CC1093/CC2093

ComputerCam

Operating Manual

Model CC1093/CC2093
rev.# 1a October 15, 1997 JWS/KLE

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Features

- Automatically selects the correct exposure by adjusting shutter speed and gain.

- Auto Shutter speeds from 1/60 sec. to 1/125,000 sec.

- 13 manual shutter speeds including: 1/100 (FL), 1/125, 1/250, 1/500, 1/1000, 1/2000, 1/4000, 1/8000, 1/10000, 1/15000, 1/16000, 1/20000, 1/24000 plus OFF and AUTO

- Camera functions may be controlled from the host computer (Shutter Control, Shutter Lock, Peak / Average, Gain, and White Balance)

- Provides RGBS, S-Video (YC), and NTSC or B&W Video signals for simultaneous display on one or more external monitors.

- High Resolution, Low Noise 1/2" Hyper HAD™, Color CCD Image Sensor

- MicroImage Support

The CC1093/CC2093 ComputerCam incorporates MicroImage Video Systems 3rd generation auto shutter system which provides very smooth auto shutter operation while maintaining a fast response time. Digital gain control has been added for improved AGC functionality and to eliminate undesirable interactions with the shutter system that are common to conventional AGC controls. Both Peak and Average detection have been added for increased flexibility under difficult lighting conditions. Other changes include improved communications for use with Computer control and with future MicroImage products, lower power consumption, and improved White Balance.

Many factors can cause a change in light level to the video camera, such as changing the magnification of the optics or varying the light source. This change in light level usually results in degradation of the image. The Auto shutter in the CC1093/CC2093 automatically adjusts the shutter speed to compensate whenever the image brightness falls outside of the acceptable range. The system is designed to provide a fast and smooth response to light level changes. When the camera determines that picture quality will be compromised, it will change to a new shutter exposure setting.

Unpacking Instructions

The MicroImage CC1093/CC2093 Camera for RGB, S-Video (YC), and NTSC consists of:

MicroImage A209 Auto Exposure Camera
MicroImage PCU109/209 Camera Control Board for PC compatibles
10' Camera (to computer) cable
5 foot RGBS 9 pin to BNC cable (RGB only)
RGB Extension bracket with ribbon cable (RGB only)
3.5" HD Diskettes with camera control software
This Instruction Manual

See the *Optional Items for use with this camera* section for other MicroImage products that may be suited to your application.

Unpack all items carefully and check each item against the contents list above. If the unit has been damaged during shipping, contact MicroImage Video Systems immediately. Do NOT apply power to unit or further damage and/or injury may result.

Use of a resistive ground strap or anti-static mat is recommended while removing the Camera Control Board from its anti-static bag. As an alternative, touching the grounded chassis of your computer before and during handling of the control board will help to dissipate static buildup.

Windows Instructions

Windows Software Installation Instructions

CAUTION - The Camera Control Board utilizes static-sensitive components. Proper anti-static handling procedures should be followed as outlined under Unpacking Instructions to avoid damage to electronic components on the control board or in your computer.

Switch Settings

Before installing the Camera Control board in your computer, you should configure the board to operate with your existing hardware. The CC1093/CC2093 is preset to communicate on serial port COM 4 (address 02E8H), using IRQ 11. If your computer has another device installed to this port, you must change the port and/or interrupt of either the camera control board or the other device. Some computers or operating systems may rearrange COM port designations, requiring either the Camera Control board or related software to be reconfigured.

Some software may have difficulty sharing interrupt requests between a mouse and other serial devices. If you have a mouse installed on COM 1, IRQ 4, the camera control board should be configured for either COM 2 or COM 4, IRQ 3. If the mouse uses COM 2, then COM 1 or COM 3, IRQ 4, is suggested.

Switches 1 and 2 of the 4 position DIP switch S2 are used to set the port address as follows:

Com Port Number & Address	**Switch 1**	**Switch 2**
COM 1 (03F8H)	ON	ON
COM 2 (02F8H)	OFF	ON
COM 3 (03E8H)	ON	OFF
COM 4 (02E8H) *	OFF	OFF

* Factory default setting

The interrupt request is typically set to IRQ 4 for either COM 1 or COM 3, or to IRQ 3 for COM 2 or COM 4. The 10-position slide switch labeled S3 is used to select an interrupt from the following: 3, 4, 5, 7, 9, 10, 11, 12, or 14. When set to the 'OFF' position, all interrupts are disabled.

In the spaces provided below, please note the board settings for future reference.

Com Port Number/Address (S2)	Interrupt Request (S3)	Port Enable Setting (S2)

The port address may be disabled for custom software applications or for passive operation of the camera system in fully automatic mode. The supplied Camera Control software requires a port address but will operate without an Interrupt. Switch 3 of the 4 position DIP switch S2 should be set as follows:

Port Enable Setting	Switch 3
Enabled *	ON
Disabled	OFF

* Factory default setting

The CC1093/CC2093 offers a user-selectable amount of edge enhancement for increased definition of horizontal boundaries. The 2 position DIP switch S1 provides 4 levels of enhancement as follows:

Level	Enhancement	Switch 1	Switch 2
0	None	OFF	OFF
1 *	Slight	OFF	ON
2	Moderate	ON	OFF
3	Full	ON	ON

* Factory default setting

Windows Hardware Installation

If you are unfamiliar with computer hardware installation, it is suggested that you either consult your computer manual for a detailed procedure on card installation, or have the installation done by professional service personnel.

Turn off your computer and unplug the power cord before attempting to open the computer case. Remove the case cover screws typically located on the back of your computer and unlock the front panel key lock, if applicable. Carefully slide the case lid open, then lift the cover free of the computer chassis. See your computer manual for further details if your hardware does not match these instructions.

If an RGB monitor is to be used with the CC1093/CC2093, attach the metal RGB Extension bracket to the Camera Control Board by pressing the ribbon cable connector of the extension bracket over the double row of pins labeled P3 on the control board. Pin 1 of the ribbon cable is denoted by a stripe on one side of the ribbon cable, and by a small arrow on the side of the connector. This should line up with the pin marked 1 on the circuit board.

Locate an empty 16-bit expansion card slot in your computer and remove the metal cover bracket for that slot. Holding the Camera Control Board by the edges, press the gold plated fingers into the connector at the bottom of the empty computer slot. The board should seat firmly into place. Fasten the metal bracket on the control

board to the computer chassis using the screw which held the blank metal bracket. For RGB installations, a second blank metal bracket must be removed from the computer and the extension bracket attached in its place. Reinstall the case lid and plug in the power cable.

Windows Software Installation

Setting up Com Port

NOTE: Communications Port must be set up prior to installation of software.

Windows 3.1x Communications Port set up instructions:

1. Double click on **Main** program group.
2. Double click on **Control Panel**.
3. Double click on **Ports**.
4. Click on the Communications Port for which the board is set.
5. Click on **Settings**.
6. Click on **Advanced**.
7. Set **Interrupt Request Line** (**IRQ**) to IRQ selected on S3 of board.
8. Click **OK** on **Advanced Settings** window.
9. Click **OK** on **Settings** window.
10. Click **Close** under **Ports** window.

Windows 95 Communications Port set up instructions:

1. Click on **Start**.
2. Under **Settings** click on **Control Panel**.
3. Double click on **Add New Hardware** icon (**Add New Hardware Wizard** screen appears).
4. Click **Next**.
5. Screen will prompt "**Do you want Windows to search for new hardware?**" Answer **Yes** and click on **Next**.
6. When completed click on **Finish**.

If Add New Hardware Wizard fails to detect hardware, complete following procedure:

1. Click **Next** to add manually.
2. Screen will list hardware types, scroll down to **Ports** (**COM & LPT**).
3. Click on **Next**.
4. Under **Manufacturers** select (**Standard Port Types**).
5. Under **Models** select **Communications Port**.
6. Click on **Next**.
7. Verify information is listed both under **Resource Type** and **Setting**.
8. Click on **Next**.
9. Click on **Finish**.
10. When **System Settings Change** screen appears and Windows asks if you want to shut down, choose **No**.
11. You will return to the **Control Panel** screen.

12. Double click on **System**.
13. Click on **Device Manager** tab.
14. Expand the **Ports (COM & LPT)** tree (by clicking on the + symbol next to **Ports (COM & LPT)**.
15. Double click on the Communications Port added in previous steps (typically the last one listed).
16. Click on **Resources** tab.
17. Click **Settings Based on:**.
18. Choose the **Basic Configuration 8**.
19. Double click on **Input/Output Range** (under **Resources Type**).
20. Change the address to match board setting. (Reference the board settings table on PAGE???)
21. Click **OK**.
22. Double click **Interrupt Request** (under **Resources Type**).
23. Change the interrupt to match board settings. (Reference the board settings table on PAGE ???)
24. Click **OK**.
25. Click **OK** again.
26. When prompted to shut down Windows, choose **Yes**.
27. When **"It Is now safe to turn off computer"** appears on screen, press **Way** to reboot computer.

Connections

Connect the small 15 pin HD end of the camera cable to the camera module. Connect the large 15 pin end of the cable to the Camera Control Board. Screws are provided to firmly secure the cables. Do not connect or disconnect the camera cable while the computer is on.

The MicroImage Model CC1093/CC2093 Camera generates RGBS, YC (S-Video), and NTSC Video or Black & White. All video signals from the ComputerCam may be connected at the same time without any signal degradation. Power from the computer is supplied through the Camera Control Board to the camera head via the camera cable.

Connect a video cable (either BNC, YC, or 9 pin D to RGBS) between the control board and monitor as described below. The CC1093/CC2093 will not display camera images directly to the computer monitor.

RGB

Connect the separate RED, GREEN, BLUE and SYNC ends from the RGB-to-9-pin cable to the appropriate BNC connectors on the monitor, and attach the 9-pin end to the RGB extension bracket supplied with the Camera Control Board. If only one RGB monitor is being used, place the RGB and SYNC TERM switches in the TERM or 75 Ω position.

If a second RGB monitor is being used, connect RED, GREEN, BLUE and SYNC cables from the RGBS LOOP connectors on the first RGB monitor to the matching input connectors on the second RGB monitor. Place the RGB and SYNC TERM switches on the first monitor (the one with six or eight cables connected to it) in the high impedance position (NOT the 75 Ω or TERM position). Place the RGB and SYNC TERM switches on the second monitor in the TERM or 75 Ω position. If more than two RGB monitors are being used, only the last one connected (the one with only four cables) should be in the TERM or 75 Ω position.

NOTE: If the monitor does not have a second set of connectors for attaching another RGB monitor, A Distribution Amplifier (DA) will be required. Contact MicroImage Video Systems for suitable units.

NTSC

Set switch S4 on the Camera Control board to NTSC. Connect a BNC cable from the NTSC connector on the CCU to the VIDEO IN connector on the monitor. If this is the only monitor being used, place the monitor TERM switch in the TERM or 75 Ω position.

If a second monitor is being used, connect a BNC cable from the extra VIDEO INPUT jack in the first monitor to the VIDEO INPUT of the second monitor. Place the TERM switch in the high impedance position (not in the 75 or TERM position) on the first monitor (the one with two cables connected to the video input). Place the TERM switch on the second monitor in the TERM or 75 Ω position. If more than two monitors are connected, only the last one connected should be placed in the 75 Ω or TERM position.

Black & White

Set switch S4 on the Camera Control board to B&W. Connect a BNC cable from the NTSC connector on the CCU to the VIDEO IN connector on the monitor. Terminate as for NTSC above.

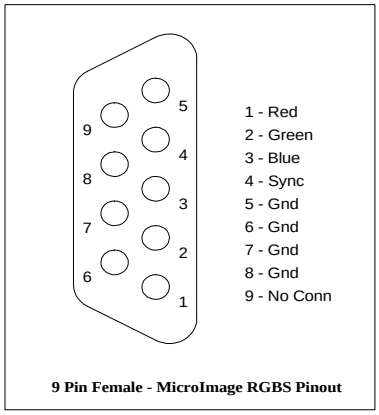
S-Video (YC)

Connect a YC (4 pin to 4 pin) cable from the YC connector on the CCB to the YC IN (S-Video) Connector on the monitor. If only one YC monitor is being used, place the YC TERM switch in TERM position.

If a second YC monitor is being used, connect a YC cable from the YC LOOP connector on the first YC monitor to the YC IN connector on the second YC monitor. Place the YC TERM switch on the first monitor (the one with two YC cables connected to it) in the high impedance position (Not the TERM or 75 Ω position). Place the TERM switch on the second monitor in the TERM or 75 Ω position. If more than two YC monitors are being used, only the last one connected (the one with only one YC cable) should be in the TERM or 75 Ω position

NOTE : If the monitor does not have a second connector for attaching another monitor, a Distribution Amplifier or DA will be required. Contact MicroImage Video Systems for suitable units.

Connector Wiring Diagram



9 Pin Female - MicroImage RGBS Pinout

The Camera Control Board provides remote manual control of most camera functions through software, or can allow the camera head to operate as an AutomatiCam. To run the control program, select the drive and directory where the software is installed as per SOFTWARE INSTALLATION, and type:

```
CAMERA
```

An introductory screen will appear with the MicroImage Video Systems name and the current software revision number. Press any key to advance to the main menu.

The main menu screen consists of a set of status boxes across the upper portion of the display, the main menu in the center, and a line of instructions across the bottom of the display. The main menu operates either by selecting the item to be changed, either with the UP and DOWN arrow keys or with the <Spacebar>, then pressing the <Enter> key. A sub-menu will appear for that item, which operates in the same manner as the main menu. Pressing <Escape> from any sub-menu will return you to the main menu.

Full Auto

Selecting FULL AUTO will place the camera head into its default mode as an AutomatiCam. Shutter Lock will be OFF, AGC will be ON, and White Balance will switch to AutoWhite (ATW).

Exposure

The Exposure menu provides 13 manual shutter speeds, plus auto-exposure and shutter off positions. When the shutter is placed in the AUTO mode, the camera will automatically adjust the shutter speed to compensate for changing light levels (see shutter lock below). The Shutter status box will display the current shutter speed while in manual mode, AUTO if in auto shutter mode, or OFF if the shutter is disabled.

Auto Lock

This option locks the auto shutter and digital gain at their current settings. The shutter and gain settings will remain constant until the lock, or the camera system, is turned off. This feature eliminates gain float or unexpected shutter changes to allow stable readings for image analysis work. The word LOCK will appear in the status box to indicate this condition.

Gain

Digital Automatic Gain Control may be enabled or disabled from this menu. The status box marked GAIN will display either AGC or OFF.

Peak/Average Detection

The peak/average detection menu selects how light from the image sensor affects auto shutter and digital gain operation. Peak detection senses bright spots and adjusts the auto shutter and digital gain to correctly expose the illuminated areas. Most situations with compound microscopes work well with Peak mode. The word PEAK will

appear in the status area marked DETECTION when this mode is chosen. Average mode senses the overall picture contrast, so the auto shutter and digital gain don't respond to pinpoints or bright spots of light. The DETECTION status box will indicate AVERAGE. Most stereo or surgical scopes work best in this mode. There are exceptions in both cases, however, and you may need to try both to find the best mode. Once the appropriate mode has been selected for your application, the camera will respond automatically to the lighting situation.

White Balance

This menu selects the white balance mode. The choices include ATW (Auto White), Halogen, Xenon, 3200K and 5600K. Normally the ATW mode will provide the best white balance.

Setup

The Port Setup options sub-menu can be accessed from the general Setup menu. The port (COM) and interrupt (IRQ) must be chosen to match the switch settings on the Camera Control Board (see Switch Settings under INSTALLATION instructions), or the software will not communicate with the camera.

Exit Program

Selecting this option will return you to the computer's operating system after saving the current settings to a file named PC_CCU6.CFG. The camera system will continue to operate with the selected settings until the software is run again or until power to the camera is turned off. When the CAMERA program is run again, it will load the saved settings, except for the Auto Lock setting, which will be set to OFF regardless of its previous status.

Connection to a VCR

The NTSC and YC signals may be recorded on videotape. High resolution VCRs such as the S-VHS type will give much better recordings than standard VCRs. Use of the YC signal with these VCRs will provide the highest quality signal.

NTSC

Connect a cable from the NTSC connector of the CCU to the VIDEO IN connector on the VCR. Note that adapters or special cables may be required.

Connect a cable from the VIDEO OUT connector of the VCR to the Video or NTSC INPUT connector of an NTSC monitor as described in the VCR instruction manual.

DO NOT connect the above signals to the Antenna or ANT connectors on the VCR.

S-Video (YC)

Connect a YC (S-Video) cable from the YC connector on the CCU to the S-Video INPUT connector on the VCR. Note that a VCR with YC capability such as an S-VHS VCR must be used.

Connect a YC (S-Video) cable from the S-Video OUTPUT connector on the VCR to the YC or S-Video INPUT connector on a YC monitor as described in the VCR instruction manual.

If the VCR has a switch to select NTSC(Video) or S-Video, place the switch in the S-Video position. See the VCR operation manual for more information.

Operation with a VCR

For normal use, the Camera and the VCR may be left connected. However, both the Camera and the VCR (along with any other connected equipment) must have their power turned on in order to see a proper camera image on the video monitor. If the VCR is connected properly, it should pass the camera image while stopped just as if the VCR was not connected. If PLAY is pressed on the VCR, you should see the video tape picture instead of the current camera image.

The exact procedure for recording and playing tapes on a VCR varies between different models. It is impossible to describe all of the possible situations in the course of this manual. Please refer to your VCR operation manual BEFORE calling MicroImage Video Systems. If calling MicroImage Video Systems for assistance on VCR connection problems, please have the VCR operation manual handy. Manuals for other equipment in your system may be of assistance, as they may also affect the operation of the VCR.

Precautions

DO NOT install unit while computer is on. Lethal voltages are present inside. If in doubt, refer servicing to authorized personnel.

DO NOT connect control board to any other camera module. The signals are proprietary to this system and may result in damage to both units

DO NOT allow water or moisture to enter computer or camera unit. Injury and/or damage may result.

DO NOT stress cable or bend tightly at connectors. DO NOT pull cable by connectors. Avoid twisting the cable near connectors.

Install Camera Control Board only into PC compatible computers, or damage to both the board and the computer may result.

Clean camera head only with a mild cleaner. Strong cleaners may damage the finish. When cleaning, dampen a soft cloth and then wipe unit. NEVER spray cleaner directly into any electronic product. Severe damage and/or a lethal or severe shock may result!

Please put all manuals for this system in a safe place where they are easily found if needed.

1 - No Picture:

1) Check all connections, make sure camera and video cables are connected and computer, computer monitor, and video monitor are all turned on. Power lights should be illuminated. If the above conditions are correct and no video is present, call MicroImage Video Systems for assistance.

2) If other equipment is installed between the camera and monitor, check the camera and monitor for proper operation by connecting camera directly to monitor.

3) Check the positions of beam splitters or other optics.

2 -Camera Picture on screen but camera control software has no effect:

1) Check COM port and IRQ DIP switches on the control board and from the software SETUP menu, either for a mismatch or for conflict with another device in your system.

2) Turn computer off for at least 30 seconds and then back on to reset both computer and camera, then rerun camera program.

3) If the above does not solve the problem, contact MicroImage Video Systems for assistance.

3 - Picture appears bright and washed out:

1) Check monitor BRIGHTNESS control.

2) Check Peak/Average software setting.

4 - Picture appears dark:

1) There may not be enough light reaching the camera. Check position of beam splitter on Microscope.

2) There may be a bright spot (such as a reflection) causing the auto shutter to compensate. Note that the camera will sense a bright spot even at the very edge or beyond the edge of the monitor. Check Peak/Average detection switch.

5 - Color appears different between RGB and YC or NTSC

1) MicroImage Video Systems uses a precision color matrix to derive colors. The matrix system used in monitors for NTSC and YC decoding may not quite match that of the camera matrix. This is a problem with all camera and monitor combinations regardless of manufacturer and only becomes evident when RGB is compared to encoded color signals such as NTSC or YC.

2) Adjust the Hue and Color controls on the monitor to match NTSC or YC to RGB

3) Have a service tech perform a "White Balance" on the monitor.

Note that steps 2 and 3 may not completely solve the problem due to the limitations listed in step 1.

6 - No color from NTSC output

1) Check position of NTSC - B/W switch S4 on the Camera Control board.

Specifications

Output Levels:	
RGB	0.714 Vpp, 75 Ω
SYNC	2 Vpp, Ω
NTSC	1.0 Vpp Composite, 75 Ω
YC	1.0 Vpp (Y),0.286 Vpp burst (C),
Connectors:	
NTSC	BNC Female
RGB / Sync	9 pin sub mini D type on extension bracket
YC	4 pin mini-DIN Female (Std. S-Video conn.)
Camera Connector:	
(on control board)	15 pin sub mini D type
(on camera)	15 pin HD sub mini D type
Horizontal Resolution	520 lines RGB, 470 lines YC/NTSC
Image Sensor	1/2" HyperHAD™ CCD, 768 (H) x 494 (V) pixels
Scanning System	2:1 interlace RS-170
Scanning Frequency	15.734 kHz (H), 59.94 Hz (V)
Chroma Frequency	3.579545 MHz
Sync System	Internal
RGB System	MicroImage High Res Matrix RGB
CCU to camera communication	EIA-D, 4800 baud 7E1 MicroImage Camera Control Format (CCF)
Shutter System	Microprocessor based digital system
Shutter Response Time	0.35 sec. max response (fast mode - A)
Auto Shutter Range	1/60 - 1/125,000 sec.
Auto Gain	0 to +16dB typ.
White Balance	Auto: 2800°K to 6200°K
S/N Ratio	50 dB
Minimum Illumination	0.3 lux on image sensor surface (gain on)
Lens Mount	C-Mount
Camera Power Requirements	12 VDC +/- 10%, 440 mA typ.
Operating Range	-10° ~ +50° C, 95% RH max.
CC Power:	
Voltage	12VDC
Consumption	25W max.
Dimensions:	
control board	110 (H) x 135 (L) 15 (D) mm 4.3 (H) x 5.3 (L) x 0.60 (D)
camera	43 (H) x 50 (W) x 130 (L) mm 1.7 (H) x 2.0 (W) x 5.125 (L) inches
Weight:	
control board	5.0 oz.
camera	12.4 oz.

HyperHAD™ is trademark of Sony Corporation.

Optional items

MicroImage Video Pointers
MicroImage Timer /Titlers
MicroImage Split Screen Controllers & Video Faders
MicroImage Fixed Pattern Generators
MicroImage CrossLine Generators
MicroImage Video Distribution Amplifiers (VDA)

CABLES

CAB11001	1 ft BNC to BNC Cable
CAB11003	3 ft BNC to BNC Cable
CAB11006	6 ft BNC to BNC Cable
CAB11012	12 ft BNC to BNC Cable
CAB11025	25 ft BNC to BNC Cable
CAB11050	50 ft BNC to BNC Cable
CAB12001	1 ft S-Video (YC) Cable
CAB12006	6 ft S-Video (YC) Cable
CAB12012	12 ft S-Video (YC) Cable
CAB12020	20 ft S-Video (YC) Cable
CAB12030	30 ft S-Video (YC) Cable
CAB13006	6 ft RGBS cable sets
CAB13012	12 ft RGBS cable sets

Other length camera cables also available. Contact MicroImage Video Systems for availability.

MicroImage Video Systems offers many more cables than listed above including longer versions. Please contact MicroImage Video Systems to check availability of cables not listed.

All above items may be ordered from your MicroImage Video Systems dealer.

Technical Assistance

For Technical Assistance Contact:

WORLD VIDEO SALES CO., INC.
P.O. Box 331
Boyertown, PA 19512
Attention: Customer Service
Phone: (610) 754-6800

World Video Sales Co., Inc. warrants that each MicroImage CC1093/CC2093 Camera System is free of defects due to faulty materials or improper workmanship. World Video Sales Co., Inc. further warrants that any part which proves defective in materials or workmanship within one year , will be replaced or repaired at no cost to the user. Labor to replace defective parts will be done without charge, provided the equipment is returned to World Video Sales Co., Inc. prepaid, insured and properly packaged. Prior return authorization must be obtained from World Video Sales Co., Inc.

NOTE

This warranty covers the MicroImage CC1093/CC2093 Camera System only.

CONDITIONS

This warranty is void if the warranted part has been altered or subjected to abuse or misuse. Defective parts must be returned to World Video Sales Co., Inc.

SOLE WARRANTY

This Warranty is in lieu of all other warranties expressed or implied including, without limitation, any implied warranty or any implied warranty of fitness for a particular purpose. World Video Sales Co., Inc. shall have the final right to determination as to the existence and cause of any defect and its appropriate adjustment in accordance with the terms of this warranty. In no event shall World Video Sales Co., Inc. be liable for any consequential or collateral damages.

Please call for a RMA Number on all repairs.

WORLD VIDEO SALES CO., INC.
625 Hoffmansville Rd., Suite 3
Bechtelsville, PA 19505
Attention: <RMA #>
Phone: (610) 754-6800