3Hz

Power consumption 1.5 KW (maximum)

58 db noise level <58dB

1.4 type and composition of representative significance



1.5 Main purpose and applications

The new powerful Model JKDM-5030C use the latest image technology, which gives higher resolution image for operator to detect all kinds of dangerous articles quickly and effectively. They are widely used in the security check of public areas, such as government agency, embassy, airport, conference center, exhibition center, scenic spot, sports area, post office, shopping mall, hotel, and school. They are fit for the detection of small package, suitcase, and handbag.

Chapter II Instructions for Operation Safety

2.1. Protection

Model JKDM5030 and JKDM6550 are X-ray systems with radiation. We have tried our utmost efforts to ensure the safety of system in design that it can protect the security of operators and maintainer in any condition. However, the following safety rules should be followed during their use, installation, and maintenance.

Rules and conditions

1. GB 15208-2005 *Micro-dose X-ray security inspection system*

2.2. Basic safety rules

Though JKDM-5030C X-ray security check systems are easy to operate, we still recommend you to read this user manual completely before starting the device, and follow the rules below:

1. If you have not used the device for over 6 months, please do not start it before the professional technologist restarts the X-ray generator; otherwise, the X-ray generator may be damaged.
2. You should know the relevant radiation protection rules before operating the X-ray security check system.
3. If other person wants to operate the device, make sure he/she is a qualified operator, and knows all safety indications, laws, and regulations.
4. The installation, electrical connections and the change of 6550 and electrical parts should be done by experienced professional technologist only.
5. If the shell, cable, or conveyor belt of the device is damaged, please stop the operation immediately.
6. The shell plate and parts of 6550 X-ray security check system should only be opened by qualified technologist.
7. Do not modify or change any parts that are related to the system safety. The installation test or

maintenance of the device should only be done by persons who have passed the training.

8. The device is for checking the articles only. Do not use it for person or other living things.

9. Do not sit or stand on the conveyor belt.

10. Any part of the body is not allowed to be in tunnel when starting up the devices.

11. Make sure the luggage is not piled up in the tunnel or outlet! If the luggage blocks the tunnel, please turn off the device before clearing.

12. Prevent the liquid spilling on the device. Turn off the device if such situation happens.

13. Do not block the thermovent of 6550 X-ray security check system and the display.

14. The device should be connected to the ground before working. The main socket and the installation field should be equipped with reliable grounding equipment.

15. Try to avoid standing by the outlet and inlet of the device when it is working.

16. Stop the operation if the lead curtain is damaged or opened.

17. Though there are very few X-ray, non-operator should also try to be away from the device.

2.3. Security check for device

1. Check the lead curtain that used for preventing the leakage of X-ray in inlet and outlet of tunnel before starting the device. Change the curtain if it is damaged.

2. Check whether there are objects blocking the photoelectric sensor.

3. Check whether the conveyor belt is sound, whether there is spine or dirt that harms the luggage, and whether the conveyor is deviated or blocked.

4. Check whether there is damage on the shell panel, display, keyboard, and cable of the device.

5. Make sure all cover plates are covered.

2.4. Safety protection for X-ray

5030C X-ray security check system takes some reliable protection measures for X-ray radiation, which effectively ensure the safety of operator and other persons.

These measures include:

1. The X-ray source of the system is the active component, which only gives out X-ray under high voltage. Therefore, there will be no X-ray when the device is not connected to the power supply, such as

when it is in transportation and storage.

2. The X-ray amount of single detection is only $0.3\mu\text{Gy/h}$, the machine cabinet and collimator are shielded by lead plate, and the inlet/outlet is equipped with lead curtain; all these measures prevent the harm of X-ray effectively.

3. To ensure the safety of maintainer, two interlocked switches are used (The device does not .emit X-ray once any of the interlocked switches is cut). The device does not emit X-ray when the conveyor is stopped or when there is no articles in the tunnel, avoiding harming the maintainer.

4. Setting grounding in several places can effectively avoid the electric shock and the damage to device.

5. The device has multiple protections, such as overload and over current protection, which minimize the possibility of accident and risk.

6. Our X-ray security check system fully meets the safety requirements in X-ray national standards GB15208-2005.1.

The design of JKDM5030 X-ray security check system can protect the safety of operators and maintainers in any time. The system has very low X-ray dose while ensuring enough penetration for checking the articles. It does not influence the sensitive materials, foods, medicine, and tapes for even several irradiation.

The device is equipped with large lead screen for preventing the leakage of X-ray. The lead curtain almost minimizes the radiation to zero. Besides, interlock switches are installed in X-ray emission place and the detector box. The control circuit is monitoring the interlock switches in case when any interlock switch is disconnected, the device will cut the AC power supply of X-ray controller, and therefore cut off the X-ray.

The X-ray source of the device does not emit X-ray after the power down.

2.5. Notice



1. Any device that emits X-ray will do harm to people. Please try to shorten the time of exposing in the radiation environment, and pay attention to the protection.

2. The external power grid and power supply should have good grounding that has connected to the ground

Chapter III System Structure

3.1. System Composition

The system includes hardware and software.

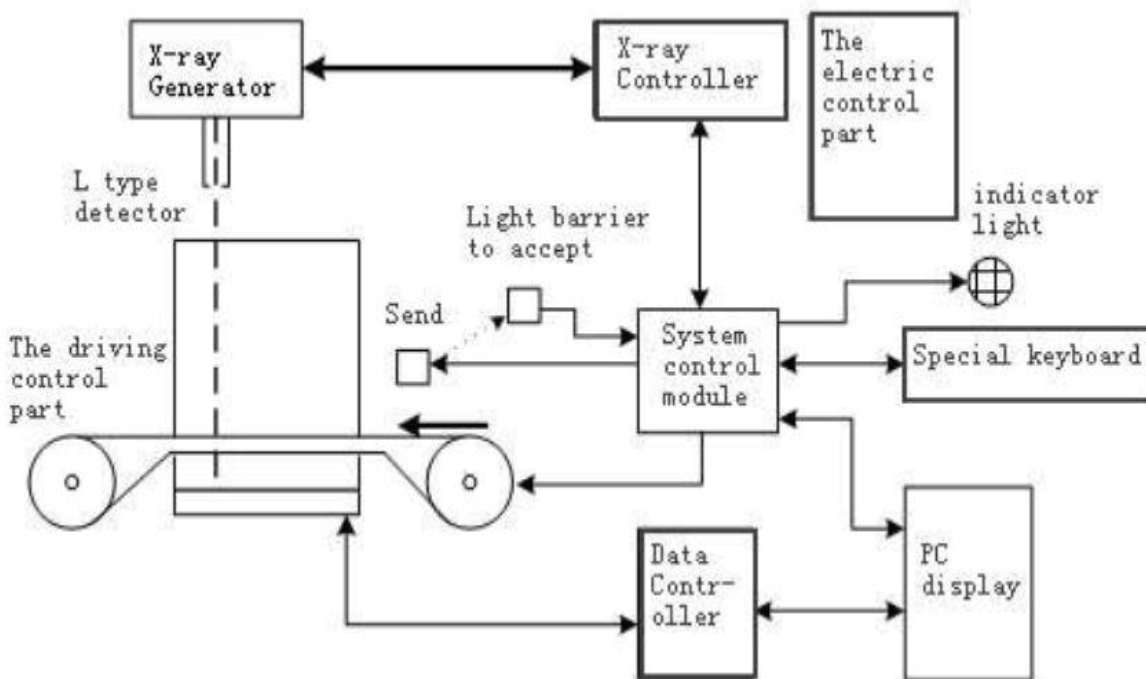
1. Hardware

- (1) X-ray generator controller
- (2) X-ray detector
- (3) Data collector
- (4) Machine frame

2. Software

- (1) Software for system control
- (2) Software for image processing

The system composition block diagram below:



3.2. System components and sub-components

The system components and sub-components include:

-
- (1) X-ray source
 - (2) X-ray source control and driver
 - (3) X-ray detector array kit
 - (4) Electronic controller
 - (5) Industrial control machine
 - (6) Display
 - (7) Auxiliary relay
 - (8) Key switch
 - (9) Conveyor
 - (10) Photoelectric sensor
 - (11) Power panel

3.3. Functions of system components/sub-components

1. X-ray source

X-ray source includes three parts:

- (1) High-voltage generator (Two voltage doubles and reactive circuits)
- (2) X-ray tube
- (3) Collimator

X-ray tube and the high-voltage generator made up by two voltage doubles and reactive circuits are put in the shell with lead screen that is filled with oil. Cable WS9 offers filament and high-voltage driving signal for the X-ray source, and feeds back the sampling signal of high-voltage and anodic current to X-ray control and driving case to maintain the stability of high-voltage and anodic current during the detection. The collimator is used for changing the X-ray beam to fan beam.

2. X-ray detector array kit

Two detector arrays form an L shape to smooth away the detecting dead angle. Vertical side (Named as "Side detecting box" below) has 4 (8) detector panels, and horizontal side (Named as "Bottom detecting box" below) has 10 (12) detector panels, in which there are 32 tunnels for each panel. The high-energy analog signal is magnified and digitized on the detecting panel, and sent to the industrial control computer

for processing.

3. Electronic control box

The control panel is in charge of receiving and forwarding the PC command from industrial control computer to control the motor to run or stop. It also monitors the status of photoelectric sensor, judges the entry/ exit of luggage, controls the X-ray emission, and monitors whether the X-ray control module is work normally. If there is any unusual action, it will give an alarm automatically.

4. Image processing system

The device has one digital image processing set, also called as industrial control computer. The industrial control computer receives the detector signal from X-ray source, and processes the sample detector data.

(1) Image processing

The device offers the basic image processing functions, such as edge enhancement, super image enhancement, pseudo color, and enlargement.

(2) Data storage and search

The device offers functions of storing and searching the image, as well as recording the operating situations of the operators.

5. Display

The system is equipped with 17" high-resolution display, which can display color image or B/W image as required. The PC computes the actual value of input information, and makes the direct response realizing the device control and image processing.

6. Conveyor

The conveyor includes:

- (1) Carrying-strap;
- (2) Electrical (Driving) roller in outlet end of conveyor;
- (3) Driven roll in inlet end of conveyor;
- (4) Dragging roller in the running direction of two driving belts under the device

The electrical roller has one single-phase motor. The driving torque of motor is transmitted to roller surface by the gear reducer to form the force of driving the belt. The driven roll is used for adjusting the

tension of belt.

7. Photoelectric sensor

There equips a pair of photoelectric sensors (Opposite-type photoelectric switch) in the inlet of tunnel for detecting the luggage carried into the tunnel by the running conveyor belt. If the luggage blocks the photoelectric sensor, the receiving end of photoelectric sensor will send a signal to the electronic controller, which will therefore inform the X-ray controller to emit the X-ray.

3.4. Software system

1. software USES

This software is a single X-ray security inspection equipment of image acquisition and processing software and has displayed image acquisition, image processing, image storage, function modules such as functional testing, provides a friendly user interface control, easy to operate.

By software for complex data transmission of signal processing, the processed image display on the screen, at the same time, the software provides the edge enhancement, color display, pseudo color, partial penetration enhancement, image pullback, amplification, and other image processing functions, convenient for operating personnel to identify prohibited item.

1. Operating environment

Windows XP

2. Software compositions

(1) Special driver

(2) User control interface

User control interface	{	Control the system hardware and achieve the automatic data acquisition
		Read the data acquisition system in regular time
		Offer interface for image processing
		Analyze and process the output of image
		Offer user-friendly interface

Chapter IV Operations and Parts of Electric Module

4.1. Electric control

Electric system is an important part of security check system; it offers power supply for the entire security check system as well as providing relevant electric protection when there is accident. The operators operate the device on the control table. The electric schematic diagram is shown in Figure 4.1:

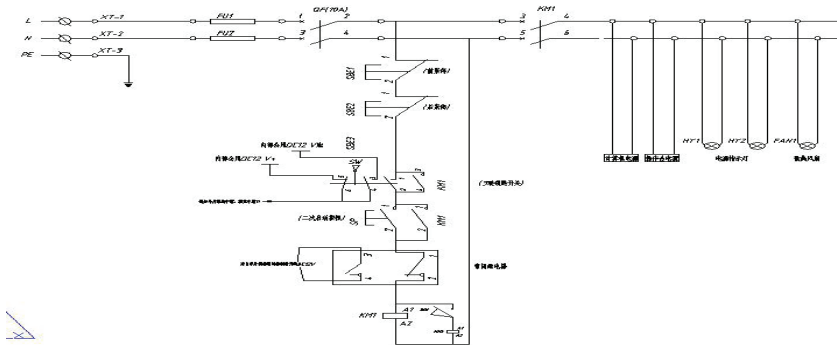


Figure 4.1 Original figure of electric control (1)

The electric part mainly realizes the following functions:

4.2. Over current protection

In Figure 4.1, FU1 and FU2 are 10A solid fuses and the actual power of the device is 1000W, this design allows the circuit to have the max power 2200W, which meets the actual requirement of the device. A circuit breaker is installed behind the fuse that when there is a short circuit in the back-end, it will release the circuit instantly to protect the device. The circuit breaker is CHNT QF, Model DZ47.

The short circuit is caused mainly by the aging insulating layer, loosened terminals, and the personal factor.

4.3. Emergency protection

In Figure 4.1, SBE1 and SBE2 are emergency stop buttons. The buttons are installed near the operator on the shell of device for cutting the power supply in case of the emergency. They are connected in the major loop of the control part. The selected model is of $\Phi 22$ and 10A, which meet the requirement of the device.

4.4. Privilege control

The device is operated by trained full-time staff only. Therefore, there require to have privilege control. Two schemes are used; one is for electric control, and the other is for software control. The electric control is achieved by controlling the SW key switch shown in Figure 4.1, which is connected in series in major control loop. You can choose 2 to open, or 1 to close the loop. Only people with the key switch can operate the device, thus preventing the mistake triggering by others.

4.5. Remote control

With remote start-up control, the control buttons can be installed on the control table separated away from the main device. The control table can be put in a room or a needed place while achieving remote control using the extended power line.

4.6. One-key shutdown control

In actual application, there will be error operations on the key switch. For example, the operators rotate the key switch in the reverse direction by mistake, causing the power failure of the major loop; or they touch the key unconsciously that causes the power failure of key switch. Such operations may have a great impact on the sudden power failure of the load, such as computer. The products designed by our company can achieve the safety shutdown by just revolving a key switch.

4.7. Positive & negative rotation control for motor

The motor is required to have positive & negative rotation during the normal operations. For example, if there is an article blocking the photoelectric sensor during the self-checking, the belt needs to be rotated positively or negatively based on the situation; or when the image is not clear enough and you want to have a clear image, you can return and use the positive and negative rotation. The circuit is done by using an intermediate reversing relay.

4.8. Thermal protection for motor

In actual application, the motor may have over current because of long time operations or overload. Therefore, it is necessary to protect the motor. The system will protect the motor when the current comes to a certain level.

4.9. Travel switch

Travel switch is mainly used for protecting the safety of human. The X-ray is harmful to human that

when people touch the X-ray emission device, the X-ray emission should be stopped immediately for the safety. The travel switch is therefore installed beside the X-ray generator control device, and connected in series with X-ray generator to protect the device from short circuit.

4.10. Indicator

All indicators should be installed on the surface of the device for giving indications. They include X-ray indicator, alarm indicator, and power supply indicator.

1) Power supply indicator: Turn on the key switch to start the device. The yellow power supply indicator on the panel in front of the tunnel will be on immediately.

2) X-ray indicator: X-ray indicator is installed on the panel in inlet and outlet of the tunnel. X-ray is emitted when the articles enter the tunnel and blocks the photoelectric sensor, and then the red indicator is on.

3) Alarm indicator: There is one alarm indicator in inlet and outlet respectively. They flash and alarm when there is suspicious article.

4.11. Connecting terminal module

In a system connection terminals are using screw type PCB terminal blocks, by cold-press terminal, line groove to go around the line. As shown in figure 4.2.

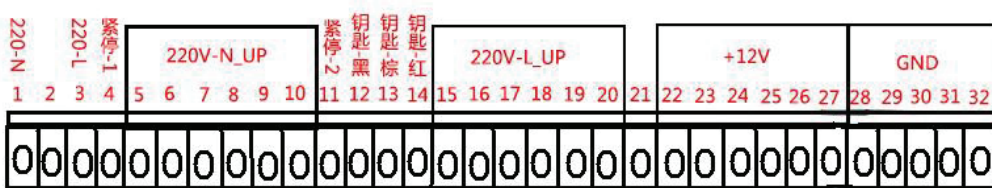


Figure 4.2 terminal module

Chapter V Image Processing and Distinguish

This chapter introduces the software operations of the device in details.

5.1. Start the device

- Insert the key in the key switch and rotate it clockwise; then, press the green button to start the device;
- Power supply indicator on the device is on, and then the waiting indicator is on.
- The system enters into the software application interface.
- The program checks the tunnel automatically to see whether there are foreign objects. The conveyor belt will run if there are foreign objects. The software system initiation is over when the foreign objects are cleaned.

5.2. Article check

- Put the articles to be detected on the conveyor belt.
- Press "Forward" button to control the operation of motor, and start the conveyor belt.
- The articles will block the photoelectric sensor once they enter the tunnel to start the X-ray generator.
- The device carries out the non-interlaced scanning for the articles when they are going through the tunnel. The relevant detected image is shown on the display immediately while, refreshing without stop, transferring from right to left.

5.3 the image processing

To allow operators to better package whether there is a recognition tool, lighters, firecrackers, liquid such as typical prohibited item, the system software has also increased, organic, inorganic to display an image magnification, image edge enhancement, image color, fade up wait for a variety of practical image processing function, users of image processing, use as shown in figure 5.3 custom function keys on the keyboard, to achieve "a key image processing", convenient operation, when a user image processing wrong operation button, simply press the "restore" button can be restored to the original image, for several commonly used image processing selected below.



Figure: 5.3 Customize keyboard

3.1 color/black and white display

ick color/black and white, two kinds of color can choose according to switch. Color image
 4 color image, scanning the object can be divided into 4 types, including orange on behalf
 the organic matter, blue for inorganic, green represents a mixture, black (or red) material
 roperties not sure, generally refers to the object of the difficult to penetrate. Black and
 hite image Grey level 256, made of pure black to white grayscale display. The white (gray),
 e greater the area of the image areas represent the object for X ray absorption rate is low,
 at is, more rays penetrate. The absorption rate of different objects corresponds to
 fferent gray level. When operating the "color/grey" button, the display of color images and
 ayscale images can be performed.

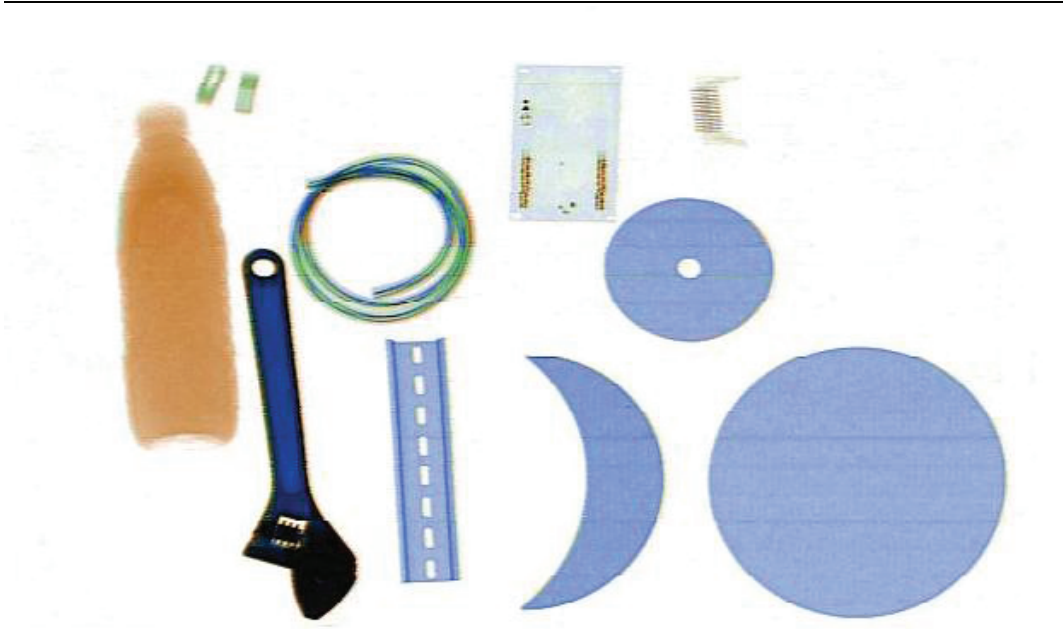
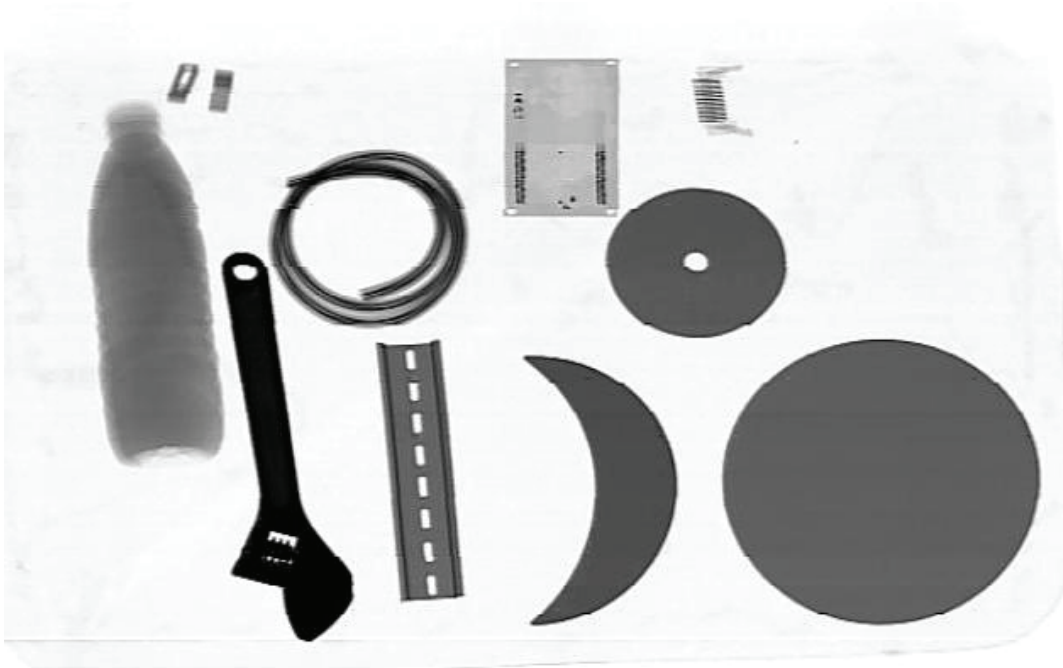


Figure: 5.3.1 Color chart



5.3.1 grayscale

5.3.2 image color

As shown in the image display, the general object of X-ray high absorption rate show for the

deep black, low absorption rate display of an object as a bright white, in the white display, is just the opposite, click on the "color" button, display switch this is negative, can be smaller or thinner high-density objects (such as metal wire) will become more clear. When "the color" button, the operation can be carried out the inverted color images and grayscale images.



Figure 5.3.2 original image

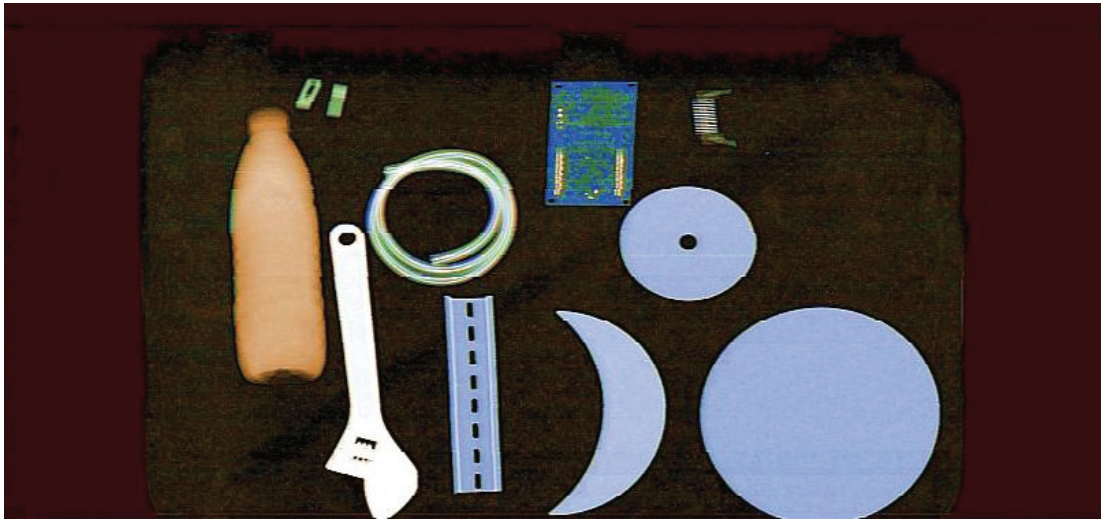


Figure 5.3.2 image color rendering

3.3 edge enhancement (edge)

shown, when operators need further interpretation was carried out on the edges, ca
ess the "add" button, the image of the edges will be highlighted, the profile more clea
ore conducive to the operator to distinguish between different objects.

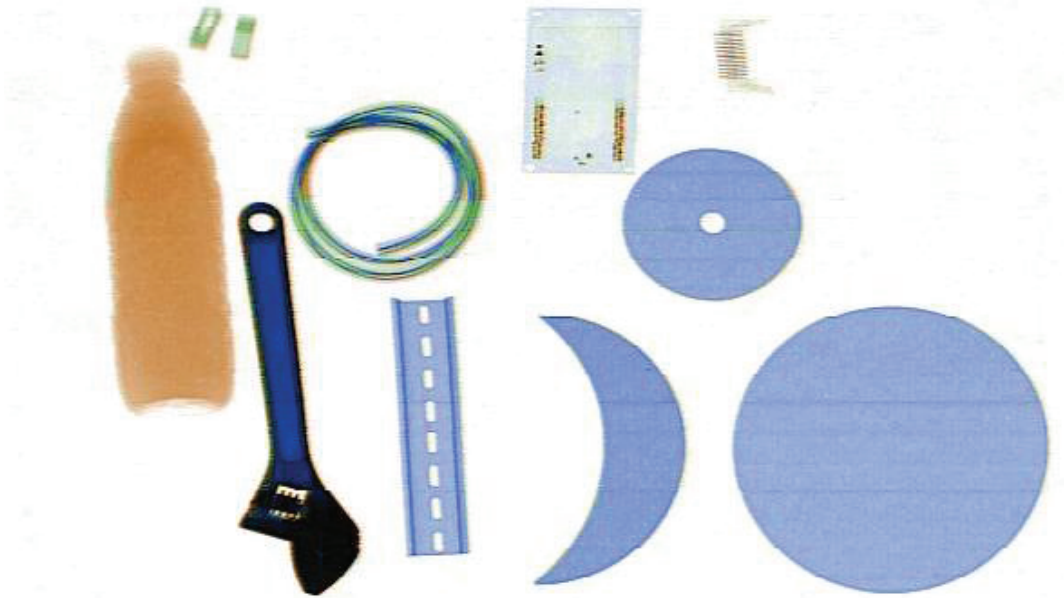


Figure 5.3.3 original image

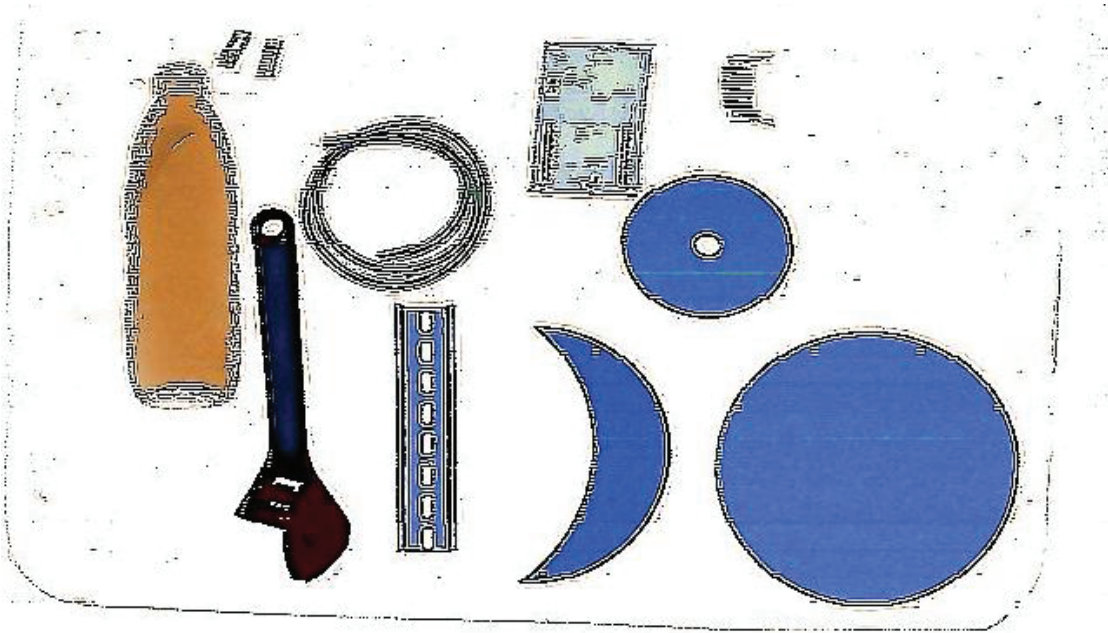


Figure 5.3.3 image edge enhancement effect

5.3.4 image local enhancement (bureau)

For the image darker areas to lighten the processing, the hidden behind the thick object object clear display, the image of a normal region are not affected. Press this button when the image automatic switching between normal display and local enhancement. Second press (or "back" button) can stop the display switch.

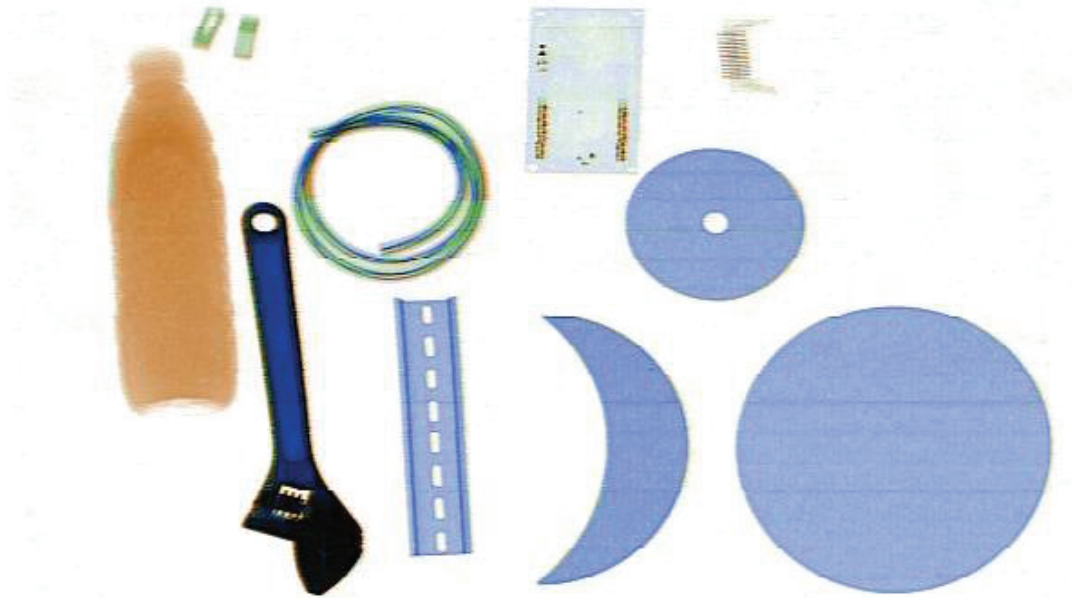


Figure 5.3.4 original image

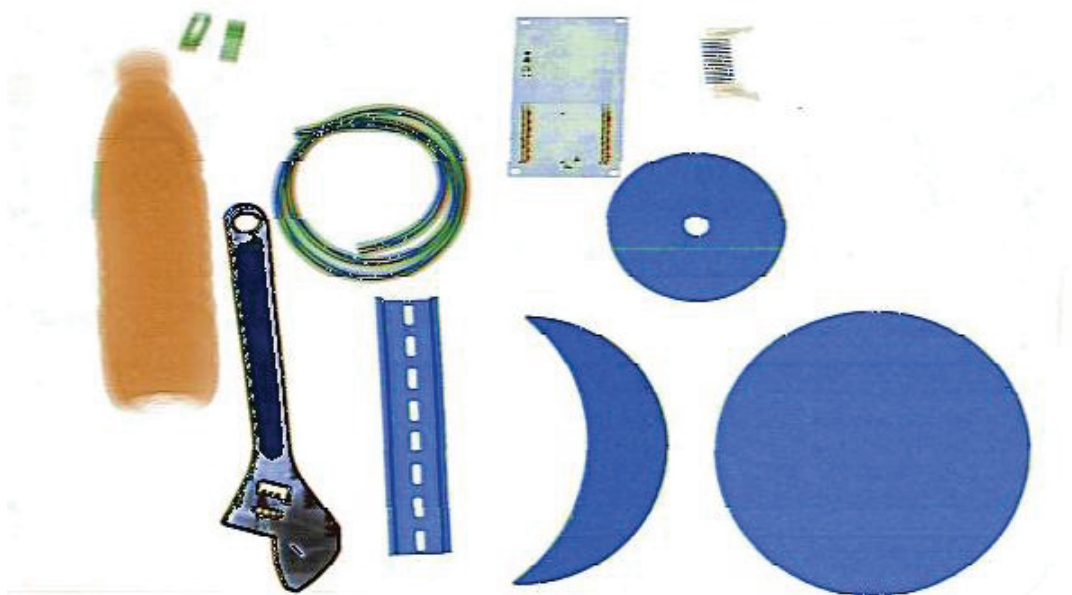


Figure 5.3.4 image edge enhancement effect

3.5 high-trust strengthen (wear)

shown in figure 5.4, strong penetrating power of regional brightness is more bright,

lower contrast, through the "high wear" operation will be a bright area, according to contrast with a suitable clearly shows high penetration area, but at the same time affected normal area, lower contrast.



Figure 5.3.5 original image

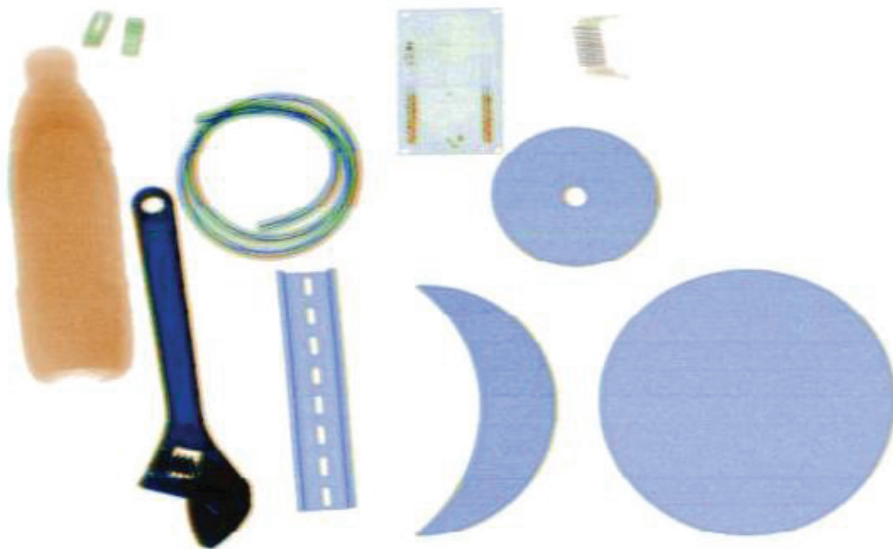


Figure 5.3.5 high-trust strengthening effect

5.3.6 low penetration (low wear)

As shown in figure 5.5, brightness dark penetration is low, not easy to observe, by "low wear" operation will brighten up the region improve the contrast of the region, clearly shows that the regional image, but at the same time affected normal area, lower contrast

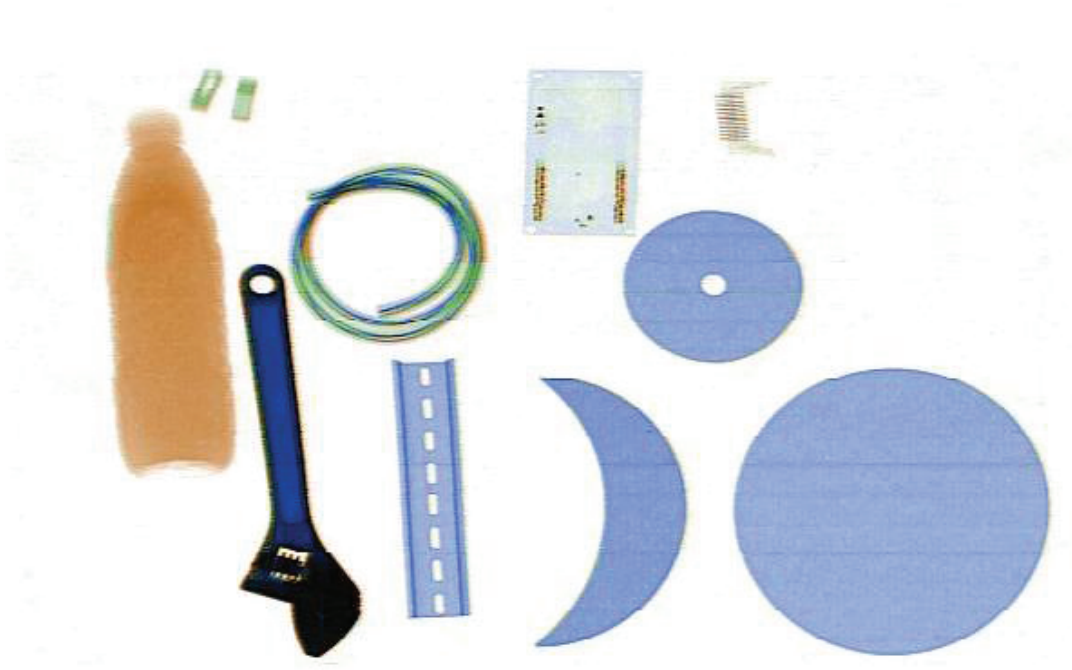


Figure 5.3.6 original image

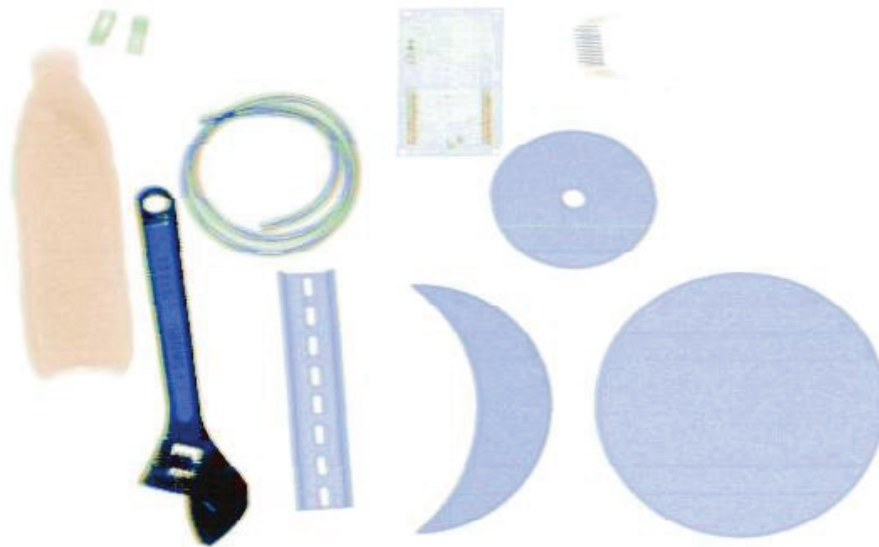


Figure 5.3.6 low penetration effect

5.3.7 highlighted organic matter (organic)

As shown, the organic display image processing effect is to inorganic matter (blue) to grayscale display, orange (organic) highlighted, facilitate the operator about the recognition of explosives, drugs and gasoline and other flammable items.

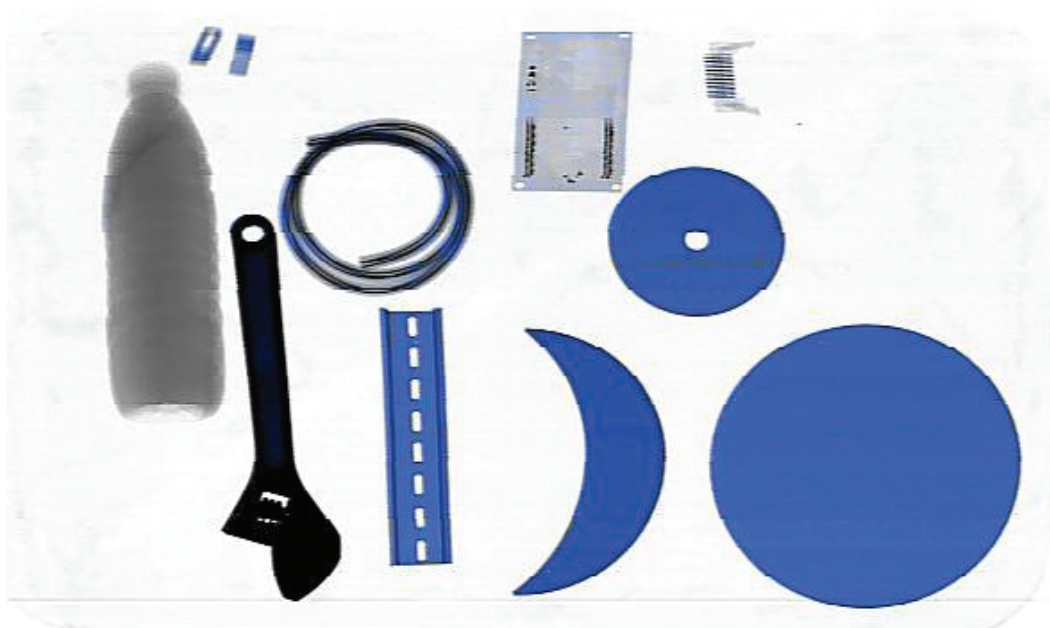


Figure 5.3.8 inorganic display effect

5.3.9 image magnification

As shown, the image magnification function can carry on the continuous zoom in the whole image area, users only need to press the keyboard "zoom in" button, can enlarge the parcel image, convenient operation personnel to observe tiny prohibited item.

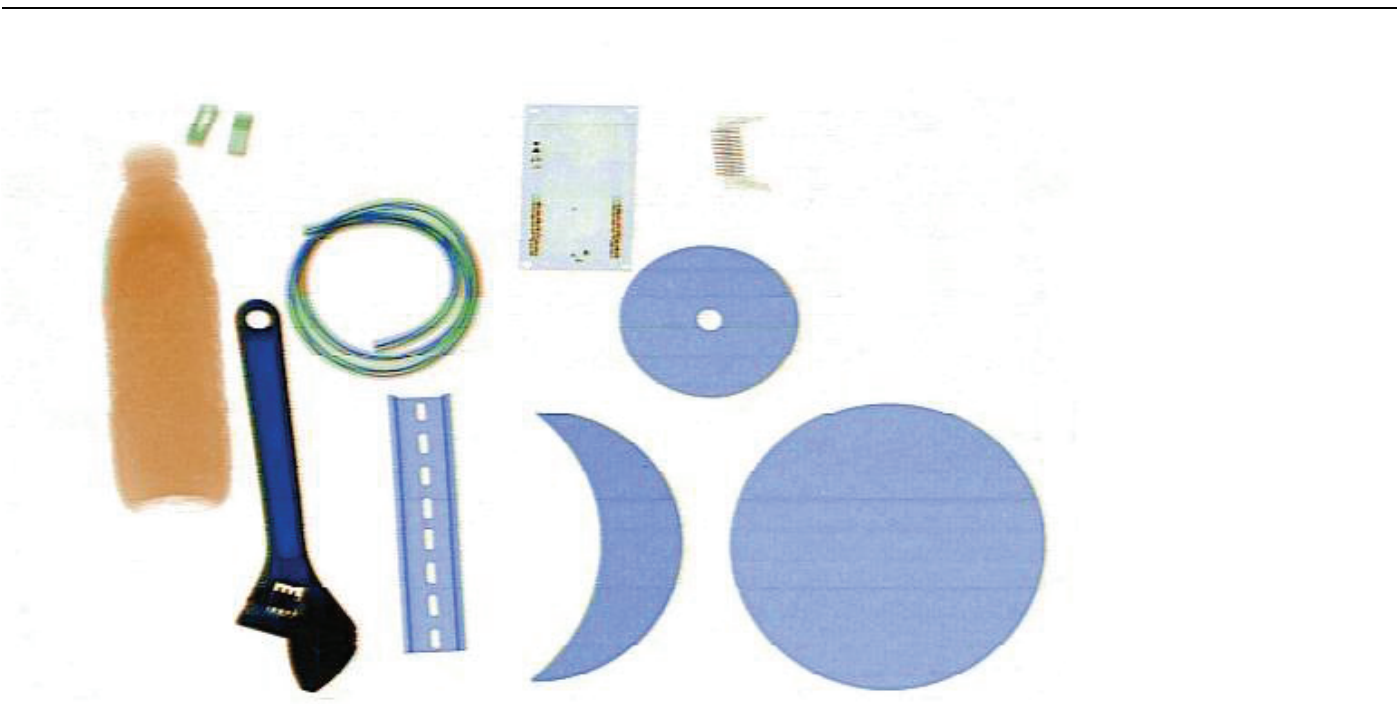


Figure 5.3.9 Magnify the image of the former

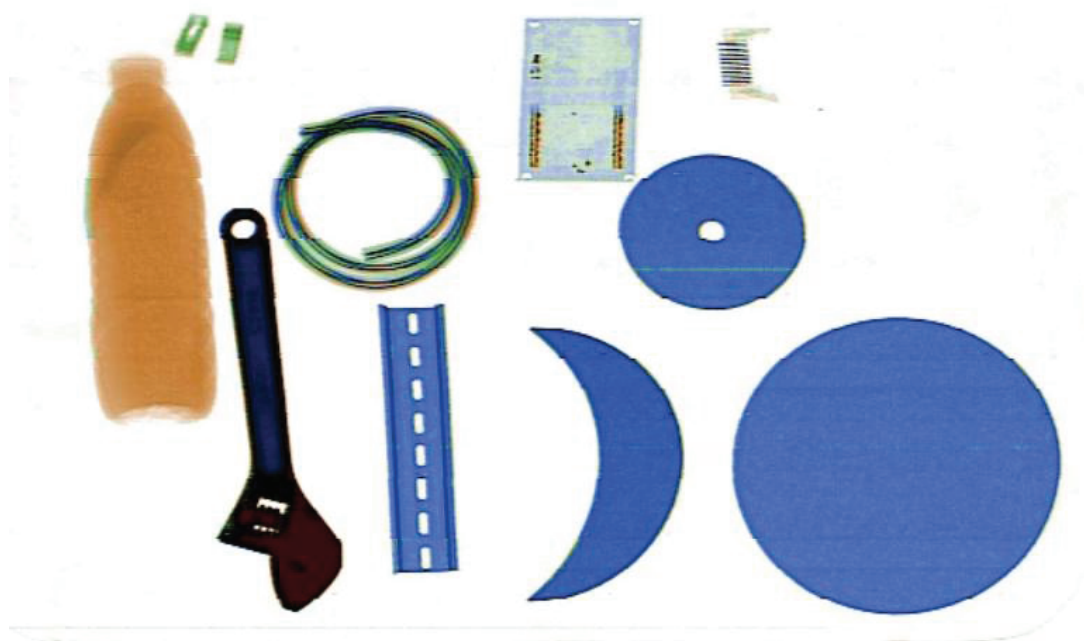


Figure 5.3.9 Image magnification effect

.10 gray scan sweep (ash)

Press this button will automatically transform grayscale image mapping, brighten gradually dark space, at the same time bright area gradually dim. Convenient for operator to find the most suitable for the current image contrast and brightness.

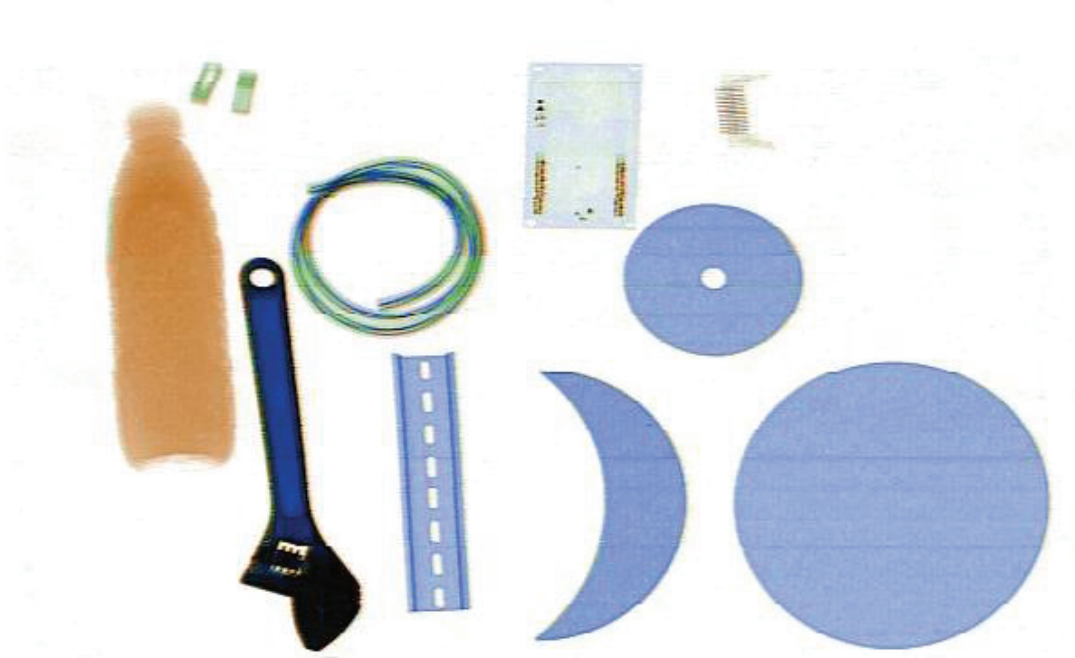


Figure 5.3.10 original image

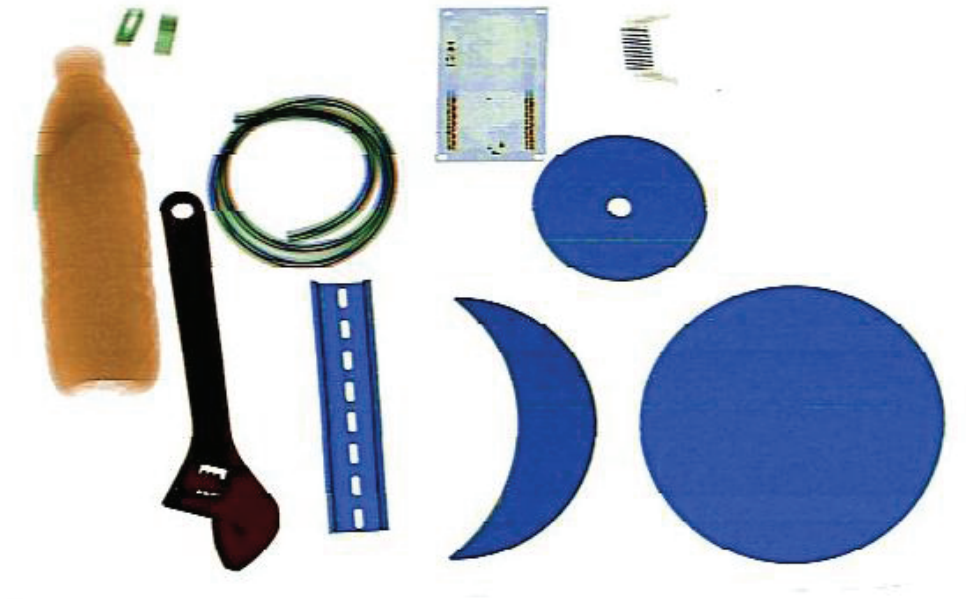


Figure 5.3.10 gray scanning rendering

5.4 shutdown to exit

1. ensure not left any luggage on the conveyor belt.If necessary, the conveyor belt forward or backward

Turn, until it is confirmed that did not leave any items on the conveyor belt.Equipment on the power turn on the light is lit.

2. directly to the left key switch, a rotating computer safety shutdown, do not need any other operation, simple and convenient, humanized design, the realization of the real "one button to turn it off" function.

3. pulled out the key, or the transition from work.

5.5 software operation manual

System software includes image display and menu operation, can see the package in the

display screen images, understand the equipment working state, in the operating menu provides image display Settings, image retrieval, intelligent control, etc.

5.5.1 image display interface

As shown in figure 5.5.1.1, image display interface is mainly used for package, through the display interface can intuitively understand the current roller motion state, data connection whether normal, whether the ray information such as open, at the same time, the display interface also provides roller control button, when click on the button or drum of normal operation or run in the opposite direction,

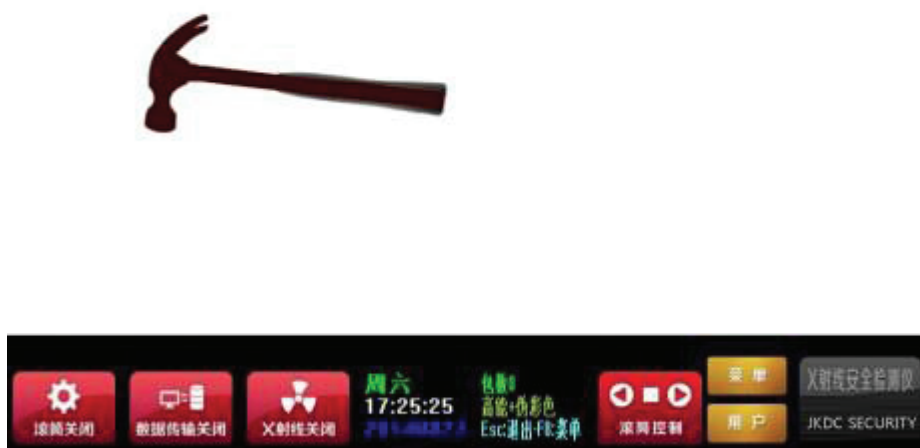


Figure 5.5.1.1 image display interface

Figure 5.5.1.2 drum were shut down, ray closed interface display effect.



Figure 5.5.1.2 state display interface

Figure 5.5.1.3 is drum run forward, ray under the open interface display effect.

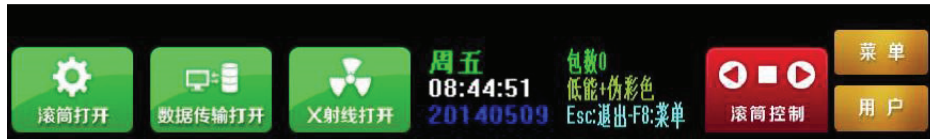


Figure 5.5.1.3 state display interface

5.5.2 operation menu

When users need to modify the Settings in the operating menu, you must first login with a valid account software, modify the Settings to take effect, the user to change the Settings simply click on the "apply" button in the corresponding function box (or "set" button), the software can be reopened software after, in the operating menu mainly contains the image Settings, files, Settings, such as ground point set 7 sub menu.

5.5.3 user login

When a user in the image on the display, press the "F7" keys on the keyboard will pop up the display user login box (as shown in figure 5.5.3), after the user input the correct code and password, click the login button.



Figure 5.5.3 login interface

5.5.4 image set

By the user to login after software, in the image display screen press the "F8" keys on the keyboard, show the menu interface to operate. 5.5.4 is image Settings menu interface, in the image Settings menu, the user can according to need, set up a package image display effect, pixel starting point to end point, high and low can display switch and package length, etc.



5.5.4 image Settings menu interface

5.5.5 file Settings

Figure is 5.5.5 file Settings menu interface, the system software has the function of image storage, can automatically save more than 50000 package image, through the file Settings menu, the user retrieval condition after set, click on the "start search" button, can see has been saved in the preview image, the image a name with a package system time, more convenient users to view images.

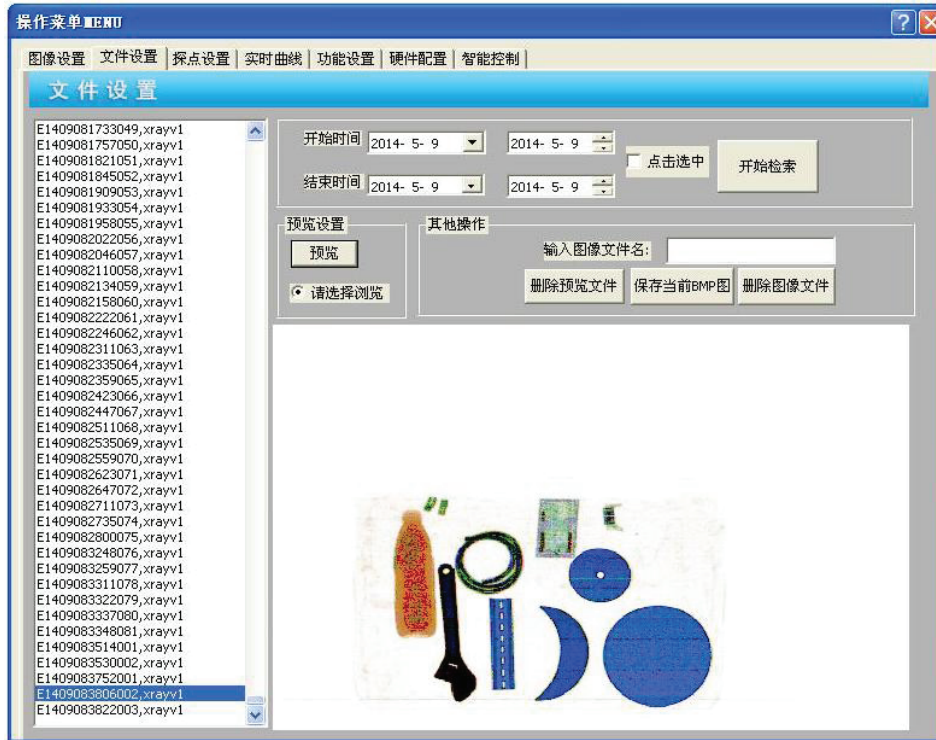


Figure 5.5.5 file Settings menu interface

5.5.6 agent point set

Figure 5.5.6 Settings menu interface agent and is mainly used to add or delete the interpolation points, setting the scope of the system effective display agent, shielding unnecessary display area.

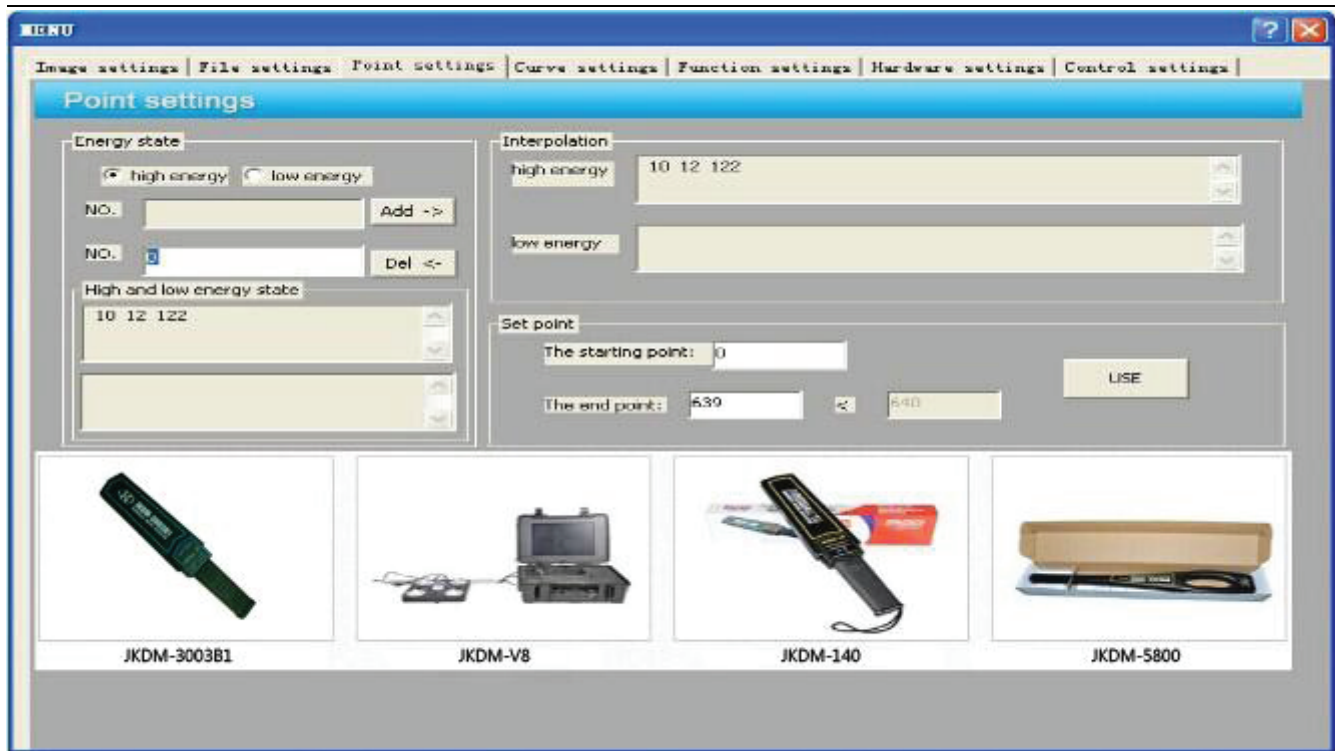


Figure 5.5.6 agent point set menu interface

5.5.7 real-time curve

Figure 5.5.7 menu interface, real-time curve is mainly used to check the detector response curve, users click on "start gathering" button, the system software can collect the real-time dynamic display of data. When users click on "open ray" button, the user can see the under the conditions of ray to open the detector response curve.

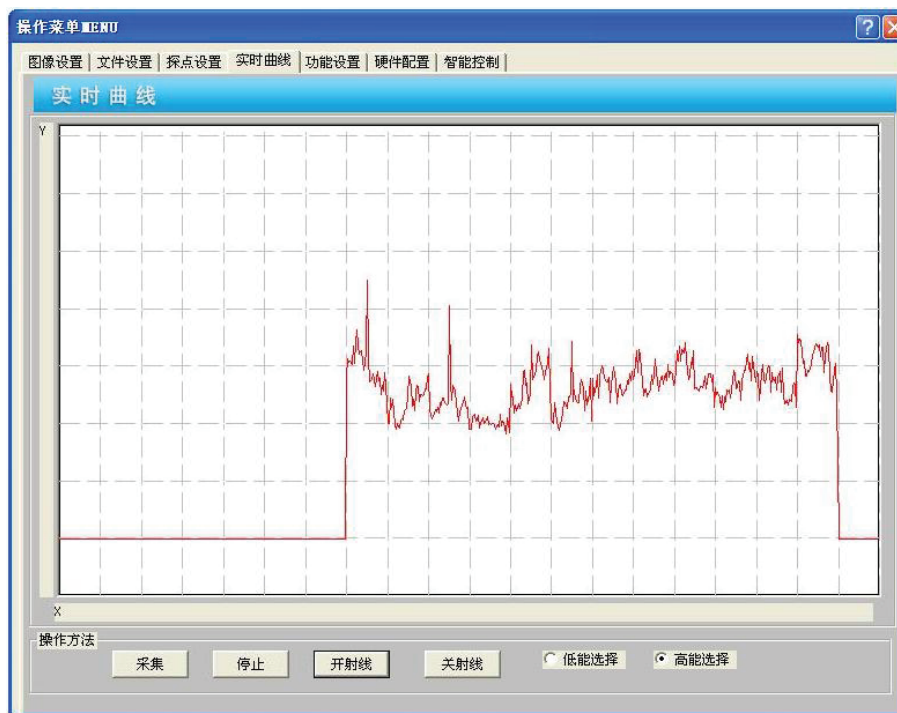


Figure 5.5.7 real-time curve menu interface

5.5.8 feature set

Figure 5.5.8 is set menu interface function, in the feature set menu option provides users with multiple intelligent control function, users can choose the package image file save mode (automatic save or manually save), define the file directory, choose whether to open the automatic, intelligent roller, automatic recognition and display screens and sound and light alarm, and other functions in both Chinese and English.

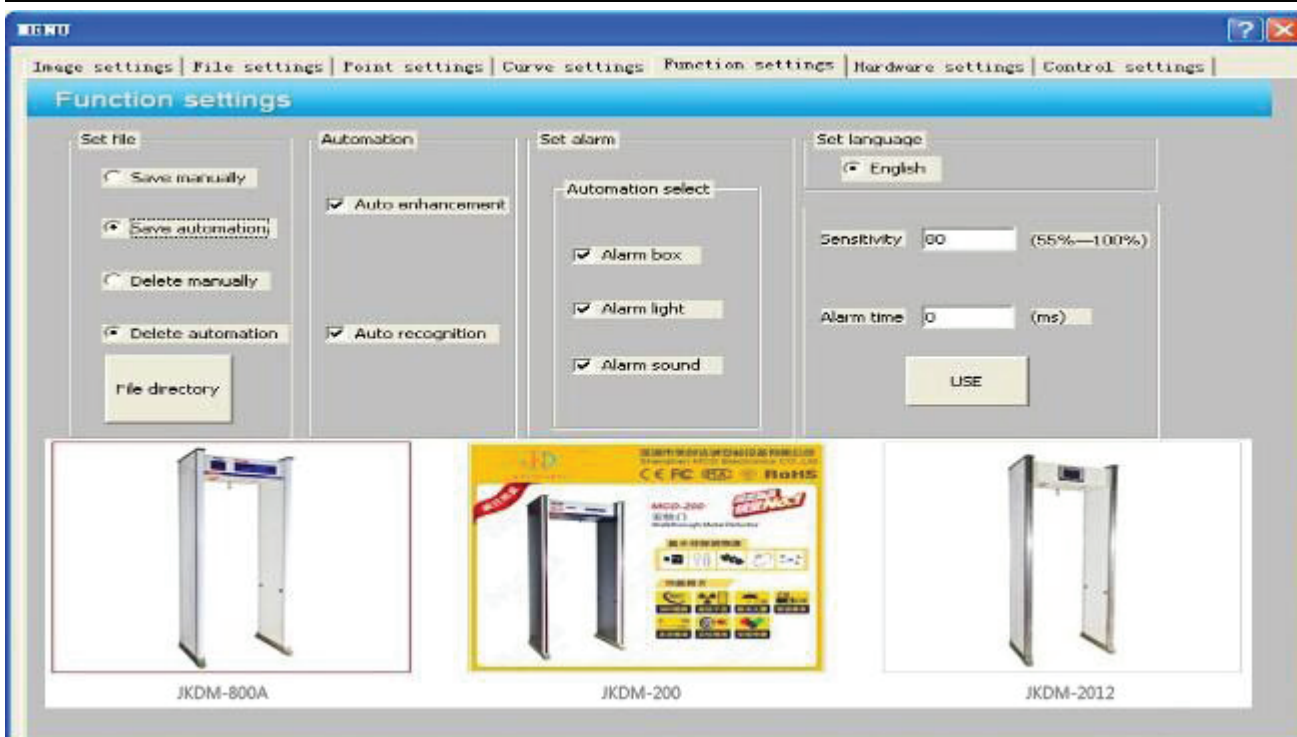


Figure 5.5.8 feature set menu interface

5.5.9 hardware configuration:

Picture 5.5.9 is hardware configuration menu interface, the menu is mainly used for ray source and control panel communication port Settings, and advantageous for the X-ray machine debugging, to help solve the equipment failure. In the menu provides a drum motor control, ray light control, alarm, light control, when the need to control the device, the user must choose to control a serial port (COM1) by default, set the serial port baud rate (default 38400 KBPS), after click "open the serial port" button, you can see a serial port status display successfully opened, returned to a serial port control of information in the display window at the same time, a serial port can work normally.



Figure 5.5.9 hardware configuration menu interface

Chapter VI Maintenance and Troubleshooting

X-ray security inspection system is a high-tech combined mechanical and electrical products. Therefore users not only to understand the technical characteristics of the machine, structure, principle operation procedures, but also good at doing the daily maintenance and maintenance work, in order to give full play to its efficiency and extend the use fixed number of year, and to ensure that equipment personal safety.

6.1 the daily maintenance and upkeep

To ensure the actual working conditions consistent with the specification of technical indicators, equipment should be checked regularly and do the related adjustment. Maintenance work must be recognized by the company's personnel. During the hardware equipment maintenance process, it should be done after the power turn off.

1. normal maintenance work

- Equipment should be installed in the ventilation, less dust, dry environment, avoid high temperature, humidity and direct sunlight.
- Maintenance of dust removal equipment, first use brush cleaner and clean dust.
- Found a loosening of the head or wire connection, immediately to tighten.
- Have components rust, replace if necessary.
- If there are components damage, should find out the reason, troubleshooting again after replace the new device. Device after replacement, the relevant parameters should be adjusted, and then you normal use.
- Can't let foreign body or liquid into the device, when maintaining case caused the leakage or cause an accident.

2. The specific content of maintenance and upkeep

- Check the equipment at the top of the power indicator light:
- On the device electrical, the green light is lit.
- Check the equipment at the top of the X-ray light:
- Ray emission, the red indicator lights.
- Check the channel at the top of the emergency stop button:
- Press the emergency stop button, the equipment can be immediately without electricity. When there is no reset button, the equipment cannot be started again.
- Check the channel at the top of the key switch: After the key switch, start button to starting equipment. Ray stop button to ray controller of power disconnection. If the key switch becomes sensitive enough, to be replaced
- Check whether the touch screen and screen images corresponding to:

-
- Press the zoom button, the image can zoom; Press the key image processing, the display image can make a corresponding transformation.
 - Check the light of the entrance barrier:
 - In the operation of conveyor belt with op

conveyor belt deviation

- Check whether the conveyor belt is relative to the motor has declined.
- Check the cooling mouth
- Check whether the cooling mouth obscured, and remove the dust.

6.2 maintenance security considerations

- Maintenance process, there can be no foreign body, water droplets into the device, and avoid causing equipment damage or safety accident.
- Equipment have a lot of work in the voltage of 220 v, ordinary maintenance must be conducted during power outage, if you want to charged operation, must be conducted by a personnel training, and work to prevent electric shock.
- Equipment has a large number of sophisticated electronic devic

6.4 change and adjust the light barrier

Adjust the light barrier steps are as follows:

- Disconnect the power supply equipment, open the cover.
- Broken medallion cable.
- Unscrew two light barrier the retaining bolt.
- New light barrier, by adjusting the upper and lower position of the barrier of light to adjust the position of the light barrier, fixation.
- The cable outlet of the light barrier in accordance with the drawings of welding good connector.
- Good connection cable.
- Pack good cover plate of the equipment.
- Put through power supply, start the conveyor belt, in opaque objects is put on a conveyor belt, test ray can normal open.

6.5 change and adjust the X-ray source

When change and adjust the X-ray source should be in accordance with the following steps:

- Power system and to remove equipment housings
- Disconnect from the X-ray source of the cable
- Remove the X-ray source fastening screws
- Demolition of limit block
- Loosen the adjusting bolt
- The X-ray source out
- According to the above steps to install new X-ray source sequence
- Do not tighten the set screw and limit block
- System of electricity
- Into the "main menu" again, the "device configuration" menu
- Alternating adjustment X-ray source on the right side of the screw and handle
- After the adjustment, tighten the gamma ray source fastening screws, set blocks
- Power system

6.6 Preheating of X-ray tube in X-ray source

1. The purpose of preheating the X-ray tube

The purpose of preheating the X-ray tube is to decrease the failure rate of X-ray source, extend t

useful life of X-ray tube, and enhance the reliability of the complete device. For MF X-ray source (including the X-ray source installed or uninstalled) that is used in X-ray security check system of line scanning, if it is not used for over half a year or it is transported or vibrated fiercely for some reasons, it is essential to preheat the X-ray tube according to the preheating procedures.

When the device is installed and tested on site or the device is restarted after a long time, it is essential to preheat the X-ray tube strictly.

2. The preheating procedure

(1) Electrifying

(2) Initial adjusting

(3) Preheating

(4) Final adjusting

6.7. Common failure and the maintenance

This chapter gives the probable failure phenomenon, reasons, and the solutions.

Before maintaining, please read the above chapters carefully.

For maintenance, please use the parts and spare parts manufactured by our company and offered for the specific conditions only.

Any device failure caused by non-authorized maintenance or damage caused by using other parts instead of the parts of the company, the company will not take any responsibility.

We reaffirm that all maintenance and adjustment are done by qualified maintainer. The device should be connected to the power supply only when all circuit boards are inserted properly. Please note that you should cut the power supply when you are drawing or inserting the printed boards. The following chapters show the reasons and the solutions in classified failures based on the failure phenomenon.

6.7.1. Power supply

Failure 1: The system cannot be electrified.

Probable reasons:

(1) The power supply is not correct.

-
- (2) There is no key switch or the key switch is not switched on.
 - (3) The fuse is broken.
 - (4) The circuit breaker is open.
 - (5) Emergency stop button is in locking status.
 - (6) The AC contactor is broken.
 - (7) The connection of terminals is loosened.

Solutions:

- (1) Check the local power supply, and make sure it is $220+10\% / -15\% \text{ V}$, and $50\pm 3\text{Hz}$.
- (2) Insert the key switch and rotate it clockwise to the switch on position.
- (3) Change for a new fuse.
- (4) Close the circuit breaker.
- (5) Reset by revolving the emergency stop button clockwise.
- (6) Change the AC contactor.
- (7) Check the connection and reconnect the line.

Note: Make sure the device works normally before electrifying the system.

Failure 2: The power supply indicator does not light.

Probable reasons:

- (1) The device has not started.
- (2) The cable of indicator is not connected.
- (3) The connection of terminals is loosened.
- (4) The indicator is broken.

Solutions:

- (1) Start the device.
- (2) Connect the cable of the indicator.
- (3) Check the connection and reconnect the line.
- (4) Change the indicator.

Failure 3: The system cannot be electrified, but with no other functions.

Probable reasons:

-
- (1) The power supply of electronic controller or X-ray source controller is not connected.
 - (2) Contactor KM2 is broken.
 - (3) The switching power supply is broken.
 - (4) Network is not connected.
 - (5) The serial port cable that connected to the industrial control computer is not connected.

Solutions:

- (1) Insert the plug of electronic controller or X-ray source controller into the corresponding sockets.
- (2) Change the contactor.
- (3) Change the switching power supply.
- (4) Connect the network to the industrial control computer.
- (5) Connect the serial port cable to the industrial control computer.

Note: Incorrect voltage output may damage the parts of device. Cut the power supply when changing or adjusting the parts.

6.7.2 system control

Failure 1: conveyor belt will not run forward

May cause analysis:

- (1) the RS232 line not connected.
- (2) the damage of electronic controller.
- (3) start the damage of capacitance.
- (4) the loose cable connection.
- (5) the electric roller damage.
- (6) conveyor belt, stuck.

Method:

- (1) connect RS232 line correctly.
- (2) change the electronic controller.
- (3) change the start capacitance.
- (4) check the cable connection, to tighten the cable.
- (5) the change of electric drum.
- (6) to adjust conveyor belt.

Fault 2: the conveyor belt

May cause analysis:

- (1) the damage of electronic controller.
- (2) the CPU board

Method:

- (1) change the electronic controller.
- (2) restart the industrial computer.

6.7.3 X-ray control

Prior to servicing this section, should be ruled out all power supply failure and system control, and there are two kinds of X-ray control related fault.

Failure 1: X-ray source don't launch

May cause analysis:

- (1) the channel is not blocking the light barrier.
- (2) installed interlock switch position cover is opened.
- (3) ray power source controller didn't plugged in.
- (4) ac contactor is damaged.
- (5) the damage of X-ray source.
- (6) ray source controller is damaged.
- (7) X-ray source cable is not properly connected.
- (8) the light barrier is not properly connected.
- (9) light barrier damage.
- (10) electric drum without operation.
- (11) electronic controller is damaged.

Solutions:

- (1) Put large and light-tight articles in the tunnel.
- (2) Cover the cover plate in the position of interlock switch.
- (3) Plug in the power plug of X-ray source controller.
- (4) Change the AC contactor KM2.
- (5) Change the X-ray source.
- (6) Change the X-ray source controller.
- (7) Reconnect the cable of X-ray source.

-
- (8) Check the cable of photoelectric sensor and connect it correctly.
 - (9) Change the photoelectric sensor.
 - (10) Start the driving roller.
 - (11) Change the electronic controller.

Failure 2: The X-ray indicator does not light

Probable reasons:

- (1) X-ray has not emitted.
- (2) Electronic control panel is broken.
- (3) The cable is not properly connected.
- (4) The indicator is broken.

Solutions:

- (1) Put the articles on the conveyer belt, and start the roller to emit the X-ray
- (2) Change the electronic control panel
- (3) Check the cable and connect it correctly
- (4) Change the indicator

6.7.4. Image display

Before image system searching the failure, make sure the electric and machinery part of the X-ray generator are properly adjusted. Make sure the power supply of system meets the requirement (5V, $\pm 5\%$; 12V, $\pm 10\%$).

Failure 1: The display does not work when the system is electrified.

Probable reasons:

- (1) The power supply of display is not connected.
- (2) The signal line of display is not connected.

Solutions:

- (1) Connect the display to the power supply
- (2) Connect the signal line of display

Failure 3: The industrial control computer checks the program after starting up, but the display shows the vertical stripes.

Probable reasons:

- (1) Signal processing board
- (2) Connecting line

Solutions:

- (1) Change the signal processing board
- (2) Change the connecting line

Failure 4: There is no image during the luggage check.

Probable reasons:

- (1) The serial port connecting line between control panel and industrial control computer
- (2) Control panel
- (3) Photoelectric sensor

Solutions:

- (1) Change the serial port cable
- (2) Change the control panel
- (3) Change the photoelectric sensor

Failure 5: There appear horizontal lines during the luggage check. (It is normal to have three to six dark lines in the image, in which the conveyor belt has two dark lines.)

Probable reasons:

- (1) Detector or the detecting panel

Solutions:

- (1) Change the detector or the corresponding detecting panel

6.8 storage conditions, storage time and the matters needing attention

When the equipment before shipment to dismantle, repeat the inverse process of installation.

System should be stored in a clean and dry place, excessive heat and moisture can damage the system components. If the equipment need not when, for a long time should be stored in the original packaging box.

Equipment storage environment condition is:

1, in transport or storage packing condition, the equipment must be can not exceed the scope of the following placed 15 weeks under the environmental conditions of the following:

Storage temperature: - 20 ~ + 60 °C (condensate);

Humidity: 20% ~ 95%;

2, need long-term storage of equipment, should have good storage conditions, warehouse should be clean and dry, well ventilated, there shall not be corrosive gas, the relative humidity is not more than 80%, equipment should be in the packaging box.

Chapter VII Storage and After-sales Service

7.1 Production guarantee

We put technical support and after-sales service at first place, dedicated to provide our customers with best quality service.

7.2 Equipment Acceptance

1, After the user notify the receipt of equipment company, our company will arrange professional technical engineers to assist in unpacking inspection and installation and debugging of the equipment. Technical Engineer should be based on the spirit responsible for the user, carefully controlled purchase contract and the packing list one by one inventory of equipment and accessories. If damaged and mistakes, technical engineers should work to assist with the claim or notify the company immediately corrected, filled, and then according to the technical specifications for equipment ,to install, debug.

2, During the installation and debugging of equipment, users should give positive cooperation in order to ensure that the system put into operation as soon as possible.

3, Standard for equipment acceptance: standards and methods stipulated in the contract acceptance.

4, Deadline for equipment acceptance: within 5 days after completion of equipment installation complete acceptance device, the user signed acceptance report, and now as the start date of the warranty period. The company will not be liable overdue.

7.3 Technical Support and Training

Technical training is divided into the basic operation training and image recognition skills training. The company provides users with free basic operator training.

1, Purpose: to make users understand the system equipment constitute ,the basic grasp operation of electromechanical parts and supporting software operation. While make a preliminary evaluation for the quality of the arrival of the equipment.

2, Time: can be arranged according to user requirements and the actual situation.

3, Place: in principles of operator training equipment on the scene where the machine to be use.

7.4 Service Matters

Thank you for choosing our equipment, our company will provide you with best quality service, you can enjoy the services as below:

1, choose the nearest authorized service our unit for repair.

2, if in doubt, and have maintenance difficulties, please first go to your province (municipality) Service Center

Belong to one of the following conditions security equipment, not covered by the warranty:

- 1, Equipment or accessories trademark nameplate or serial number has been torn off or modified
- 2, Damage caused by the improper use, maintenance and storage.
- 3, Damage caused by force majeure.
- 4, Repaired by non-designated maintenance units or privately dismantled.
- 5, And combined or assemble with machines that from our company, unless the company has obtained the written approval.

II security product certification

Thank you for your company using my company the following products:

Product Name: X-ray security inspection equipment

Product Type:

Item:

The model is in accordance with th
standard, rigorous testing.

Conclusion: Qualified permitted to sell

Inspector:

Inspection date: 201Year Month Day

QC :

III security product warranty

Thank your organization using my company's security products:

Equipment model:

5030A Quantity:

5030C Quantity:

6550 Quantity:

8065 Quantity:

10080 Quantity:

100100 Quantity:

In Use processing, please follow the instructions in the operation of normal use,

During the warranty period, the company will repair free of charge.

QC:

Chapter VIII the security products repair list

Thank your organization using my company's security products:

When the device encounters a failure and can not deal with the staff of your organization, to the quickest the shortest possible time so that you get service, please fill in the following information in writing and fax it to us, we will arrange the fastest most professional and technical personnel in a short time for your service, thank you for your cooperation!

Equipment where the full address:		
Current models use device	Number of units:	
Current models use device	Number of units:	
The person in charge of the device	Title:	Contact:
Enable Time:		
Currently equipment failure phenomenon (detailed description):		

Repair time: