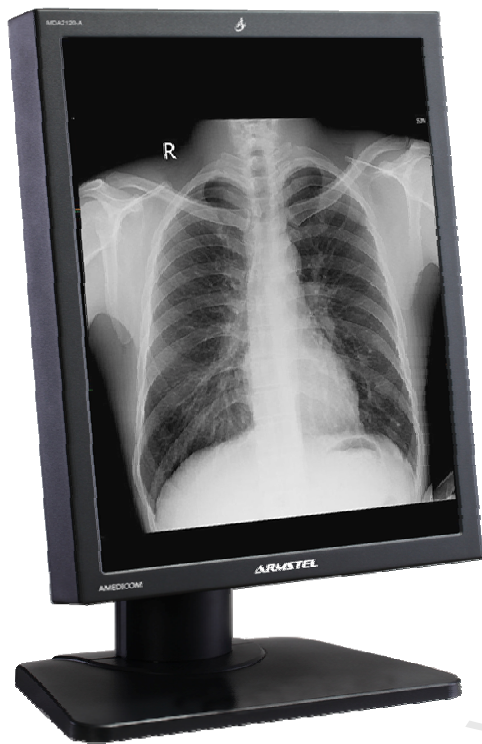


# User Manual

LCD DISPLAY

MDA2120-A/MDA2120-S








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## 1. Safety Symbols & Precautions

### 1.1 Safety Symbols

This manual uses below safety symbols. They denote critical information. Please read them carefully.

	<b>WARNING</b> Failure to abide by the information in a WARNING may result in serious injury and can be life threatening.
	<b>CAUTION</b> Failure to abide by the information in a CAUTION may result in moderate injury and/or property or product damage.
	Alert electrical hazard.
	Indicates a prohibited action.
	Indicates to ground for safety.

To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.

The design of this apparatus is safe to patient.



Do not connect this apparatus to household devices.

We will try the best to assure the newest information be shown in this manual, but the information in this document is subject to change without prior notice.

### 1.2 Precautions

To ensure personal safety and proper maintenance, please read this section and the caution statements on the unit.

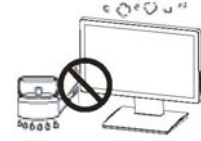
#### **WARNING**

<p><b>If the unit begins to emit smoke, smells like something is burning, or makes strange noises, disconnect all power connections immediately and contact your dealer for advice.</b></p> <p>Attempting to use a malfunctioning unit may result in fire, electric shock, or equipment damage.</p>	
<p><b>Do not open the cabinet or modify the unit.</b></p> <p>Opening the cabinet or modifying the unit may result in fire, electric shock, or burn.</p>	
<p><b>Refer all servicing to qualified service personnel.</b></p> <p>Do not attempt to service this product yourself as opening or removing covers may result in fire, electric shock, or equipment damage.</p>	
<p><b>Keep small objects or liquids away from the unit.</b></p> <p>Small objects accidentally falling through the ventilation slots into the cabinet or spillage into the cabinet may result in fire, electric shock, or equipment damage. If an object or liquid falls/spills into the cabinet, unplug the unit immediately. Have the unit checked by a qualified service engineer before using it again.</p>	

**Set up the unit in an appropriate location.**

Not doing so may result in fire, electric shock, or equipment damage.

- Do not place the unit outdoors.
- Do not install the unit in transportation systems (ship, aircraft, trains, automobiles, etc.)
- Do not place the unit in a dusty or humid environment.
- Do not place the unit in a location where the steam comes directly on the screen.
- Do not place the unit near heat generating devices or a humidifier.
- Do not place the unit in an inflammable gas environment.

**To avoid danger of suffocation, keep the plastic packing bags away from babies and children.****Use the enclosed power cord and connect to the standard power outlet of your country.**

Be sure to remain within the rated voltage of the power cord. Not doing so may result in fire or electric shock.

**To disconnect the power cord, grasp the plug firmly and pull.**

Tugging on the cord may damage and result in fire or electric shock.

**The equipment must be connected to a grounded main outlet.**

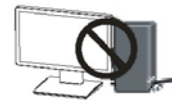
Not doing so may result in fire or electric shock.

**Use the correct voltage.**

- The unit is designed for use with a specific voltage only. Connection to another voltage than specified in this User's Manual may cause fire, electric shock, or equipment damage.
- Do not overload your power circuit, as this may result in fire or electric shock.

**Handle the power cord with care.**

- Do not put the power cord under the unit or other heavy object.
- Do not pull up or twist the power cord.



If the power cord is broken, stop to use it immediately. Using broken power cord may result in fire or electric shock.

**Never touch the plug and power cord if it begins to thunder.**

Touching them may result in electric shock.

**Do not touch a damaged LCD panel directly with bare hands.**





The liquid crystal that may leak from the panel is poisonous if it enters the eyes or mouth. If any part of the skin or body comes in direct contact with the panel, please wash thoroughly. If some physical symptoms result, please consult your doctor.

**Follow local regulation or laws for safe disposal.**

The lamp of LCD panel contains Hg, please follow the local regulation or laws for safe disposal.



## CAUTION

<p><b>Handle with care when carrying the unit.</b> Disconnect the power cord and signal cables and remove the optional unit. Moving the unit with the cord or the option attached is dangerous. It may result in injury.</p>	
<p><b>When handling the unit, grip the bottom of the unit firmly with both hands ensuring the panel faces outward before lifting.</b> Dropping the unit may result in injury or equipment damage.</p>	
<p><b>Do not block the ventilation slots on the cabinet.</b></p> <ul style="list-style-type: none"> <li>- Do not place any objects on the ventilation slots.</li> <li>- Do not install the unit in a closed space.</li> <li>- Do not use the unit laid down or upside down.</li> <li>- Blocking the ventilation slots prevents proper airflow and may result in fire, electric shock, or equipment damage.</li> </ul>	
<p><b>Do not touch the plug with wet hands.</b> Doing so may result in electric shock.</p>	
<p><b>Periodically clean the area around the plug.</b> Dust, water, or oil on the plug may result in fire.</p>	
<p><b>Unplug the unit before cleaning it.</b> Cleaning the unit while it is plugged into a power outlet may result in electric shock.</p>	
<p><b>If you plan to leave the unit unused for an extended period, disconnect the power cord from the wall socket after turning off the power switch for the safety and the power conservation.</b></p>	

## LCD PANEL

<p>When the monitor is cold and brought into a room or the room temperature goes up quickly, dew condensation may occur inside and outside the monitor. In that case, do not turn the monitor on and wait until dew condensation disappears, otherwise it may cause some damages to it.</p>
<p>In order to suppress the luminosity change by long-term use and to maintain the stable luminosity, please use the monitor with the lower brightness.</p>
<p>The screen may have defective pixels. These pixels may appear as slightly light or dark area on the screen. This is due to the characteristics of the panel itself, and not the product.</p>
<p>The backlight of the LCD panel has a fixed life span. When the screen becomes dark or begins to flicker, please contact your dealer.</p>
<p>Do not press on the panel or edge of the frame strongly, as this may result in damage to the screen. There will be prints left on the screen if the pressed image is dark or black. If pressure is repeatedly applied to the screen, it may deteriorate or damage your LCD panel. Leave the screen white to decrease the prints.</p>
<p>Do not scratch or press on the panel with any sharp objects, such as a pencil or pen as this may result in damage to the panel. Do not attempt to brush with tissues as this may scratch the LCD panel.</p>
<p>When the screen image is changed after displaying the same image for extended periods of time, an afterimage may appear. Use the screen saver or timer to avoid displaying the same image for extended periods of time.</p>

## 2. Introduction

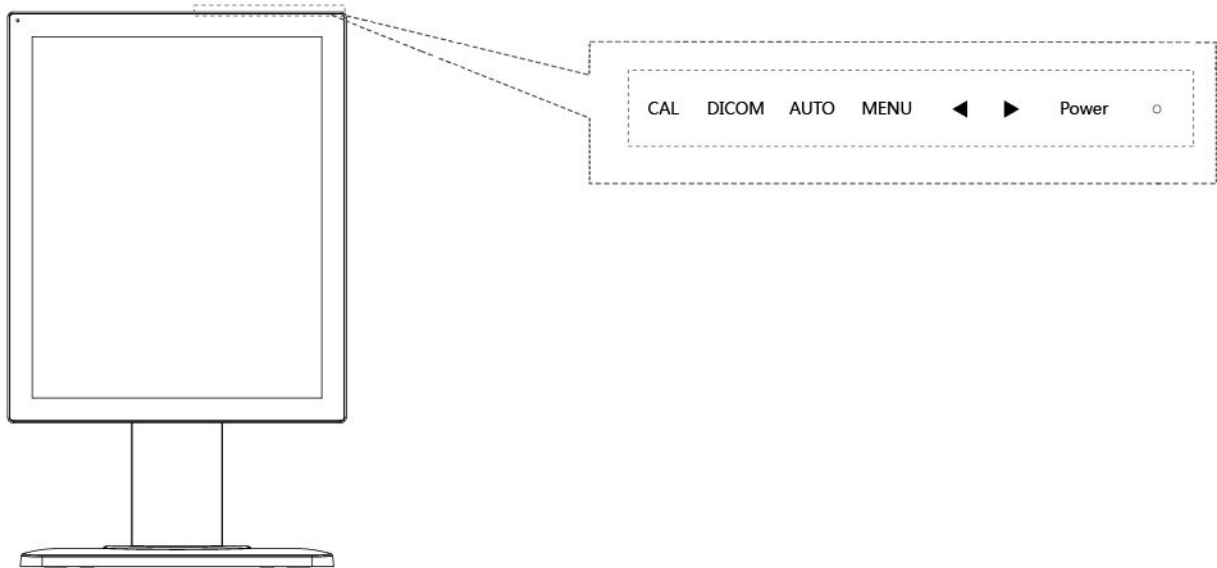
Thank you for purchasing the latest ARMSTEL Amedicom® model of dual-mode medical LCD monitor. ARMSTEL Amedicom® MDA2120-A and MDA2120-S 2MP color dual-mode medical LCD displays, with high resolution 1600x1200, are intended to be used in displaying and viewing digital images, for medical diagnostic reviewing and analysis by trained medical practitioners. Each monitor has been precisely calibrated to comply with DICOM Part 14 GSDF standard at factory. The display can support both landscape and portrait modes. It can be also used as a desktop computer monitor with dual-mode control functionality. A single button push enables the LCD to switch between DICOM display mode and regular computer display mode. Under the regular computer display mode, the backlight is adjusted and gamma curves control is enabled for regular computer use. Under the DICOM mode, the backlight and display characteristic curves are set according to DICOM Part 14 GSDF standard. In addition, a single CAL button push can enable the automatic DICOM Part 14 GSDF calibration and backlight adjustment with ARMSTEL's built-in front/backlight control sensor (MDA2120-A model only). The anti-reflection coated protective screen can prevent display from damage under hard using conditions, make the clean and disinfect easier. The monitor is designed in conformity with IEC60601-1, IEC60601-1-2, CE, FCC and CCC standards.

ARMSTEL Amedicom® medical dual-mode products consist of the following features:

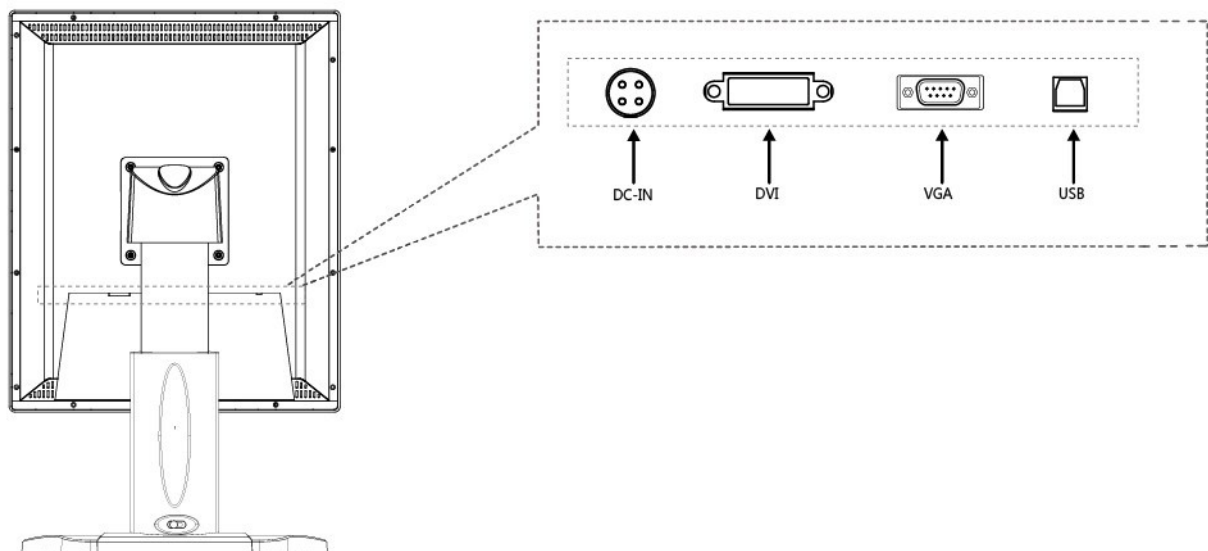
- VGA analog input.
- DVI digital input compliant.
- Resolutions up to TFT LCD 1600X1200.
- Power management system conforms to VESA DPMS standard.
- Supports DDC1/2B for Plug & Play compatibility.
- Advanced On Screen Display (OSD) control for picture quality adjustment.
- Single DICOM button push to select ARMSTEL patented ARMSTEL technology based DICOM compliant clinic medical display function.
- Single button CAL button push to start auto-calibration and backlight control/adjustment based on the sensor built-in (MDA2120-A model only).
- Built-in DICOM calibration to 11-bit grayscale (2048 grayscale luminance levels) accuracy to comply with the DICOM GSDF Part 14 standard.

## 2.1. OSD and Interface

### a. Front



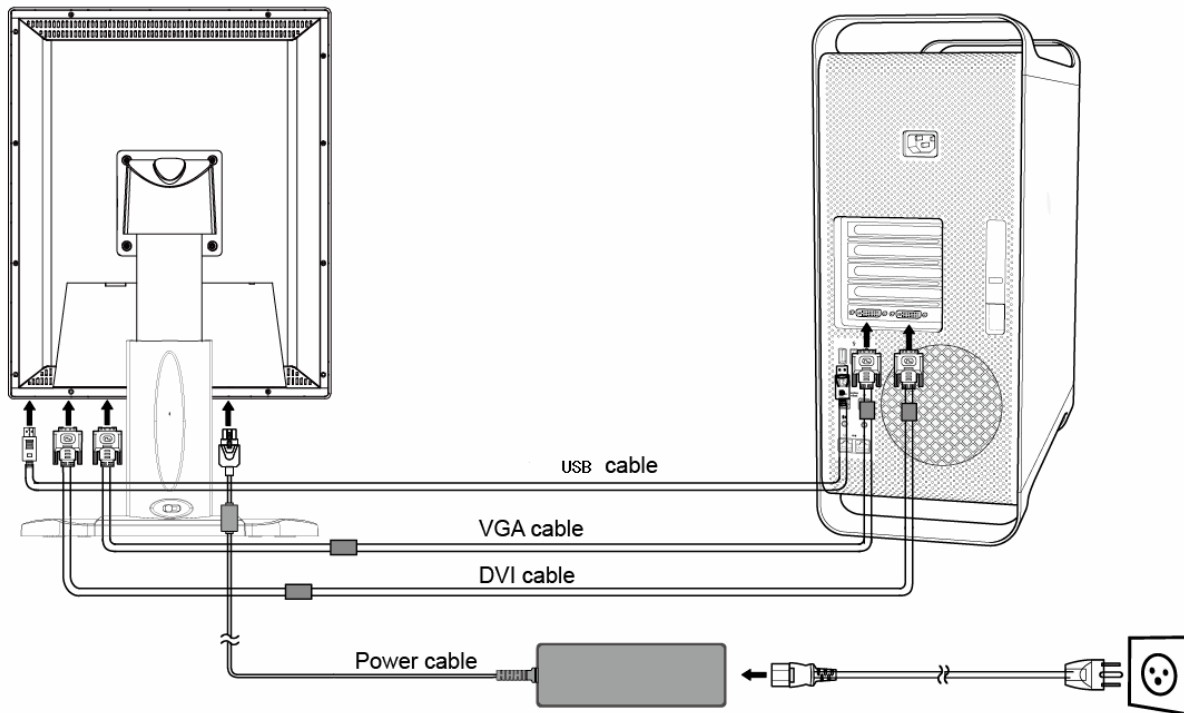
### b. Back



### 3. Quick start

#### 1. Cable Connection

Connect all cables to the appropriate connectors, as shown in below picture.



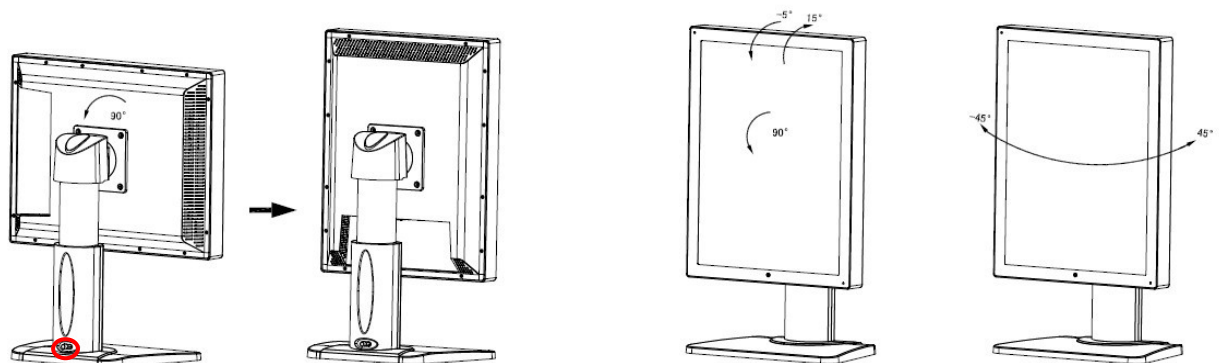
#### 2. Adjust the height, position and angle of monitor.

##### Screen Rotation

Before rotating, the screen must be raised to the highest level to avoid knocking the screen on the desk or pinching with your fingers. To raise the screen, push the button rightward (marked with red circle in below picture) to unlock the lift firstly and place hands on each side of the monitor and lift up to the highest position. To rotate screen, place hands on each side of the monitor screen and turn clockwise from Landscape to Portrait or counter-clockwise from Portrait to Landscape.

**Tilt:** Grasp both sides of the monitor screen with your hands and adjust the tilt as desired.

**Swivel:** Grasp both sides of the monitor screen with your hands and adjust the swivel as desired.





3. Turn on the monitor, the power indicator light will become green. Start the computer and set mode of monitor as below:

1200 x 1600 (in portrait mode) or

1600 x 1200 (in landscape mode).

NOTE: If no picture, please refer to the Troubleshooting section of this manual.

The original screen deflection, turn on the video card control interface, alter the rotation angle to the required display effect.

 **Warning**

**Please use the attached power cable and connect it to the standard power socket.**

Make sure the power connector be fully connected to the power socket. To prevent fire or electric shock, the power cable should be used at specified electric voltage.

**This apparatus should be connected to well grounded power socket.**



## 4. Adjustment

This monitor will not likely require adjustment. Variations in video output and application may require adjustments to the monitor to optimize the quality of the display.

For best performance, the monitor should be operating in native resolution 1600x1200. Use the Display control panel in Windows to choose 1600x1200 resolution. Operating in other resolutions will degrade video performance.

All control adjustments are automatically memorized.



- (1) CAL button for DICOM calibration
- (2) DICOM Button to switch the display modes
- (3) Auto Button
- (4) Menu Button
- (5) Increase Button
- (6) Reduce Button
- (7) Power button
- (8) Power Indicator

**NOTE: CAL is only for MDA2120-A.**

### 4.1 How to Use OSD Menu

#### 1. Hot key Functions

Key	Action
◀	Adjust the brightness
▶	Adjust the contrast
AUTO	Auto adjust when signal source is VGA
DICOM	Dual-mode switch between DICOM and regular color monitor
CAL*	Auto calibration and backlight adjustment

\* CAL is only for MDA2120-A.

#### 2. Entering the OSD Menu

Press the MENU Button once to display the OSD Menu.

#### 3. Making Adjustments and Settings

- Select the desired sub menu icon using the Control buttons and press the MENU button. The sub menu appears.
- Use the Control buttons to select the desired setting icon and press the MENU button. The setting menu appears.

- Use the Control buttons to make all required adjustments and press the MENU button to save the settings.

#### 4. Exiting the OSD MENU

- To return to the main menu, select the <Return> icon and press the MENU button.
- To exit the OSD menu, select <Exit> icon.

### 4.2 OSD menu and operation menu introduction

Press the MENU to call out the OSD menu(main menu), please see the introduction as below:  
With ► or ◀ to select the desired items, and then press the MENU button for adjustment, with ► or ◀ button to adjust the display items to optimum, press again for confirmation and exit adjustment.



#### Brightness adjust menu

Brightness: use ► or ◀ to adjust the brightness to optimum.  
Contrast: use ► or ◀ to adjust the contrast to optimum.  
Return: back to previous menu.



#### Image adjustment menu

Auto-adjust: with this button to adjust the display to optimum  
H-position adjustment: use ► or ◀ to adjust the horizontal position to optimum.  
V-position adjustment: use ► or ◀ to adjust the vertical position to optimum.  
Image position level/clock set: use ► or ◀ to adjust the image position level to optimum.  
Phase adjustment: use ► or ◀ to adjust the focus and definition to optimum.  
Return: back to previous menu.





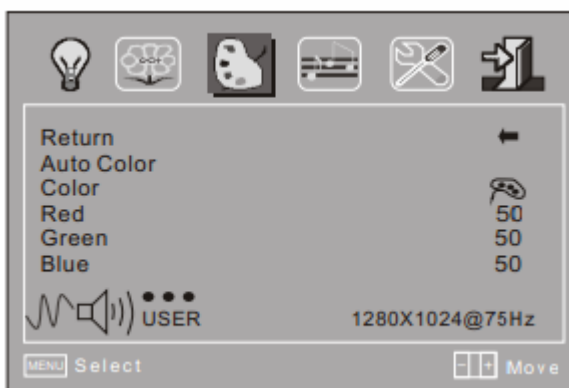
### Color adjustment menu

Red/Green/Blue color adjustment: use ► or ◀ to adjust the value of red, green and blue to change the image color so as to meet your needs.

Color temperature: use ► or ◀ to select desired color temperature (9300k, 6500k, USER)

Color adjustment: it can be adjusted if under shadow mode. If you are not satisfied with the color temperature set by manufacturer, you may set the color temperature to USER mode; it will light red at this time. When enter adjust menu, please use ► or ◀ to adjust R,G,B to change the color of image.

Return: back to previous menu.



### System setting menu

Language: use ► or ◀ to select desired language.

Menu display time: use ► or ◀ to select the desired time for menu display.

Saving time: use ► or ◀ to select desired time for display so as to meet your requirement.

Reset: reset all the set value to factory setting.

Return: back to previous menu.





### Exit and signal resource selection menu

Select terminal input: select input terminal for signal input(option)

Exit: exit OSD menu



### 4.3 DICOM GSDF Calibration

The ARMSTEL Amedicom<sup>®</sup> MDA2120-A medical dual-mode display has the built-in calibrated DICOM GSDF compliant BARTEN curve for medical image display, with patented (pending) ARMSATT<sup>™</sup> technology embedded. It also allows user to push single "CAL" button to do the automatic backlight adjustment and calibration. MDA2120-S is accurately DICOM Part 14 calibrated at the production. To adjust the display from shifting away from the DICOM characteristic display function, ARMSTEL provides a dedicated tool for user to calibrate the display lookup table whenever needed. The tool includes a calibration software package, Calispector<sup>™</sup> and a Simlux<sup>™</sup> meter compatible with the LCD display. ARMSTEL Amedicom<sup>®</sup> Calispector<sup>™</sup> software provides a user control function to calibrate the DICOM GSDF BARTEN curve on site to prevent the shifting. The software allows user to calibrate at different levels of accuracies, i.e., using 2048, 1024, 512, or 256 grayscales (grayscale luminance levels) to interpolate the BARTEN curve. Using 2048 grayscales takes approximately 40 minutes to restore the default setting, whereas 1024 takes around 20 minutes. 512 grayscales calibration takes about 10 minutes while 256 grayscales takes less than 5 minute to complete the calibration.

Calibration steps are as follows:

1) Install ARMSTEL Amedicom<sup>®</sup> Calispector<sup>™</sup> software by downloading the software from the following ARMSTEL website:

<http://www.armstel.com/Amedicom®-dicom-calispector-software.php>

The software supports Window 98/XP/Vista/Win7 OS;

2) Connect LCD display USB to the computer using the USB wire that comes with the LCD display;

3) Connect ARMSTEL Simlux<sup>™</sup> meter to the computer;

4) Fix the Simlux<sup>™</sup> meter on the LCD screen by itself with the sticky pat on the Simlux<sup>™</sup> meter.

5) Double click to run ARMSTEL Amedicom® Calispector™ software installed above. Note, during the calibration, make sure that Simlux™ meter is sitting in the middle of the Calispector™ operating window, and the window should be sufficiently big to cover the whole meter during the whole calibration process for the accurate calibration;

For the use of Calispector™, please refer to ARMSTEL home page for Calispector™ User Manual.

Note: user needs to make sure using the right luminance table and the corresponding BARTEN table generated by the software to set the LCD display in the calibration.

## 5. Trouble Shooting

If a problem persists even after applying the suggested remedies, contact a dealer.

Problems	Points to check with Possible Solutions
<b>1. No picture</b> Indicator status: Off	Check if the power cord is correctly connected. If the problem persists, turn off the monitor for a few minutes, then turn it on and try again.
Indicator status: Orange	Press the keyboard of computer or click the mouse, turn off the monitor and then restart.
<b>2. The screen is too bright or too dark.</b>	Adjust the <Brightness> (The backlight of the LCD monitor has a fixed life span. When the screen becomes dark or begins to flicker, please contact your dealer.)
<b>3. Image sticking issue appears.</b>	<ul style="list-style-type: none"> <li>- Please check if you use the screen saver or timer when displaying the same image for long time.</li> <li>- Image sticking is inherent characteristic of the panel. Avoid displaying the same image for long time.</li> </ul>
<b>4. The screen has defective pixels (e.g. slightly light or dark).</b>	This is due to the characteristics of the panel itself, not the LCD monitor.

## 6. Cleaning

Periodic cleaning is recommended to keep the monitor clean and to prolong its operation lifetime.

**Note:** Never use thinner, benzene, alcohol (ethanol, methanol, or isopropyl alcohol), abrasive cleaners, or other strong solvents, as these may cause damage to the cabinet or LCD panel.

### Cabinet

To remove stains, wipe the cabinet with a soft, lightly moistened cloth using a mild detergent. Do not spray wax or cleaner directly into the cabinet.

### LCD Panel

The LCD surface can be cleaned with a soft cloth, such as cotton or lens paper.

If necessary, stubborn stains can be removed by moistening part of a cloth with water to enhance its cleaning power.

## 7. Package and Accessory

Amedicom® MDA2120-A/MDA2120-S Medical LCD Monitor

DVI cable

USB cable

Power cable

Power adapter

User manual CD

VGA Cable (Optional)

## 8. Specification

### 8.1 Specification

Panel:	20.1" active display
Supported Color :	16,777,216 colors
Native resolution:	1600 x 1200
Pixel pitch:	0.255 x 0.255 mm
Brightness:	300cd/m <sup>2</sup> Typ.
Contrast ratio:	800:1.
Response time:	14 ms Typ.
Connections:	DVI-D D-Sub
Operating temperature:	0° to 40°C
Storage temperature:	-20° to 65°C
Relative humidity:	5% to 90%, non condensing
Certification:	CCC,CE,FCC

### 8.2 D-Sub Connector



Pin#	Signal	Pin#	Signal
1	Red Video	2	Green Video
3	Blue Video	4	GND
5	VGA DET	6	Red Ground
7	Green Ground	8	Blue Ground
9	NC/PC_5V	10	SGND
11	GND	12	SDA
13	H-Sync/C-Sync	14	V-Sync
15	SCL		

(\*NC: no connection)



### 8.3 DVI-D Connector



Pin#	Signal	Pin#	Signal	Pin#	Signal
1	T.M.D.S Data2-	11	T.M.D.S Data1/3 Shield	21	NC
2	T.M.D.S Data2+	12	NC	22	T.M.D.S Clock Shield
3	T.M.D.S Data2/4 Shield	13	NC	23	T.M.D.S Clock+
4	NC	14	DDC +5V	24	T.M.D.S Clock-
5	NC	15	GND	C1	NC
6	DDC-Serial Clock(SCL)	16	HPD	C2	NC
7	DDC-Serial Data(SDA)	17	T.M.D.S Data0-	C3	NC
8	NC	18	T.M.D.S Data0+	C4	NC
9	T.M.D.S Data1-	19	T.M.D.S Data0/5 Shield	C5	NC
10	T.M.D.S Data1+	20	NC		

(\*NC: no connection)

**FCC Warning:**

- This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
  - (1) this device may not cause harmful interference, and
  - (2) this device must accept any interference received, including interference that may cause undesired operation.
- Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
- NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
  - -- Reorient or relocate the receiving antenna.
  - -- Increase the separation between the equipment and receiver.
  - -- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
  - -- Consult the dealer or an experienced radio/TV technician for help.



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