



AMEDICOM MDA2121
21.6" DUAL-MODE 2MP11-bit

MEDICAL LCD DISPLAY

EMC COMPLIANCE
IMPORTANT PRECAUTIONS
Introduction
Installation
Operation
Technical specification
Trouble Shooting

USER MANUAL

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EMC COMPLIANCE

This device has been tested and found to comply with the standards for a class B digital device, pursuant to Part 15 of FCC Rules. Those standards are designed to provide reasonable protection against harmful interference in a residential installation. This device generates and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

If this device does cause harmful interference to radio or television reception, which can be determined by turning the device off and on, 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 device and receiver
- Plug the device into a wall outlet different from that connected to the receiver.
- Consult the dealer or an experienced radio/TV technician for help.

CAUTION: any change or modification not expressly illustrated in this manual may void the warranty.



NOTE: any unshielded cable is not allowed to be used in the device!

IMPORTANT PRECAUTIONS



WARNINGS:

1. Before using this device, please read all the instructions in this manual carefully.
2. Please keep the manual carefully for future reference.
3. Unplug this device from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp or wet cloth to clean. Please use LCD screen detergent for cleaning if it is still dirty.
4. Do not use the parts not recommended by the manufacturer, otherwise it may cause a hazard.
5. When unplugging the power cord of the monitor or adapter, please hold the plug with your hand, do not pull the cord directly.
6. Do not place any object on the power cord. Do not trample it either.
7. Do not use the device near water sources, e.g. bathtub, basin, kitchen sink, or washing machine. Do not place the device on a wet floor, or near a swimming pool etc. Do not touch the screen with your fingers or other hard objects.
8. Slots and openings on the housing and its back or bottom are provided for ventilation. To ensure reliable operation of the components and to protect them from overheating, these openings must not be blocked or covered placing the device on a bed, sofa, rug, or other similar surface. The device should never be placed near or over a radiator or heater and should not be placed in a built-in installation unless proper ventilation is provided.
9. Make sure that the device is at least 5cm distance from the wall or other objects around when it is in use.
10. The power supply must respond to that stated on the rating plate. If you have any query about the power supply, please refer to the dealer or local power supply provider.
11. As a safeguard measure, the monitor or adapter is equipped with a power cord with three-terminal plug, the third terminal is grounded. If the plug cannot be inserted into the outlet, please contact an electrical technician for replacing the original outlet while keeping the safeguard measure in effect.
12. Ensure that the power socket and cord in use are able to take the sum of the rated currency of all the products.
13. Do not put the device at the place where user is subject to mal-operation.

14. Observe all the warnings and instructions described in the manual.
15. Do not overload the power outlet or use any extension cord, otherwise it may cause fire or electric shock.
16. Do not attempt to repair this device yourself since opening or removing covers may expose you to dangerous voltage or other hazards. Refer servicing to qualified service personnel.
17. Unplug this monitor or AC adaptor from the wall outlet and refer servicing to qualified service personnel under the following conditions:
 - a. When the power cord or plug is damaged or worn.
 - b. If the device has been dropped or its housing has been damaged.
 - c. When the performance of the device deteriorates distinctly.
18. The power cord is the main facility to turn on/off the device; unplug it if the device is not used for a long period of time.
19. Store the device at a place of good ventilation; avoid strong sunlight, high temperature or humidity.
20. Store the device at a place at -20°C~55°C room temperature. Otherwise, it may cause permanent damage.

1. Introduction

1.1 General

Thank you for purchasing the latest ARMSTEL AMEDICOM model of dual-mode LCD monitor, with advantages of high display performance and light weight etc, meanwhile with the power saving and no-radiation features. The latest ARMTEL dual-mode medical LCD will bring you comfortable, safe and environmental-protection brand-new visual experience, with guaranteed DICOM adjustable medical clinic medical display functions. The AMEDICOM has the most advance ARMSTEL patented medical display solution (ARMSATT technology) (patent pending), to provide the clinic practitioners with the most convenient LCD monitor solutions.

Your purchase and use of this product are highly appreciated!

1.2 Features

- High performance intelligent frequency scanning, use active matrix Thin film transistor liquid crystal display (TFT).
- Micro Computer digital technology control, no radiation, no glare
- Comply with VESA DPMS International Power Saving Regulation.
- Support DDC 1/2B and Windows PNP Plug & Play.
- Microprocessor based with OSD (On Screen Display) control, be able to adjust the image to optimum.
- Built-in hoisting hole complying with International Standard(VESA), which is able to hang the display on the wall.
- Single DICOM button push to select ARMSTEL patented ARSMATT® technology based DICOM compliant clinic medical display function.
- Any time user friendly DICOM calibration with the ARMSTEL lux meter and calibration software via dedicated USB port on the display.
- External Power Supply to extend the life of ARMSTEL dual-mode medical LCD display.
- Pivot 90 degree turn (landscape/portrait)
- Swivel 180 degree
- Extendable back support.
- Build-in DICOM calibration to 11-bit grayscale (2048 grayscale luminance

levels) accuracy to comply with the DICOM GSDF Part 14 standard

--- 8-bit/10-bit/11-bit display grayscale bit support

1.3 Packing list

Please make sure the following items are included with your LCD display before installation:

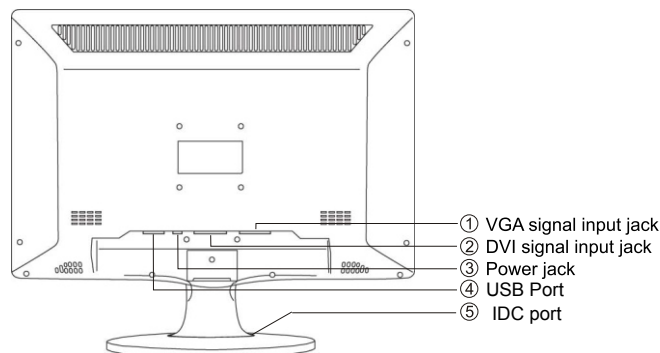
- A LCD monitor (with pedestal)
- A VGA signal cable, DVI-D signal cable
- A UPS cable
- A power cord
- An AC adapter
- A DICOM medical display calibration lux meter
- Down loadable DICOM calibrator software (free) from ARMSTEL Corporate Website .
- User's manual, qualification and warranty cards

If any of these items are missing, please contact with your dealer for technical support and customer service.



NOTE: be sure to save original box and all packing material for transport in future if the display need.

2. Installation



- ① VGA signal input: connect to computer VGA signal output jack
- ② DVI signal input: connect to computer DVI signal output jack
- ③ Power jack: connect to adaptor DC output jack
- ④ USB Port : connect to computer for DICOM GSDF Calibration
- ⑤ IDC Port : to connect to ARMSTEL technical support tool*

* NOTE: This port is only used by ARMSTEL technical support personnel , not for customer use .

2.1 Connection of signal cable

Before connecting your monitor and PC with signal cable, please turn off your monitor and computer. And then insert one end of the signal cable into the VGA or DVI jack on your computer, and lock it with two fixed screw for ensured grounding. Finally, please insert other end of signal cable to the VGA or DVI signal input jack of monitor and lock it with fixed screw.

2.2 Connection of power cord

First, insert one end of power cord into the input jack of adaptor, and another end into power outlet, then insert the output terminal of adaptor into the power input jack of monitor.

2.3 Power on

Turn on the monitor and computer, and then indicator will light green (or blue) when the screen is under normal condition. Please check to see if there is any wrong with the connection of video signal cable if the indicator lights red (orange).

2.4 Self-inspection

If the monitor inspects there is no horizontal and vertical signal, it will prompt to check the video input, please refer to the illustration below, and the monitor will enter into power saving mode after several seconds, the indicator will light red (orange).

The screen will restore to normal display once receiving video signal.

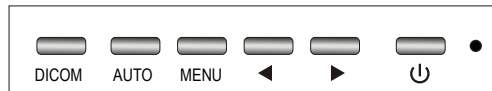
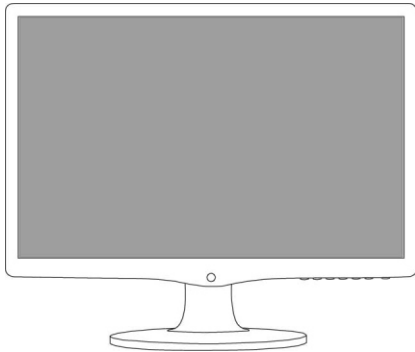


2.5 Image Adjustment

Please adjust the image according to your need; please refer to the "Operation" in Section Three.

3. Operation

3.1 OSD button



(1) Power Switch()

Digital control light-touch switch, used for turning on or off monitor power.

(2) Power Indicator ()

When the monitor is under normal working condition, the indicator will light green (or blue); if the monitor is under saving mode, the indicator will light red (orange) or off. And the indicator will turn off under the power off mode. (When the power indicator turns off, it means that the monitor is under off mode, but please pay attention that the adaptor is still in charge, so please disconnect the adaptor when the monitor is not used for the purpose of safety.)

(3) Menu Button

Activate OSD, enter sub menu, select items, confirm selection.

(4) AUTO Button

Automatically set the screen display to optimum.

(5) UP ► Button

Select and adjust the OSD items (Increase the value)

(6) DOWN ◀ Button

Select and adjust the OSD items (Decrease the value)

(7) ✱ Button

Choice options and adjust brightness

(8) ● Button

Contrast option to choose and adjust

(9) DICOM Button

Push DICOM button to activate ARMSTEL's patented Dicom technology for medical display function. When LCD display is in DICOM mode. The LED light remains flashing.

Push Dicom again to switch back to normal LCD display function.

The LED light turns purple

When DICOM mode is selected. All other OSD button functions are disabled , except power button. Note the default power up mode is normal LCD display mode.

3.2 OSD menu and operation menu introduction

Press the MENU to call out the OSD menu (main menu), please see the illustration as below:

With ► or ◀ to select the desired items, and then press the MENU button for adjustment, with >/< (the selection buttons on the front of case) 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.

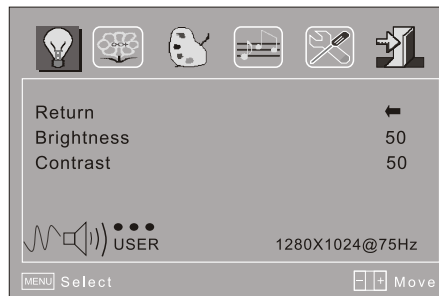


Image adjustment menu

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.



Audio adjustment menu

Volume: use ► or ◀ to adjust the volume to optimum (option)

Mute: use ► or ◀ to select Mute/Sound.

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.
- 4:3:** when setting OFF, it is normal display mode; when setting ON, it will be 4:3 display mode.
- DCR (Optional):** To open or shut off contrast ration by setting ON/OFF.



Exit and signal resource selection menu

- Select terminal input:** select input terminal for signal input (option)
- Exit:** exit OSD menu



Note: Hot Key of volume, brightness, contrast

Without OSD mode, you may press "◀" button to call volume adjustment directly, when the volume menu is not exit, please press "MENU" to call brightness and contrast adjustment, you may use "►/◀" to adjust it to optimum.

3.3 Safeguard

When the video signal of your computer exceeds the frequency range of monitor (refer to product specification), the micro-computer of monitor will turn off the sync signal of horizontal and vertical for the purpose of monitor protection, please refer to the illustration below. The monitor will enter saving mode after a few seconds, and the power indicator will light red (orange).

Please set the output frequency of your computer within the acceptable range of monitor so that the monitor can work normally.



3.4 Setting of display mode

With standard VESA and DDC function, the monitor will scan frequency, output power, performance etc and transfer to PC after turning on when you use the video card with VESA DDC1/2B function. And it will identify the connection mode of display and select the proper resolution.

The preset mode before leaving factory is as below:

Mode	Resolution	Horizontal(KHz)	Vertical(Hz)
1	640x400	31.469	70.087
2	640x480	31.469	59.940
3	640x480	37.861	72.809
4	640x480	37.500	75.000
5	720x400	31.469	70.087
6	800x600	35.156	56.250
7	800x600	37.879	60.317
8	800x600	48.077	72.188
9	800x600	46.875	75.000
10	1024x768	58.038	71.918
11	1024x768	60.023	75.029
12	1024x768	48.019	60.000
13	1024x768	47.700	60.000
14	1152x864	67.500	75.000
15	1280x800	49.702	59.800
16	1280x800	62.795	74.900
17	1280x960	60.000	60.000
18	1366x768	79.976	60.000
19	1440x900	55.935	60.000

20	1600x900	79.976	60.000
21	1680x1050	65.290	60.000
22	1600x1200	75.000	60.000
23	1920x1080	79.796	60.000

Note: 15" /15.6"LCD Monitor is applied to items 1-18, recommended mode;
 17"/19" LCD Monitor is applied to items 1-20, recommended mode;
 20" /23" LCD Monitor is applied to items 1-24, recommended mode;
 24" LCD Monitor is applied to items 1-26, recommended mode;
 26" LCD Monitor is applied to items 1-26, recommended mode;

3.5 Power management system

This monitor complies with EPA Energy Star, and is compatible with VESA DPMS standard; the saving mode is shown as below:

Mode	Power Indicator	Power Consumption 21.6"
Normal	blue	≤40W
Standby/Saving	red/orange	≤1W
Power Off	turn off	≤1W
DICOM	purple	≤40W

3.6. DICOM GSDF Part 14 calibration

The ARMSTEL AMEDICOM medical display has the built-in calibrated DICOM GSDF compliant BARTEN curve for medical image display, with patented (pending) ARMSATT technology embedded. 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 tools include a software and a lux meter coming with the LCD display.

ARMSTEL AMEDICOM Calibrator 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 Calibrator software by following the prompted up instructions. 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 lux meter to the computer;
- 4) Fix the lux meter on the LCD screen by the suction cup on the lux meter.
- 5) Double click to run ARMSTEL AMEDICOM Calibrator software installed above;
- 6) For Amedicom Calibrator software function , refer to section 4.3 for details .

Note, user needs to the right luminance table and the corresponding Barten table generated by the software to set the LCD display in the calibration.

3.7. DICOM mode setting

When LCD display is powered up, by default, the LCD working mode is set to normal color LCD mode. All OSD operations are working for the color LCD display setting.

User selects DICOM working mode by pushing the DICOM button once. When LCD is set to work in DICOM mode, the LED of display will remain purple status. All the corresponding DICOM viewers grayscale image display will trigger ARMSTEL's ARMSATT technology to apply DICOM GSDF Part 14 required display function for the medical image presentation. The color LCD OSD functions are disabled and the Gamma display curve is set to default one for color image display.

Under the DICOM mode, the only functional button is power button, unless user switch back to normal LCD display mode LED turn blue.

User can switch to normal color monitor working mode by pushing the DICOM button again under the DICOM mode. (LED indicates flashing). Once the LCD is switched back to normal color LCD mode, the full OSD functions are back to work.

4. Technical specification

4.1. 21.6" DUAL-MODE Medical LCD display specification

	21.6" (10:9)
Screen model	21.6" Active Matrix TFT LCD
Dot pitch (H x V)	0.248x0.248mm
Surface treatment	Anti-glare
Active display area (H x V)	304mmx228mm
Max. Resolution	1920x1080
Contrast	300:1~1000:1
Brightness	300cd/m ² ~500cd/m ²
Responsive time	5ms
Display color	16,777 (ten thousand color)
Visible angle left/right	+80° ~ -80° or +60° ~ -60°
up/down	+80° ~ -80° or +55° ~ -65°
Input signal video signal	RGB simulation 0.7V p-p
synchronization	TTL positive or negative polarity
Display format	VGA, SVGA, XGA, WXGA
Signal connector	15 pin D-sub or DVI-D (Option)
Panel button	Power switch, LED indicator, OSD menu, +/- button, auto setting , DICOM
OSD Function	Contrast, brightness, auto adjustment, image level, phase, image h-position, image v-position, OSD h-position, OSD v-position, color temperature, RGB, language
Adaptor AC input	100V~240V 50/60Hz
Adaptor DC output	12V 3A
Max. Power consumption	100 W
Working environment	
Temperature	0°C~50°C
Humidity	20%~80%
Storage environment	
Temperature	-20°C~60°C
Humidity	20%~80%
Packing dimension (LxWxH)	570*210*470mm
Weight (Kg)	N.W: 8KG , G.W: 10KG

Gradation Display	11-bit * (LUT)
Calibration (standard)	DICOM Part 14
Calibration Port	USB
Calibration tools	ARMSTEL lux Meter , ARMSTEL Amedicom Calibrator
In put Grayscale resolution	8-bit/10-bit *

* Requires ARMSTEL Viewer Application

4.2 ARMSTEL lux meter specification

ARMSTEL lux meter is a dedicated luminance meter for medical LCD display DICOM Part 14 calibration. The lux meter works with ARMSTEL AMEDICOM Calibrator to measure up to 2048 grayscales that ARMSATT technology can generate on a 8-bit color LCD display. Those 2048 grayscale luminance levels are measured and transmitted to the computer via USB connection. ARMSTEL AMEDICOM calibrator collects the data and calibrate the BARTEN curve based on the grayscale luminance values sent from the lux meter and set the LCD display with the correct DICOM GSDF characteristic display function via USB connection from the computer to the LCD display USB port.

Sensor: Silicon photodiode

Optical Wavelength coverage: 350~600nm

Measuring range: 0~2000 Lux

Accuracy: \pm (3% Rdg +0.5 F.S) (while the ambient temperature is 23 \pm 5°C)

Resolution: 0.01

Sampling rate: 1 /s

Repeatability: \pm 2%

USB: USB2.0

USB cable length: 1.5M

4.3 ARMSTEL AMEDICOM calibrator specification

ARMSTEL AMEDICOM Calibrator is an ARMSTEL owned software package for calibrating the DICOM GSDF Part 14 display characteristic function. The software can provide user the control over the ARMSTEL AMEDICOM medical LCD display calibration on site any time user needs.

The calibration software provides user different accuracy of calibration on site, depending on interval between calibrations.

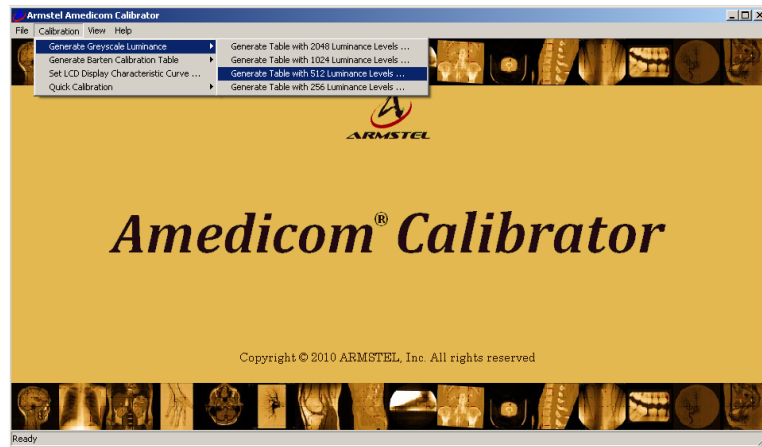
The following is the example demonstrating the use of ARMSTEL Amedicom Calibrator software to calibrate ARMSEL Amedicom dual-functional medical LCD display.

First of all, to go ARMSTEL's corporate website to down load the Amedicom Calibrator software by registering the customer information. After the down loading,

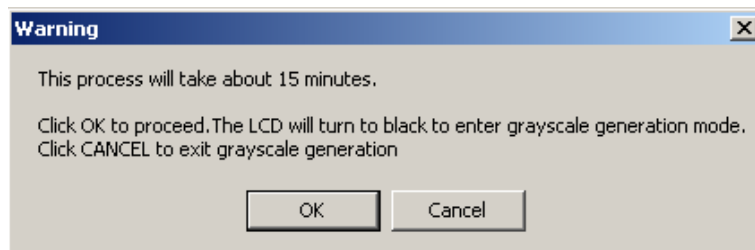
install the software on our preferred local file directory, and run the software.

After starting the software, user follows the following steps to calibrate the LCD.

(1.) Click: Calibration->Generate Grayscale Luminance->Generate Table with 512 Luminance Levels...

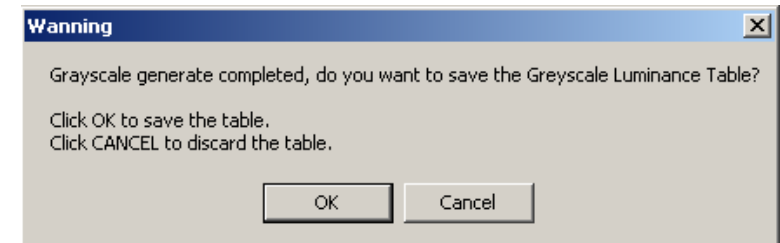


(2.) A warning dialog pops:



Click OK.

(3.) Wait about 15 minutes, when complete a dialog pops:

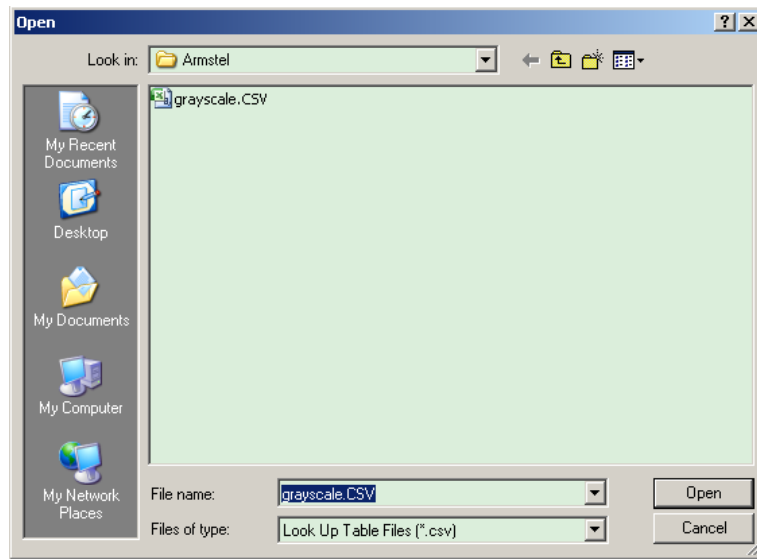


Click OK to save the grayscale file.

(4.) Click: Calibration ->Generate Barton Calibration Table->Generate Barton Table with 512 Luminance level:

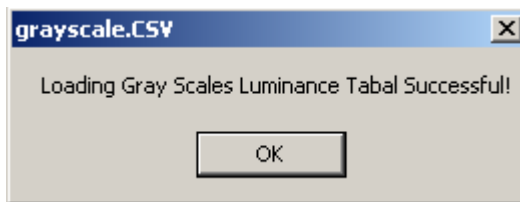


(5.) a open file dialog pops:



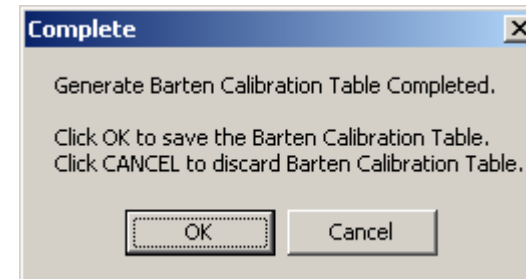
Select the grayscale file you just saved in step 3 and click OK.

(6.) A warning message box pops:



Click OK to generate Barten Calibration Table.

(7.) After Barten Calibration Table is generated successfully, a message box pops:

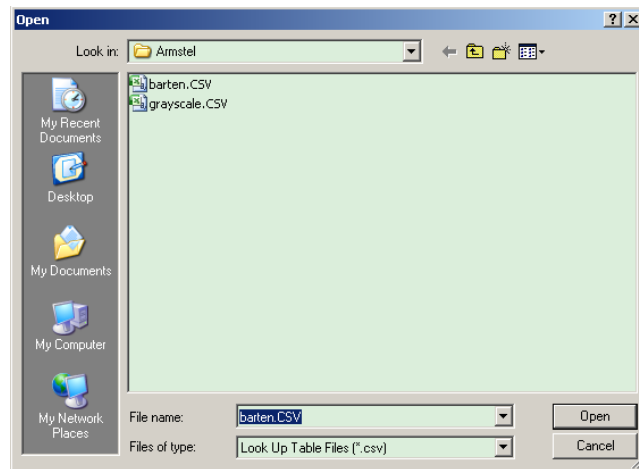


Click OK to save the Braten Calibration Table

(8.) Click Calibration->Set LCD Display Characteristic Curve.



(9.) A open file dialog pops:



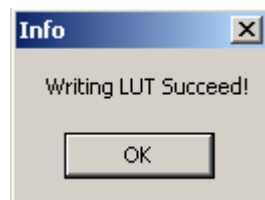
Select the barten table you just saved in Step 7 and Click OK.

(10.) A message Box pops:



Click OK to write the Barten Curve to the LCD.

(11.) Wait a few seconds. After done, a message Box pops to indicate writing Barten Curve to LCD is done



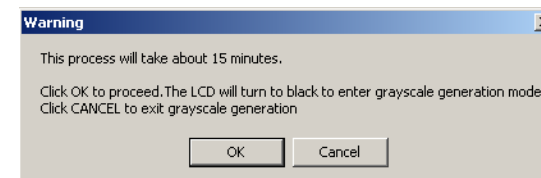
(12.) Click OK to finish calibration.

Quick Calibration:

(1.) Click Calibration->Quick Calibration->Calibrate with 512 Luminance levels...

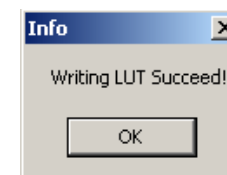


(2.) A warning dialog pops:



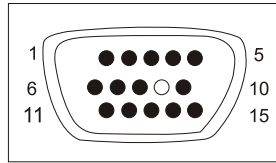
Click OK.

(3.) Wait about 15 minutes, every thing will be done and a message box pops



(4.) Click OK to finish calibration.

4.4 Pin assignment of signal cable



Pin	Signal(D-sub)	Pin	Signal(D-sub)
1	Red	9	DDC Power
2	Green	10	Ground
3	Blue	11	Ground
4	Ground	12	SDA(FOR DDC)
5	Test Cont	13	H. sync
6	Red Ground	14	V. Sync
7	Green Ground	15	SCL(FOR DDC)
8	Blue Ground		

4.5 Visual Inspection

Even the normal pixels on the LCD screen reach 99.99% or higher, there may be 0.01% or less pixels showing dark or light while displaying.

5. Troubleshooting

If your monitor cannot work normally, please refer to the follow methods for common problems quickly, if you need assistance; please call the dealer where you purchased the Monitor.

A. There is no Screen Image/LED no light

Please check to see whether the power cord is securely connect to the monitor and wall outlet, and whether the display is in power saving mode.

B. There is no Screen Image/LED light red

Please to see whether the display card of PC is loosed, and check the connection between signal cables and display.

C. The display is not clear or the image is too large or too small

Enter the OSD image adjustment menu, and then select "Auto Adjust" to make the display to adjust automatically to optimum.

D. The image is too light or too dark

Enter the OSD brightness adjustment menu, and then select the "►/◄" to adjust the brightness and contrast to optimum.

E.. The screen is overheated

Please keep at least 5cm around the display for ventilation, and do not place anything onto the monitor.

F. Dark display after power on/ facula

This is normal. Due to the temperature difference, the backlight will not give out light equably at the beginning of powering on, but the backlight lamp will come to normal work after 20 minutes, the darkness and facula will disappear at this time.

G. The image is distorted to flash and shake

Check the set of computer and choose the proper resolution, then readjust and renovate the resolution.

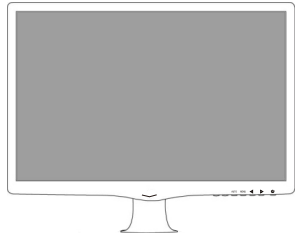
H. The color is abnormal

Check the connection of signal cable, if there is any curved or broken pin, please replace it; Enter the OSD color adjustment menu to set the display color to the optimum.

Contents of the Package

* LCD Monitor

(Reference only, the real feature is depended on selected model)



Monitor

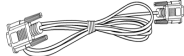


Base

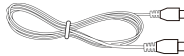
Accessory



Power Cord



VGA Cable



SUB Cable



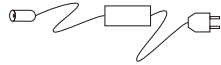
Lex meter



DVI Cable



User's Manual



Adaptor

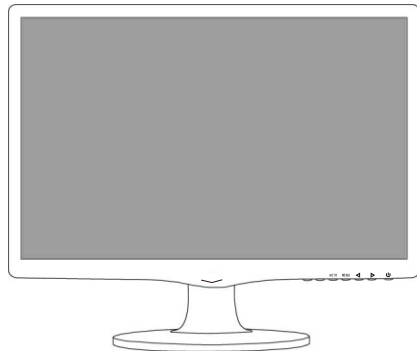


AMEDICOM calibrator

Installation and Removal

INSTALL

Turn the connecting screw at the bottom of the stand fully so that it is completely fixed.



Removing the Stand

Turn the connecting screw at the bottom of the stand to separate it.



I/O Ports Connection

