RF SYSTEM lab.

User Guide / Warranty Certificate

Thank you for purchasing 6.9mm Articulation Video Borescope, VJ. This document includes the important information to ensure safe usage of VJ. Before using VJ, please read through this instruction guide and safety information carefully.

⚠ The warranty is only applicable when the unit fails to operate with the normal use in accordance to the user guide.

■ *Table of content*

Introduction

1. Purpose of Use

The purpose of VJ usage is to observe and inspect industrial objects such as machinery, facility, pipe, building and so on. Do not use it for human and animal diagnostic and observation purpose.

2. Prior Inspection

Read "Prior Inspection" in this document carefully and inspect VJ prior to use.

3. Understanding of User Guide

Read this document carefully and use all the functions correctly.

4. Safety Precaution / Attention for Use

Read "Safety Precaution"(page 2) and "Attention for Use" (page 19) and avoid an electric shock, fire and breakage. The cable part of VJ is exempt from the product warranty. Read "Attention for Use" (page 19) carefully and use it correctly.

5. Other

Contact local vender or the RF Technical Support Center if you have any inquiries about VJ.

Safety Precaution

Please read this document carefully and use all the functions correctly. It is for both your safety and the people around you to prevent the loss of property. Please refer the following symbols and documentations.

⚠ Danger	This symbol indicates a high risk of death or serious injuries if the meaning of this symbol is ignored or the product is improperly used.
⚠ Warning	This symbol indicates a risk of death or serious injuries if the meaning of this symbol is ignored or the product is improperly used.
⚠ Attention	This symbol indicates a risk of injuries if the meaning of this symbol is ignored or the product is improperly used.

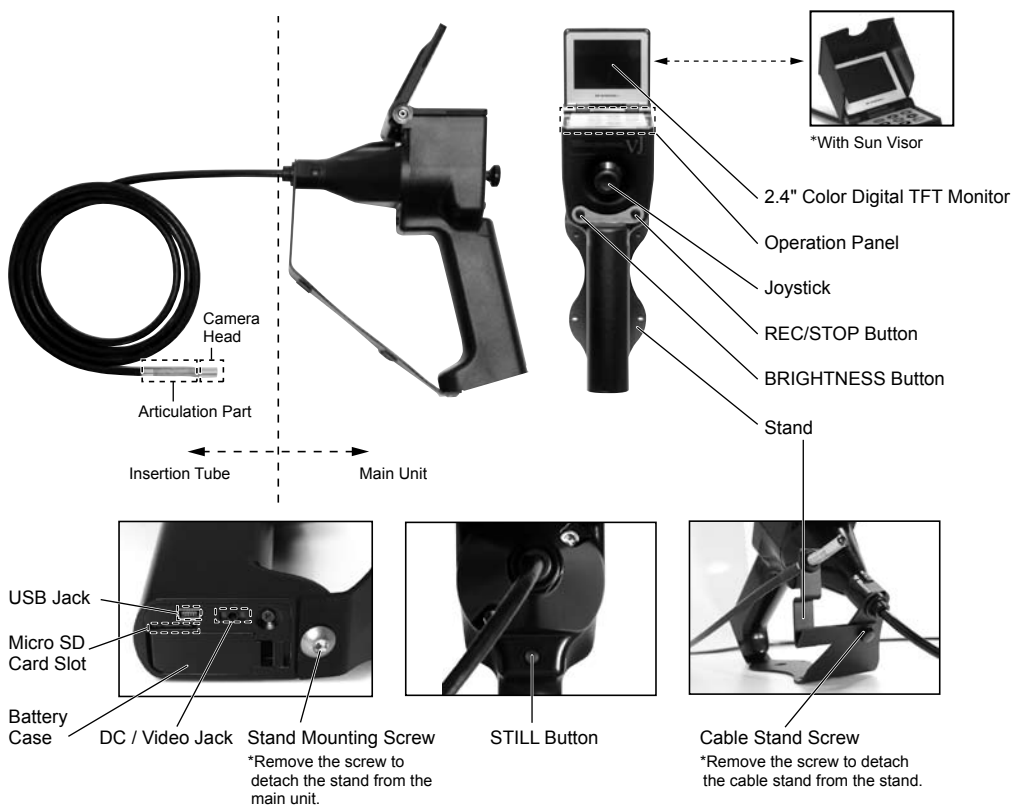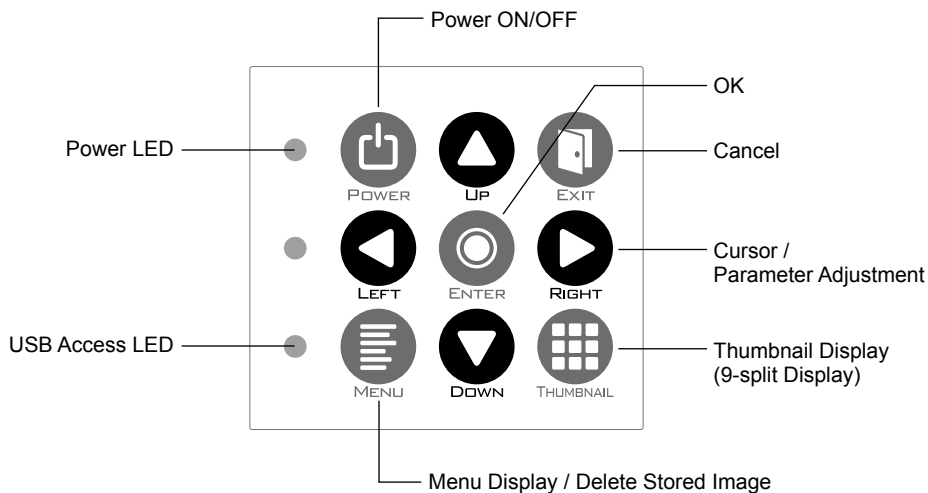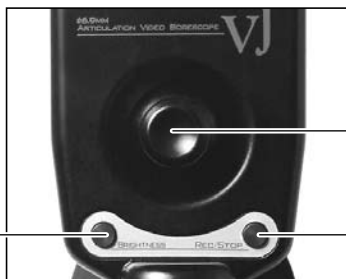| 🚫 Disassemble Prohibited	Do not disassemble, modify or customize the unit. It could cause injuries by an electric shock or failure of the unit.
🚫 Direct Contact Prohibited	Do not touch any internal components exposed by the damage on the outer casing. It could cause injuries by an electric shock or its breakage.
🚫 Water Contact Prohibited	Do not pour, splash or immerse the unit in water. Do not leave the unit out in the rain. It could cause a fire or electric shock.

■ *Packaged item*

Insertion Tube (x1) Main Unit (x1)

Micro SD Card
(x1)

AAA Battery
(x4)

AC Adapter 6V / 0.85A
(x1)

DC / Video Cable
(x1)

USB Cable
(x1)

Driver CD-ROM
(x1)

Sun Visor
(x1)

Stand (x1)
Stand Mounting Screw (x1)

Cable Stand (x1)
Cable Stand Screw
(x1)

■ *Feature*

*With Sun Visor

2.4" Color Digital TFT Monitor

Operation Panel

Joystick

REC/STOP Button

BRIGHTNESS Button

Stand

Camera
Head

Articulation Part

Insertion Tube Main Unit

USB Jack

Micro SD
Card Slot

Battery
Case

DC / Video Jack

Stand Mounting Screw
*Remove the screw to
detach the stand from the
main unit.

STILL Button

Cable Stand Screw
*Remove the screw to detach
the cable stand from the stand.

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Operation Panel

Power ON/OFF

OK

Power LED

Cancel

POWER   UP   EXIT

USB Access LED

LEFT   ENTER   RIGHT

Cursor /
Parameter Adjustment

MENU   DOWN   THUMBNAIL

Thumbnail Display
(9-split Display)

Menu Display / Delete Stored Image

Front View

【STILL Button】
It captures the still image.

Rear View

【Joystick】
It operates the
articulation part

【BRIGHTNESS button】
It adjusts the LED intensity.

【REC/STOP button】
It records /
stops the video.

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Preparation

Prior Inspection

(1) Inspect Cable Part
- Check the cable part does not have any change in shape or defect in appearance.
- Check the glass of camera head has any dirt or stain. Please wipe out with dry cloth if there is any.

(2) Inspect Articulation Part
- Check the articulation part moves smoothly.
- Check the articulation part does not have any change in shape or defect in appearance.

Insert the batteries

(1) Open the battery cover.   (2) Insert four AA batteries.

Battery Case

⚠ • Watch the direction of the batteries.
The unit indicates the proper direction of the batteries.

• Compatible battery type
Use an alkaline or rechargeable nickel hydride battery.
The unit may not function properly with a manganese dioxide battery.

Insert the micro SD card

(1) Insert the included micro SD card into the micro SD card slot.

*It is necessary to store the images.
(The unit can be operated without the micro SD card.)

YES | NO

⚠ • Be sure to turn off the power when the micro SD card is inserted / removed.

• Compatible micro SD card type
Use a micro SD card less than 2GB memory with the micro SD logo. Any micro SDHC card cannot be used.

• Inserting the micro SD card at a slant position may cause damage or failure on the card slot. Be sure to insert straightforward.
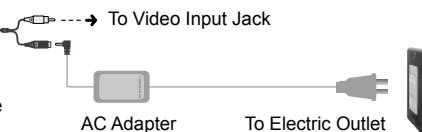
With the AC Adapter

• Plug the included AC adapter (6V / 0.85 A) to the DC / Video jack.

• When the unit is used with the AC adapter, the battery power will not be consumed.

---→ To Video Input Jack

DC / Video Jack   DC / Video Cable   AC Adapter   To Electric Outlet
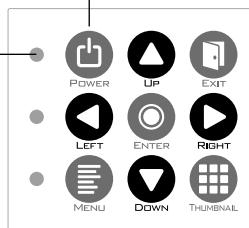
Basic Operation

Turn ON/OFF the power

Press and hold the power button for 1 second. The power LED lights up in green and the live image will be displayed on the monitor.

Press and hold the power button again for 1 second. The power of the unit and power LED will turn off.

Power LED

POWER   UP   EXIT
LEFT   ENTER   RIGHT
MENU   DOWN   THUMBNAIL

Battery Run-time

• With AA alkaline battery: total run time 2 hours (With rechargeable nickel hydride battery:3 hours)

• The power LED flashes in red if the remaining battery power reaches less than 5%. In this case, all buttons operation become ineffective beside the power ON/OFF button.

Power LED

- Green······ Power ON/
  the remaining battery power 20~100%
- Orange···· Power ON/
  he remaining battery power5~20%
- Red·········· the remaining battery power
  less than 5%
- OFF·········· Power OFF
- -
- Flashing   Accessing the micro SD card
  (Recording or playing video)

Display the image

■ With the 2.4" color digital TFT monitor
The live image is displayed on the 2.4" color digital TFT monitor, when the power is turned on.

■ With other monitor
Connect the included DC / Video power cable between the DC / Video jack on the unit and the video input jack on the monitor.

DC / Video Jack

Other monitor

⚠ Be sure to securely plug the cables into the jacks.

DC / Video Cable

To Video Input Jack

---→ TO AC Adapter (With the AC Adapter)

⚠ Temperature Alarm

The temperature sensor is equipped on the tip of camera head to avoid breaking down the CCD imaging sensor due to heat while the VJ is used under high temperature environment.
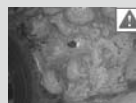
Warning label appears depending on temperature level. Please take appropriate steps as warning descriptions indicate.

*After appearing the warning label, please turn off the main power switch of VJ and take an interval for at least 10 minutes at normal temperatures.
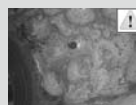
Yellow warning label
Avoid more than 30 minutes continuous use*.

Red warning label
Stop using immediately*.

Save the image

Save the still image

■ Press the STILL button to capture the still image.
  *The micro SD card must be inserted for this operation.

STILL button

■ When the still image is saved, the monitor shows the message, "JPG FILE SAVED".

Record the video

■ Press the REC/STOP button to start recording the video. To stop recording, press the REC/STOP button again or EXIT button.
 *The micro SD card must be inserted for this operation.
 *The power LED flashes while the video is recorded.
 *The frame rate varies depending on the recording video, memory capacity of the micro SD card or data transfer speed.

REC/STOP

When recording the video

When saving the video

■ The screen shows the message, "BEGIN AVI RECORDING" when the recording starts.

■ The screen shows the message, "SAVING AVI FILE" when the recording stops.

■ When the micro SD card is not inserted, the message, "NO SD card" is displayed, and the unit does not store any image.

■ When the micro SD card is full, the message, "SD Card Full" is displayed, and the unit does not store any image.

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Display the stored image.
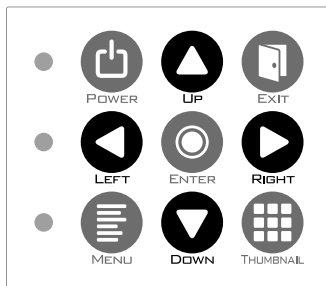
■ Press the ⊞ button on the operation panel to display the stored images on the micro SD card.
(If the micro SD card does not hold any images, the monitor shows the message, "NO Image".)

＊The power LED flashes when the still image or video is played.

■ Press the ◀ ▶ ▲ ▼ button to scroll the file and ◉ to select.

■ Press the 🔲 button to return to the live image.
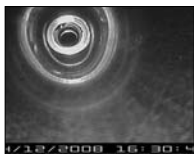
【Thumbnail】

Blue Frame
→Selected File

Number of Pages

With the red mark
→Video

Without the red mark
→Still Image

Display the still image

■ Press the ◉ button to select the image.

■ Press the ▶ button to the next image. Press the ◀ button to the previous image.

■ Press the 🔳 button to show / hide the date and time display.

■ Press the 🔲 button to return to the thumbnail.

Play the video

■ Press the ◉ button to select the video.

■ Press the ▶ button to play the video.

■ Press the ◉ to pause while the video is playing.

Press the ◉ again to resume.

■ The screen returns to the thumbnail when the video finishes playing or the 🔲 button is pressed.

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Delete the stored image / Adjust the image quality

Delete the stored image
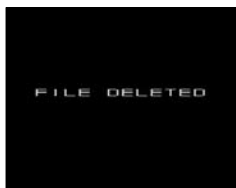
- Press the ◀ ▶ button to select the image and press the ▤ button.
- The screen displays the message, "DELETE FILE?" select "YES" on the screen and press the ◎ button.

- The screen displays the message, "FILE DELETED" when the selected file is deleted.
- Select "NO" on the screen and press the ◎ button, or press the ⬜ button to cancel and return to the thumbnail.

Adjust the image quality

- Press the ▤ button to display "SETUP MENU". Press the ▤ button again or the ⬜ button to return to the live image.
- Press the ▲ ▼ button to select the item and ◎ the button to confirm the selection.

Name	Description
BRIGHTNESS	Adjust the brightness
CONTRAST	Adjust the difference between light and dark
COLOR AUTO	Adjust overall color automatically
COLOR RED	Adjust red color (Manual)
COLOR GREEN	Adjust green color (Manual)
COLOR BLUE	Adjust blue color (Manual)
SHARPNESS	Adjust the sharpness
AGC	Adjust the automatic gain control
DEFAULT	Default all settings

The default of "COLOR AUTO" is at ON. Change it to OFF in order to adjust colors manually (COLOR RED / GREEN / BLUE cannot be used while the COLOR AUTO is at ON). Select the COLOR AUTO in SETUP MENU and hit on the ENTER to change ON / OFF.

Use UP / DOWN button at the above window and hit the ENTER to change the setting.

- Press the ▲ ▼ button to change the value. Press the ◎ button to save the change.
- Press the ⬜ button to return to the setup menu.

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Set time / date

■ Press the ⬛ button to display "SETUP MENU".
  Press the ⬛ button again or the ⬛ button to
  return to the live image.

```
SETUP MENU
   BRIGHTNESS
   CONTRAST
   COLOR AUTO
   COLOR. RED
   COLOR. GREEN
   COLOR. BLUE
   SHARPNESS
   AGC
   DEFAULT
 ▶ CLOCK
```
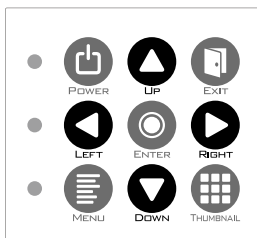
■ Select "CLOCK" on the setup menu and press
  the ⬛ button.

```
     CLOCK


DATE:  2008/04/14
TIME:    20:07:26
```

■ Select the item by the ◀ ▶ button and set the
  value by the ▲ ▼ button. Press the ⬛ button
  to save the change.

■ Press the ⬛ button to return to the setup menu.

Adjust the LED intensity

BRIGHTNESS

MAXIMUM

MINIMUM
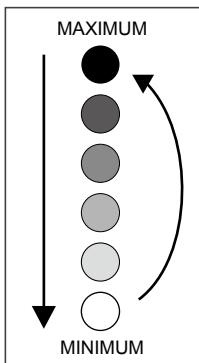
■ The LED on the tip section can be adjusted
  in 5 levels.

■ The intensity decreases as the
  BRIGHTNESS button is pressed.

■ Press the BRIGHTNESS button to return to
  the maximum intensity when the LED lights
  were off.

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View Image with Computer

Install USB driver

Recommended Operation Environment
* Windows 2000 SP4
* Windows XP   SP3
* Windows Vista SP1

Peripheral : USB 2.0 Port

1. Insert CD-ROM to the CD-ROM drive of computer.

2. Connect the USB cable to the VJ and to your computer.
   The message, "Found New Hardware USB vice" appears
   on the right bottom corner of the computer monitor.

   ⚠ **NOTE**
   •**The main power of VJ does not have to be ON.**
   •**Use a USB cable less than 5m long, which
   compatible with USB2.0, when the different
   USB cable has to be used other than the
   packaged cable.**

3. The wizard asks "Can windows connect to windows
   update to search for software?".
   Select "No, not this time" and click NEXT.

4. Select "Install from a list or specific location
   [Advanced]" and click NEXT.

5. Select "Search for the best driver in these locations".
   Check "Include this location in the search"
   and click BROWSE.

6. Search for [USB_Driver] in the CD-ROM drive.
   Select [BDA32] and click OK.
   ※Select [BDA64] when the OS is Windows Vista 64bit

7. Click NEXT.

8. If Hardware Installation window is displayed and shows
   "Analog TV Device has not passed windows Logo testing…",
   Click CONTINUE ANYWAY.

   The installation process continues.

   Click FINISH when the driver installation is completed.

Confirm USB Driver Installation

1. Right click "My Computer"
   Click "Property"
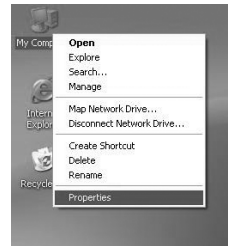
2. Click "Hardware"
   Click "Device Manager"

3. Click + next to "Sound, video and game controllers"
   If [Analog TV Device] appears, the driver is
   installed properly.

■ View VJ Image on Computer

1. Connect the USB cable to the VJ and to your computer.

> ⚠ **The USB cable must be connected to the same USB port where used for the driver installation. The driver is required to reinstall when the USB cable need to be connected to other USB port.**
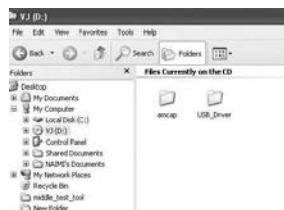
2. Open [amcap] folder in the CD-ROM drive and copy [amcap.exe] on the Desktop.
   Double click on [amcap.exe]
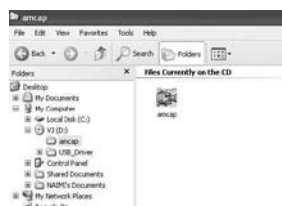
3. Click [Options] and select [Preview] VJ image displays on the screen.
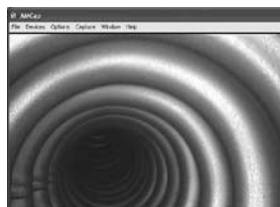
4. Click [File] and select [Exit] to close the software.

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■ Capture Still Image

1. Select the Location of Captured Image
   Click [Capture] → [Still] → 「Folder」
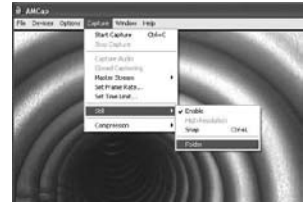
2.Select the location and click OK.

3. Capture a Still Image
   Click [Capture] → [Still] → [Snap]

> **NOTE**
> • Be sure the "Enable" button is not checked in order to select the "Snap" button.
> • The captured image is saved in the selected location (folder).
> • Image is saved with bitmap format.
> • Image file will be automatically named as [Still001.bmp], [Still002.bmp], [Still003.bmp].

The captured image can be reviewed with "Windows Image Viewer".

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■ Record Live Image

1. Select Recording Format
   Format can be selecte either "AVI"or "WMV" format.
   WMV format provides higher compressibility and data size can be smaller.

【Record with AVI format】
   Click [Capture] → [Compression] → [Video Quality]
   and select a compressibility from 4 types.
   [Highest] compresses at the smallest size and
   provide high resolution images.
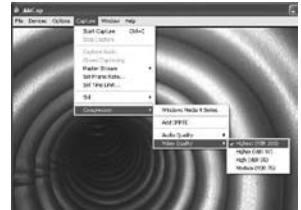
【Record with WMV format Click】
   [Capture] → [Compression] → [Windows Media 9 Series]

2. Select the Location of Recorded Image
   Click [File] → [Save Captured Video] and, decide
   the recording location and file name.
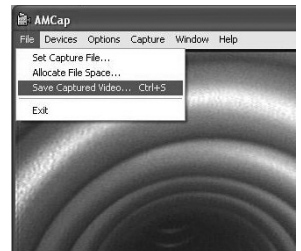
3. Record Live Image
   Click [Capture] → [Start Capture]

Recording starts when click [OK]
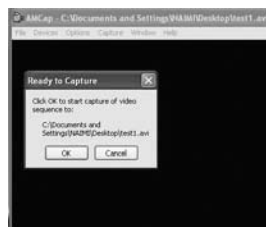
Click [Capture] → [Stop Capture] to stop recording.

Recorded images can be reviewed with the Windows Media Player.

＊The maximum movie recoding is upto 2GB.

■ **Setting**

1. Adjut Image Quality
   Click [Option] → [Video Capture Filter…]
   Image quality can be adjusted at "Video Proc Amp" tab.
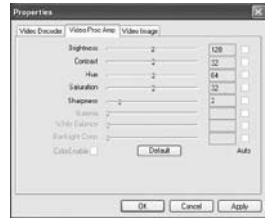
2. Adjust Output Size / Compressibility
   Click [Option] → [Video Capture Pin…]
   Output size and compressibility can be adjusted.

3. Adjust Frame Rate of Live Image Recording
   Click [Capture] → [Set Frame Rate]

   Frame rate can be adjusted.
   The maximum frame rate is 30f/sec.

4. Set Recording Time Limit
   Click [Capture] → [Set Time Limit]
   Check [Use Time Limit]
   Time limit function will be available. It enables to
   automatically stop image recording by setting time limit.

Attention for use

■ Tip section and the camera cable

1. Straighten the cable as much as possible in order to obtain the maximum flexibility on the articulation part. Because of its operating structure, the wires inside of the camera cable allow the articulation part to bend less if the camera cable is coiled in loop. This is the characteristic of an articulation borescope.

   Wires inside the camera cable may be damaged or cut if the joystick is forced to move at over 1.5 kg (3.3 lb) while the camera cable is coiled in loop.
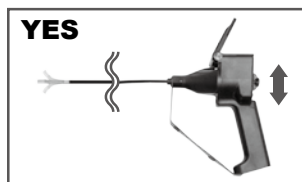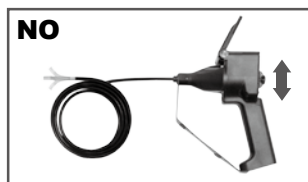
2. The articulation part contains very complex structure to fully control the tip section. Do not pull, twist or smash the articulation part, or the inner mechanical components or wire may break. When removing from the object or placing back in the case, straighten the camera cable to avoid any damage. If there is any damage or abnormality on its exterior or movement, stop the use immediately and contact the technical support center.

3. During the use, be cautious not to make any contact with rough surface or sharp edges. It may cause the cable to get torn or frayed. If the cable is damaged in such, stop the use immediately and contact the technical support center. If the unit is continuously used, the moisture or water may enter from the damaged area and cause the damage to the imaging sensor, its circuit, or the camera cable.

4. The tip section of the cable contains the micro lens, imaging sensor and the drive circuit. Do not impose any excessive impact or vibration.

5. Do not keep the unit in the high temperature environment, such as sun-heated cars. (Operate the unit in the environment less than 40 ℃/ 104 F)

6. Do not use VJ under the condition where has a risk of fire or explosion.

7. Use separate VJ units due to sanitarily reason in order to inspect water supply and sewerage systems.

⚠ **Waterproof property**

■ The tip and the cable section are waterproofed.

■ Do not immerse the body part into the water or not leave in the rain, or it may cause the damage to the main unit.

Waterproof

■ *Maintenance*
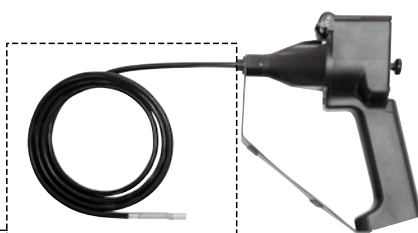
■ Cleaning
• Be sure to clean and dry VJ after used.

• Do not use the autoclaving machine to clean.

Body
Wipe any dirt or stain with dry cloth. Use the mild detergent with soft cloth to clean off any grim.
*Do not immerse the body part into the water or any liquid.
*Do not use a hard brush or any organic solvent such as benzene or thinner to clean.

Cable Part
Wipe any dirt or stain with dry cloth. Use the mild detergent with soft cloth to clean off any grim.
(Sterilizing ethanol may be used to clean)
*Do not immerse the body part into the water or any liquid.
*Do not use a hard brush or any organic solvent such as benzene or thinner to clean.

■ Storage and Transportation
• Store VJ in its case while it is not in use and place the case in the environment where there is
  no contact with dirt, moisture or water.

• Use packaging materials (box, buffer) and pack VJ securely to transport. Avoid strong vibration,
  dirt, moisture or water contact while transport.

• Store or transport in the environment with 15 - 40˚ / 59 - 59 - 104F temperature and 30 - 70%
  humidity (no condensation).

■ Monthly Maintenance
Check following:
• Operate of all features explained in this manual
• Any loose or missing screws
• Any cracks or fracture on the unit

Q&A (Troubleshooting)

Question	Answer
• The unit does not show any image on the built-in or other monitor.	• Are the batteries inserted in correct direction? (Refer the page 5) • Is there enough battery power? (Refer the page 6) If the power LED is on orange or red, replace the batteries. • TV Monitor Is the video cable connected correctly? Is the TV monitor set at Video Input Channel? • PC Is the driver correctly installed? Is the software correctly installed?
• The image does not get stored. • The unit does not display the stored image	• Confirm the micro SD card is inserted securely. • Is there enough free memory space left on the micro SD card? If not, delete unnecessary images to free up the space. • Is the micro SD card less than 2 GB memory used? Any micro SD card with SDHC standard cannot be used. • Format the micro SD card. When formatting the micro SD card, use "FAT" or "FAT32". Do not use "NTFS" to format the card, or the card would become un-readable.
• The unit operates slow or does not operate as normal.	• As the stored images in the micro SD card increases, the speed of the unit may drastically decrease, or the unit may freeze (stops working). Use the micro SD card as the temporary storage space and store the files in the computer. • After the long video was recorded, the unit may stop with the message, "SAVING AVI FILE". The unit is storing the video. If the unit does not return to the normal screen after a while, contact the technical support center.
• Odd color or distorted image is displayed when open the saved image or while capturing image.	• Confirm the enclosed Micro SD card is used. • Use a high-speed Micro SD card when use a card on the market.

Specifications

Insertion Tube	Outer Diameter	φ6.9mm	
	Tube Length	1.5m (59")	3.0m (118")
	Exterior	Polyurethane	
	Waterproof	Insertation Tube and Tip	
Optics	Field of View (H/V)	72° / 54°	
	F No.	F 6.0	
	Depth of Field	20mm ～∞	
	Illumination Method	4 High-intensity white color LED with 5 level adjustment	
Articulation	Articulation Angle	360° (more than 90° in each direction)	
	Articulation Control	Joystick with direct control mechanism	
	Rigid Distal End Length	15mm	
Temperture Observing Functions (Tip of Insertion Part)		Temperature Alarm Display	
Input/Output	Video Signal Output	φ2.5m stereo mini jack (NTSC/PAL)	
Terminal	USB Terminal	Mini B Terminal (ver. 2.0 compliance) for video capture signal output	
Storage	Still Image	JPEG 640×480 pixels	
	Movie	MotionJPEG（AVI file extension) 640 x 480 pixel 15 - 30 fps	
	Storage Capacity	Capacity with 1GB MicroSD Card Still Image: Approx. 500 pictures Movie Recording: Approx. 60 minutes	
Playback Function		Still Image: Thumbnail 9-image display / Full screen display Movie: Play / Pause	
Menu Operation		Image adjustment (Brightness, Contrast, Hue, Sharpness) Delete store image Set clock time	
Storage Media		MicroSD Card Max. 2GB	
LCD Monitor		2.4inch Color Digital TFT	
Operating Temperatures (Insertion Tube)		In air: -30℃～ 60℃ (-22° F ～ 140° F) non condensing Under water: 10℃～ 30℃ (50° F ～ 86° F)	
Power Supply		DC 6V (with 4 AAA alkaline batteries) / AC adapter (6V / 0.85A)	
Operating Time		Max. 2 hours (with 4 AAA alkaline batteries)	
Weight		480g / 24 oz (without batteries / 1.5m tube length)	

*Specifications and design may be changed without pre-notice.

Chemical Compatibility (under ordinary temperature and pressure)

Chemical compatibility refers to the cable's tolerance for various liquid substances. It is impossible to list and test all liquid substances available in the industrial environment. However, RF SYSTEM lab has tested some of the most common substances for the cable's chemical compatibility as a reference.

Regardless of liquid types, the duration of exposure to the liquid must be minimized.

Tolerant Liquid:
Water / 3.5% Concentrated Saltwater / Machine Oil / Diesel Fuel / Kerosene / Engine Oil /Engine Coolant (Ethylene glycol) / Gasoline*Do NOT use VJ under vaporized and sealed condition. There is a risk of explosion.

Nonresistant Liquid:
Strong Acid / Strong Alkaline liquids

Warranty Terms

1. Warranty Information
If the unit fails to operate properly with the normal use in accordance to the user's guide, RF SYSTEM lab conducts the repair of the unit based on the terms

2. Warranty Subject
Main Unit (The insertion cable part is excluded)

3. Duration of Warranty
- One (1) year from the delivery date
- For the after-repaired product, the duration of warranty is three (3) months from the delivery date. (It is applicable when the problem has the same symptom at the identical part)
- Shortage or initial defects of attachments is not covered by warranty. They are found by any possibility, please contact the company you purchased from within three (3) days of delivery.

4. Conditions
- Regardless of the remaining warranty period, the repair is subject to fees under the following conditions.
1) Any necessary replacement due to the deterioration of consumable parts such as insertion cable and batteries.
2) Any damages or failures caused by fire, earthquake, floods, lighting strike, environment disruption, abnormal voltage surge, or any other acts of providence.
3) Any damages or failures caused by misuse, unauthorized repair, disassembling or customization. Opening the product casing also applies here.
4) Any damages or failures caused by fall during transportation, or inappropriate handling of the unit.
5) Any damages or failures caused by repair, parts replacement or adjustment at outside of RF SYSTEM lab factory.
6) Any repair request without the warranty certificate, or warranty certificate without distributor's name or purchase date, or tamper with the certificate.
7) Any damages or failures caused by natural wear and tear, attrition and degradation of consumable parts.
- This warranty is valid only in the country, where the unit was originally delivered.
- This warranty is valid only for the original purchaser and does not apply to resale or transfer.

5. Coverage
- This guarantees the free repair only under the warranty terms, which are specified on this certificate, and does not restrict the customers from lawful rights.
- The warranty does not cover the unit, which is contaminated by detrimental substances.
- The warranty does not cover any damages or failures on the image storage media and stored data. It is responsible for user to make a backup copy.

6. Other
- All part replaced for the repair is taken and disposed by RF SYSTEM lab.

Warranty Certificate

Product	φ6.9mm Articulation Video Borescope	Serial No.	
Model	VJ	Distributor	Name: Phone:
Warranty Period	Warranty Subject : Main Unit Duration of Warranty : 1 year (From the original delivery date)		
Customer Information	Name Address Phone		

This certificate serves as the guarantee of the free repair based on the warranty term stated on the abve terms. If the unit requires the repair within the stated period of time on the left, please contact to your local distributor or RF SYSTEM lab. Customer Service.

Inspired by dreams.
RF SYSTEM lab.

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