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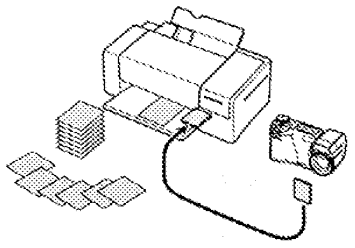
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- *Other company, product and service names used herein may also be trademarks or service marks of others.*
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# FEATURES

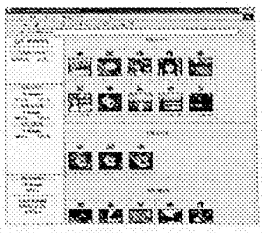
**Continuous recording (page 57)**
Continuous recording of high-quality images at 0.25-second intervals is just like have a motor drive on the camera.

**DCF Data Storage (page 104)**
DCF (Design rule for Camera File system) data storage protocol provides image inter-compatibility between the digital camera and printers.

**Digital Print Order Format (DPOF) (page 95)**
Images can be easily printed in the sequence you want using a DPOF compatible printer. DPOF can also be used by professional print services when specifying images to produce prints.



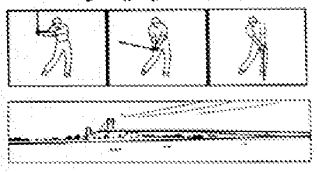
**Simple image management (page 106)**
Images are stored on a large-capacity CompactFlash memory card. A new Card Browser feature produces thumbnails of all images on a card quickly and easily.



## FEATURES

**Movie and panorama images (pages 80, 81)**

A buffer lets you capture images of events that occurred before you pressed the shutter button. A built-in function lets you combine up to nine images into breathtaking panoramas.



**Easy-to-understand graphic interface (page 32)**

All camera operations can be performed on graphic based interactive menu screens. CASIO high-resolution HAST LCD makes screen images clearer and more colorful than ever before.

**CASIO original metering system**

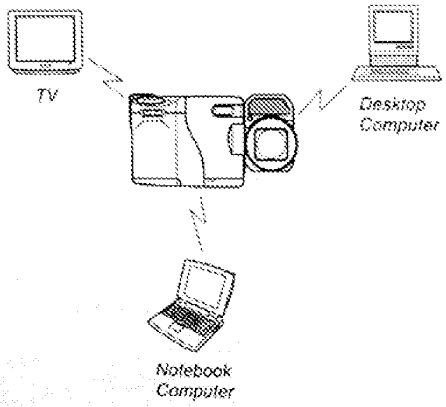
Light metering includes innovative multi-pattern metering.

**Megapixel CCD**

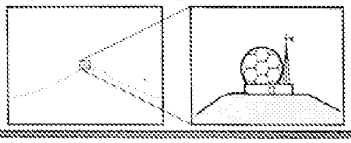
Images are recorded by a 1.31-megapixel CCD for amazing resolution and clarity.
Some slight image noise may be caused when using slow shutter speeds.

**Easy connection to other devices (page 99)**

USB, DIGITAL, and VIDEO OUT terminals provide easy connection to other devices.

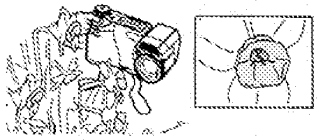


32X zoom is produced using 8X optical zoom together with 4X digital zoom.



page 58

Macro Feature



page 61

Landscape Mode



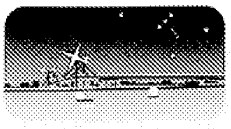
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Portrait Mode



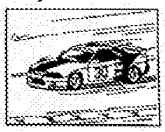
page 67

Night Scene



page 65

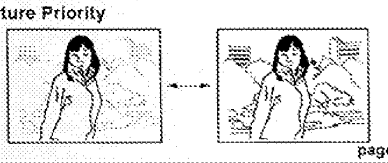
Shutter Speed Priority



page 70

## FEATURES

**Aperture Priority**



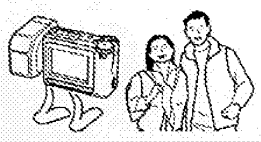
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**Date and Time Stamping**




page 44

**Self-timer**



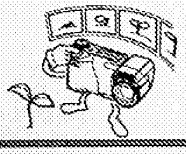
page 68

**9-image Screen**



page 83

**Timer**



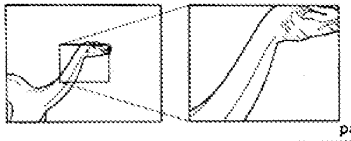
page 69

**Slide Show**



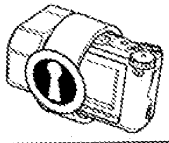
page 84

Display Zoom



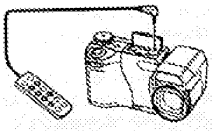
page 82

Image Protection



page 90

Wired Remote Controller



page 21

# PRECAUTIONS

## General Precautions

Be sure to observe the following important precautions whenever using the QV-8000SX.

All references in this manual to "this camera" and "the camera" refer to the CASIO QV-8000SX Digital Camera.

- Never try to take pictures or use the built-in display while operating a motor vehicle or while walking. Doing so creates the danger of serious accident.
- Never try to open the case of the camera or attempt your own repairs. High-voltage internal components create the risk of electrical shock when exposed. Always leave maintenance and repair work up to authorized CASIO service providers.
- Never fire the flash in the direction of a person operating a motor vehicle. Doing so can intertere with the driver's vision and create the danger of accident.
- Never fire the flash while it is too close to the subject's eyes. Intense light from the flash can cause eye damage if it is fired too close to the eyes, especially with young children. When using the flash, the camera should be at least one meter from the eyes of the subject.
- Keep the camera away from water and other liquids, and never let it get wet. Moisture creates the danger of fire and electrical shock. Never use the camera outdoors in the rain or snow, at the seashore or beach, in the bathroom, etc.
- Should foreign matter or water ever get into the camera, immediately turn power off, unplug the AC adaptor from the power outlet, and contact your dealer or nearest CASIO service provider. Using the camera under these conditions creates the danger of fire and electrical shock.
- Should you ever notice smoke or a strange odor coming out of the camera, immediately turn power off and unplug the AC adaptor from the power outlet. Using the camera under these conditions creates the danger of fire and electrical shock. After making sure there is no more smoke coming from the camera, take it to your nearest CASIO service provider for repair. Never attempt your own maintenance.
- At least once a year, unplug the AC adapter from the power outlet and clean the area around the prongs of the plug. Dust build up around the prongs can create the danger of fire.
- If the camera's case should ever become cracked due to dropping it or otherwise subjecting it to rough treatment, immediately turn power off, unplug the AC adaptor from the power outlet, and contact your nearest CASIO service provider.
- Never use the camera inside of an air craft or in any other areas where its use is prohibited. Doing so can result in an accident.
- Physical damage and malfunction of this camera can cause the image data stored in its memory to be deleted. Be sure to always keep backup copies of data by transferring them to personal computer memory.

• Never open the battery compartment cover, disconnect the AC adaptor from the camera or unplug it from the wall socket while recording images. Doing so will not only make storage of the current image impossible, it can also corrupt other image data already stored in camera memory.

## Operating conditions

• This camera is designed for use in temperatures ranging from 0°C to 40°C.
• Do not use or keep the camera in the following areas.
  — In areas subject to direct sunlight
  — In areas subject to high humidity or dust
  — Near air conditioners, heaters, or other areas subject to temperature extremes
  — Inside of a closed vehicle, especially one parked in the sun
  — In areas subject to strong vibration

## Condensation

• When you bring the camera indoors on a cold day or otherwise expose it to a sudden change of temperature, there is the possibility that condensation can form on the exterior or on interior components. Condensation can cause malfunction of the camera, so you should avoid exposing it to conditions that might cause condensation.
• To keep condensation from forming, place the camera into a plastic bag before moving it into a location that is much warmer or colder than your current location. Leave it in the plastic bag until the air inside the bag has a chance to reach the same temperature as the new location. If condensation does form, remove the batteries from the camera and leave the battery compartment cover open for a few hours.

## About the camera's backlight...

- The camera is equipped with a fluorescent light source to provide the back lighting for its LCD.
- The normal service life of the backlight is approximately six years, when the camera is used for about two hours a day.
- Should the LCD image appear abnormally dark, take the camera to your dealer or an authorized CASIO service provider to have the light source replaced. Note that you will be charged for this replacement.
- Under very cold conditions, the backlight may require more time than normal to light, or reddish bands may appear in the displayed image. These conditions do not indicate malfunction, and normal operation should return at higher temperatures.

## Monitor Screen

### Recording

- The image shown on the monitor screen during recording is intended for composition purposes only, so its quality does not match that of the image as it is recorded. The image is recorded in accordance with the quality setting made with the procedure under "Quality Settings" on page 53.
- A dimly lit subject can slow down monitor screen refresh or cause static in the displayed image.

### Playback

This camera is designed for high-speed scrolling of images during playback. Because of this, the playback image that initially appears on the monitor screen does not show the full resolution of the image as recorded. When you stop at the image you want, the monitor screen refreshes and shows the image in its full resolution.

## Lens

- Camera performance can be adversely affected by fingerprints or dirt on the lens surface. Never touch the lens surface with your fingers.
- Should the lens become dirty, use a blower to blow off dirt and dust, or a soft, dry cloth to wipe off the lens.

## Date Setting

No data setting is made before the camera is shipped from the factory. Be sure to use the procedure on page 44 to set the time and date before using the camera for the first time. File name assignment and time stamping will not be performed correctly if the time and date are wrong.

## GUIDELINES LAID DOWN BY FCC RULES FOR USE OF THIS UNIT IN THE U.S.A. (not applicable to other areas).

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.

### NOTICE

This equipment has been tested and found to comply with the limits for a Class B peripheral, 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.

### FCC WARNING

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
Properly shielded cables with ferrite core must be used for connection to host computer and/or peripherals in order to meet FCC emission limits.

THE SPECIAL VIDEO CABLE THAT COMES WITH THE CAMERA
... THE CAMERA TO A VIDEO IN TERMINAL OF A COMPUTER
THE SPECIAL CONNECTION CABLE THAT COMES WITH QV-LINK SOFTWARE
... THE CAMERA TO A PROPER TERMINAL OF A COMPUTER

### Declaration of Conformity

| | |
|---|---|
| Model Number: | QV-8000SX |
| Trade Name: | CASIO COMPUTER CO.,LTD. |
| Responsible party: | CASIO INC. |
| Address: | 570 MT. PLEASANT AVENUE, DOVER,NEW JERSEY 07801 |
| Telephone number: | 973-361-5400 |

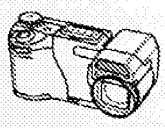
This device complies with Part 15 of the FCC Rules.
Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

CASIO COMPUTER CO.,LTD. QV-8000SX
FC Tested To Comply With FCC Standards
FOR HOME OR OFFICE USE

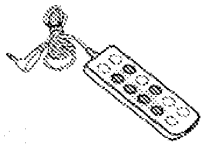
# UNPACKING

Check to make sure that all of the items shown below are included with your camera. If something is missing, contact your dealer as soon as possible.

*Camera*



*Wired Remote Controller*



*Lithium Battery for wired remote controller (CR2025)*



*Soft case*

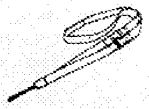


*Lens cap*

Attached to the lens



*2-Way Shoulder/ Wrist Strap*



*Video cable*



*Special USB cable*



*User's Guide*



## Using the Lens Cap

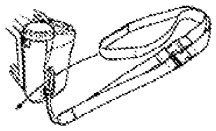
Be sure to affix the lens cap whenever you are not using the camera. When affixing the lens cap, position it as shown in the illustration and press at the points indicated by the arrows.




• A clip on the back of the lens cap lets you fasten it to the camera strap.

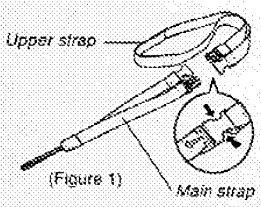
## Attaching the Strap

The two-way strap that comes with the camera can be used either as a shoulder strap or a wrist strap. Pass the wrist strap through the hole on the side of the camera as shown in the illustration.



## Using the Strap as a Wrist Strap

Detach the upper strap from the main strap (Figure 1), and then attach the two buckles of the main strap to each other (Figure 2).
Press the buckles together until they snap securely into place.

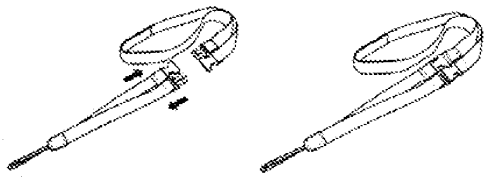


(Figure 1)


(Figure 2)

## Using the Strap as a Shoulder Strap

Attach the strap to the camera so the shoulder pad is on the inside of the loop.



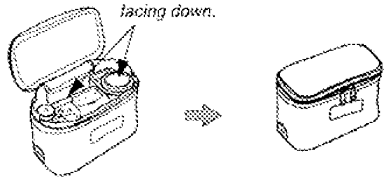
**IMPORTANT!**

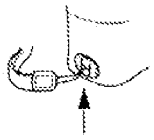
- Be sure to keep the strap around your wrist whenever using the camera to protect against accidentally dropping it.
- The supplied strap is intended for use with this camera only. Do not use for any other application.
- Never swing the camera around by the strap.
- Allowing the camera to swing freely from your neck can result in damage to the camera due to its bumping against other objects. It also creates the danger of the camera becoming caught in a door or on other objects, resulting in personal injury.

## Using the Soft Case

Keep the camera in its soft case to protect it when not in use.

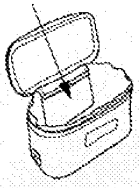
*Make sure the lens is facing up and the monitor screen is facing down.*





*If you want to hang the camera from your shoulder while it is in the soft case, pass the shoulder strap through the hole in the side of the case.*

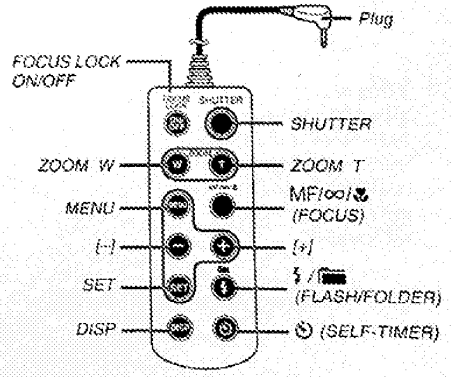
*The pocket inside the soft case can be used to store the wired remote controller and memory cards.*



## Using the Wired Remote Controller

The wired remote controller that comes with the camera can be used to control the camera. When using a slow shutter speed or telephoto, you can avoid blurring of the image due to camera movement by mounting the camera on a tripod and using the wired remote controller to trigger the record operation. You can also use remote control for playback during presentations.

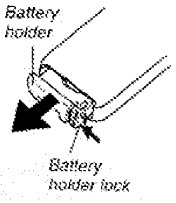
### General Guide



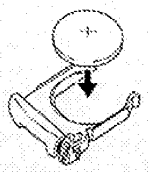
## Replacing the Wired Remote Controller Battery

The wired remote controller is powered by a single CR2025 lithium battery.

1. **While pressing the battery holder lock, pull the battery holder from the wired remote controller.**




2. **After wiping off the two sides of a battery with a soft, dry cloth, place it into the battery holder with the positive (+) side facing up (so you can see it).**




3. **Slide the battery holder back into place.**

Failure of the wired remote controller to operate probably means that the battery needs to be replaced.

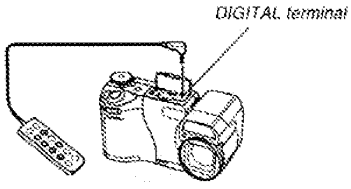
### Battery Precautions

CAUTION

- Keep batteries out of the reach of small children. If swallowed accidentally, contact a physician immediately.
- Misuse of a battery can cause it to leak, which damages and corrodes the area around the battery and creates the danger of fire and personal injury. Be sure to observe the following precautions.
- When loading the battery, make sure its positive (+) and negative (–) sides are facing correctly.
- Use only the battery type that is specified for this unit.
- Never try to charge a battery or take it apart, and never allow its poles to become connected to each other by metal (shorted). Do not expose batteries to heat or dispose of them by burning.
- Dead batteries tend to leak battery fluid. Never leave a dead battery in the wired remote controller.

## Connecting to the Camera

Turn off camera power and then attach the plug of the wired remote controller to the camera's DIGITAL terminal.




## Wired Remote Controller Buttons

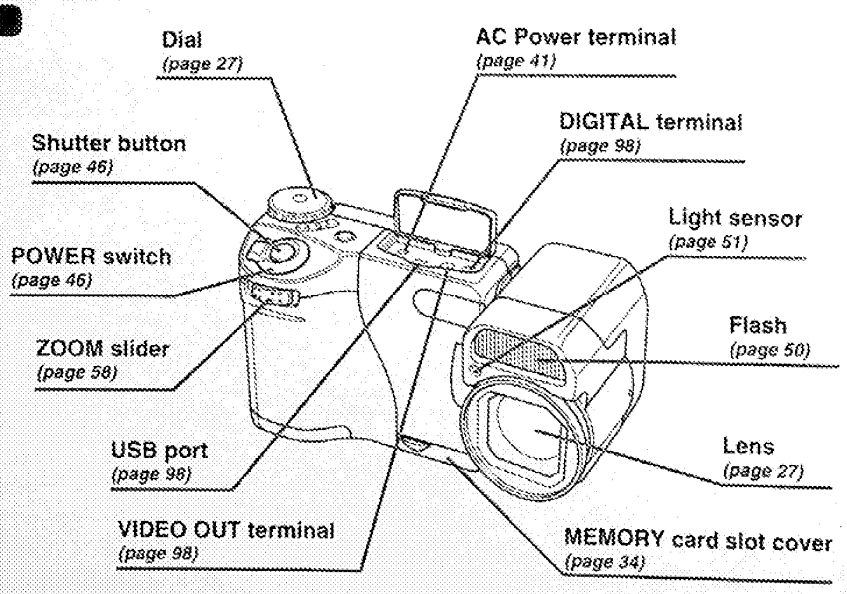
The buttons of the wired remote controller have the same basic functions as the buttons on the camera, except for the differences described below.

| To perform this operation: | Do this: |
|---|---|
| Focus Lock | **Wired remote controller:**<br>Press the FOCUS LOCK ON/OFF button to turn on focus lock, compose the image, and then press the SHUTTER button.<br>• Pressing FOCUS LOCK ON/OFF again cancels focus lock.<br>• Pressing the remote controller's SHUTTER performs the focus operation, followed by recording of the image.<br>**Camera:**<br>Press the shutter button half way, compose the image, and then press the shutter button (page 49). |
| Menu screen item selection | **Wired remote controller:**<br>Highlight the item on the camera's monitor screen, and then press the SET button.<br>**Camera:**<br>Highlight the item on the camera's monitor screen, and then press the shutter button (page 32). |

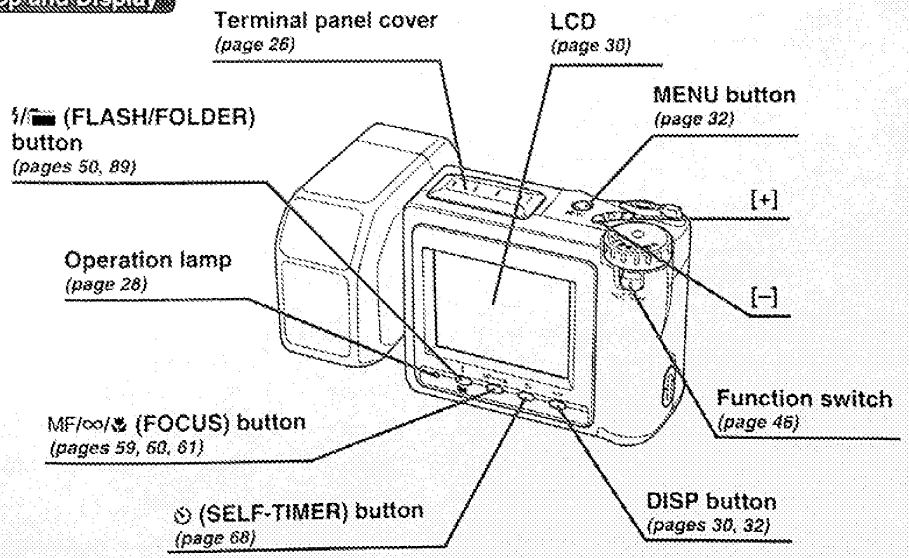
# GENERAL GUIDE

The following illustrations show the names of each component, button and switch on the camera.

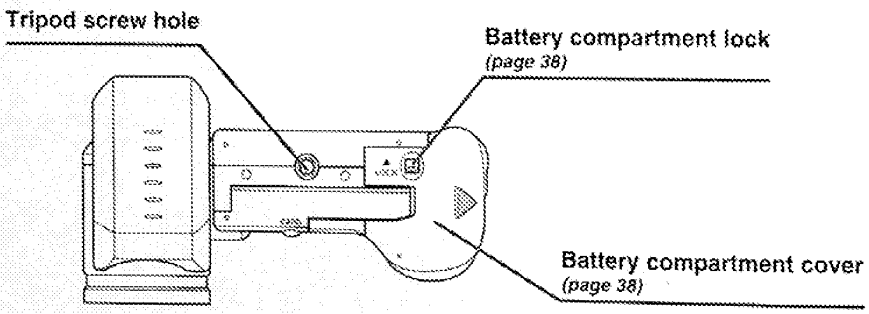
**Lens**



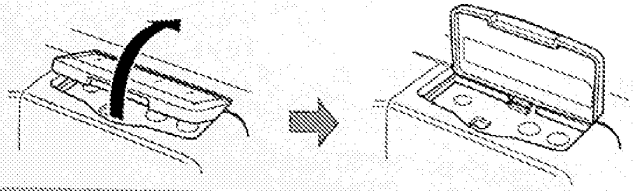
## Top and Display



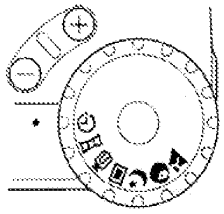
**Bottom**




Opening the Terminal Panel Cover



**Dial**

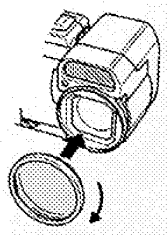


| | | |
|---|---|---|
| | Timer Mode | (page 69) |
| | Panorama Mode | (page 64) |
| | Movie Mode | (page 62) |
| | Normal Mode | (page 46) |
| | Night Scene Mode | (page 65) |
| | Portrait Mode | (page 67) |
| | Landscape Mode | (page 66) |

## Lens Filters

The area around the lens of the camera is threaded to allow use of commercially available lens filters with a diameter of 43mm. Simply screw the lens filter into place.

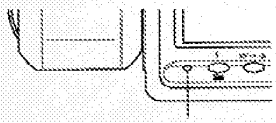
**IMPORTANT!**



- Certain types of filters can cause the problems described below. Be sure to carefully check any filter for these problems before purchasing it.
  - The frame around the outside of some filters may block light from the lens, resulting in shadows in the image.
  - Some filters can interfere with proper operation of Auto Focus and the flash unit.
  - Filter performance may not be equivalent to that obtained with a film-based camera.
- Do not use multiple filters with this camera.
- Do not use a lens hood. Doing so causes incorrect firing of the flash unit.

## Operation Lamp

The operation lamp shows the operational status of the camera.



*Operation lamp*

**Record Mode**

| Lamp Color | On | Flashing |
|---|---|---|
| Green | Auto Focus operation complete | Please wait (after power on) |
| | Monitor screen turned off due to sleep state activation or data communication | Image store operation in progress |
| | | Power off |
| | | Low battery |
| Amber | Exposure warning | Flash is charging |
| Red | Cannot focus | Memory error |
| | Memory full | |
| | Cannot charge the flash | |

### Playback Mode

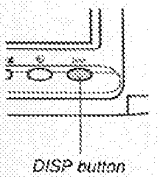
| Lamp Color | On | Flashing |
|---|---|---|
| Green | Monitor screen turned off due to data communication. | Please wait (after power on) |
| | | Delete operation in progress |
| | | Format operation in progress |
| | | Power off routine in progress |
| | | Low battery |
| Red | --- | Memory error |

### Low Battery Warning

Lights (red), after which camera power turns off automatically.

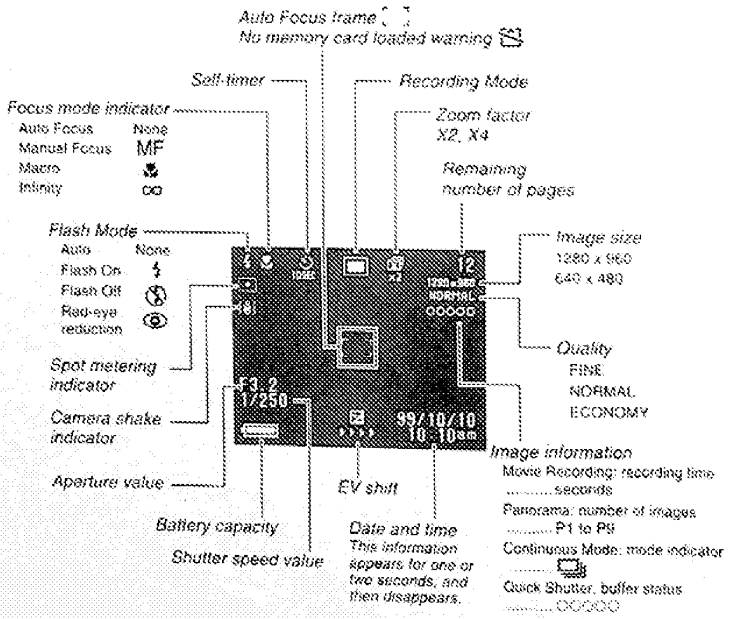
# MONITOR SCREEN

Pressing DISP causes various indicators to appear on the monitor screen.

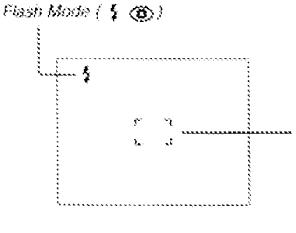


DISP button

## Recording Mode



### Screen when shutter is pressed half way

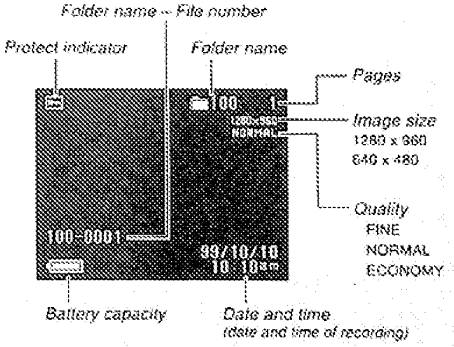



Flash indicator appears to indicate that flash will be fired (when auto flash is selected).

### Recording Mode Indicators

| | | | |
|---|---|---|---|
| | Timer | | Night Scene |
| | Panorama | | Portrait |
| | Movie | | Landscape |
| | Normal | | |

## Playback Mode




## Changing the Display Language

Use the following procedure to switch the display language between English and Japanese.

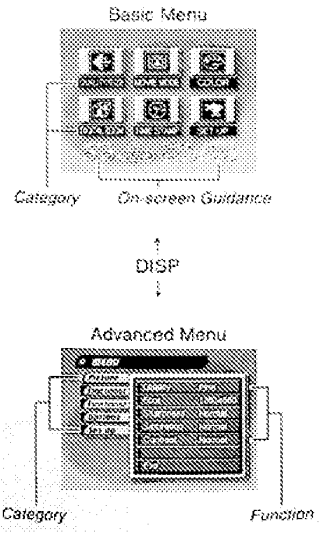
1. **Press MENU.**
2. **Select "Set Up" → "Language".**
3. **Select the display language you want.**

## Menu Screens

Pressing MENU displays the menu screen. The contents of the menu screen depend on whether you are in the PLAY Mode or REC Mode. While the menu screen is on the display, press DISP to toggle between the basic menu and the advanced menu.
In this User's Guide, the basic menu is always used for items that appear on both the basic menu and advanced menu.
The basic menu displays settings required for basic functions, while the advanced menu includes settings for all functions.

• See "Using the Record Menus" on page 75 and "Using the Playback Menus" on page 86 for more information about menu contents.

Sample Display: REC Mode



## Making menu settings

1. Slide the Function Switch to PLAY or REC.
2. Press MENU.
3. Press DISP to toggle between the basic menu and the advanced menu.
4. Use [+] and [–] to select the category or function you want, and then press the shutter button.

   [+] [–] : Item selection
   Shutter button : Execution of a selection
   MENU : Returns to the previous screen or cancels settings.

   • Make settings in accordance with the guidance messages that appear on the monitor screen.
5. After making the settings you want, select "Exit" and then press the shutter button.

# MEMORY CARDS

This camera uses a memory card (CompactFlash cards) for image memory.
Use the procedure below to insert the memory card into the camera before you try to use it for the first time.

**IMPORTANT!**

- Make sure that the power of the camera is turned off before you insert or remove a memory card.
- When inserting a memory card into the camera, make sure that the card is oriented correctly. Make sure that the correct side of the card is facing up, and that you insert the correct end of the card into the camera.

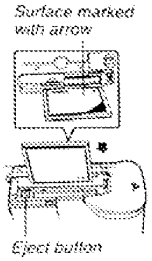
## Inserting a Memory Card into the Camera

**1. Open the memory card slot cover.**



**2. As shown in the illustration, slide the memory card into the slot and push it in as far as it will go.**

- If the Eject button is extended, press it in before sliding the memory card into the slot.




**3. Close the memory card slot cover.**

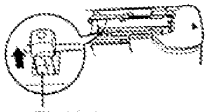


## Removing a Memory Card from the Camera

1. Open the memory card slot cover.

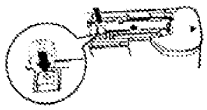


2. Press the eject button so it extends from the camera.

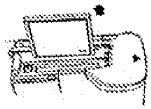


*Eject button*

3. Press the eject button once again to eject the card.



4. Remove the memory card.



5. Close the memory card slot cover.



**IMPORTANT!**

- Insert only memory cards into the memory card slot. Inserting any other type of card can cause malfunction.
- Should water or any other foreign matter get into the memory card slot, immediately turn off power, unplug the AC adaptor, and contact your original retailer or nearest CASIO Service Provider.
- Never eject the CompactFlash card while the card slot is facing downwards. Doing so creates the danger of the CompactFlash card falling, which can corrupt image data on the card.

## Formatting a Memory Card

You can format a memory card to delete all of the data stored on it.

**IMPORTANT!**

- Formatting a memory card deletes all images on the card, even if some or all of the images are protected (page 90).
- Data deleted by a memory card format operation cannot be recovered! Be sure to carefully check and confirm that you no longer need the data stored in a memory card before formatting it.

1. **Press MENU.**
2. **Select "Set Up" → "Format".**
3. **In response to the confirmation message that appears, select "Yes" to start formatting the card.**

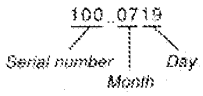
## Memory Card Precautions

- Images cannot be recorded with this camera unless a memory card is installed in it.
- Be sure to use only CASIO brand CompactFlash cards. Proper operation with other memory cards is not guaranteed.
- Static electricity, electrical noise, and other electrical phenomena can cause corruption or even total loss of the data stored on a memory card. Because of this, you should always make backup copies of important images on other media (magnetic optical disk, floppy diskette, computer hard disk, etc.).
- Memory card problems can be corrected by reformatting the memory card (page 116). Reformatting a memory card deletes all images stored on the card, but you can use a computer to copy the images you want to keep to the computer's hard disk before reformatting your card. If you plan to be recording images where you do not have access to a computer, it is a good idea to take along an extra memory card or two just in case you experience an unexpected memory card problem.

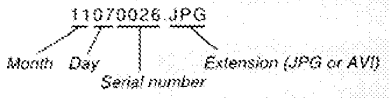
- Formatting is recommended for any memory card that you suspect contains corrupted image data (due to a DECODE ERROR, strange image colors, malformed images) or newly purchased memory cards.
- Before starting a format operation, load a full set of new batteries (alkaline or lithium) into the camera or connect the AC adaptor to power the camera. Interruption of camera power during the format operation results in improper formatting, making it impossible to use the memory card.

## Memory Card Folder Precautions

- The camera automatically creates folders (directories) on the memory card and assigns them names based on dates (month and day). Any image you record is automatically stored into the folder that corresponds to the date it is recorded.
- Up to 900 folders can be created on a single card.
  The following shows a typical folder name.




- Up to 250 image files can be stored in each folder. The following shows a typical file name.




- When you try to save the 251st image to a folder, the camera automatically creates a new folder and store the image there.
- The above maximum number of files and folders are absolute maximums. The actual number of folders and files may be less due to memory card capacity and the size of each image.
- Panorama images are divided into multiple images and stored on the memory card.
- See "USING CompactFlash CARDS WITH YOUR COMPUTER" on page 103 for information about how files and folders are organized.

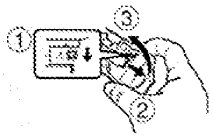
# POWER SUPPLY

The camera features a two-way power supply that lets you use either batteries (AA-size alkaline, lithium or Ni-MH) or household AC current.

## Loading Batteries

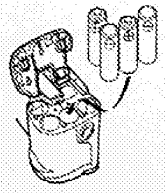
Be sure that camera power is turned off whenever loading or replacing batteries.

1. **On the bottom of the camera, slide the battery compartment cover lock towards the front of the camera (①) to release the cover.**

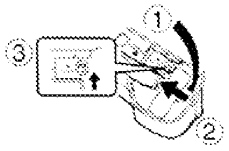



2. **Grasping both sides of the battery compartment cover, swing it open (② ③).**

3. **Load batteries so their plus (+) and minus (–) ends are facing as shown in the illustration.**



4. **Close the battery compartment cover (① ②), and then slide the battery compartment cover lock towards the back of the camera to lock the cover in place (③).**




Be sure to use **alkaline**, **lithium** or **Ni-MH** batteries. Never use manganese batteries (see precautions on the next page).

- Make sure the battery compartment cover is locked securely. Failure to do so can result in the cover opening, creating the danger of personal injury and corruption of image data.

## Standard Battery Life

This camera can be powered using AA-size alkaline, lithium or Ni-MH batteries.
The battery life reference values given below indicate the amount of time at standard temperature (25°C) until power automatically turns off due to battery failure. They do not guarantee that batteries will perform the amount of service indicated. Battery life is reduced by low temperatures and continued use.

| Type of Operation | AA-size Alkaline Batteries LR6 | AA-size Lithium Batteries FR6 | AA-size Ni-MH |
|---|---|---|---|
| Continuous Playback | 110 minutes | 280 minutes | 150 minutes |
| Continuous Recording | 400 shots | 1020 shots | 620 shots |

- The above figures are approximations only.
- The above guidelines are based on the following battery types:
  Alkaline: MX1500 (AA) DURACELL ULTRA
  Lithium: Energizer
  Ni-MH (Nickel-metal hydride): CASIO NP-H3
- Battery life varies with brand.
- Figures are based on continuous recording under the following conditions.
  Flash turned off
  One zoom slider switching between T (Telephoto) and W (Wide-angle)

Battery life is greatly affected by how much you use flash, zoom and other functions, and how long you leave power turned on.

### ● About rechargeable batteries

- Use only the nickel-metal hydride batteries (NP-H3) that are available from your dealer as options for this camera. Proper camera operation is not guaranteed when other rechargeable batteries are used.
  Nickel-metal hydride Batteries (4-battery set)/Quick Charger Set BC-1HB4
  Nickel-metal hydride Batteries (4-battery set) NP-H3P4
- Be sure to keep all four batteries together as a set at all times, for both charging and powering the camera. Mixing batteries from different sets can shorten overall battery life and cause malfunction of the camera.
- Rechargeable batteries cannot be charged while they are loaded in the camera.

### ● Tips for Prolonging Battery Life

- Use the ⚡ button to turn off the flash when you are not using it.
- You can also use the power save settings (page 42) to protect against wasting battery power when you forget to turn off the camera.

### ● How low temperature affects battery life

- The life of alkaline batteries is shortened by use under very cold temperatures. The life of alkaline batteries used at 0°C is about one fifth of what it is at normal temperatures (about 25°C). When shooting under very cold temperatures, we recommend use of lithium or nickel metal hydride batteries, which are not so dramatically affected by cold. If you must use alkaline batteries, be sure to have plenty of spares on hand.

## Battery Handling Precautions

Incorrect use or handling of batteries can cause them to leak or burst and seriously damage your camera. Be sure to note the following important precautions to avoid problems with batteries.

CAUTION

- Use only LR6 (AM-3) type alkaline or FR6 type lithium or Ni-MH (nickel-metal hydride) dry cell batteries with this camera. Never mix old batteries with new ones. Doing so can result in bursting or leaking of batteries, creating the danger of fire or personal injury.
- Always make sure that the positive (+) and negative (–) ends of the batteries are facing correctly, as noted by the markings on the camera itself. Improper loading of batteries can result in bursting or leaking of batteries, creating the danger of personal injury or soiling of objects nearby.

- Remove batteries from the camera if you do not plan to use it for more than two weeks.
- Never recharge batteries, never allow direct connection between two ends of a battery, and never try to take batteries apart.
- Do not expose batteries to direct heat or dispose of them by burning. Doing so can create the danger of explosion.
- Never mix batteries of different types.
- Dead batteries are susceptible to leakage, which can cause serious damage to your camera. Remove batteries from the camera as soon as you notice they are dead.
- The batteries that power the camera normally become warm as they discharge.

## Battery Capacity Indicator

The battery capacity indicator (shown only when the image information display is turned on) changes in the following sequence as battery power decreases: "▮▮▮" → "▮▮" → "▮" → "▯". If you continue to use the camera while the battery level is "▮" or "▯", camera power will automatically turn off.

## Auto Power Off (Battery Powered Operation Only)

Power automatically turns off whenever you do not perform any camera operation for a specific period. See page 43 for details about how you can specify the Auto Power Off time.

- To restore power, simply use the POWER Switch to turn power back on again.

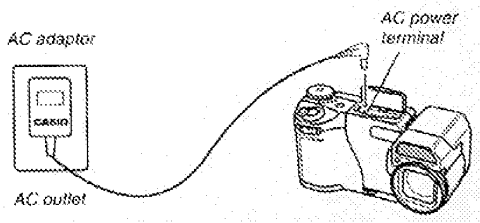
**IMPORTANT!**

The Auto Power Off function does not operate under the following conditions.

- During Slide Show (page 84)
- While the camera is being operated from a computer or printer connected via a cable or the USB port (page 98).
- Whenever the AC adaptor is connected to the camera.

## Using AC Power

Use the optional AC adaptor (AD-C620) to power the camera from standard AC power.




### AC Adaptor precautions

CAUTION

- Never use an electrical outlet whose voltage is outside the rating marked on the AC adaptor. Doing so can create the danger of fire or electrical shock. Use only the optional AC adaptor specified for this camera.
- Should the cord of the AC adaptor become damaged (exposed internal wiring), request a replacement from an authorized CASIO service provider. A damaged AC adaptor cord creates the danger of fire or electrical shock.

CAUTION

- Always be sure to use the AD-C620 AC adaptor only. Using any other AC adaptor can cause damage to the camera not covered by the warranty.
- When unplugging the AC adaptor from the wall socket, be sure to grasp the adaptor (not the cord).
- Avoid any undue bending, pulling, and twisting of the AC adaptor's cord, and never try to lengthen the cord by splicing it with other wire.

- Be sure to turn power off before connecting or disconnecting the adaptor.
- Always turn camera power off before disconnecting the AC adaptor, even if the camera has batteries installed. If you don't, the camera will turn off automatically when you disconnect the AC adaptor. You also run the risk of damaging the camera whenever you disconnect the AC adaptor without first turning power off.
- The AC adaptor may become warm to the touch after extended periods of use. This is normal and is not cause for alarm.
- After using the camera, turn it off and unplug the adaptor from the AC outlet.
- The camera automatically switches over to AC adaptor powered operation whenever the AC adaptor is plugged into the camera.
- Always use the AC adaptor to power the camera whenever it is connected to a computer.

## Power Save Settings

The settings described below let you specify sleep and auto power off trigger times that help to conserve valuable battery power.

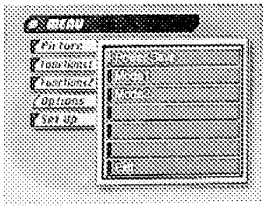
**SLEEP** ..... The monitor screen enters a sleep state if no operation is performed for a specified amount of time in the Record Mode. Pressing any button restores full power. You can specify 30 seconds, 1 minute, or 2 minutes before the sleep state is triggered, or you can turn off this setting entirely.

**AUTO POWER OFF** ..... Auto Power Off turns off camera power if no operation is performed for a specified amount of time. You can specify 2 minutes, 5 minutes, or 10 minutes before AUTO POWER OFF is triggered, or you can turn off this setting entirely.

- AUTO POWER OFF takes priority when both SLEEP and AUTO POWER OFF are both set for a 2-minute trigger time. This means camera power turns off if no operation is performed after two minutes.

### Setting SLEEP and AUTO POWER OFF Trigger Times

1. Slide the Function Switch to REC.
2. Press MENU.



3. Select "Options" → "Power Save" → "Power Save".
   - "Options" appears on the advanced menu only.
4. Use [+] and [–] to select "Sleep" or "Auto Power Off".
5. Select the trigger time you want to set.
6. When the settings are the way you want them, press the shutter button.
7. Select "Exit".

## Initializing Power Save Trigger Times

Use the following procedure to return SLEEP and AUTO POWER OFF trigger time settings to their initial factory defaults (SLEEP: 1 minute, AUTO POWER OFF: 2 minutes).

**IMPORTANT!**

Note that performing the following procedure to initialize the power save trigger time settings also initializes mode memory (page 74).

1. Slide the Function Switch to REC.
2. Press MENU.
3. Select "Options" → "Power Save" → "Power Save".
   - "Options" appears on the advanced menu only.
4. Use [+] or [–] to select "Sleep" or "Auto Power Off".
5. Select "Restore".
6. Select "Exit".

# SETTING THE CURRENT DATE AND TIME

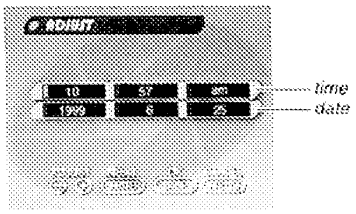
Use the following procedures to set the current date and time, and to select the date format.
When you record an image, the time and date the image was shot is registered in accordance with data from the camera's built-in clock. You can even use the TIME STAMP function to "stamp" the date and time inside the image.

**IMPORTANT!**

- The time and date settings are cleared if the camera is left for about 24 hours without battery and AC power being supplied. If this happens, restore power and make new time and date settings before using the camera again.
- A flashing time display indicates that the time and date (clock) settings have been cleared. Use the procedure on this page to make the correct time and date settings.
- If you do not set the camera's built-in clock to the current date and time, all images are recorded with the default date and time, which probably is not your correct current date and time. Be sure to correctly set the clock before you use the camera.

## Setting the Date and Time

1. **Press MENU.**
2. **Select "Set Up" → "Date" → "Adjust".**



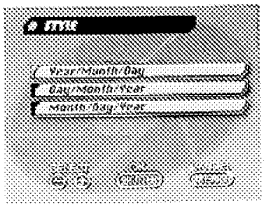

3. **Set the current date and time.**
   - Use [+] and [–] to select the green setting on the monitor screen, and then press the shutter to advance to the next setting. Repeat this for all of the settings on the monitor screen.
4. **After making all the settings on the monitor screen, press DISP to register them.**

## Selecting the Date Format

Example: Sep 12, 1999

You can select any one of the following formats for the above date: 99/9/12, 12/9/99, 9/12/99.

1. Press MENU.
2. Select "Set Up" → "Date" → "Style".



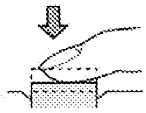

3. Use [+] and [–] to select the date format you want, and then press the shutter button.

# RECORDING

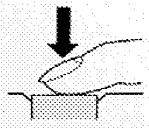
## Using the Shutter Button

The following steps describe how to operate the shutter button so that Auto Focus has a chance to focus the image.

1. **Press the shutter button about half way.**
   - The Auto Focus feature automatically focuses the image.



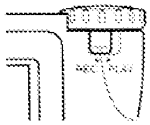
2. **Press the shutter button as far as it will go to record the image.**



## Basic Recording Operation

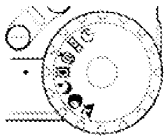
The following describes the basic operation for recording images.

1. **Slide the Function Switch to REC.**

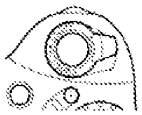


   - The REC position selects the Record Mode, while PLAY selects the Playback Mode.

2. **Rotate the dial so its ▣ (normal recording) setting is aligned with the dot on the top of the camera.**



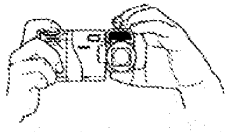
3. **Slide the POWER Switch in the direction indicated by the arrow.**



- The POWER Switch returns to its original position when you release it.
- Turning on power enters the Record Mode.
- If power turns off, use the POWER Switch to turn it back on again.

**4. After composing the image on the monitor screen, press the shutter button about half way and hold it there.**

- The camera's Auto Focus feature automatically focuses the image.
- The operation lamp lights green and the Auto Focus Frame in the monitor screen turns green when the Auto Focus operation is complete.
- Take care to avoid blocking the lens, distance sensor or light sensor with your fingers.



- Carefully press the shutter button, taking care not to move the camera as you do.

**5. After confirming that the Auto Focus operation is complete (the operation lamp lights green), press the shutter button all the way down to record the image.**

- Pressing the shutter button releases the shutter, even if Auto Focus was unsuccessful and the image is out of focus.
- After you record an image, the camera takes a few seconds to store it in memory. If you try to change to the Playback Mode while a save operation is in progress, the message "Press DISP to cancel save" appears on the monitor screen. Pressing DISP at this time cancels the save operation.
- Use of a tripod and the wired remote controller is recommended for slow shutter speeds and telephoto shots to avoid blurring of the image due to camera movement.

**IMPORTANT!**

Auto Focus tends not to work well with the following types of subjects.

- Solid color walls or objects with little contrast
- Strongly backlit objects
- Polished metal or other brightly reflective objects
- Venetian blinds or other horizontally repeating patterns
- Multiple images that are varying distances from the camera
- Subjects in poorly lit areas
- Auto Focus also may not work properly when the camera is unsteady or shaking.

These cases may make it impossible for Auto Focus to focus properly, which is indicated by the operation indicator and the Auto Focus Frame inside the monitor screen remaining red. When this happens switch to the Manual Mode for focusing (page 59). The following are the fixed focusing distances when Auto Focus is unable to focus.

Well-lit Location: 1.5 (4.9') meters minimum
With Flash: Approximately 2 meters (6.6')

**CAUTION**

- Never open the battery compartment cover, disconnect the AC adaptor from the camera, or unplug the adaptor from the wall socket while the operation indicator is flashing green. Doing so will not only make storage of the current image impossible, it can also corrupt other image data already stored in camera memory.
- Fluorescent lighting actually flickers at a frequency that cannot be detected by the human eye. When using the camera indoors under such lighting, you may experience some brightness or color problems with recorded images.

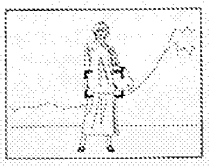
## Using Focus Lock

Normally, Auto Focus automatically focuses on the object that is inside the Auto Focus Frame. Focus lock is a technique that lets you lock the focus on a subject and then move the camera so the Auto Focus Frame is pointed at another subject when you record. This keeps the original subject in focus, even though a different object is within the Auto Focus Frame.

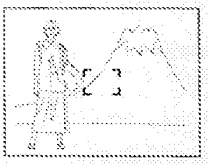
- The Auto Focus Frame is shown on the monitor screen only while the shutter button is being held half way down.
- Locking the focus also locks the exposure setting.

**1. Align the Auto Focus Frame with the subject you want to lock on and press the shutter button half way down.**

- The Auto Focus frame turns green when the image is in focus.
- If you are using the wired remote controller, press its FOCUS LOCK ON/OFF button to turn focus lock on and off.



**2. While keeping the shutter button depressed half way, move the camera and compose the image as you want.**



**3. Press the shutter button all the way down to record the image.**

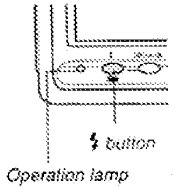
## Using the Flash

You can use the built-in flash unit to provide illumination during recording.

**1. Slide the Function Switch to REC.**

**2. Press ϟ.**

- Each press of ϟ cycles through the flash mode in the following sequence: Auto → On → Off → Red-eye Reduction.




| Indicator | Flash Mode | Description |
|---|---|---|
| None | Auto Flash | Flash is automatically enabled and disabled in accordance with exposure conditions. |
| ϟ | Flash On | Flash is always fired, regardless of exposure conditions. |
| ⊘ | Flash Off | Flash is never fired, regardless of exposure conditions. |
| 👁 | Red-eye Reduction | Fires a pre-flash followed by recording with flash, which reduces the chance of red-eye. |

- The monitor screen goes blank and the operation lamp flashes amber while the flash unit is charging.

### Camera Shake Indicator

The (camera shake indicator) appears on the monitor screen when the ZOOM slider is set to T (telephoto) or when a slow shutter speed is being used.

- If the camera shake indicator appears, use a tripod and the wired remote controller to avoid camera movement.

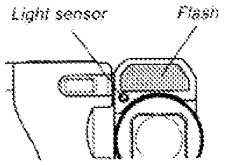
### Flash Indicator

When you press the shutter button halt way, the flash icon appears on the monitor screen to indicate that the flash will fire when shutter button is pressed the rest of the way down.

**IMPORTANT!**

- Never use the flash in areas where combustible or explosive gas is present. Doing so creates the danger of fire and explosion.
- Never fire the flash in the direction of a person operating a motor vehicle. Doing so can interfere with the driver's vision and create the danger of accident.

- Never fire the flash while it is too close to the subject's eyes. Intense light from the flash can cause eye damage if it is fired too close to the eyes, especially with young children. When using the flash, the camera should be at least one meter from the eyes of the subject.
- Make sure that you do not touch or block the flash or light sensor with your fingers. Doing so can soil these components and interfere with correct flash operation.



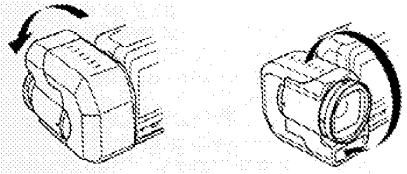

- Flash should be used for distances in the ranges shown below. Flash does not work well outside these ranges.

Normal : Approximately 0.5 meters to 2.5 meters (1.6' to 8.2')
Macro : Approximately 0.1 meters to 0.5 meters (0.3' to 1.6')

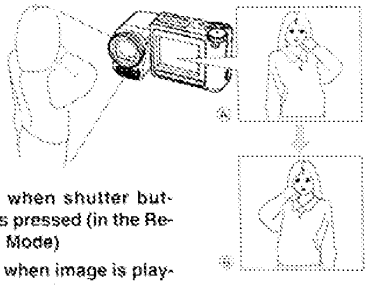
- Depending on operating conditions (type of battery being used, temperature, etc.), it may take up to 10 seconds for the flash unit to charge.
- The flash is disabled during movie and continuous recording. The ⚡ indicator flashes to indicate this condition.
- The flash unit will not charge when battery power is low. The ⚡ indicator flashes red to warn you that the flash will not fire correctly, which may affect exposure of the image. Replace batteries as soon as possible when this happens.
- Red-eye reduction may not work well when the camera is not pointed directly at the subject or when the subject is far from the camera.
- In the Red-eye Reduction Mode, the flash is fired automatically in accordance with exposure. Because of this, the flash will not fire in a well-lit area.
- White balance is fixed while the flash is being used, so the coloring of the recorded image may be affected by sunlight, fluorescent lighting, or other sources of illumination in the immediate area.

## Changing the Lens Orientation

The lens of the camera is built into a rotating lens body. This means you can change the angle of the lens without moving the rest of the camera.



- Any images recorded while the lens body is rotated so the lens is pointed towards the back of the camera are stored as mirror images of the image that appears in the LCD before the shutter button is pressed.




Ⓐ ..... LCD when shutter button is pressed (in the Record Mode)

Ⓑ ..... LCD when image is played back from camera memory

**IMPORTANT!**

- Do not apply excessive force when rotating the lens body. Doing so can cause serious damage to the lens.
- Do not carry the camera or move it around while holding onto only the lens body.
- Return the lens body to its normal position (with the lens point up) before storing the camera.
- Never lay the camera down or store it with the lens pointing downwards. Doing so can cause bending of the ring around the outside of the lens.
- Always leave the lens cap in place on the lens except when actually using the camera for recording.

## Quality Settings

The camera has three quality modes: FINE, NORMAL, ECONOMY.

- To determine the number of images that can be stored on a memory card of a different capacity, multiply the capacities in the table below, by the appropriate value.
- The actual number of images that can be stored in memory cannot be specified precisely because the amount of memory required for storage of each image differs according to image contents.

| Setting Indicator | FINE | | NORMAL | | ECONOMY | |
|---|---|---|---|---|---|---|
| Quality | Fine | | Normal | | Economy | |
| Computer Image size | 1280 X 960 pixels | 640 X 480 pixels | 1280 X 960 pixels | 640 X 480 pixels | 1280 X 960 pixels | 640 X 480 pixels |
| Number of images 8MB memory card | 13 | 39 | 16 | 48 | 29 | 83 |
| Number of images 48MB memory card (Optional) | 88 | 268 | 122 | 327 | 256 | 418 |
| File Size (per image) | 500 KB | 150 KB | 360 KB | 120 KB | 200 KB | 90 KB |

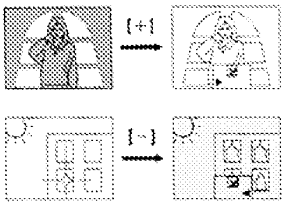
- Numbers in parentheses are compressed image file sizes.
- The figures in the left are approximations only. The actual number of images depends on image subject matter.
  Use the procedure under "Using the Record Menus" on page 75 for details on changing the quality modes.
- Note that the maximum number of images that can be stored in a single folder is 250. Because of this, even if you are using a card that allows storage of more than 250 images, the camera's monitor screen will show capacity for up to 250 images only. You will be able to store additional images by changing to another folder.
- The number of images that can be recorded may differ when you use card browser (page 106).

## Exposure Compensation

This camera features an program AE function that automatically changes shutter speed and aperture in accordance with available light. In addition, you can also manually adjust the exposure to compensate for backlighting, indirect indoor lighting, dark backgrounds, and other special conditions.

1. **Slide the Function Switch to REC.**

2. **Use [+] and [–] to perform exposure compensation.**
   - Pressing [+] or [–] displays an EV indicator that shows the current exposure compensation setting.
   - Pressing [+] makes the image on the monitor screen brighter. Use it to adjust for dim indoor lighting and backlighting.
   - Pressing [–] makes the image on the monitor screen darker. Use it to adjust for bright sunlight.
   - The EV indicator turns red whenever the compensation value is at its limit.




3. **After adjusting the exposure, press the shutter button to record the image.**

**NOTES**

- Exposure compensation is generally expressed in terms of an exposure compensation (EV) value. The exposure compensation value is always set to zero whenever you turn on the camera.
- Each press of [+] or [–] changes the exposure compensation value by 0.25EV. A change in either direction is indicated on the monitor screen by arrows pointing left (negative correction) or right (positive correction).
- The normal maximum range for exposure compensation is –2EV to +2EV. Under certain conditions, however, the camera may impose lower maximum values when exposure compensation would result in an image that is too dark or too light.

• The exposure compensation value automatically reverts to zero whenever the shutter button is pressed. You can manually reset the exposure compensation value by using [+] and [–] to change the value back to zero, which is indicated when the EV indicator disappears from the monitor. EV value is fixed during panorama recording.

# OTHER RECORDING FUNCTIONS

This section describes more advanced recording operations that are also provided by this camera.

## Using Quick Shutter

Quick Shutter lets you record up to five images at intervals of approximately one second. Quick Shutter can be used to record normal, Night Scene Mode, Landscape Mode, or Portrait Mode images.

**IMPORTANT!**

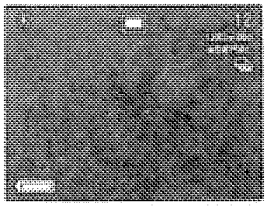
- The operation lamp flashes while data is being written to the memory card. Never remove the memory card from the camera while this lamp is flashing.
- Quick shutter is disabled under any of the following conditions: while the flash is charging, while a slow shutter speed it being used, and when conditions cause Auto Focus to take a long time to finish.
- Even if Quick Shutter is enabled, the camera automatically uses the Single shutter mode whenever the battery level is "".
- If you use the dial to try to change to another recording mode while the camera is saving buffer data to the memory card, the mode will not change to another recording mode until the data transfer and the save operation is complete.

1. **Slide the Function Switch to REC.**
2. **Select "Functions 1" → "Shutter Mode" → "Quick".**
   - "Functions 1" appears on the advanced menu only.
   - Turning on "Quick" causes "○○○○○" to appear under the quality indicator.
3. **Press the shutter button.**
   - The ○ marks sequentially change to ● marks as images are recorded.
   - Images you record using Quick Shutter are initially stored in a buffer, and then sequentially transferred to the memory card. Images continue to be recorded as long as you hold down the shutter button or until the buffer becomes full (five images). The buffer may be able to hold only four images when you are using the Night Scene Mode or a slow shutter speed.

## Continuous Recording

With continuous recording, you can hold down the shutter button and record up to five images at an interval of about 0.25 seconds. Continuous recording can be used for normal recording, as well as in the Night Scene, Landscape, and Portrait modes.

1. **Slide the Function Switch to REC.**
2. **Press MENU.**
3. **Select "Functions 1" → "Shutter Mode" → "Continuous", and then press the shutter button.**
   - "Functions 1" appears on the advanced menu only.
   - The "□" indicator is on the monitor screen while the Continuous Mode is selected.



4. **Compose the image and then record it.**
   - Focus is locked when you record the first image, and this setting is applied to all subsequent images.
   - The flash does not fire in the Continuous Mode.
   - The interval of Continuous Mode shots may be longer than 0.25 seconds at slower shutter speeds.
   - You may be able to record only four images in the Continuous Mode when using the Night Scene Mode, a fixed shutter speed, or a slow shutter speed.
   - Do not start a Continuous Record operation when the low battery indicator is on the monitor screen.
   - Storage of images recorded in the Continuous Mode to a memory card can take about 10 seconds (for five images).
   - Never remove camera batteries, unplug the AC adaptor from the camera, or remove the memory card while images are being saved.

## Using the Zoom Features

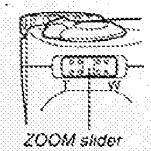
The zoom features let you move in closer on subjects that are located far from the camera. You can choose either optical zoom or digital zoom, or even use them in combination to increase the size of the original image by 16 or 32 times its original size.

### Using Optical Zoom

Optical zoom enlarges the image by changing the focal distance of the lens.
You can increase the size of the image by eight times using optical zoom.

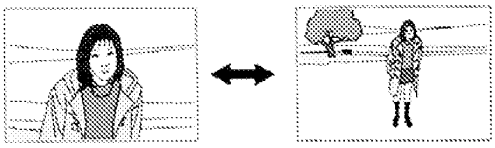
**1. Slide the Function Switch to REC.**

**2. Move the ZOOM slider towards T (telephoto) to zoom in on the subject, or W (wide-angle) to zoom out.**



*ZOOM slider*

- The camera performs an Auto Focus operation if you move the ZOOM slider towards T (telephoto).


*T (telephoto)* *W (wide-angle)*

**3. Compose the image and then record it.**

- Brightness (aperture) is also affected by using optical zoom.
- Use of a tripod and the wired remote controller is recommended for slow shutter speeds and telephoto shots to avoid blurring of the image due to camera movement.

**EXHIBIT 1004 - Continued**

## Using Digital Zoom

Digital zoom produces a VGA size image (640 x 480 pixels) that can be double or four times the size of the original image.
Using digital zoom and optical zoom in combination can zoom an image to 32X.

**IMPORTANT!**

- The focus range for Auto Focus depends on the optical zoom setting as shown below.

| Optical Zoom | Focus Range |
|---|---|
| X1 | 0.4m to ∞ (1.3' to ∞) |
| to | to |
| X8 | 1m to ∞ (3.3' to ∞) |

- The camera may not be able to focus on an image if the subject is closer than the distances noted above. Use the macro mode for very close subjects.
- Note that 4X digital zoom produces a relatively rougher image than OFF or 2X when used in combination with Auto Focus.

See "Using the Record Menus" on page 75 for details on making digital zoom settings.

## Manual Focus

Manual Focus lets you manually adjust the focus of an image.

1. **Slide the Function Switch to REC.**
2. **Press MF/∞/🌷 a number of times until the MF indicator appears on the monitor screen.**
   - Each press of MF/∞/🌷 cycles the focus mode in the following sequence: Auto Focus → Manual Focus (MF) → Infinity (∞) → Macro (🌷).
3. **While "MF" is flashing on the monitor screen, use [+] and [–] to focus the image.**
   - If you do not perform any focus operation for about two seconds, the "MF" indicator stops flashing.
   - After "MF" stops flashing, you can use [+] and [–] to adjust exposure compensation (EV).
   - If "MF" stops flashing before you have a chance to focus, press MF/∞/🌷 to make "MF" flash again.
   - Pressing MF/∞/🌷 while "MF" is flashing changes the focus mode to Infinity.

4. **Use [+] and [–] to increase or decrease the distance value on the monitor screen, until the one closest to distance you measured in step 3 is displayed.**

5. **Compose the image and then record it.**
   - The operation lamp and the Auto Focus frame do not appear while manual focus is in use.

## Infinity Mode Recording

Use the Infinity Mode when recording images of scenery or objects that are far away. This mode performs Auto Focus in the vicinity of ∞ (infinity).

1. **Slide the Function Switch to REC.**

2. **Press MF/∞/🌷 a number of times until the ∞ indicator appears on the display.**
   - Each press of MF/∞/🌷 cycles the focus mode in the following sequence: Auto Focus → Manual Focus (MF) → Infinity (∞) → Macro (🌷).

3. **Compose the image and then record it.**

## Using the Macro Mode

With the macro mode, you can record close up images of subjects located only 1 cm to 50 cm (0.4" to 19.7") from the lens.

- In the macro mode, optical zoom is limited to the range of x1 to x1.6.

1. **Slide the Function Switch to REC.**
2. **Press MF/∞/🌷 a number of times until the 🌷 indicator appears on the monitor screen.**
   - Each press of MF/∞/🌷 cycles the focus mode in the following sequence: Auto Focus → Manual Focus (MF) → Infinity (∞) → Macro (🌷).
3. **Compose the image and then record it.**

## Movie Recording

You can record movies that are approximately 10 seconds long. Movies are recorded in 320 x 240-pixel AVI format. For details, see "Using the Record Menus" on page 75.

There are two types of movie recording: PAST and NORMAL. PAST lets you capture images of events that occurred before you pressed the shutter button while NORMAL records what happens after you press the shutter button.

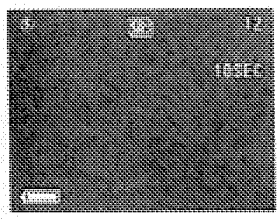
See "Using the Record Menus" on page 75 for details on how to select the movie length.

- AVI files can be displayed and saved on a computer that is set up to support use of CompactFlash cards. For such a computer, install QuickTime 3.

### NORMAL

1. **Slide the Function Switch to REC.**

**2. Align the dial with to select Movie Recording Mode.**




**3. Compose the image and then record it.**

- Auto Focus automatically adjusts in accordance with the movement of the subject.
- See "Playing Back a Movie" on page 80 for details on playing back a movie.
- Movie recording stops automatically 10 seconds after you start the record operation.
- To stop recording before the 10-second period is up, press the shutter button.

## PAST

**1. Slide the Function Switch to REC.**

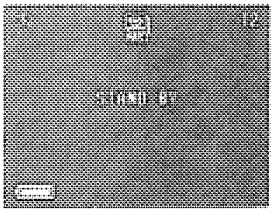
**2. Select "Movie Mode" → "Past".**

- On the advanced menu, select "Functions 2" → "Movie Mode" → "Past".

**3. Align the dial with to select Movie Recording Mode.**

**4. Compose the image on the monitor screen and then press the shutter button about half way.**

- Auto Focus automatically adjusts in accordance with the movement of the subject.
- The message "STAND BY" appears on the monitor screen to indicate that the camera's buffer memory is accumulating image data. This message remains displayed for about 10 seconds.
- After "STAND BY" disappears from the monitor screen, the contents of the buffer memory continues to be updated as long as you keep the shutter button depressed about half way.




**5. Keep the camera pointed at the action you want to record, and press the shutter button all the way down when you want to end recording.**

- Pressing the shutter button after "STAND BY" disappears from the monitor screen records everything that went on in front of the lens during the 10-second period before you pressed the shutter button.
- Pressing the shutter button while "STAND BY" is still on the monitor screen records everything that went on in front of the lens during the period from when you pressed the shutter button half way down and when you pressed it all the way down. In this case, the recording will be less than 10 seconds long.

**IMPORTANT!**

Flash is disabled during movie recording.

**NOTE**

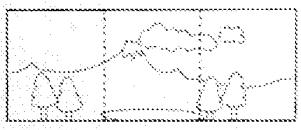
Movie Storage Capacity

| | |
|---|---|
| Storage Capacity | Approximately 300KB/ second |
| Recording Time | 10 seconds per movie |

* When using 8MB CF card.

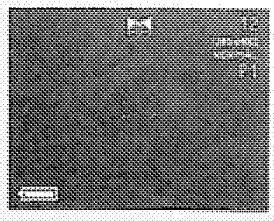
## Panorama Recording

With panorama recording you record a series of images and then link them to create a single panoramic effect.



**1. Slide the Function Switch to REC.**

**2. Align the dial with [PANO] to select Panorama Recording Mode.**

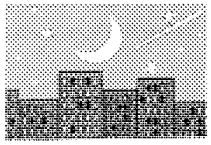


**3. Compose the image and then record it.**

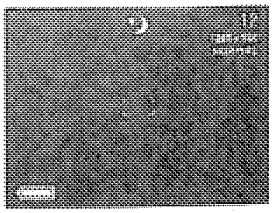
- The right edge of the previous image you recorded remains on the monitor screen, so you can align it correctly with the next image.
- From the second image onwards, aim the camera further to the right and overlap the next image with the previous one on the monitor screen.
- Up to nine images can be grouped into a panorama. Press MENU when you want to stop a panorama recording operation.
- When the lens is pointing in the same direction as the monitor screen, the right edges of the previous image you recorded remains on the monitor screen.
- Aperture setting and white balance settings are locked when you record the first image of a panorama, and these settings are applied to all subsequent images in that panorama.
- If you want to link more than 9 images into a panorama, upload the images to a computer and use your computer application to link them.
- See "Panorama Playback" on page 81 for details on playing back panoramas.

## Night Scene Mode

The Night Scene Mode is for recording images in dark areas. When recording images of people on a twilight or night time background, you can use the flash in combination with the Night Scene Mode for slow synchro recording.



1. Slide the Function Switch to REC.
2. Align the dial with ☽.



3. Compose the image and then record it.

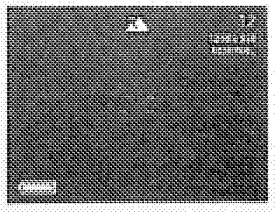
**IMPORTANT!**

- The maximum shutter speed in the Night Scene Mode is one second. Set the shutter speed manually (page 70) when you want to use a slower speed.
- The shutter speed is quite slow in the Night Scene Mode, so you should be sure to use a tripod to hold the camera steady.
- Slow shutter speed also causes slow monitor screen refresh. Because of this, the image recorded may be slightly different from the image that was on the monitor screen when you pressed the shutter button.
- Auto Focus is difficult in the dark. If you experience problems, use manual focusing (page 59). There may be some blurring of the image if the subject is fast moving.
- In the Night Scene Mode, Quick Shutter records up to 4 consecutive shots.
- The contrast of Night Scene Mode images is not affected by changes made using the Record Menu's Contrast (Record Settings) settings.

## Landscape Mode Recording

The Landscape Mode provides clear images from close ups to telephoto. The Landscape Mode records images where everything is in clear focus, from the foreground to the background. You can use the Landscape Mode with the ZOOM slider towards W (wide-angle) to record wide-angle images with clear focus from foreground to background.

1. **Slide the Function Switch to REC.**
2. **Align the dial with ⛰.**

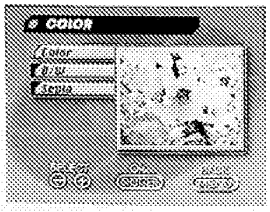


3. **Compose the image and then record it.**

## Monochrome and Sepia Recording

Use the following procedure to record an image in monochrome (black and white) or sepia. Note that you cannot convert an image to color after recording it in monochrome or sepia.

1. **Slide the Function Switch to REC.**
2. **Press MENU.**
3. **Use [+] and [–] to select "Color" and then press the shutter button.**
   - On the advanced menu, select "Functions 2" → "Color."



4. Use [+] and [–] to select "B/W" or "Sepia" and then press the shutter button.

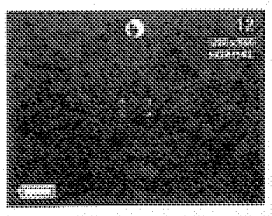
5. Compose the image and then record it.

## Portrait Recording

In the Portrait Mode, focus is adjusted so the background is slightly blurred, which highlights the subject in the foreground.

1. Slide the Function Switch to REC.

2. Align the dial with .



3. Compose the image and then press the shutter button about half way down.

4. After confirming that the subject is in focus, press the shutter button all the way down.

## Using the Self-timer

You can use the self-timer for either of the two following recording operations.

**10-second recording** .... Records about 10 seconds after the shutter button is pressed. Use this method when you want to be included in the image that is recorded.

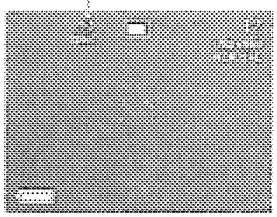
**2-second recording** ..... Records about 2 seconds after the shutter button is pressed. Use this method to avoid camera movement caused when the shutter button is pressed.

### 1. Slide the Function Switch to REC.

### 2. Press ⏲.

- Each press of ⏲ cycles the self-timer in the sequence: 10SEC → 2SEC → Off.
- The self-timer is disabled while the Shutter Speed is set to "Bulb".

*Self-timer setting*



### 3. Compose the image and then record it.

**NOTE**

During self-timer recording, you may find it helpful to rotate the swivel lens mechanism so the monitor screen faces the same direction as the lens. This way you can always see how much time is left until the start time is reached and recording begins.

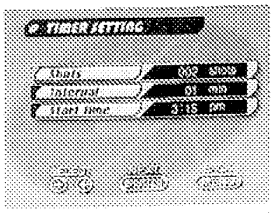
## Using the Timer

You can use the timer to perform any one of the following operations.

- Interval Recording
  Use this method to record a series of images at fixed time intervals.
- Timer Recording
  Use this method to record a single image after passage of a fixed amount of time.
- Interval Timer Recording
  Use this method to record a series of images at fixed time intervals, starting after passage of a fixed amount of time.

**1. Slide the Function Switch to REC.**

**2. Align the dial with ⏲ to select timer recording.**




**3. Specify the number of images (Shots), the interval between shots (Interval), and the record start time (Start time).**

- Shots ..... 250 maximum
- Interval ..... 1 to 60 minutes
- Start time ... Current time to current time plus 24
- The Interval cannot be specified when 1 is specified for Shots.

**4. Compose the image and then record it.**

- When the start time you set is reached, the operation lamp lights and image recording starts.
- The monitor screen of the camera turns off between shots of a timer operation. If you turn on camera power during this time, the message "TIMER CANCEL" appears and the timer operation is cancelled.

**IMPORTANT!**

- The "Bulb" Shutter Speed setting cannot be used with a timer operation. If the Shutter Speed setting is "Bulb" it automatically changes to "Auto" when you select the timer with the dial.
- The camera requires a certain amount of time to store an image in memory after it is recorded. Because of this, setting a shutter speed of "24 sec" or higher and an interval of "01 min" may result in an interval that is longer than one minute.

## Shutter Speed Priority Image Recording

You can fix the shutter speed at a specific level.

Auto: Automatic shutter speed setting in accordance with subject

Manual range: Bulb, 64 to 1/2000 second

- You can fix both the shutter speed and aperture (page 71).
- For shutter speed priority recording, set the "Aperture" setting to "Auto".

1. **Slide the function switch to REC.**
2. **Press MENU.**
3. **Select "Functions 1" → "Shutter Speed" → "Manual".**
   - "Functions 1" appears on the advanced menu only.
4. **Use [+] and [–] to select the shutter speed setting you want to use and then press the shutter button.**
5. **Select "Exit".**

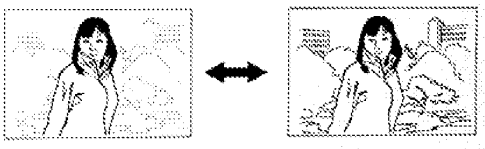
**6. Compose the image and then record it.**

- When the Shutter Speed is set to "Bulb", exposure continues as long as you depress the shutter button. Because of this, use of the wired remote control unit is recommended whenever using the "Bulb" setting.
- The self-timer is disabled while the Shutter Speed is set to "Bulb".
- The slowest shutter speed when "Bulb" is selected is 64 seconds.
- Note that using a slower shutter speed increases the chance of static being present in your image, and the amount of static visible in an image is inversely proportional to the shutter speed.
- At shutter speeds of one second or slower, the camera automatically performs internal data processing intended to limit image static, so the image record operation takes longer at slow shutter speeds. At shutter speeds of one second or greater, doubling the shutter speed setting tells you about how long it takes for an image to be recorded. For example, image recording with a shutter speed of one second takes about two seconds.

## Aperture Priority Image Recording

You can fix the aperture at a specific level. A larger aperture (indicated by a smaller aperture value) narrows the focus range, while a smaller aperture widens the focus range.

*Wide aperture (F3.2)* *Decreased aperture (F8)*



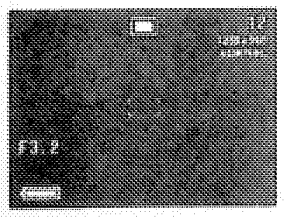
Manual settings: F3.2, F4.8, F8
Auto: Automatic aperture setting in accordance with subject

- You can fix both the aperture and shutter speed (page 70).
- For shutter speed priority recording, set the "Shutter Speed" setting to "Auto".
- Adjust the aperture setting to compensate for the relative brightness or darkness of the subject you are recording.

**1. Slide the function switch to REC.**

**2. Press MENU.**

3. **Select "Functions 1" → "Aperture".**
   - "Functions 1" appears on the advanced menu only.
4. **Use [+] and [–] to select the aperture setting you want to use and then press the shutter button.**
5. **Select "Exit".**




6. **Compose the image and then record it.**

## Performing Manual White Balance

Certain lighting conditions can cause auto white balance to take a very long time or can result in a limitation of the adjustable range (color temperature). If you suspect your current lighting conditions are causing problems, try performing manual white balance. This sets white balance to a level that can be used under any lighting conditions.
The following procedure describes how to perform manual white balance using a white piece of paper. For optimum results, you should use a special reflective plate that should be commercially available from a local camera equipment shop.

1. **Slide the Function Switch to REC.**
2. **Press MENU.**
3. **Select "Functions 1" → "White Balance" → "Manual".**
   - "Functions 1" appears on the advanced menu only.

4. **Keeping the camera pointed at the white sheet of paper, press DISP to make the manual white balance settings.**
   - Pressing the shutter button at this time returns the camera to the white balance setting that was obtained the last time you performed this manual white balance procedure.

5. **The manual white balance procedure stops automatically when it is done.**
   - If the manual white balance procedure does not end automatically, press the shutter button to interrupt it.

6. **After the camera finishes making the white balance setting, it returns to the screen in step 3 above. Select "Exit" to exit the manual white balance procedure.**

**NOTE**

White balance is automatically set to "Daylight" whenever you enter the Night Scene Mode. You can leave this as it is or change it using the above procedure.

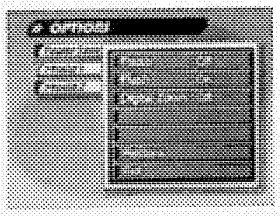
## Recording Mode Power On Settings

A power on setting is one that is set by the camera automatically whenever you turn it on. Normally, the camera uses its own built-in power on default settings.
The following table shows the items whose settings you can save in mode memory. Note that the procedure described here only lets you select ON (save current setting in mode memory) or OFF (use the camera's preset default setting).

| Mode Memory Item | On | Off |
|---|---|---|
| **Mode 1 (Mode Memory 1)** | | |
| Focus | AF, MF, ∞, 🌷 | AF |
| Flash | Auto, ϟ, (S), (R) | Auto |
| Digital Zoom | Off, Auto, X2, X4 | Auto |
| **Mode 2 (Mode Memory 2)** | | |
| Metering | Multi, Center, Spot | Multi |
| White Balance | Auto, Daylight, Shade, Tungsten, Fluorescent, Manual | Auto |
| Flash Intensity | Strong, Normal, Weak | Normal |
| Aperture | Auto, F3.2, F4.8, F8 | Auto |
| Shutter Speed | Auto, Manual (Bulb, 64 to 1/2000 second) | Auto |

### Turning power on default settings on and off

1. Slide the Function Switch to REC.
2. Press MENU.
3. Select "Options".
4. Select "Mode 1" or "Mode 2".
5. Select "Mode 1" or "Mode 2".



6. Select the item whose setting you want to change.
7. Select "On" or "Off".
   - Repeat steps 6 and 7 for other items if you want.
8. Select "Exit".

## Initializing Mode Memory

Use the following procedure to initialize the mode memory.

**IMPORTANT!**

Note that performing the following procedure to initialize mode memory also initializes power save trigger time settings (page 43).

1. Perform steps 1 through 3 under "Turning power on default settings on and off".
   - "Options" appears on the advanced menu only.
2. Select "Power Save", "Mode 1" or "Mode 2".
3. Select "Power Save", "Mode 1" or "Mode 2".
4. Select "Restore".
   - The following table shows the mode memory status of each item following the above procedure.
5. Select "Exit".

| Item | Initialized Setting |
|---|---|
| **Power Save** | |
| Sleep | 1 min |
| Auto Power Off | 2 min |
| **Mode 1 (Mode Memory 1)** | |
| Focus | Off (AF) |
| Flash | On (Auto) |
| Digital Zoom | On (Auto) |
| **Mode 2 (Mode Memory 2)** | |
| Metering | On (Multi) |
| White Balance | Off (Auto) |
| Flash Intensity | Off (Normal) |
| Aperture | Off (Auto) |
| Shutter Speed | Off (Auto) |

- An item that is "On" stores its current setting in mode memory when camera power is turned off, and restores the setting when power is turned back on again.
- An item that is "Off" uses the camera's preset power on default setting.

## Using the Record Menus

The record menus make it easy to control image quality, white balance, and other settings to suit specific conditions and preferences. Each record menu has two formats: a basic menu and an advanced menu. Press DISP to toggle between the basic menu and advanced menu.

**NOTES**

- Focus Mode, Flash Mode, Digital Zoom, Metering, White Balance, Flash Intensity, Shutter Speed, and Aperture settings are retained when camera power is turned off by only if you specify them as such with the Mode 1 and Mode 2 items of the Record Menus. All other settings are retained when you turn off camera power.
- Exposure compensation (page 54) and auto flash (page 50) settings are valid only when the shutter speed and aperture settings are both "Auto".

### Record Menus

See "Menu Screens" on page 32 for information about how to use menus.
Basic menu items are indicated by BASIC.

## Picture

**Quality** (BASIC)
Use this setting to control the quality of the image.
Fine / Normal / Economy

**Size** (BASIC)
You can specify either of two image sizes in pixels.
1280 x 960 / 640 x 480

**Sharpness**
This setting specifies the sharpness of image outlines.
Hard : Sharp outlines
Normal
Soft : Soft outlines

**Saturation**
This setting controls the intensity of colors.
High : Colors appear deeper.
Normal
Low : Colors appear lighter.

**Contrast**
This setting controls the difference between the light areas and dark areas of the image. Contrast is not applied in the Night Scene Mode.
High : Larger difference between light and dark.
Normal
Low : Less difference between light and dark.

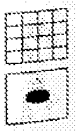
## Functions 1

**Aperture**
Use this setting when you want to fix the aperture at one of the values shown below.
Auto / F3.2 / F4.8 / F8

**Shutter Speed**
Use this setting to fix the shutter speed at one of the values shown below.
Auto / Manual (Bulb, 64 to 1/2000 second)

**Shutter Mode**
This setting specifies how the shutter operates.
Single : Records single images at an interval of about three seconds.
Quick : Allows recording of sequential images at an interval of about one second.
Continuous : Allows recording of sequential images at an interval of about 0.25 second while the shutter button is held down.
* With any of the above settings, the interval may be longer at slow shutter speeds.

**Metering**
This setting sets the metering method.
Multi : Takes readings across the entire image, and provides balanced exposure settings.
Center : Takes reading at the center of the image.



Spot : Takes reading at a very limited spot at the center of the image. Peripheral lighting does not affect this reading, so exposure is based on the subject alone.



**White Balance**

Use this setting to select the white balance setting that makes the colors of the subject appear most natural.
(Auto / Daylight / Shade / Tungsten /Fluorescent/ Manual)

- Daylight : Outdoors
- Shade : Blue tinted sunlight
- Tungsten : Red tinted incandescent light
- Fluorescent : Green tinted fluorescent light
- Manual : Sets up the camera for recording of a white sheet of paper under currently available light (page 72).

**Flash Intensity**

Select the setting for the flash intensity you want to use.
Strong / Normal / Weak

## Functions 2

**Movie Mode** BASIC

Select the movie mode you want to use.
Normal / Past

**Digital Zoom** BASIC

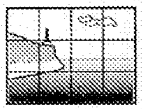
This item fixes digital zoom at the setting you want.
Off / Auto / X2 / X4

**Color** BASIC

Use this setting to select the color mode you want.
Color / B/W / Sepia

**Grid**

This item turns an on-screen grid on or off. The grid can be used to help align image components vertically and horizontally.
Off / On



**Time Stamp** BASIC

Use this item to turn time stamping on and off, and to control the format of the stamp.
Off / YMD (Year-Month-Day) / D H:M (Day-Hour-Minutes) / YMD H:M (Year-Month-Day-Hour-Minutes)
Note that the time stamp cannot be deleted from an image.

## Options

| | |
|---|---|
| **Power Save** | This item can be used to make power save settings to preserve battery power.<br>Sleep (Off / 30sec / 1min / 2min) / Auto Power Off (Off / 2min / 5min / 10min) |
| **Mode 1** | Use this item to specify which of the following settings are retained when camera power is turned off.<br>Focus / Flash / Digital Zoom |
| **Mode 2** | Use this item to specify which of the following settings are retained when camera power is turned off.<br>Metering / White Balance / Flash Intensity / Aperture / Shutter Speed |

## Set Up

| | |
|---|---|
| **Card Browser** BASIC | Use this item to select the card browser file type.<br>Off / Type1 / Type2 / Type3 / Type4 |
| **Format** BASIC | Select this item to format a memory card |
| **Date** BASIC | Use this item to specify the format of the date that appears in the monitor screen, and to adjust the date setting.<br>Style (Year/Month/Day / Day/Month/Year / Month/Day/Year) / Adjust |
| **Video Out** BASIC | This item can be used to specify the format of the video output signal.<br>NTSC: Video format in the United States and Japan<br>PAL: Video format in Europe and other areas |
| **Language** BASIC | This setting lets you select either English or Japanese as the display language. |
| **Beep** BASIC | Use this item to turn the key input confirmation tone on and off. |

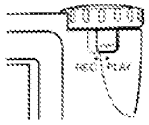
# PLAYBACK

The following describes the different techniques that you can use to playback recorded images.

## Basic Playback Operation

The built-in monitor screen of the camera lets you play back recorded images without connecting an external monitor.

**1. Slide the Function Switch to PLAY.**



**2. Use [+] and [–] to scroll through the images stored in camera memory.**

- Press [+] to scroll forward and [–] to scroll back. Holding down either button scrolls at high speed.



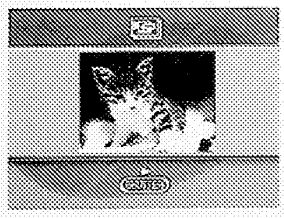

**NOTES**

- Sliding the Function Switch to PLAY immediately after recording an image displays the image you just recorded first.
- Pressing the shutter button while a movie or panorama image is on the monitor screen starts playback of the movie or panorama.
- The image that initially appears on the monitor screen in the PLAY mode is a preview image. The full of image appears after a few seconds. Images copied from another digital camera or a computer may take longer time to appear.

## Playing Back a Movie

Use the following operation to play back a movie that was recorded using the operation under "Movie Recording" on page 61.

1. **Slide the Function Switch to PLAY.**
2. **Use [+] and [–] to select the movie you want to play back.**

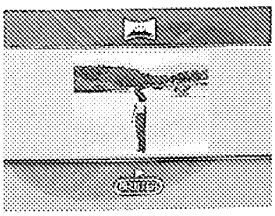


3. **Press the shutter button to start playing back the movie.**
   - You can use [+] (forward) and [–] (reverse) while playing back a movie to change the playback direction.
   - To enlarge the movie image so it fills the entire monitor screen, press DISP. Pressing the DISP again returns the image to its original small size.
   - Pressing the shutter button during movie play pauses playback. Press the shutter button again to resume playback.
   - While movie playback is paused, you can use [+] (forward) and [–] (reverse) to move frame-by-frame through the movie.
4. **After the movie is complete, press MENU.**

## Panorama Playback

Use the following operation to playback panoramas recorded using the operation under "Panorama Recording" on page 64.

1. **Slide the Function Switch to PLAY.**
2. **Use [+] and [–] to select the panorama you want to play back.**



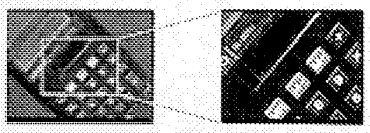
3. **Press the shutter button to start panorama playback.**
   - You can change the direction of a panorama that is playing back by pressing [+] or [–].
   - Pressing DISP changes to a small-image display. Press DISP again to return to the full-screen size.
   - Pressing the shutter button during panorama play pauses playback. Press the shutter button again to resume playback.
   - While panorama playback is paused, you can use [+] (forward) and [–] (reverse) to move frame-by-frame through the panorama.
4. **Press MENU to stop panorama playback.**

## Using Zoom

The following operation lets you magnify an image to twice its normal size. Note that you can zoom only a single still image.

**IMPORTANT!**

Movie and panorama images cannot be zoomed.



1. **Slide the Function Switch to PLAY.**
2. **Use [+] and [–] to select the image you want to zoom.**
3. **Press MENU.**
4. **Select "Zoom".**
   - On the advanced menu, select "View" → "Zoom".
5. **Specify the area.**
   - The portion of the selected area appears on the display at twice its normal size.
   - Use [+] and [–] to move the area selection frame left and right. Use ↯ and MF/∞/🌷 to move it up and down.
6. **To return the image to its normal size, press any button besides [+], [–], ↯, MF/∞/🌷 and DISP.**

## Displaying Nine Images

The following operation lets you simultaneously view nine images on the same screen. This capability is especially useful when playing back to the screen of a connected TV, and can be used to display a catalog of products, etc.



1. **Slide the Function Switch to PLAY.**
2. **Press MENU.**
3. **Select "9 Multi".**
   - On the advanced menu, select "View" → "9 Multi".
   - The first image of the set is the image that was on the screen when you performed step 2 of this operation. The other images are those that sequentially follow the first one.
4. **Use [+] and [–] to scroll through images stored in memory.**
   - To view a particular image in normal size, press DISP. This causes the [⛶] mark to appear in the upper left corner of the monitor screen. To produce an enlarged view of an image, use [+] and [–] to move the [⛶] mark to the image you want and then press the shutter button.

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | [+] → | | 10 | 11 | 12 | [+] → | | 19 | 20 | 21 | | |
| 4 | 5 | 6 | ← [–] | | 13 | 14 | 15 | ← [–] | | 22 | 23 | 24 | | |
| 7 | 8 | 9 | | | 16 | 17 | 18 | | | 25 | | | | |

5. **After you are finished, press any button besides [+], [–], or DISP return to the normal single-image display.**

## Slide Show

Slide Show automatically scrolls through the images stored in memory. You can also specify how much time should be allowed between each image.



**IMPORTANT!**

Auto Power Off (page 41) is disabled whenever Slide Show is being used. This means you should not leave Slide Show running when using batteries to power the camera. Doing so can rundown batteries. Be sure to stop Slide Show and turn off the camera after you are finished.

1. **Slide the Function Switch to PLAY.**
2. **Press MENU.**
3. **Select "Slide Show".**
   - On the advanced menu, select "View" → "Slide Show".
4. **To stop Slide Show, press any button besides MENU.**
   - Pressing MENU while a Slide Show is in progress displays a screen that lets you change the interval within the range of 3 to 30 seconds.
   - Note that all buttons are disabled while an image change is in progress. Wait until an image is stopped on the monitor screen before performing a button operation, or hold down the button until the image stops.
   - Images copied from another digital camera or a computer may take longer time to appear.

## Screen Saver

The screen saver function automatically activates Slide Show (which automatically scrolls through images) whenever you do not perform any operation for about five minutes in the Playback Mode. This protects the camera's monitor screen and the screen of a connected TV against "burn in" of a static image that is left displayed too long.

**IMPORTANT!**

- The screen saver is enabled only when the camera is being powered by its optional AC adaptor. If you do not perform any operation for five minutes under battery power, camera power automatically turns off (Auto Power Off).
- The screen saver displays protected images only. The screen saver is disabled if there are no protected images in memory.
- Photo Loader will not send images between the camera and a personal computer while the screen saver is turned on. Make sure you turn off the screen saver before trying to perform any image transfer operation. Note that the screen saver is turned on when you purchase the camera.

1. **Slide the Function Switch to PLAY.**
2. **Press MENU.**
3. **Select "Tools" → "Screen Saver" → "On".**
   - "Tools" appears on the advanced menu only.
   - To turn off the screen saver, perform the above procedure and select "Off".
   - The screen saver activates if you do not perform any operation for about five minutes in the Playback Mode.
   - Press any key to exit the screen saver.
   - When changing between images, the screen saver uses the interval that is specified for Slide Show (page 84).

## Using the Playback Menus

The playback menus provide you with control over the display format and DPOF settings, image delete and save operations, and other settings. Each playback menu has two formats: a basic menu and an advanced menu. Press DISP to toggle between the basic menu and advanced menu.

### Playback Menus

See "Menu Screens" on page 32 for information about how to use menus.
Basic menu items are indicated by BASIC.

| | | |
|---|---|---|
| View | **Zoom** BASIC | Enlarges the image on the monitor screen. |
| | **9 Multi** BASIC | Displays nine images on the monitor screen. |
| | **Slide Show** BASIC | Automatically scrolls through the images one-by-one. |
| Tools | **Protect** | Use this item to protect images against deletion.<br>Select : Protects a single specific image.<br>Folder : Protects all images in a specific folder.<br>All : Protects all images. |
| | **DPOF** BASIC | Use this item to specify images for printing on a DPOF printer.<br>Select : Prints a single specific image.<br>Folder : Prints a specific number of copies of all images in a specific folder.<br>All : Prints a specific number of copies of all images. |
| | **Screen Saver** | This item turns the screen save on and off. |
| Delete | **Select** BASIC | Deletes a single specific image. |
| | **Folder** BASIC | Deletes all unprotected images in a specific folder. |
| | **All** BASIC | Deletes all unprotected images. |

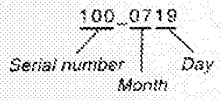
| | | |
|---|---|---|
| Set Up | Card Browser BASIC | Use this item to select the card browser file type.<br>Off/ Type1 / Type2 / Type3 / Type4 |
| | Format BASIC | Select this item to format a memory card. |
| | Date BASIC | Use this item to specify the format of the date that appears in the monitor screen, and to adjust the date setting.<br>Style(Year/Month/Day / Day/Month/Year / Month/Day/Year) / Adjust |
| | Video Out BASIC | This item can be used to specify the format of the video output signal.<br>NTSC : Video format in the United States and Japan<br>PAL : Video format in Europe and other areas |
| | Language BASIC | This setting lets you select either English or Japanese as the display language. |
| | Beep BASIC | Use this item to turn the key input confirmation tone on and off. |

# FOLDER TYPES

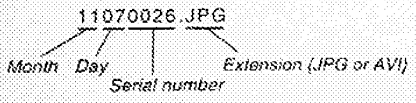
## Memory Card Folder Precautions

The camera automatically creates folders (directories) on the memory card and assigns them names based on dates (month and day). Any image you record is automatically stored into the folder that corresponds to the date it is recorded.

- Up to 900 folders can be created on a single card. The following shows a typical folder name.



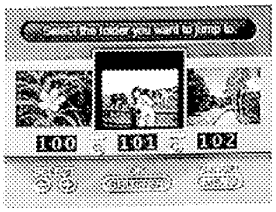

- Up to 250 image files can be stored in each folder. The following shows a typical file name.




- When you try to save the 251st image to a folder, the camera automatically creates a new folder and store the image there.
- The above maximum number of files and folders are absolute maximums. The actual number of folders and files may be less due to memory card capacity and the size of each image.
- Panorama images are divided into multiple images and stored on the memory card.
- See "USING CompactFlash CARDS WITH YOUR COMPUTER" on page 103 for information about how files and folders are organized.
- If there are more than 250 image files in a folder (due to copying from another digital camera or a computer), only the first 250 (in name sequence) can be played back.

## Selecting a Folder for Playback

1. Slide the Function Switch to PLAY.
2. Press .
3. Use [+] and [–] to select the folder you want to select for playback.




4. Press the shutter button to playback the first image in the folder.

# IMAGE PROTECTION

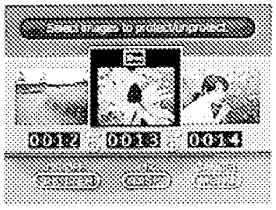
Use the following operations when you want to protect images against accidental deletion. A protected image cannot be deleted until it is unprotected. You can protect and unprotect a single specific image, all the image in a particular folder, or all images currently on the memory card.

**IMPORTANT!**

Formatting a memory card (page 36) deletes all images on the card, even if some or all of the images are protected.

## Protecting and Unprotecting a Single Image

1. **Slide the Function Switch to PLAY.**
2. **Press MENU.**
3. **Select "Tools" → "Protect" → "Select".**
   - "Tools" appears on the advanced menu only.
4. **Select the image you want to protect.**



   - Selected images are indicated by ⊶.
   - Repeat step 4 to select other images if you want.
5. **After all the images you want to protect are selected, press DISP to protect them.**

## Protecting and Unprotecting Folders

1. Slide the Function Switch to PLAY.
2. Press ▬.
3. Use [+] and [–] to select the folder you want to protect.
4. Press the shutter button.
5. Press MENU.
6. Select "Tools" → "Protect" → "Folder".
   - "Tools" appears on the advanced menu only.
7. Select "Protect" or "Unprotect".
   - The 🔑 indicator that is shown in the upper left corner of the images when image information is turned on indicates they are protected.
   - The 🔑 indicator does not appear when images are not protected.

## Protecting and Unprotecting All Images on a Memory Card

1. Perform steps 1 through 2 under "Protecting and Unprotecting a Single Image".
2. Select "Tools" → "Protect" → "All".
   - "Tools" appears on the advanced menu only.
3. Select "Protect" or "Unprotect".
   - The 🔑 indicator that is shown in the upper left corner of the images when image information is turned on indicates they are protected.
   - The 🔑 indicator does not appear when images are not protected.

# DELETING IMAGES

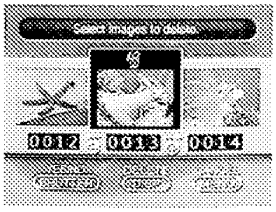
Use the following operations when you want to delete images. You can delete a single specific image, all the images in a particular folder or all images currently on the memory card.

**IMPORTANT!**

- Image deletion cannot be undone. Before deleting an image, make sure you no longer need it or you have a back-up copy saved on you computer, on diskette, or on some other medium.
- Be especially careful with "Deleting All Unprotected Images" operation, which deletes all unprotected images in memory.
- A protected image cannot be deleted. See "IMAGE PROTECTION" on page 90 for details on protecting and unprotecting images.

## Deleting a Single Image

1. Slide the Function Switch to PLAY.
2. Press MENU.
3. Select "Delete" → "Select".
4. Select the image you want to delete.



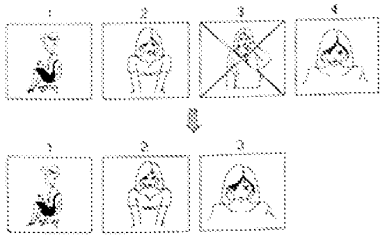

- Protected images are not displayed.
- Selected images are indicated by 🗑.
- Note that the first time you display an image its 🗑 icon is turned on.
- Repeat step 4 to select other images if you want.

5. After all the images you want to delete are selected, press DISP to delete them.

6. Select "Yes" to delete the contents of the folder, or "No" to abort the delete operation without deleting anything.
   - Deleting a panorama deletes all of the images that make it up as well.

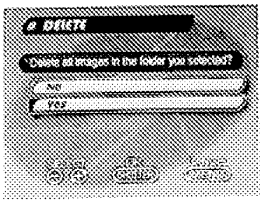
**NOTE**

The camera does not maintain open spaces in its memory. Deleting an images causes all images following the deleted image to be shifted up.



## Deleting All the Images in a Folder

1. Slide the Function Switch to PLAY.
2. Press .
3. Use [+] and [–] to select the folder you want to delete.
4. Press the shutter button.
5. Press MENU.
6. Select "Delete" → "Folder".



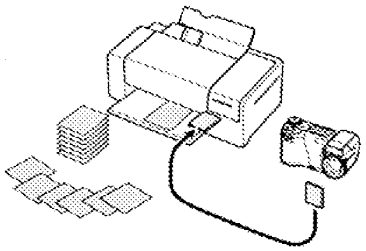
7. **Select "Yes" to delete the contents of the folder, or "No" to abort the delete operation without deleting anything.**
   - When the above procedure is performed while there are protected images in memory, the first of the protected images appears on the monitor screen after the unprotected images are deleted.

## Deleting All Unprotected Images

1. **Slide the Function Switch to PLAY.**
2. **Press MENU.**
3. **Select "Delete" → "All".**
4. **Select "Yes" to delete all unprotected images, or "No" to abort the delete operation without deleting anything.**
   - When the above procedure is performed while there are protected images in memory, the protected image appears on the monitor screen after the unprotected images are deleted.

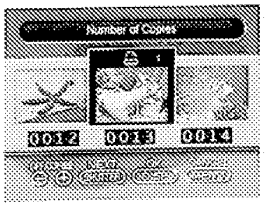
# DPOF

The letters "DPOF" stand for "Digital Print Order Format", which is a format for recording on a memory card or other medium which digital camera images should be printed and how many copies of the image should be printed. DPOF makes it possible for a DPOF compatible printer or professional print service to print images from a memory card without having to specify individual file names.



## Printing Specific Images

1. **Slide the function switch to PLAY.**
2. **Press MENU.**
3. **Select "DPOF" → "Select".**
   - On the advanced menu, select "Tools" → "DPOF".
4. **Use [+] and [–] to select the image you want to print.**
5. **Press the shutter button.**



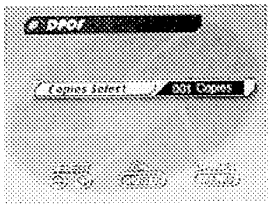

- Selected images are indicated by 🖶.

6. **Use [+] and [–] to specify the number of copies you want to print, and then press the shutter button.**
   - If you want to specify more images for printing, repeat steps 4 through 6.
   - If you change your mind about printing an image, press [–] to clear its mark.
7. **After you are finished, press DISP button to exit the image specification procedure.**

## Printing All the Images in a Folder

1. **Slide the function switch to PLAY.**
2. **Press .**
3. **Use [+] and [–] to select the folder you want to print.**
4. **Press the shutter button.**
5. **Press MENU.**
6. **Select "DPOF" → "Folder" → "Set print order".**
   - On the advanced menu, select "Tools" → "DPOF" → "Folder" → "Set print order".
   - To cancel current print settings, select "Cancel print order".
7. **Press the shutter button.**
   - If you selected "Cancel print order" in step 4, pressing the shutter button returns to the playback screen.

8. Use [+] and [–] to specify the number of copies of each image you want to print.



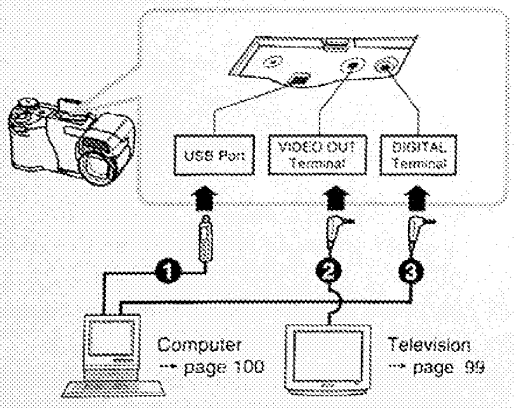

9. After you are finished, press the shutter button to exit the image specification procedure.

## Printing All Images

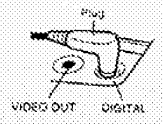
1. Slide the function switch to PLAY.
2. Press MENU.
3. Select "DPOF" → "All" → "Set print order".
   - On the advanced menu, select "Tools" → "DPOF" → "All" → "Set print order".
   - To cancel current print settings, select "Cancel print order".
4. Press the shutter button.
   - If you selected "Cancel print order" in step 3, pressing the shutter button returns to the playback screen.
5. Use [+] and [–] to specify the number of copies of each image you want to print.
6. After you are finished, press the shutter button to exit the image specification procedure.

# CONNECTIONS

This camera is equipped with a VIDEO OUT terminal for connection to a television or video deck, and a DIGITAL terminal and USB port for connection to a computer or other equipment.




- When connecting a plug to the DIGITAL terminal, make sure the cord is facing in the direction of the VIDEO OUT terminal as shown in the illustration. Otherwise, you will not be able to fully insert the plug into the terminal.




**1 Special USB cable**
When connecting to a computer, use the special USB cable and USB driver software that comes with the camera.
**2 Special video cable that comes with camera**
**3 Cables**
The type of cable you should use depends on the type of equipment to which you are connecting.

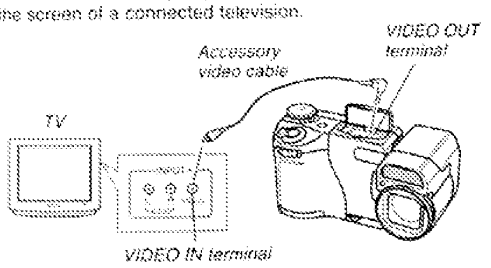
**IMPORTANT!**

- Be sure to turn off both the camera and other equipment before making any connections.
- Check the documentation that comes with your other equipment for information you may need to know when making connections.
- Leaving the same image displayed on a television or computer display screen for very long periods can cause the image to be "burned in" on the screen. When this happens, a faint after-image remains on the screen, even after you disconnect the camera. To avoid this, you should not leave the same image displayed on such a screen for very long periods.
- This camera does not support cable transfer of data with other CASIO digital cameras.

# CONNECTING TO OTHER EQUIPMENT

## Connecting to a Television

Images being displayed on the camera's monitor screen, whether for recording or playback can also be displayed on the screen of a connected television.




1. **Connect one end of the video cable to the camera and the other end to the television.**
2. **Set up the television for video input.**
   - See the documentation that comes with the television for information about how to do this.
3. **The connection procedure is the same for both recording and playback.**

**IMPORTANT!**

- A television must have a video input terminal like the one shown in the illustration to connect to this camera.
- Battery capacity (page 40) and other displays that normally appear on the camera's monitor screen are also displayed on the television screen.
- The monitor screen goes blank as soon as you connect the video cable to the camera.

### Selecting the Video Output Signal Mode

You can select either of two common video output modes: NTSC or PAL.
The video system you should use depends on the country where you plan to use the output signal. In the United States or Japan, for example, you should use NTSC, but in Europe you need to use PAL.
Check with your local video or TV retailer if you are unsure about which video mode you should use in your country.

1. **Press MENU.**
2. **Select "Set Up" → "Video Out".**
3. **Select the video mode you want to use.**

## Connecting to a Computer

The following options are available to make it easy for you to connect to a computer for image transfer and management.

- USB cable
- USB driver software (on CD-ROM)
- Data Transfer Cable
- Photo Loader application (on CD-ROM)

### USB Port Connections

The camera's USB port and accessories make it easy to connect to a computer equipped with a USB port. First install the USB driver software on your computer, and then use its special USB cable to make the connection. Once connected, you can view images on your computer's display and store images on its hard disk.

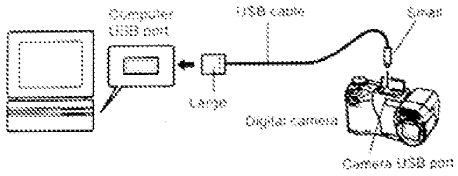
- See the separate installation manual for information about how to install the driver software on your computer.

### System Requirements

| Windows | Macintosh |
|---|---|
| • IBM PC/AT or compatible computer pre-installed with Windows 98<br>• 486 or higher CPU (Pentium recommended)<br>• CD-ROM drive (for installation)<br>• Keyboard and mouse or equivalent input device<br>• Available USB port<br>* Proper operation is not guaranteed under the following conditions.<br>• A computer that has been updated from Windows 95 to Windows 98<br>* This USB driver does not run under Windows 3.1, Windows 95 or Windows NT. | • Mac OS 8.5 or higher, Mac OS 8.1 with USB system extentions (iMac update 1.0 is required)<br>• Power PC G3<br>• CD-ROM drive (for installation)<br>• Keyboard and mouse or equivalent input device<br>• Available USB port |

* The USB driver may not run correctly under certain hardware configurations.

## USB Port Connection




**IMPORTANT!**

- Plug the USB connectors into the ports as far as they will go. Incorrect connection can result in improper operation.
- Turn off the camera before connecting the USB cable to it.
- The camera is not supplied power by the USB cable. Be sure to use the optional AC adaptor to power the camera whenever using a USB cable connection.
- Never disconnect the USB cable while a data communication operation is in progress. Doing so can corrupt memory data.

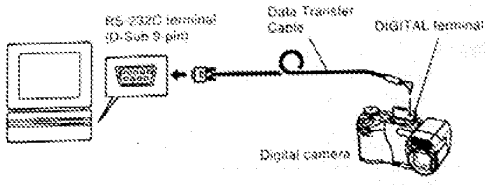
## Data Transfer Cable Connection

You can use the Data Transfer Cable to connect to your personal computer through the camera's DIGITAL terminal. Then you save images on your computer's hard disk using the Photo Loader application.

- See the separate installation manual for information about how to install Photo Loader on your computer.

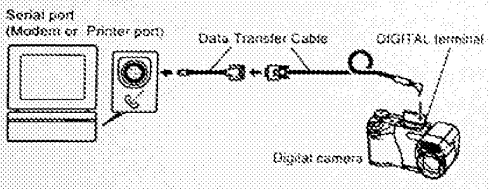
### Windows 95, 98, NT Workstation 4.0

The Data Transfer Cable can be connected to an IBM PC/AT or compatible that is equipped with a D-Sub9 RS-232C terminal.



## Macintosh

You can connect the camera to the serial port (modem or printer port) of your Macintosh using the Data Transfer Cable.




**IMPORTANT!**

- See the documentation that comes with Photo Loader for information about system requirements.
- Be sure to turn off the camera, computer, and all peripherals (monitor, disk driver, etc.) connected to the computer before connecting the digital camera with the Data Transfer Cable.
- Never connect or disconnect the cable while Photo Loader is running. Doing so can cause problems with program execution, can corrupt data, and can damage the camera and your computer.
- Data transfer while camera batteries are low can result in sudden shutdown of the camera. Because of this, use of the optional AC adaptor is recommended whenever performing data communication with the camera.
- This camera does not support data communication with any of the optionally available CASIO PC link software applications: LK-1, LK-1A, LK-10V, LK-11W, LK-2, LK-2A, LK-2V, LK-21.

# USING CompactFlash CARDS WITH YOUR COMPUTER

## Setting Up to Access CompactFlash Card Contents From Your Computer

You can use any of the three methods described below to access the contents of a memory card with your computer. You can use the Photo Loader software to save images on the memory card to your computer.

### CompactFlash Memory Card Slot

If your computer has a CompactFlash Memory Card Slot, insert the camera's memory card into the slot.

### PC Card Slot

In this case you need an optionally available CASIO CA-10 PC Card Adaptor. See the instructions that come with the PC Card Adaptor and the documentation that comes with your computer for details on using this type of configuration.



### Other Desktop Computer Configurations

Some desktop computers require a separately available PC card reader/writer and the optionally available CASIO CA-10 PC Card Adaptor to read memory card contents. See the instructions that come with the PC card reader/writer and the PC Card Adaptor for details on using this type of configuration.



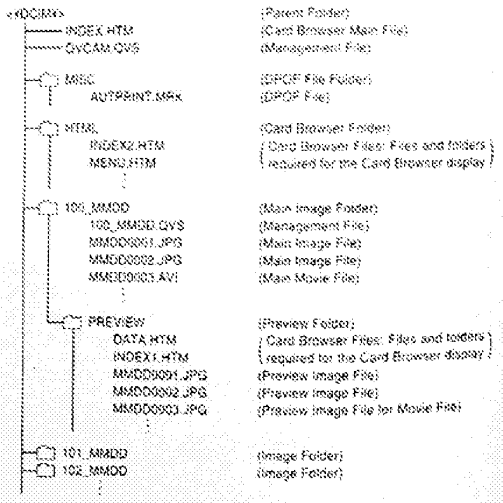
## Memory Card Data

Images recorded with this camera and other data is stored on the memory card using DCF (Design rule for Camera File system) protocol. DCF protocol is designed to make it easier to exchange image and other data between digital cameras and other devices.

### DCF Protocol

DCF devices (digital cameras, printers, etc.) can exchange images with each other. DCF protocol defines the format for image files data and the directory structure for the memory card, so images can be viewed using another manufacturer's DCF camera or printed on a DCF printer.
In addition to support for the DCF protocol, your CASIO digital camera also shows dates in image folder names and image file names, which helps to make data management easier.

## CompactFlash Card Directory Tree



## Folder and File Contents

- Parent Folder
  Contents: All files used by the digital camera
- Card Browser Main File
  Contents: Template for card browser, which is used for viewing image previews with a web browser
- Management File
  Contents: Information about folder management, image sequence, etc.
- DPOF File Folder
  Contents: DPOF files
- DPOF File
  Contents: Printer data
- Card Browser Folder
  Contents: Files used by the card browser
- Card Browser File
  Contents: Data used by the card browser
- Main Image Folder
  Contents: Image file recorded by the camera
- Main Image File
  Contents: Still image file recorded by the camera
- Main Movie File
  Contents: Movie file recorded by the camera
- Preview Folder
  Contents: Preview images
- Preview Image File
  Contents: Preview images of still image and movie files used for temporary playback and card browser previews

## Image Files Supported by the Camera

- Image files recorded with the CASIO QV-8000SX Digital Camera
- JPEG files stored using Photo Loader
  (1280 x 960 pixels or 640 x 480 pixels JPEG file)
- DCF protocol image files
- JPEG files stored using QV-LINK (1280 x 960 pixel and 640 x 480 pixel JPEG files)

## Personal Computer

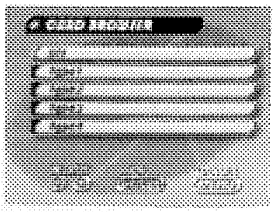
- This camera uses management files to manage the sequence and attributes of image files. Because of this, adding files, deleting files, changing management file contents, or changing file sequence and attributes with your computer can cause panorama images to become ungrouped. It can also result in slower image scrolling on the camera.
- When transferring CompactFlash card contents to a hard disk, floppy diskette, MO disk, or other external storage, keep everything in the DCIM folder together. Changing the name of the DCIM folder to a date is a good way to keep track of your images. However, be sure to change the name of this folder back to DCIM if you ever copy it back to the memory card for playback on the camera. This camera does not recognize any folder name besides DCIM.
- The above is also true about the names of folders inside the DCIM folder. These folders must be returned to the names assigned to them by the camera whenever you copy the DCIM folder back to the memory card for playback on the camera.
- Never delete or modify the QVS file in any way.
- We also strongly recommend that after transferring data from a CompactFlash card to other external storage that you re-format the card and delete its contents before using it to record more images.

## Card Browser

Card Browser makes it possible to use a browser application to view images recorded with the QV-8000SX.

- The HTML file generated by this camera is best viewed using Microsoft Internet Explorer 4.01 or later, or Netscape Communicator 4.5 or later. It cannot be viewed using Photo Loader.
- QuickTime 3 is required to play back AVI movie files.

1. **Press MENU.**
2. **Select "Set Up" → "Card Browser".**



### 3. Specify the format.

There are four Card Browser formats.

Type1 ..... This is a powerful format that provides detailed information about each image and also includes a Slide Show feature.

Type2 ..... This format is a viewer with a Slide Show feature.

Type3 ..... This format shows information about each image. You should be able to use it with any browser, regardless of version.

Type4 ..... This format provides basic image viewing. Since it is the simplest option, you should be able to use it with just about any browser, regardless of version.

| Card Browser Format | Type1 | Type2 | Type3 | Type4 |
|---|---|---|---|---|
| Data Screen | ○ | ○ | × | × |
| Index Screen | ○ | × | ○ | × |
| Actual Size (in pixels) | × | ○ | × | ○ |
| VGA Size | ○ | × | ○ | × |
| SXGA Size | ○ | × | ○ | × |
| Image Scrolling | ○ | × | ○ | × |
| Slide Show | ○ | × | ○ | × |
| Full Screen | ○ | × | ○ | × |
| Movie (AVI) Play | Endless | One Time | Endless | One Time |

**IMPORTANT!**

- Note that the Type1 and Type3 formats use Java Script, so their use requires Microsoft Internet Explorer 4.01 or later, or Netscape Communicator 4.5 or later.
- In the case of Type1 and Type3, Slide Show displays 640 x 480 pixels and 1280 x 960 pixels image in the same size, so image details may appear relatively coarse.

- The index screen uses the contents of the Preview Folder (page 104). Images copied from another digital camera or a computer may not have preview images, and so they do not appear in the index screen. If this happens, scroll through the images on the monitor screen until the copied images appear. At this time, the camera automatically generates a preview image, which will now appear on the Card Browser index screen.

- Turning on Card Browser causes an HTML file to be generated whenever you turn off camera power.
- Selecting "Off" in step 3 of the above procedure turns off Card Browser.
- Creation of an HTML file causes an INDEX.HTM file and other files to be added to the DCIM folder.

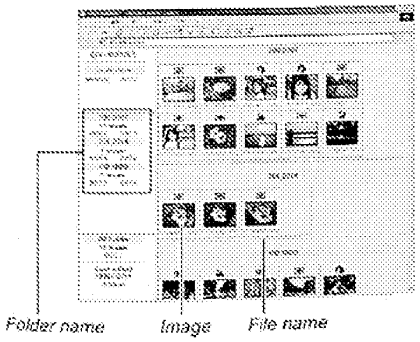
**IMPORTANT!**

- Though the camera's monitor screen goes blank when you turn off power, the operation lamp continues to flash for some time as the camera internally generates a Card Browser file (when Card Browser is turned on). Performing any of the operations while the operation lamp is flashing not only stops generation of the Card Browser file, it can also result in corruption of the image data on the CompactFlash Card.
  Note that a Card Browser file may be corrupted if batteries are low or if the CompactFlash Card becomes full during file generation.
- If the CompactFlash card in the camera has a large number of files on it, it may take quite a bit of time for the camera to generate the required HTML files and actually turn off after you slide the POWER switch towards OFF.
  Because of this, we recommend that you normally leave Card Browser turned off, except when you actually want to generate HTML files.
- This camera generates a Card Browser file whenever you turn off power. When the card in the camera contains a large number of files, it may take some time for the file generation operation to be performed. You can turn off the Card Browser feature if you do not want a file generated each time you turn off camera power.
- If you perform a timer operation while Card Browser is turned on, files are not generated until the number of shots specified for the timer's SHOTS setting are recorded. If you want to generate files for images recorded by a timer operation that is not yet complete, turn the camera off, wait for the files to be generated, and then turn the camera back on again. Note, however, that this also cancels the ongoing timer operation.

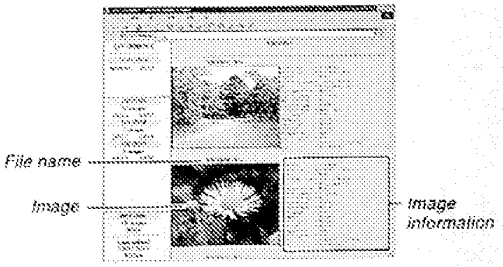
## How to use the HTML file

### Viewing HTML File Contents

Load the CompactFlash card into a card slot of your computer (page 103). Now drop the INDEX.HTM file (in the DCIM folder) onto your Web browser to display a list of all images contained on the CompactFlash card.
For information about importing data from a memory card, see "Setting Up to Access CompactFlash Card Contents from Your Computer" (page 103) and "Connecting to a Computer" (page 100).




Clicking on a folder name displays the following data about the images contained in the folder.




### Image Information

File size (KB)
Resolution (pixels)
Quality
Recording mode
AE
Light metering
Shutter speed
Aperture stop
Exposure comp
Focusing mode
Flash mode
Sharpness
Saturation
Contrast
White balance
Digital zoom
Date
Model

Click Index to return to the image list.

## Function Descriptions

| | |
|---|---|
| **Index Screen** | When the computer accesses the memory card, it opens the INDEX.HTM file in the DCIM folder and displays an index of folders, with the newest one first. Clicking the INDEX button under a folder name in the left frame displays an index of all the images in the folder. Clicking the INDEX button under ALL Folder displays an index of all the files in all folders. |
| **Data Screen** | Clicking the DATA button under a folder name in the left frame displays the images in the folder and their recording information. |
| **Actual Size (in pixels)** | Accessing the memory card on your computer and clicking the INDEX.HTM in the DCIM folder displays 320 x 240-pixel size images in the newest folder. Clicking directly on the image changes SXGA size or VGA size, whichever was the recorded size of the image. This function is available with the Type2 and Type4 formats only. |
| **VGA Size** | Clicking directly on an image in the index or data screen displays its VGA size (CHILD PAGE) image. |
| **SXGA Size** | Clicking directly on a VGA size image displays its SXGA (IMAGE DISPLAY) image. The SXGA image is always displayed, regardless of the recorded size of the image. |
| **Image Scrolling** | Clicking the arrows above a VGA size image scrolls forward and back through the images. Clicking directly on an SXGA size image advances to the next image. You can select page scrolling for a particular folder or all folders. AVI files are not displayed. |
| **Slide Show** | Images in a specific folder or all folders opened to the maximum window size to match the monitor being used. AUTO or MANUAL can be selected as the image change type. AVI files are not displayed. |
| **Full Screen** | Selecting AUTO for the slide show causes images in a specific folder or all folders opened to the maximum window size to match the monitor being used. Images are changed at an interval of about five seconds. |
| **Movie (AVI) Play** | AVI movie files can be played back on the screen. Playback image size is the same as the record image size. Endless playback is performed with the Type1 or Type3 format, while Type2 and Type4 plays the movie once and then stops. |

### Saving an HTML File

- You can use the Photo Loader application to easily save the images in the HTML file to a computer. See the documentation that comes with Photo Loader for details.
- Before using the CompactFlash card again (after storing its images on other media), delete all its current files or reformat the card.

# TROUBLESHOOTING

| | Symptom | Probable Cause | Action |
|---|---|---|---|
| Power Supply | No power | 1. Batteries not loaded correctly.<br>2. Dead batteries.<br>3. Wrong AC adaptor. | 1. Correctly load batteries (page 38).<br>2. Replace all four batteries with a set of new ones (page 38).<br>3. Use only recommended AC adaptor. |
| | Sudden power failure. | 1. Auto Power Off.<br>2. Low battery power.<br>3. Use of manganese batteries. | 1. Turn power back on.<br>2. Replace all four batteries with a set of new ones (page 38).<br>3. Replace manganese batteries with alkaline, lithium or Ni-MH batteries. |
| | "🔋" indicator on LCD. | Batteries are about to go dead. | Replace all four batteries with a set of new ones (page 38). |
| Recording | No recording when shutter button is pressed. | 1. Function Switch set to PLAY.<br>2. Flash unit is charging.<br>3. The message "MEMORY FULL" is on the monitor screen.<br>4. Insufficient memory card capacity or no memory card loaded in camera. | 1. Set Function Switch to REC.<br>2. Wait until flash unit charging is finished.<br>3. Delete images you no longer need from camera memory.<br>4. Load a memory card. |
| | Auto Focus cannot focus the image. | 1. Lens is dirty.<br>2. The object you want to focus is not in the focus frame.<br>3. Conditions make it impossible to obtain proper focus.<br>4. Camera is unsteady or shaking. | 1. Clean off the lens.<br>2. Aim the camera so the object you want to focus is in inside the focus frame.<br>3. Switch to the Manual Mode and focus manually.<br>4. Use a tripod to steady the camera. |

| | Symptom | Probable Cause | Action |
|---|---|---|---|
| Recording | The recorded image is out of focus. | The focus setting is not correct. | Make sure the subject you want to focus is within the Auto Focus Frame when you record the image. |
| | Power failure during self-timer operation. | Low battery power. | Replace all four batteries with a set of new ones (page 36). |
| | Monitor screen image is out of focus. | 1. Failure to focus the image while the camera is in the Manual Mode.<br>2. Camera is in the Macro Mode.<br>3. Camera is in the Normal Mode while the subject is too close. | 1. Focus the image before recording it.<br>2. Use the Normal Mode for scenery and group shots.<br>3. Use the Macro Mode for close ups. |
| | Poor color and brightness when indoors. | Indoor fluorescent lighting. | Shoot under incandescent or other non-fluorescent lighting (page 46). |
| | Cannot perform movie recording. | 1. Movie Record Mode is not selected.<br>2. Insufficient camera memory capacity. | 1. Select the Movie Record Mode (page 61).<br>2. Delete images you no longer need from camera memory. |
| | Recorded image is not saved. | 1. Loss of power before image is stored in memory.<br>2. Memory card cover was opened before the image was fully saved. | 1. Replace all four batteries with a set of new ones (page 36).<br>2. Never open the memory card cover until the image is fully saved. |
| Playback | Colors of recorded image are different from those on the display when image was composed. | 1. Reflection from sunlight or light from another source.<br>2. Image quality setting. | 1. Reorient the camera so that light is not shining directly into lens.<br>2. Use the Recording Menu to change to a higher image quality for recording. |

| | Symptom | Probable Cause | Action |
|---|---|---|---|
| Playback | No +/– button operation during nine-page display | Button operation during page change | Wait until an image is on the monitor screen before performing a button operation. |
| | Cannot find an image. | 1. Memory card images recording using a camera that does not support DCF.<br>2. Management files required to display images cannot be created. | 1. The file management systems of cameras that do not support DCF are different from the one used by this camera. This camera cannot read cards recorded with such cameras.<br>2. Make more room available on the memory card by deleting some of its images or other data. |
| | Camera is connected to a TV, but LCD monitor contents do not appear on TV screen. | 1. Incorrect camera-TV connection.<br>2. Wrong TV set up.<br>3. Wrong video mode is selected. | 1. Connect correctly using the video cable (page 98).<br>2. Set up the TV correctly.<br>3. Change the video mode. |
| | Images cannot be displayed when downloaded back the camera from a computer. | The images were on a memory card when they were opened on the computer for editing and then resaved back to the memory card. | Use the Photo Loader application to download edited images back to the camera. |
| Deletion | Delete operation does not operate. | All images are protected. | Unprotect the images you want to delete (page 90). |

| | Symptom | Probable Cause | Action |
|---|---|---|---|
| Other | Cannot select items in the Playback Menu. | Some functions are not available for playback of certain types of images. | Select a different function or change to the Record Mode. |
| | No buttons or switches operate. | • Malfunction due to static electrical charge or strong impact.<br>• Camera is connected to a computer. | Remove batteries and disconnect the AC adaptor if you are using one. Restore power and turn the camera on. If this does not work, contact your dealer or an authorized CASIO service provider. |
| | Slide Show starts even though it is not selected. | Activation of the screen saver. | Turn off screen saver (page 89). |
| | Nothing appears on the monitor screen. | 1. The camera is in the Sleep state.<br>2. Communication over the USB cable is in progress. | 1. Exit the Sleep state.<br>2. After the communication operation over the USB cable is complete unplug the USB cable from the camera. |

# MESSAGES

**Can't play PANORAMA**

This message appears when there is not enough memory to perform panorama recording. Delete some images from the memory card to make room for the new image.

**CF ERROR You must format the CompactFlash card before using it with this camera. FORMAT→MENU**

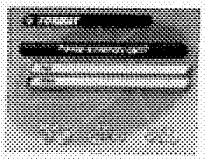
Perform the following procedure whenever a memory card starts to behave abnormally.

**Important!**

The procedure described below deletes all images stored in the memory card. Make sure all of your important images are backed up onto a computer hard disk or other storage medium before performing this procedure.

**To reformat a memory card**

1. Connect the AC adaptor to the camera and switch to AC power or load a new set of batteries into the camera.
   - Power failure while a format operation is being performed aborts the reformat operation.
2. Press MENU.



3. Use [→] and [←] to select "Yes", and then press the shutter button.
   - Select MENU if you want to abort the reformat procedure without deleting anything.
   - Completion of the format operation is indicated by the message "NO IMAGE" appearing on the monitor screen. This message also indicates that the memory card was formatted successfully.

**MEMORY FULL Change quality or delete unneeded images.**

Not enough memory for recording in the current quality mode. Change to another quality mode, or delete some images from the memory card (pages 93, 92).

**MEMORY FULL Delete unneeded images.**

- Not enough memory for further recording. Delete some images from memory card (page 92).
- DCIM folder or other file (page 104) cannot be created due to insufficient memory when downloading data from a computer to the memory card. Use your computer to delete unneeded images to free up memory card space for the images you are downloading. You could also press the MENU button and format the memory card in the camera, but doing so deletes all image files currently stored on the memory card.

**NO FORMAT**

No images are stored in memory card.

There is no memory card installed in the camera.

**EXHIBIT 1004 - Continued**

| | |
|---|---|
| **RECORD ERROR** | This message appears when the image you are trying to record cannot be compressed for some reason. Try changing the angle of the camera to the subject. |
| **REPLACE BATTERY!** | Battery power is low. Camera power turns off automatically shortly after this message appears. |
| **There are no images on this memory card!** | The memory card is not formatted. Format the memory card before trying to use it (page 36). |
| **This camera cannot display the image you selected!** | The JPEG image file you are trying to display is either corrupted or is a format that is not compatible with this camera. |
| **Timer operation cancelled.** | Timer recording was cancelled. To perform timer recording, make all necessary timer settings again. |

# SPECIFICATIONS

**Description** ..... Digital camera

**Model** ..... QV-8000SX

**Recorded Image File Format** ..... Still images (including panoramas): JPEG (Exif. Ver. 2.1), DCF standard (design rule for camera file system), DPOF compatible. Movies: AVI

**Recording Medium** ..... CompactFlash card

**Recorded Image Size** ..... 1280 x 960 pixels, 640 x 480 pixels

**Standard Memory Capacity, Number of Image Files, Computer Output Image Size**

| Static | | |
|---|---|---|
| 1280 x 960 | FINE | 88/13 sets (600KB / image) |
| | NORMAL | 122/16 sets (350KB / image) |
| | ECONOMY | 296/29 sets (200KB / image) |
| 640 x 480 | FINE | 268/39 sets (150KB / image) |
| | NORMAL | 327/48 sets (120KB / image) |
| | ECONOMY | 418/63 sets (90KB / image) |
| **Movie: File Format AVI** | | |
| Approximate Total: 155 seconds/25 seconds (30KB/second)<br>• The maximum length of a single movie is 10 seconds. | | |

* When using 48MB/8MB CF card

**Image Deletion** ..... Single image, all images in a folder, all images in memory (with image protection)

**Imaging Element** ..... 1/2.7-inch CCD (Total Pixels: 1.31 million, Effective Pixels: 1.25 million)

**Lens** ..... F3.2 to 3.5; f = 6 to 48mm (equivalent to 40 to 320mm lens for 35mm film)

**Zoom** ..... Optical zoom, 8X; Digital zoom: 32X (in combination with optical zoom)
Image size is 640 x 480 pixels when digital zoom is used

**Focusing** ..... Contrast-detect Auto Focus; manual focus with macro mode and focus lock

**Focus Range**
Normal:
Wide-angle (maximum) ..... Approximately 0.4m to ∞ (1.3' to ∞)
Telephoto (maximum) ..... Approximately 1m to ∞ (3.3' to ∞)
Macro:
Auto focus ..... Approximately 1cm to 50cm (0.4" to 19.7") (Zoom: x1 to x1.6)
Manual focus ..... Approximately 10cm to ∞ (3.9" to ∞)

**Exposure Control**
Light Metering: ..... Multi-pattern, center point, spot by CCD
Exposure: ..... Program AE, Shutter priority AE, Aperture priority AE
Exposure Compensation: ..... -2EV to +2EV (1/4EV units)

**Shutter** ..... CCD electronic shutter; mechanical shutter, Auto (Bulb, 64 to 1/2000 second)

**Aperture** ..... F3.2, F4.8, F8, auto switching or manual switching

**White Balance** ..... Automatic, fixed (4 modes), manual switching

**Self-timer** ..... 10 seconds, 2 seconds

**Built-in Flash**
Flash Modes: ..... AUTO, ON, OFF, Red eye reduction
Flash Range: ..... Normal: Approximately 0.5 to 2.5 meters (1.6' to 8.2')
Macro: Approximately 0.1 to 0.5 meters (0.3' to 1.6')

**Recording Functions** ..... One-shot, self-timer, movie, panorama, timer, continuous, macro, landscape, night scene, portrait

**Monitor** ..... 2.5" TFT, low-glare color HAST LCD (122,100 pixels, 555 x 220)

**Viewfinder** ..... LCD Monitor

**Clock** ..... Built-in quartz digital timepiece for time and date recording and storage with image data; auto calendar up to 2049

**Input/Output Terminals** ..... DIGITAL IN/OUT, USB port (special mini port), AC adaptor connector, VIDEO OUT (NTSC, PAL)

**Power Supply** ..... Four AA-size alkaline or lithium batteries
Four AA-size nickel-hydrogen rechargeable batteries (NP-H3)
AC adaptor (AD-C620)

**Battery Life**

The values noted below indicate the number of hours before battery failure under normal operating temperature (25°C). These values are for reference only, and do not guarantee that any particular set of batteries actually will provide the service life indicated. Low temperatures shorten battery life.

| Type of Operation | AA-size Alkaline Batteries LR6 | AA-size Lithium Batteries FR6 |
|---|---|---|
| Continuous Playback | Approximately 110 minutes | Approximately 280 minutes |
| Continuous Recording | Approximately 400 shots | Approximately 1020 shots |

- The above guidelines are based on the following battery types:
  Alkaline: MX1500 (AA) DURACELL ULTRA
  Lithium: Energizer
- Battery life varies with brand
- Figures are based on continuous recording under the following conditions:
  Flash turned off
  One zoom slider switching between T (Telephoto) and W (Wide-angle)

Regardless of use of the camera's flash, zoom function, turning on and off the POWER Switch, as well as other operating conditions may affect the above values.

**Power Consumption** ..... Approximately 6.2W

**Dimensions** ..... 142.5(W) x 77.5(H) x 71(D) mm (5.6"(W) x 3.1"(H) x 2.8"(D))
(Excluding projections, lens up)

**Weight** ..... Approximately 330g (11.6 oz)
(excluding batteries)

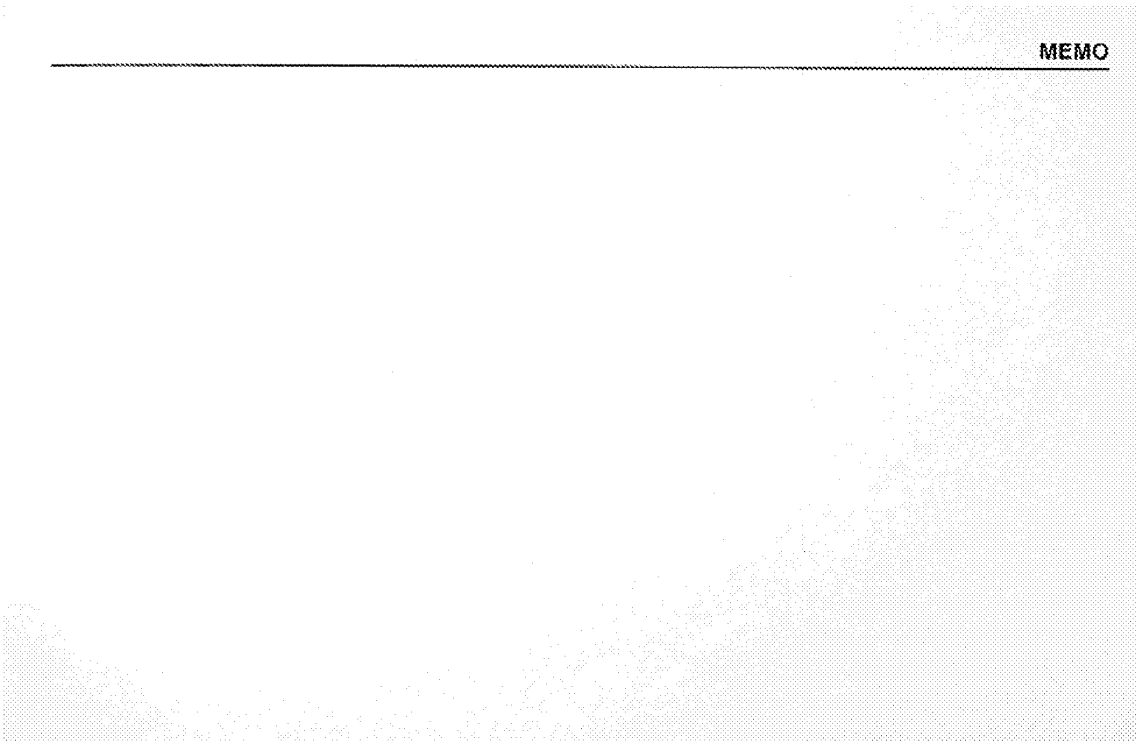
## SPECIFICATIONS

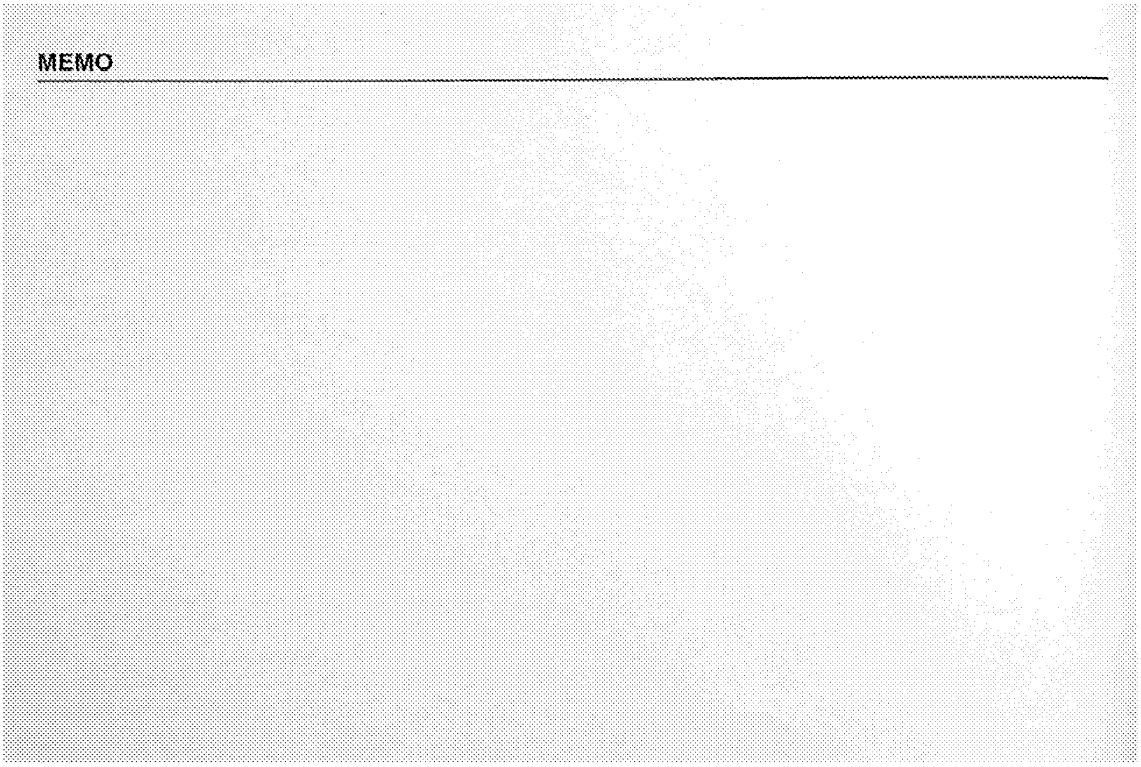
**Standard Accessories** ..... 2-way shoulder/wrist strap; soft case; lens cap; USB cable; video cable; wired remote controller; wired remote controller battery (CR2025 x 1); User's Guide

- This camera does not have a separate battery to power its clock. Clock settings are cleared whenever power to the camera is cut off (by batteries going dead while the camera is not connected to an AC power outlet with the AC adapter) for about 24 hours. After power is resumed, either by loading fresh batteries or connecting to an AC power outlet, you will have to set the correct time and date again.
- The liquid crystal panel built into this camera is the product of precision engineering, with an effective pixel rate of 99.99%. This also means, however that 0.01% of the pixels can be expected to fail to light or to remain lit at all times.

For the latest information about CASIO Digital Cameras and accessories, visit our website at:

http://www.casio.com


MEMO


MEMO



CASIO

CASIO COMPUTER CO.,LTD.
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Shibuya-ku, Tokyo 151-8543, Japan

Printed on recycled paper.

K714FCM2PMJ
MA9906-001701A Printed in Japan

**EXHIBIT 1010 - Continued**

• The exposure compensation value automatically reverts to zero whenever the shutter button is pressed. You can manually reset the exposure compensation value by using [+] and [–] to change the value back to zero, which is indicated when the EV indicator disappears from the monitor. EV value is fixed during panorama recording.



Appendix D

# OTHER RECORDING FUNCTIONS

This section describes more advanced recording operations that are also provided by this camera.

## Using Quick Shutter

Quick Shutter lets you record up to five images at intervals of approximately one second. Quick Shutter can be used to record normal, Night Scene Mode, Landscape Mode, or Portrait Mode images.

**IMPORTANT!**

- The operation lamp flashes while data is being written to the memory card. Never remove the memory card from the camera while this lamp is flashing.
- Quick shutter is disabled under any of the following conditions: while the flash is charging, while a slow shutter speed it being used, and when conditions cause Auto Focus to take a long time to finish.
- Even if Quick Shutter is enabled, the camera automatically uses the Single shutter mode whenever the battery level is "".
- If you use the dial to try to change to another recording mode while the camera is saving buffer data to the memory card, the mode will not change to another recording mode until the data transfer and the save operation is complete.

1. **Slide the Function Switch to REC.**
2. **Select "Functions 1" → "Shutter Mode" → "Quick".**
   - "Functions 1" appears on the advanced menu only.
   - Turning on "Quick" causes "○○○○○" to appear under the quality indicator.
3. **Press the shutter button.**
   - The ○ marks sequentially change to ● marks as images are recorded.
   - Images you record using Quick Shutter are initially stored in a buffer, and then sequentially transferred to the memory card. Images continue to be recorded as long as you hold down the shutter button or until the buffer becomes full (five images). The buffer may be able to hold only four images when you are using the Night Scene Mode or a slow shutter speed.

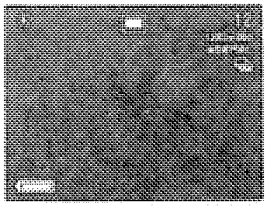


Appendix D

## Continuous Recording

With continuous recording, you can hold down the shutter button and record up to five images at an interval of about 0.25 seconds. Continuous recording can be used for normal recording, as well as in the Night Scene, Landscape, and Portrait modes.

1. **Slide the Function Switch to REC.**
2. **Press MENU.**
3. **Select "Functions 1" → "Shutter Mode" → "Continuous", and then press the shutter button.**
   - "Functions 1" appears on the advanced menu only.
   - The "□" indicator is on the monitor screen while the Continuous Mode is selected.



4. **Compose the image and then record it.**
   - Focus is locked when you record the first image, and this setting is applied to all subsequent images.
   - The flash does not fire in the Continuous Mode.
   - The interval of Continuous Mode shots may be longer than 0.25 seconds at slower shutter speeds.
   - You may be able to record only four images in the Continuous Mode when using the Night Scene Mode, a fixed shutter speed, or a slow shutter speed.
   - Do not start a Continuous Record operation when the low battery indicator is on the monitor screen.
   - Storage of images recorded in the Continuous Mode to a memory card can take about 10 seconds (for five images).
   - Never remove camera batteries, unplug the AC adaptor from the camera, or remove the memory card while images are being saved.



Appendix D

## Using the Zoom Features

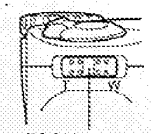
The zoom features let you move in closer on subjects that are located far from the camera. You can choose either optical zoom or digital zoom, or even use them in combination to increase the size of the original image by 16 or 32 times its original size.

### Using Optical Zoom

Optical zoom enlarges the image by changing the focal distance of the lens.
You can increase the size of the image by eight times using optical zoom.

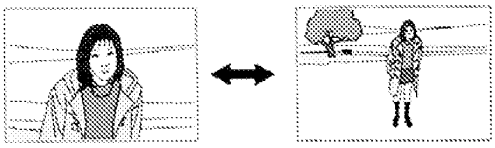
**1. Slide the Function Switch to REC.**

**2. Move the ZOOM slider towards T (telephoto) to zoom in on the subject, or W (wide-angle) to zoom out.**



*ZOOM slider*

- The camera performs an Auto Focus operation if you move the ZOOM slider towards T (telephoto).



*T (telephoto)* *W (wide-angle)*

**3. Compose the image and then record it.**

- Brightness (aperture) is also affected by using optical zoom.
- Use of a tripod and the wired remote controller is recommended for slow shutter speeds and telephoto shots to avoid blurring of the image due to camera movement.

## Using Digital Zoom

Digital zoom produces a VGA size image (640 x 480 pixels) that can be double or four times the size of the original image.
Using digital zoom and optical zoom in combination can zoom an image to 32X.

**IMPORTANT!**

- The focus range for Auto Focus depends on the optical zoom setting as shown below.

| Optical Zoom | Focus Range |
|---|---|
| X1 | 0.4m to ∞ (1.3' to ∞) |
| to | to |
| X8 | 1m to ∞ (3.3' to ∞) |

- The camera may not be able to focus on an image if the subject is closer than the distances noted above. Use the macro mode for very close subjects.
- Note that 4X digital zoom produces a relatively rougher image than OFF or 2X when used in combination with Auto Focus.

See "Using the Record Menus" on page 75 for details on making digital zoom settings.

## Manual Focus

Manual Focus lets you manually adjust the focus of an image.

1. **Slide the Function Switch to REC.**
2. **Press MF/∞/🌷 a number of times until the MF indicator appears on the monitor screen.**
   - Each press of MF/∞/🌷 cycles the focus mode in the following sequence: Auto Focus → Manual Focus (MF) → Infinity (∞) → Macro (🌷).
3. **While "MF" is flashing on the monitor screen, use [+] and [–] to focus the image.**
   - If you do not perform any focus operation for about two seconds, the "MF" indicator stops flashing.
   - After "MF" stops flashing, you can use [+] and [–] to adjust exposure compensation (EV).
   - If "MF" stops flashing before you have a chance to focus, press MF/∞/🌷 to make "MF" flash again.
   - Pressing MF/∞/🌷 while "MF" is flashing changes the focus mode to Infinity.

4. **Use [+] and [–] to increase or decrease the distance value on the monitor screen, until the one closest to distance you measured in step 3 is displayed.**

5. **Compose the image and then record it.**
   - The operation lamp and the Auto Focus frame do not appear while manual focus is in use.

## Infinity Mode Recording

Use the Infinity Mode when recording images of scenery or objects that are far away. This mode performs Auto Focus in the vicinity of ∞ (infinity).

1. **Slide the Function Switch to REC.**

2. **Press MF/∞/🌷 a number of times until the ∞ indicator appears on the display.**
   - Each press of MF/∞/🌷 cycles the focus mode in the following sequence: Auto Focus → Manual Focus (MF) → Infinity (∞) → Macro (🌷).

3. **Compose the image and then record it.**

## Using the Macro Mode

With the macro mode, you can record close up images of subjects located only 1 cm to 50 cm (0.4" to 19.7") from the lens.

- In the macro mode, optical zoom is limited to the range of x1 to x1.6.

1. **Slide the Function Switch to REC.**
2. **Press MF/∞/🌷 a number of times until the 🌷 indicator appears on the monitor screen.**
   - Each press of MF/∞/🌷 cycles the focus mode in the following sequence: Auto Focus → Manual Focus (MF) → Infinity (∞) → Macro (🌷).
3. **Compose the image and then record it.**

## Movie Recording

You can record movies that are approximately 10 seconds long. Movies are recorded in 320 x 240-pixel AVI format. For details, see "Using the Record Menus" on page 75.

There are two types of movie recording: PAST and NORMAL. PAST lets you capture images of events that occurred before you pressed the shutter button while NORMAL records what happens after you press the shutter button.

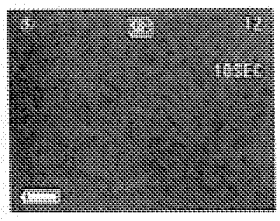
See "Using the Record Menus" on page 75 for details on how to select the movie length.

- AVI files can be displayed and saved on a computer that is set up to support use of CompactFlash cards. For such a computer, install QuickTime 3.

### NORMAL

1. **Slide the Function Switch to REC.**

**2. Align the dial with to select Movie Recording Mode.**




**3. Compose the image and then record it.**

- Auto Focus automatically adjusts in accordance with the movement of the subject.
- See "Playing Back a Movie" on page 80 for details on playing back a movie.
- Movie recording stops automatically 10 seconds after you start the record operation.
- To stop recording before the 10-second period is up, press the shutter button.

## PAST

**1. Slide the Function Switch to REC.**

**2. Select "Movie Mode" → "Past".**

- On the advanced menu, select "Functions 2" → "Movie Mode" → "Past".

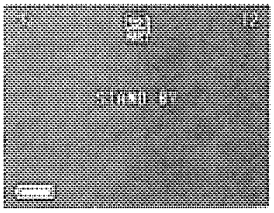
**3. Align the dial with to select Movie Recording Mode.**

**4. Compose the image on the monitor screen and then press the shutter button about half way.**

- Auto Focus automatically adjusts in accordance with the movement of the subject.
- The message "STAND BY" appears on the monitor screen to indicate that the camera's buffer memory is accumulating image data. This message remains displayed for about 10 seconds.
- After "STAND BY" disappears from the monitor screen, the contents of the buffer memory continues to be updated as long as you keep the shutter button depressed about half way.



Appendix D




**5. Keep the camera pointed at the action you want to record, and press the shutter button all the way down when you want to end recording.**

- Pressing the shutter button after "STAND BY" disappears from the monitor screen records everything that went on in front of the lens during the 10-second period before you pressed the shutter button.
- Pressing the shutter button while "STAND BY" is still on the monitor screen records everything that went on in front of the lens during the period from when you pressed the shutter button half way down and when you pressed it all the way down. In this case, the recording will be less than 10 seconds long.

**IMPORTANT!**

Flash is disabled during movie recording.

**NOTE**

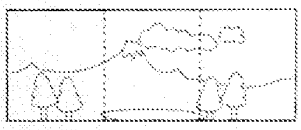
Movie Storage Capacity

| | |
|---|---|
| Storage Capacity | Approximately 300KB/ second |
| Recording Time | 10 seconds per movie |

* When using 8MB CF card.

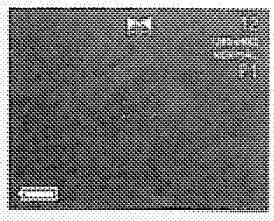
## Panorama Recording

With panorama recording you record a series of images and then link them to create a single panoramic effect.



**1. Slide the Function Switch to REC.**

**2. Align the dial with to select Panorama Recording Mode.**

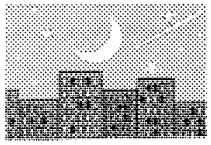


**3. Compose the image and then record it.**

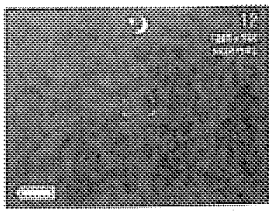
- The right edge of the previous image you recorded remains on the monitor screen, so you can align it correctly with the next image.
- From the second image onwards, aim the camera further to the right and overlap the next image with the previous one on the monitor screen.
- Up to nine images can be grouped into a panorama. Press MENU when you want to stop a panorama recording operation.
- When the lens is pointing in the same direction as the monitor screen, the right edges of the previous image you recorded remains on the monitor screen.
- Aperture setting and white balance settings are locked when you record the first image of a panorama, and these settings are applied to all subsequent images in that panorama.
- If you want to link more than 9 images into a panorama, upload the images to a computer and use your computer application to link them.
- See "Panorama Playback" on page 81 for details on playing back panoramas.

## Night Scene Mode

The Night Scene Mode is for recording images in dark areas. When recording images of people on a twilight or night time background, you can use the flash in combination with the Night Scene Mode for slow synchro recording.



1. Slide the Function Switch to REC.
2. Align the dial with *).



3. Compose the image and then record it.

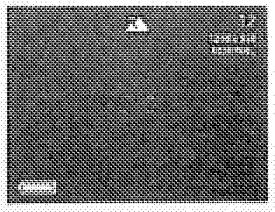
**IMPORTANT!**

- The maximum shutter speed in the Night Scene Mode is one second. Set the shutter speed manually (page 70) when you want to use a slower speed.
- The shutter speed is quite slow in the Night Scene Mode, so you should be sure to use a tripod to hold the camera steady.
- Slow shutter speed also causes slow monitor screen refresh. Because of this, the image recorded may be slightly different from the image that was on the monitor screen when you pressed the shutter button.
- Auto Focus is difficult in the dark. If you experience problems, use manual focusing (page 59). There may be some blurring of the image if the subject is fast moving.
- In the Night Scene Mode, Quick Shutter records up to 4 consecutive shots.
- The contrast of Night Scene Mode images is not affected by changes made using the Record Menu's Contrast (Record Settings) settings.

## Landscape Mode Recording

The Landscape Mode provides clear images from close ups to telephoto. The Landscape Mode records images where everything is in clear focus, from the foreground to the background. You can use the Landscape Mode with the ZOOM slider towards W (wide-angle) to record wide-angle images with clear focus from foreground to background.

1. **Slide the Function Switch to REC.**
2. **Align the dial with ⛰.**

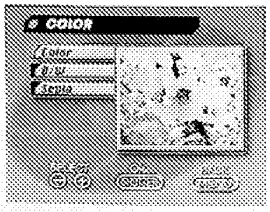


3. **Compose the image and then record it.**

## Monochrome and Sepia Recording

Use the following procedure to record an image in monochrome (black and white) or sepia. Note that you cannot convert an image to color after recording it in monochrome or sepia.

1. **Slide the Function Switch to REC.**
2. **Press MENU.**
3. **Use [+] and [–] to select "Color" and then press the shutter button.**
   - On the advanced menu, select "Functions 2" → "Color."



4. Use [+] and [–] to select "B/W" or "Sepia" and then press the shutter button.

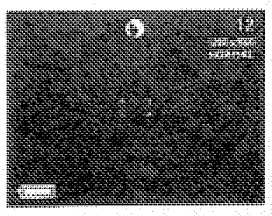
5. Compose the image and then record it.

## Portrait Recording

In the Portrait Mode, focus is adjusted so the background is slightly blurred, which highlights the subject in the foreground.

1. Slide the Function Switch to REC.

2. Align the dial with .



3. Compose the image and then press the shutter button about half way down.

4. After confirming that the subject is in focus, press the shutter button all the way down.

## Using the Self-timer

You can use the self-timer for either of the two following recording operations.

**10-second recording** .... Records about 10 seconds after the shutter button is pressed. Use this method when you want to be included in the image that is recorded.

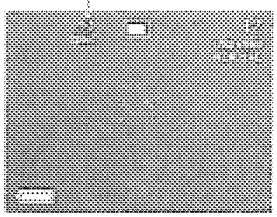
**2-second recording** ..... Records about 2 seconds after the shutter button is pressed. Use this method to avoid camera movement caused when the shutter button is pressed.

**1. Slide the Function Switch to REC.**

**2. Press ⏲.**

- Each press of ⏲ cycles the self-timer in the sequence: 10SEC → 2SEC → Off.
- The self-timer is disabled while the Shutter Speed is set to "Bulb".

*Self-timer setting*



**3. Compose the image and then record it.**

**NOTE**

During self-timer recording, you may find it helpful to rotate the swivel lens mechanism so the monitor screen faces the same direction as the lens. This way you can always see how much time is left until the start time is reached and recording begins.

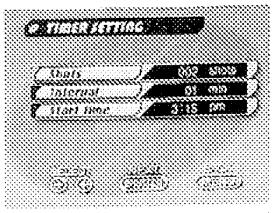
## Using the Timer

You can use the timer to perform any one of the following operations.

- Interval Recording
  Use this method to record a series of images at fixed time intervals.
- Timer Recording
  Use this method to record a single image after passage of a fixed amount of time.
- Interval Timer Recording
  Use this method to record a series of images at fixed time intervals, starting after passage of a fixed amount of time.

**1. Slide the Function Switch to REC.**

**2. Align the dial with ⏲ to select timer recording.**




**3. Specify the number of images (Shots), the interval between shots (Interval), and the record start time (Start time).**

- Shots ..... 250 maximum
- Interval ..... 1 to 60 minutes
- Start time ... Current time to current time plus 24
- The Interval cannot be specified when 1 is specified for Shots.

**4. Compose the image and then record it.**

- When the start time you set is reached, the operation lamp lights and image recording starts.
- The monitor screen of the camera turns off between shots of a timer operation. If you turn on camera power during this time, the message "TIMER CANCEL" appears and the timer operation is cancelled.



Appendix D

**IMPORTANT!**

- The "Bulb" Shutter Speed setting cannot be used with a timer operation. If the Shutter Speed setting is "Bulb" it automatically changes to "Auto" when you select the timer with the dial.
- The camera requires a certain amount of time to store an image in memory after it is recorded. Because of this, setting a shutter speed of "24 sec" or higher and an interval of "01 min" may result in an interval that is longer than one minute.

## Shutter Speed Priority Image Recording

You can fix the shutter speed at a specific level.

Auto: Automatic shutter speed setting in accordance with subject

Manual range: Bulb, 64 to 1/2000 second

- You can fix both the shutter speed and aperture (page 71).
- For shutter speed priority recording, set the "Aperture" setting to "Auto".

1. **Slide the function switch to REC.**
2. **Press MENU.**
3. **Select "Functions 1" → "Shutter Speed" → "Manual".**
   - "Functions 1" appears on the advanced menu only.
4. **Use [+] and [–] to select the shutter speed setting you want to use and then press the shutter button.**
5. **Select "Exit".**

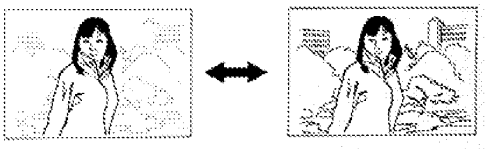
**6. Compose the image and then record it.**

- When the Shutter Speed is set to "Bulb", exposure continues as long as you depress the shutter button. Because of this, use of the wired remote control unit is recommended whenever using the "Bulb" setting.
- The self-timer is disabled while the Shutter Speed is set to "Bulb".
- The slowest shutter speed when "Bulb" is selected is 64 seconds.
- Note that using a slower shutter speed increases the chance of static being present in your image, and the amount of static visible in an image is inversely proportional to the shutter speed.
- At shutter speeds of one second or slower, the camera automatically performs internal data processing intended to limit image static, so the image record operation takes longer at slow shutter speeds. At shutter speeds of one second or greater, doubling the shutter speed setting tells you about how long it takes for an image to be recorded. For example, image recording with a shutter speed of one second takes about two seconds.

## Aperture Priority Image Recording

You can fix the aperture at a specific level. A larger aperture (indicated by a smaller aperture value) narrows the focus range, while a smaller aperture widens the focus range.

*Wide aperture (F3.2)* *Decreased aperture (F8)*



Manual settings: F3.2, F4.8, F8
Auto: Automatic aperture setting in accordance with subject

- You can fix both the aperture and shutter speed (page 70).
- For shutter speed priority recording, set the "Shutter Speed" setting to "Auto".
- Adjust the aperture setting to compensate for the relative brightness or darkness of the subject you are recording.

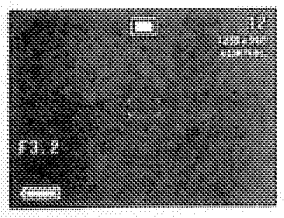
**1. Slide the function switch to REC.**

**2. Press MENU.**



Appendix D

3. **Select "Functions 1" → "Aperture".**
   - "Functions 1" appears on the advanced menu only.
4. **Use [+] and [–] to select the aperture setting you want to use and then press the shutter button.**
5. **Select "Exit".**




6. **Compose the image and then record it.**

## Performing Manual White Balance

Certain lighting conditions can cause auto white balance to take a very long time or can result in a limitation of the adjustable range (color temperature). If you suspect your current lighting conditions are causing problems, try performing manual white balance. This sets white balance to a level that can be used under any lighting conditions.
The following procedure describes how to perform manual white balance using a white piece of paper. For optimum results, you should use a special reflective plate that should be commercially available from a local camera equipment shop.

1. **Slide the Function Switch to REC.**
2. **Press MENU.**
3. **Select "Functions 1" → "White Balance" → "Manual".**
   - "Functions 1" appears on the advanced menu only.

4. **Keeping the camera pointed at the white sheet of paper, press DISP to make the manual white balance settings.**
   - Pressing the shutter button at this time returns the camera to the white balance setting that was obtained the last time you performed this manual white balance procedure.

5. **The manual white balance procedure stops automatically when it is done.**
   - If the manual white balance procedure does not end automatically, press the shutter button to interrupt it.

6. **After the camera finishes making the white balance setting, it returns to the screen in step 3 above. Select "Exit" to exit the manual white balance procedure.**

NOTE

White balance is automatically set to "Daylight" whenever you enter the Night Scene Mode. You can leave this as it is or change it using the above procedure.

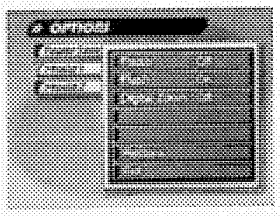
## Recording Mode Power On Settings

A power on setting is one that is set by the camera automatically whenever you turn it on. Normally, the camera uses its own built-in power on default settings.
The following table shows the items whose settings you can save in mode memory. Note that the procedure described here only lets you select ON (save current setting in mode memory) or OFF (use the camera's preset default setting).

| Mode Memory Item | On | Off |
|---|---|---|
| **Mode 1 (Mode Memory 1)** | | |
| Focus | AF, MF, ∞, 🌷 | AF |
| Flash | Auto, ϟ, (S), (R) | Auto |
| Digital Zoom | Off, Auto, X2, X4 | Auto |
| **Mode 2 (Mode Memory 2)** | | |
| Metering | Multi, Center, Spot | Multi |
| White Balance | Auto, Daylight, Shade, Tungsten, Fluorescent, Manual | Auto |
| Flash Intensity | Strong, Normal, Weak | Normal |
| Aperture | Auto, F3.2, F4.8, F8 | Auto |
| Shutter Speed | Auto, Manual (Bulb, 64 to 1/2000 second) | Auto |

### Turning power on default settings on and off

1. Slide the Function Switch to REC.
2. Press MENU.
3. Select "Options".
4. Select "Mode 1" or "Mode 2".
5. Select "Mode 1" or "Mode 2".



6. Select the item whose setting you want to change.
7. Select "On" or "Off".
   - Repeat steps 6 and 7 for other items if you want.
8. Select "Exit".

### Initializing Mode Memory

Use the following procedure to initialize the mode memory.

IMPORTANT!

Note that performing the following procedure to initialize mode memory also initializes power save trigger time settings (page 43).

1. Perform steps 1 through 3 under "Turning power on default settings on and off".
   - "Options" appears on the advanced menu only.
2. Select "Power Save", "Mode 1" or "Mode 2".
3. Select "Power Save", "Mode 1" or "Mode 2".
4. Select "Restore".
   - The following table shows the mode memory status of each item following the above procedure.
5. Select "Exit".

| Item | Initialized Setting |
|---|---|
| **Power Save** | |
| Sleep | 1 min |
| Auto Power Off | 2 min |
| **Mode 1 (Mode Memory 1)** | |
| Focus | Off (AF) |
| Flash | On (Auto) |
| Digital Zoom | On (Auto) |
| **Mode 2 (Mode Memory 2)** | |
| Metering | On (Multi) |
| White Balance | Off (Auto) |
| Flash Intensity | Off (Normal) |
| Aperture | Off (Auto) |
| Shutter Speed | Off (Auto) |

- An item that is "On" stores its current setting in mode memory when camera power is turned off, and restores the setting when power is turned back on again.
- An item that is "Off" uses the camera's preset power on default setting.

## Using the Record Menus

The record menus make it easy to control image quality, white balance, and other settings to suit specific conditions and preferences. Each record menu has two formats: a basic menu and an advanced menu. Press DISP to toggle between the basic menu and advanced menu.

**NOTES**

- Focus Mode, Flash Mode, Digital Zoom, Metering, White Balance, Flash Intensity, Shutter Speed, and Aperture settings are retained when camera power is turned off by only if you specify them as such with the Mode 1 and Mode 2 items of the Record Menus. All other settings are retained when you turn off camera power.
- Exposure compensation (page 54) and auto flash (page 50) settings are valid only when the shutter speed and aperture settings are both "Auto".

### Record Menus

See "Menu Screens" on page 32 for information about how to use menus.
Basic menu items are indicated by BASIC.

## OTHER RECORDING FUNCTIONS

### Picture

**Quality** (BASIC)
Use this setting to control the quality of the image.
Fine / Normal / Economy

**Size** (BASIC)
You can specify either of two image sizes in pixels.
1280 x 960 / 640 x 480

**Sharpness**
This setting specifies the sharpness of image outlines.
Hard : Sharp outlines
Normal
Soft : Soft outlines

**Saturation**
This setting controls the intensity of colors.
High : Colors appear deeper.
Normal
Low : Colors appear lighter.

**Contrast**
This setting controls the difference between the light areas and dark areas of the image. Contrast is not applied in the Night Scene Mode.
High : Larger difference between light and dark.
Normal
Low : Less difference between light and dark.

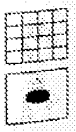
### Functions 1

**Aperture**
Use this setting when you want to fix the aperture at one of the values shown below.
Auto / F3.2 / F4.8 / F8

**Shutter Speed**
Use this setting to fix the shutter speed at one of the values shown below.
Auto / Manual (Bulb, 64 to 1/2000 second)

**Shutter Mode**
This setting specifies how the shutter operates.
Single : Records single images at an interval of about three seconds.
Quick : Allows recording of sequential images at an interval of about one second.
Continuous : Allows recording of sequential images at an interval of about 0.25 second while the shutter button is held down.
• With any of the above settings, the interval may be longer at slow shutter speeds.

**Metering**
This setting sets the metering method.
Multi : Takes readings across the entire image, and provides balanced exposure settings.
Center : Takes reading at the center of the image.



Spot : Takes reading at a very limited spot at the center of the image. Peripheral lighting does not affect this reading, so exposure is based on the subject alone.



**White Balance**

Use this setting to select the white balance setting that makes the colors of the subject appear most natural.
(Auto / Daylight / Shade / Tungsten /Fluorescent/ Manual)

- Daylight : Outdoors
- Shade : Blue tinted sunlight
- Tungsten : Red tinted incandescent light
- Fluorescent : Green tinted fluorescent light
- Manual : Sets up the camera for recording of a white sheet of paper under currently available light (page 72).

**Flash Intensity**

Select the setting for the flash intensity you want to use.
Strong / Normal / Weak

## Functions 2

**Movie Mode** (BASIC)

Select the movie mode you want to use.
Normal / Past

**Digital Zoom** (BASIC)

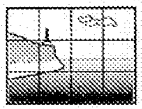
This item fixes digital zoom at the setting you want.
Off / Auto / X2 / X4

**Color** (BASIC)

Use this setting to select the color mode you want.
Color / B/W / Sepia

**Grid**

This item turns an on-screen grid on or off. The grid can be used to help align image components vertically and horizontally.
Off / On



**Time Stamp** (BASIC)

Use this item to turn time stamping on and off, and to control the format of the stamp.
Off / YMD (Year-Month-Day) / D H:M (Day-Hour-Minutes) / YMD H:M (Year-Month-Day-Hour-Minutes)
Note that the time stamp cannot be deleted from an image.

## Options

| | |
|---|---|
| **Power Save** | This item can be used to make power save settings to preserve battery power.<br>Sleep (Off / 30sec / 1min / 2min) / Auto Power Off (Off / 2min / 5min / 10min) |
| **Mode 1** | Use this item to specify which of the following settings are retained when camera power is turned off.<br>Focus / Flash / Digital Zoom |
| **Mode 2** | Use this item to specify which of the following settings are retained when camera power is turned off.<br>Metering / White Balance / Flash Intensity / Aperture / Shutter Speed |

## Set Up

| | |
|---|---|
| **Card Browser** BASIC | Use this item to select the card browser file type.<br>Off / Type1 / Type2 / Type3 / Type4 |
| **Format** BASIC | Select this item to format a memory card |
| **Date** BASIC | Use this item to specify the format of the date that appears in the monitor screen, and to adjust the date setting.<br>Style (Year/Month/Day / Day/Month/Year / Month/Day/Year) / Adjust |
| **Video Out** BASIC | This item can be used to specify the format of the video output signal.<br>NTSC: Video format in the United States and Japan<br>PAL: Video format in Europe and other areas |
| **Language** BASIC | This setting lets you select either English or Japanese as the display language. |
| **Beep** BASIC | Use this item to turn the key input confirmation tone on and off. |

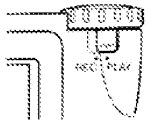
# PLAYBACK

The following describes the different techniques that you can use to playback recorded images.

## Basic Playback Operation

The built-in monitor screen of the camera lets you play back recorded images without connecting an external monitor.

1. **Slide the Function Switch to PLAY.**



2. **Use [+] and [–] to scroll through the images stored in camera memory.**
   - Press [+] to scroll forward and [–] to scroll back. Holding down either button scrolls at high speed.




**NOTES**

- Sliding the Function Switch to PLAY immediately after recording an image displays the image you just recorded first.
- Pressing the shutter button while a movie or panorama image is on the monitor screen starts playback of the movie or panorama.
- The image that initially appears on the monitor screen in the PLAY mode is a preview image. The full of image appears after a few seconds. Images copied from another digital camera or a computer may take longer time to appear.

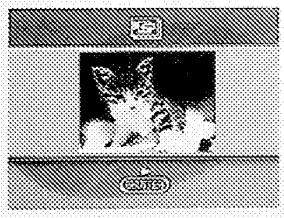


Appendix D

## Playing Back a Movie

Use the following operation to play back a movie that was recorded using the operation under "Movie Recording" on page 61.

1. **Slide the Function Switch to PLAY.**
2. **Use [+] and [–] to select the movie you want to play back.**

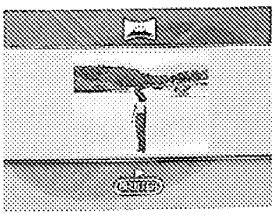


3. **Press the shutter button to start playing back the movie.**
   - You can use [+] (forward) and [–] (reverse) while playing back a movie to change the playback direction.
   - To enlarge the movie image so it fills the entire monitor screen, press DISP. Pressing the DISP again returns the image to its original small size.
   - Pressing the shutter button during movie play pauses playback. Press the shutter button again to resume playback.
   - While movie playback is paused, you can use [+] (forward) and [–] (reverse) to move frame-by-frame through the movie.
4. **After the movie is complete, press MENU.**

## Panorama Playback

Use the following operation to playback panoramas recorded using the operation under "Panorama Recording" on page 64.

1. **Slide the Function Switch to PLAY.**
2. **Use [+] and [–] to select the panorama you want to play back.**



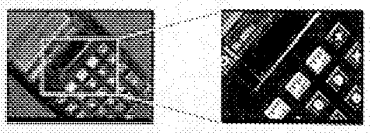
3. **Press the shutter button to start panorama playback.**
   - You can change the direction of a panorama that is playing back by pressing [+] or [–].
   - Pressing DISP changes to a small-image display. Press DISP again to return to the full-screen size.
   - Pressing the shutter button during panorama play pauses playback. Press the shutter button again to resume playback.
   - While panorama playback is paused, you can use [+] (forward) and [–] (reverse) to move frame-by-frame through the panorama.
4. **Press MENU to stop panorama playback.**

## Using Zoom

The following operation lets you magnify an image to twice its normal size. Note that you can zoom only a single still image.

**IMPORTANT!**

Movie and panorama images cannot be zoomed.



1. **Slide the Function Switch to PLAY.**
2. **Use [+] and [–] to select the image you want to zoom.**
3. **Press MENU.**
4. **Select "Zoom".**
   - On the advanced menu, select "View" → "Zoom".
5. **Specify the area.**
   - The portion of the selected area appears on the display at twice its normal size.
   - Use [+] and [–] to move the area selection frame left and right. Use ↯ and MF/∞/🌷 to move it up and down.
6. **To return the image to its normal size, press any button besides [+], [–], ↯, MF/∞/🌷 and DISP.**



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## Displaying Nine Images

The following operation lets you simultaneously view nine images on the same screen. This capability is especially useful when playing back to the screen of a connected TV, and can be used to display a catalog of products, etc.



1. **Slide the Function Switch to PLAY.**
2. **Press MENU.**
3. **Select "9 Multi".**
   - On the advanced menu, select "View" → "9 Multi".
   - The first image of the set is the image that was on the screen when you performed step 2 of this operation. The other images are those that sequentially follow the first one.
4. **Use [+] and [–] to scroll through images stored in memory.**
   - To view a particular image in normal size, press DISP. This causes the mark to appear in the upper left corner of the monitor screen. To produce an enlarged view of an image, use [+] and [–] to move the mark to the image you want and then press the shutter button.

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | [+] → | 10 | 11 | 12 | [+] → | 19 | 20 | 21 |
| 4 | 5 | 6 | ← [–] | 13 | 14 | 15 | ← [–] | 22 | 23 | 24 |
| 7 | 8 | 9 | | 16 | 17 | 18 | | 25 | | |

5. **After you are finished, press any button besides [+], [–], or DISP return to the normal single-image display.**

## Slide Show

Slide Show automatically scrolls through the images stored in memory. You can also specify how much time should be allowed between each image.



**IMPORTANT!**

Auto Power Off (page 41) is disabled whenever Slide Show is being used. This means you should not leave Slide Show running when using batteries to power the camera. Doing so can rundown batteries. Be sure to stop Slide Show and turn off the camera after you are finished.

1. **Slide the Function Switch to PLAY.**
2. **Press MENU.**
3. **Select "Slide Show".**
   - On the advanced menu, select "View" → "Slide Show".
4. **To stop Slide Show, press any button besides MENU.**
   - Pressing MENU while a Slide Show is in progress displays a screen that lets you change the interval within the range of 3 to 30 seconds.
   - Note that all buttons are disabled while an image change is in progress. Wait until an image is stopped on the monitor screen before performing a button operation, or hold down the button until the image stops.
   - Images copied from another digital camera or a computer may take longer time to appear.



Appendix D

## Screen Saver

The screen saver function automatically activates Slide Show (which automatically scrolls through images) whenever you do not perform any operation for about five minutes in the Playback Mode. This protects the camera's monitor screen and the screen of a connected TV against "burn in" of a static image that is left displayed too long.

**IMPORTANT!**

- The screen saver is enabled only when the camera is being powered by its optional AC adaptor. If you do not perform any operation for five minutes under battery power, camera power automatically turns off (Auto Power Off).
- The screen saver displays protected images only. The screen saver is disabled if there are no protected images in memory.
- Photo Loader will not send images between the camera and a personal computer while the screen saver is turned on. Make sure you turn off the screen saver before trying to perform any image transfer operation. Note that the screen saver is turned on when you purchase the camera.

1. **Slide the Function Switch to PLAY.**
2. **Press MENU.**
3. **Select "Tools" → "Screen Saver" → "On".**
   - "Tools" appears on the advanced menu only.
   - To turn off the screen saver, perform the above procedure and select "Off".
   - The screen saver activates if you do not perform any operation for about five minutes in the Playback Mode.
   - Press any key to exit the screen saver.
   - When changing between images, the screen saver uses the interval that is specified for Slide Show (page 84).



Appendix D

## Using the Playback Menus

The playback menus provide you with control over the display format and DPOF settings, image delete and save operations, and other settings. Each playback menu has two formats: a basic menu and an advanced menu. Press DISP to toggle between the basic menu and advanced menu.

### Playback Menus

See "Menu Screens" on page 32 for information about how to use menus.
Basic menu items are indicated by BASIC.

| | | |
|---|---|---|
| View | **Zoom** BASIC | Enlarges the image on the monitor screen. |
| | **9 Multi** BASIC | Displays nine images on the monitor screen. |
| | **Slide Show** BASIC | Automatically scrolls through the images one-by-one. |
| Tools | **Protect** | Use this item to protect images against deletion.<br>Select : Protects a single specific image.<br>Folder : Protects all images in a specific folder.<br>All : Protects all images. |
| | **DPOF** BASIC | Use this item to specify images for printing on a DPOF printer.<br>Select : Prints a single specific image.<br>Folder : Prints a specific number of copies of all images in a specific folder.<br>All : Prints a specific number of copies of all images. |
| | **Screen Saver** | This item turns the screen save on and off. |
| Delete | **Select** BASIC | Deletes a single specific image. |
| | **Folder** BASIC | Deletes all unprotected images in a specific folder. |
| | **All** BASIC | Deletes all unprotected images. |



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| | | |
|---|---|---|
| Set Up | Card Browser BASIC | Use this item to select the card browser file type.<br>Off/ Type1 / Type2 / Type3 / Type4 |
| | Format BASIC | Select this item to format a memory card. |
| | Date BASIC | Use this item to specify the format of the date that appears in the monitor screen, and to adjust the date setting.<br>Style(Year/Month/Day / Day/Month/Year / Month/Day/Year) / Adjust |
| | Video Out BASIC | This item can be used to specify the format of the video output signal.<br>NTSC : Video format in the United States and Japan<br>PAL : Video format in Europe and other areas |
| | Language BASIC | This setting lets you select either English or Japanese as the display language. |
| | Beep BASIC | Use this item to turn the key input confirmation tone on and off. |



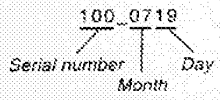
Appendix D

# FOLDER TYPES

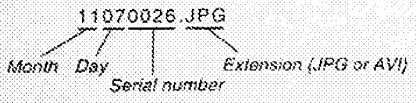
## Memory Card Folder Precautions

The camera automatically creates folders (directories) on the memory card and assigns them names based on dates (month and day). Any image you record is automatically stored into the folder that corresponds to the date it is recorded.

- Up to 900 folders can be created on a single card. The following shows a typical folder name.



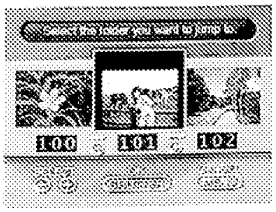

- Up to 250 image files can be stored in each folder. The following shows a typical file name.




- When you try to save the 251st image to a folder, the camera automatically creates a new folder and store the image there.
- The above maximum number of files and folders are absolute maximums. The actual number of folders and files may be less due to memory card capacity and the size of each image.
- Panorama images are divided into multiple images and stored on the memory card.
- See "USING CompactFlash CARDS WITH YOUR COMPUTER" on page 103 for information about how files and folders are organized.
- If there are more than 250 image files in a folder (due to copying from another digital camera or a computer), only the first 250 (in name sequence) can be played back.

## Selecting a Folder for Playback

1. Slide the Function Switch to PLAY.
2. Press .
3. Use [+] and [–] to select the folder you want to select for playback.




4. Press the shutter button to playback the first image in the folder.

# IMAGE PROTECTION

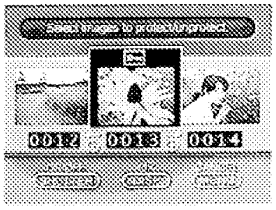
Use the following operations when you want to protect images against accidental deletion. A protected image cannot be deleted until it is unprotected. You can protect and unprotect a single specific image, all the image in a particular folder, or all images currently on the memory card.

**IMPORTANT!**

Formatting a memory card (page 36) deletes all images on the card, even if some or all of the images are protected.

## Protecting and Unprotecting a Single Image

1. **Slide the Function Switch to PLAY.**
2. **Press MENU.**
3. **Select "Tools" → "Protect" → "Select".**
   - "Tools" appears on the advanced menu only.
4. **Select the image you want to protect.**



   - Selected images are indicated by ⊶.
   - Repeat step 4 to select other images if you want.
5. **After all the images you want to protect are selected, press DISP to protect them.**

## Protecting and Unprotecting Folders

1. Slide the Function Switch to PLAY.
2. Press ▬.
3. Use [+] and [–] to select the folder you want to protect.
4. Press the shutter button.
5. Press MENU.
6. Select "Tools" → "Protect" → "Folder".
   - "Tools" appears on the advanced menu only.
7. Select "Protect" or "Unprotect".
   - The 🔑 indicator that is shown in the upper left corner of the images when image information is turned on indicates they are protected.
   - The 🔑 indicator does not appear when images are not protected.

## Protecting and Unprotecting All Images on a Memory Card

1. Perform steps 1 through 2 under "Protecting and Unprotecting a Single Image".
2. Select "Tools" → "Protect" → "All".
   - "Tools" appears on the advanced menu only.
3. Select "Protect" or "Unprotect".
   - The 🔑 indicator that is shown in the upper left corner of the images when image information is turned on indicates they are protected.
   - The 🔑 indicator does not appear when images are not protected.

# DELETING IMAGES

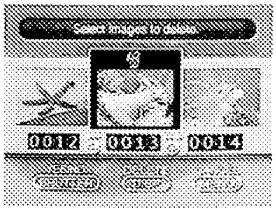
Use the following operations when you want to delete images. You can delete a single specific image, all the images in a particular folder or all images currently on the memory card.

**IMPORTANT!**

- Image deletion cannot be undone. Before deleting an image, make sure you no longer need it or you have a back-up copy saved on you computer, on diskette, or on some other medium.
- Be especially careful with "Deleting All Unprotected Images" operation, which deletes all unprotected images in memory.
- A protected image cannot be deleted. See "IMAGE PROTECTION" on page 90 for details on protecting and unprotecting images.

## Deleting a Single Image

1. Slide the Function Switch to PLAY.
2. Press MENU.
3. Select "Delete" → "Select".
4. Select the image you want to delete.



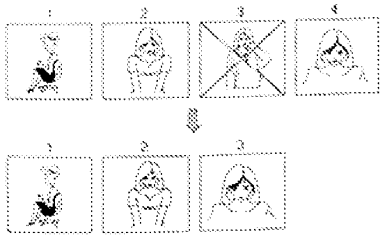

- Protected images are not displayed.
- Selected images are indicated by 🗑.
- Note that the first time you display an image its 🗑 icon is turned on.
- Repeat step 4 to select other images if you want.

5. After all the images you want to delete are selected, press DISP to delete them.

6. Select "Yes" to delete the contents of the folder, or "No" to abort the delete operation without deleting anything.
   - Deleting a panorama deletes all of the images that make it up as well.

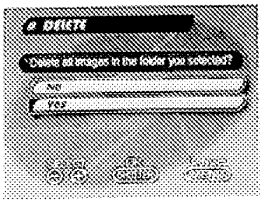
**NOTE**

The camera does not maintain open spaces in its memory. Deleting an images causes all images following the deleted image to be shifted up.



## Deleting All the Images in a Folder

1. Slide the Function Switch to PLAY.
2. Press .
3. Use [+] and [–] to select the folder you want to delete.
4. Press the shutter button.
5. Press MENU.
6. Select "Delete" → "Folder".



7. **Select "Yes" to delete the contents of the folder, or "No" to abort the delete operation without deleting anything.**
   - When the above procedure is performed while there are protected images in memory, the first of the protected images appears on the monitor screen after the unprotected images are deleted.

## Deleting All Unprotected Images

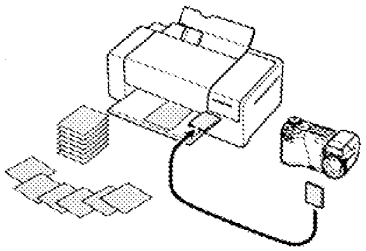
1. **Slide the Function Switch to PLAY.**
2. **Press MENU.**
3. **Select "Delete" → "All".**
4. **Select "Yes" to delete all unprotected images, or "No" to abort the delete operation without deleting anything.**
   - When the above procedure is performed while there are protected images in memory, the protected image appears on the monitor screen after the unprotected images are deleted.



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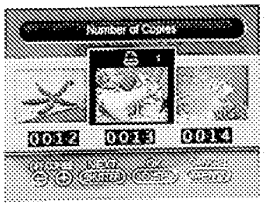
# DPOF

The letters "DPOF" stand for "Digital Print Order Format", which is a format for recording on a memory card or other medium which digital camera images should be printed and how many copies of the image should be printed. DPOF makes it possible for a DPOF compatible printer or professional print service to print images from a memory card without having to specify individual file names.



## Printing Specific Images

1. **Slide the function switch to PLAY.**
2. **Press MENU.**
3. **Select "DPOF" → "Select".**
   - On the advanced menu, select "Tools" → "DPOF".
4. **Use [+] and [–] to select the image you want to print.**
5. **Press the shutter button.**



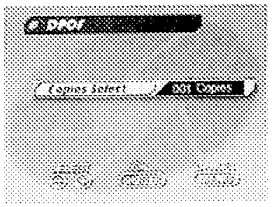

- Selected images are indicated by 🖶.

6. **Use [+] and [–] to specify the number of copies you want to print, and then press the shutter button.**
   - If you want to specify more images for printing, repeat steps 4 through 6.
   - If you change your mind about printing an image, press [–] to clear its mark.
7. **After you are finished, press DISP button to exit the image specification procedure.**

## Printing All the Images in a Folder

1. **Slide the function switch to PLAY.**
2. **Press .**
3. **Use [+] and [–] to select the folder you want to print.**
4. **Press the shutter button.**
5. **Press MENU.**
6. **Select "DPOF" → "Folder" → "Set print order".**
   - On the advanced menu, select "Tools" → "DPOF" → "Folder" → "Set print order".
   - To cancel current print settings, select "Cancel print order".
7. **Press the shutter button.**
   - If you selected "Cancel print order" in step 4, pressing the shutter button returns to the playback screen.

8. Use [+] and [–] to specify the number of copies of each image you want to print.



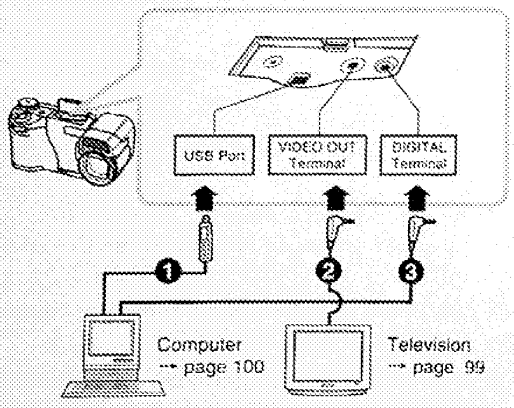

9. After you are finished, press the shutter button to exit the image specification procedure.

## Printing All Images

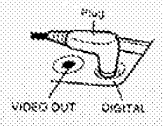
1. Slide the function switch to PLAY.
2. Press MENU.
3. Select "DPOF" → "All" → "Set print order".
   - On the advanced menu, select "Tools" → "DPOF" → "All" → "Set print order".
   - To cancel current print settings, select "Cancel print order".
4. Press the shutter button.
   - If you selected "Cancel print order" in step 3, pressing the shutter button returns to the playback screen.
5. Use [+] and [–] to specify the number of copies of each image you want to print.
6. After you are finished, press the shutter button to exit the image specification procedure.

# CONNECTIONS

This camera is equipped with a VIDEO OUT terminal for connection to a television or video deck, and a DIGITAL terminal and USB port for connection to a computer or other equipment.




- When connecting a plug to the DIGITAL terminal, make sure the cord is facing in the direction of the VIDEO OUT terminal as shown in the illustration. Otherwise, you will not be able to fully insert the plug into the terminal.




**1 Special USB cable**
When connecting to a computer, use the special USB cable and USB driver software that comes with the camera.
**2 Special video cable that comes with camera**
**3 Cables**
The type of cable you should use depends on the type of equipment to which you are connecting.

**IMPORTANT!**

- Be sure to turn off both the camera and other equipment before making any connections.
- Check the documentation that comes with your other equipment for information you may need to know when making connections.
- Leaving the same image displayed on a television or computer display screen for very long periods can cause the image to be "burned in" on the screen. When this happens, a faint after-image remains on the screen, even after you disconnect the camera. To avoid this, you should not leave the same image displayed on such a screen for very long periods.
- This camera does not support cable transfer of data with other CASIO digital cameras.

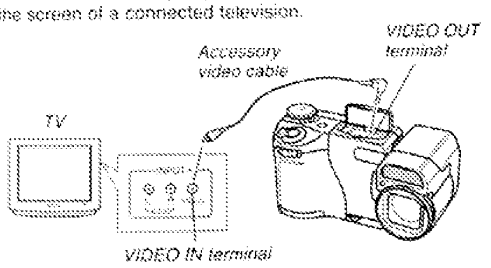


Appendix D

# CONNECTING TO OTHER EQUIPMENT

## Connecting to a Television

Images being displayed on the camera's monitor screen, whether for recording or playback can also be displayed on the screen of a connected television.




1. **Connect one end of the video cable to the camera and the other end to the television.**
2. **Set up the television for video input.**
   - See the documentation that comes with the television for information about how to do this.
3. **The connection procedure is the same for both recording and playback.**

**IMPORTANT!**

- A television must have a video input terminal like the one shown in the illustration to connect to this camera.
- Battery capacity (page 40) and other displays that normally appear on the camera's monitor screen are also displayed on the television screen.
- The monitor screen goes blank as soon as you connect the video cable to the camera.

### Selecting the Video Output Signal Mode

You can select either of two common video output modes: NTSC or PAL.
The video system you should use depends on the country where you plan to use the output signal. In the United States or Japan, for example, you should use NTSC, but in Europe you need to use PAL.
Check with your local video or TV retailer if you are unsure about which video mode you should use in your country.

1. **Press MENU.**
2. **Select "Set Up" → "Video Out".**
3. **Select the video mode you want to use.**

## Connecting to a Computer

The following options are available to make it easy for you to connect to a computer for image transfer and management.

- USB cable
- USB driver software (on CD-ROM)
- Data Transfer Cable
- Photo Loader application (on CD-ROM)

### USB Port Connections

The camera's USB port and accessories make it easy to connect to a computer equipped with a USB port. First install the USB driver software on your computer, and then use its special USB cable to make the connection. Once connected, you can view images on your computer's display and store images on its hard disk.

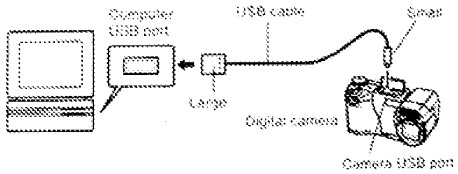
- See the separate installation manual for information about how to install the driver software on your computer.

### System Requirements

| Windows | Macintosh |
|---|---|
| • IBM PC/AT or compatible computer pre-installed with Windows 98<br>• 486 or higher CPU (Pentium recommended)<br>• CD-ROM drive (for installation)<br>• Keyboard and mouse or equivalent input device<br>• Available USB port<br>* Proper operation is not guaranteed under the following conditions.<br>• A computer that has been updated from Windows 95 to Windows 98<br>* This USB driver does not run under Windows 3.1, Windows 95 or Windows NT. | • Mac OS 8.5 or higher, Mac OS 8.1 with USB system extentions (iMac update 1.0 is required)<br>• Power PC G3<br>• CD-ROM drive (for installation)<br>• Keyboard and mouse or equivalent input device<br>• Available USB port |

* The USB driver may not run correctly under certain hardware configurations.

## USB Port Connection




**IMPORTANT!**

- Plug the USB connectors into the ports as far as they will go. Incorrect connection can result in improper operation.
- Turn off the camera before connecting the USB cable to it.
- The camera is not supplied power by the USB cable. Be sure to use the optional AC adaptor to power the camera whenever using a USB cable connection.
- Never disconnect the USB cable while a data communication operation is in progress. Doing so can corrupt memory data.

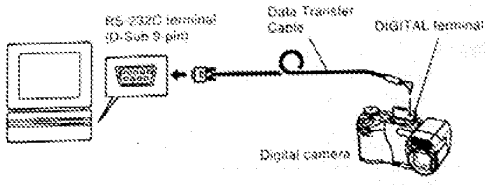
## Data Transfer Cable Connection

You can use the Data Transfer Cable to connect to your personal computer through the camera's DIGITAL terminal. Then you save images on your computer's hard disk using the Photo Loader application.

- See the separate installation manual for information about how to install Photo Loader on your computer.

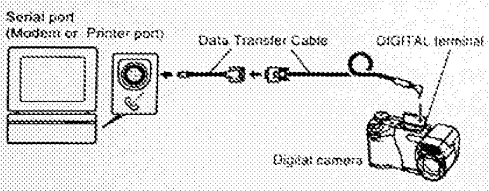
### Windows 95, 98, NT Workstation 4.0

The Data Transfer Cable can be connected to an IBM PC/AT or compatible that is equipped with a D-Sub9 RS-232C terminal.



## Macintosh

You can connect the camera to the serial port (modem or printer port) of your Macintosh using the Data Transfer Cable.




**IMPORTANT!**

- See the documentation that comes with Photo Loader for information about system requirements.
- Be sure to turn off the camera, computer, and all peripherals (monitor, disk driver, etc.) connected to the computer before connecting the digital camera with the Data Transfer Cable.
- Never connect or disconnect the cable while Photo Loader is running. Doing so can cause problems with program execution, can corrupt data, and can damage the camera and your computer.
- Data transfer while camera batteries are low can result in sudden shutdown of the camera. Because of this, use of the optional AC adaptor is recommended whenever performing data communication with the camera.
- This camera does not support data communication with any of the optionally available CASIO PC link software applications: LK-1, LK-1A, LK-10V, LK-11W, LK-2, LK-2A, LK-2V, LK-21.



Appendix D

# USING CompactFlash CARDS WITH YOUR COMPUTER

## Setting Up to Access CompactFlash Card Contents From Your Computer

You can use any of the three methods described below to access the contents of a memory card with your computer. You can use the Photo Loader software to save images on the memory card to your computer.

### CompactFlash Memory Card Slot

If your computer has a CompactFlash Memory Card Slot, insert the camera's memory card into the slot.

### PC Card Slot

In this case you need an optionally available CASIO CA-10 PC Card Adaptor. See the instructions that come with the PC Card Adaptor and the documentation that comes with your computer for details on using this type of configuration.



### Other Desktop Computer Configurations

Some desktop computers require a separately available PC card reader/writer and the optionally available CASIO CA-10 PC Card Adaptor to read memory card contents. See the instructions that come with the PC card reader/writer and the PC Card Adaptor for details on using this type of configuration.



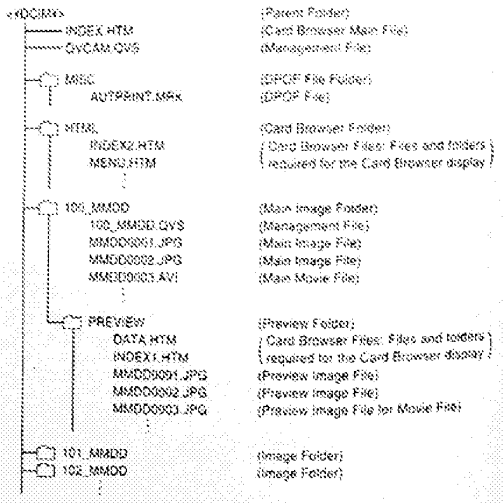
## Memory Card Data

Images recorded with this camera and other data is stored on the memory card using DCF (Design rule for Camera File system) protocol. DCF protocol is designed to make it easier to exchange image and other data between digital cameras and other devices.

### DCF Protocol

DCF devices (digital cameras, printers, etc.) can exchange images with each other. DCF protocol defines the format for image files data and the directory structure for the memory card, so images can be viewed using another manufacturer's DCF camera or printed on a DCF printer.
In addition to support for the DCF protocol, your CASIO digital camera also shows dates in image folder names and image file names, which helps to make data management easier.

## CompactFlash Card Directory Tree



## Folder and File Contents

- Parent Folder
  Contents: All files used by the digital camera
- Card Browser Main File
  Contents: Template for card browser, which is used for viewing image previews with a web browser
- Management File
  Contents: Information about folder management, image sequence, etc.
- DPOF File Folder
  Contents: DPOF files
- DPOF File
  Contents: Printer data
- Card Browser Folder
  Contents: Files used by the card browser
- Card Browser File
  Contents: Data used by the card browser
- Main Image Folder
  Contents: Image file recorded by the camera
- Main Image File
  Contents: Still image file recorded by the camera
- Main Movie File
  Contents: Movie file recorded by the camera
- Preview Folder
  Contents: Preview images
- Preview Image File
  Contents: Preview images of still image and movie files used for temporary playback and card browser previews

## Image Files Supported by the Camera

- Image files recorded with the CASIO QV-8000SX Digital Camera
- JPEG files stored using Photo Loader
  (1280 x 960 pixels or 640 x 480 pixels JPEG file)
- DCF protocol image files
- JPEG files stored using QV-LINK (1280 x 960 pixel and 640 x 480 pixel JPEG files)

## Personal Computer

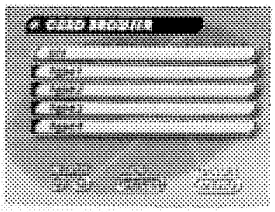
- This camera uses management files to manage the sequence and attributes of image files. Because of this, adding files, deleting files, changing management file contents, or changing file sequence and attributes with your computer can cause panorama images to become ungrouped. It can also result in slower image scrolling on the camera.
- When transferring CompactFlash card contents to a hard disk, floppy diskette, MO disk, or other external storage, keep everything in the DCIM folder together. Changing the name of the DCIM folder to a date is a good way to keep track of your images. However, be sure to change the name of this folder back to DCIM if you ever copy it back to the memory card for playback on the camera. This camera does not recognize any folder name besides DCIM.
- The above is also true about the names of folders inside the DCIM folder. These folders must be returned to the names assigned to them by the camera whenever you copy the DCIM folder back to the memory card for playback on the camera.
- Never delete or modify the QVS file in any way.
- We also strongly recommend that after transferring data from a CompactFlash card to other external storage that you re-format the card and delete its contents before using it to record more images.

## Card Browser

Card Browser makes it possible to use a browser application to view images recorded with the QV-8000SX.

- The HTML file generated by this camera is best viewed using Microsoft Internet Explorer 4.01 or later, or Netscape Communicator 4.5 or later. It cannot be viewed using Photo Loader.
- QuickTime 3 is required to play back AVI movie files.

1. **Press MENU.**
2. **Select "Set Up" → "Card Browser".**



### 3. Specify the format.

There are four Card Browser formats.

Type1 ..... This is a powerful format that provides detailed information about each image and also includes a Slide Show feature.

Type2 ..... This format is a viewer with a Slide Show feature.

Type3 ..... This format shows information about each image. You should be able to use it with any browser, regardless of version.

Type4 ..... This format provides basic image viewing. Since it is the simplest option, you should be able to use it with just about any browser, regardless of version.

| Card Browser Format | Type1 | Type2 | Type3 | Type4 |
|---|---|---|---|---|
| Data Screen | ○ | ○ | × | × |
| Index Screen | ○ | × | ○ | × |
| Actual Size (in pixels) | × | ○ | × | ○ |
| VGA Size | ○ | × | ○ | × |
| SXGA Size | ○ | × | ○ | × |
| Image Scrolling | ○ | × | ○ | × |
| Slide Show | ○ | × | ○ | × |
| Full Screen | ○ | × | ○ | × |
| Movie (AVI) Play | Endless | One Time | Endless | One Time |

**IMPORTANT!**

- Note that the Type1 and Type3 formats use Java Script, so their use requires Microsoft Internet Explorer 4.01 or later, or Netscape Communicator 4.5 or later.
- In the case of Type1 and Type3, Slide Show displays 640 x 480 pixels and 1280 x 960 pixels image in the same size, so image details may appear relatively coarse.

- The index screen uses the contents of the Preview Folder (page 104). Images copied from another digital camera or a computer may not have preview images, and so they do not appear in the index screen. If this happens, scroll through the images on the monitor screen until the copied images appear. At this time, the camera automatically generates a preview image, which will now appear on the Card Browser index screen.

- Turning on Card Browser causes an HTML file to be generated whenever you turn off camera power.
- Selecting "Off" in step 3 of the above procedure turns off Card Browser.
- Creation of an HTML file causes an INDEX.HTM file and other files to be added to the DCIM folder.

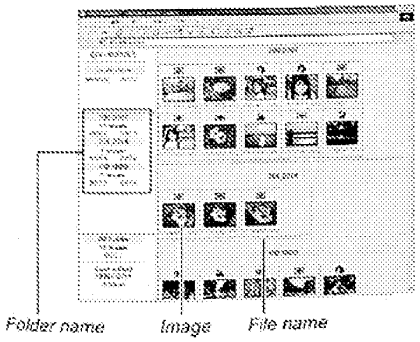
**IMPORTANT!**

- Though the camera's monitor screen goes blank when you turn off power, the operation lamp continues to flash for some time as the camera internally generates a Card Browser file (when Card Browser is turned on). Performing any of the operations while the operation lamp is flashing not only stops generation of the Card Browser file, it can also result in corruption of the image data on the CompactFlash Card.
  Note that a Card Browser file may be corrupted if batteries are low or if the CompactFlash Card becomes full during file generation.
- If the CompactFlash card in the camera has a large number of files on it, it may take quite a bit of time for the camera to generate the required HTML files and actually turn off after you slide the POWER switch towards OFF.
  Because of this, we recommend that you normally leave Card Browser turned off, except when you actually want to generate HTML files.
- This camera generates a Card Browser file whenever you turn off power. When the card in the camera contains a large number of files, it may take some time for the file generation operation to be performed. You can turn off the Card Browser feature if you do not want a file generated each time you turn off camera power.
- If you perform a timer operation while Card Browser is turned on, files are not generated until the number of shots specified for the timer's SHOTS setting are recorded. If you want to generate files for images recorded by a timer operation that is not yet complete, turn the camera off, wait for the files to be generated, and then turn the camera back on again. Note, however, that this also cancels the ongoing timer operation.

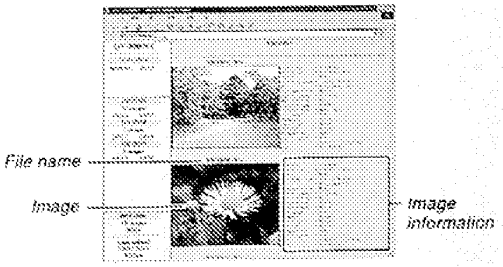
## How to use the HTML file

### Viewing HTML File Contents

Load the CompactFlash card into a card slot of your computer (page 103). Now drop the INDEX.HTM file (in the DCIM folder) onto your Web browser to display a list of all images contained on the CompactFlash card.
For information about importing data from a memory card, see "Setting Up to Access CompactFlash Card Contents from Your Computer" (page 103) and "Connecting to a Computer" (page 100).




Clicking on a folder name displays the following data about the images contained in the folder.




### Image Information

File size (KB)
Resolution (pixels)
Quality
Recording mode
AE
Light metering
Shutter speed
Aperture stop
Exposure comp
Focusing mode
Flash mode
Sharpness
Saturation
Contrast
White balance
Digital zoom
Date
Model

Click Index to return to the image list.



Appendix D

## Function Descriptions

| | |
|---|---|
| **Index Screen** | When the computer accesses the memory card, it opens the INDEX.HTM file in the DCIM folder and displays an index of folders, with the newest one first. Clicking the INDEX button under a folder name in the left frame displays an index of all the images in the folder. Clicking the INDEX button under ALL Folder displays an index of all the files in all folders. |
| **Data Screen** | Clicking the DATA button under a folder name in the left frame displays the images in the folder and their recording information. |
| **Actual Size (in pixels)** | Accessing the memory card on your computer and clicking the INDEX.HTM in the DCIM folder displays 320 x 240-pixel size images in the newest folder. Clicking directly on the image changes SXGA size or VGA size, whichever was the recorded size of the image. This function is available with the Type2 and Type4 formats only. |
| **VGA Size** | Clicking directly on an image in the index or data screen displays its VGA size (CHILD PAGE) image. |
| **SXGA Size** | Clicking directly on a VGA size image displays its SXGA (IMAGE DISPLAY) image. The SXGA image is always displayed, regardless of the recorded size of the image. |
| **Image Scrolling** | Clicking the arrows above a VGA size image scrolls forward and back through the images. Clicking directly on an SXGA size image advances to the next image. You can select page scrolling for a particular folder or all folders. AVI files are not displayed. |
| **Slide Show** | Images in a specific folder or all folders opened to the maximum window size to match the monitor being used. AUTO or MANUAL can be selected as the image change type. AVI files are not displayed. |
| **Full Screen** | Selecting AUTO for the slide show causes images in a specific folder or all folders opened to the maximum window size to match the monitor being used. Images are changed at an interval of about five seconds. |
| **Movie (AVI) Play** | AVI movie files can be played back on the screen. Playback image size is the same as the record image size. Endless playback is performed with the Type1 or Type3 format, while Type2 and Type4 plays the movie once and then stops. |

**EXHIBIT 1010 - Continued**

### Saving an HTML File

- You can use the Photo Loader application to easily save the images in the HTML file to a computer. See the documentation that comes with Photo Loader for details.
- Before using the CompactFlash card again (after storing its images on other media), delete all its current files or reformat the card.

# TROUBLESHOOTING

| | Symptom | Probable Cause | Action |
|---|---|---|---|
| Power Supply | No power | 1. Batteries not loaded correctly.<br>2. Dead batteries.<br>3. Wrong AC adaptor. | 1. Correctly load batteries (page 38).<br>2. Replace all four batteries with a set of new ones (page 38).<br>3. Use only recommended AC adaptor. |
| | Sudden power failure. | 1. Auto Power Off.<br>2. Low battery power.<br>3. Use of manganese batteries. | 1. Turn power back on.<br>2. Replace all four batteries with a set of new ones (page 38).<br>3. Replace manganese batteries with alkaline, lithium or Ni-MH batteries. |
| | "🔋" indicator on LCD. | Batteries are about to go dead. | Replace all four batteries with a set of new ones (page 38). |
| Recording | No recording when shutter button is pressed. | 1. Function Switch set to PLAY.<br>2. Flash unit is charging.<br>3. The message "MEMORY FULL" is on the monitor screen.<br>4. Insufficient memory card capacity or no memory card loaded in camera. | 1. Set Function Switch to REC.<br>2. Wait until flash unit charging is finished.<br>3. Delete images you no longer need from camera memory.<br>4. Load a memory card. |
| | Auto Focus cannot focus the image. | 1. Lens is dirty.<br>2. The object you want to focus is not in the focus frame.<br>3. Conditions make it impossible to obtain proper focus.<br>4. Camera is unsteady or shaking. | 1. Clean off the lens.<br>2. Aim the camera so the object you want to focus is in inside the focus frame.<br>3. Switch to the Manual Mode and focus manually.<br>4. Use a tripod to steady the camera. |



Appendix D

| | Symptom | Probable Cause | Action |
|---|---|---|---|
| Recording | The recorded image is out of focus. | The focus setting is not correct. | Make sure the subject you want to focus is within the Auto Focus Frame when you record the image. |
| | Power failure during self-timer operation. | Low battery power. | Replace all four batteries with a set of new ones (page 38). |
| | Monitor screen image is out of focus. | 1. Failure to focus the image while the camera is in the Manual Mode.<br>2. Camera is in the Macro Mode.<br>3. Camera is in the Normal Mode while the subject is too close. | 1. Focus the image before recording it.<br>2. Use the Normal Mode for scenery and group shots.<br>3. Use the Macro Mode for close ups. |
| | Poor color and brightness when indoors. | Indoor fluorescent lighting. | Shoot under incandescent or other non-fluorescent lighting (page 46). |
| | Cannot perform movie recording. | 1. Movie Record Mode is not selected.<br>2. Insufficient camera memory capacity. | 1. Select the Movie Record Mode (page 61).<br>2. Delete images you no longer need from camera memory. |
| | Recorded image is not saved. | 1. Loss of power before image is stored in memory.<br>2. Memory card cover was opened before the image was fully saved. | 1. Replace all four batteries with a set of new ones (page 38).<br>2. Never open the memory card cover until the image is fully saved. |
| Playback | Colors of recorded image are different from those on the display when image was composed. | 1. Reflection from sunlight or light from another source.<br>2. Image quality setting. | 1. Reorient the camera so that light is not shining directly into lens.<br>2. Use the Recording Menu to change to a higher image quality for recording. |



Appendix D

## TROUBLESHOOTING

| | Symptom | Probable Cause | Action |
|---|---|---|---|
| Playback | No +/– button operation during nine-page display | Button operation during page change | Wait until an image is on the monitor screen before performing a button operation. |
| | Cannot find an image. | 1. Memory card images recording using a camera that does not support DCF.<br>2. Management files required to display images cannot be created. | 1. The file management systems of cameras that do not support DCF are different from the one used by this camera. This camera cannot read cards recorded with such cameras.<br>2. Make more room available on the memory card by deleting some of its images or other data. |
| | Camera is connected to a TV, but LCD monitor contents do not appear on TV screen. | 1. Incorrect camera-TV connection.<br>2. Wrong TV set up.<br>3. Wrong video mode is selected. | 1. Connect correctly using the video cable (page 98).<br>2. Set up the TV correctly.<br>3. Change the video mode. |
| | Images cannot be displayed when downloaded back the camera from a computer. | The images were on a memory card when they were opened on the computer for editing and then resaved back to the memory card. | Use the Photo Loader application to download edited images back to the camera. |
| Deletion | Delete operation does not operate. | All images are protected. | Unprotect the images you want to delete (page 90). |



Appendix D

| | Symptom | Probable Cause | Action |
|---|---|---|---|
| Other | Cannot select items in the Playback Menu. | Some functions are not available for playback of certain types of images. | Select a different function or change to the Record Mode. |
| | No buttons or switches operate. | • Malfunction due to static electrical charge or strong impact<br>▲ Camera is connected to a computer. | Remove batteries and disconnect the AC adaptor if you are using one. Restore power and turn the camera on. If this does not work, contact your dealer or an authorized CASIO service provider. |
| | Slide Show starts even though it is not selected. | Activation of the screen saver. | Turn off screen saver (page 89). |
| | Nothing appears on the monitor screen. | 1. The camera is in the Sleep state.<br>2. Communication over the USB cable is in progress. | 1. Exit the Sleep state.<br>2. After the communication operation over the USB cable is complete unplug the USB cable from the camera. |



Appendix D

# MESSAGES

**Can't play PANORAMA**

This message appears when there is not enough memory to perform panorama recording. Delete some images from the memory card to make room for the new image.

**CF ERROR You must format the CompactFlash card before using it with this camera. FORMAT→MENU**

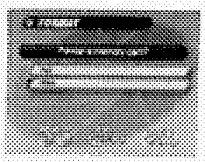
Perform the following procedure whenever a memory card starts to behave abnormally.

**Important!**

The procedure described below deletes all images stored in the memory card. Make sure all of your important images are backed up onto a computer hard disk or other storage medium before performing this procedure.

**To reformat a memory card**

1. Connect the AC adaptor to the camera and switch to AC power or load a new set of batteries into the camera.
   - Power failure while a format operation is being performed aborts the reformat operation.
2. Press MENU.



3. Use [+] and [–] to select "Yes", and then press the shutter button.
   - Select MENU if you want to abort the reformat procedure without deleting anything.
   - Completion of the format operation is indicated by the message "NO IMAGE" appearing on the monitor screen. This message also indicates that the memory card was formatted successfully.

**MEMORY FULL Change quality or delete unneeded images.**

Not enough memory for recording in the current quality mode. Change to another quality mode, or delete some images from the memory card (pages 93, 92).

**MEMORY FULL Delete unneeded images.**

- Not enough memory for further recording. Delete some images from memory card (page 92).
- DCIM folder or other file (page 104) cannot be created due to insufficient memory when downloading data from a computer to the memory card. Use your computer to delete unneeded images to free up memory card space for the images you are downloading. You could also press the MENU button and format the memory card in the camera, but doing so deletes all image files currently stored on the memory card.

**NO FORMAT**

No images are stored in memory card.

There is no memory card installed in the camera.

| | |
|---|---|
| RECORD ERROR | This message appears when the image you are trying to record cannot be compressed for some reason. Try changing the angle of the camera to the subject. |
| REPLACE BATTERY! | Battery power is low. Camera power turns off automatically shortly after this message appears. |
| There are no images on this memory card! | The memory card is not formatted. Format the memory card before trying to use it (page 36). |
| This camera cannot display the image you selected! | The JPEG image file you are trying to display is either corrupted or is a format that is not compatible with this camera. |
| Timer operation cancelled. | Timer recording was cancelled. To perform timer recording, make all necessary timer settings again. |



Appendix D

# SPECIFICATIONS

**Description** ..... Digital camera

**Model** ..... QV-8000SX

**Recorded Image File Format** ..... Still images (including panoramas): JPEG (Exif. Ver. 2.1), DCF standard (design rule for camera file system), DPOF compatible, Movies: AVI

**Recording Medium** ..... CompactFlash card

**Recorded Image Size** ..... 1280 x 960 pixels, 640 x 480 pixels

**Standard Memory Capacity, Number of Image Files, Computer Output Image Size**

| Static | | | |
|---|---|---|---|
| 1280 x 960 | FINE | 88/13 sets (800KB / image) | |
| | NORMAL | 122/16 sets (550KB / image) | |
| | ECONOMY | 206/29 sets (200KB / image) | |
| 640 x 480 | FINE | 268/39 sets (150KB / image) | |
| | NORMAL | 327/48 sets (120KB / image) | |
| | ECONOMY | 418/63 sets (90KB / image) | |
| Movie: File Format AVI | | | |
| Approximate Total: 155 seconds/25 seconds (30KB/second) • The maximum length of a single movie is 10 seconds. | | | |

* When using 48MB/8MB CF card

**Image Deletion** ..... Single image, all images in a folder, all images in memory (with image protection)

**Imaging Element** ..... 1/2.7-inch CCD (Total Pixels: 1.31 million, Effective Pixels: 1.25 million)

**Lens** ..... F3.2 to 3.5; f = 6 to 48mm (equivalent to 40 to 320mm lens for 35mm film)

**Zoom** ..... Optical zoom, 8X; Digital zoom: 32X (in combination with optical zoom) Image size is 640 x 480 pixels when digital zoom is used

**Focusing** ..... Contrast-detect Auto Focus; manual focus with macro mode and focus lock

**Focus Range**

Normal:

Wide-angle (maximum) ..... Approximately 0.4m to ∞ (1.3' to ∞)

Telephoto (maximum) ..... Approximately 1m to ∞ (3.3' to ∞)

Macro:

Auto focus ..... Approximately 1cm to 50cm (0.4" to 19.7") (Zoom: x1 to x1.6)

Manual focus ..... Approximately 10cm to ∞ (3.9" to ∞)

**Exposure Control**

Light Metering: ..... Multi-pattern, center point, spot by CCD

Exposure: ..... Program AE, Shutter priority AE, Aperture priority AE

Exposure Compensation: ..... -2EV to +2EV (1/4EV units)

**Shutter** ..... CCD electronic shutter; mechanical shutter, Auto (Bulb, 64 to 1/2000 second)

**Aperture** ..... F3.2, F4.8, F8, auto switching or manual switching



Appendix D

**White Balance** ..... Automatic, fixed (4 modes), manual switching

**Self-timer** ..... 10 seconds, 2 seconds

**Built-in Flash**
Flash Modes: ..... AUTO, ON, OFF, Red eye reduction
Flash Range: ..... Normal: Approximately 0.5 to 2.5 meters (1.6' to 8.2')
Macro: Approximately 0.1 to 0.5 meters (0.3' to 1.6')

**Recording Functions** ..... One-shot, self-timer, movie, panorama, timer, continuous, macro, landscape, night scene, portrait

**Monitor** ..... 2.5" TFT, low-glare color HAST LCD (122,100 pixels, 555 x 220)

**Viewfinder** ..... LCD Monitor

**Clock** ..... Built-in quartz digital timepiece for time and date recording and storage with image data; auto calendar up to 2049

**Input/Output Terminals** ..... DIGITAL IN/OUT, USB port (special mini port), AC adaptor connector, VIDEO OUT (NTSC, PAL)

**Power Supply** ..... Four AA-size alkaline or lithium batteries
Four AA-size nickel-hydrogen rechargeable batteries (NP-H3)
AC adaptor (AD-C620)

**Battery Life**

The values noted below indicate the number of hours before battery failure under normal operating temperature (25°C). These values are for reference only, and do not guarantee that any particular set of batteries actually will provide the service life indicated. Low temperatures shorten battery life.

| Type of Operation | AA-size Alkaline Batteries LR6 | AA-size Lithium Batteries FR6 |
|---|---|---|
| Continuous Playback | Approximately 110 minutes | Approximately 280 minutes |
| Continuous Recording | Approximately 400 shots | Approximately 1020 shots |

- The above guidelines are based on the following battery types:
  Alkaline: MX1500 (AA) DURACELL ULTRA
  Lithium: Energizer
- Battery life varies with brand
- Figures are based on continuous recording under the following conditions:
  Flash turned off
  One zoom slider switching between T (Telephoto) and W (Wide-angle)

Regardless of use of the camera's flash, zoom function, turning on and off the POWER Switch, as well as other operating conditions may affect the above values.

**Power Consumption** ..... Approximately 6.2W

**Dimensions** ..... 142.5(W) x 77.5(H) x 71(D) mm (5.6"(W) x 3.1"(H) x 2.8"(D))
(Excluding projections, lens up)

**Weight** ..... Approximately 330g (11.6 oz)
(excluding batteries)



Appendix D

## SPECIFICATIONS

**Standard Accessories** ..... 2-way shoulder/wrist strap; soft case; lens cap; USB cable; video cable; wired remote controller; wired remote controller battery (CR2025 x 1); User's Guide

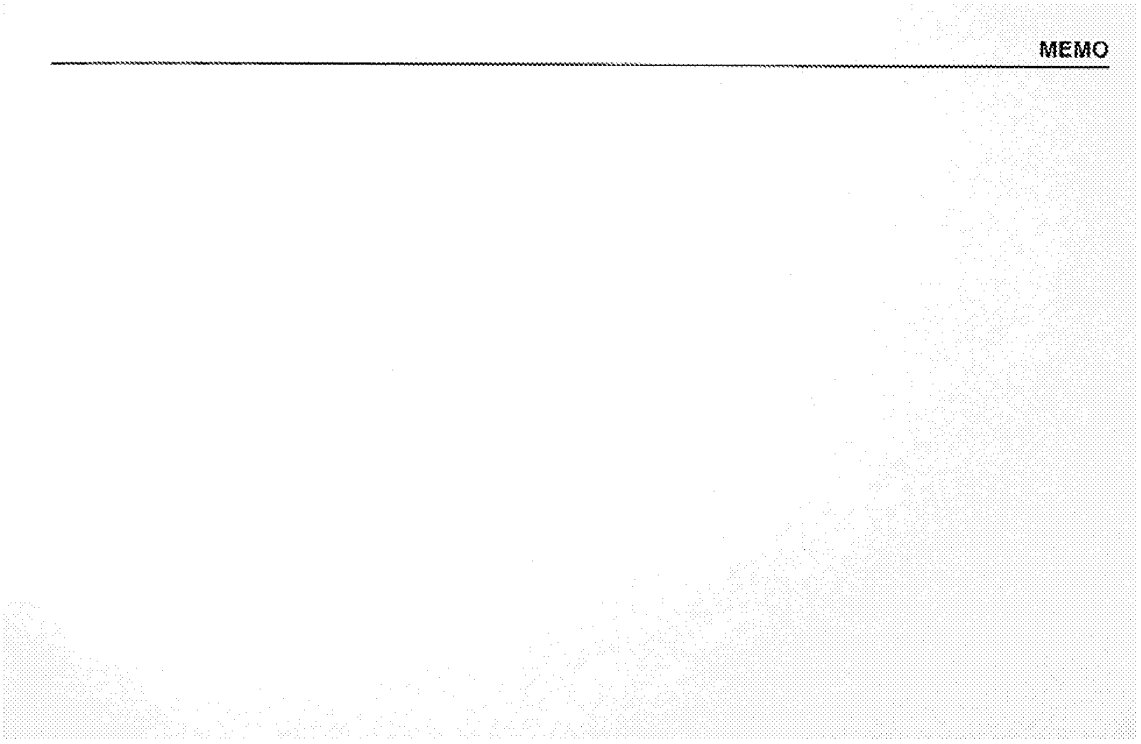
- This camera does not have a separate battery to power its clock. Clock settings are cleared whenever power to the camera is cut off (by batteries going dead while the camera is not connected to an AC power outlet with the AC adapter) for about 24 hours. After power is resumed, either by loading fresh batteries or connecting to an AC power outlet, you will have to set the correct time and date again.
- The liquid crystal panel built into this camera is the product of precision engineering, with an effective pixel rate of 99.99%. This also means, however that 0.01% of the pixels can be expected to fail to light or to remain lit at all times.

For the latest information about CASIO Digital Cameras and accessories, visit our website at:

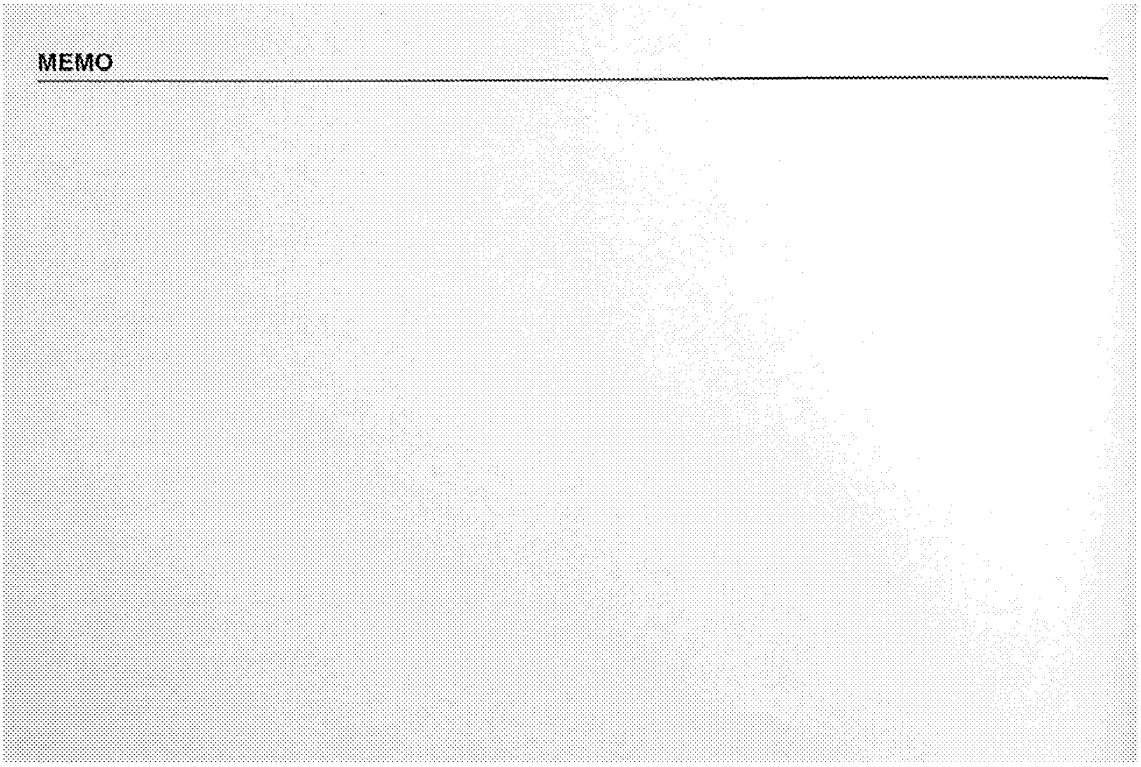
http://www.casio.com



Appendix D




Appendix D




Appendix D



Appendix D

CASIO

CASIO COMPUTER CO.,LTD.
6-2, Hon-machi 1-chome
Shibuya-ku, Tokyo 151-8543, Japan

Printed on recycled paper.

K714FCM2PMJ
MA9906-001701A Printed in Japan

Appendix D

Appendix E




Appendix E

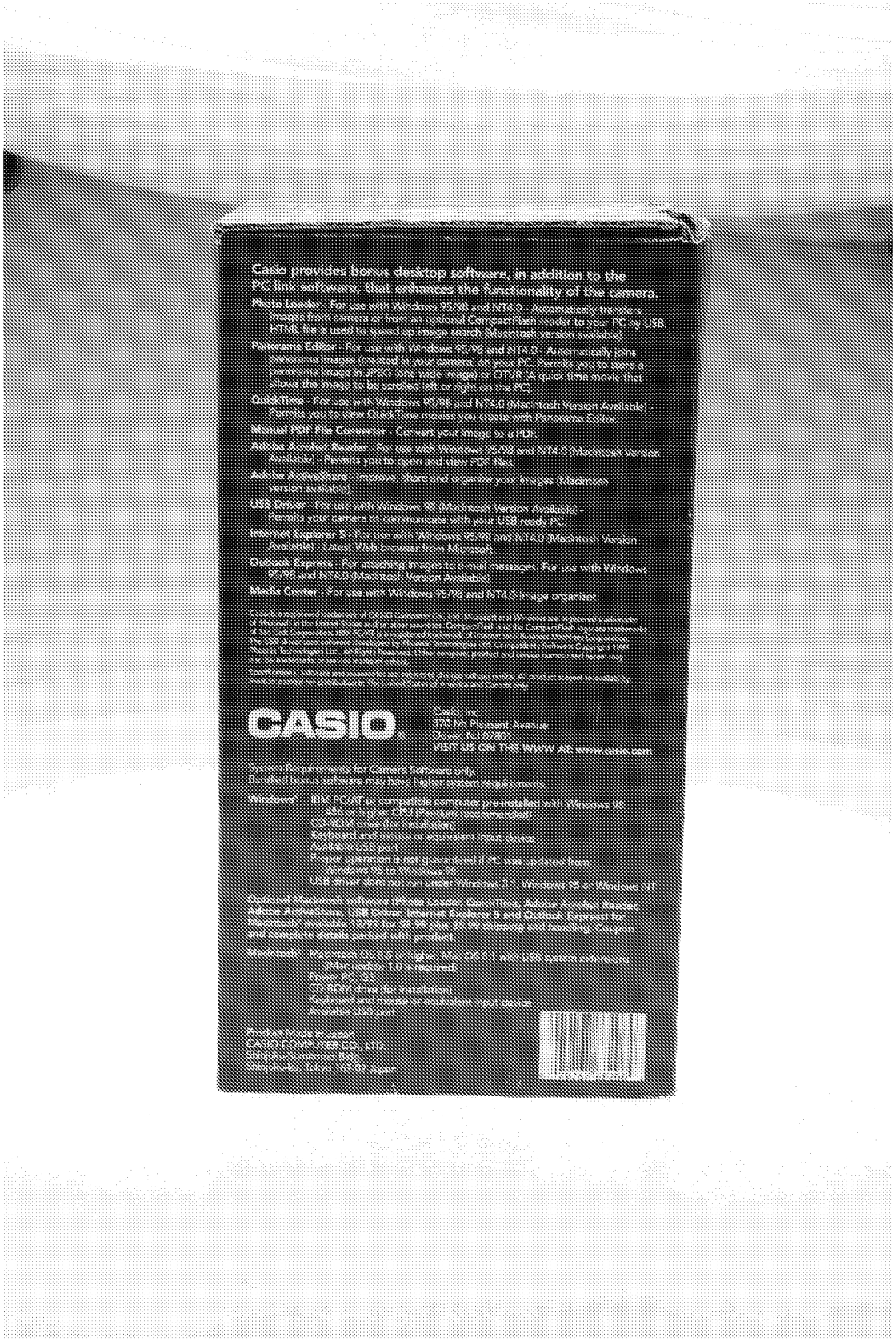



Appendix E

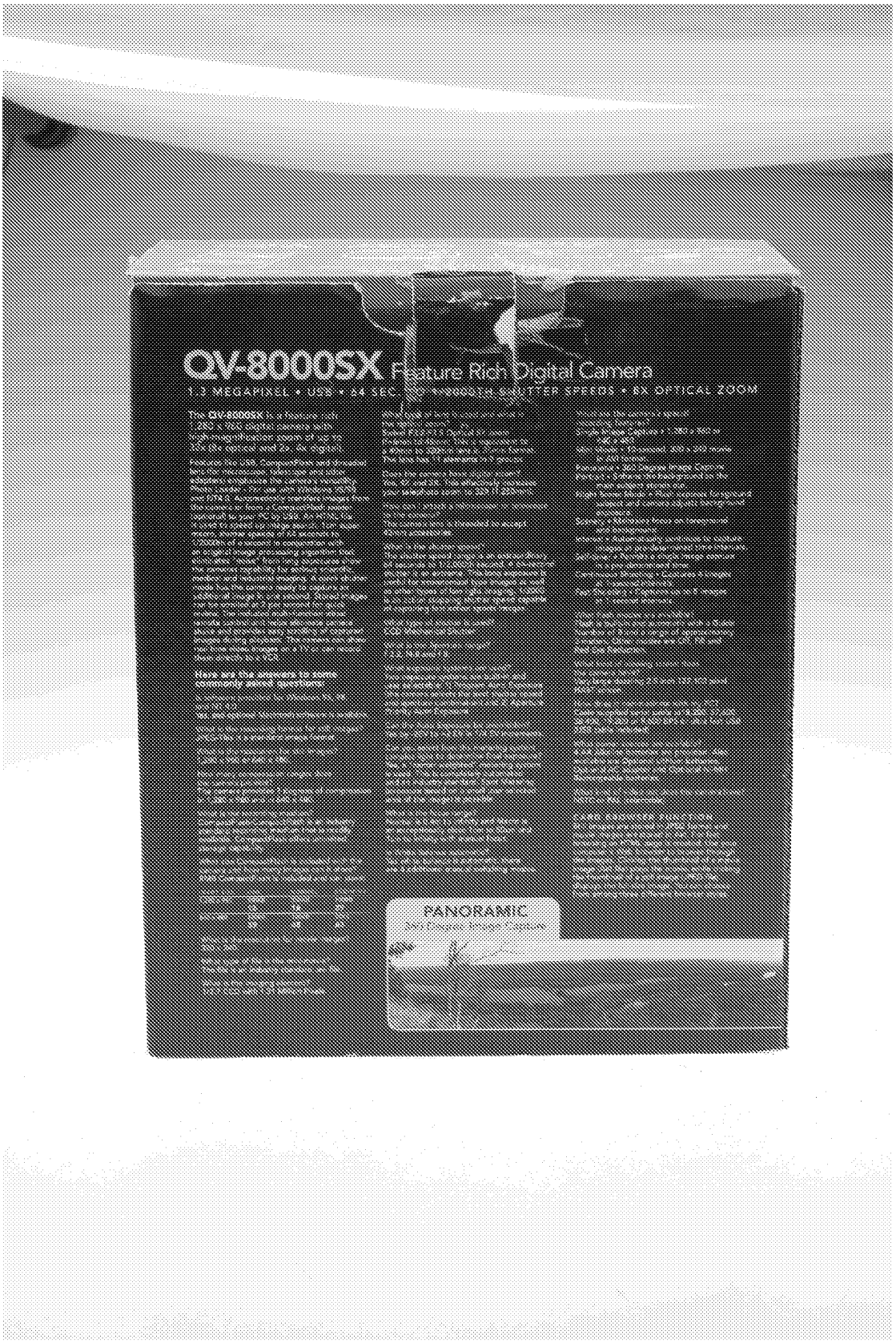
Appendix E


CASIO
QV-8000SX
Feature Rich Digital Camera
1280x960
RESOLUTION
1.3 MEGAPIXEL
64 SEC. TO 1/2000TH SHUTTER SPEEDS

Appendix E


Casio provides bonus desktop software, in addition to the PC link software, that enhances the functionality of the camera.
CASIO

Appendix E



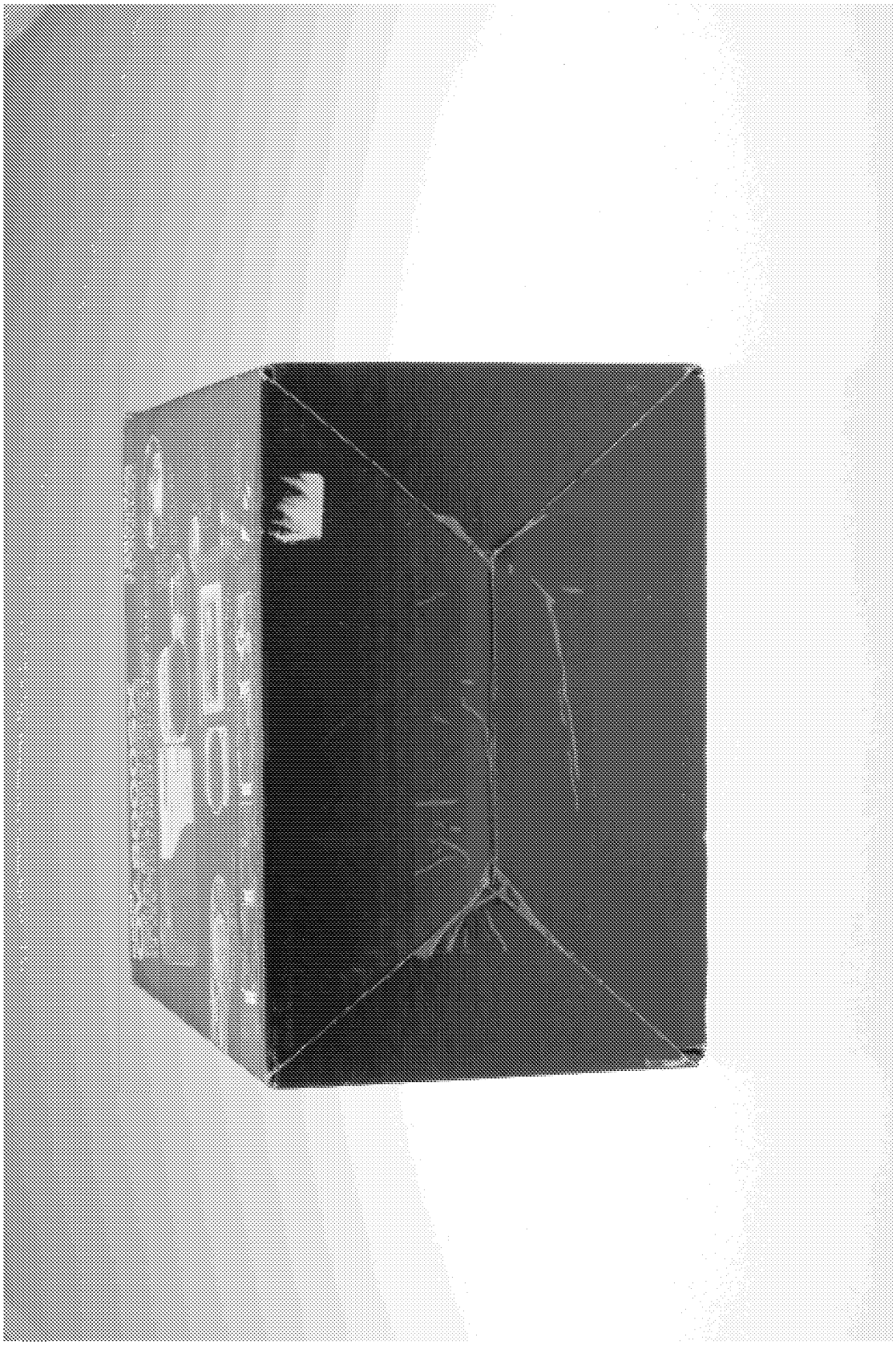

Appendix E


QV-8000SX
Feature Rich Digital Camera
1.3 MEGAPIXEL • USB • 6X OPTICAL ZOOM
SPECIFICATIONS
Visit the Casio homepage at: www.casio.com
to see the latest QV accessories.

Appendix E

AV8000X
Four-Head Digital Camera
SPECIAL RECORDING FEATURES

Appendix E



Appendix E

To: Stephanie Boozer <stephanie@quink.com>
From: Dave Etchells <detchells@imaging-resource.com>
Subject: Re: Sony text
Cc:
Bcc: "ƒ: People: Stephanie"
X-Attachments:

Hi Stephanie -

Outstanding! - I'm battling with the !*#! DC215 review, wish I'd just gone ahead and had you rewrite it from scratch while I still had the camera! It's taking me forever, makes me appreciate having you to do the bulk of the writing all the more!

If you're available to shoot with the QV-8000 tomorrow, that'd be fine, otherwise, I'll probably just look to have you come out right after Thanksgiving. We'll be leaving sometime Wednesday afternoon, won't be back until Saturday night late.

Thanks again,
Dave E.

At 11:29 AM -0500 11/22/99, Stephanie Boozer wrote:

> Hey Dave,
>
> Sorry about the delay, we've had connectivity problems since Friday. Adam is still battling with BellSouth. But, we've reached a temporary solution. (We're basically just waiting for them to change the MAC address from the old G3 to the new one...).
>
> Anyway, here's the text. I'm working on the Casio and hope to complete it tonight or in the morning. I'll give you a status report on that one soon.
>
> Hope you had a good weekend...
>
> Stephanie
>
> Content-Type: application/rtf; x-mac-type="52544620"; x-mac-creator="4D535744";
> name="Sony DSC-F505.rtf"
> Content-Description: Unknown Document
> Content-Disposition: inline;
> filename="Sony DSC-F505.rtf"
>
> Attachment converted: G3 HD:Sony DSC-F505.rtf (RTF /MSWD) (0000C6A5)

```
X-From_: stephanie@quink.com  Mon Nov 22 18:26:06 1999
Date: Mon, 22 Nov 1999 18:32:43 -0500
From: Stephanie Boozer <stephanie@quink.com>
X-Accept-Language: en
To: Dave Etchells <detchells@imaging-resource.com>
Subject: Casio QV-8000SX text

Here's the Casio text.  See you in the morning between 11 & 12...

Stephanie

Content-Type: application/rtf; x-mac-type="52544620"; x-mac-creator="4D535744";
 name="Casio QV-8000SX.rtf"
Content-Description: Unknown Document
Content-Disposition: inline;
 filename="Casio QV-8000SX.rtf"

Attachment converted: G3 HD:Casio QV-8000SX.rtf (RTF /MSWD) (0000CC40)
```

Q8DBASF.JPG

**File name:** Q8DBASF.JPG
**File size:** 137014 bytes (640x480, 3.6bpp, 7x)
**EXIF Summary:** 1/39s f/3.2 6.99mm

Camera-Specific Properties:

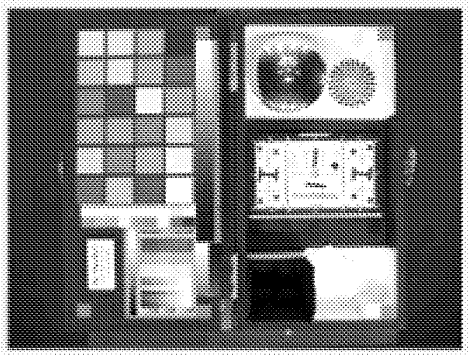
| | |
|---|---|
| **Equipment Make:** | CASIO |
| **Camera Model:** | QV-800SX |
| **Camera Software:** | 99.06.16.13.38 |
| **Maximum Lens Aperture:** | f/3.2 |

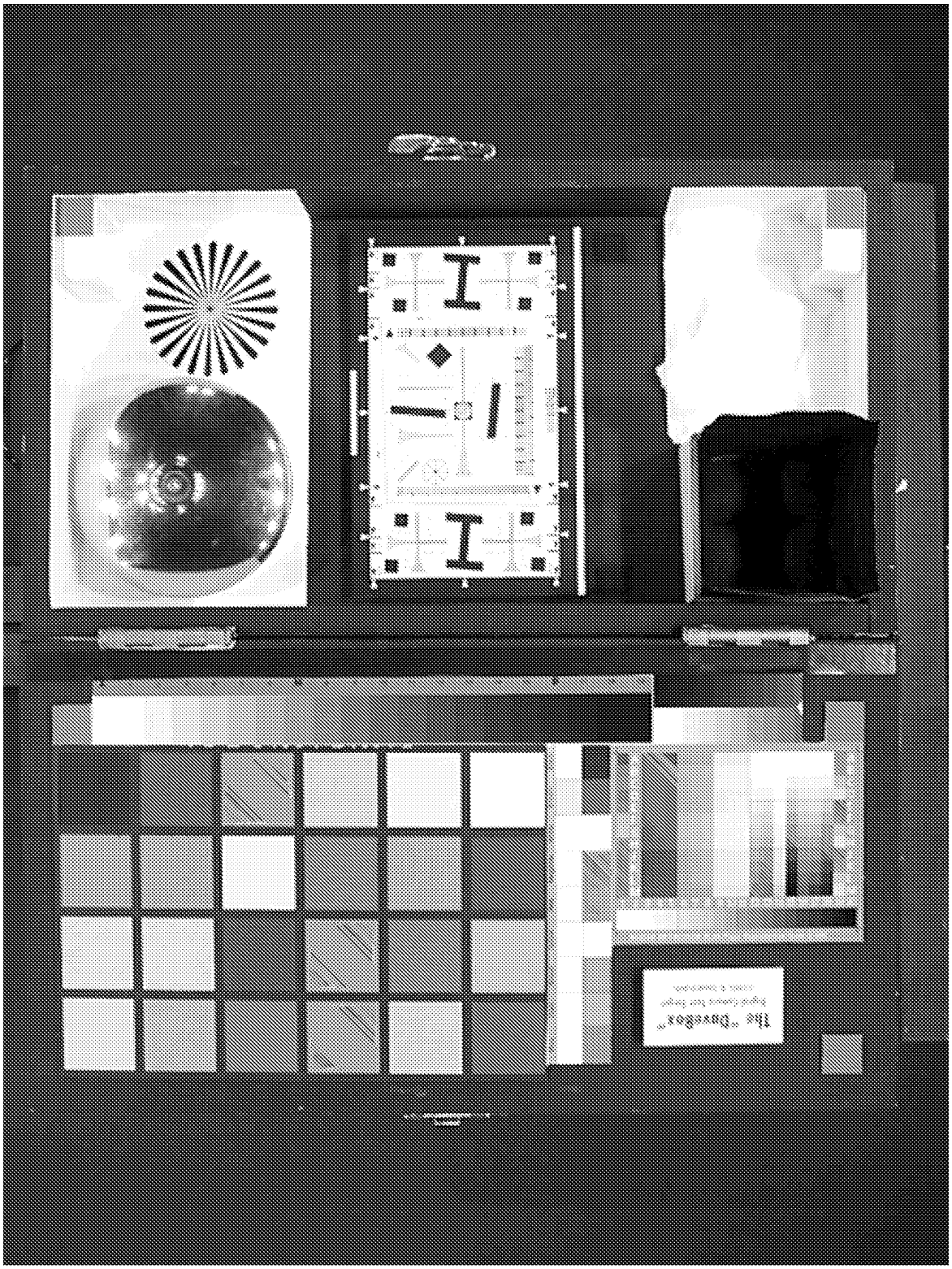
Image-Specific Properties:

| | |
|---|---|
| **Image Orientation:** | Top, Left-Hand |
| **Horizontal Resolution:** | 72 dpi |
| **Vertical Resolution:** | 72 dpi |
| **Image Created:** | 1999:12:07 15:10:08 |
| **Exposure Time:** | 2500/98637 sec |
| **F-Number:** | f/3.2 |
| **Exposure Program:** | Normal Program |
| **Exposure Bias:** | 0 EV |
| **Metering Mode:** | Pattern |
| **Flash:** | No Flash |
| **Focal Length:** | 6.99 mm |
| **Color Space Information:** | sRGB |
| **Image Width:** | 640 |
| **Image Height:** | 480 |
| **Recording Mode:** | Single Shutter |
| **Quality Setting:** | Fine |
| **Focusing Mode:** | Auto |
| **Flash Mode:** | Off |
| **Flash Intensity:** | Normal |
| **White Balance:** | Auto |
| **Sharpness:** | Normal |
| **Contrast:** | Normal |
| **Saturation:** | Normal |
| **Sensitivity:** | Normal |

Other Properties:

| | |
|---|---|
| **Resolution Unit:** | i |
| **Chrominance Comp Positioning:** | Centered |
| **Exif IFD Pointer:** | 210 |
| **Compression Scheme:** | JPEG Compression (Thumbnail) |
| **Horizontal Resolution:** | 72 dpi |
| **Vertical Resolution:** | 72 dpi |
| **Resolution Unit:** | i |
| **Offset to JPEG SOI:** | 814 |
| **Bytes of JPEG Data:** | 5429 |
| **Exif Version:** | 2.10 |
| **Image Generated:** | 1999:12:07 15:10:08 |
| **Image Digitized:** | 1999:12:07 15:10:08 |
| **Meaning of Each Comp:** | Unknown |
| **Image Compression Mode:** | 4 |
| **File Source:** | Other |
| **Object Distance:** | 781 |





Appendix I

Appendix J

```
X-From_: stephanie@quink.com  Mon Jan 10 14:51:19 2000
Date: Mon, 10 Jan 2000 14:53:58 -0500
From: Stephanie Boozer <stephanie@quink.com>
X-Accept-Language: en
To: Dave Etchells <detchells@imaging-resource.com>
Subject: QV-8000 Image Analysis

Hey there -- here ya go!  I think my monitor may need some calibration.
Some shots seemed pinker than they should be. One thing I forgot to
mention over the phone is that I don't have House images from the QV8K.
So, everything is done except House, Low-Light and the Res Target.

Stephanie

Content-Type: application/rtf; x-mac-type="52544620"; x-mac-creator="4D535744";
 name="QV8K analysis.rtf"
Content-Description: Unknown Document
Content-Disposition: inline;
 filename="QV8K analysis.rtf"

Attachment converted: G3 HD:QV8K analysis.rtf (RTF /MSWD) (0001AB48)
```

PTO/SB/57 (01-18)
Approved for use through 11/30/2021. OMB 0651-0064
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(Also referred to as FORM PTO-1465)

# REQUEST FOR *EX PARTE* REEXAMINATION TRANSMITTAL FORM

Address to:
**Mail Stop *Ex Parte* Reexam**
**Commissioner for Patents**
**P.O. Box 1450**
**Alexandria, VA 22313-1450**

**Attorney Docket No.:** 2638-19.00

**Date:** December 10, 2020

1. ☒ This is a request for *ex parte* reexamination pursuant to 37 CFR 1.510 of patent number 8,339,493 issued December 25, 2012. The request is made by:
   ☐ patent owner. ☒ third party requester.

2. ☒ The name and address of the person requesting reexamination is:
   Apple Inc.
   One Apple Park Way
   Cupertino, CA 95014

3. Requester ☐ asserts small entity status (37 CFR 1.27) or ☐ certifies micro entity status (37 CFR 1.29). Only a patent owner requester can certify micro entity status. Form PTO/SB/15A or B must be attached to certify micro entity status.

4. This request is accompanied by payment of the reexamination fee as set forth in:
   ☒ 37 CFR 1.20(c)(2); **or**
   ☐ 37 CFR 1.20(c)(1). **In checking this box for payment of the fee set forth in 37 CFR 1.20(c)(1), requester asserts that this request has forty (40) or fewer pages and complies with all other requirements of 37 CFR 1.20(c)(1).**

   Payment of the reexamination fee is made by the method set forth below.
   a. ☐ A check in the amount of $_____ is enclosed to cover the reexamination fee;
   b. ☒ The Director is hereby authorized to charge the reexamination fee to Deposit Account No. 50-6159;
   c. ☐ Payment by credit card. Form PTO-2038 is attached; **or**
   d. ☒ Payment made via EFS-Web.

   ☒ In addition, the Director is hereby authorized to charge any fee deficiencies to Deposit Account No. 50-6159.

5. ☒ Any refund should be made by ☐ check or ☒ credit to Deposit Account No. 50-6159. 37 CFR 1.26(c). If payment is made by credit card, refund must be to credit card account.

6. ☒ A copy of the patent to be reexamined having a double column format on one side of a separate paper is enclosed. 37 CFR 1.510(b)(4).

7. ☐ CD-ROM or CD-R in duplicate, Computer Program (Appendix) or large table
   ☐ Landscape Table on CD



This collection of information is required by 37 CFR 1.510. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) a request for reexamination. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 18 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Mail Stop *Ex Parte* Reexam, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

8. ☐ Nucleotide and/or Amino Acid Sequence Submission
*If applicable, items a. – c. are required.*
   a. ☐ Computer Readable Form (CRF)
   b. Specification Sequence Listing on:
      i. ☐ CD-ROM (2 copies) or CD-R (2 copies) **or**
      ii. ☐ paper
   c. ☐ Statements verifying identity of above copies.

9. ■ A copy of any disclaimer, certificate of correction or reexamination certificate issued in the patent is included.

10. ■ Reexamination of claim(s) 5 and 6 is requested.

11. ■ A copy of every patent or printed publication relied upon is submitted herewith including a listing thereof on Form PTO/SB/08, PTO-1449, or equivalent.

12. ☐ An English language translation of all necessary and pertinent non-English language patents and/or printed publications is attached.

13. ■ The attached detailed request includes at least the following items:
   a. A statement identifying each substantial new question of patentability based on prior patents and printed publications. 37 CFR 1.510(b)(1).
   b. An identification of every claim for which reexamination is requested, and a detailed explanation of the pertinency and manner of applying the cited art to every claim for which reexamination is requested. 37 CFR1.510(b)(2).

14. ☐ A proposed amendment is included (only where the patent owner is the requester). 37 CFR 1.510(e).

15. ■ It is certified that the statutory estoppel provisions of 35 U.S.C. 315(e)(1) or 35 U.S.C. 325(e)(1) do not prohibit requester from filing this *ex parte* reexamination request. 37 CFR 1.510(b)(6).

16. Service
   a. ■ It is certified that a copy of this request (if filed by other than the patent owner) has been served in its entirety on the patent owner as provided in 37 CFR 1.33(c).

      The name and address of the party served are:

      MATTINGLY & MALUR, PC
      1800 Diagonal Road, Suite 210
      Alexandria, VA 22314

      Date of Service: December 9, 2020

   **OR**

   b. ☐ A duplicate copy is enclosed since service on patent owner was not possible. An explanation of the efforts made to serve patent owner **is attached**. See MPEP 2220.

17. Correspondence Address: Direct all communication about the reexamination to:

☒ The address associated with Customer Number: 118925

**OR**

☐ Firm or Individual Name _____
(at the address identified below)

Address

| City | State | Zip |
|---|---|---|
| | | |

| Country | |
|---|---|
| | |

| Telephone | Email |
|---|---|
| | |

18. ☐ The patent is currently the subject of the following concurrent proceeding(s):

a. ☐ Copending reissue Application No. _____

b. ☐ Copending reexamination Control No. _____

c. ☐ Copending Interference No. _____

d. ☐ Copending litigation styled:

_____

_____

**WARNING : Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.**

| /Jennifer C. Bailey/ | December 10, 2020 |
|---|---|
| Authorized Signature | Date |
| Jennifer C. Bailey | 52,583 |
| Typed/Printed Name | Registration No. |

☐ For Patent Owner Requester ☐ For Third Party Requester

# Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PTO/SB/08a (07-09)
Approved for use through 11/30/2020. OMB 0651-0031
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Substitute for form 1449/PTO

# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

*(Use as many sheets as necessary)*

Sheet 1 of 2

| Complete if Known | |
|---|---|
| Application Number | |
| Filing Date | |
| First Named Inventor | Takahiro Nakano |
| Art Unit | |
| Examiner Name | |
| Attorney Docket Number | 2638-19.00 |

**U. S. PATENT DOCUMENTS**

| Examiner Initials* | Cite No.[1] | Document Number<br>Number-Kind Code[2] *(if known)* | Publication Date MM-DD-YYYY | Name of Patentee or Applicant of Cited Document | Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear |
|---|---|---|---|---|---|
| | EX 1005 | US-7903162 B2 | 2011-03-08 | Juen | |
| | EX 1006 | US-5444482 | 1995-08-22 | Misawa et al. | |
| | EX 1013 | US-5502483 | 1996-03-26 | Takase et al. | |
| | EX 1014 | US-4949117 | 1990-08-14 | Van Heyningen et al. | |
| | EX 1015 | US-5150109 | 1992-09-22 | Berry | |
| | EX 1016 | US-6335760 B1 | 2002-01-01 | Sato | |
| | EX 1017 | US-5642171 | 1997-06-24 | Baumgartner et al. | |
| | EX 1019 | US-4740828 | 1988-04-26 | Kinoshita | |
| | EX 1020 | US-6018363 | 2000-01-25 | Horii | |
| | EX 1022 | US-6512541 B2 | 2003-01-28 | Dunton et al. | |
| | EX1023 | US-6563535 B1 | 2003-05-13 | Anderson | |
| | EX 1024 | US-4612575 | 1986-09-16 | Ishman et al. | |
| | EX 1028 | US-6963361 | 2005-11-08 | Kawahara et al. | |
| | | US- | | | |
| | | US- | | | |
| | | US- | | | |
| | | US- | | | |
| | | US- | | | |
| | | US- | | | |

**FOREIGN PATENT DOCUMENTS**

| Examiner Initials* | Cite No.[1] | Foreign Patent Document<br>Country Code[3] -Number [4] -Kind Code[5] *(if known)* | Publication Date MM-DD-YYYY | Name of Patentee or Applicant of Cited Document | Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear | T[6] |
|---|---|---|---|---|---|---|
| | EX 1021 | EP 0802688 B1 | 2006-08-09 | Hitachi, Ltd. | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

| Examiner Signature | | Date Considered | |
|---|---|---|---|

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5]Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

*If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.*

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Substitute for form 1449/PTO

# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

*(Use as many sheets as necessary)*

Sheet 2 of 2

| *Complete if Known* | |
|---|---|
| **Application Number** | |
| **Filing Date** | |
| **First Named Inventor** | Takahiro Nakano |
| Art Unit | |
| Examiner Name | |
| Attorney Docket Number | 2638-19.00 |

## NON PATENT LITERATURE DOCUMENTS

| Examiner Initials* | Cite No.[1] | Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published. | T[2] |
|---|---|---|---|
| | EX 1002 | File History of U.S. Patent No. 8,339,493 (12/845,266) | |
| | EX 1004 | Casio LCD Digital Camera QV-8000SX User's Guide | |
| | EX 1011 | File History for U.S. Application Serial No. 15/959,774 | |
| | EX 1012 | File History for U.S. Application Serial No. 15/386,656 | |
| | EX 1018 | Holst, Gerald C., "CCD Arrays, Cameras, and Displays," 2d. Ed., JCD Publ. 1998. | |
| | EX 1025 | Complaint for Patent Infringement, Maxell Ltd. v. Apple Inc, No. 5:19-cv-0036-RWS (E.D. Tex. Mar. 15, 2019), Document No. 1. | |
| | EX 1026 | Claim Construction Memorandum and Order, Maxell Ltd. v. Apple Inc, No. 5:19-cv-0036-RWS (E.D. Tex. Mar. 18, 2020), Document No. 235. | |
| | EX1027 | Patent Owner Preliminary Response to Petition for Inter Partes Review of U.S. Patent 8,339,493, Apple Inc. v. Maxell, Ltd., IPR2020-00597, Paper 6. | |
| | | | |
| | | | |

| Examiner Signature | | Date Considered | |
|---|---|---|---|

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

1 Applicant's unique citation designation number (optional). 2 Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO:**

**Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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**EXHIBIT 1010**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

| | |
|---|---|
| *In re* reexamination of: Nakano et al. | Confirmation No.: *To Be Assigned* |
| U.S. Patent No. 8,339,493 B2 | Art Unit: *To Be Assigned* |
| Issue Date: December 25, 2012 | Examiner: *To Be Assigned* |
| Title: ELECTRIC CAMERA | Third Party Requester Docket No. 2638-19.00 |

**Mail Stop *Ex Parte* Reexam**
Attn: Central Reexamination Unit
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

**DECLARATION OF DAVID ETCHELLS IN SUPPORT OF REEXAMINATION REQUEST FOR U.S. PATENT NO. 8,339,493**

I, David Etchells, declare as follows:

1. My name is David Etchells. I am over the age of eighteen (18) and otherwise competent to make this declaration. The statements made in this declaration are to the best of my knowledge and recollection. I have personal knowledge of the facts set forth in this Declaration, and, for facts stated on information and belief, I have been provided with information by a person having personal knowledge of such facts. If called as a witness, I could and would testify competently under oath to the facts stated in this declaration. I am being paid at my standard hourly rate of $250.00 as a non-technical witness. My compensation is not contingent upon the outcome of this Reexamination.

2. I was the Founder, Publisher, and Editor in Chief of Imaging Resource, a Photography News and Review website from April of 1998 until mid-March of 2020, when I sold the brand and website to a third party. I launched the Imaging Resource website on April 1, 1998, to provide photographers with unbiased, detailed information on digital cameras, particularly actual sample photos shot under carefully-controlled conditions. In addition to my managerial role, I authored numerous product reviews and articles published by Imaging Resource.

3. I have been a photographer for all my life, starting photography in 1970, maintaining a dark room for personal use while earning a BSEE and MSEE degree from UCLA with a specialization in semiconductor physics.

4. Prior to founding Imaging Resource, I worked in the California aerospace industry and delved deeply into image processing architectures while working at the Hughes Research Labs in Malibu, California and was named as an inventor on three image-processing patents. I also ran a Macintosh-based systems integrator (Perspect Systems) in LA in the early 1990s. Some of our clients produced huge volumes of photography for mail-order catalogs, and a study I did for one of our clients in 1992 on the economics and performance of digital studio cameras turned into a widely-circulated industry report, recognized in the Seybold Report and marketed through the Future Image organization.

5. During my work for Imaging Resource, I wrote a product review for the Casio QV8000SX digital camera. My review of the QV8000SX digital camera was first posted on Imaging Resource's website on January 26, 2000. A copy of this product review is attached to this Declaration as Appendix A. I downloaded this product review from the Imaging Resource website approximately January 2020.

6. After viewing a press release issued by Casio covering the QV8000SX digital camera, I became interested in writing a product review of this new camera. To begin my product review, I initially reached out to Pat Carrasco at Casio on August 23, 1999, requesting the QV8000SX digital camera. A copy of this email chain is attached as Appendix B, which included the following:

>I'm very eager to get your new cameras, particularly the QV-2000 and
>QV-8000 onto our site. The 3-megapixel cameras are drawing large amounts
>of traffic overall, and the QV-2000 in particular has a number of
compelling
>features, such as Microdrive compatibility, USB interface, and a 2 second
>cycle time. (There's been a lot of interest in Microdrives lately, we
could
>arrange with Microtech to feature a test of the Microdrive in conjunction
with
>your new camera, which would make it doubly interesting for
>readers.) Likewise,
>the QV-8000's 8x zoom is an exciting feature in the 1.3 megapixel arena.

(Appendix B). I subsequently received a response dated September 21, 1999, from Cheryl Balbach at Casio, where she referenced sending me the QV800SX camera:

At 2:18 PM -0400 9/21/99, Balbach, Cheryl wrote:
> Hi Dave -
>
> How are you? We are finally back to work after 2-1/2 days off due to Floyd.
> We had no power
> or telephones.
> I have forwarded your e-mail to the appropriate people for approval. I do
> want to verify the
> price you have listed of $12K. If we sent you the QV-2000UX and QV-8000SX,
> wouldn't
> it be $4,000? I will let you know when I hear back from them.
>
> Thanks.
>
> Cheryl Balbach
> 973-361-5400, ext. 1551
> http://www.casio.com

*Id.*

7. Casio thereafter provided me with a QV8000SX digital camera. An email attached as Appendix C and dated November 1, 1999, confirms that I had received the QX8000SX digital camera from Casio at least as early as November 1, 1999. This email (Appendix C) is between a colleague, Mike Pasini, and me. In the

email, I write to Mr. Pasini that we just received the Casio QV-8000SX:

> One/two additions: The new Casios look pretty interesting, but we've only just gotten them in, haven't looked at *any* results yet.
> (That's the QV-2000UX, and QV-8000SX)

(Appendix C).

8. I received the Casio QV8000SX digital camera in its original packaging. Included in the packaging, along with the camera itself, was a paper copy of a user's manual, which is still in my possession. A photocopy of this paper user's manual is attached to this declaration as Appendix D. Photos of the Casio QV8000SX camera, user's manual, and original packaging, which I currently have in my possession, are attached as Appendix E.

9. My standard practice both in 1999 and since then has been to request from a company the open market, consumer version of the product for which Imaging Resource will perform a product review. Because Imaging Resource is a website dedicated to providing comprehensive product reviews to consumers of the products, my standard practice both in 1999 and since has been to perform the product review on the same version of the product available to consumers. Based upon information and belief, the Casio QV8000SX camera provided by Casio to me for preparing the product review was the consumer version of the product (i.e., the version a consumer would purchase). The photos of Appendix E include photos of the original packaging for the camera that I received (and which, as I stated in above

¶ 8, I currently have in my possession). In my opinion, the original packaging appears to be packaging for a camera to be sold to a user. It is my recollection the Casio QV8000SX camera was available for purchase by the time I received the camera from Casio (by at least November 1, 1999).

10. I was not required to sign a non-disclosure agreement or otherwise restricted in any way from the distribution of materials relating to the Casio QV8000SX digital camera. Casio did not require any confidentiality from me or Imaging Resource as part of preparing and publishing the product review of the Casio QV8000SX camera.

11. Attached as Appendix F is an email dated November 22, 1999, from my colleague at Imaging Resource, Stephanie Boozer, to me where Ms. Boozer refers to "working on the Casio and hope to complete it tonight or in the morning." (Appendix F). Ms. Boozer is referring to working on the product review for the Casio QV8000SX. I know this, because my response to Ms. Boozer, also provided at Appendix F, refers to her being available to shoot test photos for the QV-8000SX:

> If you're available to shoot with the QV-8000 tomorrow, that'd be fine, otherwise, I'll probably just look to have you come out right after Thanksgiving. We'll be leaving sometime Wednesday afternoon, won't be back until Saturday night late.

(Appendix F). Later in the day on November 22, 1999, Ms. Boozer sent me another email (Appendix G) with the "Casio text" referenced from her email in Appendix F. As can be seen in the attachment information to the email of Appendix F, the

filename for the attachment was "Casio QV-8000SX.rtf."

**Stephanie Boozer, 11/22/99 6:32 PM -0500, Casio QV-8000SX text**

```
X-From_: stephanie@quink.com  Mon Nov 22 18:26:06 1999
Date: Mon, 22 Nov 1999 18:32:43 -0500
From: Stephanie Boozer <stephanie@quink.com>
X-Accept-Language: en
To: Dave Etchells <detchells@imaging-resource.com>
Subject: Casio QV-8000SX text

Here's the Casio text.  See you in the morning between 11 & 12...

Stephanie

Content-Type: application/rtf; x-mac-type="52544620"; x-mac-creator="4D535744";
 name="Casio QV-8000SX.rtf"
Content-Description: Unknown Document
Content-Disposition: inline;
 filename="Casio QV-8000SX.rtf"

Attachment converted: G3 HD:Casio QV-8000SX.rtf (RTF /MSWD) (0000CCA0)
```

12. Attached as Appendix H is a listing of EXIF data from an image file of an image taken with the Casio QV8000SX. As can be seen towards the bottom of Appendix H, the "Image Generated" and "Image Digitized" date is December 7, 1999. The EXIF data file is the data file generated by the QV8000SX camera corresponding to a particular JPG image file stored by the camera. As shown at the top of Appendix H, the filename for the image file is "Q8DBASF.JPG."

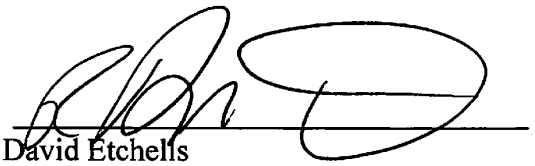
13. Attached as Appendix I is the JPG image file for Appendix H, namely the file "Q8DBASF.JPG."

14. Attached as Appendix J is a screen capture of Imaging Resource's stored files related to the Casio QV8000SX, as indicated by the folder info "Q8K" at the top of the document. Appendix J shows the filename "Q8DBASF.JPG" having a saved date of January 7, 2000.

15. Attached as Appendix K is an email dated January 10, 2000, from my colleague, Ms. Boozer, to me, attaching the QV-8000 image analysis (see subject line of the email and the filename of the attachment on the email). The referenced "image analysis" would have been a discussion of the quality of the images taken by the Casio QV8000SX to include with the product review.

16. As evidenced by the emails referenced above, the product review was drafted in November 1999 and December 1999 and eventually posted by Imaging Resource on January 26, 2000. (Appendix A.) The review references the QV-8000SX as one of the most versatile cameras *on the market* and having one of the widest zoom ranges *on the market*. (Appendix A, page 18).

I declare that all statements made herein of my knowledge are true, and that all statements made on information and belief are believed to be true, and that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

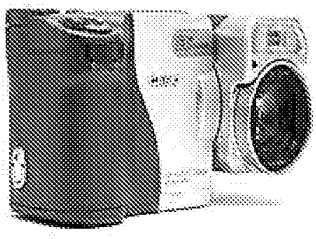
By: 
David Etchells

Date: 12/7/2020

## Casio QV-8000SX

*Casio delivers 2 million pixels, and "real camera" features (including full-manual exposure!)*

***(Review first posted 1/26/2000***



***1.3 megapixel CCD, 1280x960 images**

***8X (!) optical zoom, plus 2x/4x digital zoom**

***Time exposures to 64 seconds (!)**

***Full-manual exposure option**

## EZ Print Link

Readers have requested free-formatted versions of our reviews (without the graphical accouterments of our page design), to make printing easier. We are accommodating this request with special copies of each review, formatted to allow the text flow to be dictated by the browser window. Click here for a print-optimized page.

## Manufacturer Overview

Casio was one of the very first companies to produce digital cameras for consumers, and their original QV-10 digicam introduced digicam users to the wonders of LCD viewscreens. What a concept! It's become almost mandatory these days, but back when the QV-10 was first introduced, the feature was a real eye-opener.

## Highlights

Appendix A

- 1.3 megapixel CCD delivering up to 1280 x 960 pixel images.
- 2.5 inch low glare, Hyper Amorphous TFT color LCD panel (122,100 pixels at 555 x 220).
- F/3.2-3.5, 6 to 48mm, 8x zoom(!), swivel lens (equivalent to a 40 to 320mm on a 35mm camera).
- 2x/4x digital zoom.
- Apertures of F/3.2, F/4.8 and F/8.
- Shutter speed options from Bulb to 64 (!) to 1/2000 seconds.
- Multi-pattern, spot and center weighted exposure metering options.
- Exposure compensation from -2 to +2 EV in 0.25 EV increments.
- Program AE, Aperture Priority, Shutter Priority, and Full Manual exposure modes.
- Contrast detect TTL autofocus with manual and infinity focus modes as well as focus lock.
- Panorama mode supports full 360 degree in-camera display.
- White balance with four modes.
- Built-in flash with four modes (Auto, On, Off and Red-Eye Reduction). Multi-pattern, center point and spot metering modes
- Movie and still capture modes.
- USB and serial connections.
- Wired remote control.
- DPOF (Digital Print Order Format) compatibility for image printing.
- Image capture in JPEG (Exif.Ver.2.1) for still images and AVI files for movie images

## Executive Overview

Casio labels the QV-8000SX as a "versatile" digital camera on its packaging, and the product certainly lives up to that billing. It boasts a plethora of features and operating modes, including a full 8x optical zoom lens that swivels separately from the body, flexible exposure options, including aperture and shutter-priority autoexposure calculation, time exposures up to 64 seconds(!) and much more. Here's a quick rundown of the major camera features; see the individual sections of the full review for more detail.

We really like the rotating lens concept (invented by Casio, introduced way back in digicam prehistory on their original QV-10), and would like to see it adopted by more manufacturers. The fact that the lens doesn't protrude very much from the camera body is another plus, keeping the entire camera reasonably compact and pocketable (for large pockets, at least). Additionally, the camera is quite lightweight (due to its all plastic body), adding to its portability. Control-wise, all the buttons and levers are laid out so that one handed operation is possible (a definite benefit in some shooting situations).

The QV-8000SX relies solely on its LCD for viewfinder operation, making it harder to use in very bright conditions, and also eliminating the power-saving option of using the camera with the LCD turned off. (We're big proponents of the dual optical/LCD viewfinder approach, as seen in Casio's QV-2000UX, which we reviewed previously.) The lack of an optical viewfinder also makes it more difficult to take advantage of the astonishing low-light capability of the QV-8000, since the live LCD viewfinder display only requires a moderate amount of light to work. For all that, the LCD is at least big and bright, at 2.5 inches and 122,100 pixels. An information display of camera settings and options can be canceled and recalled by hitting the Display button, with the exception of the flash mode icon and center focus target mark, which are always present. We were pleased with the optional grid function that superimposes a grid of light gray lines over the LCD image, significantly assisting with image composition and alignment.

The QV-8000SX has a 6 to 48mm, 8x zoom lens (equivalent to a 40 to 320mm lens on a 35mm camera). As we mentioned earlier, the lens actually swivels a full 270 degrees, enabling you to point the lens all the way back at yourself (useful during self-timer shots so you can see the countdown on the LCD panel). Filter threads on the inside lip of the lens accommodate 43mm diameter filters. Focus ranges from 1.3 feet (0.4m) to infinity at the wide angle end and from 3.3 feet (1m) to infinity at the telephoto end. In macro mode, focus ranges from 0.4 to 19.7 inches (1 to 50 cm) with auto focus and from 3.9 inches (10cm) to infinity with manual focus. The aperture can be manually or automatically controlled, with options of F/3.2, F/4.8 and F/8. A manually controlled 2x or 4x digital zoom option extends the optical zoom (8x) capabilities up to 32x, but with lesser image quality as a side effect. Focus options include Manual and Infinity modes.

The QV-8000SX is unusual in that it provides both fully automatic and optional manual exposure modes. You thus

have full auto, aperture or shutter priority, or full manual exposure options. Programmed modes such as Night Scene, Portrait and Landscape set up the camera for special shooting, saving time with preset options.
A built-in flash offers four operating modes: Auto, On, Off and Red-Eye Reduction. Auto puts the camera in control of the flash; On fires the flash with every exposure; Off completely suppresses the flash and Red-Eye Reduction emits a small pre-flash before firing the full flash to prevent the Red-Eye Effect. Normal flash power provides a working range from 1.6 to 8.2 feet (0.5 to 2.5m) and from 0.3 to 1.6 feet (0.1 to 0.5m) in macro mode and flash intensity is adjustable, with Strong, Normal or Weak settings.
Six white balance modes (Auto, Daylight, Shade, Tungsten, Fluorescent and Manual) are available. Automatic mode lets the camera govern white values based on existing light. Daylight, Shade, Tungsten and Fluorescent settings adjust white balance for various natural and artificial light values. Probably the most accurate when shooting under artificial light, the Manual setting sets the white value based on a sheet of white paper held in front of the lens.
Other exposure options include exposure compensation (EV adjustment), adjustable from -2 to +2 EV in .25 EV increments, resetting after each shot. Three metering options include Multi, Center and Spot settings. Multi averages the exposure based on the entire image while Center averages the values from a large area in the center of the image. Spot metering determines the exposure value from a small spot directly in the center of the frame.
The Quick Shutter and Continuous Recording options enable you to catch fast paced action shots. Quick Shutter records up to five images in approximately one second intervals with one multiple presses of the shutter button while Continuous Recording captures up to five images at approximately 0.25 second intervals while you hold the shutter button down. Shooting intervals in both modes depend on the image size and resolution and available CompactFlash space. To capture moving action, the movie recording mode records up to 10 second movies in 320 x 240 pixel AVI format. An interesting option here is the Past movie mode, which records events that occurred before the shutter button was pressed (the camera actually records images to a buffer memory and once the shutter button is pressed, copies those images to the CompactFlash).
You can also record a 360 degree panorama image (or up to nine consecutive shots) on the QV-8000SX through the Panorama record mode. A helpful feature is that after the first image is exposed, the right edge of the preceding image remains on the screen to help you line up the next shot properly. Images can be linked together in the camera (for playback only) or on the computer via the included Panorama Editor software (Windows users only).
Other recording options include the ability to record images in monochrome black and white or sepia tones, adding a little creativity to your shots. The self-timer counts down from two or 10 seconds once the shutter button is pressed and a separate timer function allows you to record a series of images at set intervals (from one to 60 minutes and up to 250 shots).
For image playback, US and Japanese models of the QV-8000SX come with an NTSC video connection cable (European models come with PAL) to connect the camera to your television set. If desired, the TV can also be used as a viewfinder when composing images, helpful in manually focusing on macro subjects, or in studio settings where you have to interact with the subject from in front of the camera. (Kid photography, etc.) Playback mode allows you to view images individually or as thumbnails, nine to a screen. You can also play back movies and panoramic images in the camera. A playback zoom feature lets you enlarge images and scroll around within the enlarged view.
Four AA alkaline, lithium or NiMH batteries keep the QV-8000SX running (you can also take advantage of the included AC adapter). Since the lack of the optical viewfinder reduces battery conservation options, we highly recommend keeping a spare set of batteries with you.
USB, serial and Mac adapter cables come with the QV-8000SX, as well as a software CD with PhotoLoader, Panorama Editor, Picture Works MediaCenter, QuickTime, Adobe ActiveShare, Adobe Acrobat Reader, Internet Explorer 5.0 and a trial version of Picture Works Web Publisher. For some reason, Casio only includes software compatible with Windows 95, 98 and NT 4.0, so Mac users must fend for themselves, or order the $10 accessory PhotoLoader program for Macs. When inserted into your computer, the CD displays a detailed menu with options to install the various software applications, read about the applications, register your camera online, go directly to the Casio website, open the accessory listing or fill out an accessory order form. Most of the software included offers relatively basic image correction and manipulation capabilities, but the trial version of Picture Works Web Publisher creates customized web pages that incorporate your QV-8000SX images. Additionally, Adobe Active Share allows you to post images to the ActiveShare.com website for easy viewing by family and friends
In the end, the QV-8000SX offers capabilities that both the novice and the expert photo consumer will appreciate.

## Appendix A

From the full manual capabilities to complete automatic control, the camera accommodates a variety of users. Plus, its compact shape and light weight make it a portable option for those of you on the go. We confess to some skepticism when we saw the "ultra versatile" billing on the QV-8000's box, but have to admit it's one of the most flexible digicams we've seen to date. (January, 2000).

## Design

At first glance, the QV-8000SX doesn't look too different from some of the digital camcorders out on the market. We personally like swivel-lens designs, as they give the consumer more shooting flexibility in both still and movie modes. The QV-8000SX's lens actually turns a full 270 degrees, meaning you can point the lens back at yourself! The lens is protected by a lens cap that avoids being a nuisance through its ability to clip onto the wrist/shoulder strap. (A nice little design touch, other manufacturers take note!) As for its other design features, the QV-8000SX gives you a nice hand grip, via the battery compartment, and an overall sleek design. The all plastic body makes the camera surprisingly light weight for its size, at only 11.6 ounces (330g) without the batteries. It's also fairly compact at 5.6 x 3.1 x 2.8 inches (142.5 x 77.5 x 71mm), excluding any protrusions.

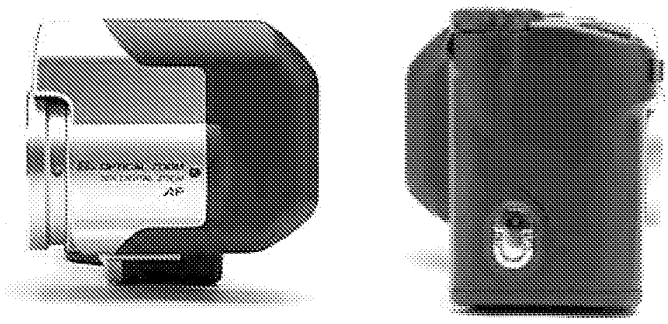



The front of the camera offers a minimalist design aesthetic, with smooth contours and few controls or features. The only control on the front is the slightly awkward optical zoom lever, which we've become accustomed to controlling on other digicams with our thumb on a back panel control.

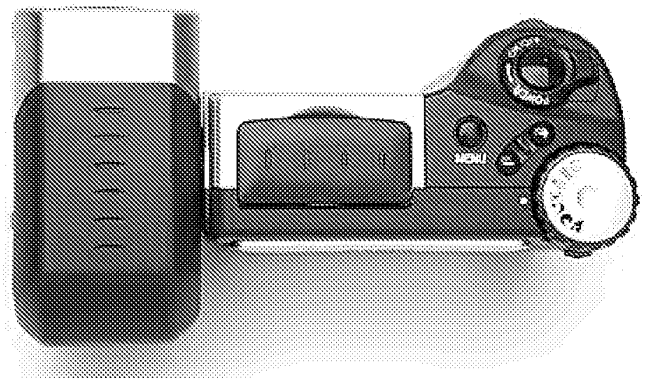



The back panel of the camera features the LCD monitor, various function controls and the Record/Play mode switch. Here too, the design is very minimal with clean lines and shapes.

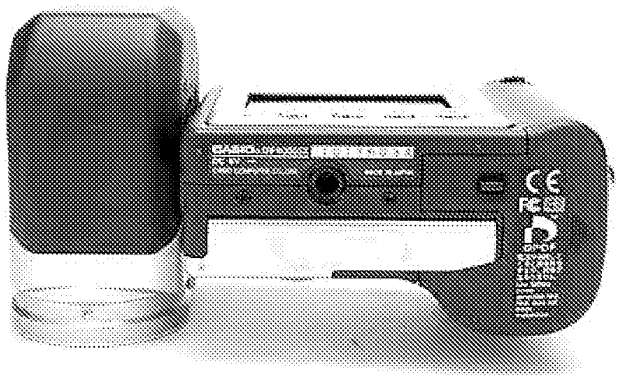
Appendix A



Both sides of the camera are feature free, with the exception of the wrist/shoulder strap attachment on the side opposite the lens.



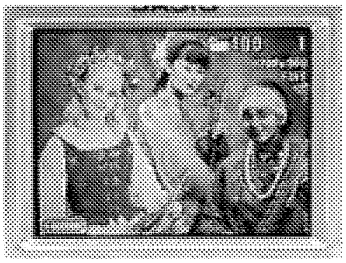
The top of the camera carries the shutter button, power switch, mode dial, menu and various other buttons. The I/O and AC adapter jacks are covered by a plastic flap that snaps closed.



Finally, the bottom of the camera holds the plastic tripod mount, locking battery compartment and CompactFlash slot. One note here is that the placement of the battery and CompactFlash compartments makes it impossible to change out either one while mounted to a tripod (a design issue we notice when doing studio work).

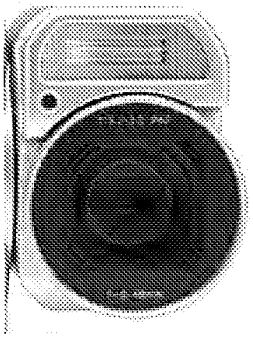
## Viewfinder

The QV-8000SX has done away with the optical viewfinder, utilizing the LCD monitor as its sole viewfinder. In some respects, this makes sense since the LCD viewfinder provides a TTL (through the lens) view, and is therefore more true to the captured image. Alternatively, when it comes to power conservation, optical viewfinders really help squeeze



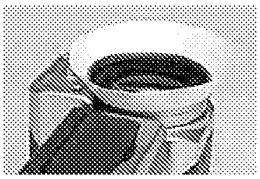
the most out of the batteries. Just keep this in mind and have some spare batteries handy. Optical viewfinders are also very handy in both very bright and very dim light, where the image on the LCD can be difficult or impossible to see. The 2.5 inch, low glare, color Hyper Amorphous TFT LCD monitor displays images at 122,100 pixels (555 x 220). An information display can be canceled or recalled by hitting the Display button, with the exception of the flash mode icon and center focus target mark, which are always present. There's also a very handy grid function that can be turned on or off, helping you line up shots. (We really like this optional grid of light gray horizontal and vertical lines, as we've very often ended up with digicam images that were slightly rotated, when we thought everything was nice and level. You can always rotate the photo after the fact in an image editor, but it's preferable by far to avoid the problem in the first place.)

## Optics



A 6 to 48mm, 8x zoom lens comes on the QV-8000SX (equivalent to a 40 to 320mm lens on a 35mm camera). This is a much longer zoom ratio than is typical of digicams (most have only a 3x zoom), and we really liked the extra flexibility it affords. It's interesting to note the impact of a longer zoom on the effective camera resolution. Consider the situation where you want to capture a distant object, and want to fill the frame with it. If a 3x zoom will do that, then a 2 megapixel camera clearly wins the resolution war, with 1600 pixels horizontally. Suppose though, that the subject is twice as far away: The 3x zoom on a 2 megapixel camera ends up only delivering 800 pixels worth of resolution on the subject itself (assuming that it now only fills half the frame). Compare this to the QV-8000, which could zoom out to 6x, and fill the frame with the subject, devoting the full 1280 pixels to it. In this case at least, the QV-8000 actually delivers more useful resolution than the 2 megapixel model. Then consider that the QV-8000 goes all the way out to 8x! For distant subjects (wildlife?), the QV-8000 is actually a better choice than a 2 megapixel camera with only a 3x zoom (or even a 5x zoom).

We really liked swiveling lens on the QV-8000, which rotates a full 270 degrees, letting you point the lens all the way back at yourself, straight down or anywhere in between. Filter threads on the inside lip of the lens allow you to attach 43mm diameter filters or accessory lenses. Focus ranges from 1.3 feet (0.4m) to infinity at the wide angle end and from 3.3 feet (1m) to infinity at the telephoto end. In macro mode, focus ranges from 0.4 to 19.7 inches (1 to 50 cm) in auto focus and from 3.9 inches (10cm) to infinity in manual focus mode. Aperture can be manually or automatically controlled, with options of F/3.2, F/4.8 and F/8.



The 1cm minimum focusing distance in Macro mode can produce some really amazing close-ups. The zoom lens seems to have a much more limited range of focal lengths in macro mode (we'd guess it's only about a 1.2x zoom at that setting), but the detail the camera can capture is incredible: The minimum capture area is an amazing 0.71 x 0.95 inches (18 x 24 mm). The only limitation we found with this incredible macro capability is that the width of the lens itself can make it difficult to get adequate light into the subject: You may find it helpful to make a conical "light tent" out of a piece of white paper or diffusion material, as shown at right. With this sort of arrangement, you can shine lights onto the diffusion material from multiple angles, and obtain very even illumination, despite the extremely short working distance. You do pay one price for the extraordinary macro capability: At the shortest focusing distances, the lens appears to suffer from considerable "curvature of field", which means that the corners of the image will be out of focus when the center is sharp. This effect is most noticeable at the 1cm focusing distance, decreasing as you move out to greater distances.

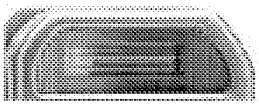
A 2x / 4x digital zoom option extends the 8x optical zoom capabilities up to 32x, but the image quality always suffers as a result of digital enlargement. Digital zoom automatically saves images at the 640 x 480 pixel size. The QV-8000SX offers manual focus and Infinity modes, both accessed by a control button beneath the LCD monitor. Manual focus is adjusted by the plus and minus buttons on top of the camera, after pressing the MF button under the viewfinder. After a few seconds though, the +/- buttons return to their normal exposure-compensation function. No focus feedback is provided other than the view in the LCD: For fine focusing, we'd like the option of having feedback

Appendix A

from the camera, or at least being able to see a magnified view in the LCD. Infinity mode sets the focus at infinity for quick shooting of far away subjects.

## Exposure

Exposure control on the QV-8000SX can be fully automatic, or you can take advantage of several programmed modes. Aperture and Shutter Speed Priority modes allow you to control either the aperture and the shutter speed individually or both at the same time (full manual). In the menu system, both aperture and shutter speed have entries with options of "Auto", or several manual settings. Picking a manual setting for aperture, but leaving the shutter option set to auto results in "aperture priority" metering. The opposite set of choices produces "shutter priority" metering. Manually selecting values for both settings gives you full manual exposure control, a very rare commodity in the digicam marketplace. Additionally, program modes such as Night Scene, Portrait and Landscape save time when shooting in special situations. While in full automatic mode, you have the ability to change white balance, exposure compensation (EV) and the flash. You also have control over image sharpness, color saturation and image contrast through the Record Details menu. Here's a more detailed description of the QV-8000SX's exposure options:



**Flash**

The built-in flash on the QV-8000SX resides directly on top of the lens, so that when the lens spins around, so does the flash. This is convenient, and almost mandatory for a rotating-lens design like the QV-8000, but the close proximity of the flash tube to the lens makes it much more difficult to eliminate the red-eye effect in shots of people. Four flash modes are available: Auto, On, Off and Red-Eye Reduction. Auto mode puts the camera in charge of judging light levels and whether or not to fire the flash. The On setting fires the flash with every exposure and the Off setting prevents it from firing at all. Red-Eye Reduction mode emits a small pre-flash before firing the full flash to help prevent the occurrence of the Red-Eye Effect. Working range for the flash runs from 1.6 to 8.2 feet (0.5 to 2.5m) in normal, wide angle mode and from 0.3 to 1.6 feet (0.1 to 0.5m) in macro mode. An icon on the LCD monitor clues you in to the selected flash mode, which is changed by pressing the Flash button until the desired icon appears (Auto mode has no icon). Flash intensity can be changed via the Record Details menu, with options of Strong, Normal and Weak. We'd loved to have seen an option for external flash on the QV-8000, given the extraordinary flexibility it offers otherwise. The good news here though, is that its flash is a "single pop" design, producing only a single flash in normal operating mode. This makes it easy to use with conventional optical strobe triggers for use with external flash units. (Many digicams produce a double flash in normal exposure mode, the first "pop" being used for white balance and metering, and the second making the actual exposure. These cameras require special "smart" triggers to sync properly with external strobes.)

**White Balance**

Six white balance modes are available on the QV-8000SX: Auto, Daylight, Shade, Tungsten, Fluorescent and Manual. In Automatic mode, the camera assesses light type and levels and assigns the appropriate white values. Daylight, Shade, Tungsten and Fluorescent settings all do as they sound by adjusting white balance for varying natural and artificial light sources. Manual white balance allows you to set the white value based on a sheet of white paper held in front of the lens (usually the most accurate in special lighting situations). A little-known benefit of manual white balance options like this is that you can use them to deliberately introduce color casts into your images, by using off-white objects as your reference targets: Experiment with this a bit, and see what happens!

**Exposure Compensation (EV adjustment)**

To adjust for lighter or darker exposures, exposure compensation (EV adjustment) is adjustable from -2 to +2 in .25 EV increments. The setting is only good for one exposure, as the EV value automatically reverts to zero once the shutter button is pressed.

**Metering**

The QV-8000SX allows you to change exposure metering options via the Record Details menu with options of Multi, Center and Spot. The Multi setting takes readings from the entire image and then bases the exposure on the average of those values. Center weighted metering averages the values from a large area in the center of the image. Spot metering takes the exposure value from a reading at the direct center of the image. Unlike the EV adjustment setting, the metering setting can not only persist from shot to shot, but from one shooting session to the next, even if the

camera is powered down in the interim. You can select whether or not the camera remembers the metering preference via a setting on the "Mode 2" options menu.

**Quick Shutter**

The Quick Shutter function allows you to record up to five images at approximately one second intervals (depending on image information and memory card space) with one press of the shutter button. The mode can be used in Automatic, Night Scene, Landscape or Portrait recording modes. As you shoot, the camera continuously processes the images you've already captured in the background, saving them to the memory card. When you pause, the camera "catches up" with you, and when you shoot rapidly, you get ahead of it. The camera displays the current status of the memory buffer (temporary image storage) as you shoot and it processes, via a set five small circles in the LCD viewfinder. Filled-in circles indicate full memory spaces, empty ones indicate space available. We found both the Quick Shutter mode and this memory-usage feedback very useful in our shooting: It's nice to know what's going on inside the camera, and it helps you plan your shots a bit.

**Continuous Recording**

The Continuous Recording option allows you to record up to five images at approximately 0.25 second intervals with one press of the shutter button (depending on the image information and CompactFlash space). Like Quick Shutter, Continuous Recording is available in Automatic, Night Scene, Landscape and Portrait recording modes. Flash is unavailable in this mode and focus and exposure settings are locked with the first image.

**Movie Recording**

The QV-8000SX allows you to record movies approximately 10 seconds long in 320 x 240 pixel AVI format. The Past Movie mode allows you to capture events that occurred before the shutter button was pressed, meaning that the camera actually continuously records images into a buffer and once the shutter button is pressed, records the information to the CompactFlash memory card. Normal Movie mode simply starts recording at the press of the shutter button and stops when the button is let go. (The Past Movie mode is really mind-boggling for people who haven't seen anything like it before. "How does the camera know when you're going to press the trigger?" is a common question. - Great fun for parties!)

**Panorama Recording**

You can record a 360 degree panorama image on the QV-8000SX through the Panorama record mode. A total of nine consecutive images can be recorded in the panoramic series. After the first image in the series is shot, the right edge of the preceding image remains on the screen to help you line up the next shot. You can actually record more images in a series by recording the first nine, uploading them to a computer and then recording more. The images can then be linked in Windows based computers via the included Panorama Editor software. What's really slick though, is that you can actually preview the panoramas you've shot while the images are still in the camera! When the camera is in panorama mode, there's a playback option by which the camera performs a crude stitching operation all by itself, and then displays the resulting panoramic image on the LCD for you to scroll around in at will. Very slick!

**Night Scene Mode**

The Night Scene mode records subjects with dark backgrounds. The slowest shutter speed available in this mode is one second, but a slower one can be set in Shutter Speed Priority mode (up to 64 seconds). We confess to not being sure exactly what the Night Scene mode is actually doing, since it doesn't appear to increase CCD sensitivity at all. It does however, bias the camera toward slower shutter speeds, even when the flash is used. This equates to a "slow synchro" mode, which allows more ambient light into pictures taken with flash. (This is useful for brightening backgrounds and avoiding the stark silhouettes that on-camera flashes can produce.)

**Landscape Mode**

Per the description in the QV-8000's manual, landscape mode sets the focus and aperture so that everything from background to foreground is in focus simultaneously. A more photographic description would be that it biases the camera's exposure system to use smaller lens apertures, producing greater depth of field. (This would also be useful for macro shooting, something you'd never guess from the mode's name and description in the manual.)

**Monochrome and Sepia Recording**

Monochrome and sepia expand your creative options by letting you record images in black and white or sepia tones. Once recorded in monochrome, images cannot be converted back to color.

**Portrait Recording**

Portrait mode adjusts the focus and aperture so that the subject is in focus and the background is slightly blurred.

## Appendix A

(Just the opposite of "Landscape Mode" above: It biases the camera to use wider apertures, producing shallower depth of field.)

**Self-Timer**

The self-timer on the QV-8000SX gives you a two or 10 second countdown before firing the shutter once the shutter button is pressed. You can swivel the lens around during self-timer recording to see the countdown on the LCD monitor. - Very helpful to keep everybody clued in as to when the shutter is actually going to release.

**Timer**

The Timer function allows you to record a series of images at set intervals (from one to 60 minutes) with approximately 250 maximum shots available depending on the amount of CompactFlash space. (Very neat feature, for time-lapse photography!)

**Shutter Speed Priority**

Shutter Speed Priority mode allows you to control the shutter speed from 64 to 1/2000 seconds. The Bulb setting keeps the shutter open for as long as the shutter button is held down (up to 64 seconds). The included wired remote control works best with the Bulb setting, preventing any slight camera movement due to pressing the shutter button. Casio also notes that with slower shutter speeds, the chance of image static or noise increases.

This would be a good point to talk about the QV-8000's absolutely amazing low-light capability: When we first saw the specs for the camera, we almost laughed - Who were they trying to kid? 64 seconds? 64 seconds?! All you'd see would be colored snow! When we actually shot some very long time exposures with the camera though, we were totally humbled: It really *can* take long exposures like that! We didn't actually take a 64 second shot, but we did go all the way out to 48 seconds in our studio tests, and the results absolutely blew us away! The images were cleaner than those from most other cameras when trying for a 4 second exposure, let alone a 48 second one! We could see some of what Casio's doing, in that they evidently capture a "black-reference" image immediately after the time-exposure shot itself, and using it to subtract-out the noise. (You'll notice that time exposures actually take about twice as long to complete as the shutter speed selected would indicate. The extra time is that required for the black-reference image to be captured.) Still, even allowing for this trick, Casio must have come up with something genuinely new: Other manufacturers have used the black-reference approach before, but nobody has gotten the noise down to the level that Casio has achieved here. Whatever they're doing also bodes well for future, higher-resolution cameras, because image noise becomes an increasing problem as pixel counts scale higher and the individual pixel sensors become smaller on the CCD.

Overall, the QV-8000 completely captures the low-light picture-taking crown, at least as of this writing in January, 2000. Nothing else we've seen to date even comes close to it: If you're looking for a digicam to experiment with long time exposures, the QV-8000 is it. Don't even bother looking at anything else!

One fly in the ointment: The QV-8000 does have one major shortcoming for low-light photography though. As we noted earlier, the LCD viewfinder is completely non-functional under even moderately dim conditions. Some kind of optical viewfinder absolutely should have been included on the unit, and its lack makes low-light work rather difficult. (Plan on jerry-rigging some sort of gunsight-type framing guide atop the lens housing for any serious low-light work.)

**Aperture Priority**

An alternative to Shutter Speed Priority, Aperture Priority allows you to set the lens aperture at F/3.2, F/4.8 or F/8.

**Full-Manual Mode**

Not actually a separate camera mode, but worth mentioning because the capability is so sought-after, and so surprisingly rare in current digicams. On the QV-8000, you can set the shutter speed and aperture completely independent of each other, and aren't required (as on some cameras) to have one under the camera's control if you're manipulating the other. Very nice!

## Shutter Lag / Cycle Times

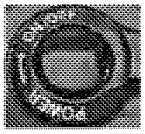
When you press the shutter release on a camera, there's usually a lag time before the shutter actually fires. This time allows the autofocus and autoexposure mechanisms to do their work and can amount to a fairly long delay in some situations. Since this number is almost never reported on, and can significantly affect the picture taking experience, we now routinely measure it using a special electronic test setup that's accurate to 0.01 seconds.

The QV-8000 is actually fairly quick, as digicams go: A full autofocus cycle results in a shutter lag of only about 0.85 seconds: Not blazingly fast, but certainly not bad by comparison with competing cameras. If the lens is prefocused by half-pressing the shutter button prior to the shot itself, the shutter delay drops to only 0.15 seconds, a very good

number indeed. Using manual focus, the shutter delay is 0.20 seconds.
Shot-to-shot cycle times are also quite good, particularly when using the Quick Shutter mode. We clocked the camera at 1.6 seconds shot-to-shot using manual focus in high resolution mode and 1.53 seconds shot-to-shot in low resolution mode. Autofocus would presumably add about 0.6 seconds to these times. We never managed to fill the memory buffer in low-resolution mode, as it emptied quicker than we could take the next shot. In high resolution mode, we managed 10 shots before the buffer filled, and even then, cycle time only rose to 3 seconds. In continuous mode, the camera captured five frames in 1.09 seconds, a frame rate of 3.67 frames per second, reasonably close to the 4 frames per second claimed by Casio.
The camera also starts up in only 4.24 seconds (from "off" to the first shot acquired), switches from record to play mode in anywhere from 1 to 3.5 seconds (depending on the resolution mode and how much processing it needs to do on the current image), and switches back from play to record mode in 1.4-2.0 seconds (from playback to the first image captured).
Overall, we found the QV-8000 surprisingly quick compared to the current crop of cameras (January 2000), particularly competing 1.3 megapixel models.

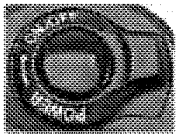
## User Interface

The QV-8000SX offers uncomplicated menu navigation through a series of 3D graphic menus typical of Casio's standard user interface. It shares the visually attractive interface design we reported on earlier in our coverage of the QV-2000UX. The placement of function controls allows for one handed operation if necessary, but two hands is always easier. Here's a look at the individual controls:



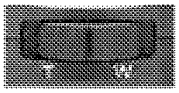
**Shutter Button**

Located on top of the camera, in the center of the circular power toggle switch. In all record modes, the shutter button sets focus and exposure when half pressed and fires the shutter when fully pressed. When navigating through menus, the shutter button acts as the OK button to accept menu selections.



**Power Switch**

Located on top of the camera, this circular switch toggles back and forth to turn the camera on and off.



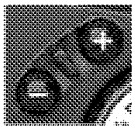
**Zoom Control**

Located on the front of the camera, about where your right index finger would wrap around the grip, this slide control operates the zoom lens. If the digital telephoto control option is set to "auto", pressing the zoom control toward "T" again after the lens has reached its maximum telephoto setting engages the digital zoom function. Pressing it again increases the digital zoom from 2x to 4x.




**Menu Button**

Located on top of the camera, this button accesses the menu system for whatever camera mode is currently selected. It also acts as the cancel button when navigating through the menus.

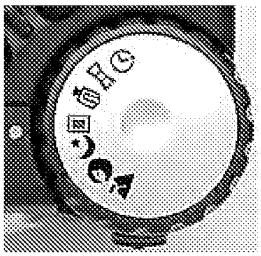


**+/- Buttons**

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Located on top of the camera, these buttons are marked with a + and - sign.

- In both Record and Playback modes, they navigate through menu selections.
- In Record mode, they control exposure compensation (EV) and manual focus settings.
- In Playback mode, they scroll through captured images on the CompactFlash card.



**Mode Dial**

Located on top of the camera, this notched dial selects between the following modes:

- **Timer:** puts the camera in Timer mode for recording a series of images at selected time intervals.
- **Panorama Mode:** sets up the camera for recording panoramic images.
- **Movie Mode:** records up to 10 second movies as 320 x 240 AVI files.
- **Normal Mode:** puts the camera in standard, automatic capture mode.
- **Night Scene Mode**: sets up the camera for recording subjects in dark areas and backgrounds.
- **Portrait Mode:** adjusts focus and aperture for portraits-where the subject is in focus and the background is slightly blurred.
- **Landscape Mode:** adjusts focus and aperture so that foreground and background are both in focus.




**Rec/Play Switch**

Located beneath the Mode Dial, on the back panel of the camera, this switch selects between Record and Playback, for each of the major camera operating modes listed above.




**Display Button**

Located at the bottom right of the LCD monitor, this button cancels and recalls the information display on the monitor. In the Record menu, this button switches between the normal and Details menu systems.



**Self-Timer Button**

Marked with the standard "clock" icon, and located beneath the LCD monitor, to the left of the Display button, this button cycles between two second self-timer, 10 second self-timer and self-timer off modes.



**Manual Focus / Infinity / Macro Button**

Located beneath the LCD monitor, to the left of the Display button, this button cycles between Manual Focus, Infinity and Macro modes.

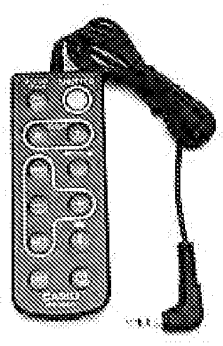


**Flash / Folder Button**

Located at the bottom left of the LCD monitor, marked with the traditional flash symbol and a black folder icon.

- In Record mode, this button selects the desired flash mode from Auto, On, Off and Red-Eye Reduction.
- In Playback mode, this button allows you to select a different folder on the memory card for playback.

**Wired Remote**



The QV-8000SX is unusual in that it includes a wired remote control unit in the box with the camera. Few cameras include remotes, but we find them very handy for studio or macro work, where you don't want to disturb the camera (presumably mounted on a tripod) by pressing the button. A remote can also give you more freedom to work with the subject from in front of the camera, without having to run back and forth. The cable on the QV-8000's remote is only a few feet long, but still very useful for situations where you don't want to jostle the camera/tripod setup. The QV-8000's remote is also unusual in the degree of control it gives you over the camera: Most remotes only provide a subset of on-camera functions, but the QV-8000's remote lets you control every aspect of the camera's operation, duplicating all the on-camera controls (except the record/play toggle).

## Camera Modes and Menus

**Timer Mode**

Accessed by turning the mode dial to the black timer symbol, this mode allows you to capture a series of up to 250 images at anywhere from one to 60 minute intervals. (Note that you almost certainly will want to run the camera from the AC adapter when shooting long time-lapse sequences.) Putting the camera in this mode automatically calls up the Timer Setting menu with these options:

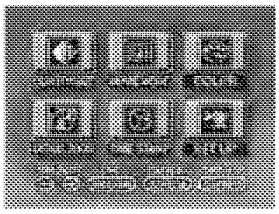
- Shots: choose from one to 250 shots.
- Interval: choose from one to 60 minutes.
- Start Time: sets the start time for recording. (You can delay the start of the sequence up to 24 hours, using the camera's 24-hour clock.)

**Panorama Mode**

Sets up the camera to record up to nine images in secession to compose a panoramic image. Pressing the Menu button in this mode calls up a series of menus. These menus are identical to those used in the other recording modes, so we'll cover them here, and then just once, here. The QV-8000SX has two sets of menus: The default set, providing a somewhat simpler interface, but more limited functions, and the "Details" version, which gives access to the camera's more advanced features. In this section, we'll show the default menu first, followed by some of the sub-menus from the Details mode.

**Record Menu**

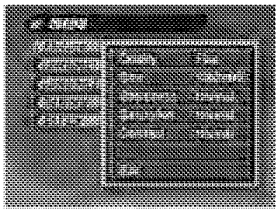
- **Quality/Size:** selects between Fine, Normal and Economy qualities and between 1280 x 960 or 640 x 480 image sizes.
- **Movie Mode:** selects between Normal and Past movie recording modes.



- **Color:** selects between Color, Black and White and Sepia recording modes.
- **Digital Zoom:** sets the digital zoom to Off, Auto, 2x or 4x.
- **Time Stamp:** sets the format of the time stamp that can be applied to your images, and turns it on or off.
- **Setup:** sets the following camera options:
- **Card Browser:** sets the card browser file type. (A very interesting feature: See our comments in the "Image Storage and Interface" section below.)
- **Format:** formats the CompactFlash card.
- **Date:** sets the camera date and time.
- **Video Out:** sets the video output signal to NTSC or PAL.
- **Language:** sets the camera language to either English or Japanese.
- **Beep:** turns the camera beep on and off.

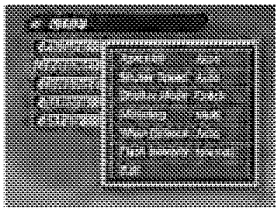
Hitting the Display button while in the Record menu pulls up the Details menu with these sub-menus:

**Picture Menu**



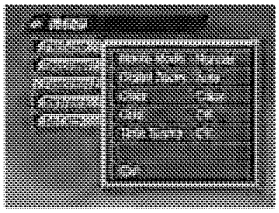
- **Quality:** sets the image quality to Fine, Normal or Economy.
- **Size:** sets image size to 1280 x 960 or 640 x 480.
- **Sharpness:** sets image sharpness to Hard, Normal or Soft.
- **Saturation:** sets color intensity to High, Normal or Low.
- **Contrast:** sets image contrast to High, Normal or Low.

**Functions 1 menu**



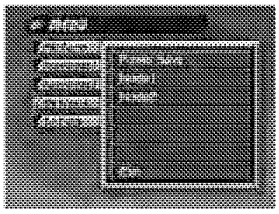
- **Aperture:** sets the aperture to F/3.2, F/4.8 or F/8.
- **Shutter Speed:** sets the shutter speed to Auto or Manual (with options of Bulb and timed exposures from 64 to 1/2000 seconds).
- **Shutter Mode:** selects between Single, Quick and Continuous shooting modes.
- **Metering:** selects between Multi, Center and Spot metering options.
- **White Balance:** selects between Auto, Daylight, Shade, Tungsten, Fluorescent and Manual white balance settings.
- **Flash Intensity:** sets the flash intensity to Strong, Normal or Weak.

**Functions 2 Menu**



- **Movie Mode:** selects between Normal and Past movie recording modes.
- **Digital Zoom:** turns the digital zoom on or off and sets it to Auto, 2x and 4x.
- **Color:** selects between Color, Black and White and Sepia recording modes.
- **Grid:** turns an on-screen alignment grid on and off. (Very handy for aligning shots!)
- **Time Stamp:** turns the time stamp function on and off and sets the format.

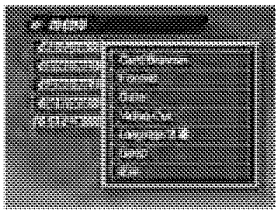
**Options Menu**



- **Power Save:** sets power save options for conserving battery power: Sleep (Off, 30 seconds, one minute or two minutes) and Auto Power Off (Off, two, five or 10 minutes).
- **Mode 1:** specifies which of the following settings are retained when the camera is powered off: Focus, Flash and Digital Zoom.
- **Mode 2:** specifies which of the following settings are retained when the camera is powered off: Metering, White Balance, Flash Intensity, Aperture and Shutter Speed.

## Appendix A

**Setup Menu**



- **Card Browser:** sets the card browser file type.
- **Format:** formats the CompactFlash card.
- **Date:** sets the camera date and time.
- **Video Out:** sets the video output signal at NTSC or PAL.
- **Language:** sets the camera language at either English or Japanese.
- **Beep:** turns the camera beep on and off.

**Movie Record Mode**

Accessed by turning the mode dial to the black movie camera icon, this mode allows you to record up to 10 second movies (depending on available CompactFlash memory space). Pressing the Menu button in this mode pulls up the same Record and Details menu as in Panorama mode.

**Normal Record Mode**

Accessed by turning the mode dial to the green rectangular symbol, this option selects the QV-8000's default operating mode. Pressing the Menu button pulls up the same Record and Details menus, which means you can control aperture or shutter speed if desired, although the default is a fully-automatic (commonly called "program") mode, in which the camera controls all exposure parameters..

**Night Scene Mode**

Accessed by turning the mode dial to the black moon and star symbol, this mode sets up the camera for recording images of subjects with dark backgrounds, as we described earlier in the "Exposure" section. Pressing the Menu button in this mode pulls up the same Record and Details menus.

**Portrait Mode**

Accessed by turning the mode dial to the black portrait symbol, this mode sets the aperture and focus so that the subject is in focus and the background is slightly blurred. (A bias toward wider lens apertures.) Pressing the Menu button in this mode pulls up the same Record and Details menus as in the other modes.

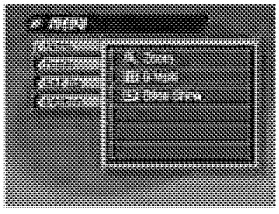
**Landscape Mode**

Accessed by turning the mode dial to the black landscape symbol, this mode sets aperture and focus so that both the foreground and background are in focus simultaneously. (A bias toward smaller lens apertures.) Pressing the Menu button pulls up the same Record and Details menus.

**Playback Mode**

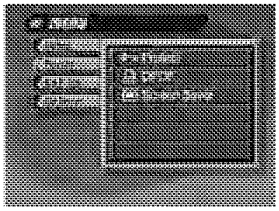
Accessed by switching the Rec/Play switch to the Play position in any camera operating mode, this sub-mode allows you to view captured images and movies in any camera recording mode. Pressing the Menu button in this mode pulls up the Playback menu with the following sub-menus:

**View Menu**



- **Zoom:** enlarges the image on the LCD monitor screen. You can scroll around the enlarged view by pressing the +/-, flash, or MF buttons.
- **9 Multi:** displays nine thumbnail images on the screen at one time. This is handy for rapidly stepping through all the pictures on the memory card.
- **Slide Show:** automatically scrolls through captured images, one at a time.

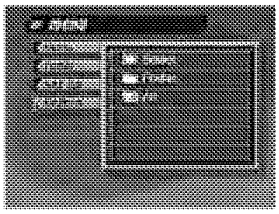
**Tools Menu**



- **Protect:** protects images against deletion (single image, folder or all). (Note that "protected" images will still be deleted if the memory card is reformatted.)
- **DPOF:** specifies images for printing (single image, folder or all).
- **Screen Saver**: turns the camera's screen saver function on or off.

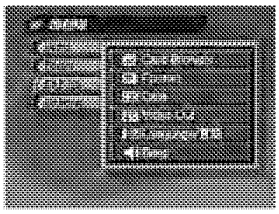
## Appendix A

**Delete Menu**



- **Select:** deletes a single image.
- **Folder:** deletes an entire folder.
- **All:** deletes all images on the CompactFlash card.

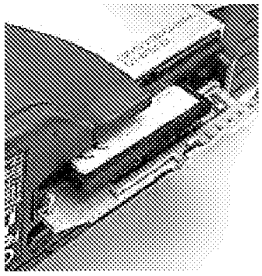
**Setup Menu**



- **Card Browser:** selects the card browser file type.
- **Format:** formats the CompactFlash card.
- **Date:** sets the date and time as well as sets the display format for the date and time.
- **Video Out:** selects between NTSC and PAL video output signals.
- **Language:** selects between English and Japanese camera languages.
- **Beep:** turns the camera beep on and off.

Pressing the Display button with the Playback menu up pulls up the basic playback menu, offering all of the above options except for the Protect and Screen Saver settings.

## Image Storage and Interface



The QV-8000SX utilizes CompactFlash (Type I) as its image storage medium. An 8MB card comes with the camera, with upgrades available to 15MB, 30MB, 48MB and 64MB. (Third parties currently (January 2000) offer Type I CF cards in capacities as large as 128MB.) An interesting feature is that the QV-8000SX creates an HTML file with four card browser options available (compatible with Microsoft Internet Explorer 4.01 or later and Netscape Communicator 4.5 or later). QuickTime 3 or later is required to play back movie images on your computer. The four different card browser formats let you choose how much information is recorded with each image (a very detailed chart in the manual explains the settings). We found the HTML image indexes very handy for viewing pictures shot with the camera, and for seeing the exposure settings they were shot with. The four "card browser" options provide a range of display options designed to offer as much functionality as possible with a variety of different web browsers. (The more sophisticated options even include JavaScript code for a web browser-based slide-show function!)

The QV-8000SX organizes images into storage folders, assigned numbers from 100 to 998. Within each folder, images are numbered from 0001 to 9900 and each folder contains up to 100 files. An extremely detailed directory tree in the manual shows exactly how information is encoded onto the CompactFlash card by the camera.

You can protect individual images on the CompactFlash card through the Playback menu in Playback mode, preventing accidental deletion of images. (Although, as noted earlier, it's important to remember that "protected" images will still be erased when you reformat the memory card.) If you want to erase images, the Delete menu in Playback mode gives you the option of deleting individual images, a folder or all images that aren't protected.

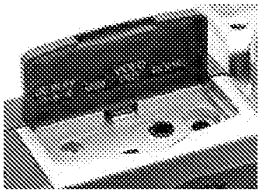
Below are the approximate numbers of still images that will fit on an 8MB card and their compression ratios:

Still Images:

| ***Resolution/Quality vs Image Capacity*** | **Ultra Resolution** | | **High Resolution** | |
|---|---|---|---|---|
| | Images | Approx. Compression | Images | Approx. Compression |
| **Fine Quality** | 13 | 8:1 | 39 | 6:1 |
| | | | | |

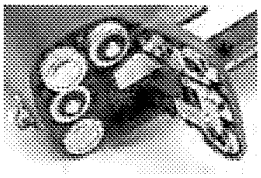
| | | | | |
|---|---|---|---|---|
| **Normal Quality** | 16 | 11:1 | 48 | 8:1 |
| **Economy Quality** | 29 | 19:1 | 63 | 11:1 |

## Video Out



US and Japanese models of the QV-8000SX come with an NTSC video connection cable (European models come with PAL) for connecting the camera to a television set. (Provided the set has a separate "raw video" input.) This connection enables the TV to act as the LCD monitor when composing and playing back images. As we noted earlier, this can be helpful in manually focusing on macro subjects, or in studio settings where you have to interact with the subject from in front of the camera. (Kid photography, etc.) TV playback can also be handy when using the camera as a presentation device.

## Power



The QV-8000SX runs on four AA alkaline, lithium, NiCd or NiMH batteries. An AC adapter comes with the camera, useful for conserving batteries when playing back images, connecting to the computer or television, or capturing long time-lapse sequences. Casio estimates that a standard set of AA alkaline batteries allows you to record up to 400 shots (1020 for lithium and 620 for NiMH) and they recommend keeping the flash turned off when not in use and taking advantage of the power save settings in the setup menus to help conserve battery power. We feel per-shot ratings of this sort are of relatively little value in deciding how long you'll actually be able to use a camera, particularly with ones like the QV-8000 that rely on their LCD screen as a viewfinder. (How many times do you simply run off 500 shots as fast as you can trip the shutter?) A more useful rating would be how long the camera will operate in various modes with typical NiMH rechargeable batteries. The QV-8000 has fairly low power consumption for a camera with such a large LCD display, but by the same token consumes more power than cameras offering optical viewfinders. Overall, the QV-8000 seems to do a good job of regulating its power consumption (turning off the LCD screen when it's charging the flash, for instance) to maximize battery life. The 510 mA power consumption in capture mode leads us to estimate a typical battery life of about 2 hours with 1200-1300 mAh NiMH cells. (This is a bit less than the batteries' capacity rating would suggest, because the batteries are rated at a relatively low power drain, and total capacity decreases as the load increases.) We actually tested the power consumption of the QV-8000 with a couple of sets of batteries, with wildly varying results: A set of 1200mAh cells lasted just less than an hour, while a new set of 1600 mAh units (recently released by Kodak) powered the camera in capture mode continuously for two hours and 35 minutes!

The table below shows the power consumption figures we measured in various operating modes, via the external power connector.

| Operating Mode | Power Drain |
|---|---|
| Capture Mode, w/LCD | 510 mA |
| Capture Mode, half pressed shutter | 510 mA |
| Memory Write (transient) | 510 mA |
| Flash Recharge (transient) | 470 mA |
| Image Playback | 360 mA |

## Included Software

The QV-8000SX comes with a USB, serial and Macintosh adapter cable for connecting and downloading images to a computer. A CD packaged with the camera comes with Casio's PhotoLoader, Panorama Editor, Picture Works Technology's MediaCenter with a trial version of their Web Publisher add-on for it, Apple's QuickTime for Windows, Adobe ActiveShare, Adobe Acrobat Reader, Internet Explorer 5.0 as its main software applications (a USB driver and

various other odds and ends also come on the CD for assistance in installation). Unfortunately for Mac users, the included software is only compatible with Windows 95, 98 and NT 4.0. The included cables support the Mac platform, but Mac users will need to order a copy of PhotoLoader for the Mac for $9.99 extra.

Immediately when you insert the software CD, a menu comes up with options to install the various software applications, find out about the software, register your camera online, go directly to the Casio website, open the accessory catalog or fill out an accessory order form. The PhotoLoader software is responsible for downloading images and movies from the camera onto your computer. Once the images have been moved, Picture Works Media Center allows you to organize, enhance or prepare images for the Internet. The trial version of Picture Works Web Publisher allows you to create customized web pages in 30 seconds or less (up to 15 pages in the trial version). Adobe Active Share lets you perform minor image correction and connects you with ActiveShare.com for instant image sharing with family and friends. Quicktime 3 is the medium for movie playback and works with the included copy of Internet Explorer. And finally, Panorama Editor lets you connect your recorded panoramic shots and play back 360 degree images. Overall, a very complete software package, albeit one limited to Windows users.

## Test Results

In keeping with our standard policy, our comments here are rather condensed, summarizing our key findings: For a full commentary on each of the test images, see the QV-8000's "pictures" page.

As with all Imaging Resource camera tests, we encourage you to let your own eyes be the judge of how well the devices performed: Explore the images on the pictures page, to see how well the QV-8000SX performed, and how its images compare to other cameras you may be considering buying.

Well, Casio calls the QV-8000SX a "Feature Rich" digicam, and it certainly lived up to that billing - It packs more features, options, and capabilities than any other 1.3 megapixel digicam we've tested to date! (January, 2000)

In our testing, the QV-8000SX produced excellent pictures overall. Its color and tonal rendition were excellent, our only (slight) criticism being that its resolution was only average for a 1.3 megapixel camera, testing-out at 600 lines per picture height in both horizontal and vertical directions. As noted, color was very good, with clean primaries, good handling of pastels and decent saturation. The camera handled the always-difficult red/magenta separation of our Davebox target very well, as well as the tricky blues in our outdoor portrait test. The only minor shortcoming we found in its color-handling was a slight weakness with the subtractive primaries. (cyan, magenta, and yellow.)

The QV-8000's lens is quite good, particularly considering it's exceptional 8:1 zoom ratio. (Longer-ratio lenses are much trickier to design optically than shorter-ratio ones.) As could be expected from such a long-ratio lens, geometric distortion is a bit higher than some cameras, at 0.9% barrel distortion in the wide-angle position, transitioning to 0.6% pincushion at the telephoto end. (While this is more than we like to see, we have to point out that some 3x zoom cameras show this much distortion.) Chromatic aberration was particularly low, showing none at all at short focal lengths, and only the barest hint at telephoto.

There were two features we'd really have liked to see on the QV-8000: An external flash connector, and some sort of optical viewfinder. The LCD viewfinder is pretty accurate though, showing between 89 and 92% of the final image area, as the lens moves from wide angle to tele.

The reason we'd so like to have seen an optical viewfinder on the QV-8000 is so we could take better advantage of its *absolutely amazing* low-light capability.(!) The QV-8000SX walked away with the low-light crown in our tests, producing usable images at lower light levels than any camera we've tested to date (January, 2000). Our fancy exposure meter only reads down to about 1/16 of a foot-candle, and the QV-8000 produced a surprisingly good image even at that light level. (That's REALLY dark, to the point we have a hard time seeing our way around the studio!)

The QV-8000SX also offers excellent macro capability, focusing down to an incredible 1 centimeter(!) from the front of the lens. This close approach and the large diameter of the lens make it tricky getting light into the subject, but the minimum capture area is a very tiny 0.71 x 0.95 inches (24.2 x 18.1 mm).At this microscopic level, there's a fair bit of barrel distortion evident, and a goodly amount of curvature of field as well, but if you need to get really close for a reasonable price, the QV-8000SX can do the job!

Overall, the QV-8000SX turned in a very good performance. It's incredible feature list is what makes it a real standout though.

## Conclusion

We were frankly surprised by the tremendous functionality offered by the QV-8000SX: Its fully-automatic exposure mode is perfect for novices, yet it offers one of the broadest range of exposure options of any camera we've tested. Its

Appendix A

8x optical zoom lens provides one of the widest zoom ranges in the market today, and its low-light capabilities go beyond anything we've seen to date (January, 2000). About the only additional features we could possibly ask for are an optical viewfinder (please!), and an option to connect to an external flash. Overall, the QV-8000 is one of the most versatile and capable 1.3 megapixel cameras on the market, and an excellent value for anyone looking for maximum flexibility in a digital camera.

## Reader Sample Images!

Do you have a QV-8000SX camera? If you'll post an album of your samples on one of the photo-sharing services and email us at photos@imaging-resource.com, we'll list the album here for others to see!

Visit David Bogdan's sample images at the Photo Album Collection at the Imaging Resource Photo Club!

**For More Info:**
**View the data sheet for the QV-8000SX**
**View the test images from the QV-8000SX**

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Appendix A

X-From_: detchells@imaging-resource.com  Tue Sep 21 17:16:38 1999
X-Sender: detchells@pop.trusted.net
Date: Tue, 21 Sep 1999 15:27:15 -0400
To: "Balbach, Cheryl" <cbalbach@casio.com>
From: Dave Etchells <detchells@imaging-resource.com>
Subject: RE: Reviews of your new cameras

Hi Cheryl -

Glad to hear you came through Floyd OK - Sounds like you folks up there really got hammered! We'd been hoping to at least get some of the rain here in Atlanta, as it's been **dry** this summer.It completely missed us though - We just got a sprinkling today from a line of thunderstorms, and that was the first rain in ~5 weeks. (Maybe I can have you ship some water along with the cameras, when the time comes! ;)

Sorry for the confusion - I was actually looking at a press release covering three of your new products, the 2000, 5500, and 8000, so was thinking about all three of them. I spoke in the email about the 2000 and 8000, as those seemed to be the most newsworthy, although I'd hope to actually get all three up here.

Here's how the costs normally work out: $4K for the first camera on a PO, $3K for second and subsequent, $50/gigabyte allowance for user downloads (a significant drop in this cost, since we first started) I'd based the $12K number on $4K (first camera) plus 2x $3K (second two), plus $2K for 40 gigabytes of bandwidth allowance.

My reference to the $2K/item was that early on, we had to deal with a $2K/item limit for signoff on Casio POs, but managed to creatively structure things on the invoice as multiple items, all below the $2K limit, amounting to the same total.

For the sake of clarity, I'll fax a formal proposal and pro forma invoice to your attention, detailing the costs above. (Of course, it's your choice as to which products, and how many you want to list - If you wanted to only do the 2000 and 8000, the total cost would drop to perhaps $8,500, since we could also cut some of the bandwidth allowance...)

Look for a fax later today, thanks as always for your assistance!

Best Regards,
Dave Etchells
detchells@imaging-resource.com

At 2:18 PM -0400 9/21/99, Balbach, Cheryl wrote:

> Hi Dave -
>
> How are you?  We are finally back to work after 2-1/2 days off due to Floyd.
> We had no power
> or telephones.
> I have forwarded your e-mail to the appropriate people for approval.  I do
> want to verify the
> price you have listed of $12K.  If we sent you the QV-2000UX and QV-8000SX,
> wouldn't
> it be $4,000?  I will let you know when I hear back from them.
>
> Thanks.
>
> Cheryl Balbach
> 973-361-5400, ext. 1551
> http://www.casio.com

-----Original Message-----
From: Dave Etchells [SMTP:detchells@imaging-resource.com]
Sent: Tuesday, September 07, 1999 8:04 AM
To: Pat Carrasco; Cheryl Balbach
Subject: Fwd: Reviews of your new cameras

Hi Pat (and Cheryl)

Cheryl suggested I re-send this earlier email about your new cameras, to re-elevate it in your in-box. In the time since my prior message, we've arrived at a syndication deal for HP's new digital photo site, "Cartogra", meaning all our reviews will be appearing there as well. We also expect to announce syndication to PhotoChannel this week, and still have two other such deals in the works. - The upshot of this is that your presentations
on our site will now automatically appear on four other photo-oriented sites
across the web, providing significantly expanded exposure.

Cheryl said you'd be back in next Monday, so I'll calendar myself to call again next Tuesday, giving you a day to get settled.

Best Regards,
Dave Etchells
detchells@imaging-resource.com

PS: Cheryl, it was great to hear your voice again - whoever was subbing for
you was nice enough, but I was concerned: Couldn't imagine Casio functioning
without Cheryl Balbach! Good to know you're still there!

>Date: Mon, 23 Aug 1999 20:25:16 -0400
>To: Casio_Pat_Carrasco
>From: Dave Etchells <detchells@imaging-resource.com>
>Subject: Reviews of your new cameras
>Cc:
>Bcc: detchells@imaging-resource.com
>X-Attachments:
>
>Hi Pat -
>
>Finding you continuously in meetings, your secretary suggested I try email
>to contact you. (I don't know what it is with the digital camera
> industry,
>but everybody seems to be grossly overworked! - Maybe we should all get into
>plumbing fixtures or something...)
>
>I'm very eager to get your new cameras, particularly the QV-2000 and
>QV-8000 onto our site. The 2-megapixel cameras are drawing large amounts
>of traffic overall, and the QV-2000 in particular has a number of compelling
>features, such as Microdrive compatibility, USB interface, and a 2 second
>cycle time. (There's been a lot of interest in Microdrives lately, we could
>arrange with Microtech to feature a test of the Microdrive in conjunction with
>your new camera, which would make it doubly interesting for
>readers.) Likewise,
>the QV-8000's 8x zoom is an exciting feature in the 1.3 megapixel arena.
>
>What do we need to do to get the new cameras onto the site? - In the



APPENDIX B

>past, we've
>sometimes worked with Casio's budgetary limits by splitting the invoicing
to
>keep individual items below $2K. Would this be helpful again? The total
cost
>for presenting all three new cameras would be $12K, including an
allowance
>for bandwidth. As always, this would accommodate a year's presence
>on our site,
>presently visited by over 100,000 unique readers per month. Now
>though, the "reach"
>of our material goes quite a bit beyond our own site's borders: Our
>reviews are
>currently being syndicated to the ClubPhoto site, we've just
>announced a similar
>agreement with ArcSoft for their PhotoIsland site, and we have a
>total of 3 other
>syndication deals in progress. By mid-October, we project that our
>review material
>will be exposed to several million readers per month, across 6 major
consumer
>imaging sites!
>
>Let me know what we can do to proceed: I can generate and fax to you
>a proposal,
>accompanied by pro forma invoices structured however you'd like. If you'd
like
>to discuss any of this, or have any questions, please don't hesitate
>to call me
>at 770-772-6658 (I should be in the office more or less continuously all
this
>week), or email me at your convenience.
>
>Congratulations on the new cameras, they certainly continue Casio's
history
>of innovation!
>
>Best Regards,
>Dave Etchells
>detchells@imaging-resource.com

To: Mike Pasini <70516.1007@compuserve.com>
From: Dave Etchells <detchells@imaging-resource.com>
Subject: Re: TIPS 1.0a Test Drive
Cc:
Bcc: "ƒ:  People:  Mike Pasini"
X-Attachments: :G3 Volume 2:13635:V1N4NewDigicams.rtf:

At 9:46 PM -0500 11/1/99, Mike Pasini wrote:

> How does this sound: Segment the market into resolution ranges (under a
> megapixel, 1.3-1.5, 2.0+), and then list the recent cameras that we're
> aware of in each category, with a brief blurb about each. Three problems:
> 1) We haven't yet tested all the new cameras, so can't comment with equal
> authority on them, 2) It can't possibly be comprehensive, and 3) to
really
> do it justice would (a) take way more time than I have, and (b) take more
> space than I want to devote to it.

Sounds good. Not every camera needs a blurb ("coming soon" will do). I think a breakdown of the cameras available in each of those three major categories will be very helpful as people start to think about these things for the holiday season. If we structure it as a list, you can just write blurbs for the models you feel strongly about. And that will catch their eye first time through.

Just sent you an email with no attachment on this - here it is, attached to this reply.

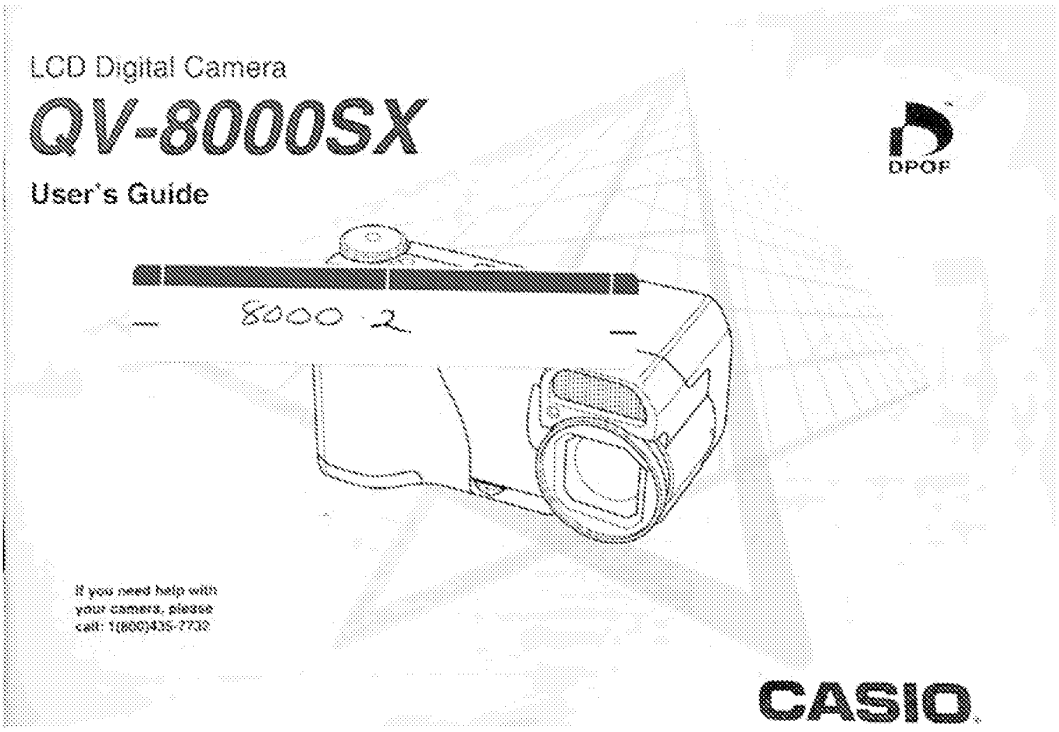
I ended up not making anywhere near an exhaustive list, just the ones that seemed noteworthy.

One/two additions: The new Casios look pretty interesting, but we've only just gotten them in, haven't looked at *any* results yet.
(That's the QV-2000UX, and QV-8000SX)

Best,
Dave E.



Appendix C

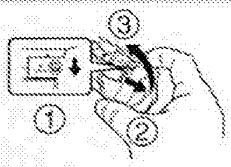
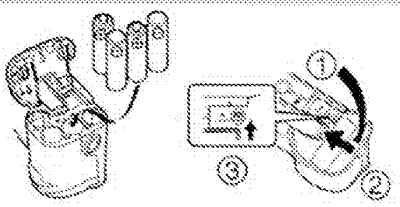

LCD Digital Camera
QV-8000SX
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If you need help with
your camera, please
call: 1(800)435-7700
CASIO

Appendix D

# QUICK REFERENCE

The section provides a general outline of operational procedures.

**Loading Batteries (page 38)**
**Setting the Current Date and Time (page 44)**

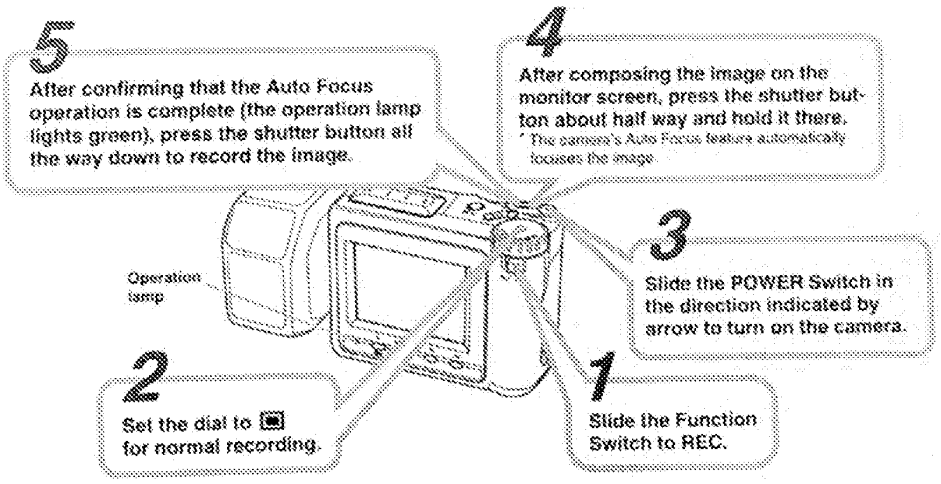
| 1 | 2 | 3 |
|---|---|---|
|  |  | • Be sure to use the procedure on page 44 to set the time and date before using the camera for the first time.<br>• File name assignment and time stamping will not be performed correctly if the time and date are wrong. |
| On the bottom of the camera, slide the battery compartment cover lock towards the front of the camera (①) to release the cover.<br>Grasping both sides of the battery compartment cover, swing it open (② ③). | Load batteries so their plus (+) and minus (–) ends are facing as shown in the illustration.<br>Close the battery compartment cover (① ②), and then slide the battery compartment cover lock towards the back of the camera to lock the cover in place (③). | |

2

Appendix D

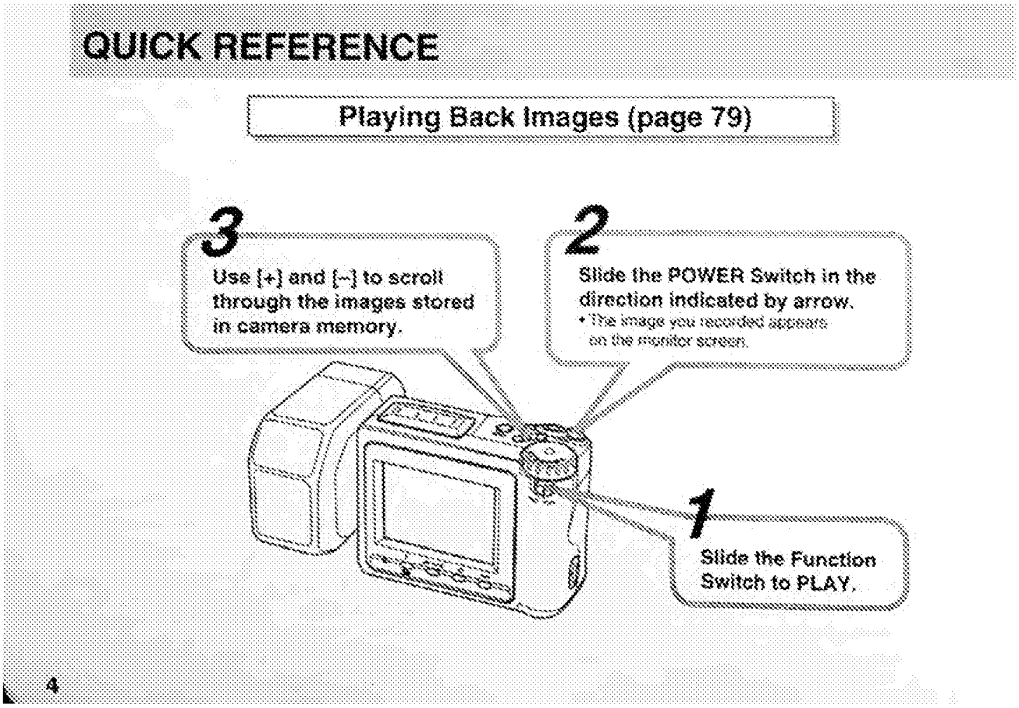
## QUICK REFERENCE

### Recording Images (page 46)

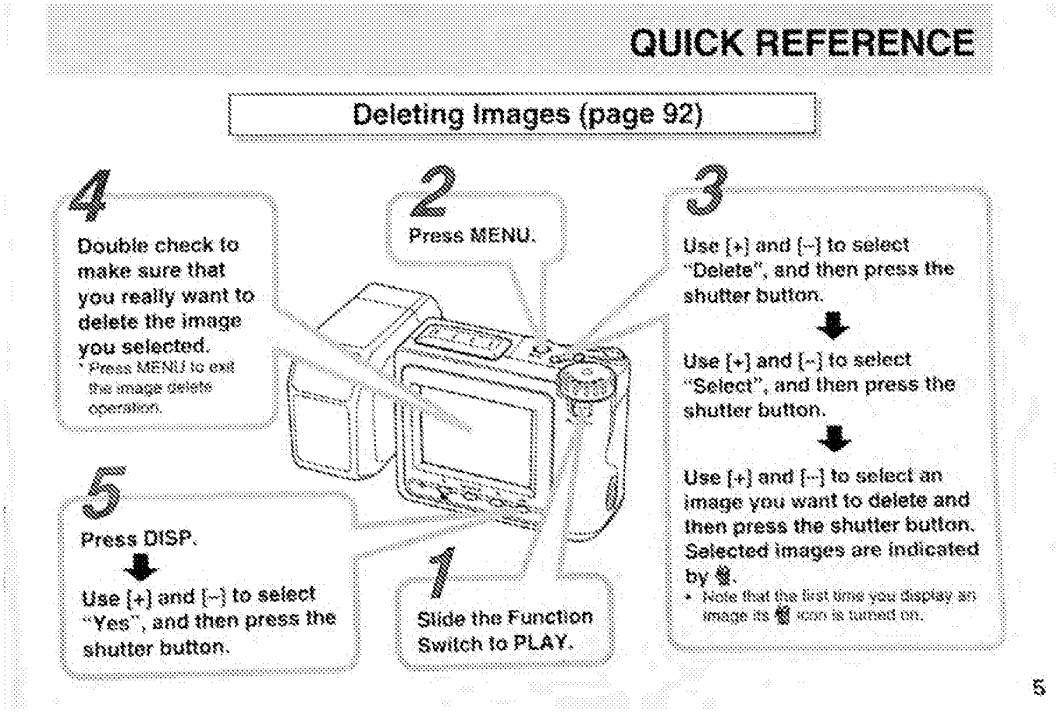





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QUICK REFERENCE
Playing Back Images (page 79)
3
Use [+] and [–] to scroll through the images stored in camera memory.
2
Slide the POWER Switch in the direction indicated by arrow.
• The image you recorded appears on the monitor screen.
1
Slide the Function Switch to PLAY.
4

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QUICK REFERENCE
Deleting Images (page 92)
4
Double check to make sure that you really want to delete the image you selected.
* Press MENU to exit the image delete operation.
2
Press MENU.
3
Use [+] and [–] to select "Delete", and then press the shutter button.
Use [+] and [–] to select "Select", and then press the shutter button.
Use [+] and [–] to select an image you want to delete and then press the shutter button. Selected images are indicated by 🗑.
• Note that the first time you display an image its 🗑 icon is turned on.
5
Press DISP.
Use [+] and [–] to select "Yes", and then press the shutter button.
1
Slide the Function Switch to PLAY.
5

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*Congratulations upon your selection of the DV-8905SX LCD Digital Camera.*
*To get the most out of the DV-8905SX, be sure to carefully read this manual and follow the instructions contained in it.*


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- CASIO COMPUTER CO., LTD. assumes no responsibility for any damage or loss resulting from the use of this manual.
- CASIO COMPUTER CO., LTD. assumes no responsibility for any loss or claims by third parties which may arise through the use of the QV-8000SX.
- CASIO COMPUTER CO., LTD. assumes no responsibility for any damage or loss caused by deletion of data as a result of malfunction, repairs, or battery replacement. Be sure to back up all important data on other media to protect against its loss.
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- *The USB driver uses software by Phoenix Technologies Ltd.*
  *Compatibility Software Copyright © 1997*
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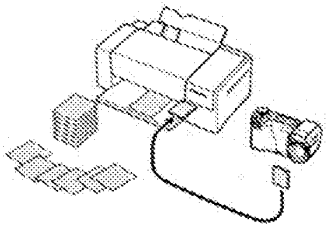
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# FEATURES

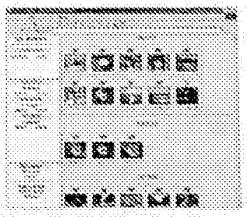
**Continuous recording (page 57)**
Continuous recording of high-quality images at 0.25-second intervals is just like have a motor drive on the camera.

**DCF Data Storage (page 104)**
DCF (Design rule for Camera File system) data storage protocol provides image inter-compatibility between the digital camera and printers.

**Digital Print Order Format (DPOF) (page 95)**
Images can be easily printed in the sequence you want using a DPOF compatible printer. DPOF can also be used by professional print services when specifying images to produce prints.

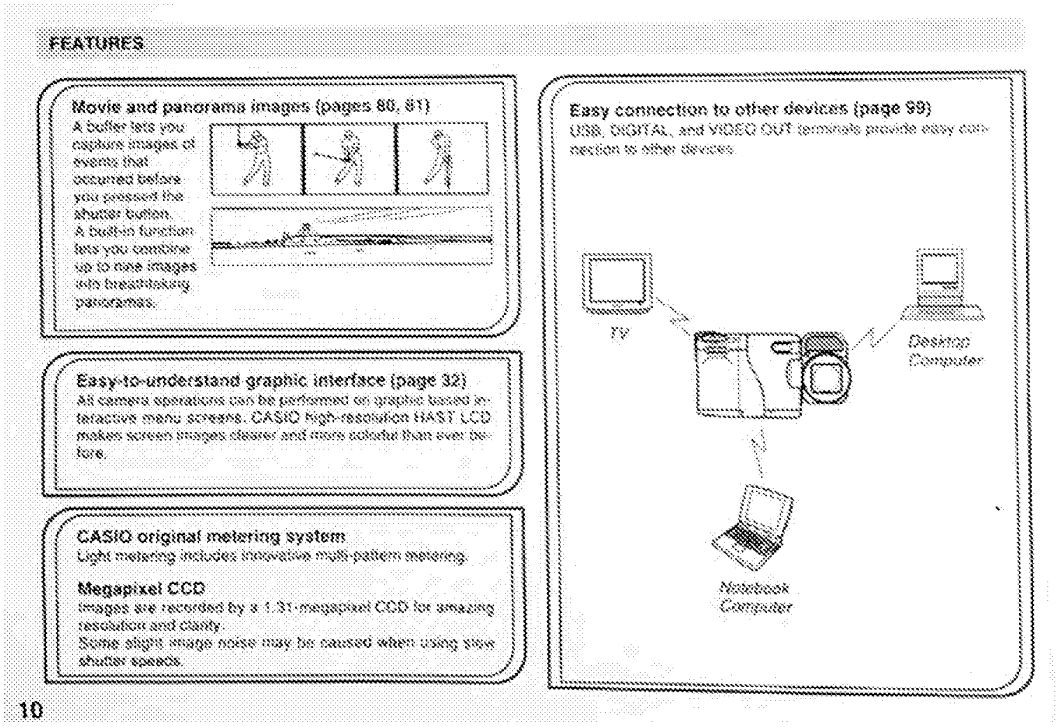


**Simple image management (page 105)**
Images are stored on a large-capacity CompactFlash memory card. A new Card Browser feature produces thumbnails of all images on a card quickly and easily.

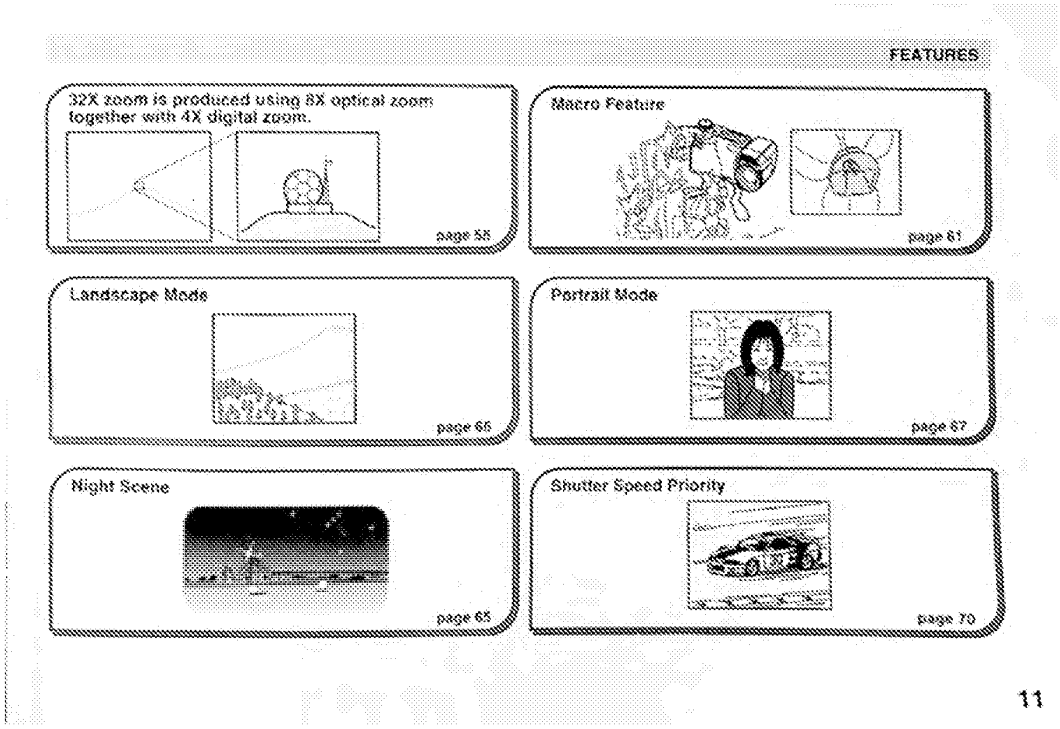


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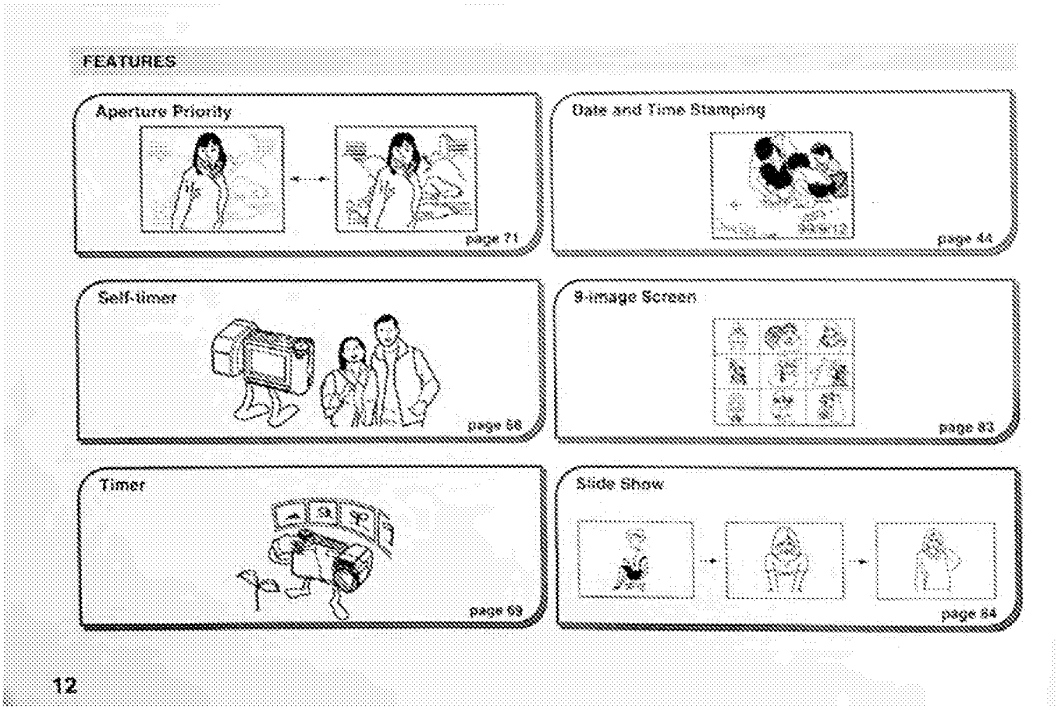

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Movie and panorama images (pages 80, 81)
A buffer lets you capture images of events that occurred before you pressed the shutter button.
A built-in function lets you combine up to nine images into breathtaking panoramas.
Easy-to-understand graphic interface (page 32)
All camera operations can be performed on graphic based interactive menu screens. CASIO high-resolution HAST LCD makes screen images clearer and more colorful than ever before.
CASIO original metering system
Light metering includes innovative multi-pattern metering.
Megapixel CCD
Images are recorded by a 1.31-megapixel CCD for amazing resolution and clarity.
Some slight image noise may be caused when using slow shutter speeds.
Easy connection to other devices (page 99)
USB, DIGITAL, and VIDEO OUT terminals provide easy connection to other devices.
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Desktop Computer
Notebook Computer
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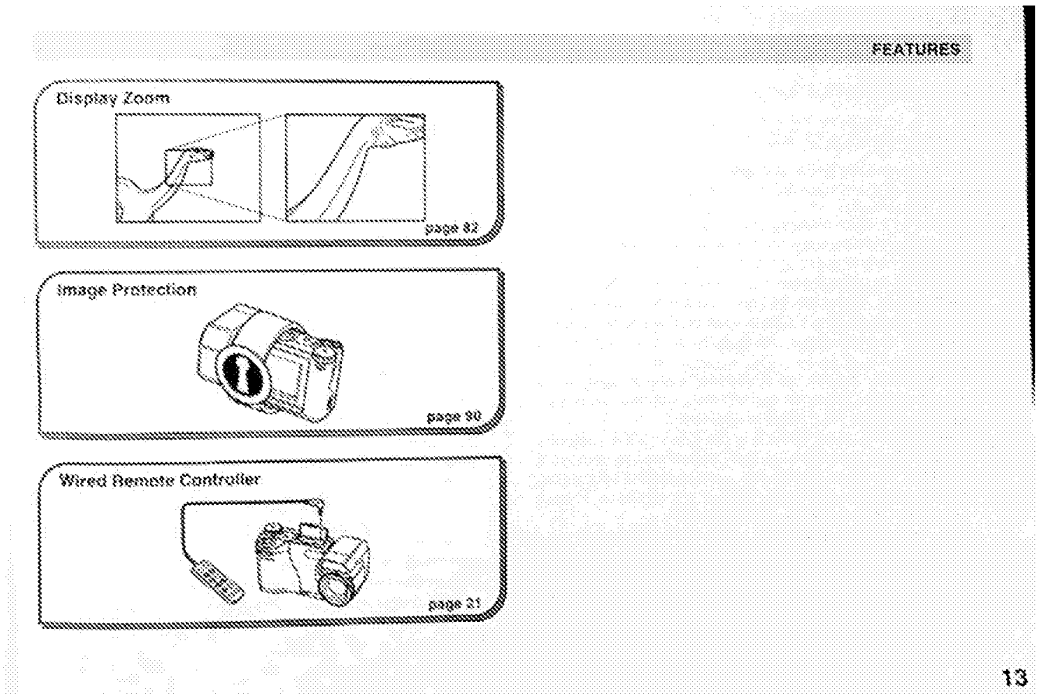



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Appendix D

# PRECAUTIONS

## General Precautions

Be sure to observe the following important precautions wherever using the QV-8000SX.

All references in this manual to "this camera" and "the camera" refer to the CASIO QV-8000SX Digital Camera.

- Never try to take pictures or use the built-in display while operating a motor vehicle or while walking. Doing so creates the danger of serious accident.
- Never try to open the case of the camera or attempt your own repairs. High-voltage internal components create the risk of electrical shock when exposed. Always leave maintenance and repair work up to authorized CASIO service providers.
- Never fire the flash in the direction of a person operating a motor vehicle. Doing so can interfere with the driver's vision and create the danger of accident.
- Never fire the flash while it is too close to the subject's eyes. Intense light from the flash can cause eye damage if it is fired too close to the eyes, especially with young children. When using the flash, the camera should be at least one meter from the eyes of the subject.
- Keep the camera away from water and other liquids, and never let it get wet. Moisture creates the danger of fire and electrical shock. Never use the camera outdoors in the rain or snow, at the seashore or beach, in the bathroom, etc.
- Should foreign matter or water ever get into the camera, immediately turn power off, unplug the AC adaptor from the power outlet, and contact your dealer or nearest CASIO service provider. Using the camera under these conditions creates the danger of fire and electrical shock.
- Should you ever notice smoke or a strange odor coming out of the camera, immediately turn power off and unplug the AC adaptor from the power outlet. Using the camera under these conditions creates the danger of fire and electrical shock. After making sure there is no more smoke coming from the camera, take it to your nearest CASIO service provider for repair. Never attempt your own maintenance.
- At least once a year, unplug the AC adaptor from the power outlet and clean the area around the prongs of the plug. Dust build up around the prongs can create the danger of fire.
- If the camera's case should ever become cracked due to dropping it or otherwise subjecting it to rough treatment, immediately turn power off, unplug the AC adaptor from the power outlet, and contact your nearest CASIO service provider.
- Never use the camera inside of an air craft or in any other areas where its use is prohibited. Doing so can result in an accident.
- Physical damage and malfunction of the camera can cause the image data stored in its memory to be deleted. Be sure to always keep backup copies of data by transferring them to personal computer memory.



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• Never open the battery compartment cover, disconnect the AC adaptor from the camera or unplug it from the wall socket while recording images. Doing so will not only make storage of the current image impossible, it can also corrupt other image data already stored in camera memory.

## Operating conditions

• This camera is designed for use in temperatures ranging from 0°C to 40°C.
• Do not use or keep the camera in the following areas:
— In areas subject to direct sunlight
— In areas subject to high humidity or dust
— Near air conditioners, heaters, or other areas subject to temperature extremes
— Inside of a closed vehicle, especially one parked in the sun
— In areas subject to strong vibration

## Condensation

• When you bring the camera indoors on a cold day or otherwise expose it to a sudden change of temperature, there is the possibility that condensation can form on the exterior or on interior components. Condensation can cause malfunction of the camera, so you should avoid exposing it to conditions that might cause condensation.
• To keep condensation from forming, place the camera into a plastic bag before moving it into a location that is much warmer or colder than your current location. Leave it in the plastic bag until the air inside the bag has a chance to reach the same temperature as the new location. If condensation does form, remove the batteries from the camera and leave the battery compartment cover open for a few hours.



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## About the camera's backlight...

- The camera is equipped with a fluorescent light source to provide the back lighting for its LCD.
- The normal service life of the backlight is approximately six years, when the camera is used for about two hours a day.
- Should the LCD image appear abnormally dark, take the camera to your dealer or an authorized CASIO service provider to have the light source replaced. Note that you will be charged for this replacement.
- Under very cold conditions, the backlight may require more time than normal to light, or reddish bands may appear in the displayed image. These conditions do not indicate malfunction, and normal operation should return at higher temperatures.

## Monitor Screen

### Recording

- The image shown on the monitor screen during recording is intended for composition purposes only, so its quality does not match that of the image as it is recorded. The image is recorded in accordance with the quality setting made with the procedure under "Quality Settings" on page 53.
- A dimly lit subject can slow down monitor screen refresh or cause static in the displayed image.

### Playback

The camera is designed for high speed scrolling of images during playback. Because of this, the playback image that initially appears on the monitor screen does not show the full resolution of the image as recorded. When you stop at the image you want, the monitor screen refreshes and shows the image in its full resolution.

## Lens

- Camera performance can be adversely affected by fingerprints or dirt on the lens surface. Never touch the lens surface with your fingers.
- Should the lens become dirty, use a blower to blow off dirt and dust, or a soft, dry cloth to wipe off the lens.

## Date Setting

No date setting is made before the camera is shipped from the factory. Be sure to use the procedure on page 44 to set the time and date before using the camera for the first time. File name assignment and time stamping will not be performed correctly if the time and date are wrong.



Appendix D

**GUIDELINES LAID DOWN BY FCC RULES FOR USE OF THIS UNIT IN THE U.S.A. (not applicable to other areas)**

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.

**NOTICE**

This equipment has been tested and found to comply with the limits for a Class B peripheral, 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.

**FCC WARNING**

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Properly shielded cables with ferrite core must be used for connection to host computer and/or peripherals in order to meet FCC emission limits.

**Declaration of Conformity**

| | |
|---|---|
| Model Number: | QV-8000SX |
| Trade Name: | CASIO COMPUTER CO.,LTD. |
| Responsible party: | CASIO INC. |
| Address: | 570 MT. PLEASANT AVENUE, DOVER,NEW JERSEY 07801 |
| Telephone number: | 973-361-5400 |

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.

CASIO COMPUTER CO.,LTD. QV-8000SX

FC Tested To Comply With FCC Standards

FOR HOME OR OFFICE USE

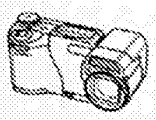


Appendix D

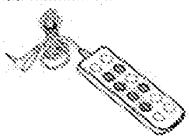
# UNPACKING

Check to make sure that all of the items shown below are included with your camera. If something is missing, contact your dealer as soon as possible.

Camera



Wired Remote Controller



Lithium Battery for wired remote controller (CR2025)



Soft case



Lens cap

Attached to the lens.



2-Way Shoulder/ Wrist Strap



Video cable



Special USB cable



User's Guide





Appendix D

## Using the Lens Cap

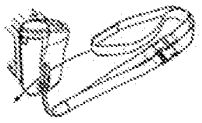
Be sure to affix the lens cap whenever you are not using the camera. When affixing the lens cap, position it as shown in the illustration and press at the points indicated by the arrows.




• A clip on the back of the lens cap lets you fasten it to the camera strap.

## Attaching the Strap

The two-way strap that comes with the camera can be used either as a shoulder strap or a wrist strap. Pass the wrist strap through the hole on the side of the camera as shown in the illustration.

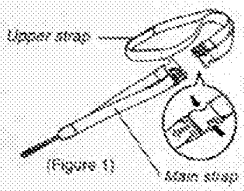




Appendix D

## Using the Strap as a Wrist Strap

Detach the upper strap from the main strap (Figure 1), and then attach the two buckles of the main strap to each other (Figure 2).
Press the buckles together until they snap securely into place.



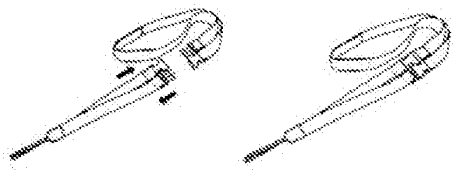

(Figure 1)



(Figure 2)

## Using the Strap as a Shoulder Strap

Attach the strap to the camera so the shoulder pad is on the inside of the loop.



**IMPORTANT!**

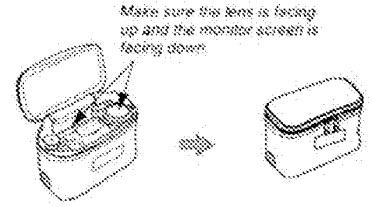
- Be sure to keep the strap around your wrist whenever using the camera to protect against accidentally dropping it.
- The supplied strap is intended for use with this camera only. Do not use for any other application.
- Never swing the camera around by the strap.
- Allowing the camera to swing freely from your neck can result in damage to the camera due to its bumping against other objects. It also creates the danger of the camera becoming caught in a door or on other objects, resulting in personal injury.

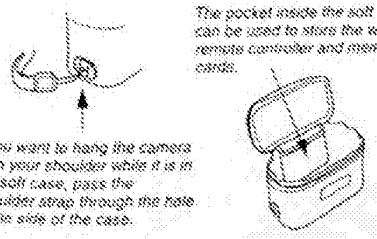


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## Using the Soft Case

Keep the camera in its soft case to protect it when not in use.

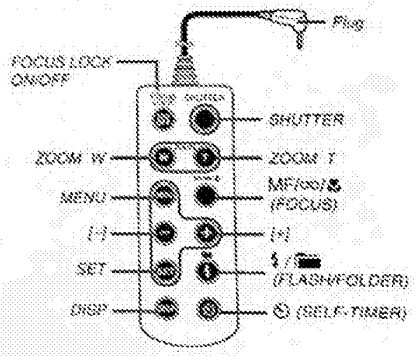



## Using the Wired Remote Controller

The wired remote controller that comes with the camera can be used to control the camera. When using a slow shutter speed or telephoto, you can avoid blurring of the image due to camera movement by mounting the camera on a tripod and using the wired remote controller to trigger the record operation. You can also use remote control for playback during presentations.

### General Guide



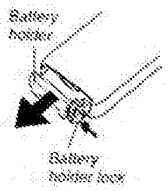



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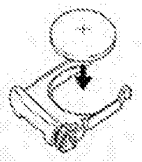
## Replacing the Wired Remote Controller Battery

The wired remote controller is powered by a single CR2025 lithium battery.

1. While pressing the battery holder lock, pull the battery holder from the wired remote controller.




2. After wiping off the two sides of a battery with a soft, dry cloth, place it into the battery holder with the positive (+) side facing up (so you can see it).



3. Slide the battery holder back into place.

Failure of the wired remote controller to operate probably means that the battery needs to be replaced.

### Battery Precautions

CAUTION

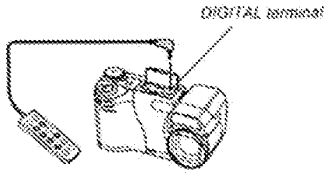
- Keep batteries out of the reach of small children. If swallowed accidentally, contact a physician immediately.
- Misuse of a battery can cause it to leak, which damages and corrodes the area around the battery and creates the danger of fire and personal injury. Be sure to observe the following precautions.
- When loading the battery, make sure its positive (+) and negative (–) sides are facing correctly.
- Use only the battery type that is specified for this unit.
- Never try to charge a battery or take it apart, and never allow its poles to become connected to each other by metal (shorted). Do not expose batteries to heat or dispose of them by burning.
- Dead batteries tend to leak battery fluid. Never leave a dead battery in the wired remote controller.



Appendix D

## Connecting to the Camera

Turn off camera power and then attach the plug of the wired remote controller to the camera's DIGITAL terminal.




## Wired Remote Controller Buttons

The buttons of the wired remote controller have the same basic functions as the buttons on the camera, except for the differences described below.

| To perform this operation: | Do this: |
|---|---|
| Focus Lock | **Wired remote controller:**<br>Press the FOCUS LOCK ON/OFF button to turn on focus lock, compose the image, and then press the SHUTTER button.<br>• Pressing FOCUS LOCK ON/OFF again cancels focus lock.<br>• Pressing the remote controller's SHUTTER performs the focus operation, followed by recording of the image.<br>**Camera:**<br>Press the shutter button half way, compose the image, and then press the shutter button (page 48) |
| Menu screen item selection | **Wired remote controller:**<br>Highlight the item on the camera's monitor screen, and then press the SET button.<br>**Camera:**<br>Highlight the item on the camera's monitor screen, and then press the shutter button (page 32) |

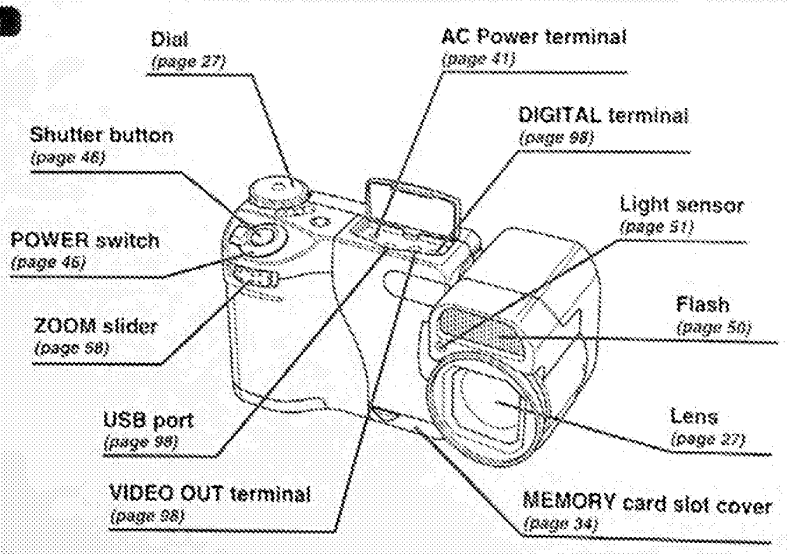


Appendix D

# GENERAL GUIDE

The following illustrations show the names of each component, button and switch on the camera.

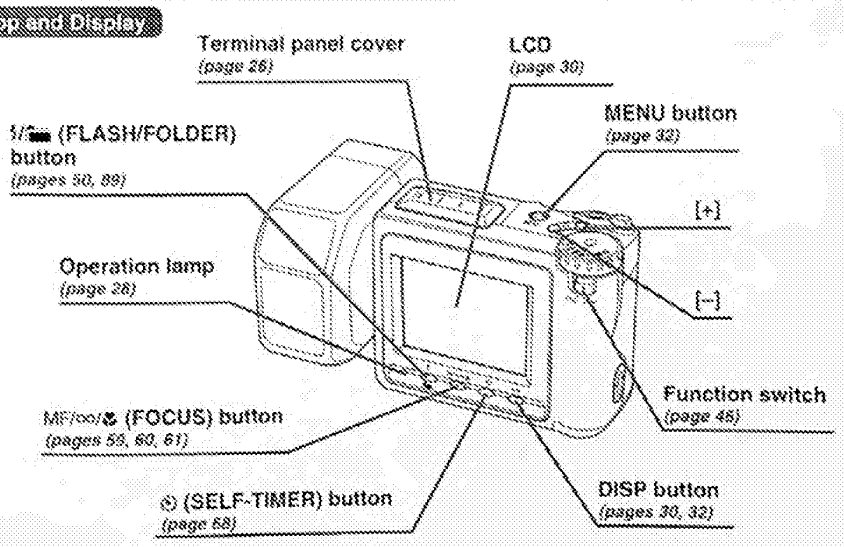
**Lens**






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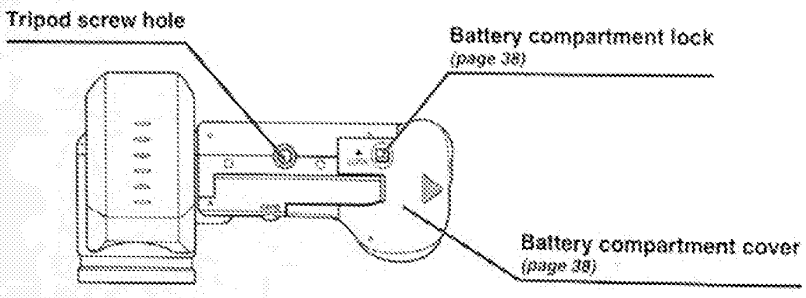
Top and Display






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Bottom

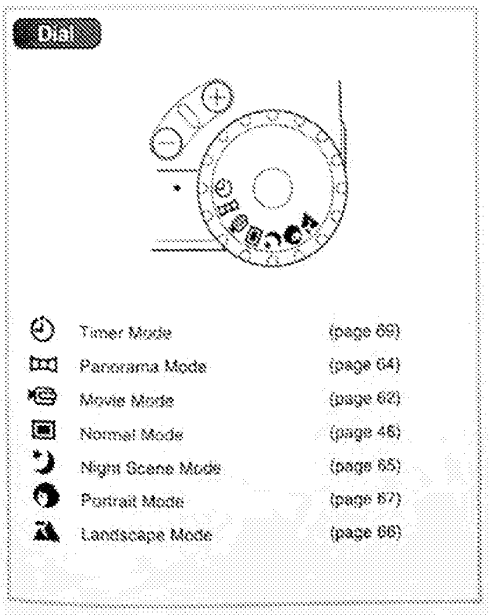



Opening the Terminal Panel Cover





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## Lens Filters

The area around the lens of the camera is threaded to allow use of commercially available lens filters with a diameter of 43mm. Simply screw the lens filter into place.

**IMPORTANT!**



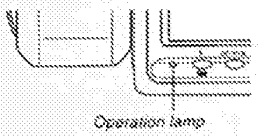
- Certain types of filters can cause the problems described below. Be sure to carefully check any filter for these problems before purchasing it.
  - The frame around the outside of some filters may block light from the lens, resulting in shadows in the image.
  - Some filters can interfere with proper operation of Auto Focus and the flash unit.
  - Filter performance may not be equivalent to that obtained with a film-based camera.
- Do not use multiple filters with this camera.
- Do not use a lens hood. Doing so causes incorrect firing of the flash unit.



Appendix D

## Operation Lamp

The operation lamp shows the operational status of the camera.



Operation lamp

Record Mode

| Lamp Color | On | Flashing |
|---|---|---|
| Green | Auto Focus operation complete | Please wait (after power on) |
| | Monitor screen turned off due to sleep state activation or data communication | Image store operation in progress |
| | | Power off |
| | | Low battery |
| Amber | Exposure warning | Flash is charging |
| Red | Cannot focus | Memory error |
| | Memory full | |
| | Cannot charge the flash | |



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Playback Mode

| Lamp Color | On | Flashing |
|---|---|---|
| Green | Monitor screen turned off due to data communication. | Please wait (after power on) |
| | | Delete operation in progress |
| | | Format operation in progress |
| | | Power off routine in progress |
| | | Low battery |
| Red | — | Memory error |

Low Battery Warning

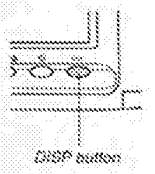
Lights (red), after which camera power turns off automatically.



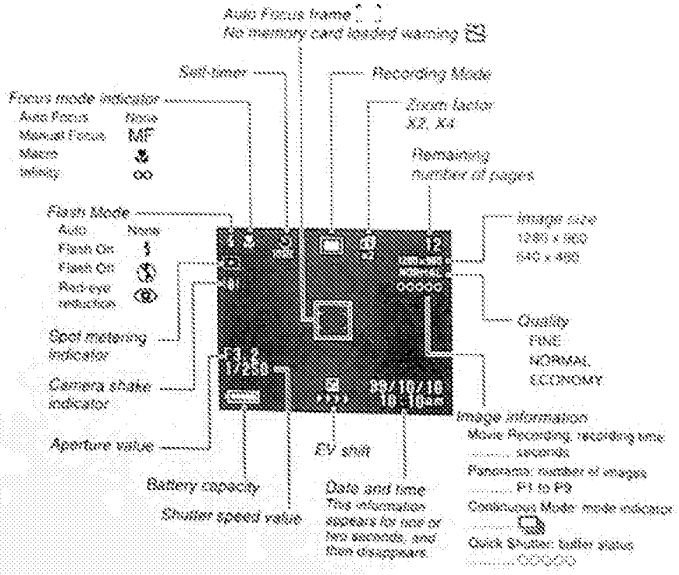
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# MONITOR SCREEN

Pressing DISP causes various indicators to appear on the monitor screen.



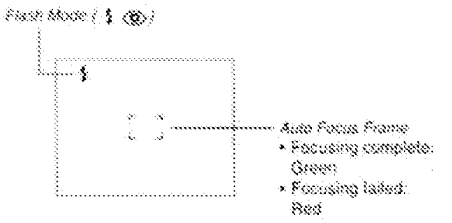

## Recording Mode






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Screen when shutter is pressed half way

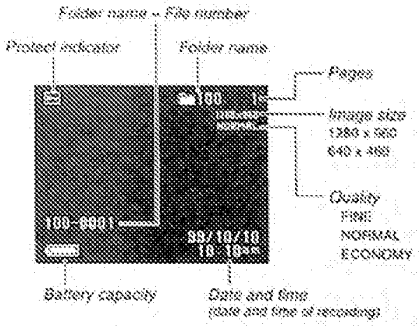



Flash indicator appears to indicate that flash will be fired (when auto flash is selected)

Recording Mode Indicators

| | | | |
|---|---|---|---|
| | Timer | | Night Scene |
| | Panorama | | Portrait |
| | Movie | | Landscape |
| | Normal | | |

## Playback Mode




### Changing the Display Language

Use the following procedure to switch the display language between English and Japanese.

1. Press MENU.
2. Select "Set Up" → "Language".
3. Select the display language you want.



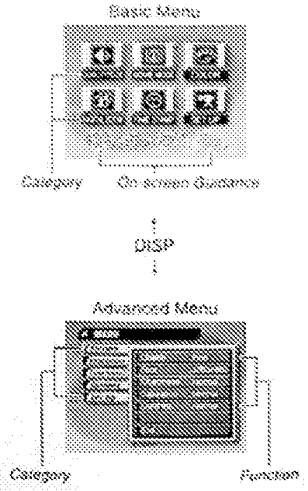
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## Menu Screens

Pressing MENU displays the menu screen. The contents of the menu screen depend on whether you are in the PLAY Mode or REC Mode. While the menu screen is on the display, press DISP to toggle between the basic menu and the advanced menu.
In this User's Guide, the basic menu is always used for items that appear on both the basic menu and advanced menu.
The basic menu displays settings required for basic functions, while the advanced menu includes settings for all functions.

- See "Using the Record Menus" on page 75 and "Using the Playback Menus" on page 88 for more information about menu contents.

Sample Display: REC Mode






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## Making menu settings

1. Slide the Function Switch to PLAY or REC.
2. Press MENU.
3. Press DISP to toggle between the basic menu and the advanced menu.
4. Use [+] and [–] to select the category or function you want, and then press the shutter button.

   [+] [–] : Item selection
   Shutter button : Execution of a selection
   MENU : Returns to the previous screen or cancels settings.

   • Make settings in accordance with the guidance messages that appear on the monitor screen.
5. After making the settings you want, select "Exit" and then press the shutter button.



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# MEMORY CARDS

This camera uses a memory card (CompactFlash cards) for image memory.
Use the procedure below to insert the memory card into the camera before you try to use it for the first time.

**IMPORTANT!**

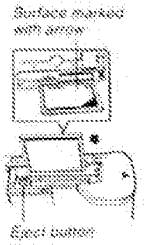
- Make sure that the power of the camera is turned off before you insert or remove a memory card.
- When inserting a memory card into the camera, make sure that the card is oriented correctly. Make sure that the correct side of the card is facing up, and that you insert the correct end of the card into the camera.

## Inserting a Memory Card into the Camera

1. Open the memory card slot cover.



2. As shown in the illustration, slide the memory card into the slot and push it in as far as it will go.
   - If the Eject button is extended, press it in before sliding the memory card into the slot.




3. Close the memory card slot cover.





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## Removing a Memory Card from the Camera

1. Open the memory card slot cover.

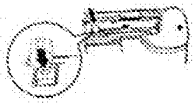


2. Press the eject button so it extends from the camera.



Eject button

3. Press the eject button once again to eject the card.



4. Remove the memory card.



5. Close the memory card slot cover.



**IMPORTANT!**

- Insert only memory cards into the memory card slot. Inserting any other type of card can cause malfunction.
- Should water or any other foreign matter get into the memory card slot, immediately turn off power, unplug the AC adaptor, and contact your original retailer or nearest CASIO Service Provider.
- Never eject the CompactFlash card while the card slot is facing downwards. Doing so creates the danger of the CompactFlash card falling, which can corrupt image data on the card.



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## Formatting a Memory Card

You can format a memory card to delete all of the data stored on it.

**IMPORTANT!**

- Formatting a memory card deletes all images on the card, even if some or all of the images are protected (page 90).
- Data deleted by a memory card format operation cannot be recovered! Be sure to carefully check and confirm that you no longer need the data stored in a memory card before formatting it.

1. Press MENU.
2. Select "Set Up" → "Format".
3. In response to the confirmation message that appears, select "Yes" to start formatting the card.

## Memory Card Precautions

- Images cannot be recorded with this camera unless a memory card is installed in it.
- Be sure to use only CASIO brand CompactFlash cards. Proper operation with other memory cards is not guaranteed.
- Static electricity, electrical noise, and other electrical phenomena can cause corruption or even total loss of the data stored on a memory card. Because of this, you should always make backup copies of important images on other media (magnetic optical disk, floppy diskette, computer hard disk, etc.).
- Memory card problems can be corrected by reformatting the memory card (page 116). Reformatting a memory card deletes all images stored on the card, but you can use a computer to copy the images you want to keep to the computer's hard disk before reformatting your card. If you plan to be recording images where you do not have access to a computer, it is a good idea to take along an extra memory card or two just in case you experience an unexpected memory card problem.

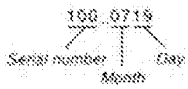


Appendix D

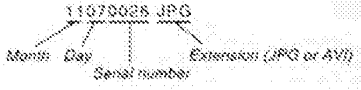
- Formatting is recommended for any memory card that you suspect contains corrupted image data (due to a DECODE ERROR, strange image colors, malformed images) or newly purchased memory cards.
- Before starting a format operation, load a full set of new batteries (alkaline or lithium) into the camera or connect the AC adaptor to power the camera. Interruption of camera power during the format operation results in improper formatting, making it impossible to use the memory card.

## Memory Card Folder Precautions

- The camera automatically creates folders (directories) on the memory card and assigns them names based on dates (month and day). Any image you record is automatically stored into the folder that corresponds to the date it is recorded.
- Up to 900 folders can be created on a single card. The following shows a typical folder name.




- Up to 250 image files can be stored in each folder. The following shows a typical file name.




- When you try to save the 251st image to a folder, the camera automatically creates a new folder and store the image there.
- The above maximum number of files and folders are absolute maximums. The actual number of folders and files may be less due to memory card capacity and the size of each image.
- Panorama images are divided into multiple images and stored on the memory card.
- See "USING CompactFlash CARDS WITH YOUR COMPUTER" on page 103 for information about how files and folders are organized.



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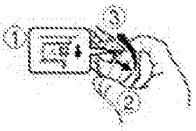
# POWER SUPPLY

The camera features a two-way power supply that lets you use either batteries (AA-size alkaline, lithium or Ni-MH) or household AC current.

## Loading Batteries

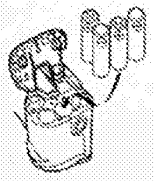
Be sure that camera power is turned off whenever loading or replacing batteries.

1. On the bottom of the camera, slide the battery compartment cover lock towards the front of the camera (①) to release the cover.

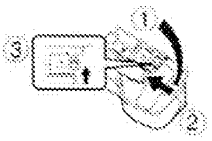



2. Grasping both sides of the battery compartment cover, swing it open (② ③).

3. Load batteries so their plus (+) and minus (–) ends are facing as shown in the illustration.



4. Close the battery compartment cover (① ②), and then slide the battery compartment cover lock towards the back of the camera to lock the cover in place (③).




Be sure to use **alkaline**, **lithium** or **Ni-MH** batteries. Never use manganese batteries (see precautions on the next page).

- Make sure the battery compartment cover is locked securely. Failure to do so can result in the cover opening, creating the danger of personal injury and corruption of image data.



Appendix D

## Standard Battery Life

This camera can be powered using AA-size alkaline, lithium or Ni-MH batteries.

The battery life reference values given below indicate the amount of time at standard temperature (25°C) until power automatically turns off due to battery failure. They do not guarantee that batteries will perform the amount of service indicated. Battery life is reduced by low temperatures and continued use.

| Type of Operation | AA-size Alkaline Batteries LR6 | AA-size Lithium Batteries FR6 | AA-size Ni-MH |
|---|---|---|---|
| Continuous Playback | 110 minutes | 280 minutes | 180 minutes |
| Continuous Recording | 400 shots | 1080 shots | 620 shots |

- The above figures are approximations only.
- The above guidelines are based on the following battery types.
  - Alkaline: MX1500 (AA) DURACELL ULTRA
  - Lithium: Energizer
  - Ni-MH (Nickel-metal hydride): CASIO NP-H3
- Battery life varies with brand.
- Figures are based on continuous recording under the following conditions.
  - Flash turned off
  - One zoom slider switching between T (Telephoto) and W (Wide-angle)

Battery life is greatly affected by how much you use flash, zoom and other functions, and how long you leave power turned on.

### ● About rechargeable batteries

- Use only the nickel-metal hydride batteries (NP-H3) that are available from your dealer as options for this camera. Proper camera operation is not guaranteed when other rechargeable batteries are used.
  - Nickel-metal hydride Batteries (4-battery set)/Quick Charger Set BC-1HB4
  - Nickel-metal hydride Batteries (4-battery set) NP-H3P4
- Be sure to keep all four batteries together as a set at all times, for both charging and powering the camera. Mixing batteries from different sets can shorten overall battery life and cause malfunction of the camera.
- Rechargeable batteries cannot be charged while they are loaded in the camera.

### ● Tips for Prolonging Battery Life

- Use the $ button to turn off the flash when you are not using it.
- You can also use the power save settings (page 40) to protect against wasting battery power when you forget to turn off the camera.

### ● How low temperature affects battery life

- The life of alkaline batteries is shortened by use under very cold temperatures. The life of alkaline batteries used at 0°C is about one fifth of what it is at normal temperatures (about 25°C). When shooting under very cold temperatures, we recommend use of lithium or nickel metal hydride batteries, which are not so dramatically affected by cold. If you must use alkaline batteries, be sure to have plenty of spares on hand.



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## Battery Handling Precautions

Incorrect use or handling of batteries can cause them to leak or burst and seriously damage your camera. Be sure to note the following important precautions to avoid problems with batteries.

CAUTION

- Use only LR6 (AM-3) type alkaline or FR6 type lithium or Ni-MH (nickel-metal hydride) dry cell batteries with this camera. Never mix old batteries with new ones. Doing so can result in bursting or leaking of batteries, creating the danger of fire or personal injury.
- Always make sure that the positive (+) and negative (–) ends of the batteries are facing correctly, as noted by the markings on the camera itself. Improper loading of batteries can result in bursting or leaking of batteries, creating the danger of personal injury or soiling of objects nearby.

- Remove batteries from the camera if you do not plan to use it for more than two weeks.
- Never recharge batteries, never allow direct connection between two ends of a battery, and never try to take batteries apart.
- Do not expose batteries to direct heat or dispose of them by burning. Doing so can create the danger of explosion.
- Never mix batteries of different types.
- Dead batteries are susceptible to leakage, which can cause serious damage to your camera. Remove batteries from the camera as soon as you notice they are dead.
- The batteries that power the camera normally become warm as they discharge.

## Battery Capacity Indicator

The battery capacity indicator (shown only when the image information display is turned on) changes in the following sequence as battery power decreases. "▮▮▮" → "▮▮▯" → "▮▯▯" → "▯▯▯". If you continue to use the camera while the battery level is "▮▯▯" or "▯▯▯", camera power will automatically turn off.



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## Auto Power Off (Battery Powered Operation Only)

Power automatically turns off whenever you do not perform any camera operation for a specific period. See page 43 for details about how you can specify the Auto Power Off time.

- To restore power, simply use the POWER Switch to turn power back on again.

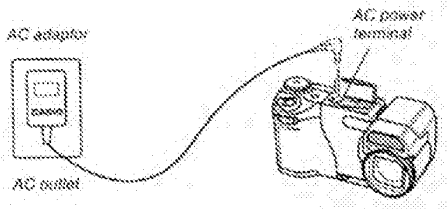
**IMPORTANT!**

The Auto Power Off function does not operate under the following conditions.

- During Slide Show (page 84)
- While the camera is being operated from a computer or printer connected via a cable or the USB port (page 98).
- Whenever the AC adaptor is connected to the camera.

## Using AC Power

Use the optional AC adaptor (AD-C620) to power the camera from standard AC power.




### AC Adaptor precautions

CAUTION

- Never use an electrical outlet whose voltage is outside the rating marked on the AC adaptor. Doing so can create the danger of fire or electrical shock. Use only the optional AC adaptor specified for this camera.
- Should the cord of the AC adaptor become damaged (exposed internal wiring), request a replacement from an authorized CASIO service provider. A damaged AC adaptor cord creates the danger of fire or electrical shock.



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CAUTION

- Always be sure to use the AD-C620 AC adaptor only. Using any other AC adaptor can cause damage to the camera not covered by the warranty.
- When unplugging the AC adaptor from the wall socket, be sure to grasp the adaptor (not the cord).
- Avoid any undue bending, pulling, and twisting of the AC adaptor's cord, and never try to lengthen the cord by splicing it with other wire.

- Be sure to turn power off before connecting or disconnecting the adaptor.
- Always turn camera power off before disconnecting the AC adaptor, even if the camera has batteries installed. If you don't, the camera will turn off automatically when you disconnect the AC adaptor. You also run the risk of damaging the camera whenever you disconnect the AC adaptor without first turning power off.
- The AC adaptor may become warm to the touch after extended periods of use. This is normal and is not cause for alarm.
- After using the camera, turn it off and unplug the adaptor from the AC outlet.
- The camera automatically switches over to AC adaptor powered operation whenever the AC adaptor is plugged into the camera.
- Always use the AC adaptor to power the camera whenever it is connected to a computer.

## Power Save Settings

The settings described below let you specify sleep and auto power off trigger times that help to conserve valuable battery power.

**SLEEP** ..... The monitor screen enters a sleep state if no operation is performed for a specified amount of time in the Record Mode. Pressing any button restores full power. You can specify 30 seconds, 1 minute, or 2 minutes before the sleep state is triggered, or you can turn off this setting entirely.

**AUTO POWER OFF** ..... Auto Power Off turns off camera power if no operation is performed for a specified amount of time. You can specify 2 minutes, 5 minutes, or 10 minutes before AUTO POWER OFF is triggered, or you can turn off this setting entirely.

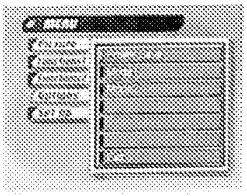
- AUTO POWER OFF takes priority when both SLEEP and AUTO POWER OFF are both set for a 2-minute trigger time. This means camera power turns off if no operation is performed after two minutes.



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### Setting SLEEP and AUTO POWER OFF Trigger Times

1. Slide the Function Switch to REC.
2. Press MENU.



3. Select "Options" → "Power Save" → "Power Save".
   - "Options" appears on the advanced menu only.
4. Use [+] and [–] to select "Sleep" or "Auto Power Off".
5. Select the trigger time you want to set.
6. When the settings are the way you want them, press the shutter button.
7. Select "Exit".

## Initializing Power Save Trigger Times

Use the following procedure to return SLEEP and AUTO POWER OFF trigger time settings to their initial factory defaults (SLEEP: 1 minute, AUTO POWER OFF: 2 minutes).

**IMPORTANT!**

Note that performing the following procedure to initialize the power save trigger time settings also initializes mode memory (page 74).

1. Slide the Function Switch to REC.
2. Press MENU.
3. Select "Options" → "Power Save" → "Power Save".
   - "Options" appears on the advanced menu only.
4. Use [+] or [–] to select "Sleep" or "Auto Power Off".
5. Select "Restore".
6. Select "Exit".



Appendix D

# SETTING THE CURRENT DATE AND TIME

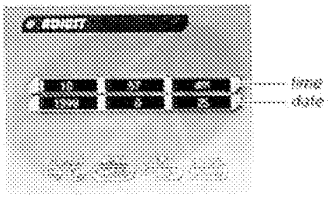
Use the following procedures to set the current date and time, and to select the date format.
When you record an image, the time and date the image was shot is registered in accordance with data from the camera's built-in clock. You can even use the TIME STAMP function to "stamp" the date and time inside the image.

**IMPORTANT!**

- The time and date settings are cleared if the camera is left for about 24 hours without battery and AC power being supplied. If this happens, restore power and make new time and date settings before using the camera again.
- A flashing time display indicates that the time and date (clock) settings have been cleared. Use the procedure on this page to make the correct time and date settings.
- If you do not set the camera's built-in clock to the current date and time, all images are recorded with the default date and time, which probably is not your correct current date and time. Be sure to correctly set the clock before you use the camera.

## Setting the Date and Time

1. Press MENU.
2. Select "Set Up" → "Date" → "Adjust".




3. Set the current date and time.
   - Use [+] and [–] to select the green setting on the monitor screen, and then press the shutter to advance to the next setting. Repeat this for all of the settings on the monitor screen.
4. After making all the settings on the monitor screen, press DISP to register them.



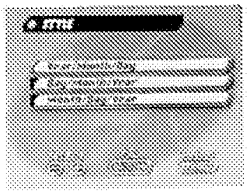
Appendix D

## Selecting the Date Format

Example: Sep 12, 1999

You can select any one of the following formats for the above date: 99/9/12, 12/9/99, 9/12/99.

1. Press MENU.
2. Select "Set Up" → "Date" → "Style".



3. Use [+] and [–] to select the date format you want, and then press the shutter button.



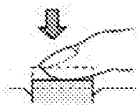
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# RECORDING

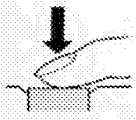
## Using the Shutter Button

The following steps describe how to operate the shutter button so that Auto Focus has a chance to focus the image.

1. **Press the shutter button about half way.**
   - The Auto Focus feature automatically focuses the image.



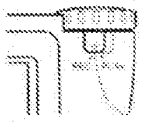
2. **Press the shutter button as far as it will go to record the image.**



## Basic Recording Operation

The following describes the basic operation for recording images.

1. **Slide the Function Switch to REC.**



   - The REC position selects the Record Mode, while PLAY selects the Playback Mode.

2. **Rotate the dial so its ■ (normal recording) setting is aligned with the dot on the top of the camera.**



3. **Slide the POWER Switch in the direction indicated by the arrow.**





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- The POWER Switch returns to its original position when you release it.
- Turning on power enters the Record Mode.
- If power turns off, use the POWER Switch to turn it back on again.

**4. After composing the image on the monitor screen, press the shutter button about half way and hold it there.**

- The camera's Auto Focus feature automatically focuses the image.
- The operation lamp lights green and the Auto Focus Frame on the monitor screen turns green when the Auto Focus operation is complete.
- Take care to avoid blocking the lens, distance sensor or light sensor with your fingers.



- Carefully press the shutter button, taking care not to move the camera as you do.

**5. After confirming that the Auto Focus operation is complete (the operation lamp lights green), press the shutter button all the way down to record the image.**

- Pressing the shutter button releases the shutter, even if Auto Focus was unsuccessful and the image is out of focus.
- After you record an image, the camera takes a few seconds to store it in memory. If you try to change to the Playback Mode while a save operation is in progress, the message "Press DISP to cancel save" appears on the monitor screen. Pressing DISP at this time cancels the save operation.
- Use of a tripod and the wired remote controller is recommended for slow shutter speeds and telephoto shots to avoid blurring of the image due to camera movement.



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**IMPORTANT!**

Auto Focus tends not to work well with the following types of subjects:

- Solid color walls or objects with little contrast
- Strongly backlit objects
- Polished metal or other brightly reflective objects
- Venetian blinds or other horizontally repeating patterns
- Multiple images that are varying distances from the camera
- Subjects in poorly lit areas
- Auto Focus also may not work properly when the camera is unsteady or shaking.

These cases may make it impossible for Auto Focus to focus properly, which is indicated by the operation indicator and the Auto Focus Frame inside the monitor screen remaining red. When this happens switch to the Manual Mode for focusing (page 59). The following are the fixed focusing distances when Auto Focus is unable to focus.

Well-lit Location: 1.5 (4.9') meters minimum
With Flash: Approximately 2 meters (6.6')

**CAUTION**

- Never open the battery compartment cover, disconnect the AC adaptor from the camera, or unplug the adaptor from the wall socket while the operation indicator is flashing green. Doing so will not only make storage of the current image impossible, it can also corrupt other image data already stored in camera memory.
- Fluorescent lighting actually flickers at a frequency that cannot be detected by the human eye. When using the camera indoors under such lighting, you may experience some brightness or color problems with recorded images.



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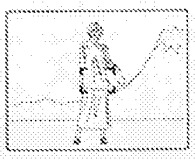
## Using Focus Lock

Normally, Auto Focus automatically focuses on the object that is inside the Auto Focus Frame. Focus lock is a technique that lets you lock the focus on a subject and then move the camera so the Auto Focus Frame is pointed at another subject when you record. This keeps the original subject in focus, even though a different object is within the Auto Focus Frame.

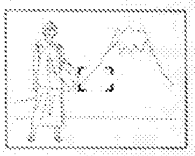
- The Auto Focus Frame is shown on the monitor screen only while the shutter button is being held half way down.
- Locking the focus also locks the exposure setting.

**1. Align the Auto Focus Frame with the subject you want to lock on and press the shutter button half way down.**

- The Auto Focus frame turns green when the image is in focus.
- If you are using the wired remote controller, press its FOCUS LOCK ON/OFF button to turn focus lock on and off.



**2. While keeping the shutter button depressed half way, move the camera and compose the image as you want.**



**3. Press the shutter button all the way down to record the image.**

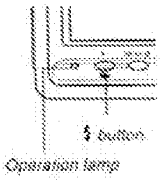


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## Using the Flash

You can use the built-in flash unit to provide illumination during recording.

1. **Slide the Function Switch to REC.**
2. **Press ↯.**
   - Each press of ↯ cycles through the flash mode in the following sequence: Auto → On → Off → Red-eye Reduction.




| Indicator | Flash Mode | Description |
|---|---|---|
| None | Auto Flash | Flash is automatically enabled and disabled in accordance with exposure conditions. |
| ↯ | Flash On | Flash is always fired, regardless of exposure conditions. |
| ⊘ | Flash Off | Flash is never fired, regardless of exposure conditions. |
| ◉ | Red-eye Reduction | Fires a pre-flash followed by recording with flash, which reduces the chance of red-eye. |

- The monitor screen goes blank and the operation lamp flashes amber while the flash unit is charging.

### Camera Shake Indicator

The "✋" (camera shake indicator) appears on the monitor screen when the ZOOM slider is set to T (telephoto) or when a slow shutter speed is being used.

- If the camera shake indicator (✋) appears, use a tripod and the wired remote controller to avoid camera movement.

### Flash Indicator

When you press the shutter button half way, the flash icon appears on the monitor screen to indicate that the flash will fire when shutter button is pressed the rest of the way down.

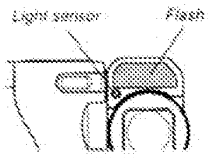
**IMPORTANT!**

- Never use the flash in areas where combustible or explosive gas is present. Doing so creates the danger of fire and explosion.
- Never fire the flash in the direction of a person operating a motor vehicle. Doing so can interfere with the driver's vision and create the danger of accident.



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- Never fire the flash while it is too close to the subject's eyes. Intense light from the flash can cause eye damage if it is fired too close to the eyes, especially with young children. When using the flash, the camera should be at least one meter from the eyes of the subject.
- Make sure that you do not touch or block the flash or light sensor with your fingers. Doing so can soil these components and interfere with correct flash operation.




- Flash should be used for distances in the ranges shown below. Flash does not work well outside these ranges.

Normal : Approximately 0.5 meters to 2.5 meters (1.6' to 8.2')
Macro : Approximately 0.1 meters to 0.5 meters (0.3' to 1.6')

- Depending on operating conditions (type of battery being used, temperature, etc.), it may take up to 10 seconds for the flash unit to charge.
- The flash is disabled during movie and continuous recording. The ⚡ indicator flashes to indicate this condition.
- The flash unit will not charge when battery power is low. The ⚡ indicator flashes red to warn you that the flash will not fire correctly, which may affect exposure of the image. Replace batteries as soon as possible when this happens.
- Red-eye reduction may not work well when the camera is not pointed directly at the subject or when the subject is far from the camera.
- In the Red-eye Reduction Mode, the flash is fired automatically in accordance with exposure. Because of this, the flash will not fire in a well-lit area.
- White balance is fixed while the flash is being used, so the coloring of the recorded image may be affected by sunlight, fluorescent lighting, or other sources of illumination in the immediate area.



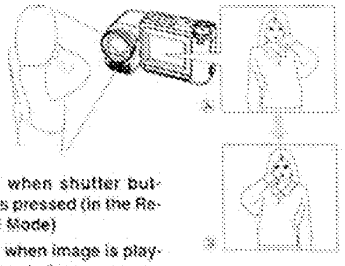
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## Changing the Lens Orientation

The lens of the camera is built into a rotating lens body. This means you can change the angle of the lens without moving the rest of the camera.



• Any images recorded while the lens body is rotated so the lens is pointed towards the back of the camera are stored as mirror images of the image that appears in the LCD before the shutter button is pressed.




Ⓐ ..... LCD when shutter button is pressed (in the Record Mode)

Ⓑ ..... LCD when image is played back from camera memory

**IMPORTANT!**

- Do not apply excessive force when rotating the lens body. Doing so can cause serious damage to the lens.
- Do not carry the camera or move it around while holding onto only the lens body.
- Return the lens body to its normal position (with the lens point up) before storing the camera.
- Never lay the camera down or store it with the lens pointing downwards. Doing so can cause bending of the ring around the outside of the lens.
- Always leave the lens cap in place on the lens except when actually using the camera for recording.



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## Quality Settings

The camera has three quality modes: FINE, NORMAL, ECONOMY.

- To determine the number of images that can be stored on a memory card of a different capacity, multiply the capacities in the table below, by the appropriate value.
- The actual number of images that can be stored in memory cannot be specified precisely because the amount of memory required for storage of each image differs according to image contents.

| Setting Indicator | FINE | | NORMAL | | ECONOMY | |
|---|---|---|---|---|---|---|
| Quality | Fine | | Normal | | Economy | |
| Computer Image size | 1280 x 960 pixels | 640 x 480 pixels | 1280 x 960 pixels | 640 x 480 pixels | 1280 x 960 pixels | 640 x 480 pixels |
| Number of Images With memory card | 13 | 35 | 16 | 48 | 28 | 63 |
| Number of Images With memory card (Default) | 68 | 258 | 122 | 307 | 206 | 418 |
| File Size (per image) | 5000 KB | 1500 KB | 3500 KB | 1100 KB | 2000 KB | 900 KB |

- Numbers in parentheses are compressed image file sizes.
- The figures in the left are approximations only. The actual number of images depends on image subject matter.
  Use the procedure under "Using the Record Menus" on page 75 for details on changing the quality modes.
- Note that the maximum number of images that can be stored in a single folder is 250. Because of this, even if you are using a card that allows storage of more than 250 images, the camera's monitor screen will show capacity for up to 250 images only. You will be able to store additional images by changing to another folder.
- The number of images that can be recorded may differ when you use card browser (page 106).



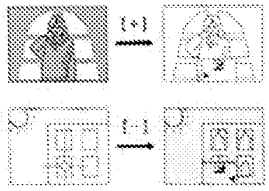
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## Exposure Compensation

This camera features an program AE function that automatically changes shutter speed and aperture in accordance with available light. In addition, you can also manually adjust the exposure to compensate for backlighting, indirect indoor lighting, dark backgrounds, and other special conditions.

1. **Slide the Function Switch to REC.**

2. **Use [+] and [–] to perform exposure compensation.**
   - Pressing [+] or [–] displays an EV indicator that shows the current exposure compensation setting.
   - Pressing [+] makes the image on the monitor screen brighter. Use it to adjust for dim indoor lighting and backlighting.
   - Pressing [–] makes the image on the monitor screen darker. Use it to adjust for bright sunlight.
   - The EV indicator turns red whenever the compensation value is at its limit.




3. **After adjusting the exposure, press the shutter button to record the image.**

**NOTES**

- Exposure compensation is generally expressed in terms of an exposure compensation (EV) value. The exposure compensation value is always set to zero whenever you turn on the camera.
- Each press of [+] or [–] changes the exposure compensation value by 0.25EV. A change in either direction is indicated on the monitor screen by arrows pointing left (negative correction) or right (positive correction).
- The normal maximum range for exposure compensation is –2EV to +2EV. Under certain conditions, however, the camera may impose lower maximum values when exposure compensation would result in an image that is too dark or too light.



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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

| | |
|---|---|
| *In re* reexamination of: Nakano et al. | Confirmation No.: *To Be Assigned* |
| U.S. Patent No. 8,339,493 B2 | Art Unit: *To Be Assigned* |
| Issue Date: December 25, 2012 | Examiner: *To Be Assigned* |
| Title: ELECTRIC CAMERA | Third Party Requester Docket No. 2638-19.00 |

**Mail Stop *Ex Parte* Reexam**
Attn: Central Reexamination Unit
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

**REQUEST FOR *EX PARTE* REEXAMINATION OF U.S. PATENT NO. 8,339,493 UNDER 35 U.S.C. § 302 AND 37 C.F.R. § 1.510**

Requester submits this Request for *Ex Parte* Reexamination under 35 U.S.C. § 302 and 37 C.F.R. § 1.510 of U.S. Patent No. 8,339,493 to Nakano et al., titled "ELECTRIC CAMERA" ("the '493 Patent"). In accordance with 37 C.F.R. § 1.510(b)(4), a copy of the '493 Patent is attached hereto as Exhibit 1001. The '493 Patent is assigned to Maxell, Ltd. ("Maxell") according to United States Patent and Trademark Office ("USPTO") records at the time of this request.

Pursuant to 37 C.F.R. § 1.510, this Request for *Ex Parte* Reexamination includes:

1) A statement pointing out each substantial new question of patentability based on prior art patents and printed publications;
2) An identification of every claim for which reexamination is requested and a detailed explanation of the pertinency and manner of applying the cited prior art to every claim for which reexamination is requested;
3) A copy of every patent or printed publication relied upon or referred to herein, attached as Exhibits 1004, 1005, 1006, and 1013;

4) A copy of the entire U.S. Patent No. 8,339,493 for which re-examination is requested, including any disclaimer, certificate of correction, or reexamination certificate issued in the patent, attached as Exhibit 1001;

5) A certification that a copy of the request filed has been served in its entirety on the patent owner at the address as provided for in 37 C.F.R. § l.33(c);

6) A certification that the statutory estoppel provisions of 35 U.S.C. § 315(e)(l) or 35 U.S.C. § 325(e)(1) do not prohibit the requester from filing the *Ex Parte* Reexamination Request; and

7) The appropriate fee under 37 C.F.R. § l.20(c)(2).

The Commissioner is authorized to charge any additional fees, or to credit any overpayment, to Deposit Account No. 50-6159.

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2. *Claim 5(a): "an image sensing device with a light receiving sensor having an array of pixels arranged vertically and horizontally in a grid pattern, in an N number of vertically arranged pixel lines"* ..... 21
3. *Claim 5(b): "a signal processing unit that generates image signals by processing the output signals of the image sensing device"* ..... 28
4. *Claim 5(c): "a display unit with a display screen, that displays an image corresponding to the image signals"* ..... 33
5. *Claim 5(d): "when recording an image in a static image mode, the signal processing unit generates the image signals by using all signal charges accumulated in all N number of vertically arranged pixel lines of the image sensing device, to provide N pixel lines"* ..... 35
6. *Claim 5(e): "when monitoring the image in the static image mode, the signal processing unit generates the image signals by using pixel lines that have been mixed or culled from the N number of vertically arranged pixel lines to only include pixel lines separated from one another by intervals of a first distance"* ..... 39
7. *Claim 5(f): "when recording the image in a moving video mode, the signal processing unit generates the image signals by using a portion of, or the entirety of, pixel lines which have been mixed or culled from the N number of vertically arranged pixel lines to only*

*include pixel lines separated from one another by intervals of a second distance"* ..... *51*

*8. "Signal Processing Unit" Functionality Recited in Claims 5(d)-5(f)* ..... *55*

B. SNQP 2: CLAIM 6 IS UNPATENTABLE UNDER 35 U.S.C. 103 AS OBVIOUS OVER CASIO IN VIEW OF JUEN AND/OR TAKASE IN FURTHER VIEW OF MISAWA ..... 58

*1. Claim 6: "An electric camera according to the claim 5, further comprising: an image-instability detector which detects an image-instability of the electric camera; and wherein when recording in the moving video mode, in order to correct the image-instability, the signal processing unit generates the image signals by changing the pixel lines used, and the portion of the pixel lines used, according to an amount of image-instability detected by the instability detector."* ..... *58*

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## LIST OF EXHIBITS

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| **Exhibit 1001** | U.S. Patent No. 8,339,493 ("*'493 Patent*") |
| **Exhibit 1002** | File History of U.S. Patent No. 8,339,493 ("*File History for '493 Patent*") |
| **Exhibit 1003** | Declaration of Dr. Jeffrey J. Rodriguez ("*Dec.*") (including Appendix A) |
| **Exhibit 1004** | Casio LCD Digital Camera QV-8000SX User's Guide ("*Casio*") |
| **Exhibit 1005** | U.S. Patent No. 7,903,162 to Juen ("*Juen*") |
| **Exhibit 1006** | U.S. Patent No. 5,444,482 to Misawa et al. ("*Misawa*") |
| **Exhibit 1007** | Declaration of Edward Lang ("*Lang Dec.*") |
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| **Exhibit 1011** | File History for U.S. Application Serial No. 15/959,774 |
| **Exhibit 1012** | File History for U.S. Application Serial No. 15/386,656 |
| **Exhibit 1013** | U.S. Patent No. 5,502,483 to Takase et al. ("*Takase*") |
| **Exhibit 1014** | U.S. Patent No. 4,949,117 to Van Heyningen et al. ("*Heyningen*") |
| **Exhibit 1015** | U.S. Patent No. 5,150,109 to Berry ("*Berry*") |
| **Exhibit 1016** | U.S. Patent No. 6,335,760 to Sato ("*Sato*") |
| **Exhibit 1017** | U.S. Patent No. 5,642,171 to Baumgartner et al. ("*Baumgartner*") |
| **Exhibit 1018** | *CCD Arrays, Cameras, and Displays*, 2d. Ed. (JCD Publ. 1998) ("*CCD Arrays*") |
| **Exhibit 1019** | U.S. Patent No. 4,740,828 to Kinoshita ("*Kinoshita*") |
| **Exhibit 1020** | U.S. Patent No. 6,018,363 to Horii ("*Horii*") |
| **Exhibit 1021** | EP 0 802 688 B1 to Inoue et al. ("*Inoue*") |
| **Exhibit 1022** | U.S. Patent No. 6,512,541 to Dunton et al. ("*Dunton*") |
| **Exhibit 1023** | U.S. Patent No. 6,563,535 to Anderson ("*Anderson*") |
| **Exhibit 1024** | U.S. Patent No. 4,612,575 to Ishman et al. ("*Ishman*") |
| **Exhibit 1025** | Complaint for Patent Infringement, *Maxell Ltd. v. Apple Inc*, No. 5:19-cv-0036-RWS (E.D. Tex. Mar. 15, 2019), Document No. 1 ("*Complaint*") |
| **Exhibit 1026** | Claim Construction Memorandum and Order, *Maxell Ltd. v. Apple Inc*, No. 5:19-cv-0036-RWS (E.D. Tex. Mar. 18, 2020), Document No. 235 ("*Markman Order*") |
| **Exhibit 1027** | Patent Owner Preliminary Response to Petition for *Inter Partes Review* of U.S. Patent 8,339,493, *Apple Inc. v. Maxell, Ltd.*, IPR2020-00597, Paper 6 ("*'597 IPR*, Paper 6"). |
| **Exhibit 1028** | U.S. Patent No. 6,963,361 to Kawahara et al. ("*Kawahara*") |

## I. IDENTIFICATION OF CLAIMS FOR WHICH REEXAMINATION IS REQUESTED

In accordance with 37 C.F.R. § 1.510, reexamination of claims 5 and 6 of U.S. Patent No. 8,339,493 is requested in view of the following references:

A. Casio LCD Digital Camera QV-8000SX User's Guide ("*Casio*") (Ex. 1004);

B. U.S. Patent No. 7,903,162 to Juen ("*Juen*") (Ex. 1005);

C. U.S. Patent No. 5,444,482 to Misawa et al. ("*Misawa*") (Ex. 1006); and

D. U.S. Patent No. 5,502,483 to Takase et al. ("*Takase*") (Ex. 1013).

Re-examination of claim 5 is requested under 35 U.S.C. 103(a) as being unpatentable over *Casio* in view of *Juen* and/or *Takase*.

Re-examination of claim 6 is requested under 35 U.S.C. 103(a) as being unpatentable over *Casio* in view of *Juen* and/or *Takase* in further view of *Misawa*.

U.S. Patent No. 8,339,493 is still enforceable.

## II. SUMMARY OF U.S. PATENT NO. 8,339,493

The '493 Patent describes an electric camera for recording both still images and moving video images. (*Dec.*, 65).[1] The camera includes a CCD image sensor with an arbitrary but relatively large number of pixels. (*'493 Patent*, 4:34-49; *Dec.*, 66). The '493 Patent discusses the need to display video recorded by the camera conforming to the NTSC or PAL system, which displays 240 effective scanning lines. (*'493 Patent*, 1:30-50, 7:8:51-58, 10:18-21; *Dec.*, 67). Therefore, the camera reduces the number of pixels for displaying a still (i.e., static) image on the monitor or recording a moving video image but uses the full CCD (image sensor) pixel resolution for recording a still image. (*'493 Patent*, 3:8-13; *Dec.*, 68-69).

[1] All citations to "*Dec.*" are to Ex. 1003, Declaration of Dr. Jeffrey J. Rodriguez.

The '493 Patent was granted on December 25, 2012. U.S. Patent Application No. 12/845,266 ("the '266 Application"), from which the '493 Patent issued, was filed on July 28, 2010. The '266 Application claims priority to JP 2000-006064 filed January 11, 2000. (*'493 Patent*, (30)).

## III. NOTIFICATION OF CONCURRENT PROCEEDINGS PURSUANT TO 37 C.F.R. § 1.565

The '493 Patent is currently the subject of pending litigation: *Maxell Ltd. v. Apple Inc*, No. 5:19-cv-0036-RWS (E.D. Tex.) (*Complaint*, Ex. 1025) (the "Litigation"). The Requester is a Defendant in the Litigation. Claim construction has occurred in the Litigation and is discussed in Section VI below. (*Markman Order*, Ex. 1026). In view of this concurrent Litigation, it is respectfully urged that this Request be granted and reexamination be conducted not only with "special dispatch," but also with "priority over all other cases" in accordance with M.P.E.P. § 2261.

Requester notes that trial in the Litigation is currently scheduled for April 2021. Therefore, there is currently no federal court decision affecting this reexamination. A final holding of claim invalidity or unenforceability (after all appeals) will likely not occur prior to a determination on the request for reexamination is made. Requester reminds the Office of M.P.E.P. § 2286(II) and treatment of federal court decisions, namely that "[a] *non-final* federal court decision concerning a patent under reexamination shall have no binding effect on a reexamination proceeding." (M.P.E.P. § 2286(IV)) (emphasis in original).

Three Petitions for *Inter Partes* Review were previously filed against the '493 Patent; however, none resulted in an institution decision by the Board. In the first IPR, *ZTE Corp., et al. v. Maxell, Ltd.*, IPR2018-00236 ("the '236 IPR"), the Board declined to institute. (*'236 IPR*, Paper 9 at 3). The second IPR, *Olympus Corp., et al. v. Maxell, Ltd.*, IPR2018-00904 ("the '904 IPR"),

was terminated prior to an institution decision. (*'904 IPR*, Paper 9 at 2-3). The third IPR was filed by Requester, *Apple Inc. v. Maxell, Ltd.*, IPR2020-00597 ("the '597 IPR"), and the Board declined to institute, relying on discretionary denial under § 314(a) in view of the co-pending litigation. (*'597 IPR*, Paper 9 at 17).

## IV. RELATED REEXAMINATION PROCEEDINGS

Requester is not aware of any reexamination proceeding related to the '493 Patent or any patent related to the '493 Patent.

## V. STATEMENT POINTING OUT EACH SUBSTANTIAL NEW QUESTION OF PATENTABILITY

Requester respectfully submits that a substantial new question of patentability under § 103 exists with respect to claim 5 of U.S. Patent No. 8,339,493 based on *Casio* in view of *Juen* and/or *Takase*.

Requester respectfully submits that a substantial new question of patentability under § 103 exists with respect to claim 6 of U.S. Patent No. 8,339,493 based on *Casio* in view of *Juen* and/or *Takase* in further view of *Misawa*.

### A. *Casio* Is Analogous Prior Art

*Casio* was not cited or considered during the prosecution of the '493 Patent. *Casio* was not cited in the prior-filed '236 IPR or the '904 IPR. *Casio* was cited by Requester in the '597 IPR; however, this IPR was not instituted based on discretionary denial under § 314(a). *Casio* qualifies as prior art under 35 U.S.C. § 102(a), as explained below.

#### *1. Casio Is Analogous Art*

*Casio* discloses a digital camera having multiple operating modes (*Casio*, 27), including recording a static image (*Casio*, 47), recording a moving image (*Casio*, 61), and composing an image on a display screen before recording (*Casio*, 3). Because both the '493 Patent and *Casio* are

directed to a digital electronic camera for capturing and recording still and video images, *Casio* is in the same field of endeavor and is pertinent to a problem to be solved by the claimed invention in the '493 Patent. (*Dec.*, 71-72). Therefore, *Casio* is analogous art to the claimed invention in the '493 Patent.

### *2. Casio Is a Printed Publication Under 35 U.S.C. § 102(a)*

*Casio* qualifies as prior art under 35 U.S.C. § 102(a). *Casio* is a printed publication that was publicly available at least as early as November 1999. *Casio* is a photocopy of a paper version of the "LCD Digital Camera QV-8000SX User's Guide," which was sufficiently publicly available and accessible to persons concerned with the art prior to the '493 Patent's earliest claimed priority date of January 11, 2000. In accordance with M.P.E.P. § 2258(I)(E), Requester submits herewith Declarations (Exs. 1007-1010) providing evidence in support of *Casio* being a printed publication.

#### *a) Legal Requirements for Establishing Printed Publication in Reexaminations*

During examination (or reexamination), the Examiner meets his burden of proof "by setting forth the nominal publication date…The burden is clearly on the appellants to disprove the prima facie publication date established by the examiner." *Ex Parte Albert*, 18 USPQ 2d 1325 (BPAI 1984). *See* M.P.E.P. § 2128. The standard for establishing a printed publication is different in the examination context from that of IPR proceedings. Specifically, the Board stated that "the framework set forth in the *Hulu* decision for IPR proceedings does not apply to examination." *Ex Parte Antionio J. Grillo-Lopez*, Appeal 2018-006082, at 3 (PTAB Jan. 31, 2020) (designated precedential).

To determine if *Casio* qualifies as prior art under 35 U.S.C. § 102(a), the key inquiry is whether the document was made "sufficiently accessible to the public interested in the art" before the critical date, which here is January 11, 2000. *Constant v. Advanced Micro-Devices, Inc.*, 848

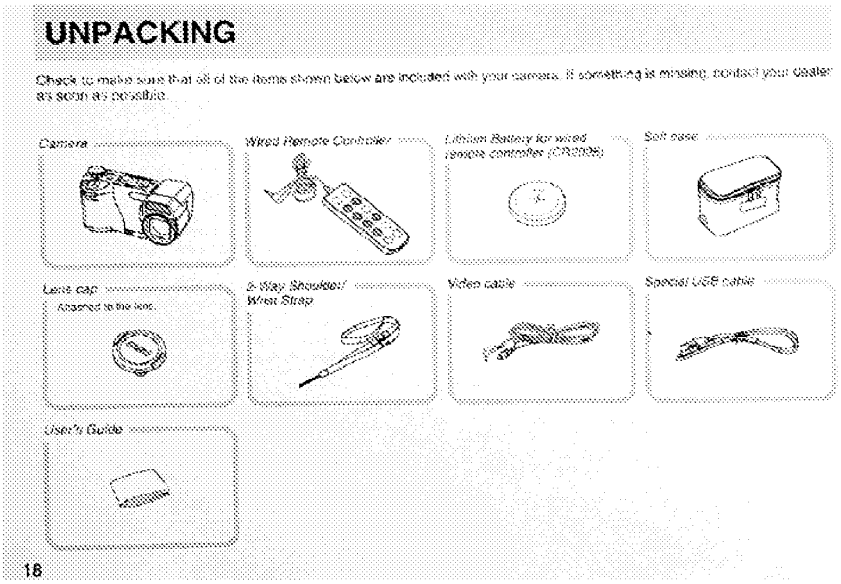
F.2d 1560, 1568 (Fed. Cir. 1988). "A given reference is 'publicly accessible' upon a satisfactory showing that such document has been disseminated or otherwise made available to the extent that persons interested and ordinarily skilled in the subject matter or art exercising reasonable diligence, can locate it." *Bruckelmyer v. Ground Heaters, Inc.*, 445 F.3d 1374, 1378 (Fed. Cir. 2006). A printed publication is determined to be publicly accessible if a POSITA could, after exercising reasonable diligence, access the publication. *Samsung Elecs. Co. v. Infobridge Pte. Ltd.*, 929 F.3d 1363, 1374 (Fed. Cir. 2019).

"Whether a reference is publicly accessible is determined on a case-by-case basis based on the 'facts and circumstances surrounding the reference's disclosure to members of the public.'" *Voter Verified, Inc., v. Premier Election Solutions, Inc.*, 698 F.3d 1374, 1380 (Fed. Cir. 2012) (quoting *In re Lister*, 583 F.3d 1307, 1311 (Fed. Cir. 2009)). *See also In re Klopfenstein*, 380 F.3d 1345, 1350 (Fed. Cir. 2004).

***b) Casio Is a Prior Art Printed Publication***

The following facts and circumstances establish that *Casio* is a printed publication within the meaning of 35 U.S.C. § 102(a). *Casio* is a user manual, a hard copy of which accompanied Casio's QV-8000SX digital camera sold prior to the critical date (i.e., prior to January 11, 2000). As detailed below, *Casio* was included in the packaging for a Casio QV-8000SX camera provided ***by Casio*** to Mr. Etchells prior to the critical date.

In April 1999, the first sales of the Casio QV-8000SX digital camera occurred. (Ex. 1007, *Lang Dec.*, ¶ 2). In 1999, it was Casio's regular business practice to include a hardcopy of the "LCD Digital Camera QV-8000SX User's Guide" with each QV-8000SX digital camera product sold. (Ex. 1008, *Siller Dec.*, ¶ 2). This is confirmed by the User's Guide itself, which says a copy of the User's Guide is included in the packaging with the sold digital camera:




(*Casio*, 18). Additionally, there were no restrictions placed on the purchaser's use of the User's Guide included with sale of the QV-8000SX camera. (*Siller Dec.*, Ex. 1008, ¶ 2). Therefore, the User's Guide was provided with sold cameras, and cameras were sold prior to the critical date.

A true and correct copy of a User's Guide for the QV-8000SX is attached as Exhibit A to the *Siller Dec*. Casio's declarant attests the "hardcopy of the Manual was and has been retained in Casio's archived files" and "Casio's regular business practice has been to maintain an archive of user manuals shipped with the sold product." (*Id.* at ¶ 3).

On July 21, 1999, Casio issued a press release for the QV-8000SX digital camera, which stated the camera "was introduced at MacWorld that opened at the Jacob Javits Convention Center in New York City today." (Ex. 1009, *VanderSchans Dec.*, ¶ 2, Ex. A). Therefore, Casio's own marketing materials evidence the QV-8000SX digital camera was publicly available prior to the critical date. Because the publicly available camera included a hardcopy of the *Casio* User's Guide, per Ex. 1008, ¶ 2), and because the camera was sold prior to the critical date (per Ex. 1007, ¶ 2), the *Casio* reference was publicly available to interested parties prior to the critical date.

On August 23, 1999, Mr. Etchells requested a consumer version of the QV-8000SX digital camera from Casio to prepare a product review. (Ex. 1010, *Etchells Dec.*, ¶ 6, Appendix B). Mr. Etchells was the Editor-in-Chief of Imaging Resource, a website for providing photographers with unbiased, detailed information on digital cameras. (*Etchells Dec.*, ¶ 2). This product review was later posted by Imaging Resource on January 26, 2000. (*Id.* at ¶ 5). In Mr. Etchell's August 23, 1999 email to Casio, Mr. Etchells referred to Casio's "new cameras," including the QV-8000. In a follow-up email from Casio (specifically, from Cheryl Balbach) dated September 21, 1999, Casio referenced sending the QV-8000SX camera to Mr. Etchells. (*Etchells Dec.*, ¶ 6). Moreover, in a follow-up email to Casio on September 21, 1999, Etchells referenced "looking at a press release covering three of your new products, the 2000, 5500, and 8000." (*Etchells Dec.*, ¶ 6, Appendix B).

By November 1, 1999, Mr. Etchells had received the Casio QV-8000SX digital camera from Casio in its original packaging, which included a paper copy of the User's Manual. (*Id.* at ¶¶ 7-8). When preparing product reviews, Mr. Etchells's standard practice was to request the consumer version of the product publicly available to customers. (*Id.* at ¶ 9). The digital camera provided by Casio to Mr. Etchells was, based upon Mr. Etchells's information and belief, the consumer version of the QV-8000SX camera that a consumer could purchase. (*Id.* at ¶ 9). Mr. Etchells still has the original product packaging, camera, and user's manual. (*Id.* at ¶¶ 7-8). The *Casio* reference used herein is the user's manual received by Mr. Etchells in the product packaging for the QV-8000SX camera received from Casio. (*Id.* at ¶ 8).

In preparing the product review for the Imaging Resource website, Mr. Etchells was not required to sign a non-disclosure agreement or otherwise restricted from distributing any materials related to the QV-8000SX camera. (*Id.* at ¶ 10). Mr. Etchells and his colleagues used the QV-

8000SX camera between November 1999 and the publishing of the review in January 2000, including using the camera to take images. (*Id.* at ¶¶ 11-15).

Therefore, *Casio* is a printed publication that was publicly accessible to interested persons in the art and was not intended to be confidential. Mr. Etchells was a person interested in the subject matter of the art, as he was the Editor-in-Chief of a company providing product reviews of digital cameras to digital camera consumers. Mr. Etchells had sufficient access to *Casio* before the priority date of the '493 Patent, which is January 11, 2000. Mr. Etchells's access to the *Casio* user's guide (which was included with the camera) is confirmed by Casio itself. Furthermore, the QV-8000SX camera (and included user's guide) was publicly available (on sale) by the time Mr. Etchells received the camera (and included user's guide) from Casio. The camera was presented at a trade show on July 21, 1999, thus confirming additional public access to the QV-8000SX digital camera (and the included user's guide).

The submitted evidence establishes the following:

(1) Casio publicly introduced the QV-8000SX at a trade show prior to the critical date (Ex. 1009);

(2) Casio sold the QV-8000SX prior to the critical date, including making approximately 25 unrestricted sales of the digital camera in the United States prior to the critical date (Ex. 1007);

(3) It was Casio's regular business practice to include a paper copy of the *Casio* User's Guide in the packaging for sold QV-8000SX digital cameras (Ex. 1008); and

(4) The *Casio* User's Guide was sufficiently accessible to the public interested in the art, e.g., at least Mr. Etchells and other staff at Imaging Resources, prior to the critical date (Ex. 1004).

The submitted evidence includes dated communications (e.g., emails and a dated press release) evidencing the facts and circumstances occurring pre-critical date and otherwise

corroborating Mr. Etchells's and the other declarant's statements made under oath. These facts, including the detail and exhibits set forth in the supporting declarations (Exs. 1007-1010), evidence *Casio* is a printed publication that was publicly available at least as early as November 1999, which is before the priority date of January 11, 2000, and thus qualifies as prior art to the '493 Patent under 35 U.S.C. § 102(a).

### *3. Response to Patent Owner Arguments in the '597 IPR Regarding Public Accessibility*

In the '597 IPR, Patent Owner made several arguments against the public accessibility of *Casio*. (*'597 IPR*, Paper 6, at 38-49). Requester addresses these arguments here.

The receipt of the *Casio* User's Manual by Etchells prior to the critical date is ***alone*** sufficient to prove the public accessibility of *Casio* for establishing as a printed publication. "There is no requirement that a document needs to be disseminated to more than one person—or even to one person—to be a printed publication." *RPX Corp., et al. v. Iridescent Networks, Inc.*, IPR2018-00254, Paper No. 20, p. 35 (PTAB Dec. 10, 2018). Furthermore, "in *Nobel Biocare,* a catalog was found to be a printed publication even though there was only evidence that a single person obtained a copy of it at a tradeshow." *Id.* (citing *Nobel Biocare Servs. AG v. Instradent U.S., Inc.*, 903 F.3d 1365 at 1376-77 (Fed. Cir. 2018)).

In a similar case to the present facts, a reviewer of consumer electronics declared that she was provided with a retail version of a PDA and associated reference manual from the manufacturer so that she could evaluate the product and post a review. *Directv, LLC v. Qurio Holdings, Inc.*, IPR2015-02005, Paper No. 9, Decision Granting Institution (PTAB Apr. 4, 2016). Even though Patent Owner argued that "Ms. Gade's testimony (i) is conclusory, (ii) 'on its face' only establishes that the manual was disseminated to one person, and (iii) falls short of providing evidence that the RX3000 reference (Ex. 1012) is the same reference as Attachment C or was

shipped with the PDA product," the Court found that "Petitioner has shown *sufficiently for institution* that the RX3000 reference is a printed publication." *Id.* at 26 (emphasis in original). The evidence here is more than sufficient for establishing *Casio* as a printed publication.

In the '597 IPR, Patent Owner argued there is no evidence showing communication between Etchells and Casio. (*'597 IPR*, Paper 6, at 39-40). The Etchells Declaration submitted herewith includes Appendix B, which includes an email chain between Etchells and Casio (Pat Carrasco and Cheryl Balbach). On August 23, 1999, Etchells requested the Casio QV-8000SX camera and Casio responded on September 21, 1999. Etchells received the Casio QV-8000SX camera on or before November 1, 1999, as evidenced by his email of this date to his co-worker stating that "we've only just gotten them in" with reference to the new Casio cameras.

Patent Owner further argues that "it is just as plausible that Etchells received a non-public version of the camera." (*'597 IPR*, Paper 6, at 41). Patent Owner provides no support for this assertion, and the evidence contradicts the assertion. Etchells received the camera in consumer packaging, thus indicating the camera received was the publicly accessible camera. (*Etchells Dec.*, ¶ 8). Etchells states that it was his standard business practice to perform a product review on the consumer version of the product. Thus, "upon information and belief, the Casio QV8000SX camera provided by Casio to [Etchells] for preparing the product review was the consumer version of the product (i.e., the version a consumer would purchase)." (*Etchells Dec.*, ¶ 9). Moreover, the camera was publicly available as of the time Etchells requested the camera from Casio. This is evidenced by (1) the press release (authenticated by Casio personnel, *see* Ex. 1009); (2) Casio's declaration that the camera was sold in 1999 (*see* Ex. 1007); and (3) Etchells's statement in a September 21, 1999, email to Cheryl Balbach at Casio that he "was actually looking at a press release covering three of your new products, the 2000, 5500, and 8000" (*see* Ex. 1010, Appendix

B). Etchells knew the camera was publicly accessible by, at the least, the press release indicating such. (*Etchells Dec.*, ¶ 6).

Patent Owner states that "[t]here are no date stamps, no confirmation numbers, no receipts, no tickets of purchase and no confirmation from Casio that Etchells purchased or received the Casio User Guide before the critical date." (*'597 IPR*, Paper 6, at 43). This is incorrect. The emails between Casio and Etchells, and Etchells and other personnel at Imaging Resources, evidence Etchells received the camera from Casio prior to the critical date, this showing a "date stamp." (*Etchells Dec.*, ¶¶ 6-7). As for receipts or tickets of purchase, Etchells does not allege that he purchased the camera; however, purchase of the camera by Etchells is not required to establish public accessibility, and regardless, Casio's own declarations establish the camera (with included User's Guide) was publicly accessible and on sale. (Exs. 1007-1009). And again, the *Casio* reference relied on for this reexamination ***was included with the packaging*** for the QV-8000SX camera received by Etchells from Casio. Thus, Requester has submitted evidence that Etchells received the *Casio* reference prior to the critical date.

Patent Owner states that there is no evidence showing how long (if at all) the User's Guide was ever disclosed or displayed to the public and refers to the product review posted by Etchells post critical date. (*'597 IPR*, Paper 6, at 43-44). Patent Owner continually misdirects by referring to the product review. Requester does not rely on the product review to establish public accessibility. Rather the product review, which was admittedly posted after the critical date, is merely provided to explain *why* Etchells requested the camera.

Patent Owner states that factors to determine whether a reference is publicly accessible "include length of display, target audience and their expertise, expectations (or lack) of copying, and ease of copying." (*'597 IPR*, Paper 6, at 43). These factors may be used but are not specifically

required, as the determination is based on the particular facts and circumstances surrounding the reference's disclosure to members of the public. When considering the factors set forth in *In re Klopfenstein*, the court stated "[i]t **may be** relevant to determine whether … members were expected to maintain the confidentiality of received materials or would be permitted to share or even publicize the insights gained and materials collected…." *Id.* at 127 USPQ2d at 1218. In addition, in *GoPro, Inc. v. Contour IP Holding LLC*, 908 F.3d 690, 128 USPQ2d 1447 (Fed. Cir. 2018), the court stated that the expertise of the target audience is a factor in determining public accessibility but is not dispositive of the inquiry: "Rather, our case law directs us to also consider the nature of the conference or meeting; whether there are restrictions on public disclosure of the information; expectations of confidentiality; and expectations of sharing the information." *Id.* at 695, 128 USPQ2d at 1451. Therefore, public accessibility does not require a particular or minimum length of display, a particular target audience, or evidence of copying.

Patent Owner also argues Etchells's declaration lacks corroboration and credibility. (*'597 IPR*, Paper 6, at 44-45). This is wholly false in view of the numerous dated emails and communications supporting Etchells's statements.

Etchells and his staff are members of the target audience as they are interested in the subject matter of the art, namely digital cameras, and provide product reviews to digital camera consumers. Furthermore, there was no expectation of confidentiality—as expressly testified to by Etchells—and thus, *Casio* was not limited from being copied. Additionally, a User's Guide was distributed with the Casio QV-8000SX camera that was sold to the public as early as April 1999, in accordance with Casio's regular business practice.

Patent Owner further argues that the Casio press release does not demonstrate public accessibility. (*'597 IPR*, Paper 6, at 45-46). However, Requester is not relying on the press release

or the sales alone as the basis for the public accessibility. Casio's press release and stated sales in 1999 further confirm the public accessibility of the camera (which was sold with the hardcopy User's Guide) and how Etchells was made aware of the public accessibility of the camera (via at least the press release).

Patent Owner also argues the "evidence on the trade show is contradictory." (*'597 IPR*, Paper 6, at 47). The press release states the camera was "introduced" at the MacWorld trade show today (July 21, 1999)—not that the camera was first *sold* as of the trade show date. (*VanderSchans Dec.*, Ex. A). There is no evidence Casio personnel's statement made under oath that "the Casio QV-8000SX digital camera was first sold in the United States in April 1999" is false, and Patent Owner makes absurd suggestions otherwise. (*Lang Dec.*, ¶ 2). Patent Owner's arguments that the Casio declaration regarding sales of the camera requires further corroborating evidence is without support; this is a declaration made under oath by Casio personnel regarding documents from over 20 years ago. Requester is not required to submit detailed sales records. And as to Patent Owner's made-up questions of Casio's fiscal year, Patent Owner is attempting to insert doubt where there is none. (*'597 IPR*, Paper 6, at 48). The Casio declaration states the sales were made in 1999 – not fiscal year 1999. (*Lang Dec.*, ¶ 2).

In sum, the collective evidence establishes the *Casio* reference was publicly available to interested persons skilled in the art before the priority date of the '493 Patent, and as such, is printed publication under § 102(a).

### B. *Juen* Is Analogous Prior Art

*Juen* was not cited or considered during the prosecution of the '493 Patent. *Juen* was cited in an IDS and considered by the Examiner in child applications but was not the basis for any rejections. (Ex. 1011, 430; Ex. 1012, 418).

*Juen* was not cited in the prior-filed '236 IPR or the prior-filed '904 IPR. *Juen* was cited by Requester in the '597 IPR; however, this IPR was not instituted based on discretionary denial under § 314(a).

*Juen* is a U.S. patent claiming priority, through a series of continuation applications, to a parent filing date of September 25, 1997. *Juen* issued March 8, 2011, qualifying as prior art under 35 U.S.C. § 102(e).

*Juen* teaches an electronic camera including an imaging device, a pixel density converter, a moving image recording device, a still image recording device, and a display screen. (*Juen*, Abstract). Because *Juen*, like the '493 Patent, discloses a digital electronic camera for capturing and recording still and video images, *Juen* is in the same field of endeavor and is pertinent to a problem to be solved by the claimed invention in the '493 Patent. (*Dec.*, 74-79). Therefore, *Juen* is analogous art to the claimed invention in the '493 Patent.

### C. *Takase* Is Analogous Prior Art

*Takase* was not cited or considered during the prosecution of the '493 Patent. *Takase* was cited in an IDS and considered by the Examiner in child applications but was not the basis for any rejections. (Ex. 1011, 131; Ex. 1012, 419).

*Takase* was not cited in the prior-filed '236 IPR or the prior-filed '904 IPR. *Takase* was cited by Requester in the '597 IPR; however, this IPR was not instituted based on discretionary denial under § 314(a).

*Takase*, issued March 26, 1996, qualifies as prior art under § 102(b).

*Takase* teaches a video camera including an imager and a signal processing circuit and is directed to correcting image vibration. (*Takase*, 3:40-46, Abstract). Because *Takase*, like the '493 Patent, discloses a digital electronic camera for capturing and recording images and correcting

image instability, *Takase* is in the same field of endeavor and is pertinent to a problem to be solved by the claimed invention in the '493 Patent. (*Dec.*, 81-82). Therefore, *Takase* is analogous art to the claimed invention in the '493 Patent.

### D. *Misawa* Is Analogous Prior Art

*Misawa* was not cited or considered during the prosecution of the '493 Patent. *Misawa* was cited in an IDS and considered by the Examiner in child applications but was not the basis for any rejections. (Ex. 1011, 131; Ex. 1012, 419).

*Misawa* was not cited in the prior-filed '236 IPR. *Misawa* was used as the primary reference in all grounds of unpatentability presented in the '904 IPR. However, no institution decision was reached in this case. (*'904 IPR*, Paper 9). *Misawa* was also cited by Requester in the '597 IPR; however, this IPR was not instituted based on discretionary denial under § 314(a).

If *Misawa* is considered to be "old art," since the rejection presented herein is based on a combination of "old art" and new art cited during the reexamination proceeding, such a rejection is proper. (*See In re Hiniker*, 150 F.3d at 1362, 1367; MPEP 2258.01).

*Misawa* issued August 22, 1995, and therefore qualifies as prior art under 35 U.S.C. § 102(b).

*Misawa* teaches a digital electronic camera for recording still images and video images including an image sensor and an image signal processor for processing the pixel signals produced. (*Misawa*, 2:55-61). *Misawa* teaches correcting for blur due to unintentional movement of the camera. (*Misawa*, 11:18-30). Because *Misawa*, like the '493 Patent, discloses a digital electronic camera for capturing and recording still and video images and correcting image instability, *Misawa* is in the same field of endeavor and is pertinent to a problem to be solved by the claimed invention

in the '493 Patent. (*Dec.*, 84-86). Therefore, *Misawa* is analogous art to the claimed invention in the '493 Patent.

## VI. CLAIM CONSTRUCTION

For the purposes of this Request, the claim terms are presented by the Requester in accordance with M.P.E.P. § 2258(I)(G) for an expired patent. Specifically, the earliest U.S. priority claim for the '493 Patent is March 8, 2000, and has a patent term adjustment of 136 days. Thus, the '493 Patent expired on July 22, 2020. In a reexamination proceeding involving claims of an expired patent, claim construction pursuant to the principle set forth by the court in *Phillips v. AWH Corp.*, 415 F.3d 1303, 1316, 75 USPQ2d 1321, 1329 (Fed. Cir. 2005) should be applied because the expired claims are not subject to amendment.

A *Phillips* claim construction means words of a claim "are generally given their ordinary and customary meaning" as understood by a person of ordinary skill in the art in question at the time of the invention. *See Ex parte Papst-Motoren,* 1 USPQ2d 1655 (BPAI 1986). Under this standard, words in a claim are given their plain and ordinary meaning, which is the meaning understood by a POSITA in view of the patent and file history. *Phillips*, 415 F.3d at 1312-13. Dictionaries or other extrinsic sources may assist in determining the plain and ordinary meaning but cannot override a meaning that is unambiguous from the intrinsic evidence. *Id.*

On March 18, 2020, the District Court in the copending Litigation issued a Claim Construction Memorandum and Order following a *Markman* Hearing. (*Markman Order*, Ex. 1026). In the Litigation, the Parties agreed to the following claim construction for the limitation of "**an image-instability detector**" in claim 6: "a detector, such as a gyroscopic sensor or the like, capable of detecting an image instability of the camera." (*Markman Order*, 7). The Parties also agreed to the following claim construction for the limitation of "**an image-instability of the**

**electric camera**" in claim 6: "instability caused by vertical and/or horizontal movement of the electric camera." (*Markman Order*, 7).

With respect to claim 5 of the '493 Patent, the Court construed the disputed term: "**mixed**" as "combined." (*Markman Order*, 46-52). Additionally, in claim 5, the Court construed the disputed term "**culled**" as "only one line of signal charges of pixels is read out for every predetermined number of lines." (*Markman Order*, 46-52).

Although the claim constructions issued by the District Court in the copending Litigation are not binding on the reexamination proceeding, per M.P.E.P. § 2286, the proposed SNQPs are established both under the District Court's construction and under a plain and ordinary construction.

In the copending Litigation, Maxell applied the language of claims 5 and 6 of the '493 Patent to certain Apple products to argue that those products infringe the patent. In the following detailed explanation, Apple relies upon Maxell's interpretation of claims 5 and 6 to show that *Casio* in view of *Juen* and/or *Takase* render claims 5 and 6 obvious under Maxell's reading of the claims. Apple's explanation should not be interpreted as an endorsement of Maxell's reading of the claim scope in the copending Litigation.

## VII. DETAILED EXPLANATION UNDER 37 C.F.R. § 1.510(B)(2)

In accordance with M.P.E.P. § 2258(I)(E), Requester submits herewith the Declaration of Dr. Rodriguez (Ex. 1003) providing further explanation of the contents of the prior art, as referenced below.

### A. SNQP 1: Claim 5 is unpatentable under 35 U.S.C. § 103 as obvious over Casio in view of Juen and/or Takase

Under Maxell's position in the Litigation, independent claim 5 of the '493 Patent recites an electric camera having three modes of operation (recording an image in a static image mode,

monitoring the image in the static image mode, and recording the image in a moving video mode), where monitoring a static image and recording a moving video utilize a different pixel resolution (i.e., mixing or culling pixel lines at intervals of a first distance versus a second distance). *Casio* discloses this. As discussed in detail below, *Casio* discloses a digital, electric camera with included LCD capable of taking both still photos and moving video. *Casio* teaches a high-resolution CCD (a "megapixel" CCD). *Casio* further discloses that when storing a movie (i.e., a video), the resolution is reduced. And, during composing of the still or static image on the LCD, the resolution displayed on the LCD is also less than the resolution used for recording the image and is different than the stored resolution of the moving video images. Both *Juen* and *Takase* further expressly teach mixing or culling the pixel lines. For example, *Juen* teaches performing conversion of the pixel density by executing interpolation, which is well known as a technique for mixing pixel signal charges. (*Juen,* 6:10-14). Similarly, *Takase* teaches "mixing" signal charges, including applying an interpolation coefficient to mixed pixels. (*Takase*, 4:20-25, 5:15-49). *Takase* even refers to a technique of "reading out every other scanning lines in the odd field and the even field," thus further teaching "culling" as would be known to a POSITA. (*Takase*, 5:7-14).

As will be discussed below, *Casio* teaches multiple modes of operation, including recording in a static image mode (i.e., recording a static or still image), monitoring in a static image mode (i.e., viewing an image on the LCD "viewfinder" while composing the image before recording it to memory), and recording in a moving video mode (i.e., recording a moving video (movie)). *Casio* teaches that each of these modes is performed at a different pixel resolution. Specifically, the static image can be stored in memory at multiple resolutions, including 1280 x 960 pixels (corresponding to the claimed "recording in a static image mode"). The static image can also be viewed on the LCD at a resolution of the LCD, i.e., 555 x 220 pixels (corresponding

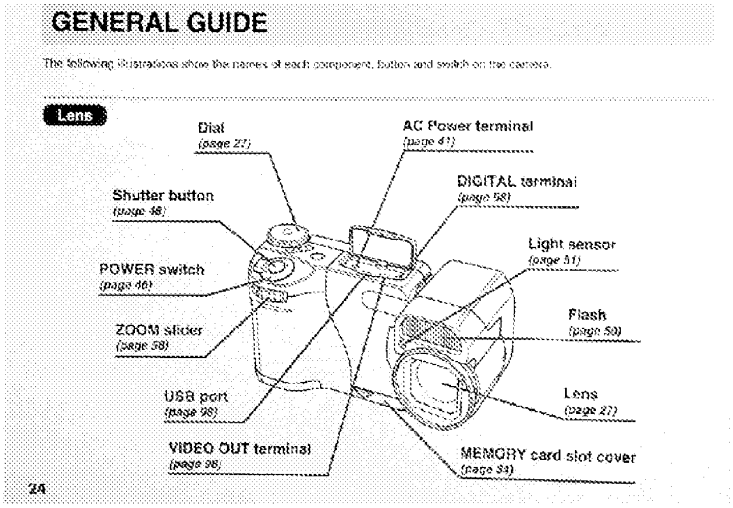
to the claimed "monitoring in a static image mode"). And finally, the moving video can be stored in memory at a resolution of 320 x 240 pixels (corresponding to the claimed "recording in a moving video mode"). *Casio* also teaches a CCD sensor with a pixel resolution of 1280 x 960 pixels (i.e., approximately 1.23M pixels), or N = 960 vertically arranged pixel lines. Because the *Casio* camera can record a static image at 1280 x 960 pixels, the camera records the static image at N = 960 vertically arranged pixel lines. The camera displays a static image on the LCD at 220 vertically arranged pixel lines, for a reduction in pixel resolution by a factor of 4.36 (i.e., 960/220 = 4.36). The camera records a moving video with 240 vertically arranged pixel lines, for a reduction in pixel resolution by a factor of 4 (i.e., 960/240 = 4). Therefore, *Casio* teaches multiple modes of camera operation, each with a different resolution. (*Dec.*, 87-88).

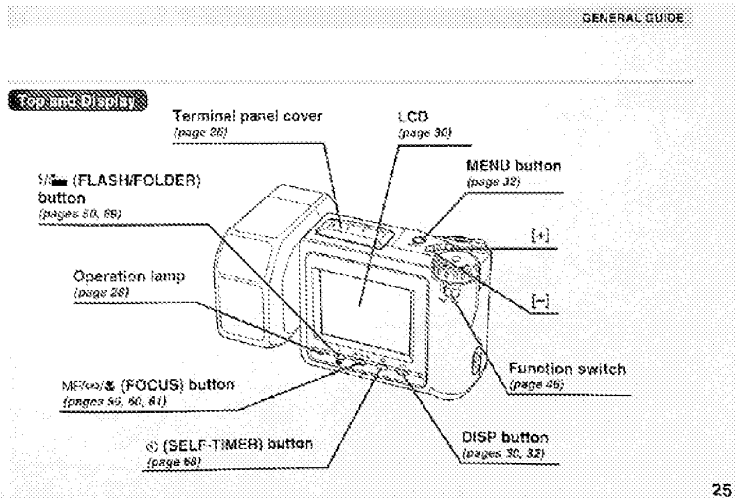
The only limitation recited in claim 5 and not explicitly taught in *Casio* is that pixel lines are mixed or culled. As opined by Dr. Rodriguez, *Casio* at least implicitly teaches this, as *Casio* teaches reducing, from the full resolution of N = 960 vertically arranged pixel lines, the resolution of the monitored image in the static image mode (220 vertically arranged pixel lines) and the resolution of the recorded image in the moving video mode (240 vertically arranged pixel lines). As explained by Dr. Rodriguez and discussed in detail below, a POSITA would have readily understood the digital camera disclosed in *Casio* performs the claimed mixing or culling due to the resolution reduction. (*Dec.*, 89). Regardless, both *Juen* and *Takase* teach such, and it would have been obvious to a POSITA to modify or otherwise add to the digital camera disclosed in *Casio* the feature of pixel line mixing or culling. (*Dec.*, 89).

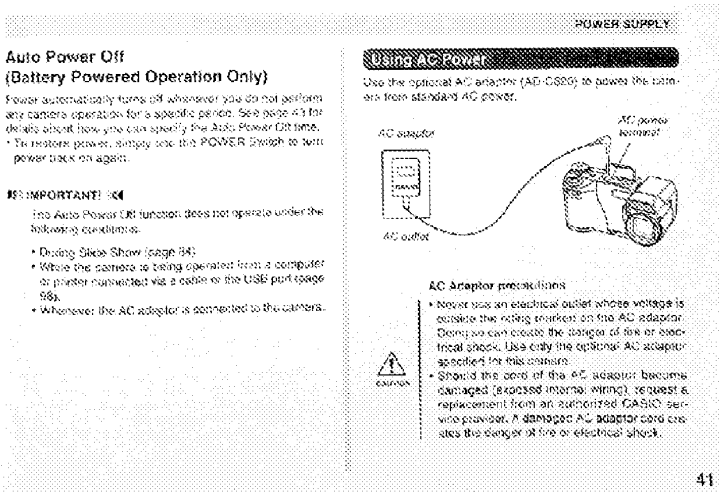
#### *1. Claim 5 [Preamble]: "An electric camera comprising:"*

Claim 5 of the '493 Patent recites the following preamble: "An electric camera comprising." To the extent the preamble is limiting, *Casio* teaches "an electric camera," as claimed. *Casio* discloses an "LCD Digital Camera." (*Casio*, Ex. 1004, 1). This digital camera is

"electric" because it is powered by electricity in the form of batteries or an adaptor for connection to a standard power outlet. (*Casio*, 38, 24, 41; *Dec.*, 92). *Casio* teaches the camera "features a two-way power supply that lets you either use batteries (AA-size alkaline, lithium, or Ni-MH) or household AC current." (*Casio*, 38). The camera has an optional AC adaptor (AD-C620) to connect the "AC Power terminal" to a standard AC outlet (*Casio*, 24, 41). The camera is illustrated below:






(*Casio*, 24-25, 41).

### *2. Claim 5(a): "an image sensing device with a light receiving sensor having an array of pixels arranged vertically and horizontally in a grid pattern, in an N number of vertically arranged pixel lines"*

Claim 5(a) of the '493 Patent recites "an image sensing device with a light receiving sensor having an array of pixels arranged vertically and horizontally in a grid pattern, in an N number of vertically arranged pixel lines."

#### *a) "an image sensing device with a light receiving sensor"*

The '493 Patent describes "image sensing device 3 is of a CCD type." (*'493 Patent*, 4:37-38, *Dec.*, 93). Further, the '493 Patent describes "light coming from the lens 1 through the aperture 2 is focused on a light receiving surface of the image sensing device 3." *('493 Patent*, 4:34-37). Additionally, "FIG. 2 shows the structure of this image sensing device 3…[where] denoted 30 are pixels each formed from a photodiode." (*'493 Patent*, 4:38-41). *Casio* alone or *Casio* in combination with *Juen* teaches claim 5(a). (*Dec.*, 93).

*Casio* teaches an "Image Element" that is a "1/2.7 inch CCD." (*Casio*, 118, 10 (teaching a "megapixel CCD"); *Dec.*, 93-94). The *Casio* CCD is "an image sensing device with a light receiving sensor," as claimed. As was well known in the art prior to the critical date, CCDs

operatively receive incident light at an array of photodiodes. (*Dec.*, 35-40, 94). Incident light applied to a photodiode creates an electric charge. For each row (i.e., "line") of photodiodes, the charges are transferred across the row of photodiodes and accumulated to form a "signal"; the charges are then converted to digital values to form a "signal" containing "signal charges" representing a row of the image. *Id.* The photodiodes (either each photodiode alone or the plurality of photodiodes forming the array) are "a light receiving sensor," as claimed, that converts light into digital data. (*Dec.,* 36, 94). Therefore, because the *Casio* CCD is an "Image Element" (*Casio*, 118) that receives light via the camera lens (via photodiodes well known to be included in a CCD), a POSITA would have understood the CCD is an "image sensing device with a light receiving sensor." (*Dec.*, 94).

*Juen* also teaches an image sensing device as claimed. *Juen* teaches: "Light passing through the photographic lens 12 is refracted within the camera part 11a, and received by a photoreceptor surface of an imaging element 13, which is composed of a CCD image sensor." (*Juen*, 5:63–6:2). *Juen's* imaging element, which is composed of a CCD image sensor, is an "image sensing device." CCD image sensors were known in the art prior to the critical date to sense or otherwise capture an image using light receiving sensors. *Juen* further teaches the claimed "light receiving sensor," namely the "photoreceptor surface" of the imaging element (i.e., of the CCD image sensor). (*Juen*, 5:63–6:2). Therefore, *Juen* teaches an image sensing device (imaging element 13, which is a CCD image sensor) with a light receiving sensor (photoreceptor surface of the imaging element 13). And, because *Juen's* CCD image sensor receives light on the photoreceptor surface, *Juen* teaches "an image sensing device with a *light* receiving sensor." (*Dec.*, 95).

It would have been obvious to a POSITA to include the CCD of *Juen* in the digital camera of *Casio*. (*Dec.*, 96). To the extent any modification of *Casio* is required, the modification would

entail applying the well-known use of a CCD (as taught by *Juen*) as an image sensing device in the *Casio* digital camera in the same way the *Juen* CCD is used. *Id.* Because any digital camera needs an image sensing device to capture an image, a POSITA would have had the knowledge to incorporate the hardware and software for including the CCD of *Juen*. *Id.* Additionally, a POSITA would have been motivated to make such a beneficial combination for ease of installation and integration with other components of the *Casio* digital camera. *Id.* The combination would have had a reasonable expectation of success given *Casio's* teaching of a CCD, as the *Casio* camera is already equipped to capture and process an image using a light receiving sensor (i.e., the *Casio* CCD). *Id.*

**Response to Patent Owner's Arguments in the '597 IPR**

In the '597 IPR, Patent Owner argued a POSITA would not have combined *Casio* and *Juen* without the benefit of hindsight. Specifically, Patent Owner relied on another prior art reference, *Anderson* (U.S. Patent No. 6,563,535), for arguing that a POSITA would not have been "motivated to incorporate the complicated and specialized features of *Juen* into *Casio*." (*'597 IPR*, Paper 6, at 50).

Initially, it is noted that *Anderson* does not form any part of the basis for this rejection, and therefore, the Patent Owner's arguments regarding obviousness based on a non-applied reference are irrelevant to the proposed rejection. However, as *Anderson* (filed May 18, 1998) is also prior art to the '493 Patent, the arguments with respect to the state of the art at the time of the invention will be addressed.

Patent Owner states that *Anderson* criticizes "specialized circuitry to handle each of the advanced features" and warns not "to use different circuits and data paths." (*'597 IPR*, Paper 6, at 50). Citing to this language in *Anderson,* Patent Owner argues "a POSITA would not be motivated

to incorporate the complicated and specialized features of *Juen* into *Casio*." *Id.* Patent Owner's arguments are incorrect for several reasons.

First, Patent Owner conflates the background section of *Anderson* that discusses the art prior to *Anderson* (1:12–2:10), with the description of *Anderson's* own invention. (*Dec.*, 100-101). As explained by Dr. Rodriguez, the Patent Owner's discussion of *Anderson* is misplaced and does not fully address *Anderson's* teachings. *Id.*

Second, Patent Owner's arguments rely on bodily incorporation of various structure from *Juen* not relied on for the proposed rejection. Patent Owner identifies *Juen's* "moving image recording" circuit and argues the circuit is "an entirely separate pipeline or data flow path from the still image recording means." (*'597 IPR*, Paper 6, at 51). The proposed rejection does not rely on *Juen's* moving image recording circuit for teaching, for example, the claimed moving video mode recited in Claim 5(f), because *Casio* already teaches such. Therefore, Patent Owner is improperly arguing no motivation to modify *Casio* based on requiring bodily incorporation of features from *Juen*.

Additionally, Patent Owner misconstrues what Figure 1 of *Juen* discloses. Figure 1 refers to the processing of data for storage (recording on the recording medium R), not for display. (*Juen*, 3:38-44). Furthermore, *Juen* discloses "[p]referably, the moving image recording means and the still image recording means share a coding conversion component for executing high efficiency coding." (*Juen*, 2:30-34). Thus, *Juen's* preferred method of sharing components is entirely consistent with *Anderson's* system in which "certain parts and paths of the circuit are reused and shared so as to leverage existing resources with minimal impact on its speed and functionality." (*Anderson*, 2:16-18; *Dec.*, 102-103). This sharing of resources is akin to what *Juen* discloses. (*Dec.*, 102-103). In view of the teachings of both *Juen* and *Anderson*, a POSITA would have

known that a very common method of making multi-component electronic systems more efficient was to modify them so that components are shared across the system rather than being implemented separately. (*Dec.*, 102). Thus, it would have been obvious a POSITA to modify *Casio* to incorporate the hardware of *Juen* to achieve such benefits.

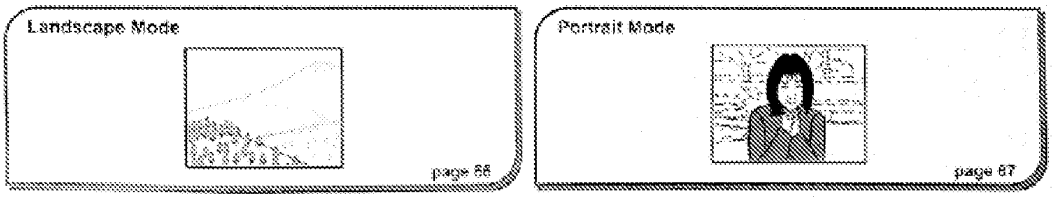
Patent Owner argues that *Anderson* states "the final hardware architecture…was deceptively difficult to conceive" (*Anderson*, 9:19-36) due to a number of elements that must be accounted for. (*'597 IPR*, Paper 6, at 52). Patent Owner's arguments are not relevant to the proposed rejection of *Casio* in view of *Juen* because *Anderson* is express that its comments on developing the *Anderson* image processing system are specific to "the final hardware architecture of the [Anderson] present invention." (*Anderson*, 9:19-21). *Anderson* includes many features not disclosed or claimed in the '493 Patent, such as data processing for the post rotation of an image for instant review (*Anderson*, 7:60-61). Because the proposed ground does not rely on *Anderson*, *Anderson* cannot be properly used to establish a lack of a motivation or rationale to combine *Casio* and *Juen* and/or *Takase*.

***b) "having an array of pixels arranged vertically and horizontally in a grid pattern"***

*Casio* teaches an array of pixels, as claimed, for at least three reasons. (*Dec.*, 104-107). First, *Casio* teaches the camera produces a "VGA size image (640 x 480 pixels)," which is a known standard of 640 (horizontal) x 480 (vertical) pixels. (*Casio*, 59). Therefore, a POSITA would have understood that *Casio* refers to the first-listed number as the horizontal dimension and the second-listed number as the vertical dimension, and the pixels are arranged vertically and horizontally in a grid pattern. (*Dec.*, 105).

Second, *Casio* teaches the "Recorded Image Size" or "Static" image size as either "1280x960 pixels" or "640x480 pixels." (*Casio*, 76, 118). These are standard resolutions for an array or grid of pixels arranged vertically and horizontally in a grid pattern. (*Dec.*, 106).

Third, a POSITA would have understood the *Casio* CCD captures image signals in an array or grid of pixels arranged vertically and horizontally, as evidenced by *Casio's* illustrations of the image and the monitor being rectangular in shape:




(*Casio*, 11-12, 49, 58). A rectangular monitor presenting rectangular images would have been understood to be produced by a CCD having "an array of pixels arranged vertically and horizontally in a grid pattern." (*Dec.*, 107).

Furthermore, *Juen* also teaches an array of pixels as claimed. *Juen* teaches the imaging element having 1280 pixels in width and 960 pixels in length (1280x960), similar to *Casio*. *Compare Juen*, 5:63–6:2, with *Casio*, 118. *Juen* also refers to respective vertical and horizontal resolution by a number of pixels along each dimension. (*Juen*, 1:35-42). Therefore, a POSITA would have understood that *Juen* teaches an array of pixels arranged vertically and horizontally in a grid pattern. (*Dec.*, 108).

Finally, the '493 Patent explicitly admits vertically arranged pixel lines in an image sensing device were known in the art. (*'493 Patent*, 1:43-67 (discussing pixel rows and "vertically arranged pixels")).

It would have been obvious to a POSITA to include *Juen's* array of horizontally and vertically arranged pixels formed in a grid in the *Casio* camera. (*Dec.*, 109). An array or grid of

pixels with vertical and horizontal dimensions was standard and well-known, as evidenced by *Juen*. To the extent not already taught by *Casio*, it would have been obvious and desirable to modify the *Casio* camera so the CCD captured the pixels in the standard grid-like array, given that the commonly-accepted format for photographs and moving video was rectangular. *Id.* Arranging the *Casio* CCD's sensor elements to be in an array or grid with vertical and horizontal dimensions would have been application of a known technique (*Juen's* CCD with a horizontal x vertical array) to a known device (*Casio's* CCD) to improve Casio's digital camera in the same way *Juen's* camera is improved, i.e., to desirably provide an image in a standardized, rectangular geometry for photographs and moving videos. (*Id., citing Casio*, 61). There would have been a reasonable expectation of success, as the modification would entail a simple substitution of the *Juen* CCD (and rectangular sensor geometry) for the *Casio* CCD and any corresponding software integration, both of which would have been well within a POSITA's expertise given the wide acceptance and use of CCDs. *Id.*

***c) "in an N number of vertically arranged pixel lines"***

*Casio* teaches the CCD provides "Total Pixels: 1.31 million, Effective Pixels: 1.25 million." (*Casio,* 118). *Casio* also teaches a stored static image size of 1280 x 960, which is the largest image size listed in *Casio*. (*Id.*; *Dec.*, 113-115). For an image size of 1280 x 960, the total number of pixels is 1,228,800 pixels (~1.23M). (*Dec.*, 38, 112-114). The maximum number of pixels provided for images in *Casio* is 1280 x 960, such that *Casio* teaches N number of vertically arranged pixel lines is 960. (*Dec.*, 110-114).

*Juen* also teaches an imaging element 13 that has N number of vertically arranged pixel lines, namely 960 pixels in length, such that N = 960. (*Juen*, 5:66–6:2, 7:51-58). The imaging element may be a CCD and has 960 pixels in length x 1280 pixels in width. *Id.* A POSITA would

have understood "960 in length" corresponds to N = 960 vertically arranged pixel lines. (*Juen,* 5:63–6:2; *Dec.*, 115).

### *3. Claim 5(b): "a signal processing unit that generates image signals by processing the output signals of the image sensing device"*

Claim 5(b) of the '493 Patent recites "a signal processing unit that generates image signals by processing the output signals of the image sensing device."

*Casio* teaches or renders obvious a signal processing unit. *Casio* teaches a digital camera that generates image signals using a CCD and displays images on the included display. A POSITA would have understood generating image signals is performed using a signal processing unit. (*Dec.*, 116). Additionally, *Casio* discusses processes well understood by a POSITA to be performed by a signal processing unit, such as converting or encoding images to a JPEG or AVI file format (*Casio*, 61, 118), converting images to a lower resolution for display on the monitor (*Casio*, 16), and performing digital zoom (*Casio*, 58-59). (*Dec.*, 116). A signal processing unit is needed to receive the output signals from the CCD (as disclosed in *Casio*) and to generate the image signals *Casio* teaches are shown on the display. (*Casio*, 30-31; *Dec.*, 116). A POSITA would thus have understood the discloses digital camera in *Casio* includes or renders obvious a signal processing unit to generate these image signals using the output signals of the disclosed CCD, as taught by *Casio*. (*Dec.*, 116). Indeed, the described camera would not be operative without a signal processing unit. *Id.*

Furthermore, *Juen* teaches "an electronic camera 100 includes an imaging means 1 that images an object or living subject…and converts an image thereof to image information." (*Juen*, 3:32-35, Fig. 1). The camera has both a still image mode and a moving image mode. (*Juen*, 3:38-44 ("still image recording means 4," "moving image recording means 3"), Fig. 1; *Dec.*, 117).

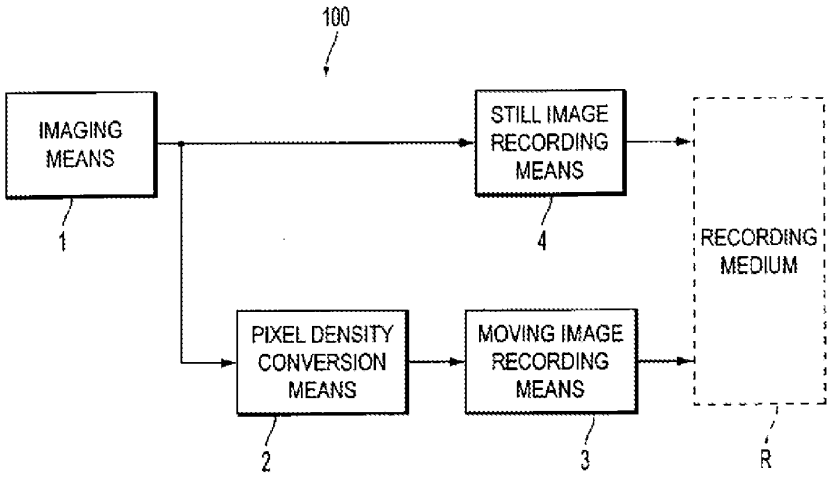



FIG. 1

*Juen* further teaches a picture image signal processor 15 and an image density converter 16 that collectively receive the output from the CCD, process the output into image signals, and convert the pixel "density" of the image signal. (*Juen*, 6:3-14, 9:52-58; *Dec.*, 77-78 (explaining *Juen's* "pixel density" refers to the pixel resolution)).

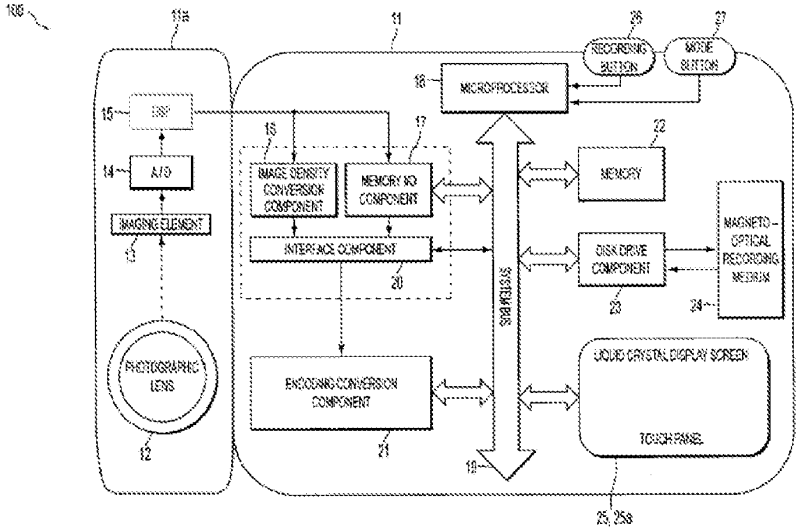



FIG. 7

(*Juen*, Fig. 7; *Dec.*, 118-120 (*see* ¶ 118, noting *Juen*, Fig. 7 lists element 15 as "DSP," which would have been understood by a POSITA as a "digital signal processor"). Thus, *Juen* teaches the "output" of the imaging element, which is a CCD image sensor (*Juen*, 5:66), is input to the picture image signal processor, which outputs "image information." *Id.* The image information is then input to the image density converter 16, which performs pixel resolution conversion. *Id.* A POSITA would have understood the combined picture image signal processor 15 and image density converter 16 satisfies the claimed "signal processing unit." (*Dec.*, 118-119).

*Casio* further teaches the signal processing unit generates image signals *by processing* the output signals at least because the image is shown on the monitor. (*Dec.*, 120). Additionally, *Casio* teaches the digital camera performs "internal data processing," further indicating the digital camera includes a signal processing unit. (*Casio*, 71). Alternatively, a "picture image signal processor" (aka DSP, *Juen,* Fig. 12, RN 15) as taught by *Juen processes* the output signals from the CCD, as a processor would have been understood to *process* signals, and the image signals are thereafter shown on the *Juen* display. (*Dec.*, 116).

A POSITA would have found it obvious and been motivated to include a signal processing unit comprising a picture image signal processor and image density converter, as taught by *Juen*, in the *Casio* camera to generate image signals from the output signals of the CCD. (*Dec.,* 121). Because the *Casio* camera is an electronic, digital camera using a CCD and producing both video and still images, including a signal processing unit is an expected addition to the *Casio* camera to achieve the image-generating functionality disclosed in *Casio*. *Id.* Modifying the *Casio* digital camera to have a signal processing unit as taught by *Juen* (i.e., specifically a signal processor and image density converter) would achieve a simpler, more compact (e.g., physically smaller), and, in many cases, less costly design. *Id.* Including a signal processing unit, as claimed, would entail

combining prior art elements (the image signal processor (aka DSP) and image density converter of *Juen*) according to known methods (including a signal processor in a digital camera is well known) to yield predictable results (the *Casio* digital camera would use the signal processor to perform signal generation based on the output signals from a CCD). *Id.* The modification to *Casio's* digital camera would have been met with a reasonable expectation of success given a POSITA would have known how to include a signal processing unit to receive the output signals from the CCD and generate image signals to display on the LCD monitor or record to memory, such that designing a digital camera with a signal processing unit would have been within the POSITA's expertise. Indeed, a signal processing unit for a digital camera is extremely well known. *Id., citing Anderson*, 4:9-34.

**Response to Patent Owner's Argument in the '597 IPR**

In the POPR, Patent Owner argued that claim 5 requires "certain functions to be performed by the claimed signal processing unit" and asserted the Petition "provides no analysis attempting to show that the purported signal processing unit of either *Casio* or *Juen* perform the claimed functions required by the claims…." (*'597 IPR*, Paper 6, at 56). Patent Owner's argument seems to be predicated on a misunderstanding of the claimed technology or the proposed obviousness rejection.

Per claim 5(b), the signal processing unit generates image signals by processing the output signals of the image sensing device (e.g., the CCD). The output signals of the image sensing device are, in the case of a CCD, the signal charges. This is confirmed in, for example, claim 5(d), which recites the image signals are generated by "using all *signal charges*…." The discussion of claim 5(b), above, establishes that either of *Casio* or *Juen* teaches a signal processing unit, as claimed. Additionally, the discussion establishes that both references teach that the signal processing unit

generates image signals by processing the output signals of the image sensing device. The specific processing performed, e.g., generating image signals for static image recording, generating image signals for monitoring in static image mode, or generating image signals for moving video recording, is discussed in claims 5(d)-(f).

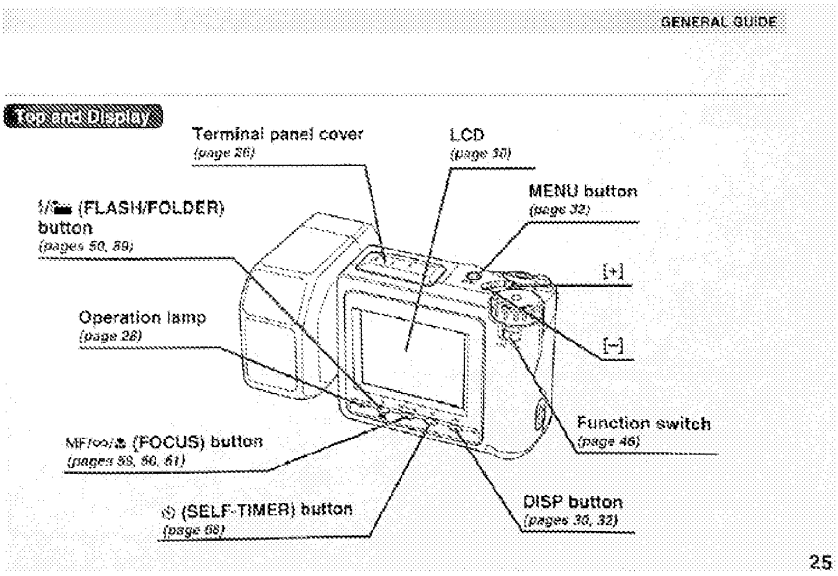
In particular, because *Casio* teaches a digital camera that generates image signals, as recited for claim 5(b), and because *Casio* further teaches using all signal charges accumulated in all N number of vertically arranged pixel lines in the static image mode, as set forth for claim 5(d), below, a POSITA would have understood the signal processing unit in *Casio* generates the image signals according to *Casio's* claimed functionality of recording an image with all N number of vertically arranged pixel lines. (*Dec.*, 122-123). Similarly, because *Casio* teaches a digital camera that generates image signals, as recited for claim 5(b), and because *Casio* further teaches generating the image signals by using pixel lines mixed or culled from the N number of vertically arranged pixel lines, as set forth for claim 5(e), below, a POSITA would have understood the signal processing unit in *Casio* generates the image signals according to *Casio's* claimed functionality of monitoring an image with the generated image signals recited in claim 5(e). *Id.* And finally, because *Casio* teaches a digital camera that generates image signals, as recited for claim 5(b), and because *Casio* further teaches generating the image signal by using a portion of or the entirety of pixel lines mixed or culled from the N number of vertically arranged pixel lines in the moving video mode, as set forth for claim 5(f), below, a POSITA would have understood the signal processing unit in *Casio* generates the image signals according to *Casio's* claimed functionality of recording a moving video with a portion of or the entirety of the N number of vertically arranged pixel lines. *Id.*

With respect to Patent Owner's arguments regarding *Juen*, Patent Owner mischaracterizes the mapping. *Juen* discloses a signal processing unit (namely picture image signal processor 15 and an image density converter 16), as established above for claim 5(b). Requester's mapping explains how it would have been obvious to modify the digital camera disclosed in *Casio* (to the extent not otherwise already taught in *Casio*) to include *Juen's* picture image signal processor 15 and image density converter 16 to generate the image signals as otherwise already taught by *Casio*. (*Dec.*, 124). That is, *Casio* already teaches generating image signals according to claims 5(d)-(f), e.g., generating the image signals by using all signal charges from the N number of vertically arranged pixels as recited in claim 5(d). *Juen* further expressly teaches a signal processing unit that, when combined with *Casio*, teaches a signal processing unit that generates the image signals according to the functionality already disclosed in *Casio*.

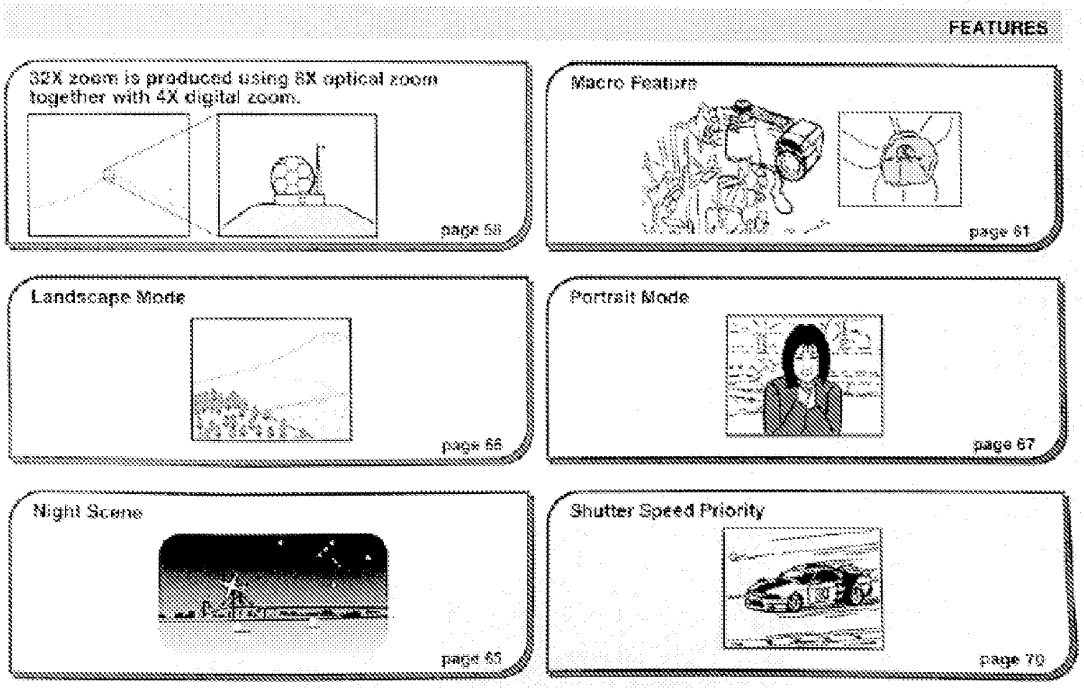
Finally, an additional discussion of the signal processing unit performing all claimed functionality recited in claims 5(d)-(f) is provided in Section VII.A.7, below.

#### *4. Claim 5(c): "a display unit with a display screen, that displays an image corresponding to the image signals"*

Claim 5(c) of the '493 Patent recites "a display unit with a display screen, that displays an image corresponding to the image signals." Casio teaches a "display unit" comprising a housing surrounding an LCD. (*Casio*, 25).




Casio also teaches a "display screen," namely LCD (also referred to as "monitor" in *Casio*). (*Casio*, 25, 119, 1 (Title of "LCD Digital Camera")). A user views an image on the screen by "composing the image on the monitor screen." (*Casio*, 47). Exemplary images that a user sees on the monitor are shown below:




11

(*Casio*, 11). When the user presses the shutter button half way, "the Auto Focus feature automatically focuses the image." (Casio, 46, 49 (discussing "composing" the image)). When the shutter button is pressed completely, the image is recorded. *Id.* Thus, a POSITA would have understood or found obvious the image shown to the user on the LCD monitor in *Casio* corresponds to the image signals produced by the mapped signal processing unit (as taught by *Casio* alone or as modified by *Juen*) using the output signals from the *Casio* CCD. (*Dec.*, 127-128).

***5. Claim 5(d): "when recording an image in a static image mode, the signal processing unit generates the image signals by using all signal charges accumulated in all N number of vertically arranged pixel lines of the image sensing device, to provide N pixel lines"***

Claim 5(d) of the '493 Patent recites "when recording an image in a static image mode, the signal processing unit generates the image signals by using all signal charges accumulated in all N number of vertically arranged pixel lines of the image sensing device, to provide N pixel lines."

***a) "recording an image in a static image mode"***

*Casio* teaches "recording an image in a static image mode." *Casio* teaches recording the claimed static image at various resolutions, including 1280 x 960 and 640 x 480:

Recorded Image Size ..... 1280 x 960 pixels, 640 x 480 pixels

Standard Memory Capacity, Number of Image Files, Computer Output Image Size

| Static | | |
|---|---|---|
| 1280 x 960 | FINE | 88/13 sets (500KB / image) |
| | NORMAL | 122/18 sets (350KB / image) |
| | ECONOMY | 206/29 sets (200KB / image) |
| 640 x 480 | FINE | 268/39 sets (150KB / image) |
| | NORMAL | 327/48 sets (120KB / image) |
| | ECONOMY | 418/63 sets (90KB / image) |
| Movie, File Format AVI | | |
| Approximate Total: 155 seconds/25 seconds (300KB/second)<br>• The maximum length of a single movie is 10 seconds. | | |

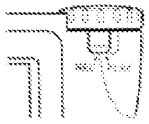
* When using 48MB/8MB CF card.

(*Casio*, 118). A "Recorded Image Size" would have been understood by a POSITA to be a recorded static image. (*Dec.*, 129). *Casio* further teaches "for recording images," the user should "slide the Function Switch to REC. The REC position selects the Record Mode." (*Casio*, 46). *Casio* instructs the user to "press the shutter button all the way down to record the image":

## Basic Recording Operation

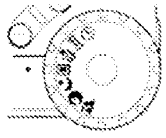
The following describes the basic operation for recording images.

1. Slide the Function Switch to REC.



- The REC position selects the Record Mode, while PLAY selects the Playback Mode.

2. Rotate the dial so its (normal recording) setting is aligned with the dot on the top of the camera.



3. Slide the POWER Switch in the direction indicated by the arrow.





- The POWER Switch returns to its original position when you release it.
- Turning on power enters the Record Mode.
- If power turns off, use the POWER Switch to turn it back on again.

4. After composing the image on the monitor screen, press the shutter button about half way and hold it there.

- The camera's Auto Focus feature automatically focuses the image.
- The operation lamp lights green and the Auto Focus Frame in the monitor screen turns green when the Auto Focus operation is complete.
- Take care to avoid blocking the lens, distance sensor or light sensor with your fingers.



- Carefully press the shutter button, taking care not to move the camera as you do.

5. After confirming that the Auto Focus operation is complete (the operation lamp lights green), press the shutter button all the way down to record the image.

- Pressing the shutter button releases the shutter, even if Auto Focus was unsuccessful and the image is out of focus.
- After you record an image, the camera takes a few seconds to store it in memory. If you try to change to the Playback Mode while a save operation is in progress, the message "Press DISP to cancel save" appears on the monitor screen. Pressing DISP at this time cancels the save operation.
- Use of a tripod and the wired remote controller is recommended for slow shutter speeds and telephoto shots to avoid blurring of the image due to camera movement.



(*Casio*, 46-47). The static image files are recorded as JPEG files:

**Image Files Supported by the Camera**

- Image files recorded with the CASIO QV-8000SX Digital Camera
- JPEG files stored using Photo Loader (1280 x 960 pixels or 640 x 480 pixels JPEG file)
- DCF protocol image files
- JPEG files stored using QV-LINK (1280 x 960 pixel and 640 x 480 pixel JPEG files)

(*Casio*, 105, 53 (teaching storing images on a memory card)). Based on at least these collective teachings, a POSITA would have understood *Casio* teaches "recording an image in a static image mode." (*Dec.*, 129).

***b) "the signal processing unit generates the image signals"***

See Claim 5(b) above with respect to the "signal processing unit that generates image signals." (*Dec.*, 130). See Section VII.A.7. below with respect to the functionality of the signal processing unit using all signal charges as recited in Claim 5(d).

***c) "using all signal charges accumulated in all N number of vertically arranged pixel lines of the image sensing device, to provide N pixels"***

As discussed with respect to Claim 5(a) above, *Casio* teaches static images can be recorded with a "Computer Output Image Size" of "1280 x 960 pixels," where N = 960 vertically arranged pixel lines. (*Dec.*, 131).

**Recorded Image Size** ..... 1280 x 960 pixels, 640 x 480 pixels

**Standard Memory Capacity, Number of Image Files, Computer Output Image Size**

| Static | | |
|---|---|---|
| 1280 x 960 | FINE | 88/13 sets (500KB / image) |
| | NORMAL | 122/16 sets (350KB / image) |
| | ECONOMY | 206/29 sets (200KB / image) |
| 640 x 480 | FINE | 268/39 sets (150KB / image) |
| | NORMAL | 327/48 sets (120KB / image) |
| | ECONOMY | 418/63 sets (90KB / image) |
| Movie File Format AVI | | |
| Approximate Total: 155 seconds/25 seconds (300KB/second)<br>* The maximum length of a single movie is 10 seconds. | | |

* When using 48MB/8MB CF card.

(*Casio*, 118, 53; *Dec.*, 132). Because the *Casio* digital camera is operable to store a static image at a resolution of 1280 x 960, and because N = 960 vertically arranged pixel lines, *Casio* teaches "using all signal charges accumulated in all N number of vertically arranged pixel lines of the image sensing device, to provide N pixel lines" during "recording in the static image mode." (*Dec.*, 132).

***6. Claim 5(e): "when monitoring the image in the static image mode, the signal processing unit generates the image signals by using pixel lines that have been mixed or culled from the N number of vertically arranged pixel lines to only include pixel lines separated from one another by intervals of a first distance"***

Claim 5(e) of the '493 Patent recites "when monitoring the image in the static image mode, the signal processing unit generates the image signals by using pixel lines that have been mixed or culled from the N number of vertically arranged pixel lines to only include pixel lines separated from one another by intervals of a first distance."

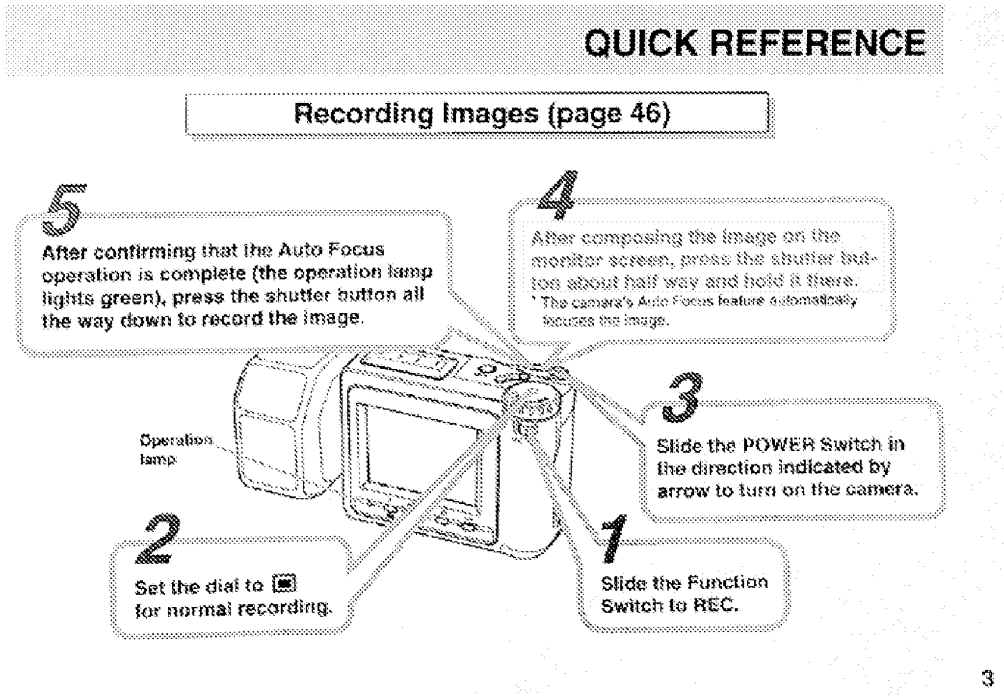
***a) "monitoring the image in the static image mode"***

*Casio* teaches "monitoring the image in the static image mode," as claimed. *Casio* teaches the "LCD monitor" is a "Viewfinder":

**Viewfinder ..... LCD Monitor**

(*Casio*, 119). For digital cameras, a "viewfinder" would have been understood by a POSITA to be the display screen on which an image to be recorded is previewed. (*Dec.*, 133-134, *citing Juen,* 3:49-55 (disclosing a "display screen" can be an "electronic viewfinder")).

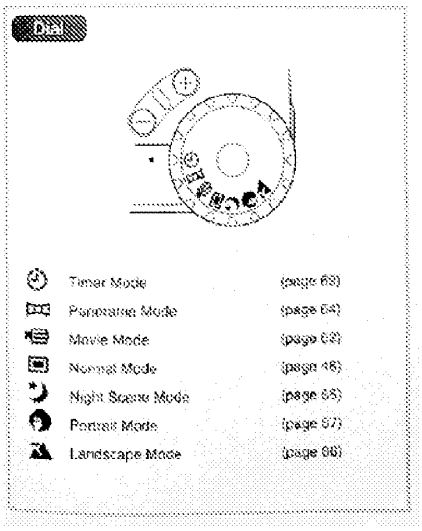
*Casio* further teaches the user composing an image on the LCD monitor:




3

(*Casio*, 3 (Step 4), 47, 57-58, 60-62, 64-69, 71-72 (teaching "composing" an image on the LCD monitor)). Once the user views the image on the monitor screen, *Casio* teaches a user should "press the shutter button all the way down to record the image." (*Casio*, 3 (Step 5), 47). Because the user "composes" the image on the monitor screen prior to recording the image, a POSITA would have understood the user can view or otherwise *monitor* the image on the display screen. (*Dec.*, 135).

A POSITA also would have understood viewing of the image on the monitor screen is monitoring in a *static* image mode. *Casio* teaches various modes of operation, including a "Normal Mode," a "Panorama Mode," and a "Movie Mode." (*Casio*, 27). A user can select one of seven different modes by turning a dial located on the top of the camera:




(*Casio*, 27, 118).

*Casio* also differentiates between a "still image" and a "movie file":

- Main Image Folder
  Contents: Image file recorded by the camera
- Main Image File
  Contents: Still image file recorded by the camera

- Preview Image File
  Contents: Preview images of still image and movie files used for temporary playback and card browser previews

Recorded Image
File Format ..... Still images (including panoramas): JPEG (Exif. Ver. 2.1), DCF standard (design rule for camera file system), DPOF compatible, Movies: AVI

Recording Medium ..... CompactFlash card

Recorded Image Size ..... 1280 x 960 pixels, 640 x 480 pixels

Standard Memory Capacity, Number of Image Files, Computer Output Image Size

| Static | | |
|---|---|---|
| 1280 x 960 | FINE | 98/13 sets (500KB / image) |
| | NORMAL | 122/16 sets (350KB / image) |
| | ECONOMY | 206/29 sets (200KB / image) |
| 640 x 480 | FINE | 268/39 sets (150KB / image) |
| | NORMAL | 327/48 sets (120KB / image) |
| | ECONOMY | 418/63 sets (90KB / image) |
| Movie: File Format AVI | | |
| Approximate Total: 155 seconds/25 seconds (300KB/second)<br>* The maximum length of a single movie is 10 seconds. | | |

* When using 48MB/8MB CF card.

(*Casio*, 105, 118, 62 (describing composing a moving image on the monitor)). Still images, including panoramas per *Casio*, 118, would have been understood by a POSITA as a *static* image. (*Dec.*, 136-137, 52 (noting the '493 Patent uses the terms "still" and "static" interchangeably)). Therefore, *Casio* teaches "monitoring the image in the static image mode."

***b) "the signal processing unit generates the image signals"***

See Claim 5(b) above with respect to the "signal processing unit that generates image signals." (*Dec.*, 137). See Section VII.A.7. below with respect to the functionality of the signal processing unit using pixel lines that have been mixed or culled as recited in Claim 5(e).

***c) "using pixel lines that have been mixed or culled from the N number of vertically arranged pixel lines"***

*Casio* alone or in combination with *Juen* and/or *Takase* teaches the signal processing unit generates the image signals by mixing or culling the signal charges. (*Dec.*, 140-143). *Casio* teaches reducing the pixel resolution of the N number of vertically arranged pixel lines to match a pixel resolution of the LCD, and a POSITA would have found it obvious that the pixel resolution

reduction is performed by, at the least, mixing the signal charges, as taught by *Juen* and/or *Takase*. (*Dec.*, 139-140).

*Casio* teaches the LCD monitor has a resolution of 555 x 220 pixels:

Monitor ..... 2.5" TFT, low-glare color HAST LCD
(122,100 pixels, 555 x 220)

(*Casio*, 119; *Dec.*, 123). A POSITA would have understood the *Casio* LCD monitor displays an image at a maximum resolution of the LCD monitor itself, i.e., 555 x 220 pixels. (*Dec.*, 150, citing *Sato,* 1:44-52). Therefore, during monitoring (i.e., composing) an image in the static image mode, a POSITA would have understood the displayed static image on the LCD monitor was at an image size of no greater than 555 x 220 given the monitor resolution taught by *Casio* is 555 x 220 pixels. (*Dec.*, 150).

*Casio* also teaches the image resolution quality is reduced to match the LCD resolution: "The image shown on the monitor screen during recording is intended for composition purposes only, so its quality does not match that of the image as recorded. The image is recorded in accordance with the quality setting made with the procedure under 'Quality Settings' on page 53." (*Casio*, 16, 53).

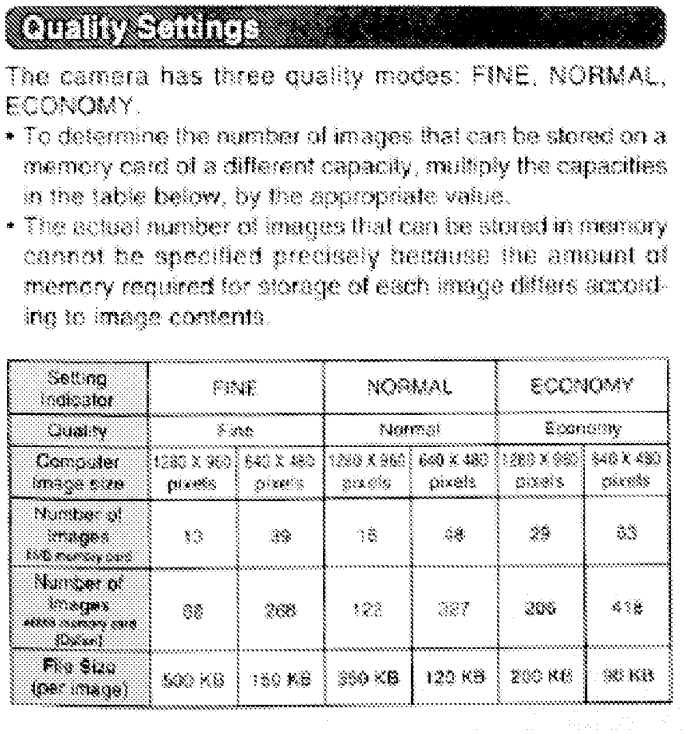
## Monitor Screen

### Recording

- The image shown on the monitor screen during recording is intended for composition purposes only, so its quality does not match that of the image as it is recorded. The image is recorded in accordance with the quality setting made with the procedure under "Quality Settings" on page 53.

*Id.* The "Quality Settings" includes an image size of 1280 x 960. (*Casio*, 53). Therefore, *Casio* expressly teaches the image quality shown on the LCD monitor is not the image quality actually

recorded or stored by the digital camera, where such "Quality Settings" include an image size resolution of 1280 x 960:



**Quality Settings**

The camera has three quality modes: FINE, NORMAL, ECONOMY.

- To determine the number of images that can be stored on a memory card of a different capacity, multiply the capacities in the table below, by the appropriate value.
- The actual number of images that can be stored in memory cannot be specified precisely because the amount of memory required for storage of each image differs according to image contents.

| Setting Indicator | FINE | | NORMAL | | ECONOMY | |
|---|---|---|---|---|---|---|
| Quality | Fine | | Normal | | Economy | |
| Computer Image size | 1280 x 960 pixels | 640 x 480 pixels | 1280 x 960 pixels | 640 x 480 pixels | 1280 x 960 pixels | 640 x 480 pixels |
| Number of Images (16 MB memory card) | 10 | 39 | 15 | 58 | 29 | 83 |
| Number of Images (other memory card) (Note) | 68 | 268 | 122 | 387 | 208 | 418 |
| File Size (per image) | 500 KB | 150 KB | 350 KB | 120 KB | 200 KB | 80 KB |

(*Casio*, 53; *Dec.*, 142).

As discussed above for Claim 5(a), N = 960 (either from the *Casio* or *Juen* CCD), and the signal charges are accumulated in the N = 960 vertically arranged pixel lines. (*Dec.*, 125; *Casio*, 76, 105, 118). Per Dr. Rodriguez, because *Casio* teaches the image quality shown on the monitor does not match that of the recorded image, and because in static image mode, an image shown (i.e., monitored) on the LCD monitor during composing of the image is shown at an image size of 555 x 220 pixels, a POSITA would have understood the resolution of the signal charges accumulated in the N = 960 vertically arranged pixel lines of either the *Casio* CCD (or *Casio* as modified to include the *Juen* CCD) is *reduced* to match the pixel resolution of the 555 x 220 LCD, namely 220 vertically arranged pixel lines, i.e., combining signal charges from multiple pixels.

(*Casio*, 16; *Dec.*, 144-147). To the extent *Casio* does not expressly teach the pixel reduction is performed via mixing or culling, *Juen* teaches such.

*Juen*, like *Casio*, teaches reducing the pixel resolution for display on an included display. (*Dec.*, 144-145). *Juen* teaches the pixel resolution is reduced by, at the least, executing "interpolation," which a POSITA would have understood as "mixing" the signal charges accumulated in the N number of vertically arranged pixel lines.

*Juen* teaches a "pixel density conversion means 2" that converts the "image information" to a "pixel density that is compatible with a scan format of a display screen 25." (*Juen*, 3:45-49, Figs. 1, 10A (S5), 10B (S14); *Dec.*, 77-78, 144). In the embodiment of Fig. 6, the "image density converter 16 performs conversion of the pixel density by executing **interpolation**, dividing into identical blocks, thinning, and the like, to the pixel value of the image information." (*Juen,* 6:10-13, 7:53-59; *see also id.* at 7:44-59). *Juen* teaches the pixel density is converted for both recording in a moving video mode and for displaying on the digital camera's display. Specifically, for recording in "movie mode," the image density converter 16 "reduces the density to a pixel density" of half the original resolution (i.e., from N = 960 vertically arranged pixel lines to 480 vertically-arranged lines). (*Juen*, 7:41-58). For displaying a still image on the display screen (e.g., monitoring in a static image mode), *Juen* teaches "a still image of a high pixel density may be converted to a pixel density matching the scan format of the display screen by approximating the pixel density conversion means 2 used during recording for use during playback." (*Juen*, 11:3-7; *see also id.* at 3:64–4:13). A POSITA would have understood converting the image resolution to a smaller resolution via *interpolation*, as taught by *Juen*, is "mixing" of the pixels. (*Dec.*, 144). Per Dr. Rodriguez, "interpolation," as taught by *Juen*, was well known in the art to be mixing (or combining) of pixels.

*Takase* expressly teaches that interpolation is the mixing of pixel signals (or pixel signals forming a pixel line). Dr. Rodriguez points to *Takase* as an example of the prior art employing interpolation (specifically, an "interpolation processing circuit") that determines an interpolation coefficient [alpha] by which the pixels are interpolated. (*Takase*, 5:15-64, Fig. 1). *Takase* states "[w]hen the pixel signals are read out as shown in FIG. 4B, there are obtained the ***mixed*** pixel signals a, b, c as shown in FIG. 4A (hereinafter this combination of the mixed signals will be referred to as a combination A)." (*Takase,* 5:38-43). Dr. Rodriguez opines that a POSITA would thus have understood that reducing the image resolution by reducing the number of pixels by "executing interpolation," as taught by *Juen*, is "combining...signal charges from multiple pixels," as otherwise confirmed in the art in *Takase*. (*Dec.*, 145). Therefore, *Takase* also teaches the claimed "generates the image signals by using pixel lines that have been mixed or culled."

The '493 Patent also describes mixing together pixels to reduce the pixel resolution as Applicant Admitted Prior Art. In the "Background of the Invention," the '493 Patent describes reducing the pixel resolution of a video camera that is to display the image on a television monitor "conforming to a television system such as NTSC and PAL." (*'493 Patent*, 1:30-50). The pixel resolution is reduced from about 480-pixel rows to about "240 scanning lines," where "the signals of two vertically adjoining pixels in each field are mixed together…to generate about 240 scanning lines…." *Id.* The '493 Patent also refers to a prior art reference, which, per the '493 Patent, "mixes or culls the pixel signals inside the image sensing device to reduce the number of signals to be read and therefore the read cycle." (*'493 Patent*, 2:44-47; *Dec.*, 146-147). Therefore, the technique of mixing or culling pixel lines to downscale the image was well known at the priority date of the '493 Patent.

***d) "to only include pixel lines separated from one another by intervals of a first distance"***

*Casio* teaches providing pixel lines separated by intervals of a first distance during monitoring the image in the static image mode. *Casio* teaches an image shown (monitored) on the LCD monitor during composing of the image (i.e., during monitoring the image in the static image mode) is shown at a resolution of 555 x 220 pixels. (*Dec.*, 149-152). Therefore, the number of vertically arranged pixel lines displayed on the LCD monitor during monitoring in a static image mode is 220. The vertically arranged pixel lines output by the *Casio* CCD (or *Casio* as modified to include the *Juen* CCD) are reduced from N = 960 to 220, such that the pixel lines displayed on the LCD during monitoring in a static image mode are provided at pixel intervals of a first distance = 960/220 = 4.36. (*Dec.*, 152).

*Casio* combined with *Juen* and/or *Takase* teaches "*using*" the mixed pixel lines. After the pixel lines are mixed, per *Juen* and/or *Takase*, the signal processing unit (see Claim 5(b) above) uses the mixed pixel lines to monitor the image by displaying on the *Casio* LCD the image at a resolution of 522 x 220. (*Dec.*, 141).

Therefore, it would have been obvious to a POSITA to have modified the *Casio* digital camera (alone or as modified to include the signal processing unit as mapped for Claim 5(b)) to reduce the pixel resolution from the CCD resolution of 1280 x 960 to a smaller pixel resolution by mixing (i.e., interpolation), as taught by *Juen* and/or *Takase*. (*Dec.*, 148). Modifying the *Casio* signal processor or adding the *Juen* signal processing unit (including image density converter 16) to the *Casio* digital camera to perform the reduced pixel resolution taught by *Casio* would generate the image signals by, at the least, mixing, i.e., combining the signal charges from multiple pixels, of the N number of vertically arranged pixel lines (the 960 pixel lines of the *Casio* or *Juen* CCD) to provide pixel lines separated from one another by a first distance (the 220 pixel lines of the

*Casio* LCD monitor at first distance = 4.36). *Id.* It would have been obvious to add *Juen's* technique of executing interpolation or *Takase's* express technique of **mixing**, as the addition to *Casio* would have been an expected application of a known technique (*Juen's* and/or *Takase's* mixing of pixels to reduce the resolution) to a similar device (the *Casio* digital camera) in the same way (to reduce the pixel resolution). *Id.* Additionally, performing the pixel reduction via mixing would have the advantage of implementing well-known techniques, lessening the development cost for a POSITA in developing new techniques for reducing pixel resolution and facilitating ease of integration and conformity when connecting the *Casio* digital camera to other equipment, such as an external monitor. *Id., citing Casio*, 98-101. A POSITA would have had a reasonable expectation of success in the combination, as the *Casio* digital camera already performs pixel resolution conversion, indicating to a POSITA the *Casio* camera already had the hardware, software, or firmware to perform the mixing, as otherwise taught by *Juen* and/or *Takase*. *Id.* Alternatively, it would have been well within a POSITA's expertise to modify the *Casio* camera to perform mixing, per *Juen* and/or *Takase*, or as otherwise admitted by the '493 Patent as known in the art, as the skilled person designing digital cameras would have been aware of the hardware considerations for performing mixing (e.g., a signal processor and algorithms for performing the combining operations). *Id.* Modification of the *Casio* camera would then entail hardware/software changes well within the skilled person's knowledge implementing standard pixel conversion techniques. *Id.*

**Response to Patent Owner Arguments in the '597 IPR**

In the '597 IPR, Patent Owner argued "pixels cannot be divided into fractions of themselves" and it is not explained "how mixing or culling can occur at intervals of fractions of a

pixel." (*'597 IPR*, Paper 6, at 62). Patent Owner incorrectly understands the technology. (*Dec.*, 148-150).

Claim 5(e) requires that in the static image mode, the image is generated using "pixel lines" mixed or culled from the N number of vertically arranged pixel lines "to only include pixel lines separated from one another by intervals of a first distance." Patent Owner is incorrect that mixing cannot be performed on a "fraction" of an interval (using the Patent Owner's parlance). *Interpolation*—which is described in *Takase* as including *mixing* of the pixels (*Takase*, 5:15-22)—is applied to mix the signal charges from more than one pixel (whether a whole pixel or a "fraction" of a pixel) to obtain an output pixel. (*Dec.*, 148-150). Patent Owner incorrectly understands digital camera technology in stating "[b]ecause pixels refer to specific components…they cannot be divided into fractions of themselves." (*'597 IPR*, Paper 6, at 62). The Patent Owner mistakenly believes mixing signal charges to provide pixel lines at a fractional pixel interval requires *dividing* pixels. However, a POSITA would have understood the interpolation technique taught in both *Juen* and *Takase* would not have required *dividing* pixels. (*Dec.*, 148-150).

For example, *Takase* discloses that interpolation can be performed at a fractional pixel interval:

> When the control unit 9 **fine adjusts** the moving amount of the scanning area at the unit of ***smaller than the pixel unit*** in response to the handling amount detected by the vibration detection sensor 12, the **interpolation coefficient** [alpha] **corresponding to this fine adjustment amount** is set in the interpolation processing circuit 7. Then, the control circuit 9 supplies data to the interpolation processing circuit 7 such that the above-mentioned fine adjustment is equivalently carried out by the interpolation processing using this interpolation coefficient [alpha] as shown in FIG. 1.

(*Takase*, 5:23-32; *Dec.*, 149). Here, *Takase* is teaching that when fine adjustments are made to account for vibration, then interpolation at "smaller than the pixel unit" is performed to obtain the interpolation coefficient. Therefore, Patent Owner is incorrect that interpolation of pixel lines (i.e., *mixing* of pixel lines) cannot be performed at "fractional" intervals. (*Dec.*, 149).

Yet another example of "fractional" pixel mixing is U.S. Patent No. 6,963,361 to *Kawahara*, which describes pixel interpolation at K values less than 1 when referring to "fine pixel shifting":

> In order to initiate the fine pixel shifting, it is necessary to determine **a distribution ratio K between two adjacent pixels** in step S404. At first, distribution ratio $K_V$ in the vertical direction will be described. In the second embodiment, the distribution ratio in the **vertical direction $K_V$** is determined in accordance with $Dec(V_0)$ or $1+Dec(V_0)$, and **is determined to be as 1/8 or 7/8**.

(*Kawahara*, 16:24-30). *Kawahara* goes on to discuss "fine pixel shifting **with shift amount of less than one pixel**" and performing "interpolations." *Id.* at 16:18-21, 16:31-54, Fig. 19. As explained by Dr. Rodriguez, interpolation—which again, encompasses mixing of pixels—uses portions of a pixel (either fraction or whole) as an input and interpolates to end up with a given number of pixels as an output. (*Dec.*, 150). Thus, if interpolating (i.e., mixing) at intervals of 4.36 pixels, the system takes the values of 4.36 pixels and mixes to obtain the output pixel. *Id.*

Notably, there is nothing in Claim 5 requiring the first distance be an integer value; that is, there is nothing in Claim 5 excluding the first distance from being a fractional value. Requester likely appreciates this and, in an attempt to call into question the cited art's teaching, couches the discussion in terms of "fractions of a pixel." (*'597 IPR*, Paper 6, at 62). But, as shown above, mixing of a fraction of a pixel is well known, and nothing in Claim 5 excludes the first distance being composed of a fractional value.

Requester has shown above how *Casio* teaches downscaling from N = 960 vertically arranged pixel lines to 220 vertically arranged pixel lines during monitoring of the image in the static image mode (e.g., viewing the image on the *Casio* camera's display). The result is the pixel lines are separated from one another by intervals of a first distance = 4.36.

Because Claim 5(e) does not require the first distance separating pixel lines be an integer value, and because pixels may be mixed at smaller than a pixel unit, per *Takase*, *Casio* in view of *Juen* and/or *Takase* teaches Claim 5(e).

***7. Claim 5(f): "when recording the image in a moving video mode, the signal processing unit generates the image signals by using a portion of, or the entirety of, pixel lines which have been mixed or culled from the N number of vertically arranged pixel lines to only include pixel lines separated from one another by intervals of a second distance"***

Claim 5(f) of the '493 Patent recites "when recording the image in a moving video mode, the signal processing unit generates the image signals by using a portion of, or the entirety of, pixel lines which have been mixed or culled from the N number of vertically arranged pixel lines to only include pixel lines separated from one another by intervals of a second distance."

***a) "recording the image in a moving video mode"***

*Casio* teaches "recording the image in a moving video mode." When the dial is turned to "Movie Mode," a user "can record movies that are approximately 10 seconds long":

## Movie Recording

You can record movies that are approximately 10 seconds long. Movies are recorded in 320 x 240-pixel AVI format. For details, see "Using the Record Menus" on page 75.
There are two types of movie recording: PAST and NORMAL. PAST lets you capture images of events that occurred before you pressed the shutter button while NORMAL records what happens after you press the shutter button.
See "Using the Record Menus" on page 75 for details on how to select the movie length.

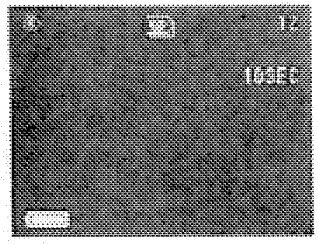
- AVI files can be displayed and saved on a computer that is set up to support use of CompactFlash cards. For such a computer, install QuickTime 3.

### NORMAL

**1. Slide the Function Switch to REC.**

(*Casio*, 61). To record a movie, *Casio* teaches for Step "2. Align the dial with the to select Movie Recording Mode" and Step "3. Compose the image and then record it":

**2. Align the dial with to select Movie Recording Mode.**



**3. Compose the image and then record it.**

- Auto Focus automatically adjusts in accordance with the movement of the subject.
- See "Playing Back a Movie" on page 80 for details on playing back a movie.
- Movie recording stops automatically 10 seconds after you start the record operation.
- To stop recording before the 10-second period is up, press the shutter button.

(*Casio*, 62; *Dec.*, 160). The movie is recorded in an "AVI format," which a POSITA would have understood is a standard *video* format. (*Casio,* 61; *Dec.*, 161). The camera can be connected to an

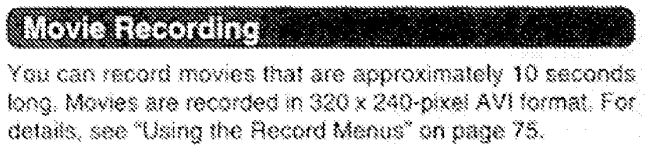
external display screen via a VIDEO OUT terminal, where the recorded video can be displayed according to the NTSC or PAL standards, further indicating the camera records in a moving video mode. (*Casio*, 10, 78, 119). Therefore, *Casio* discloses "recording the image in a moving video mode."

***b) "the signal processing unit generates the image signals"***

*See* Claim 5(b) above with respect to the "signal processing unit that generates image signals." (*Dec.*, 162). See Section VII.A.7. below with respect to the functionality of the signal processing unit using pixel lines that have been mixed or culled as recited in Claim 5(f).

***c) "using a portion of, or the entirety of, pixel lines which have been mixed or culled from the N number of vertically arranged pixel lines"***

As discussed with respect to Claim 5(a) above, the CCD provides a pixel resolution of 1280 x 960, with N = 960 vertically arranged pixel lines. (*Casio*, 76, 118). In "Movie Recording," the *Casio* camera records video in a 320 x 240-pixel AVI format:




(*Casio*, 61). Thus, for the "Movie Recording," the *Casio* camera reduces the resolution of the image signals from N = 960 vertically arranged pixel lines to 240 vertically arranged pixel lines. (*Dec.*, 166).

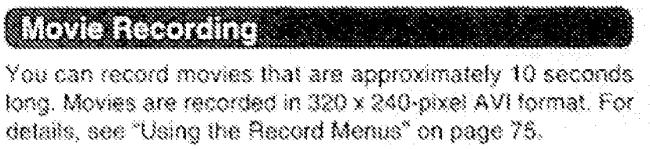
*Juen* teaches mixing signal charges by "executing interpolation" to reduce the pixel resolution, i.e., combining signal charges from multiple pixels (See Claim 5(e) above). *Juen*, 6:10-13, 7:53-59. And *Takase* teaches *mixing* pixels to perform fine pixel resolution reduction. (*Takase,* 4:20-29, 5:15-49). Furthermore, the '493 Patent describes mixing signal charges as being well known in the art. *'493 Patent*, 1:30-50, 2:44-47. Additionally, because the *Casio* camera teaches

generating image signals in the AVI format for the movie mode, a POSITA would have understood the signal processing unit of *Casio* alone or combined with *Juen* and/or *Takase* (as discussed for Claim 5(b)) performs the claimed mixing "during a moving video recording mode" to reduce the pixel resolution to the 320 x 240-pixel AVI format. (*Dec.*, 163-165).

*Casio* combined with *Juen* and/or *Takase* teaches the signal processing unit generates the image signals by using pixel lines combined from the vertically arranged pixel lines. For example, the signal processing unit uses the combined pixel lines to generate the image signals in a moving video mode. (*Casio*, 61, 118). When generating the image signals for recording in the moving video mode in an AVI format, the mapped *Casio* signal processing unit uses the combined pixel lines. A POSITA would have understood the combination of *Casio* and *Juen* and/or *Takase* to teach that when recording the image in a moving video mode, i.e., when recording in the AVI format, the *Casio* signal processing unit (or as modified by *Juen's* processor 15 and converter 16) actually uses the combined pixel lines to record the moving video image. (*Dec.*, 163-165). And because *Casio* teaches using the combined pixel lines when recording in the AVI format, a POSITA would have understood the combination to teach the camera must be using a portion of, or the entirety of, the combined pixel lines. *Id.*

***d) "to only include pixel lines separated from one another by intervals of a second distance, where the second distance is different from the first distance"***

As discussed above, in "Movie Recording," the *Casio* camera records video in a 320 x 240-pixel AVI format:


Movie Recording

You can record movies that are approximately 10 seconds long. Movies are recorded in 320 x 240-pixel AVI format. For details, see "Using the Record Menus" on page 78.

(*Casio*, 61). Thus, for the "Movie Recording," *Casio* teaches the digital camera reduces the resolution of the image signals from N = 960 vertically arranged pixel lines to 240 vertically arranged pixel lines. (*Dec.*, 166; *Casio*, 61). When the N = 960 pixel lines disclosed in *Casio* (and also in *Juen*) is reduced to 240 lines when recording in a moving video mode (as taught by *Casio*, 61), the pixel lines are separated by a second distance according to the degree of the pixel resolution conversion. (*Dec.*, 166). Thus, the vertically arranged pixel lines recorded during the moving video mode are provided at pixel intervals of a second distance = 960/240 = 4.00. *Id.* In the case of 960 vertically arranged pixel lines being converted to 240 vertically arranged pixel lines, *Casio* teaches intervals of a second distance, where the second distance is 4.00.

*Casio* further teaches "the second distance being different from the first distance," as claimed. As discussed for Claim 5(e) above, first distance = 4.36. Because the first distance = 4.36 and the second distance = 4.00, and 4.36 ≠ 4.00, then first distance ≠ second distance. (*Dec.*, 167).

***8. "Signal Processing Unit" Functionality Recited in Claims 5(d)-5(f)***

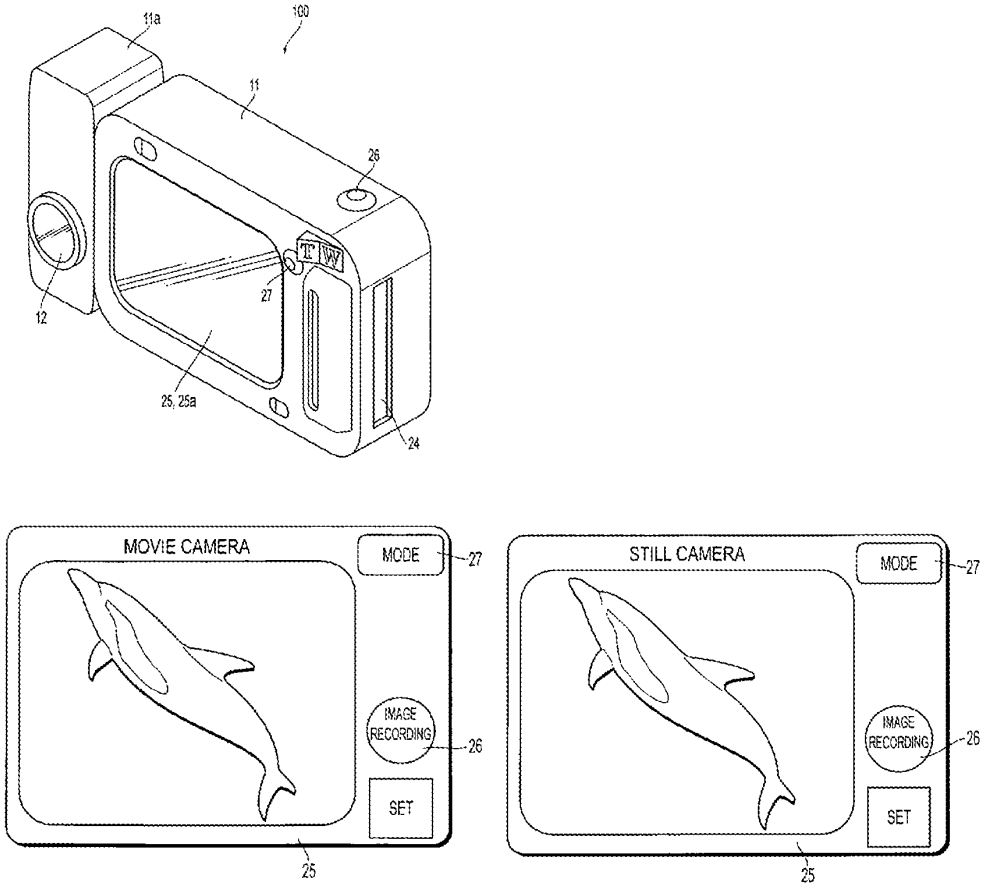
The signal processing unit, as discussed above for Claim 5(b), performs the functions recited in Claims 5(d)-5(f). These functions includes generating the image signals by mixing or culling signal charges at pixel intervals of a first distance pixels (Claim 5(e)) or a second distance (Claim 5(f)) or generating image signals by using all signal charges to provide N pixel lines (Claim 5(d)). (*Dec.*, 168-170). A POSITA would have understood the signal processing unit of *Casio* (as either implicitly or inherently taught or rendered obvious) or the *Casio* digital camera modified to include *Juen's* processor and image converter would have performed the claimed functionality of Claims 5(d)-5(f), as discussed above.

It would have been reasonable and expected for the same signal processing unit (as mapped for Claim 5(b)) to perform the mixing or culling of Claims 5(e)-(f) or using all signal charges of Claim 5(d), as frequently the same signal processor is going to read out the signals from the CCD

and perform image processing to generate the image. (*Dec.*, 168-170). Additionally, the signal processing unit is the processor generating the image signals, and so a POSITA would have understood or found it obvious the *Casio* processor is also performing the disclosed pixel resolution reduction (*Casio,* 16) to generate the image signals or using all signal charges to record a static image. *Id.*

A digital camera designer would have desirably used the same signal processing unit for performing the image generation recited in Claims 5(d)-5(f) for ease of installation and design, lower cost, lower weight of the digital camera, and less possibility for malfunction. It would have been common sense to use the same signal processing unit to generate the image at N pixel lines and to mix or cull the signal charges for pixel line intervals of a first or second distance so as to avoid duplicative processors for performing similar functionality. (*Dec.*, 171). A digital camera designer would have programmed the processor to receive the CCD data, perform any signal processing (e.g., pixel resolution reduction), and generate the image for display or storage. (*Anderson*, 4:9-34 (discussing a DSP receiving raw CCD image data and performing image processing); *Dec.*, 171). Programming of a single signal processing unit to ensure system compatibility would have been desirable. (*Dec.*, 171). A POSITA would have understood and been reasonably motivated to use the same signal processing unit for reducing the pixel resolution when monitoring in a static image on the display or recording a movie (video) or reading out all signal charges when recording a static image to accomplish desirable ease of manufacture and lower cost. *Id.*

Furthermore, *Juen* teaches the same signal processing unit used to generate the image signals also performs the functions recited in Claims 5(d)-(f). *Juen* expressly teaches an electronic camera including both a movie recording mode and a still image mode:




(*Juen,* Figs. 8, 16-17, 5:42-52, 7:36-50).

*Juen* teaches recording a static image at a full resolution of the CCD and recording a moving video at a lesser resolution. The CCD pixel resolution is matched to a suitable scan format of the display. (*Juen*, 3:56–4:13). The *Juen* camera is operable to perform the generation of image signals during recording in the moving video mode, as claimed. *Id. Juen* also teaches the signal processor 15 and image converter 16 collectively perform this pixel reduction. Therefore, *Juen* teaches the same signal processing unit (i.e., processor 15 and converter 16) performs the function of displaying the image on the included display, in addition to generating image signals at different resolutions for recording static versus moving video images. (*Dec.*, 172).

It would have been obvious to a POSITA to modify the digital camera disclosed in *Casio* to include *Juen's* signal processor 15 and image density converter 16 for generating the image signals at different resolutions. (*Dec.*, 173). To the extent not already taught in *Casio*, it would have been obvious to modify *Casio's* digital camera to include *Juen's* signal processor and converter that performs various pixel reduction functionality. Such a modification to *Casio* would have entailed use of *Juen's* known signal processor and converter to the similar *Casio* digital camera to improve it in the same way. *Id.* A POSITA would have had a reasonable expectation of success given both *Casio* and *Juen* disclose digital cameras operable to record in both still and moving video modes. The hardware and software configurations made to the *Casio* digital camera (to the extent needed) would have included adding the *Juen* signal processor and converter to perform the already-disclosed functionality in *Casio* of generating the image signals from the 1280 x 960 CCD at a lesser resolution for moving video recording (i.e., the disclosed 320 x 240 resolution in *Casio*). Because *Casio* already teaches the modes of operation and claimed functionality, any software or firmware changes would either be minimal or well within the skilled person's expertise. *Id.* (*citing* ¶ 146 for desirability of the combination).

### B. SNQP 2: Claim 6 is unpatentable under 35 U.S.C. 103 as obvious over Casio in view of Juen and/or Takase in further view of Misawa

#### *1. Claim 6: "An electric camera according to the claim 5, further comprising: an image-instability detector which detects an image-instability of the electric camera; and wherein when recording in the moving video mode, in order to correct the image-instability, the signal processing unit generates the image signals by changing the pixel lines used, and the portion of the pixel lines used, according to an amount of image-instability detected by the instability detector."*

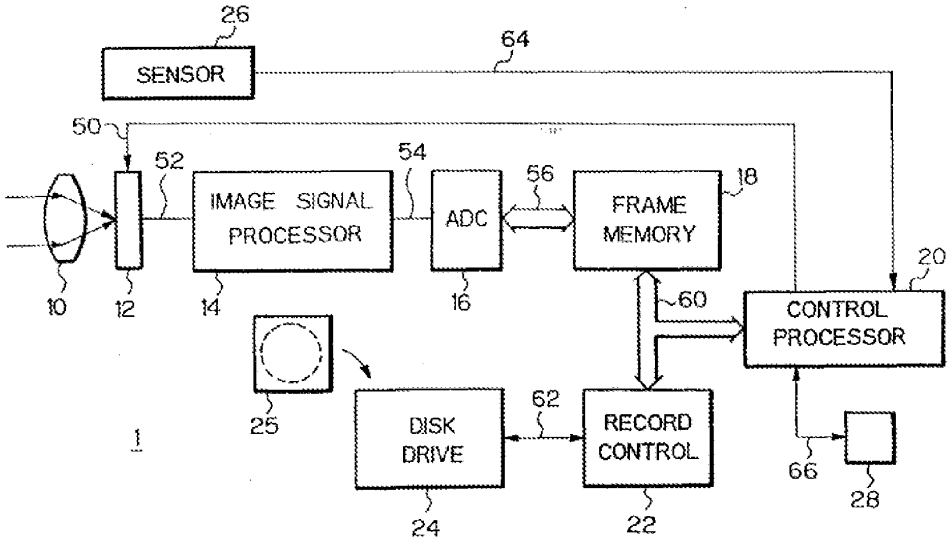
Claim 6 depends from Claim 5. *Casio* in view of *Juen* and/or *Takase* teaches all the limitations of Claim 5 as discussed above. (*Dec.*, 175).

***a) Claim 6(a): "an image-instability detector which detects an image-instability of the electric camera"***

*Casio* teaches an image instability detector, namely a "camera shake indicator." (*Casio*, 30).

*Misawa* teaches an image instability detector. (*Dec.*, 176-177). *Misawa* teaches a digital electronic camera for recording still images and video images. (*Misawa*, Title). *Misawa* includes a "sensor 26 for sensing movement or viblation [sic] of the camera," and the sensor may be a "piezoelectric gyroscopic transducer…adapted to sense any mechanical movement." (*Misawa*, 3:7-8, 4:60–5:8).

Fig. 1




(*Misawa*, Fig. 1). *Misawa* teaches a detector, namely sensor 26 that may be a gyroscopic transducer, that is a gyroscopic sensor or the like, capable of detecting an image instability of the camera. (*Dec.*, 177). Additionally, *Misawa* teaches "movement detector 314 receives a movement signal from sensor 26" and "generates movement data representing how digital camera moves or

vibrates," which is "delivered to correction processor 316." (*Misawa*, 8:7-16, 7:30-33). The disclosed "movement data representing how digital camera moves or vibrates" and generated based on information from the gyroscopic transducer (sensor 26) is indicative of instability caused by vertical and/or horizontal movement of the video camera. (*Dec.*, 178). Because the movement data represents movement or vibration, the corresponding movement data is associated with the image instability. *Id.; see also Misawa*, 8:7-27 (disclosing the "movement data" including rotational movement and horizontal/vertical movement and the Misawa camera using the "movement data" to compensate for "blur").

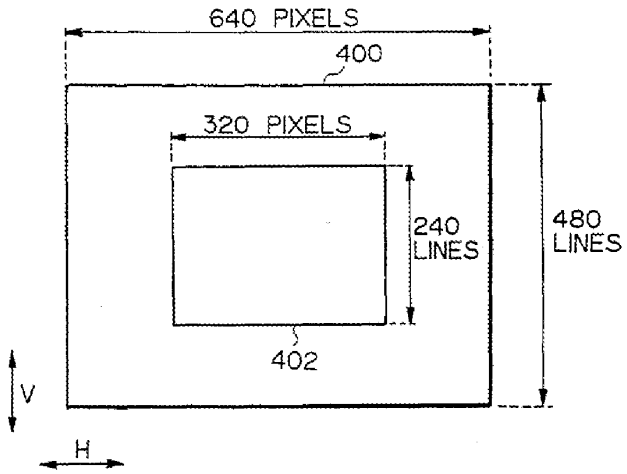
***b) Claim 6(b): when recording in the moving video mode, in order to correct the image-instability, the signal processing unit generates the image signals by changing the pixel lines used, and the portion of the pixel lines used, according to an amount of image-instability detected by the instability detector***

As discussed above for Claim 5(b), *Casio* in view of *Juen* and/or *Takase* teaches a signal processing unit that generates image signals. As discussed above for Claim 5(f), *Casio* in view of *Juen* and/or *Takase* teaches during the moving video mode, the signal processing unit generates the image signals by using a portion of, or the entirety of pixel lines which have been mixed or culled from the N number of vertically arranged pixel lines. *Misawa* teaches *changing the pixel lines used*, and the portion of the pixel lines used, according to an amount of image-instability detected by the instability detector to correct the image-instability.

*Misawa* teaches an "image sensor 12 for producing pixel signals associated with the optical image thus formed." (*Misawa*, 2:55-59). *Misawa* also teaches "an image signal processor 14 for processing the pixel signals produced to develop image signals representative of the optical image captured." (*Misawa*, 2:55-61, 3:14-48, 6:32-37 (teaching moving picture mode and informing correction processor 316 that movie mode is selected)). Therefore, *Misawa* teaches when recording in the moving video mode, generating image signals. (*Dec.*, 180).

*Misawa* teaches "read-out processor 308 is also adapted to compensate for blur which would otherwise be caused by unintentional movement of camera 1" and "responds to correction data provided from correction processor 316." (*Misawa*, 7:30-35, 9:49-56). In Figure 4B, "read-out processor 308 changes in response to the correction signal the position of area 402 within the imaging field 400 and generates the address representing the altered position of area 402." (*Misawa*, 7:40-43, 9:52-61 (teaching correcting the position of area 402 for imaging field 400 when in movie picture mode)).

Fig. 4B




(*Misawa*, Fig. 4B, 9:57–10:2). "Area 402 is smaller than the entire frame 400, thus utilizing portions of the image data associated with a peripheral portion adjacent to and surrounding area 402 for the purpose of compensating for blur." (*Misawa*, 10:39-51, 10:8-15 (teaching compressing and recording to memory the movie image frames), 2:9-15).

*Misawa* thus teaches that when recording in the movie image mode and to correct image-instability (i.e., blur), the image signals are generated by changing the part of pixels lines used from the image data (field 400) and a portion of the pixel lines is used (area 402) according to the

correction data indicative of an amount of image-instability detected by sensor 26. (*Dec.*, 182-183).

It would have been obvious to a POSITA to include an image instability detector, as taught by *Misawa,* in the camera of *Casio* (as modified by *Juen* and/or *Takase*) to compensate for image blur. (*Misawa*, Abstract; *Dec.*, 158). It also would have been obvious to a POSITA to generate the image signals by changing the pixel lines, as taught by *Misawa,* in the camera of *Casio* (as modified by *Juen* and/or *Takase*) to compensate for image blur. *Id. Casio* recognizes the need for an image instability detector, as the camera includes a "Camera shake indicator," thus indicating the camera already includes a sensor for determining the movement of the camera. (*Dec.*, 183, *citing Casio*, 30). *Misawa* further teaches the need for compensating for movement of the camera during a movie recording mode. (*Misawa*, 2:9-15). Applying *Misawa's* technique would have been met with a reasonable expectation of success given the *Casio* camera already indicates a camera shake indicator and therefore, some detector, is used. Modifying the hardware and software components would have entailed incorporating a sensor as taught by *Misawa* and the algorithm disclosed in *Misawa*, both of which would have been within the expertise of a POSITA. Additionally, the *Misawa* method would have been particularly desirable for adding to the *Casio* camera given that *Misawa* recognizes the desire to "permit the size of the visualized image frame to continuously be changed during imaging operation…." (*Misawa*, 7:19-29). A POSITA would have understood the *Misawa* method may be implemented efficiently by the *Casio* camera when switching between static and movie recording modes and without increasing processing time. (*Dec.*, 183). *Misawa* specifically discusses the advantage of being able to record movie videos at the same pixel signal transfer rate as still images while compensating for blur caused by unintentional movement. (*Misawa,* 11:11-30; *Dec.*, 183).

## VIII. TIMING FOR REQUESTING EX PARTE REEXAMINATION UNDER 35 U.S.C. 302

The filing of this Request for *Ex Parte* Reexamination is timely. The '493 Patent expired less than 6 years from the date of filing this Request for *Ex Parte* Reexamination. *See* M.P.E.P. § 2211; 35 U.S.C. § 286.

## IX. COMMUNICATIONS TO THIRD PARTY REQUESTER

The Requester's correspondence address is:

ERISE IP, P.A.

7015 College Boulevard, Suite 700

Overland Park, Kansas 66211

Telephone: (913) 777-5600

Facsimile: (913) 777-5601

## X. CERTIFICATION THAT REEXAMINATION IS NOT PROHIBITED

In accordance with 37 C.F.R. § 1.510(b)(6), the Third Party Requester hereby certifies that the statutory estoppel provisions of 35 U.S.C. § 315(e)(1) and 35 U.S.C. § 325(e)(l) do not prohibit the Requester from filing this *Ex Parte* Reexamination Request.

## XI. CERTIFICATION OF SERVICE ON PATENT OWNER

In accordance with 37 C.F.R. § 1.510(b)(5), the Third Party Requester hereby certifies that the above captioned Request for *Ex Parte* Reexamination under 37 C.F.R. § 1.510 will be served upon:

MATTINGLY & MALUR, PC
1800 Diagonal Road
Suite 210
Alexandria, VA 22314

## XII. CONCLUSION

For at least the forgoing reasons, Requester respectfully submits substantial new questions of patentability have been raised with respect to claims 5 and 6 of the '493 Patent. Accordingly, claims 5 and 6 of the '493 Patent are unpatentable over the prior art documents cited herein under 35 U.S.C. § 103.

Requester respectfully requests that this Request for *Ex Parte* Reexamination of the '493 Patent be granted by the U.S. Patent and Trademark Office, and that the reexamination be conducted with "special dispatch" pursuant to 35 U.S.C. § 314 and with "priority over all other cases" in accordance with M.P.E.P. § 2661.

Prompt and favorable consideration of this Request for *Ex Parte* Reexamination is respectfully requested.

Date: December 10, 2020

Respectfully submitted,

/Jennifer C. Bailey/

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ATTORNEY FOR THIRD PARTY REQUESTER,
APPLE INC.

**EXHIBIT 1003**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

| | |
|---|---|
| *In re* reexamination of: Nakano et al. | Confirmation No.: *To Be Assigned* |
| U.S. Patent No. 8,339,493 B2 | Art Unit: *To Be Assigned* |
| Issue Date: December 25, 2012 | Examiner: *To Be Assigned* |
| Title: ELECTRIC CAMERA | Third Party Requester Docket No. 2638-19.00 |

**Mail Stop *Ex Parte* Reexam**
Attn: Central Reexamination Unit
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

**DECLARATION OF DR. JEFFREY J. RODRIGUEZ IN SUPPORT OF REEXAMINATION REQUEST FOR U.S. PATENT NO. 8,339,493**

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**VIII. CONCLUSION** ..... **101**

I, Dr. Jeffrey J. Rodriguez, hereby declare the following:

## I. INTRODUCTION

1. My name is Jeffrey J. Rodriguez, and I am over 21 years of age and otherwise competent to make this Declaration. I make this Declaration based on facts and matters within my own knowledge and on information provided to me by others, and, if called as a witness, I could and would competently testify to the matters set forth herein.

2. I have been retained on behalf of Apple Inc. ("Requester") for the above-captioned *ex parte* reexamination to provide my independent opinions on whether certain references teach or suggest the limitations recited in certain claims of U.S. Patent No. 8,339,493 ("the *'493 Patent*"). I am being compensated at an hourly rate of $525.00. My compensation in this matter is not based on the substance of my opinions or on the outcome of this matter. I have been informed that the purported owner of the '493 Patent is Maxell, Ltd. ("Patent Owner"). I note that I have no financial interest in the Patent Owner or Requester, and I have no other interest in the outcome of this matter. In a prior matter, I submitted a declaration in support of a Petition for *Inter Partes* Review of the '493 Patent in Case IPR2020-00597 ("'597 IPR").

3. I have summarized in this section my educational background, career history, and other qualifications relevant to this matter. I have also included a current version of my curriculum vitae, attached as Appendix A.

### A. Background and Qualifications

4. I earned my undergraduate degree in Electrical Engineering from the University of Texas at Austin in 1984. I earned a Master of Science degree in Electrical Engineering from MIT in 1986. I earned a Ph.D. in Electrical Engineering from the University of Texas at Austin in 1990.

5. I am currently a professor at the University of Arizona in the Department of Electrical and Computer Engineering, where I hold or have held the following positions: (a)

Tenured Associate Professor of Electrical and Computer Engineering (1997-present), (b) Director of the Signal and Image Laboratory (1990-present), (c) Director of Image Analysis, Cancer Imaging Shared Services, Arizona Cancer Center (2009-2014), (d) Director of Graduate Studies for the Department of Electrical and Computer Engineering (2000-2003, 2005-2016).

6. I teach courses at both the graduate and undergraduate level through the Dept. of Electrical and Computer Engineering and the College of Optical Sciences. The courses I have taught include Digital Image Processing (ECE/OPTI 533), Digital Image Analysis (ECE/OPTI 532), Digital Signal Processing (ECE 429/529), Advanced Digital Signal Processing (ECE 528), Signals and Systems (ECE 340), and Circuit Analysis (ECE 320). I have supervised more than 50 master's and Ph.D. theses and dissertations in the Electrical and Computer Engineering program.

7. My research activity is generally directed to systems for digital signal/image/video processing and analysis. Past projects include super-resolution techniques for image enhancement, a real-time video processing system for detection and tracking of zebrafish, automobile detection and tracking in aerial video of urban traffic scenes, tongue detection and tracking using ultrasound, video segmentation of the right ventricle in cardiac magnetic resonance image sequences, performance evaluation of superpixel algorithms for image segmentation, image inpainting, segmentation and measurement of lesions in magnetic resonance images, content-adaptive improved error concealment methods for H.264/AVC video communication, etc.

8. I am named as an inventor on one patent in the area of polar dynamic programing for automated image segmentation.

9. A recent research project of mine involved the design and development of a real-time image and video processing system for automated behavioral analysis of zebrafish for use in ototoxicity assessment of drugs. The system we designed and built includes an array of Raspberry

Pi microcomputer systems configured with video cameras for parallel video capture of sixteen zebrafish populations. Each Raspberry Pi features a system on a chip, which includes a CPU, a video graphics processing unit (GPU), a disk storage system, and a memory system. Our zebrafish analysis system automatically captures and transmits video data to a high-performance cluster to implement customized algorithms for further video processing and analysis, resulting in automated assessment of zebrafish swimming behavior.

10. Another area of my research has been the development of super-resolution (SR) techniques for computing a high-resolution image from one or more low-resolution images. For example, my research lab developed a new method for single-image SR using dictionary-based local regression to produce a high-resolution image from a single low-resolution image without any external training image sets. We used a dictionary-based regression model using local self-similar example patches within the input image. Our method was inspired by the observation that image patches can be well represented as a sparse linear combination of elements from a chosen over-complete dictionary and that a patch in the high-resolution image has good matches around its corresponding location in the low-resolution image. A first-order approximation of a nonlinear mapping function, learned using the local self-similar example patches, is applied to the low-resolution image patches to obtain the corresponding high-resolution image patches. We extended the technique by developing a graph regularized block sparse representation (GRBSR) for images, which is used for patch-based SR reconstruction of a high-resolution image from a low-resolution image.

11. I am a Senior Member of the Institute of Electrical and Electronics Engineers (IEEE) and the IEEE Signal Processing Society. I served as General Chair of the 2016 IEEE Southwest Symposium on Image Analysis and Interpretation (SSIAI), and General Chair of the

2007 IEEE International Conference on Image Processing (ICIP). In addition, during 2005-2011, I served on the IEEE Signal Processing Society Technical Committee on Image, Video, and Multidimensional Signal Processing. I have served on numerous other professional committees, and I have served as a technical reviewer for numerous journals and professional conferences.

12. I have authored or co-authored over 150 published papers in the field of signal/image/video processing. I have served as an expert witness in patent cases since 2005, involving signal/image/video processing, data compression systems, video receivers, document cameras, cellular camera phones, signal/image/video transmission over wireless networks, etc.

13. Based on my experiences described above, and as indicated in my curriculum vitae, I am qualified to provide the opinions set forth in this Declaration.

### B. Materials Considered

14. The opinions contained in this Declaration are based on the materials I have reviewed and my professional judgment, as well as my education, experience, and/or knowledge regarding technologies relating to the '493 Patent.

15. As part of my investigation and in forming my opinions, I have reviewed at least the following materials:

- Patent Owner Preliminary Response to Petition for *Inter Partes* Review of U.S. Patent No. 8,339,493, Case IPR2020-00597 ("'597 IPR, PO Prelim. Response");
- Request for *Ex Parte* Reexamination of U.S. Patent No. 8,339,493 ("Reexamination Request");
- U.S. Patent No. 8,339,493 (Ex. 1001);
- File History for U.S. Patent 8,339,493 (Ex. 1002);
- Casio LCD Digital Camera QV-8000SX User's Guide ("*Casio*") (Ex. 1004);

- U.S. Patent No. 7,903,162 to *Juen* (Ex. 1005);
- U.S. Patent No. 5,444,482 to *Misawa* (Ex. 1006);
- U.S. Patent No. 5,502,483 to *Takase* (Ex. 1013);
- U.S. Patent No. 4,949,117 to *Heyningen* et al. (Ex. 1014);
- U.S. Patent No. 5,150,109 to *Berry* (Ex. 1015);
- U.S. Patent No. 6,335,760 to *Sato* (Ex. 1016);
- U.S. Patent No. 5,642,171 to *Baumgartner* et al. (Ex. 1017);
- *CCD Arrays, Cameras, and Displays*, 2d. Ed. (JCD Publ. 1998) ("*CCD Arrays*") (Ex. 1018);
- U.S. Patent No. 4,740,828 to *Kinoshita* (Ex. 1019);
- U.S. Patent No. 6,018,363 to *Horii* (Ex. 1020);
- EP 0 802 688 B1 to *Inoue* et al. (Ex. 1021);
- U.S. Patent No. 6,512,541 to *Dunton* et al. (Ex. 1022);
- U.S. Patent No. 6,563,535 to *Anderson* (Ex. 1023);
- U.S. Patent No. 4,612,575 to *Ishman* et al. (Ex. 1024);
- U.S. Patent No. 6,963,361 to *Kawahara* et al. (Ex. 1028); and
- Any other materials I refer to in this Declaration in support of my opinions.

## II. LEGAL FRAMEWORK

16. I am a technical expert and do not offer any legal opinions. However, I have been informed about certain legal principles regarding patentability and related matters under United States patent law, which I have applied in performing my analysis and arriving at my technical opinions in this matter.

**A. Analogous Art**

17. I have been informed by counsel that for prior art to be used to establish the unpatentability of a patent based on obviousness, the prior art must be "analogous art" to the claimed invention. I have also been informed by counsel that a prior art reference is analogous art to the claimed invention if: (1) the reference is from the same field of endeavor as the claimed invention, even if it addresses a different problem; or (2) the reference is reasonably pertinent to the problem faced by the invention, even if it is not in the same field of endeavor as the claimed invention.

**B. Obviousness**

18. I have been informed that a person cannot obtain a patent on an invention if the differences between the invention and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art ("POSITA" or skilled person). I have been informed that a conclusion of obviousness may be founded upon more than a single item of prior art. I have been further informed that obviousness is determined by evaluating the following factors: (1) the scope and content of the prior art, (2) the differences between the prior art and the claim at issue, (3) the level of ordinary skill in the pertinent art, and (4) secondary considerations of non-obviousness. In addition, the obviousness inquiry should not be done in hindsight. Instead, the obviousness inquiry should be done through the eyes of a POSITA at the time of the alleged invention.

19. In considering whether certain prior art renders a particular patent claim obvious, I have been informed that I can consider the scope and content of the prior art, including the fact that one of skill in the art would regularly look to the disclosures in patents, trade publications, journal articles, conference papers, industry standards, product literature and documentation, texts describing competitive technologies, requests for comment published by standard setting

organizations, and materials from industry conferences, as examples. I have been informed that for a prior art reference to be proper for use in an obviousness analysis, the reference must be "analogous art" to the claimed invention. I have been informed that a reference is analogous art to the claimed invention if: (1) the reference is from the same field of endeavor as the claimed invention (even if it addresses a different problem), or (2) the reference is reasonably pertinent to the problem faced by the inventor (even if it is not in the same field of endeavor as the claimed invention). A reference is "reasonably pertinent" to the problem if it would have been logically considered by an inventor in considering his problem. In determining whether a reference is reasonably pertinent, one should consider the problem faced by the inventor, as reflected either explicitly or implicitly, in the specification. I believe that all of the references I considered in forming my opinions are well within the range of references a POSITA would have consulted to address the type of problems described in the '493 Patent.

20. I have been informed that, in order to establish that a claimed invention was obvious based on a combination of prior art elements, a clear articulation of the reason(s) why a claimed invention would have been obvious must be provided. Specifically, I am informed that, under the U.S. Supreme Court's *KSR* decision, a combination of multiple items of prior art renders a patent claim obvious when there was an apparent reason for one of ordinary skill in the art, at the time of the invention, to combine the prior art, which can include, but is not limited to, any of the following rationales: (A) combining prior art methods according to known methods to yield predictable results; (B) substituting one known element for another to obtain predictable results; (C) using a known technique to improve a similar device in the same way; (D) applying a known technique to a known device ready for improvement to yield predictable results; (E) trying a finite number of identified, predictable potential solutions, with a reasonable expectation of success; (F) identifying

that known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations are predictable to one of ordinary skill in the art; or (G) identifying an explicit teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine the prior art references to arrive at the claimed invention. I am also informed that where there is a motivation to combine, claims may be rejected as prima facie obvious provided a POSITA would have had a reasonable expectation of success regarding the proposed combination.

21. I am informed that the existence of an explicit teaching, suggestion, or motivation to combine known elements of the prior art is a sufficient, but not a necessary, condition to a finding of obviousness. This so-called "teaching-suggestion-motivation" test is not the exclusive test and is not to be applied rigidly in an obviousness analysis. In determining whether the subject matter of a patent claim is obvious, neither the particular motivation nor the avowed purpose of the patentee controls. Instead, the important consideration is the objective reach of the claim. In other words, if the claim extends to what is obvious, then the claim is invalid. I am further informed that the obviousness analysis often necessitates consideration of the interrelated teachings of multiple patents, the effects of demands known to the technological community or present in the marketplace, and the background knowledge possessed by a person having ordinary skill in the art. All of these issues may be considered to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent.

22. I also am informed that in conducting an obviousness analysis, a precise teaching directed to the specific subject matter of the challenged claim need not be sought out because it is appropriate to take account of the inferences and creative steps that a POSITA would employ. The

prior art considered can be directed to any need or problem known in the field of endeavor at the time of invention and can provide a reason for combining the elements of the prior art in the manner claimed. In other words, the prior art need not be directed towards solving the same specific problem as the problem addressed by the patent. Further, the individual prior art references themselves need not all be directed towards solving the same problem. I am informed that, under the *KSR* obviousness standard, common sense is important and should be considered. Common sense teaches that familiar items may have obvious uses beyond their primary purposes.

23. I also am informed that the fact that a particular combination of prior art elements was "obvious to try" may indicate that the combination was obvious even if no one attempted the combination. If the combination was obvious to try (regardless of whether it was actually tried) or leads to anticipated success, then it is likely the result of ordinary skill and common sense rather than innovation. I am further informed that in many fields it may be that there is little discussion of obvious techniques or combinations, and it often may be the case that market demand, rather than scientific literature or knowledge, will drive the design of an invention. I am informed that an invention that is a combination of prior art must do more than yield predictable results to be non-obvious.

24. I am informed that for a patent claim to be obvious, the claim must be obvious to a POSITA at the time of the alleged invention. I am informed that the factors to consider in determining the level of ordinary skill in the art include (1) the educational level and experience of people working in the field at the time the invention was made, (2) the types of problems faced in the art and the solutions found to those problems, and (3) the sophistication of the technology in the field.

25. I am informed that it is improper to combine references where the references teach away from their combination. I am informed that a reference may be said to teach away when a POSITA, upon reading the reference, would have been discouraged from following the path set out in the reference, or would have been led in a direction divergent from the path that was taken by the patent applicant. In general, a reference will teach away if it suggests that the line of development flowing from the reference's disclosure is unlikely to be productive of the result sought by the patentee. I am informed that a reference teaches away, for example, if (1) the combination would produce a seemingly inoperative device, or (2) the references leave the impression that the product would not have the property sought by the patentee. I also am informed, however, that a reference does not teach away if it merely expresses a general preference for an alternative invention but does not criticize, discredit, or otherwise discourage investigation into the invention claimed.

### C. Secondary Considerations of Non-Obviousness

26. I am informed that even if a *prima facie* case of obviousness is established, the final determination of obviousness must also consider "secondary considerations" if presented. In most instances, the patentee raises these secondary considerations of non-obviousness. In that context, the patentee argues an invention would not have been obvious in view of these considerations, which include: (a) commercial success of a product due to the merits of the claimed invention; (b) a long-felt, but unsatisfied need for the invention; (c) failure of others to find the solution provided by the claimed invention; (d) deliberate copying of the invention by others; (e) unexpected results achieved by the invention; (f) praise of the invention by others skilled in the art; (g) lack of independent simultaneous invention within a comparatively short space of time; (h) teaching away from the invention in the prior art.

27. I am further informed that secondary-considerations evidence is only relevant if the offering party establishes a connection, or nexus, between the evidence and the claimed invention. The nexus cannot be based on prior art features. The establishment of a nexus is a question of fact.

### D. Claim Construction

28. I have been informed by counsel that the first step in an unpatentability analysis involves construing the claims, as necessary, to determine their scope. Second, the construed claim language is then compared to the disclosures of the prior art. I am informed that claims are generally given their plain and ordinary meaning as understood by one of ordinary skill in the art at the time of the invention, in light of the patent specification and file history.

29. For all claim terms, I have been asked to give the terms their plain and ordinary meaning, as would have been understood by a person of ordinary skill in the art, at the time of the alleged invention, taking into consideration the language of the claims, the specification, and the prosecution history of the '493 Patent. I have applied these understandings of the claim terms in my analysis and in forming my opinions. I have been instructed to assume for purposes of my analysis that the time of the claimed invention is January 11, 2000. I also understand that some of the claim terms have been construed by the district court, and I have reviewed those constructions, which are provided in Section V of the co-filed Reexamination Request. My opinions regarding the teachings of the prior art and the unpatentability of claims 5 and 6 of the '493 Patent do not change depending on whether the plain and ordinary meaning of the claim terms is applied or the district court's construction is applied.

## III. OPINIONS REGARDING LEVEL OF SKILL OF A PERSON HAVING ORDINARY SKILL IN THE ART

30. I was asked to provide my opinion as to the level of skill of a person having ordinary skill in the art ("POSITA" or "skilled person") of the '493 Patent at the time of the claimed invention, which I have been instructed to assume is January 11, 2000. In determining the characteristics of a hypothetical POSITA, I was told to consider several factors, including the type of problems encountered in the art, the solutions to those problems, the rapidity with which innovations are made in the field, the sophistication of the technology, and the education level of active workers in the field. I also placed myself back in the time frame of the claimed invention and considered the colleagues with whom I had worked at that time.

31. In my opinion, a POSITA would have been a person having a bachelor's degree in Electrical Engineering, Computer Science, or the equivalent and at least two years of experience in the field of digital image processing, digital cameras, electronic imaging, or a related field. Additional education may substitute for lesser work experience and vice-versa. Such a POSITA would have been capable of understanding the '493 Patent and the prior art references discussed herein.

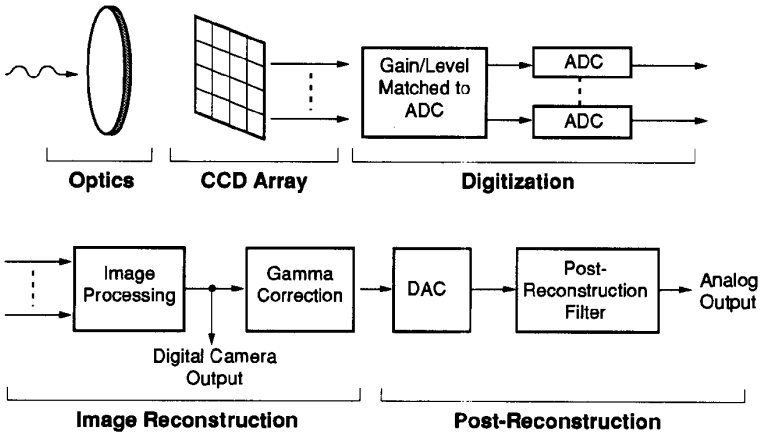
32. Based on my education, training, and professional experience in the field of the claimed invention, I am familiar with the level and abilities of a POSITA at the time of the claimed invention. Additionally, I met at least these minimum qualifications to be a person having ordinary skill in the art at the time of the claimed invention. Further, although my qualifications may exceed those of the hypothetical POSITA defined above, my analysis and opinions regarding the '493 Patent have been rendered from the perspective of a POSITA at the time of the claimed invention.

## IV. BACKGROUND OF THE TECHNOLOGY

33. I was asked to briefly summarize the background of the prior art from the standpoint of a POSITA at the time of the claimed invention. I have been informed by counsel that each of the references discussed in this Section IV is prior art to the '493 Patent.

### A. Digital Camera Basics

34. Many digital cameras share a common hardware architecture, as illustrated by a manual on digital cameras available at the time of the '493 Patent:




*CCD Arrays, Cameras, and Displays*, 2d. Ed. (JCD Publ. 1998) ("Ex. 1018" or "*CCD Arrays*"), Fig. 5-1 (p. 148).

35. The "CCD Array" refers to a common type of image sensor called a "charge coupled device," the basic operation of which is explained below. "Digitization" refers to the conversion of analog electrical signals collected by the image sensor into digital image signals. "Image processing" or "Image Reconstruction," together with "Post-Reconstruction," "reformats the data into signals and timing that are consistent with transmission and display requirements." (*CCD Arrays*, p. 149). In practice, the implementation of the CCD Array, Digitization, and Image

Reconstruction components means that digital cameras commonly contain: 1) a CCD device used as an image sensor, 2) some type of device for digitization, and 3) a signal processor to reconstruct the digitized data into an image ready to display, for example, on a display device or to be stored in memory, for example, as a formatted image.

36. A "CCD" is the acronym for "charge-coupled device," which operates by receiving light through the camera lens that is directed to a sensor (e.g., a photodiode) and converting this light into digital data. The CCD uses the photoelectric effect to convert light received by the camera's optics into electrical signals. The CCD comprises a plurality of photodiodes arranged in an array, where each photodiode represents a pixel of an image of the scene being viewed. The photodiodes are thus light receiving surfaces, such that when incident light is applied to a photodiode, an electric charge is generated. For each row (i.e., "line") of photodiodes, the charges are transferred across the row of photodiodes and accumulated to form a "signal"; the charges are then converted to digital values to form a "signal" containing "signal charges" representing a row of the image. (*CCD Arrays*, Fig. 3-1, p. 48); *see also id.* at pp. 47-48 (describing process of converting incident light into measured voltages); *Heyningen* (Ex. 1014, 3:26-33) (teaching a CCD is an "image sensor" that uses photodiodes to collect incident light into a charge).

37. When used in a camera, a CCD usually has some pixels that do not receive incident light from the imaged scene and are typically not counted as "effective pixels." These pixels will not contribute to the image being generated but may be used for calibration purposes such as dark current compensation. Additionally, in some applications, some of the effective pixels may be used for various internal calculation purposes, such as image stabilization analysis or noise analysis, and not included in the output image; and some of the effective pixels may not be used at all.

Therefore, the CCD may include some pixels that receive incident light but are still not otherwise used for image generation.

38. The resolution of the CCD is commonly indicated by the number of horizontal x vertical pixel lines, such that a CCD resolution of 1280 x 960 means 960 vertically-arranged rows, each containing 1280 pixels. For example, *Kinoshita* teaches "The built-in electronic monitor 24 of the electronic camera is assumed to have a number "n" of vertical display lines and a number "m" of horizontal display lines, as shown in FIG. 2. The image sensor 4 is assumed to have a number "l" of vertical picture elements and a number "k" of columns of vertical registers 29, as shown in FIG. 3(a)." (*Kinoshita* (Ex. 1019), 5:67-6:6, Figs. 2 and 3a).

FIG.2

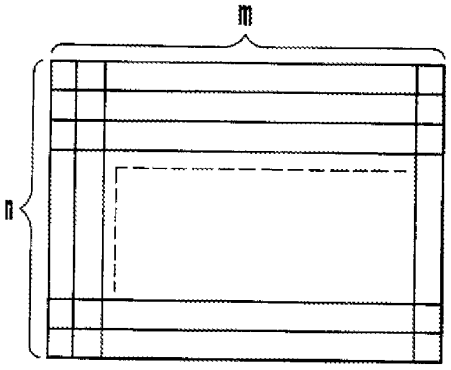
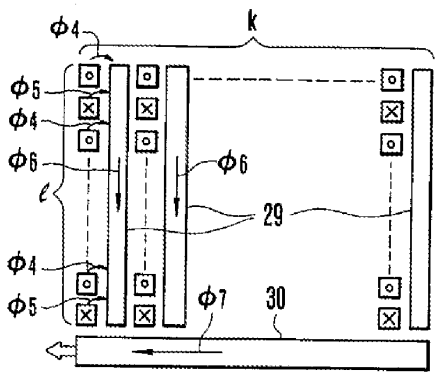



FIG.3(a)




To calculate the total number of pixels in the CCD, the number of horizontal pixels is multiplied by the number of vertical pixels, such that, for example, a 1280 x 960 resolution results in approximately 1.23M pixels (rounded to the nearest hundredth). *See, e.g., Anderson,* 10:28-43 (discussed further below).

39. *CCD Arrays* further explains the arrangement of the capacitors into a Cartesian grid, or two-dimensional "array":

The CCD array is a series of columns registers (Fig. 3-4). The charge is kept within rows or columns by channel stops or channel blocks and the depletion regions overlap in one direction only. At the end of each column is a horizontal register of pixels. This register collects a line at a time and then transports the charge packets in a serial fashion to an output amplifier. The entire horizontal serial register must be clocked out to the sense node before the next line enters the serial register. Therefore, separate vertical and horizontal clocks are required for all CCD arrays. This process creates a serial data stream that represents the two-dimensional array.

(*CCD Arrays*, p. 49). Figure 3-4 illustrates the capacitor array:

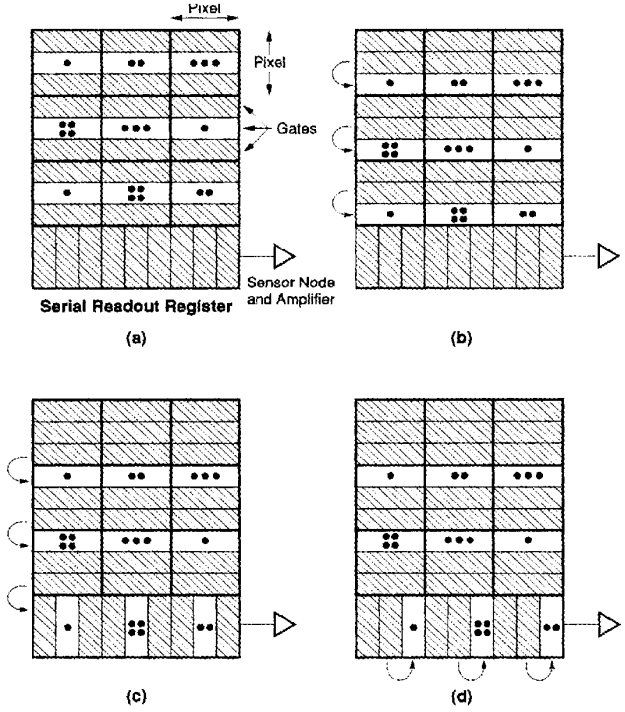



Figure 3-4. Representative CCD operation of a 3 × 3 array with three gates per pixel. Nearly all the photoelectrons generated within a pixel are stored in the well beneath that pixel. (a) The CCD is illuminated and an electronic image is created. (b) The columns are shifted down in parallel, one gate at a time. (c) Once in the serial row register, the pixels are shifted right to the output node. (d) The entire serial register must be clocked out before the next packet can be transferred into the serial readout register.

(*CCD Arrays*, Fig. 3-4, p. 50).

40. A CCD array of horizontal and vertically arranged pixels is very common due to the desire for the sensor geometry to conform to common rectangular displays. *See, e.g., Misawa* (Ex. 1006), 3:14-38 (disclosing CCD image sensor "has an array of photosensitive cells"). Because most displays, e.g., a television or a computer monitor, are rectangular in shape, the desired geometry for the CCD array is also rectangular. This makes translating the signal charges from the CCD to be displayed on the television or monitor simpler. Note that other sampling geometries other than a rectangle are known, but the rectangular sampling geometry for the CCD is by far the most prevalent to correspond to common displays for television, computer monitors, and cameras. Most user displays are rectangular in shape, and therefore, the CCD sampling geometry for the light sensors corresponds to the rectangular shape. The light-sensitive surfaces of a CCD are arranged in the horizontal x vertical array comprising one or more columns and one or more rows. The nomenclature for whether the horizontal versus the vertical axis is listed first is not standardized, but most skilled persons can determine what is meant by the context of usage or known standard resolutions.

41. With the advance of CCD technology, image sensors were eventually developed with the ability to capture image data at resolutions exceeding the resolution of the display device on which the image was to be displayed (e.g., televisions, computer monitors, portable digital assistants, and mobile communication devices). This advance paralleled the ability to pack an increasing number of capacitors into the same space on a silicon wafer. Rendering a high-resolution image on a lower-resolution display presented obstacles related to processing and latency. (*Sato* (Ex. 1016), 1:29-52 (discussing that "unnecessary image reproduction processing time is utilized in generating the full image resolution" when "a full resolution of the image is

greater than an indicating performance of the display"); *Kinoshita*, 1:29-53, 2:15-30 ("An embodiment of this invention is provided with means for driving the image sensor with a fewer number of scanning lines when the apparatus is in a monitor mode than in an image sensing mode, so that monitoring can be adequately accomplished even with an electronic monitor having a number of scanning lines fewer than the number of vertical picture elements of the image sensor."), 5:15-22). Internal camera processing times, furthermore, were also increased to accommodate the greater amount of data.

42. The '493 Patent describes the problem of displaying a sample high-resolution "monitoring" image on a television set:

> In a digital still camera designed for taking still images, there has been a trend in recent years toward an increasing number of pixels used on the moving video image sensing device in order to obtain higher resolution static image signals. When taking a moving image or monitoring the video, it is necessary to generate signals that conform to the television system. The number of pixels on such an image sensing device, however, does not necessarily match the number of scanning lines of the television system and therefore **some form of conversion means** is required.

(*'493 Patent*, 2:26-35).[1] The '493 Patent's proposed solution is to mix or cull the image data from the CCD to generate different resolutions depending upon the camera's operational mode. *Id.* at 4:66-5:6, 7:40-45, 8:52-55. But, as the following discussion illustrates, downsampling the resolution of a high-resolution CCD to be compatible with different modes of camera operation was known in the art long before the '493 Patent.

[1] All emphases added unless otherwise indicated.

**B. Representative Examples of Digital Cameras**

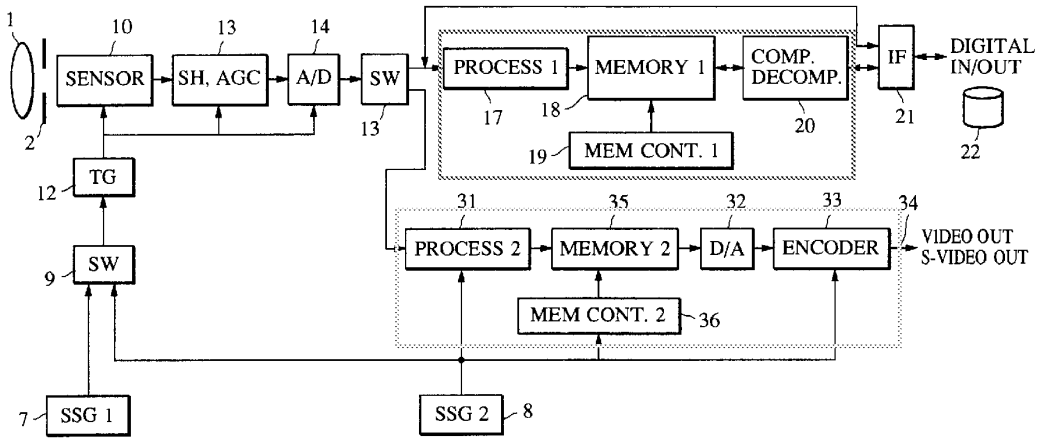
***1. Horii***

43. U.S. Patent No. 6,018,363 to *Horii* ("Ex. 1020" or "*Horii*") teaches a digital camera with "an image taking sensor 10 having a high-resolution mode and a normal mode." (*Horii*, Abstract). *Horii* also discloses a digital-camera system that can both take high-resolution still photographs and output a video signal to a standard video output device with a lower resolution than the high-resolution photograph. (*Horii*, 1:41-45, 2:12-16, 7:14-20, 20:21-26).

44. Signal generators 7 and 8, switch 9, and image taking sensor 10 form the basic image sensing circuitry. (*Horii*, 5:44-50). Timing generator 12, sample and hold (SH) and automatic gain control (AGC) circuit 13, analog-to-digital (A/D) converter 14, and A/D switch 15 perform digitization of the sensed data. (*Horii*, 5:50-55).

45. In *Horii*, to account for the different modes of camera operation, image reconstruction is bifurcated into two parts, as illustrated by the distinct processing pathways illustrated in Fig. 1, below:

FIG. 1



(*Horii*, Fig. 1) (annotated). The camera's low-resolution mode involves color processing section 17, first memory 18, first memory controller 19, and image compressor/expander 20 assembled into a first image-construction processing branch (highlighted in red, above). (*Horii*, 5:55-63). Video mode involves second color processing section 21, D/A converter 32, video signal encoder 33, second memory 35, and second memory controller 36, assembled into a second image-construction processing branch (highlighted in green, above). (*Horii*, 5:63-6:4).

46. Image taking sensor 10 is capable of providing 1536×988 resolution. (*Horii*, 6:5-17). Such high resolution, however, is greater than the resolution of some video output standards (e.g., the 768x494 resolution). (*Horii*, 6:5-28). Alternative data processing methods must therefore be utilized to address the additional visual data that sensor 10 is capable of collecting.

47. For the low-resolution video imaging of the second image-taking mode, *Horii* uses the second processing pathway instead of the first. The second synchronous signal generator 8 utilizes the well-known technique of adding (i.e., combining) or culling CCD pixel data so as to reduce the effective resolution of data read from sensor 10:

> The second synchronous signal generator 8 generates a synchronous signal for video signals (NTSC, PAL and the like). **It effects thinning-out by reducing the apparent number of pixels through addition of pixels of the same filter arranged close to each other, or by skipping over part of the pixels when reading them from the image taking sensor 10.** Alternatively, it reads only a particular storage area. In this way, it has the same access to data in the same way as in the case of video CCD, and reads 768×494 pixels in accordance with a video signal.

(*Horii*, 6:19-28, 18:46-52). Operation of the remaining elements is similar to that of the first image-taking mode. *Compare*, *e.g.*, *id.* at 6:29-56 (describing operation of timing generator 12, image taking sensor 10, SH,AGC circuit 13, A/D converter 14, second color processing section 31, D/A

converter 32, encoder 33, video signal 34, second memory 35, and second memory controller 36 as operating in the second image-taking mode), *with id.* at 6:57-7:12 (same or analogous elements discussed *supra* in connection with the first image-taking mode). Figures 7 and 11 provide flowcharts of methods to effectuate operation of the camera according to the two distinct image taking modes. *See id.* at 7:38-44, 11:24-29, 12:38-13:20, Fig. 7, 14:52-16:2, Fig. 11, 17:33-42, 20:21-32.

***2. Sato***

48. U.S. Patent No. 6,335,760 to *Sato* ("Ex. 1016" or "*Sato*") teaches a digital camera comprising "a CPU, an image signal processing circuit, a memory card, in which a compressed image signal is recorded, and a display device having a liquid crystal display (LCD) and a resolution recognition unit." (*Sato*, Abstract).

49. The resolution of LCD 24 detected by resolution recognition unit 25 may not match the resolution of CCD 11. Image signal processing circuit 13 therefore reduces the resolution of the image signal. *Sato* teaches thinning out of pixel lines from CCD 11 to accommodate the resolution of LCD 24:

> When the image signal, stored in the frame memory **14**, is read therefrom and then stored in the video memory **18** (see FIG. **1**), **some pixel signals are thinned or disregarded from the image signal, in accordance with the inherent resolution of the LCD 24**, except when the inherent resolution has a value greater than a predetermined value. In the context of this specification, **"thinning" is a process of reading only every [thinning number +1]th pixel, i.e., the thinning number is the number of skipped or disregarded pixels (per pixel read)**. **The number of thinned pixels becomes greater as the inherent resolution becomes lower.** Namely, in the case of the LCD 24 being of type D (160×120 pixels), pixel signals are only stored in the video memory 18 on every eighth pixel (i.e. an eight pixel separation in both the horizontal and vertical directions of the image), so that an

> image having a satisfactory number of pixels, which conforms to the inherent resolution of the LCD 24, is generated, and subsequently indicated by the LCD 24, while the expanded image data, stored in the frame memory 14, maintains the resolution of the original image signal, i.e., in this case, 1280×960 pixels. The reason is as follows: Since the inherent resolution of the LCD 24 is 160 ×120 pixels, only ⅛ of the pixels in both the horizontal direction and the vertical direction of the original 1280×960 pixel image (FIG. 2, F1) can be indicated by the LCD 24.

(*Sato*, 7:8-32). As illustrated in Fig. 13, *Sato* teaches thinning numbers[2] of 7, 3, 1, and 0:

FIG. 13

| NUMBER OF PIXELS IN THINNING | NUMBER OF SCANS | RESOLUTION |
|---|---|---|
| 7 | N1 ⟷ | CORRESPONDING TO TYPE D |
| 3 | N2 ⟷ | CORRESPONDING TO TYPE C |
| 1 | N3 ⟷ | CORRESPONDING TO TYPE B |
| 0 | N4 ⟷ | CORRESPONDING TO TYPE A |

N1<N2<N3<N4

[2] To avoid confusion, note that *Sato* expresses the thinning number according to a slightly different format than how a similar concept is expressed in the '493 Patent. In the '493 Patent, culling to provide pixel lines only at pixel intervals of, for example, 8 pixels is equivalent to a thinning number of 7 in *Sato* because *Sato's* thinning technique involves "reading only every [thinning number +1]th pixel". (*Sato*, 7:8-18). *See, e.g.*, *'493 Patent*, 3:16-31, and claims 1-4 (reciting various K values).

(*Sato*, Fig. 13, 6:60-7:7). Using a CCD that outputs an image signal of 1280x960 pixels, *id.* at 6:10, thinning numbers of 7, 3, 1, and 0 correspond to LCD inherent resolutions of 160x120, 320x240, 640x480, and 1280x960, respectively. *Id.* at 6:49-50.

### C. Modes of Camera Operation

50. As evidenced by, for example, *Sato* and *Horii*, digital cameras may be operated in a variety of different modes, such as a monitoring mode where the image to be captured is viewable on an included display, and recording modes, where the static image or video is recorded to memory.

#### *1. '493 Patent: Monitoring vs. Recording*

51. In the '493 Patent, "recording" refers to storing image data in memory. (*'493 Patent*, 4:21-29, 7:4-8, 7:31-39). Monitoring refers to sending an image-data signal to a display device (e.g., a television monitor or a video monitor). (*'493 Patent*, 7:27-39, 8:51-58, 2:26-35). As would have been well understood, an image is "monitored," i.e., viewed on a display, to assist with image composition. The user would view the image to be recorded on the display to compose the image (e.g., center the image, focus the image, address lighting issues, etc.) before actually recording or "taking" the image.

#### *2. '493 Patent: Still Image vs. Moving Image*

52. The '493 Patent describes a still or "static" image mode of operation in which still images (i.e., photographs) are processed (i.e., monitored, recorded, analyzed, etc.). (*'493 Patent*, 7:28-39). The '493 Patent discusses that it was known in the art that a still image could be generated to conform to a JPEG format. *Id.* at 1:60-64 ("When such a camera is used to photograph a still image, it is relatively easy to generate a static image signal conforming to, for example, JPEG (Joint Photographic Expert Group) from the signals coming from the same pixel area that is used to take a moving image."), 9:13-24; *compare to Casio* (Ex. 1004), 105 (teaching still images

stored as JPEG files)). I note the '493 Patent uses the term "still" and "static" interchangeably, as the '493 Patent refers to both "still" and "static" images and does not distinguish between the two. *See '493 Patent,* 2:62–3:7 (using the terms "static" and "still" interchangeably), 3:8-15 (describing the alleged invention in terms of taking "still" images), 4:27-29 (describing changing the mode of operation between taking "moving video" and a "still image")). Moreover, in my opinion, the term "still" and "static" are used interchangeably in the art.

53. The '493 Patent also described "moving" images or a "moving" mode, which I understand to refer to a mode of operation in which moving images (i.e., video) are processed (i.e., monitored, recorded, analyzed, etc.). (*'493 Patent*, 4:64–5:6.

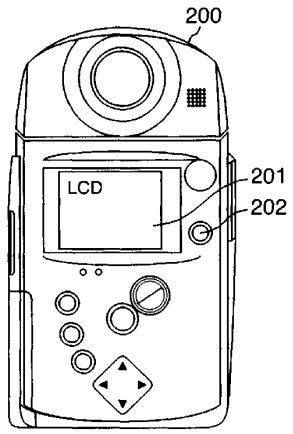
***3. Prior Art Examples of Multimode Cameras***

54. A digital camera having multiple modes, including a moving video mode, a static image monitoring mode, and a static image recording mode, was well known prior to the '493 Patent. For example, both *Horii* and *Juen* teach multimode digital cameras. *See*, *e.g.*, *Horii*, 1:39-45, 2:24-39 (describing a high-resolution recording mode and a lower-resolution monitoring mode), 17:33-42 (discussing "previewing the image taken by the sensor 10"); *Juen*, 1:46-2:42 (describing different still image and moving image modes).

***a) Inoue***

55. An example of a multimode camera can be found in published European Patent Application No. EP 0802688 by Inoue et al. ("Ex. 1021" or "*Inoue*"). *Inoue* teaches a multimode digital camera with a built in LCD viewfinder that allows for both display of recorded images (both still and moving images) along with monitoring of visual data incident on the CCD device prior to image capture (i.e., "monitoring."). Fig. 2 illustrates a commercial embodiment of *Inoue's* device:

**FIG. 2**




(*Inoue*, Fig. 1). Describing how LCD 201 operates as an image monitor before recording an image, *Inoue* states:

> Fig. 5 shows the screen of the built-in display unit 201 used in the embodiment of the invention, in which the diagonal length is 1.8 inch (45.7 mm), the horizontal length is 36.6 mm, and the vertical length is 27 mm. The illustrated screen arrangement uses a liquid crystal consisting of 352 pixels and 240 pixels. In order to reduce the power consumption and the size of the portable digital camcorder 200, the 1.8-inch liquid crystal is used for the built-in display unit 201. **This built-in display unit 201 shows an imaging screen formed by a monitoring signal when recording the signal, a retrieval screen formed by the program when retrieving the data, and a playback screen formed by the decoded data when playing back the data.**
>
> In recording the data, **the moving image recording mode (MPEG compression recording mode)** or the **still image recording mode (JPEG compression recording mode)** may be switched each time the mode selecting button is pressed. As the user can select the recording mode with this button, as shown in Figs. 17 and 18, the mark for each mode located in the upper left portion of the imaging screen is switched each time the mode is switched.

(*Inoue*, 6:47-7:2, 1:55 (describing capture of both still and moving images), 4:46-57 (MPEG decoder details for recording in still image mode), 7:3-17 (switching between still and moving image modes), and Figs. 17 (viewfinder appearance in still image recording mode) and 18 (viewfinder appearance in moving image recording mode)).

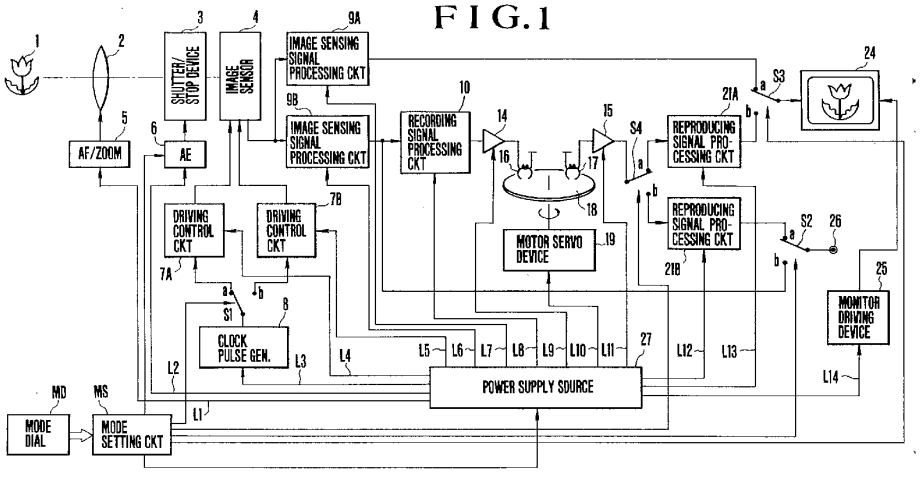
***b) Kinoshita***

56. Another example of a multimode camera can be found in U.S. Patent No. 4,740,828, issued April 26, 1988, to Kinoshita ("Ex. 1019" or "*Kinoshita*"). *Kinoshita* teaches a digital camera provided with:

> an image sensor having picture elements; an electronic monitor having a number of scanning lines fewer than the vertical picture elements of the image sensor; **and a driving circuit for reading from the image sensor a fewer scanning lines when the apparatus is in a monitor mode than when the apparatus is in an image sensing mode**.

(*Kinoshita*, Abstract). Figure 1 provides the basic hardware diagram for *Kinoshita's* device:

FIG.1




(*Kinoshita,* Fig. 1). *Kinoshita* describes that the hardware components of Fig. 1 may accommodate five (5) distinct modes of camera operation:

> The electronic camera shown in FIG. 1 can be set in each of the different modes including the **monitor mode**, the **recording mode**, the **monitor reproduction mode**, the **external monitor mode**, the **external recording mode** and the **external reproduction mode** by setting the selectors S1-S4 in the following manner:

(*Kinoshita,* 5:23-63). I understand "Reproduction modes" in *Kinoshita* refer to the display of a previously captured image on a display device. *See Kinoshita*, 2:6-13 (discussing built-in monitor for both "monitoring" and "reproduction"), 4:63-5:3 (discussing a previously recorded signal read out and supplied to reproduction signal processing circuit 21A or 21B and the processing circuit 21A or 21B supplying the reproduced signal to a built-in monitor), 5:23-28 (discussing various modes). "External modes" in *Kinoshita* refer to displaying images on a device, other than built in monitor 24, such as an optional television monitor attached to the camera. *See Kinoshita,* 5:1-3 (discussing "external monitor (not shown)" in connection with monitoring modes of operation).

57. *Kinoshita* recognizes the problem of "the number of scanning lines of the built-in monitor 24 … is fewer than the number of vertical picture elements of the image sensor 4." (*Kinoshita*, 5:15-18). Driving monitor 24 with less than all image data read from image sensor 4 is therefore required. *Id.* at 5:15-22, 2:18-22. As such, *Kinoshita* can achieve different resolutions for image data read from image sensor 4 to drive built-in monitor 24 in different modes of camera operation. *Id.* at 6:19-48.

#### *4. Matching Resolution Reduction Rates to Operational Mode*

58. The practice of downscaling image data read from the image sensing device according to different ratios to match the needs of particular modes of operation of the camera, however, was not new at the time of the '493 Patent. In fact, it was well known by the time of the '493 Patent, as the following references demonstrate.

***a) Dunton***

59. U.S. Patent No. 6,512,541 to Dunton et al. ("Ex. 1022" or "*Dunton*") teaches adjusting the CCD pixel thinning rate to accommodate different operational modes of the camera. *Dunton* teaches techniques that are "particularly suitable for an imaging system such as a digital camera that operates in at least two modes to provide still and video images." (*Dunton*, 2:58-60). *Dunton* states:

> An imaging apparatus that is configurable to operate in at least two modes. **One mode is particularly suitable for still image capture, whereas the second mode is suitable for video image capture and other rapid frame rate applications.** The image data in the second mode is smaller (lower resolution) than the image data obtained in the first mode. The reduction is accomplished by either digital scaling, cropping, or by a combination of optical scaling and selective readout of sensor signals. **The simple digital scaling provides a fixed angular field of view for both modes of operation, while cropping alone gives a smaller field of view. Using the combination of optical scaling and selective sensor signal readout, however, provides a wider field of view for the second mode of operation while at the same time providing lower resolution images, thus improving frame rate in the second mode of operation.** The embodiments can be used in a wide range of imaging applications, including digital cameras used for both still image capture and video.

(*Dunton*, Abstract).

***b) Anderson***

60. U.S. Patent No. 6,563,535 to Anderson ("Ex. 1023" or "*Anderson*"), teaches a digital camera in which certain parts of the hardware architecture and various data paths are reused. Multiple modes of operation are supported: live view, instant view, and play mode. (*Anderson*, Abstract). Image data from the image sensor is thinned differently for each mode of operation.

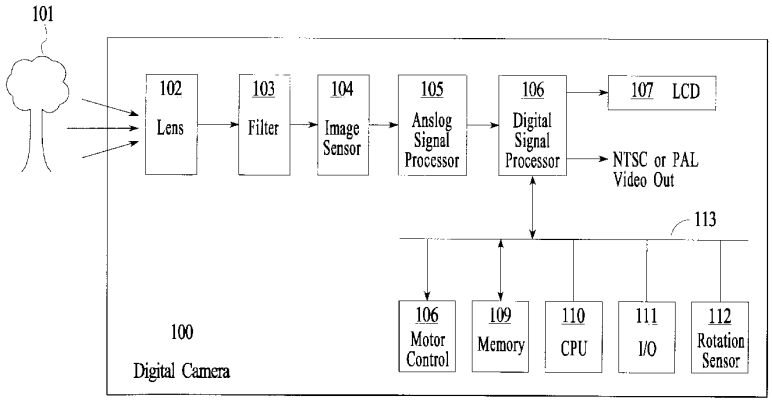



FIG. 1

(*Anderson*, Fig. 1). Describing these modes of operation, *Anderson* states:

> The live view mode causes the actual image that is seen by the camera in real time to be displayed on the camera's LCD. The capture mode of operation stores a picture when the user clicks the shutter button. The instant review mode of operation displays an image immediately after the shutter button is clicked by the person taking the picture. The user can immediately review the picture that was just taken. If the user is not satisfied with the picture, he/she may simply discard that picture and shoot again. Also, capture [and] instant review are essentially simultaneous with this architecture, allowing it to be used to "show" a burst real time as it is captured. The play back mode sequentially displays a series of stored pictures on the LCD. For example, a user may take a rapid series of shots of some event (e.g., a golf swing) and later playback those time-lapsed images. The captured images may be captured in full, quarter, or one-sixteenth size.

(*Anderson*, 6:3-18).

61. *Anderson* teaches that different rates of sampling data from the image sensor 104 may be appropriate for different operational modes. Digital signal processor 106 contains a

functional unit, pixel average block 103 (*see* Fig. 4), which "performs pixel averaging to reduce lines to half and quarter length." (*Anderson*, 10:1-3). *Anderson* states:

> It should be noted that this block 403 does averaging of pixels on a line. The compliment function, line averaging, is done when the data is returned to the ASIC for image processing. In this case, MCU's are returned, making it easy to do the line averaging. This dual process eliminates aliasing in the image for 1/4 and 1/16 resolution captures. For 1/16 capture, CCD line skipping (e.g., 2 out of 4) may be used without serious image quality effects. However, for 1/4 capture, line skipping should not be used. During live view mode, typically the CCD is being scanned using line skipping, for 50% vertical resolution, reduced bus bandwidth, and faster frame rate. As can be seen from Table 1 below, for CCD's 1152 and larger, {fraction (1/16)} mode is used for live view. To accomplish this, a combination of 2 out of 8 line skipping and Quarter Output is used. This is necessary to provide sufficient read-out speed for large CCD's, as well as keeping the bus bandwidth low enough during live view. It should be noted that using 1/4 or 1/16 size in live view is optional.

(*Anderson*, 10:9-27).

TABLE 1

CCD Size and Live View Size Table

| Image Size | | ¼ Image Size | | 1/16 Image Size | | M Pixels |
|---|---|---|---|---|---|---|
| 640 | 480 | 320 | 240 | 160 | 120 | 0.31 |
| 768 | 576 | 384 | 288 | 192 | 144 | 0.45 |
| 896 | 672 | 448 | 336 | 224 | 168 | 0.61 |
| 1024 | 768 | 512 | 384 | 256 | 192 | 0.79 |
| 1152 | 864 | 576 | 432 | 288 | 216 | 1.00 |
| 1280 | 960 | 640 | 480 | 320 | 240 | 1.23 |
| 1536 | 1024 | 768 | 512 | 384 | 256 | 1.58 |
| 1536 | 1152 | 768 | 576 | 384 | 288 | 1.77 |
| 1792 | 1344 | 896 | 672 | 448 | 336 | 2.41 |
| 2048 | 1536 | 1024 | 768 | 512 | 384 | 3.15 |

*Live view sizes to resizer are shown underlined

(*Anderson*, 10:3-45 (Table 1)). *Anderson* teaches "pixel averaging to reduce lines to half and quarter length," which I understand to be combining signal charges from multiple pixels. (*Anderson*, 10:1-10). *Anderson* further teaches "CCD line skipping (e.g., 2 out of 4)," which I understand is reading out 2 lines of signal charges for every 4 lines, i.e., culling the pixel lines. (*Anderson*, 10:15-27). Therefore, *Anderson* establishes that mixing (i.e., combining, adding, or averaging pixels) and culling (i.e., skipping lines of pixels) were known techniques.

***5. Image Instability Detection & Reduction***

62. By the time of the '493 Patent, digital camera technology had evolved to incorporate techniques for detecting movement of the camera body that caused an unstable (or "blurry") image to be formed on the CCD. Methods for correcting for this movement so as to reduce or to remove the detected instability from the final rendered image(s), were also well known.

***a) Ishman***

63. U.S. Patent No. 4,612,575 to Ishman et al. ("Ex. 1024" or "*Ishman*"), teaches image-instability correction in a digital video camera:

> A video camera image with a motion induced blurring component is corrected by measuring the motion of the video camera by orthogonally mounted rate gyros each producing a signal that varies with camera motion along a defined axis relative to the bore sight of the camera.

(*Ishman*, Abstract). Fig. 2 illustrates the hardware components:

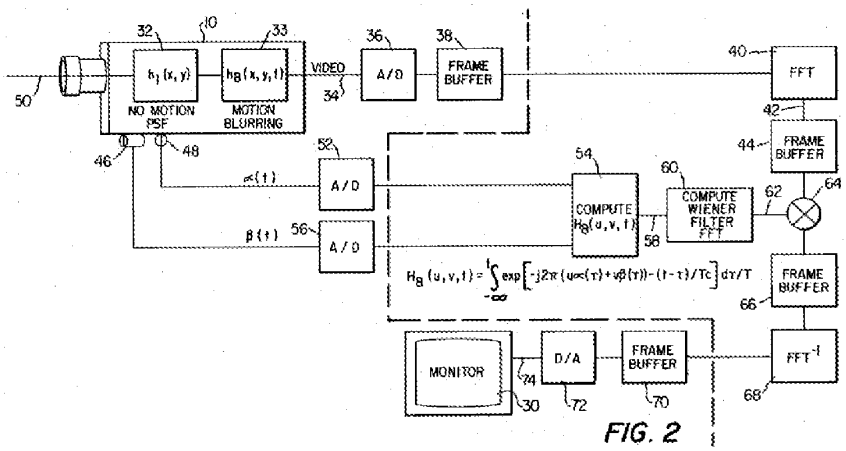



FIG. 2

*Id.* at Fig. 2. Rate gyros 46 and 48 (not shown) provide input for A/D converters 56 and 52, respectively, for processing into motion signals:

> Mounted to the camera 10 at mutually perpendicular axis are rate gyros 46 and 48. These gyros are also perpendicular to the line of sight 50 of the camera 10. Each of these gyros generates a signal varying with the motion of the camera 10 along the respective axis of the gyro. A signal from the gyro 48 is input to an analog to digital converter 52 wherein it is digitized and applied to a computing network 54 that generates a motion signal in the frequency domain as will be explained. The output of gyro 46 is passed through an analog to digital converter 56 and also applied to the computing network 54.
>
> * * * *
>
> The computing network 54 then generates a motion related signal in the frequency domain which is similar to the motion component of the video signal in the spatial domain on the cable 34. Thus, the output of the computing network 54 on line 58 is a signal which tracks the motion component of the video signal on the cable 34 as given by the expression in the block 33.

(*Ishman*, 3:62-4:19).

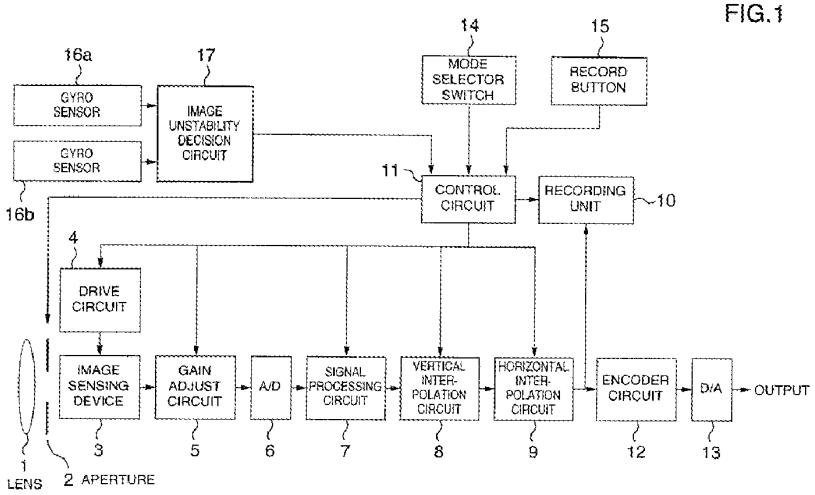
## V. OPINIONS REGARDING THE '493 PATENT, SUMMARY OF THE REFERENCES, AND DISCUSSION OF ANALOGOUS ART

### A. Overview of the '493 Patent

64. I have reviewed the '493 Patent (Ex. 1001). Descriptions of the '493 Patent that may be pertinent to my analysis are provided herein, and my descriptions of the '493 Patent are intended only as a summary of the '493 Patent and/or intended as being pertinent to the claims at issue in the Reexamination Request. My opinions provided herein are not intended as a discussion of my entire understanding of the '493 Patent or any other claims in any patent related to the '493 Patent.

65. The '493 Patent describes an electric camera capable of recording both still images and moving video images. Figure 1 shows the configuration of an electric camera according to the '493 Patent, including an image sensing device 3 and a signal processing circuit 7. The image sensing device 3 is of a CCD type capable of generating pixels. (*'493 Patent*, 4:34-38).

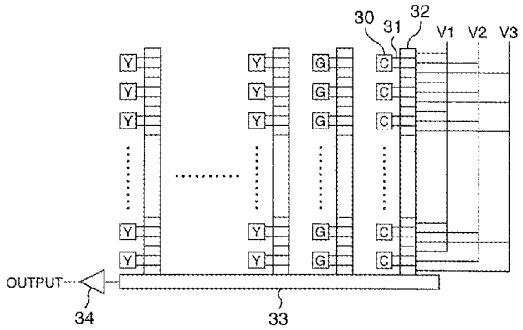
FIG.1




66. The '493 Patent describes "the pixels arranged horizontally and vertically in a grid pattern" and refers to the "grid-arrayed pixels." (*'493 Patent*, 4:39-48, Fig. 2, Abstract (stating the "image sensing device with a light receiving surface having N vertically arranged pixels and an

arbitrary number of pixels arranged horizontally"). The image sensor is a CCD with an arbitrary but relatively large number of pixels, such as 1600x1200. (*'493 Patent*, 4:34-49).

FIG.2




(*'493 Patent*, 4:46-48, Figs. 2 and 5).

67. To display a video recorded by a digital video camera, a television monitor is often used, which is configured to receive an input signal conforming to the NTSC or PAL system. "The NTSC system, for example, performs interlaced scanning on two fields, each of which has an effective scanning line number of about 240 lines." (*'493 Patent*, 1:37-40). However, when taking a still image using such a configured video camera, the number of pixels is generally insufficient to produce a high-quality still image.

68. The '493 Patent describes that in known digital still cameras, increasing the number of pixels in the image sensing device has been used to obtain higher resolution static image signals. (*'493 Patent*, 2:26-30). However, "[t]aking both moving and static images of satisfactory quality with a single camera is difficult to achieve." (*'493 Patent*, 2:67-3:2). The '493 Patent "eliminates the limit on the number of vertically arranged pixels" to enable "the taking of highly detailed still images and a satisfactory moving video taking by using an image sensing device with a large enough pixel number even for still images." (*'493 Patent*, 3:33-37). The camera reduces the number of pixels for displaying a still (i.e., static) image on the monitor or recording a moving

video image but uses the full CCD (or image sensor) pixel resolution for recording a still image. (*'493 Patent*, 3:8-13).

69. The '493 Patent describes a mode selector switch 14 to change "the operation mode between the moving video taking and the still image taking" and a record button 15 "to start or stop the recording." (*'493 Patent*, 4:27-29). "During monitoring in the static mode, the signals are mixed together inside the image sensing device to reduce the number of signals and thereby generate television signals." (*'493 Patent*, 8:52-55). One embodiment discloses "the image sensing device has 1200 vertically arranged pixels, and four pixels are mixed together during the moving video mode and five pixels during the static image mode." (*'493 Patent*, 9:58-61). During recording in the static image mode, no mixing process is performed in order to produce high-resolution signals. (*'493 Patent*, 8:55-58).

**B. Opinions Regarding *Casio***

70. I have been informed that *Casio*, LCD Digital Camera QV-8000SX, User's Guide ("*Casio*" or "Ex. 1004") is prior art to the '493 Patent. I have reviewed *Casio* and provide herein my opinions on the teachings of *Casio*. The opinions provided herein do not necessarily represent my entire understanding of *Casio*.

71. *Casio* generally describes a digital camera having multiple operating modes (*Casio*, 27), including recording a static or still image to memory (*Casio*, 47), recording a moving image of 10 seconds in length using the AVI format (*Casio*, 61), and composing an image on a display screen before recording (*Casio*, 3). I note the *Casio* reference is a user's guide (or manual) for an actual digital camera provided by Casio. *Casio* is quite detailed in its discussion of the various modes of operation and the resolution at which the captured images are stored in memory.

72. In my opinion, *Casio* and the '493 Patent are both directed to a digital electronic camera for capturing and recording still and video images. Therefore, *Casio* is in the same field of endeavor and is pertinent to the same problem as the claimed invention in the '493 Patent.

### C. Opinions Regarding *Juen*

73. I have been informed by counsel that U.S. Patent No. 7,903,162 to *Juen* ("*Juen*" or "Ex. 1005") is prior art to the '493 Patent. I have reviewed *Juen* and provide herein my opinions on the teachings of *Juen*. The opinions provided herein do not necessarily represent my entire understanding of *Juen*.

74. *Juen* generally describes an electronic camera used with a display screen that includes an imaging device, a pixel density converter, a moving image recording device, and a still image recording device. (*Juen*, Abstract). Like the '493 Patent, *Juen* describes an imaging means with a pixel number that is larger than the pixel number in the scan format. (*Juen*, 3:64-65). *Juen* includes a pixel density conversion means that "converts the image information converted by the imaging means to a pixel density suitable for a scan format of the display screen." (*Juen*, 2:4-8). *Juen* describes the display screen may include an electronic viewfinder, a monitor screen, a television or a computer monitor. (*Juen*, 3:45-55). However, for recording still-images, data flow comes directly from the imaging means and bypasses the pixel density conversion means. (*Juen,* 3:59-62, Fig. 1).

75. Thus, *Juen*'s device can take full advantage of a high-resolution imaging means for still-image photography while preserving the ability to display moving images on display devices using a standard video format (e.g., NTSC). *Juen*, for example, describes that an original still image may have a resolution of 960 pixels in length (vertical) and 1280 pixels in width (horizontal), which is "twice the degrees in both length and width of the effective resolution in a NTSC method." (*Juen*, 6:63-6:2).

76. *Juen* teaches "an image density converter 16 performs conversion of the pixel density by executing interpolation, dividing into identical blocks, thinning, and the like, to the pixel value of the image information." (*Juen*, 6:10-14). As I discuss at ¶¶ 81-82 it was known in the art that "interpolation" is mixing of multiple pixels and can be used to reduce the pixel resolution.

77. I note that *Juen* uses the terms "pixel density" and reducing the "pixel density." *See, e.g., Juen*, 7:51-59. In my opinion, *Juen* uses "pixel density" to mean the resolution of the image. I understand this because *Juen* refers to the pixel density of, for example, 480 x 640. The nomenclature of 480 x 640 is more commonly referred to as the pixel resolution, and *Juen's* teachings of reducing the "pixel density" from 960 x 1280 to 480 x 640 is consistent with the understanding of reducing the pixel resolution, i.e., the number of pixels in the image.

78. In my opinion, *Juen's* teaching of a "scan format" of the display (*see, e.g., Juen*, 9:55-59, 11:3-21) is referring to the resolution of the display. For example, *Juen* discusses the still image is shown on the display screen and that a "still image of a high pixel density may be converted to a pixel density matching the scan format of the display screen by appropriating the pixel density conversion means 2 used during recording for use during playback." (*Juen*, 11:3-7; *see also id.* at 11:16-21 (discussing similar reducing for a moving image to recording the moving image "appropriate to the scan format of the display screen")).

79. In my opinion, both *Juen* and the '493 Patent are directed to a digital electronic camera for capturing and recording still and video images. Therefore, *Juen* is in the same field of endeavor and is pertinent to the same problem as the claimed invention in the '493 Patent.

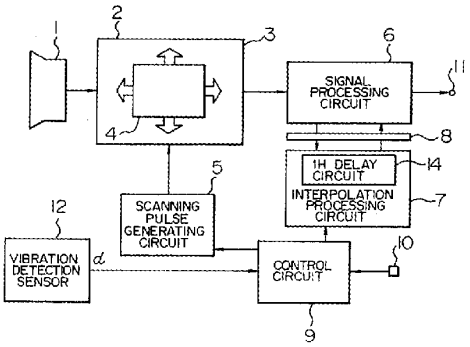
### D. Opinions Regarding *Takase*

80. I have been informed by counsel that U.S. Patent No. 5,502,483 to *Takase* ("*Takase*" or "Ex. 1013") is prior art to the '493 Patent. I have reviewed *Takase* and provide herein

my opinions on the teachings of *Takase*. The opinions provided herein do not necessarily represent my entire understanding of *Takase*.

81. *Takase* teaches "a video camera apparatus which can automatically correct an image vibration." (*Takase*, Abstract). Figure 3 provides the basic hardware architecture:

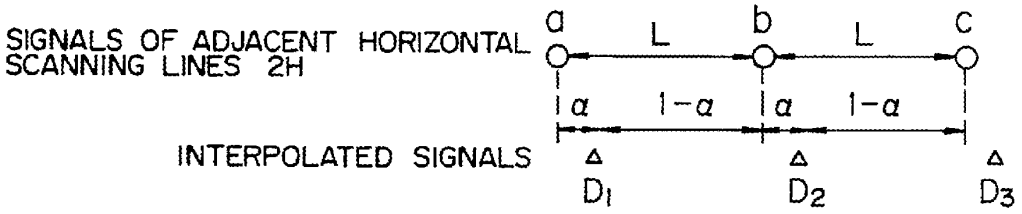
FIG. 3




(*Takase,* Fig. 3). *Takase* discloses an interpolation processing circuit 7 that "performs the interpolation processing by an interpolation coefficient [alpha]." (*Takase*, 4:4-16). *Takase* further teaches *mixing* signal charges read from a CCD. *Id.* at 4:20-28. *Takase* teaches performing interpolation of the signal charges according to a "fine adjust" to correct vibration or image instability in the camera, and discloses equations that can be used to perform the mixing of signal charges. *Id.* at 5:15-6:5. Specifically, a vibration detector sensor 12 "detects vibrations of horizontal and vertical directions of the video camera apparatus when a handling occurs and outputs a detected signal." (*Takase*, 3:57-59). Thereafter, control circuit 9 and scanning pulse generating circuit 5 generate "a scanning pulse used to energize the imager 2 to perform the scanning in response to the calculated moving amount and the interpolation processing circuit 7." (*Takase*, 3:60-4:3). *Takase* explains data is supplied by control circuit 9 to the interpolation processing circuit 7 and then to the signal processing circuit 6. (*Takase,* 4:4-13). *Takase* states,

"Thus, the signal processing circuit 6 derives a video signal in which a deterioration of a resolution can be suppressed and in which an image vibration due to a handling or the like can be avoided." (*Takase,* 4:13-16). *Takase* employs interpolation (specifically, an "interpolation processing circuit") that determines an interpolation coefficient [alpha] by which the pixels are interpolated. (*Takase*, 5:15-64, Fig. 1). "When the pixel signals are read out as shown in FIG. 4B, there are obtained the ***mixed*** pixel signals a, b, c as shown in FIG. 4A (hereinafter this **combination** of the **mixed** signals will be referred to as a combination A)." (*Takase,* 5:38-43). Figure 1 of Takase, which *Takase* identifies as "PRIOR ART," provides a visual example of interpolation "signals":

FIG. 1 PRIOR ART




(*Takase*, Fig. 1; *see also id.* at 1:39-54). *Takase* discloses, for example, that the multiple pixel values b and c are mixed to obtain interpolated pixel value $D_1$ according to the following equation: $D_1 = \alpha c + (1 - \alpha) \cdot b$. (*Takase*, 5:54-64, Fig. 4A).

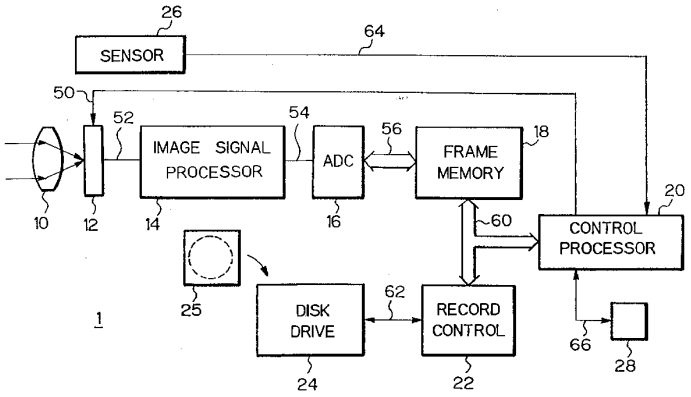
82. In my opinion, both *Takase* and the '493 Patent are directed to a digital electronic camera for capturing and recording images, mixing pixels via interpolation, and correcting image instability. Therefore, *Takase* is in the same field of endeavor and is pertinent to the same problem as the claimed invention in the '493 Patent.

**E. Opinions Regarding *Misawa***

83. I have been informed by counsel that U.S. Patent No. 5,444,482 to *Misawa* ("*Misawa*" or "Ex. 1006") is prior art to the '493 Patent. I have reviewed *Misawa* and provide herein my opinions on the teachings of *Misawa*. The opinions provided herein do not necessarily represent my entire understanding of *Misawa*.

84. *Misawa* describes a digital camera with an image-instability detector 26 that senses movement or vibration of the camera body, as shown in Figure 1. (*Misawa*, 3:7-9). *Misawa* describes "sensor 26 serves to sense how digital camera 1 physically moves and produce[s] corresponding electric signals." (*Misawa*, 4:60-62, Fig. 1).

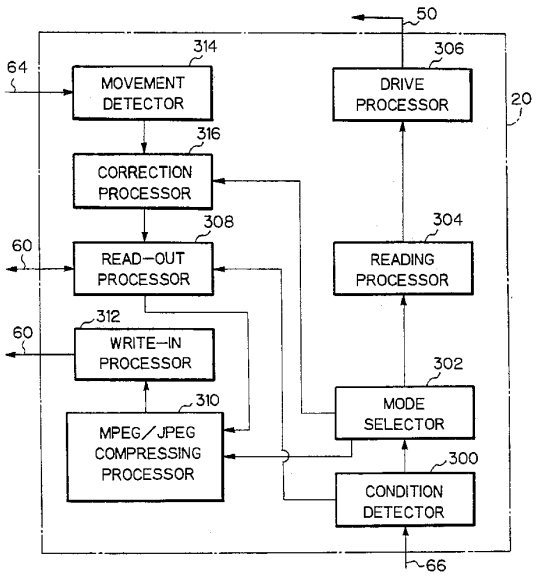
*Fig. 1*




An "image sensor 12 for producing pixel signals associated with the optical image [is] thus formed." (*Misawa*, 2:55-59). *Misawa* also teaches "an image signal processor 14 for processing the pixel signals produced to develop image signals representative of the optical image captured." (*Misawa*, 2:55-61).

85. *Misawa* describes "movement detector 314 receives a movement signal from sensor 26" and "generates movement data representing how digital camera moves or vibrates" which is "delivered to correction processor 316" (*Misawa*, 8:7-16, Fig. 3).

*Fig. 3*




*Misawa* teaches "read-out processor 308 is also adapted to compensate for blur" and "responds to correction data provided from correction processor 316." (*Misawa*, 7:30-35). Thus, as shown in Figure 4B, read-out processor 308 uses the "correction data" created by correction processor 316 to modify how image data is read out from memory to correct for image instability. (*Misawa*, 7:30-46).

86. In my opinion, both *Misawa* and the '493 Patent are directed to a digital electronic camera for capturing and recording images and correcting image instability. Therefore, *Misawa* is in the same field of endeavor and is pertinent to the same problem as the claimed invention in the '493 Patent.

## VI. OPINIONS REGARDING THE COMBINATION OF CASIO IN VIEW OF JUEN AND/OR TAKASE FOR CLAIM 5

87. As I discuss in the following paragraphs, *Casio* teaches multiple modes of operation, including recording in a static image mode (i.e., recording a static or still image), monitoring in a static image mode (i.e., viewing an image on the LCD "viewfinder" while composing the image before recording it to memory), and recording in a moving video mode (i.e., recording a moving video (movie)). As I also discuss below, *Casio* teaches that each of these modes is performed at a different pixel resolution. Specifically, the static image can be stored in memory at multiple resolutions, including 1280 x 960 pixels (corresponding to the claimed "monitoring in a static image mode"). The static image can also be viewed on the LCD at a resolution of the LCD, i.e., 555 x 220 pixels (corresponding to the claimed "monitoring in a static image mode"). And finally, the moving video can be stored in memory at a resolution of 320 x 240 pixels. (corresponding to the claimed "recording in a moving video mode"). *Casio* also teaches a CCD sensor with a pixel resolution of 1280 x 960 pixels (i.e., approximately 1.23M pixels, as I discuss in ¶ 112, below), or N = 960 vertically arranged pixel lines. Because the *Casio* camera can record a static image at 1280 x 960 pixels, the camera records the static image at N=960 vertically arranged pixel lines. The camera displays a static image on the LCD at 220 vertically arranged pixel lines, for a reduction in pixel resolution by a factor of 4.36 (i.e., 960/220 = 4.36). The camera records a moving video with 240 vertically arranged pixel lines, for a reduction in pixel resolution by a factor of 4 (i.e., 960/240 = 4). Therefore, *Casio* teaches multiple modes of camera operation, each with a different resolution.

88. In my opinion, the digital camera described in *Casio* is very similar to the claimed electric camera of the '493 Patent in several respects. Independent claim 5 of the '493 Patent recites an electric camera having three modes of operation (monitoring a static image, recording a static

image, and recording a moving video), where monitoring a static image and recording a moving video utilize a different pixel resolution. *Casio* also discloses this. As I discuss in detail below, *Casio* discloses a digital, electric camera with included LCD capable of taking both still photos and moving video. *Casio* teaches a high-resolution CCD (a "megapixel" CCD). *Casio* further teaches that when storing a movie (i.e., a video), the resolution is reduced. And, during composing of the still or static image on the LCD, the resolution displayed on the LCD is also less than the resolution used for recording the image and is different than the stored resolution of the moving video images. The secondary reference, *Juen*, is cited only for hardware or software technologies well known in the art, including some of which the '493 Patent admits were known.

89. In my opinion, the only limitation recited in claim 5 and not explicitly taught in *Casio* is that pixel lines are mixed or culled. *Casio* at least implicitly teaches this, as *Casio* teaches reducing from the full resolution of N = 960 vertically arranged pixel lines to the resolution of the monitored image in the static image mode (220 vertically arranged pixel lines) and the resolution of the recorded image in the moving video mode (240 vertically arranged pixel lines). As discussed in detail below, a POSITA would have understood the digital camera disclosed in *Casio* performs the claimed mixing or culling due to the resolution reduction. Regardless, both *Juen* and *Takase* teach such, and it would have been obvious to a POSITA to modify or otherwise add to the digital camera disclosed in *Casio* the feature of pixel line mixing or culling.

**A. Motivation to Combine**

90. In my opinion, a POSITA would have found it obvious and been motivated to combine certain features of *Juen* with the disclosed digital camera in *Casio*. I discuss below my opinions regarding the obviousness of modifying *Casio* for each particular claimed element in claims 5 and 6. However, at a higher level, modifying *Casio's* disclosed digital camera to include certain features of *Juen* and/or *Takase* would have been obvious, desirable and advantageous, and

well within the capabilities of a POSITA, given the state of the technology at the time of the *Casio* reference.

91. *Casio* already discloses an operating digital camera with many of the claimed features of claims 5 and 6. Because of the nature of the *Casio* reference (i.e., a user manual to accompany a product offering), the *Casio* reference does not describe some features expressly. For example, Casio does not expressly state the camera includes a signal processing unit, but of course it must. A digital camera performing digital image generation using a CCD would necessarily have to include a signal processing unit. And, there are several express teachings indicating the disclosed camera includes a signal processing unit, as I discuss below. Therefore, in my opinion, a POSITA would have understood *Casio* teaches, implicitly or inherently, a signal processing unit as recited in claim 5.

92. Given *Casio's* detailed disclosure of a working digital camera, in my opinion, a POSITA would have found it obvious to add the features not expressly taught in *Casio*. For example, I note that *Casio* does not expressly teach that the pixel resolution reduction (which is expressly taught in Casio) is performed via mixing or culling. But mixing or culling were well known in the art (per even the '493 Patent's own admitted prior art discussion at 1:43-50). It would have been obvious to a POSITA to use the known technique of mixing, for example, to reduce the resolution. In contrast, other techniques for pixel reduction, such as cropping the edges of the image, would not have been as desirable because such techniques would have lessened the overall image captured.

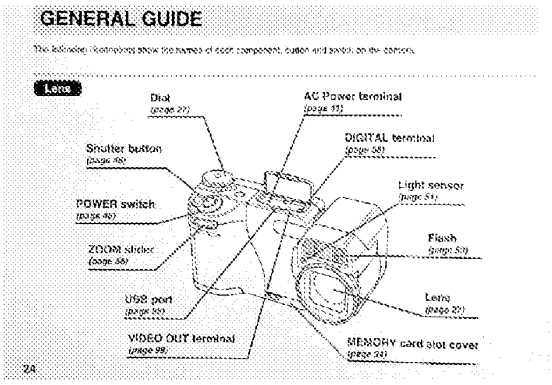
93. I also note that digital camera design was relatively advanced as of the priority date of the '493 Patent. Modifying the *Casio* disclosed camera to include additional functionality, such as the ability to mix pixel signals, would have been well within a POSITA's skill level and would

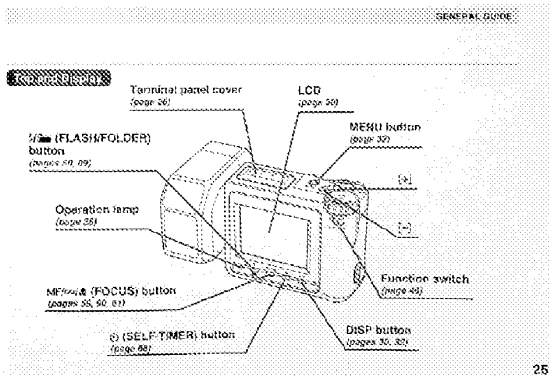
have had no design hurdles that could not otherwise be addressed with routine electronics design experience.

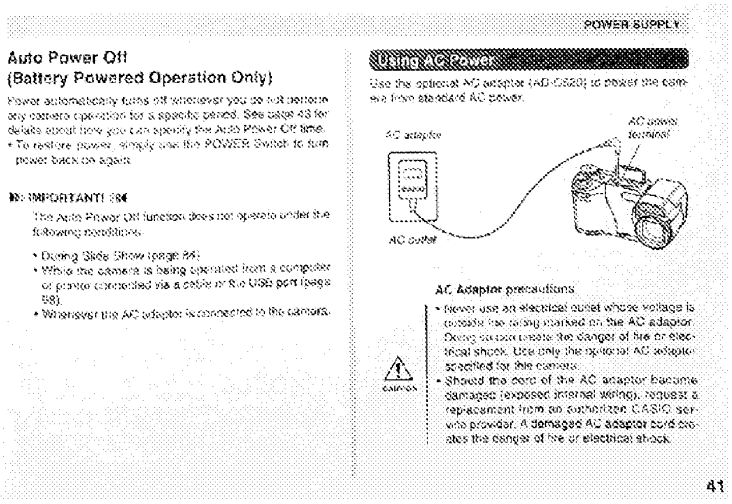
## B. Claim 5

### *1. Claim 5 [Preamble]: An electric camera*

94. *Casio* describes an "LCD Digital Camera" that is an "electric" camera, as recited in Claim 5. (*Casio*, 1). *Casio*'s camera is powered by electricity because it receives power from either batteries or from a standard power outlet. *Casio* teaches the camera "features a two-way power supply that lets you either use batteries (AA-size alkaline, lithium, or Ni-MH) or household AC current." (*Casio*, 38). The camera has an optional AC adaptor (AD-C620) to connect the "AC Power terminal" to a standard AC outlet. (*Casio*, 24, 41).




POWER SUPPLY

Auto Power Off
(Battery Powered Operation Only)

Power automatically turns off whenever you do not perform any camera operation for a specific period. See page 43 for details about how you can specify the Auto Power Off time.
• To restore power, simply use the POWER Switch to turn power back on again.

IMPORTANT!

The Auto Power Off function does not operate under the following conditions.

• During Slide Show (page 84)
• While the camera is being operated from a computer or printer connected via a cable or the USB port (page 58)
• Whenever the AC adaptor is connected to the camera

Using AC Power

Use the optional AC adaptor (AD-C520) to power the camera from standard AC power.

AC adaptor
AC power terminal
AC outlet

AC Adaptor precautions

• Never use an electrical outlet whose voltage is outside the rating marked on the AC adaptor. Doing so can create the danger of fire or electrical shock. Use only the optional AC adaptor specified for this camera.
• Should the cord of the AC adaptor become damaged (exposed internal wiring), request a replacement from an authorized CASIO service provider. A damaged AC adaptor cord creates the danger of fire or electrical shock.

41

(*Casio*, 24-25, 41).

### *2. Claim 5(a)*

#### *a) "an image sensing device with a light receiving sensor"*

95. I initially note the '493 Patent describes the "image sensing device 3 is of a CCD type." (*'493 Patent*, 4:34-38). Further, the '493 Patent describes "light coming from the lens 1 through the aperture 2 is focused on a light receiving surface of the image sensing device 3." ('493 Patent, 4:34-37). Additionally, "FIG. 2 shows the structure of this image sensing device 3…[where] denoted 30 are pixels each formed from a photodiode." ('493 Patent, 4:38-41). *Casio* alone or *Casio* in combination with *Juen* teaches claim 5(a).

96. *Casio* teaches an "Image Element" that is a "1/2.7 inch CCD." (*Casio*, 118). *Casio* teaches the CCD is a "megapixel CCD" because it has more than 1 million (1M) pixels. (*Casio*, 10). As I discussed above at ¶¶ 35-40, CCDs were well known in the art at the time of the '493 Patent as image sensing devices with a light receiving sensor. Because CCDs operate to receive incident light at photodiodes, a POSITA would have understood the CCD is an image sensing device with a light receiving sensor and would further have understood that the CCD of *Casio*

receives light via the camera lens. (*Casio*, 24, 27). Incident light applied to a photodiode creates an electric charge. For each row (i.e., "line") of photodiodes, the charges are transferred across the row of photodiodes and accumulated to form a "signal"; the charges are then converted to digital values to form a "signal" containing "signal charges" representing a row of the image. The photodiodes (either each photodiode alone or the plurality of photodiodes forming the array) are "a light receiving sensor," as claimed, that converts light into digital data. Therefore, in my opinion, the claimed "image sensing device with a light receiving sensor" is met by the CCD (which a POSITA would have understood includes photodiodes) of *Casio*.

97. I also note *Juen* teaches the claimed "image sensing device with a light receiving sensor." *Juen* teaches "Light passing through the photographic lens 12 is refracted within the camera part 11a, and received by a photoreceptor surface of an imaging element 13, which is composed of a CCD image sensor. For example, the number of pixels of the imaging element 13 is 960 in length x 1280 in width, which is twice the degrees in both length and width of the effective resolution in a NTSC method." (*Juen*, 5:63–6:2). *Juen's* imaging element, which is composed of a CCD image sensor, is an "image sensing device." CCD image sensors were known in the art prior to the date of the claimed invention to sense or otherwise capture an image using light receiving sensors. *Juen* further teaches the claimed "light receiving sensor," namely the "photoreceptor surface" of the imaging element (i.e., of the CCD image sensor). (*Juen*, 5:63–6:2). Therefore, *Juen* teaches an image sensing device (imaging element 13, which is a CCD image sensor) with a light receiving sensor (photoreceptor surface of the imaging element 13). And, because *Juen's* CCD image sensor receives light on a photoreceptor surface, *Juen* teaches an image sensing device with a light receiving sensor, as claimed.

98. In my opinion, a POSITA would have found it obvious and been motivated to include the CCD of *Juen* in the digital camera of *Casio*. *Casio* already teaches a CCD, which as I explained above, was well known to be an image sensing device having a light receiving sensor. *Juen* expressly teaches the image sensing device, as claimed. Modifying *Casio* to include the *Juen* imaging element 13 would have been common sense and well within a POSITA's expertise. A skilled person would know how to incorporate the *Juen* imaging element in the *Casio* camera, as the skilled person would have been experienced in designing digital cameras. Because any digital camera needs an imaging element to capture an image, a POSITA would have the knowledge to incorporate the hardware and software for including the *Juen* imaging element. Additionally, it would have been beneficial to include the image sensing device taught by *Juen* to incorporate well-known imaging devices for ease of installation and integration with other components of the *Casio* digital camera. The combination would have had a reasonable expectation of success given *Casio's* teaching of a CCD, as the *Casio* camera is already equipped to capture and process an image using a light receiving sensor (i.e., the *Casio* CCD). To the extent any modification of *Casio* is required, such a modification would entail applying the well-known use of a CCD (as taught by Juen) as an image sensor in the *Casio* digital camera in the same way the Juen CCD is used.

99. I have been asked to consider Patent Owner's arguments in the '597 IPR, where Patent Owner argued a POSITA would not have combined *Casio* and *Juen* without the benefit of hindsight. ('597 IPR PO Prelim. Response at 50-51). I note Patent Owner relied on another prior art reference, *Anderson* (U.S. Patent No. 6,563,535), for arguing that a POSITA would not have been "motivated to incorporate the complicated and specialized features of *Juen* into *Casio*." *Id.* Patent Owner states that Anderson criticizes "specialized circuitry to handle each of the advanced

features" and warns not "to use different circuits and data paths" and argues "a POSITA would not be motivated to incorporate the complicated and specialized features of Juen into Casio." *Id.*

100. I first note that Patent Owner's reliance on *Anderson* at 1:50-58 ignores the fact that *Anderson* is describing the prior art *before* Anderson's invention. As of the filing date of *Anderson*, such shortcomings of the prior art had been overcome by *sharing* resources, such as *Juen* discloses. For example, *Anderson* at 2:16-21 states "[c]ertain parts and paths of the circuit are reused and shared so as to leverage existing resources with minimal impact on its speed and functionality. By sharing certain resources, duplication is reduced, thereby **decreasing costs**. Furthermore, the present invention is adaptable to be used in virtually any type of digital camera and CCD array." (*Anderson*, 2:16-21) (emphasis added). *Anderson* states "**[t]his reduces the total amount of hardware which is needed, which minimizes the overall cost** with minimal or no impact on speed and functionality." (*Anderson*, 3:16-19) (emphasis added). I also disagree that the combination of *Casio* and *Juen* and/or *Takase* would use different circuits and data paths. At the time of the January 11, 2000, priority date of the '493 Patent, digital camera design and general electronics design was advanced enough that a digital camera designer would know how to reuse parts and paths or leverage the resources of the digital camera to most efficiently gain the desired functionality, as recognized by *Anderson* at 2:16-21. It would have been within a POSITA's expertise to avoid using different circuits and paths to obtain a particular functionality, such as mixing or culling of the signal charges.

101. Patent Owner further says "Anderson teaches that this architecture 'was deceptively difficult to conceive.'" ('597 IPR PO Prelim. Response at 51, *quoting Anderson*, 9:19-36). But Patent Owner failed to quote the full sentence from Anderson: "Although the final hardware architecture of the present invention appears **straightforward** in retrospect, it was deceptively

difficult to conceive." (*Anderson*, 9:19-21) (emphasis added). In other words, it may have been difficult to conceive Anderson's invention, but once the details were disclosed by Anderson, implementation of the invention would be *straightforward* for any POSITA desiring to implement it. Indeed, as *Anderson* explains, "[a]ll these factors were taken into account in order to produce the integrated solution of the present invention which effectively and efficiently utilizes the available hardware resources." (*Anderson*, 9:33-36). Despite the fact that the *Anderson* invention may have been difficult to conceive due to various factors, *Anderson* has disclosed an "integrated solution" that effectively takes all those factors into account. Likewise, using the disclosed technology of *Juen* to combine with *Casio* would also be straightforward, especially with *Anderson's* teachings of providing a straightforward architecture. Once the *Juen* and *Anderson* systems had been conceived and disclosed, the difficulties had been overcome, and a POSITA would have found it obvious to proceed to use the disclosed technologies in a straightforward manner.

102. Second, Patent Owner identifies *Juen's* "moving image recording" circuit and argues the circuit is "an entirely separate pipeline or data flow path from the still image recording means." ('597 IPR PO Prelim. Response at 51). By looking only at the figures in *Juen*, the Patent Owner failed to see that *Juen* teaches: "Preferably, the moving image recording means and the still image recording means **share** a coding conversion component for executing high efficiency coding ...." (*Juen*, 2:30-34) (emphasis added). More specifically, *Juen* teaches that the "moving image recording means 3 and the still image recording means 4 **share** the coding conversion component 6 that performs high efficiency coding (i.e., compression) of the image information." (*Juen*, 4:40-43) (emphasis added); *see also id.* at 1:52-60, 4:36-39, 4:43-55, 9:52-55, 11:11-15, 11:22-27, 11:36-42. Thus, *Juen* teaches how to implement the two components efficiently by sharing the

most complex portion. *Juen's* preferred method of sharing components is entirely consistent with *Anderson's* system, in which "[c]ertain parts and paths of the circuit are reused and shared so as to leverage existing resources with minimal impact on its speed and functionality." (*Anderson*, 2:16-18). Both *Juen* and *Anderson* advocate sharing resources among the various system components. Further, a POSITA would have known that a very common method of making multi-component electronic systems more efficient was to modify them so that components are shared across the system rather than being implemented separately. Therefore, in modifying *Casio* to include additional functionality, such as *mixing* signal charges (to the extent not otherwise already disclosed in *Casio*), a POSITA would have found it obvious to modify *Casio's* system components to share resources, per both *Juen* and *Anderson*.

103. Yet further, Patent Owner says "*Anderson* warns not 'to use different circuits and data paths.'" ('597 IPR PO Prelim. Response at 51, *quoting Anderson*, 1:56-58). But the Patent Owner is apparently confused about the context of this citation from *Anderson*, which is warning against using different circuits for different viewing modes, such as live view and playback mode. *See Anderson*, 5:52-65. Just like *Anderson, Juen* does not show different circuits and data paths for processing live view and playback mode. Note that the moving image recording means and the still image recording means shown in Fig. 1 of *Juen* refer to processing data for *storage*, not for display. Specifically, Figure 1 refers to the processing of data for storage (recording on the recording medium R), not for display. (*Juen*, 3:38-44). Furthermore, *Juen* discloses "[p]referably, the moving image recording means and the still image recording means share a coding conversion component for executing high efficiency coding." (*Juen*, 2:30-34).

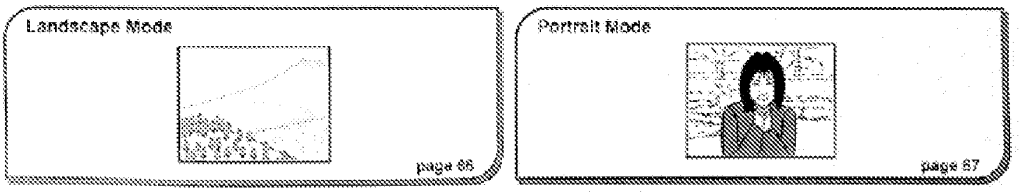
***b) "having an array of pixels arranged vertically and horizontally in a grid pattern"***

104. A digital image is typically created by an *array* of pixels arranged in horizontally arranged columns and vertically arranged rows, as I discussed at ¶¶ 36-40. It is my opinion *Casio* teaches this well-known rectangular sensor geometry, where the CCD's imaging elements are arranged vertically and horizontally in a grid pattern. There are at least three teachings in *Casio* that indicate this geometry.

105. First, *Casio* teaches the camera produces a "VGA size image (640 x 480 pixels)." (*Casio*, 59). A VGA resolution is standard and is a 640 x 480 array or grid of pixels arranged with vertical and horizontal dimensions. *See Berry* (Ex. 1015), 1:31-42 (discussing the "VGA" standard introduced by IBM and having a 640 x 480 resolution). I therefore understand *Casio's* teaching of a VGA image size of 640x480 to refer to an array of pixels arranged vertically and horizontally in a grid pattern.

106. Second, *Casio* teaches the "Recorded Image Size" or "Static" image size can be selected by the user to be either "1280 x 960 pixels" or "640 x 480 pixels." (*Casio*, 76, 118). Resolutions of 1280x960 and 640x480 are standard resolutions of an array or grid of pixels arranged with vertical and horizontal dimensions. Therefore, *Casio's* teaching of the "image size" as "1280 x 960 pixels" or "640 x 480 pixels" indicates an array of pixels arranged vertically and horizontally in a grid pattern.

107. Third, *Casio* provides multiple illustrations of images captured in a rectangular geometry, and the LCD is shown as rectangular. (*Casio*, 11-12, 49, 58, 4, 5, 30-31).




Because the *Casio* camera generates rectangular images, it is my opinion that the CCD in *Casio* captures image signals in an array or grid of pixels arranged with vertical and horizontal dimensions. In my opinion, a POSITA would have understood a rectangular monitor presenting rectangular images to be produced by a CCD having "an array of pixels arranged vertically and horizontally in a grid pattern," as claimed. *See, e.g., Misawa* (Ex. 1006), 3:30-38 ("As shown in FIG. 4A, the photosensitive array of image sensor 12 has an imaging field 400 including 640 photosensitive cells or pixels in its horizontal direction H to form a horizontal line and 480 lines in its vertical direction (V), thus including approximately three hundred thousand photosensitive cells or pixels. The array of photosensitive cells in imaging field 400 is driven by the drive signals supplied from control processor 20 to produce pixel signals from the respective cells.").

108. *Juen* also teaches an "array of pixels arranged vertically and horizontally in a grid pattern," as claimed. *Juen* teaches the imaging element having 1280 pixels in width and 960 pixels in length (or 1280x960), similar to *Casio*. *Compare Juen*, 5:63–6:2, with *Casio*, 118. *Juen* also refers to vertical and horizontal resolution by a number of pixels along each dimension. (*Juen*, 1:35-42). As I explained above, a resolution of 1280x960 is a standard resolution of an array or grid of pixels arranged with vertical and horizontal dimensions, such that I understand *Juen's* teaching of 1280 pixels in width and 960 pixels in length to teach an array of pixels arranged vertically and horizontally in a grid pattern, as claimed.

109. In my opinion, a POSITA would have found it obvious to and would have been motivated to modify *Casio* or otherwise combine *Juen's* CCD with *Casio's* CCD to generate an

array of pixels arranged vertically and horizontally in a grid pattern. As I explained above, it is my opinion the *Casio* CCD already has a light receiving sensor with an array of pixels arranged vertically and horizontally in a grid pattern. However, to the extent not already taught by *Casio*, the arrangement as an array or grid of pixels with vertical and horizontal dimensions was standard and known, as evidenced by *Juen*. Casio teaches presenting a horizontal x vertical image (*Casio*, 11-12, 49, 58, 4) on a rectangular LCD monitor. Therefore, arranging the *Casio* CCD's sensor elements to be in an array or grid with vertical and horizontal dimensions would have been an application of a known technique (*Juen's* CCD with a horizontal x vertical array) to a known device (*Casio's* CCD) to improve Casio's digital camera in the same way *Juen's* camera is improved, i.e., to desirably provide an image in a standardized, rectangular geometry for photographs and moving videos. *See Casio*, 61 (teaching AVI format for moving video, which uses a known standardized array or grid of pixels with vertical and horizontal dimensions). There would have been a reasonable expectation of success, as the modification would entail a simple substitution of the *Juen* CCD for the *Casio* CCD and any corresponding software integration, both of which would have been well within a POSITA's expertise given the wide acceptance and use of CCDs.

***c) "in an N number of vertically arranged pixel lines"***

110. In my opinion, *Casio* teaches an "N number of vertically arranged pixel lines," as claimed, where N = 960 vertically arranged pixel lines. As explained above, the pixels are arranged in an array or grid having vertical and horizontal dimensions, i.e., rows of pixel lines arranged vertically adjacent to each other. In the *Casio* CCD that provides a maximum image size of 1280 x 960 pixels, the N number of vertically arranged pixel lines is thus 960 (N = 960), where 960 represents the number of lines or rows of pixels.

111. *Casio* teaches the camera produces a "VGA size image (640 x 480 pixels)." (*Casio*, 59). A VGA resolution is standard and is a 640 x 480 array or grid of pixels arranged with vertical and horizontal dimensions. *See Berry*, 1:31-42 (discussing the "VGA" standard introduced by IBM and having a 640x480 resolution). A POSITA would have known VGA resolution has a horizontal dimension of 640 pixels and a vertical dimension of 480 pixels. Since *Casio* lists the VGA resolution as "640 x 480 pixels," a POSITA would have understood the image dimensions recited in *Casio* are listed in horizontal x vertical nomenclature, with the horizontal dimension first and the vertical dimension second. (*Casio*, 59). It is also my opinion *Casio* lists the width or horizontal dimension first because in listing the dimensions of the camera itself, *Casio* lists the width or horizontal dimension first and the height or vertical dimension second. *See Casio*, 119 (listing the "Dimensions" as "142.5(W) x 77.5(H)"). It would make sense and be consistent that all disclosures of width and height, or horizontal and vertical dimension, are listed by *Casio* in the same order for ease of reference to the user. *Casio's* teaching of a maximum image size of 1280 x 960 therefore refers to the horizontal dimension first and the vertical dimension second.

112. *Casio* teaches the CCD provides "Total Pixels: 1.31 million, Effective Pixels: 1.25 million." (*Casio,* 118). *Casio* also teaches a stored static image size of 1280 x 960, which is the largest image size listed in *Casio*. *Id.* As I discussed above in ¶ 38, the number of image pixels is the horizontal number of pixels multiplied by the vertical number of pixels. Therefore, for an image size of 1280 x 960, the total number of image pixels is 1,228,800 pixels (which rounds to 1.23 million pixels). I note this number is not exactly equal to the total (1.31 M) or effective (1.25 M) pixel resolution taught in Casio. However, for the reasons I discussed at ¶ 38, I understand from *Casio* that the maximum number of pixels provided for images is 1280 x 960, such that the N number of vertically arranged pixel lines is 960.

113. It was understood in the art that a resolution of 1280 x 960 is equivalent to approximately 1.23 million pixels. For example, *Anderson*, which I discussed above at ¶¶ 60-62, provides a table of common resolutions and the corresponding resolution when reduced to 1/4th and 1/16th size, and the total number of pixels. As shown in the table, a resolution of 1280 x 960 pixels is a total of 1.23 million pixels:

TABLE 1

CCD Size and Live View Size Table

| Image Size | | 1/4 Image Size | | 1/16 Image Size | | M Pixels |
|---|---|---|---|---|---|---|
| 640 | 480 | 320 | 240 | 160 | 120 | 0.31 |
| 768 | 576 | 384 | 288 | 192 | 144 | 0.45 |
| 896 | 672 | 448 | 336 | 224 | 168 | 0.61 |
| 1024 | 768 | 512 | 384 | 256 | 192 | 0.79 |
| 1152 | 864 | 576 | 432 | 288 | 216 | 1.00 |
| 1280 | 960 | 640 | 480 | 320 | 240 | 1.23 |
| 1536 | 1024 | 768 | 512 | 384 | 256 | 1.58 |
| 1536 | 1152 | 768 | 576 | 384 | 288 | 1.77 |
| 1792 | 1344 | 896 | 672 | 448 | 336 | 2.41 |
| 2048 | 1536 | 1024 | 768 | 512 | 384 | 3.15 |

*Live view sizes in sensor are shown underlined

(*Anderson,* Ex. 1023, 10:29-44 (Table 1) (referring to a CCD image size and corresponding pixels)).

114. Therefore, in my opinion, a POSITA would have understood *Casio*'s teaching of a CCD providing a maximum image size of 1280 x 960 means the N number of vertically arranged pixel lines in *Casio* is N = 960.

115. *Juen* also teaches N number of vertically arranged pixel lines, including N=960. (*Juen*, 5:66–6:2, 7:51-58). *Juen* teaches an imaging element 13, which may be a CCD image sensor, having 1280 pixels in width and 960 pixels in length. (*Juen,* 5:66–6:2). I understand this to mean N = 960 is the number of vertically arranged pixels lines. I also note *Juen* discusses reducing the resolution by dividing the image information into 2 x 2 pixel blocks (i.e., dividing

each dimension by 2), to reduce the pixel density (i.e., resolution) to 480 vertically arranged pixel lines, further indicating the maximum number of vertically arranged pixel lines is N = 960.

### *3. Claim 5(b): "a signal processing unit that generates image signals by processing the output signals of the image sensing device"*

116. In my opinion, *Casio* teaches "a signal processing unit that generates image signals by processing the output signals of the image sensing device," as recited in Claim 5(b) of the '493 Patent. *Casio* describes in detail a ***digital*** camera that captures and stores images, indicating a signal processing unit is required to process the digital signals. *Casio* discusses processes that would have been well understood by a POSITA to have been performed by a signal processing unit, such as converting or encoding images to a JPEG or AVI file format (*Casio*, 61, 118) and digital zoom (*Casio*, 58-59). It would have been readily apparent to a POSITA the *Casio* camera would have included a signal processing unit that generates the image signals by using the output signals of the CCD in order to perform these functions and operations. For example, a signal processing unit is needed to receive the output signals from the CCD (which is already disclosed in *Casio*) and to generate the image signals that *Casio* teaches are shown on the display. (*Casio*, 30-31). A digital camera as disclosed in *Casio* would not be operative without a signal processing unit. Additionally, a CCD was well known to operate in conjunction with a signal processor to receive output signals from the CCD and generate image signals. *See, e.g., Anderson*, 4:24-34 (disclosing a raw CCD image passed to a DSP to perform the function of image processing). Because the *Casio* camera includes a CCD, the camera receives the output signals from the CCD and generates image signals to display the image on the LCD (which *Casio* expressly teaches at, for example, page 16 discussing the image shown on the monitor screen). *Casio* also teaches displaying an image during "composition" on the LCD at a resolution that does not match the stored pixel resolution, further indicating a signal processor that generates images at different

resolutions. (*Casio*, 16). Because these disclosed processes (e.g., generating an image for composing on a lower-resolution screen, or JPEG and AVI processing for recording, or digital zoom) for a digital camera require a signal processing unit to perform the functions, the disclosed digital camera in *Casio* would have been understood by a POSITA to include a signal processing unit.

117. *Juen* also teaches the claimed "signal processing unit." *Juen* teaches "an electronic camera 100 includes an imaging means 1 that images an object or living subject…and converts an image thereof to image information." (*Juen*, 3:32-35, Fig. 1). The camera has both a still image mode and a moving image mode. (*Juen*, 3:38-44 ("still image recording means 4," "moving image recording means 3"), Fig. 1).

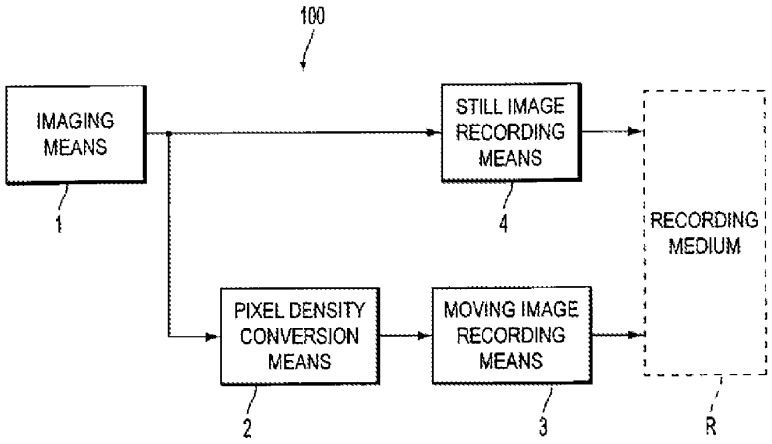



**FIG. 1**

118. *Juen* teaches a picture image signal processor 15 and an image density converter 16 that collectively receive the output from the CCD, process the output into image signals, and convert the pixel density of the image signal:

The photoelectric **output of the imaging element 13** is connected to a **picture image signal processor 15** that performs white balance adjustment, gamma correction, or the like via an A/D converter 14.

The **image information of the picture image signal processor 15** is **input to an image density converter 16** and a memory I/O component 17.

The **image density converter 16 performs conversion of the pixel density** by executing **interpolation**, dividing into identical blocks, thinning, and the like, to the pixel value of the image information.

(*Juen*, 6:3-14, 9:52-58).

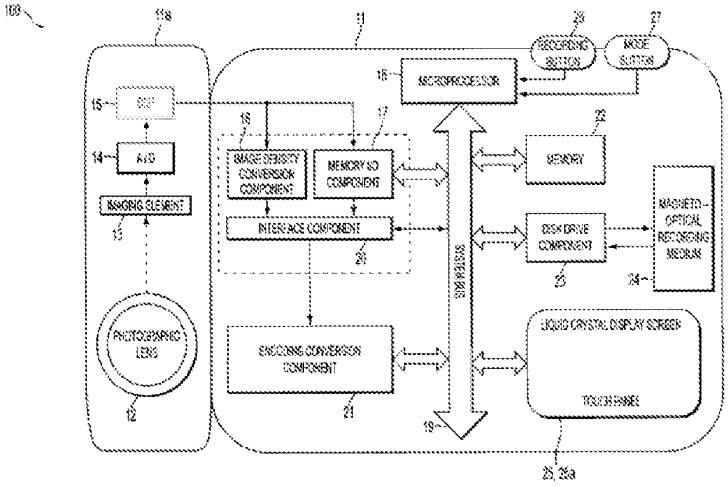



FIG. 7

(*Juen*, Fig. 7). I note that in Fig. 7, above, the picture image signal processor 15 is listed as a "DSP," which I understand to mean a "digital signal processor."

119. *Juen* teaches the "output" of the imaging element, which is a CCD image sensor (*Juen*, 5:63-5:66), is input to the picture image signal processor, which outputs "image information" (*Juen*, 6:3-9). The image information is then input to the image density converter 16, which performs pixel resolution conversion. (*Juen*, 6:7-14). Therefore, the image signal processor

15 alone or in combination with the image density converter 16 satisfies the claimed "signal processing unit."

120. I note Claim 5(b) recites that the signal processing unit generates image signals by *processing* the output signals of the image sensing device. In my opinion, the *Casio* signal processing unit or the *Juen* "picture image signal processor" (aka DSP, *see Juen*, Fig. 12, Reference Numeral (RN) 15) processes the output signals from the CCD, as a processor would have been understood to process signals and because both references teach, for example, the image signal being shown on the respective references' included display. *See Casio,* 30, *Juen*, Figs. 15-16. The *Casio* signal processing unit or the *Juen* "picture image signal processor" (aka DSP, *see Juen*, Fig. 12, RN 15) processes the output signals from the CCD by performing, for example, mixing or culling, digital zoom, and conversion to JPEG or AVI format. *See Juen* at 6:7-14, *Casio*, 58-59 (digital zoom), 61 (AVI format), 118 (JPEG format). Additionally, *Casio* teaches the digital camera performs "internal data processing," further indicating the digital camera includes a signal processing unit. (*Casio*, 71).

121. In my opinion, a POSITA would have found it obvious to and would have been motivated to modify the digital camera disclosed in *Casio* to include the picture image signal processor 15 (also referred to as a DSP) and the image density converter 16 of *Juen* to generate image signals by processing the output signals of the *Casio* CCD. As I discussed above for Claim 5a, *Casio* teaches a camera having a similar image sensing device to *Juen* in the form of a CCD, i.e., both *Casio* and *Juen* disclose an image sensing device that is a *CCD*. *See Casio*, 118; *Juen*, 5:63-66. It would have been obvious to a POSITA that the CCD of *Casio* would function in a similar way to the CCD ("imaging element 13") in the electronic camera 100 of *Juen* to generate image signals. *See, e.g., Juen*, 6:3-6 (discussing the photoelectric output of the imaging element

13 (i.e., CCD) is connected to the picture image signal processor 15 to perform various image processing). The *Casio* camera already performs the claimed functionality of generating image signals. Because the *Casio* camera is an electronic, digital camera using a CCD and producing both video and still images, including a signal processing unit, as claimed, is an expected addition to the *Casio* camera to achieve the functionality already disclosed in *Casio*. Modifying the *Casio* digital camera to have the *Juen* picture image signal processor 15 and image density converter 16 would have the advantage of a simpler, more compact (e.g., physically smaller), and, in many cases, less costly design. Including a signal processing unit, as claimed, would entail combining prior art elements (the image signal processor (aka digital signal processor) and image density converter of *Juen*) according to known methods (including a signal processor in a digital camera was well known) to yield predictable results (the *Casio* digital camera would use the signal processor to perform signal generation based on the output signals from a CCD). The modification to *Casio's* digital camera would have been met with a reasonable expectation of success given that any digital camera designer would know how to include a signal processing unit to receive the output signals from the CCD and generate image signals to display on the LCD monitor or record to memory, such that designing a digital camera with a signal processing unit would have been within the POSITA's expertise. Indeed, a signal processing unit for a digital camera was extremely well known. *See, e.g., Anderson*, 4:9-34 (discussing raw image data in a CCD format converted to a digital signal and passed to a digital signal processor (DSP) for image processing).

122. I have been asked to consider arguments raised by the Patent Owner in the '597 IPR that the proposed ground of rejections does not establish that "the purported signal processing unit of either *Casio* or *Juen* perform the claimed functions required by the claims…." ('597 IPR PO Prelim. Response at 56). Per claim 5(b), the signal processing unit generates image signals by

processing the output signals of the image sensing device (e.g., the CCD). The output signals of the image sensing device are, in the case of a CCD, the signal charges. This is confirmed in, for example, claim 5(d), which recites the image signals are generated by "using all *signal charges*…." The discussion of claim 5(b), above, establishes that either of *Casio* or *Juen* teaches a signal processing unit, as claimed. Additionally, the discussion establishes that both references teach that the signal processing unit generates image signals by processing the output signals of the image sensing device. The specific processing performed, e.g., generating image signals for static image recording, generating image signals for monitoring in static image mode, or generating image signals for moving video recording, is discussed in claims 5(d)-(f), below.

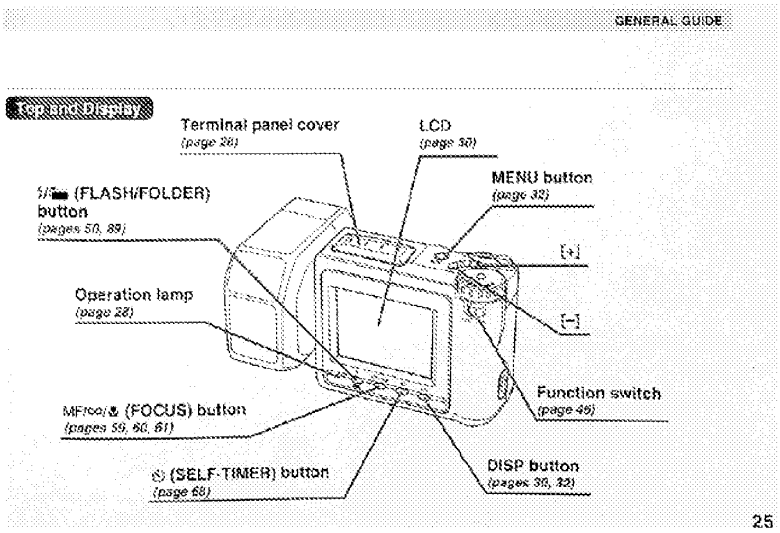
123. In my opinion, because *Casio* teaches a digital camera that generates image signals, as recited for claim 5(b), and because *Casio* further teaches using all signal charges accumulated in all N number of vertically arranged pixel lines in the static image mode, as set forth for claim 5(d), below, a POSITA would have understood the signal processing unit in *Casio* generates the image signals according to *Casio's* claimed functionality of recording an image with all N number of vertically arranged pixel lines. Similarly, because *Casio* teaches a digital camera that generates image signals, as recited for claim 5(b), and because *Casio* (or as modified to include the *Juen* and/or *Takase* functionality of mixing or culling, discussed for claim 5(e)) further at least implicitly teaches generating the image signals by using pixel lines mixed or culled from the N number of vertically arranged pixel lines, as set forth for claim 5(e), below, a POSITA would have understood the signal processing unit in *Casio* generates the image signals according to *Casio's* claimed functionality of monitoring an image with the generated image signals recited in claim 5(e). And finally, because *Casio* teaches a digital camera that generates image signals, as recited for claim 5(b), and because *Casio* (or as modified to include the *Juen* and/or *Takase* functionality of mixing

or culling, discussed for claim 5(f)) further at least implicitly teaches generating the image signal by using a portion of or the entirety of pixel lines mixed or culled from the N number of vertically arranged pixel lines in the moving video mode, as set forth for claim 5(f), below, a POSITA would have understood the signal processing unit in *Casio* generates the image signals according to *Casio's* claimed functionality of recording a moving video with a portion of or the entirety of the N number of vertically arranged pixel lines.

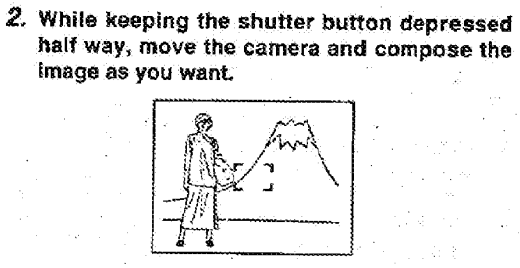
124. With respect to Patent Owner's arguments regarding *Juen*, *Juen* discloses a signal processing unit (namely picture image signal processor 15 and an image density converter 16). ('597 IPR PO Prelim. Response at 58). I explain at ¶¶ 117-121 how it would have been obvious to modify the digital camera disclosed in *Casio* (to the extent not otherwise already taught in *Casio*) to include *Juen's* picture image signal processor 15 and image density converter 16 to generate the image signals as otherwise already taught by *Casio*. *Casio* already teaches generating image signals according to claims 5(d)-(f), e.g., generating the image signals by using all signal charges from the N number of vertically arranged pixels as recited in claim 5(d). *Juen* further expressly teaches a signal processing unit that, when combined with *Casio*, teaches a signal processing unit that generates the image signals according to the functionality already disclosed in *Casio*.

#### *4. Claim 5(c): "a display unit with the display screen, to display an image corresponding to the image signals"*

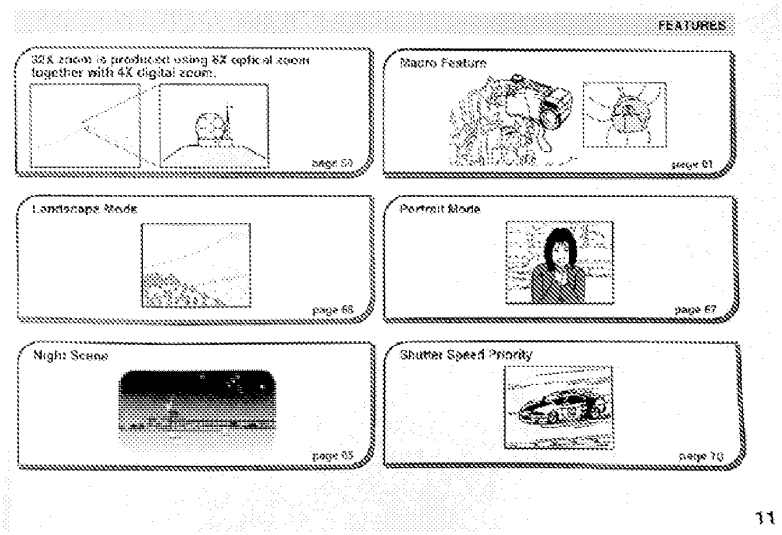
125. In my opinion, *Casio* discloses a "display unit" comprising at least the housing for the LCD, where the LCD is the claimed "display screen." (*Casio*, 25).




*Casio* refers to the LCD as a "monitor" or "LCD monitor." (*Casio*, 25, 119, 1 (title of "LCD Digital Camera")). The LCD is a liquid crystal display that displays the image signals captured by the CCD and processed by the *Casio* camera's processor. *Casio* discusses how the user can take and record (i.e., store) an image by pressing the shutter button half way. This focuses the image. Once focused, the user then continues pressing the shutter button completely, which "takes" the image, i.e. records or stores it to memory. (*Casio*, 46). When the user is taking and recording an image, the image that is being recorded is displayed on the LCD so that the user can compose the image. (*Casio*, 49). For example, *Casio* includes an instruction to the user that "[w]hile keeping the shutter button depressed half way, move the camera and compose the image as you want." *Id.* The instruction includes a mock-up of the image seen on the LCD:



Exemplary images that a user sees on the monitor are shown below:




(*Casio*, 11).

126. Because *Casio* teaches that the user takes an image by composing the image on the monitor and pressing the shutter button, I understand *Casio* to be teaching that the output signals from the CCD image sensor are processed and displayed on the LCD as the corresponding image to be taken. Therefore, *Casio* teaches or renders obvious "a display unit with the display screen to display an image corresponding to the image signals," as claimed.

***5. Claim 5(d)***

***a) "wherein when recording an image in a static image mode"***

127. *Casio* teaches "recording an image in a static image mode." *Casio* teaches recording the claimed static image at various resolutions, including 1280 x 960 and 640 x 480:

Recorded Image Size ..... 1280 x 960 pixels, 640 x 480 pixels

Standard Memory Capacity, Number of Image Files, Computer Output Image Size

| Static | | |
|---|---|---|
| 1280 x 960 | FINE | 88/13 sets (500KB / image) |
| | NORMAL | 122/18 sets (350KB / image) |
| | ECONOMY | 206/29 sets (200KB / image) |
| 640 x 480 | FINE | 268/39 sets (150KB / image) |
| | NORMAL | 327/48 sets (120KB / image) |
| | ECONOMY | 418/63 sets (90KB / image) |
| Movie: File Format AVI | | |
| Approximate Total: 155 seconds/25 seconds (300KB/second)<br>• The maximum length of a single movie is 10 seconds. | | |

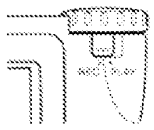
* When using 48MB/8MB CF card.

(*Casio*, 118). In the above excerpt, *Casio* teaches a "Recorded Image Size," which I understand to indicate a recorded static image. *Casio* further teaches "for recording images," the user should "slide the Function Switch to REC. The REC position selects the Record Mode." (*Casio*, 46). *Casio* instructs the user to "press the shutter button all the way down to record the image":

## Basic Recording Operation

The following describes the basic operation for recording images.

1. Slide the Function Switch to REC.



- The REC position selects the Record Mode, while PLAY selects the Playback Mode.

2. Rotate the dial so its [camera] (normal recording) setting is aligned with the dot on the top of the camera.




3. Slide the POWER Switch in the direction indicated by the arrow.





- The POWER Switch returns to its original position when you release it.
- Turning on power enters the Record Mode.
- If power turns off, use the POWER Switch to turn it back on again.

4. After composing the image on the monitor screen, press the shutter button about half way and hold it there.

- The camera's Auto Focus feature automatically focuses the image.
- The operation lamp lights green and the Auto Focus Frame in the monitor screen turns green when the Auto Focus operation is complete.
- Take care to avoid blocking the lens, distance sensor or light sensor with your fingers.



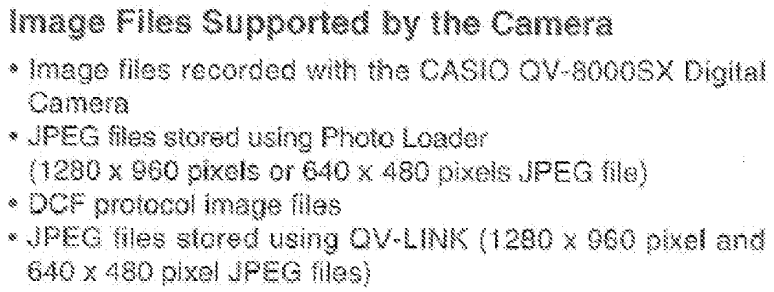
- Carefully press the shutter button, taking care not to move the camera as you do.

5. After confirming that the Auto Focus operation is complete (the operation lamp lights green), press the shutter button all the way down to record the image.

- Pressing the shutter button releases the shutter, even if Auto Focus was unsuccessful and the image is out of focus.
- After you record an image, the camera takes a few seconds to store it in memory. If you try to change to the Playback Mode while a save operation is in progress, the message "Press DISP to cancel save" appears on the monitor screen. Pressing DISP at this time cancels the save operation.
- Use of a tripod and the wired remote controller is recommended for slow shutter speeds and telephoto shots to avoid blurring of the image due to camera movement.



(*Casio*, 46-47). I also note that one of the image files supported by the camera is JPEG, which was well known as a static image file:



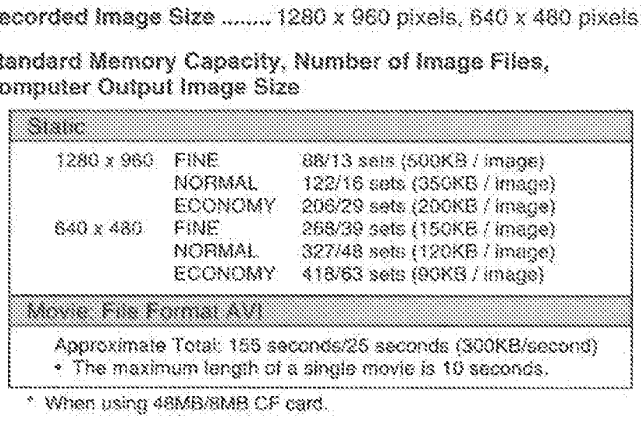

(*Casio*, 105, 53 (teaching storing images on a memory card)). Based on at least these collective teachings, it is my opinion a POSITA would have understood *Casio* teaches "recording an image in the static image mode."

***b) "the signal processing unit generates image signals"***

128. The limitation of "the signal processing unit generates the image signals" was discussed for Claim 5(b) above, which recites "a signal processing unit that generates image signals by…." As I discussed above in ¶¶ 116-124, *Casio* alone or as modified by *Juen* teaches the signal processing unit generates the image signals. I further note that *Juen* teaches a signal processing unit that performs pixel resolution conversion. Specifically, *Juen* teaches the image density converter 16, which is part of the signal processing unit mapped for Claim 5(b), "performs conversion of the pixel density." *Juen*, 6:11-14, 7:53-59. In my opinion, the signal processing unit of *Casio* alone (see ¶ 116, above) or as modified by *Juen* (see ¶¶ 117-121, above) also at least implicitly performs the mixing or culling of the image signals to provide pixel lines at pixel intervals of a first and second distance as recited in respective Claims 5(e)-5(f) and the N pixel lines recited in Claim 5(d). I discuss in detail below at ¶¶ 163-168 that it is the same signal processing unit that performs the functionality recited in Claims 5(d)-5(f).

***c) "by using all signal charges accumulated in all N number of vertically arranged pixel lines of the image sensing device, to provide N pixel lines"***

129. As I discussed for Claim 5(a), *Casio* teaches static images can be recorded with a "Computer Output Image Size" of "1280 x 960 pixels," where N = 960 vertically arranged pixel lines.



Recorded Image Size ..... 1280 x 960 pixels, 640 x 480 pixels

Standard Memory Capacity, Number of Image Files, Computer Output Image Size

| Static | | |
|---|---|---|
| 1280 x 960 | FINE | 88/13 sets (500KB / image) |
| | NORMAL | 122/16 sets (350KB / image) |
| | ECONOMY | 208/29 sets (200KB / image) |
| 640 x 480 | FINE | 268/39 sets (150KB / image) |
| | NORMAL | 327/48 sets (120KB / image) |
| | ECONOMY | 418/63 sets (90KB / image) |
| Movie File Format AVI | | |
| Approximate Total: 155 seconds/25 seconds (300KB/second)<br>• The maximum length of a single movie is 10 seconds. | | |

* When using 48MB/8MB CF card.

(*Casio*, 118). *Casio* teaches a "Standard Memory Capacity" in the above screen capture from page 118, with a number of stored static image files at a resolution of 1280x960. Therefore, *Casio* is teaching "Static" (i.e., still) images are recorded at an image size of 1280 x 960. Because N = 960 vertically arranged pixel lines as I discussed for Claim 5(a), *Casio* teaches "using all signal charges accumulated in all N number of vertically arranged pixel lines of the image sensing device, to provide N pixel lines" during "recording an image in a static image mode."

***6. Claim 5(e)***

***a) "wherein when monitoring the image in a static image mode"***

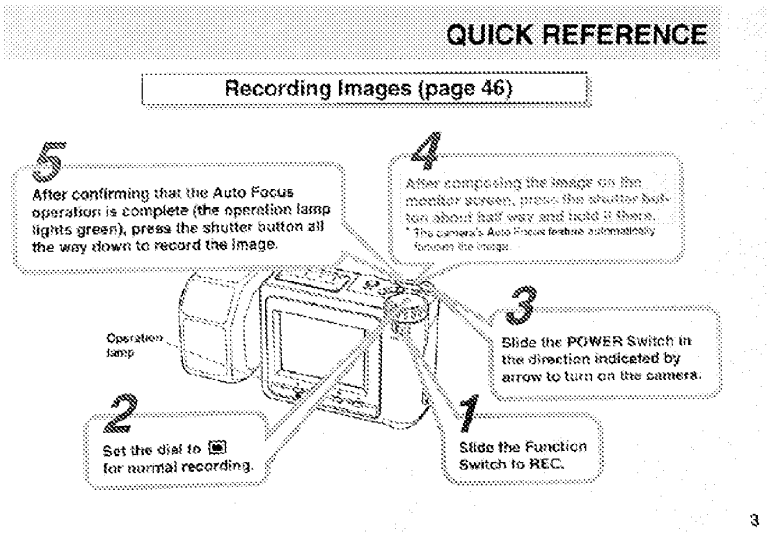
130. *Casio* teaches a mode of operation where a static or still image is monitored on the LCD. This mode of operation corresponds to when the user is composing the image, i.e., viewing the image on the LCD prior to taking or recording the image to memory.

131. *Casio* teaches the "LCD monitor" is a "Viewfinder":

**Viewfinder ..... LCD Monitor**

(*Casio*, 119). At the time of the '493 Patent, the monitor included with a digital camera was commonly referred to as a "viewfinder," where the image to be recorded is previewed on the viewfinder prior to taking or recording the image. For example, *Juen* also teaches a "display screen" can be an "electronic viewfinder." (*Juen*, 3:49-55; *see also Anderson*, 4:31-34 (stating LCD "can act as a viewfinder and as a display for captured images").

132. *Casio* also teaches the user can compose an image on the LCD monitor to view or monitor the image prior to recording. At Step 4 in the below figure, *Casio* instructs the user that "[a]fter composing the image on the monitor screen, press the shutter button about half way and hold it there. The camera's Auto Focus feature automatically focuses the image." (*Casio*, 3, 47, 57-58, 60-62, 64-69, 71-72 (further teaching "composing" an image on the LCD monitor)).

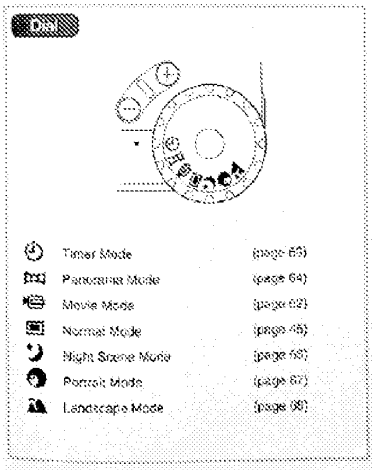



(*Casio*, 3). Once the user views the image they want to record on the monitor screen, *Casio* teaches a user should "press the shutter button all the way down to record the image." (*Casio*, 3 (Step 5),

47). *Casio* refers to the user "composing" the image on the monitor screen prior to recording the image (i.e., prior to performing the auto-focus operation and then depressing the shutter completely to record the image). In my opinion, *Casio* is teaching "monitoring" the image on the LCD monitor (i.e., viewfinder), as would have been done prior to taking or recording the image. During this mode of operation, the user can adjust the image, e.g., re-center on the LCD monitor, focus the image, or perform other actions associated with taking a photo. The ability to view the image on the LCD (per *Casio*, to "compose" the image) prior to recording allows the user to *monitor* the image on the display screen, thus teaching a "monitoring in a static image mode."

133. Casio teaches viewing and recording "static" images, such that when the user is viewing the image on the LCD while composing the image, as discussed in the previous paragraph, the user is monitoring in a *static* image mode. I first note that as discussed in ¶ 52, above, the '493 Patent seems to use the terms "still" and "static" interchangeably, and in my opinion, a skilled person would commonly use the terms synonymously. *See, e.g., '493 Patent*, 2:62–3:7 (using the terms "static" and "still" interchangeably).

134. Regarding Casio's teachings of monitoring a "static" image, Casio teaches various modes of operation, including a "Normal Mode," a "Panorama Mode," and a "Movie Mode." (*Casio*, 27). A user can select one of seven different modes by turning a dial located on the top of the camera:




(*Casio*, 27, 118). Casio expressly differentiates between a "still image" and a "movie file":

- Main Image Folder
  Contents: Image file recorded by the camera
- Main Image File
  Contents: Still image file recorded by the camera
- Preview Image File
  Contents: Preview images of still image and movie files used for temporary playback and card browser previews

Recorded Image
File Format ..... Still images (including panoramas): JPEG (Exif, Ver. 2.1), DCF standard (design rule for camera file system), DPOF compatible, Movies: AVI

Recording Medium ..... CompactFlash card

Recorded Image Size ..... 1280 x 960 pixels, 640 x 480 pixels

Standard Memory Capacity, Number of Image Files, Computer Output Image Size

| Static | | |
|---|---|---|
| 1280 x 960 | FINE | 89/13 sets (500KB / image) |
| | NORMAL | 122/18 sets (350KB / image) |
| | ECONOMY | 206/29 sets (200KB / image) |
| 640 x 480 | FINE | 268/38 sets (150KB / image) |
| | NORMAL | 327/46 sets (120KB / image) |
| | ECONOMY | 418/63 sets (90KB / image) |
| Movie File Format AVI | | |
| Approximate Total: 155 seconds/25 seconds (300KB/second)<br>• The maximum length of a single movie is 10 seconds. | | |

* When using 48MB/8MB CF card.

(*Casio*, 105, 118). In my opinion, still images, which include images taken in, for example, "normal mode," "panorama mode" (per *Casio*, 118), or "landscape mode," are *static* images. Casio teaches a "Static" image file and a "Movie" file, as shown in the above figure at page 118. Casio also refers to "Still images" at page 105, and at page 118, refers to "still images (including panoramas)" being a "recorded image file format." *Casio* thus uses the terms "still" and "static" interchangeably. Because *Casio* teaches viewing and recording static images, where a mode for doing such includes, at the least, the disclosed panorama mode at page 118 in *Casio*, *Casio* teaches monitoring in a *static* image mode. That is, I understand from *Casio* that in either of the normal or panorama mode, images are monitored or shown on the LCD monitor. Therefore, in my opinion, *Casio* teaches "monitoring in a static image mode."

***b) "the signal processing unit generates the image signals"***

135. Claim 5(e) is similar to Claim 5(d) in reciting a mode of operation and the signal generating unit generating image signals at a recited pixel interval. I refer back to my opinions

expressed at ¶¶ 116-124 that *Casio* alone or combined with *Juen* teaches a signal processing unit that generates the image signals. *See* ¶¶ 163-168, below, that it is the same signal processing unit that performs the functionality recited in Claims 5(d)-5(f).

***c) "by using pixel lines that have been mixed or culled from the N number of vertically arranged pixel lines"***

136. In my opinion, *Casio* in combination with *Juen* and/or *Takase* teaches the signal processing unit generates the image signals by "mixing or culling," as claimed.

137. *Casio* teaches reducing the pixel resolution of the N number of vertically arranged pixel lines to match a pixel resolution of the LCD (as I discuss below at ¶¶ 151-154), and *Juen* teaches reducing the pixel density (i.e., resolution) by methods including mixing the pixels. As detailed in this section, it would have been obvious to reduce the pixel resolution of N vertically arranged pixel lines by mixing the pixels for display of the image on the *Casio* LCD, including for both display of the image during monitoring in a static image mode and for recording a moving video.

138. *Casio* (as modified by *Juen*) teaches the signal processing unit generates the image signals by using pixel lines combined from the vertically arranged pixel lines. For example, the signal processing unit *uses* the combined pixel lines to generate the image on the LCD during monitoring the image in the static image mode. (*Casio*, 118). Therefore, I understand the combination of *Casio* and *Juen* to teach that when monitoring the image in the static image mode, the *Casio* signal processing unit (or as modified by *Juen's* processor 15 and converter 16) actually *uses* the combined pixel lines to generate the image signals monitored on the LCD.

139. As already discussed, the *Casio* CCD provides 1280 x 960 pixels, and the camera can store static images having 1280 x 960 pixels. The LCD pixel resolution is 555 x 220 pixels:

Monitor ..... 2.5" TFT, low-glare color HAST LCD
(122,100 pixels, 555 x 220)

(*Casio*, 119).

140. *Casio* also teaches the pixel resolution of the image is reduced to match the LCD resolution: "The image shown on the monitor screen during recording is intended for composition purposes only, so its quality does not match that of the image as recorded. The image is recorded in accordance with the quality setting made with the procedure under 'Quality Settings' on page 53." (*Casio*, 16, 53).

## Monitor Screen

### Recording

- The image shown on the monitor screen during recording is intended for composition purposes only, so its quality does not match that of the image as it is recorded. The image is recorded in accordance with the quality setting made with the procedure under "Quality Settings" on page 53.

*Id.* The "Quality Settings" includes an image size of 1280 x 960. (*Casio*, 53). Therefore, *Casio* expressly teaches the image resolution quality shown on the LCD monitor (555 x 220) is not the image quality actually recorded or stored by the digital camera, where such "Quality Settings" include an image size resolution of 1280 x 960:

## Quality Settings

The camera has three quality modes: FINE, NORMAL, ECONOMY.

- To determine the number of images that can be stored on a memory card of a different capacity, multiply the capacities in the table below, by the appropriate value.
- The actual number of images that can be stored in memory cannot be specified precisely because the amount of memory required for storage of each image differs according to image contents.

| Setting Indicator | FINE | | NORMAL | | ECONOMY | |
|---|---|---|---|---|---|---|
| Quality | Fine | | Normal | | Economy | |
| Computer Image size | 1280 x 960 pixels | 640 x 480 pixels | 1280 x 960 pixels | 640 x 480 pixels | 1280 x 960 pixels | 640 x 480 pixels |
| Number of Images [illegible] | 13 | 38 | 16 | 48 | 29 | 63 |
| Number of Images [illegible] (Default) | 68 | 268 | 122 | 327 | 206 | 418 |
| File Size (per image) | 500 KB | 150 KB | 350 KB | 120 KB | 200 KB | 80 KB |

(*Casio*, 53). I understand from these teachings in *Casio* that the digital camera reduces the pixel resolution when displaying the image on the monitor to match the LCD resolution of 555 x 220 pixels. This is why *Casio* teaches the image quality "does not match." Because *Casio* teaches the recorded image is at a quality of either 1280 x 960 or 640 x 480, and because the LCD resolution cannot display higher than 555 x 220 due to the LCD's hardware limitations (i.e., the LCD has a maximum resolution of 555 x 220), then *Casio's* teaching of the displayed image resolution not matching the recorded image resolution means the digital camera reduces the image resolution for display on the LCD. Thus, the image resolution on the LCD is less than the recorded image resolution for a static image.

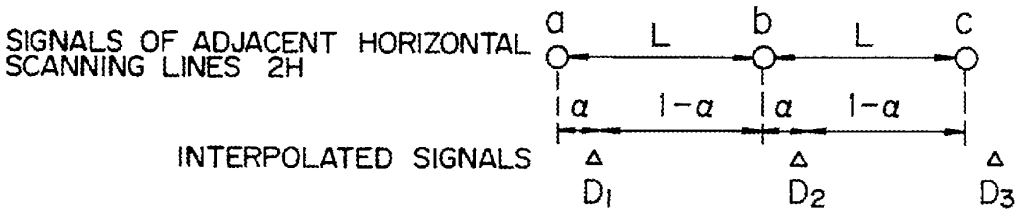
141. As I discussed above for Claim 5(a) in ¶¶ 95-103, the N number of vertically arranged pixel lines taught by *Casio* is N = 960. (*Casio*, 76, 105, 118). And as I also discussed for Claim 5(a), the signal charges are accumulated in the N = 960 vertically arranged pixel lines. Because *Casio* teaches the image quality shown on the monitor is less than that of the recorded image, and because in static image mode, an image shown (i.e., monitored) on the LCD monitor during composing of the image is shown at an image size of 555 x 220 pixels, it is my opinion a POSITA would have understood the resolution of the signal charges accumulated in the N = 960 vertically arranged pixel lines of the *Casio* CCD (or the *Casio* CCD modified to include the *Juen* CCD) is reduced to match the pixel resolution of the 555 x 220 LCD, namely 220 vertically arranged pixel lines.

142. *Juen* also teaches reducing the pixel resolution by "executing interpolation," which as I explain below, is *mixing* of the signal charges forming the pixels. *Juen* teaches a "pixel density conversion means 2" that converts the "image information" to a "pixel density that is compatible with a scan format of a display screen 25." (*Juen*, 3:45-49, Figs. 1, 10A (S5), 10B (S14)). In the embodiment of Fig. 6, the "image density converter 16 performs conversion of the pixel density by **executing interpolation**, dividing into identical blocks, thinning, and the like, to the pixel value of the image information." (*Juen,* 6:10-13, 7:53-59). *Juen* teaches the pixel density is converted for both recording in a moving video mode and for displaying on the digital camera's display. Specifically, for recording in "movie mode," the image density converter 16 "reduces the density to a pixel density" of half the original resolution (i.e., from N = 960 vertically arranged pixel lines to 480 vertically-arranged lines). (*Juen*, 7:41-58). For displaying a still image on the display screen (e.g., monitoring in a static image mode), *Juen* teaches "a still image of a high pixel density may be converted to a pixel density matching the scan format of the display screen by approximating

the pixel density conversion means 2 used during recording for use during playback." (*Juen*, 11:3-7; *see also id.* at 3:64–4:13).

143. In my opinion, *Juen's* teaching of executing interpolation to reduce the image resolution is teaching "mixing" signal charges, i.e., combining signal charges from multiple pixels, as claimed. "Interpolation" was well known in the art to comprise combining, averaging, or otherwise "mixing" the signal charges from multiple pixels. For example, *Takase* is an example of the prior art employing interpolation (specifically, an "interpolation processing circuit") that determines an interpolation coefficient [alpha] by which the pixels are interpolated. (*Takase*, 5:15-64, Fig. 1). "When the pixel signals are read out as shown in FIG. 4B, there are obtained the ***mixed*** pixel signals a, b, c as shown in FIG. 4A (hereinafter this **combination** of the **mixed** signals will be referred to as a combination A)." (*Takase,* 5:38-43). Figure 1 of Takase, which *Takase* identifies as "PRIOR ART," provides a visual example of interpolation "signals":

FIG. 1 PRIOR ART




(*Takase*, Fig. 1; *see also id.* at 1:39-54). *Takase* discloses, for example, that the multiple pixel values b and c are mixed to obtain interpolated pixel value $D_1$ according to the following equation: $D_1 = \alpha c + (1 - \alpha) \cdot b$. (*Takase*, 5:54-64, Fig. 4A). Thus, a POSITA would have understood that "interpolation," as taught by *Juen* for reducing the image resolution, means mixing or combining signal charges from multiple pixels.

144. Additionally, for the same reasons I just provided in the above paragraph, *Takase* also teaches the claimed "generates the image signals by using pixel lines that have been mixed or culled."

145. I also note the '493 Patent also describes mixing together pixels to reduce the pixel resolution. In the "Background of the Invention" section, the '493 Patent describes reducing the pixel resolution of a video camera that is to display the image on a television monitor "conforming to a television system such as NTSC and PAL." (*'493 Patent*, 1:30-50). The pixel resolution is reduced from about 480 pixel rows to about "240 scanning lines," where "the signals of two vertically adjoining pixels in each field are mixed together…to generate about 240 scanning lines…." *Id.* The '493 Patent also refers to a prior art reference, which, per the '493 Patent, "mixes or culls the pixel signals inside the image sensing device to reduce the number of signals to be read and therefore the read cycle." (*'493 Patent*, 2:44-47). A POSITA would have understood from the '493 Patent that mixing or culling pixels to reduce the pixel resolution was known in the art prior to the '493 Patent's priority date, as the '493 Patent discusses mixing and culling as known pixel resolution reduction techniques.

146. In addition to the '493 Patent's discussion of mixing and culling being known in the art, reducing pixel resolution was well known, as I discussed above in ¶¶ 47, 49, 61. Pixel resolution reduction was accomplished via different methods, including pixel averaging or addition (i.e., combining signal charges from multiple pixels) or pixel skipping, i.e., selecting a line of pixels for every predetermined number of lines. *See Horii*, 6:19-28 ("It [a signal generator] effects thinning-out by reducing the apparent number of pixels through **addition** of pixels of the same filter arranged close to teach other, or by **skipping over part of the pixels when reading them from the image taking sensor** 10."), 18:46-52; *Sato*, 7:8-32 (teaching thinning by reading

out only certain lines of pixels); *Anderson*, 10:3-45 (disclosing both pixel averaging and pixel skipping). These methods of reducing the pixel resolution were well known and routine techniques used as of the priority date of the '493 Patent.

147. A POSITA would have found it obvious and been motivated to modify the *Casio* digital camera (alone or as modified to include the *Juen* signal processing unit comprising image signal processor 15 and image density converter 16) to reduce the pixel resolution by executing interpolation (i.e., mixing) as taught by *Juen* and/or *Takase*. *Casio* performs the function of reducing pixel resolution, as discussed at ¶ 140. (*Casio,* 16). The *Juen* signal processing unit added to the *Casio* digital camera to perform the functionality taught by *Casio* would generate the image signals by mixing the signal charges accumulated in the N number of vertically arranged pixel lines (the N = 960 pixel lines of the *Casio* CCD or the *Juen* CCD) to use pixel lines (the 220 pixel lines of the *Casio* LCD monitor) separated from one another by intervals of a first distance, where the first distance = 960/220 = 4.36. As I discuss above at ¶ 61, mixing (i.e., combining pixels) was a common technique for reducing the pixel resolution. *See Anderson*, 9:66–10:44. Algorithms for performing pixel reduction were known, per *Anderson, Horii,* and *Sato*. In my opinion, the skilled person wanting to reduce the image resolution in a digital camera would look to common, well-known, and widely-used pixel reduction techniques, as the algorithms for performing the reduction would have already been developed and implemented. *Casio* already teaches performing pixel resolution conversion, so performing the conversion via mixing, per *Juen*, would have been an expected application of a known technique to a similar device (the *Casio* digital camera) in the same way (to reduce the pixel resolution). Additionally, performing the pixel reduction via mixing would have the advantage of implementing well-known techniques, lessening the development cost for a POSITA in developing new techniques for reducing pixel resolution, and facilitating

ease of integration and conformity when connecting the *Casio* digital camera to other equipment, such as an external monitor. (*Casio*, 98-101 (discussing connecting to other equipment)). And as I discussed above at ¶ 145, the '493 Patent discusses mixing was a known method for reducing the pixel resolution of an image. In my opinion, there would have been a reasonable expectation of success in the combination, as the *Casio* digital camera already performed some pixel resolution conversion, indicating the *Casio* camera already had the hardware, software, or firmware to perform the mixing. Alternatively, it would have been well within a POSITA's expertise to modify the *Casio* camera to perform mixing, per *Juen* or as admitted by the '493 Patent as being well known, as the skilled person designing digital cameras would have been well aware of the hardware considerations for performing mixing (e.g., a signal processor and algorithms for performing the combining operation). Modification of the *Casio* camera would thus entail hardware/software changes well within the skilled person's knowledge. Therefore, it would have been obvious to a POSITA to incorporate *Juen's* "interpolation" to reduce the pixel resolution into the *Casio* digital camera or as otherwise admitted as well known in the art by the '493 Patent.

148. I have also been asked to opine about the Patent Owner's argument in the '597 IPR that "pixels cannot be divided into fractions of themselves." ('597 IPR PO Prelim. Response at 62). In my opinion, the Patent Owner is incorrectly understanding digital camera technology. Specifically, Patent Owner is incorrect that mixing cannot be performed on a "fraction" of an interval (I am using the term used by the Patent Owner, and in my opinion, a POSITA would not normally refer to a "fraction" of a pixel). I just discussed above at ¶ 143 the technique of *interpolation*, which is described in *Takase* as including *mixing* of the pixels. (*Takase*, 5:15-22). Notably, *Takase* discloses mixing the signal charges from more than one pixel to obtain an output pixel at a whole pixel interval or a "fractional" pixel interval, using equations that do not require

dividing pixels. (*See Takase* at 1:39-54, 5:15-64, Fig. 1, Fig. 4A.) The Patent Owner mistakenly believes mixing signal charges to provide pixel lines at a fractional pixel interval requires *dividing* pixels. However, in my opinion, a POSITA would have understood the interpolation technique taught in both *Juen* and *Takase* would not have required *dividing* pixels.

149. For example, *Takase* discloses that interpolation can be performed at a fractional pixel interval:

> When the control unit 9 **fine adjusts** the moving amount of the scanning area at the unit of ***smaller than the pixel unit*** in response to the handling amount detected by the vibration detection sensor 12, the **interpolation coefficient** [alpha] **corresponding to this fine adjustment amount** is set in the interpolation processing circuit 7. Then, the control circuit 9 supplies data to the interpolation processing circuit 7 such that the above-mentioned fine adjustment is equivalently carried out by the interpolation processing using this interpolation coefficient [alpha] as shown in FIG. 1.

(*Takase*, 5:23-32). Here, *Takase* is teaching that when fine adjustments are made to account for vibration, then interpolation at "smaller than the pixel unit" is performed to obtain the interpolation coefficient. Therefore, Patent Owner is incorrect that interpolation of pixel lines (i.e., *mixing* of pixel lines) cannot be performed at "fractional" intervals.

150. Additional evidence of "fractional" pixel mixing (again, using the Patent Owner's language) is U.S. Patent No. 6,963,361 to *Kawahara* (Ex. 1028), which describes pixel interpolation at K values less than 1 when referring to "fine pixel shifting":

> In order to initiate the fine pixel shifting, it is necessary to determine **a distribution ratio K between two adjacent pixels** in step S404. At first, distribution ratio $K_V$ in the vertical direction will be described. In the second embodiment, the distribution ratio in the **vertical direction $K_V$** is determined in accordance with $Dec(V_0)$ or $1+Dec(V_0)$, and **is determined to be as 1/8 or 7/8**.

(*Kawahara*, 16:24-30). *Kawahara* discusses "fine pixel shifting **with shift amount of less than one pixel**" and performing "interpolations."[3] *Id.* at 16:18-21, 16:31-54, Fig. 19. Interpolation uses two or more pixels as an input and interpolates by mixing of pixels to end up with a given number of pixels as an output. For example, if interpolating (i.e., mixing) at intervals of 4.36 pixels, which is a fractional number between 4 and 5, the system must generate a pixel value corresponding to a position that is 36 hundredths (36/100 or 0.36) of the distance between the 4th neighboring pixel and the 5th neighboring pixel. The well-known equation disclosed by *Takase* for calculating the interpolated pixel value for this example is $\text{InterpolatedValue} = \alpha \cdot \text{Nbr5Value} + (1 - \alpha) \cdot \text{Nbr4Value}$, where $\alpha = 0.36$, Nbr4Value is the value of the 4th neighboring pixel, and Nbr5Value is the value of the 5th neighboring pixel. (*See Takase*, 5:54-64, Fig. 4A).

***d) "to only include pixel lines separated from one another by intervals of a first distance"***

151. I understand that to only include pixel lines separated from one another by intervals of a first distance to mean providing pixel lines at intervals greater than or equal to one pixel, i.e., providing no more than N vertically arranged pixel lines. In my opinion, *Casio* teaches including

[3] I note *Kawahara*, 16:31-36 discusses that "fine pixel shifting with shift amount of less than one pixel would deteriorate resolution at interpolated pixels because the interpolations are made between two pixels with two pixel distance apart." As *Kawahara* points out, some deterioration in resolution is expected whenever performing interpolation (mixing) of the pixels, as interpolation involves adding up the data from multiple pixels in the form of a weighted sum. *Kawahara's* invention is addressing resolution unevenness in the generated image while still maintaining a high resolution, thus avoiding deterioration due to interpolation. (*Kawahara*, 9:3-28, 16:36-39). Note that the '493 Patent instead uses the term *resolution* to relate to the number of pixels in an image.

pixel lines separated from one another by intervals of a first distance during monitoring in a static image mode.

152. *Casio* teaches the LCD monitor has a resolution of 555 x 220 pixels and that the image displayed on the monitor is at a resolution of 220 vertically arranged pixel lines. *Casio* teaches an LCD "monitor" with 122,100 pixels at a resolution of 555 x 220:

Monitor ..... 2.5" TFT, low-glare color HAST LCD
(122,100 pixels, 555 x 220)

(*Casio*, 119). As I discussed above at ¶ 140, *Casio* teaches, "[t]he image shown on the monitor screen during recording is intended for composition purposes only, so its quality does not match that of the image as recorded. The image is recorded in accordance with the quality setting made with the procedure under 'Quality Settings' on page 53." (*Casio*, 16, 53). The image resolution quality shown on the LCD monitor is thus not the image quality actually recorded or stored by the digital camera. The "Quality Settings" mentioned at *Casio*, page 16 as listed at *Casio*, page 53 are shown below:

## Quality Settings

The camera has three quality modes: FINE, NORMAL, ECONOMY.

- To determine the number of images that can be stored on a memory card of a different capacity, multiply the capacities in the table below, by the appropriate value.
- The actual number of images that can be stored in memory cannot be specified precisely because the amount of memory required for storage of each image differs according to image contents.

| Setting Indicator | FINE | | NORMAL | | ECONOMY | |
|---|---|---|---|---|---|---|
| Quality | Fine | | Normal | | Economy | |
| Computer Image size | 1280 x 960 pixels | 640 x 480 pixels | 1280 x 960 pixels | 640 x 480 pixels | 1280 x 960 pixels | 640 x 480 pixels |
| Number of images [illegible] memory card | 10 | 39 | 16 | 48 | 29 | 53 |
| Number of images [illegible] memory card (Option) | 68 | 268 | 122 | 327 | 205 | 418 |
| File Size (per image) | 500 KB | 150 KB | 350 KB | 120 KB | 200 KB | 90 KB |

(*Casio*, 53). The "Quality Settings" include an image size resolution of 1280 x 960. At both the 1280 x 960 and 640 x 480 image sizes recorded by the digital camera, neither of these sizes can be displayed on the LCD monitor. This is because the LCD monitor is only capable of displaying an image at a resolution up to the maximum resolution of the LCD monitor itself, i.e., 555 x 220 pixels. *See, e.g., Sato,* 1:44-52 ("The display, which indicates the image, includes an inherent resolution which is a maximum permissible resolution."). *Juen* also recognizes this well-understood limitation that the pixel resolution of the image from the CCD is reduced to match the pixel resolution (referred to in *Juen* as "scan format") of the display screen. (*Juen,* 2:16-18, 11:3-

7; *see* ¶ 78). Therefore, in static image mode, any image displayed (i.e., monitored) on the LCD in *Casio* during composing of the image is shown at an image size of 555 x 220 pixels.

153. It also would have been obvious to display the static image on the LCD monitor during composing the image at an image size of 555 x 220, to the extent *Casio* does not already teach such. As discussed in the preceding paragraph, the monitor resolution taught by *Casio* is 555 x 220 pixels. In my opinion, a POSITA would have designed the camera to take full advantage of the LCD resolution capabilities when displaying the image on the monitor while composing the image so as to display to the user the highest resolution image possible within the hardware limitations of the LCD.

154. With the understanding that the image displayed on the *Casio* monitor during composing the image, i.e., during monitoring in a static image mode, is 220 vertically arranged pixel lines, it can then be shown that *Casio* teaches the image signals are mixed or culled to provide pixel lines only at pixel intervals of a first distance. As discussed at ¶¶ 110-112, above, N = 960 vertically arranged pixel lines are output by the *Casio* CCD (or *Casio* as modified to include the *Juen* CCD). When N = 960 is reduced to 220, then the pixel lines displayed on the LCD during monitoring in a static image mode are provided at pixel intervals of a first distance = 960/220 = 4.36.

### *7. Claim 5(f)*

#### *a) "wherein when recording the image in a moving video mode"*

155. *Casio* teaches "recording the image in a moving video mode." When the dial is turned to "Movie Mode," a user "can record movies that are approximately 10 seconds long":

## Movie Recording

You can record movies that are approximately 10 seconds long. Movies are recorded in 320 x 240-pixel AVI format. For details, see "Using the Record Menus" on page 75.
There are two types of movie recording: PAST and NORMAL. PAST lets you capture images of events that occurred before you pressed the shutter button while NORMAL records what happens after you press the shutter button.
See "Using the Record Menus" on page 75 for details on how to select the movie length.

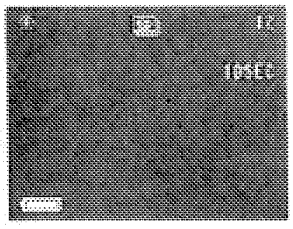
- AVI files can be displayed and saved on a computer that is set up to support use of CompactFlash cards. For such a computer, install QuickTime 3.

### NORMAL

1. Slide the Function Switch to REC.

(*Casio*, 61). To record a movie, Casio teaches for Step "2. Align the dial with the to select Movie Recording Mode" and Step "3. Compose the image and then record it":

2. Align the dial with to select Movie Recording Mode.



3. Compose the image and then record it.

- Auto Focus automatically adjusts in accordance with the movement of the subject.
- See "Playing Back a Movie" on page 80 for details on playing back a movie.
- Movie recording stops automatically 10 seconds after you start the record operation.
- To stop recording before the 10-second period is up, press the shutter button.

(*Casio*, 62).

156. The "movie" recorded by *Casio* is a "video," as the movie is recorded in an "AVI format." (*Casio*, 61). The AVI format is a well-known and recognized standard video format. *See Baumgartner*, Ex. 1017, 3:41-45 (teaching AVI is a format enabling video to be played on PCs with standard VGA displays)). Casio further teaches the camera can be connected to an external display screen via a VIDEO OUT terminal, where the recorded video can be displayed according to the NTSC or PAL standards, further indicating the camera records in a moving video mode. (*Casio*, 10, 78, 119). Therefore, I understand from at least these teachings that *Casio* discloses a "recording in a moving video mode."

***b) "the signal processing unit generates the image signals"***

157. Claim 5(f) is similar to Claim 5(d) in reciting a mode of operation and the signal generating unit generating image signals at a recited pixel interval. I refer back to my opinions expressed at ¶¶ 116-124 that *Casio* alone or combined with *Juen* teaches a signal processing unit that generates the image signals. See ¶¶ 163-168 below that it is the same signal processing unit that performs the functionality recited in Claims 5(d)-5(f).

***c) "by using a portion, or the entirety of, pixel lines that have been mixed or culled from the N number of vertically arranged pixel lines"***

158. Regarding the claimed "mixing or culling," I refer back to my opinions at ¶¶ 137-147 that *Casio* combined with *Juen* and/or *Takase* teaches the mapped signal processing unit generates the image signals by mixing signal charges, i.e., by combining signal charges from multiple pixels. And *Takase* teaches *mixing* pixels to perform fine pixel resolution reduction. (*Takase,* 4:20-29, 5:15-49). I also note that the *Casio* camera teaches recording moving video image signals in the AVI format for the movie mode at an image resolution of 320 x 240 pixels. (*Casio*, 61). To reduce the image resolution from the N = 960 vertically arranged pixels, as taught by either *Casio* or *Juen*, to 240 vertically arranged pixels (in the 320 x 240 AVI format for movie

recording) means the *Casio* digital camera also reduces the pixels when recording during a moving video mode. *Juen* teaches reducing the pixels for moving video recording, including by mixing (i.e., combining) the pixels. (*Juen*, 7:44, 7:53-56).

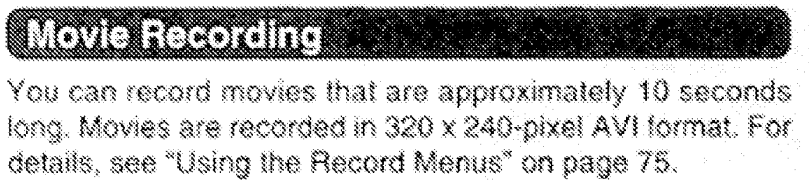
159. *Casio* (as modified by *Juen*) teaches the signal processing unit generates the image signals by using pixel lines combined from the vertically arranged pixel lines. For example, the signal processing unit *uses* the combined pixel lines to generate the image signals in a moving video mode. (*Casio*, 61, 118). When generating the image signals for recording in the moving video mode in an AVI format, the mapped *Casio* signal processing unit *uses* the combined pixel lines. Therefore, I understand the combination of *Casio* and *Juen* to teach that when recording the image in a moving video mode, i.e., when recording in the AVI format, the *Casio* signal processing unit (or as modified by *Juen's* processor 15 and converter 16) actually *uses* the combined pixel lines to record the moving video image. Because *Casio* teaches using the combined pixel lines when recording in the AVI format, I understand *Casio* (as otherwise modified by *Juen*) to teach the camera must be using a portion of, or the entirety of, the combined pixel lines.

160. Therefore, for reasons similar to those discussed above, a POSITA would have found it obvious and been motivated to modify the *Casio* digital camera (alone or as modified to include the *Juen* signal processing unit comprising image signal processor 15 and image density converter 16) to reduce the pixel resolution according to the mixing technique taught by *Juen* and specifically during recording in a moving video mode. *Casio* expressly teaches the image resolution is reduced for movie recording to a 320 x 240 pixel AVI format, and *Juen* expressly teaches executing interpolation, i.e., mixing, and reducing the pixel resolution for moving video recording. Because mixing is a common technique for reducing the pixel resolution, a skilled person would reduce the pixel resolution in *Casio* according to well-known and accepted pixel

reduction techniques (as taught by *Juen*) to reduce development costs and facilitate ease of integration and conformity of the other *Casio* digital camera components. *Casio* already teaches performing pixel resolution conversion, so performing the conversion via mixing, per *Juen*, would have been an expected application of a known technique to a similar device (the *Casio* digital camera) in the same way (to reduce the pixel resolution). There would have been a reasonable expectation of success in the combination, as the *Casio* digital camera already performed some pixel resolution conversion, indicating the *Casio* camera already had the hardware, software, or firmware to perform the mixing or culling.

***d) "to only include pixel lines separated from one another by intervals of a second distance, where the second distance is different from a first distance"***

161. In "Movie Recording," the *Casio* camera records video in a 320 x 240-pixel AVI format:




(*Casio*, 61). The CCD provides a pixel resolution of 1280 x 960, where N = 960. (*Casio*, 76, 118). For the "Movie Recording," the *Casio* camera reduces the image signals from the CCD from a value of N = 960 vertically arranged pixel lines to 240 vertically arranged pixel lines. Thus, the vertically arranged pixel lines recorded during the moving video mode are provided at pixel intervals of a second distance = 960/240 = 4.00.

162. *Casio* also teaches "the second distance is different from the first distance." As I discussed in ¶ 147, first distance = 4.36. Because first distance = 4.36 and second distance = 4.00,

and 4.36 ≠ 4.00, then first distance ≠ second distance, such that the second distance is different from the first distance.

### *8. The Same "Signal Processing Unit" Performs the Functionality of Claims 5(d)-5(f)*

163. In my opinion, the same signal processing unit, as recited in Claim 5(b), and as met by *Casio* (alone or as combined with *Juen*) performs the functionality recited in Claims 5(d)-5(f) of generating the image signals to provide pixel intervals of a first distance (Claim 5(e)), generating the image signals to provide pixel intervals of a second distance (Claim 5(f)), and generating the image signals by using all signal charges to provide N pixel lines (Claim 5(d)). That is, the signal processing unit mapped for Claim 5(b) performs the functionality recited in Claims 5(d)-5(f). Alternatively, it would have been obvious for the *Casio* digital camera's *signal processing unit* (whether the signal processor implicitly or inherently taught by *Casio* or the signal processor of *Casio* modified with *Juen's* image signal processor 15 and image density converter 16), as opposed to some other processor, to perform the claimed functionality of Claims 5(d)-5(f).

164. Claim 5(b) recites a signal processing unit that generates image signals by processing the output signals of the image sensing device. Regarding the mixing or culling at intervals or either a first distance or a second distance, it would have been reasonable and expected for this same signal processing unit to perform the mixing or culling, as frequently the same signal processor is going to read out the signals from the CCD and perform image processing to generate the image. Additionally, the signal processing unit is the processor that generates the image signals, and so I understand *Casio's* signal processing unit (as taught by *Casio* or modified by *Juen*) to perform the disclosed pixel reduction in *Casio* (*Casio,* 16) to generate the image signals or, alternatively, such would have been obvious. A digital camera designer would program the processor to receive the CCD data, perform any signal processing (such as pixel resolution

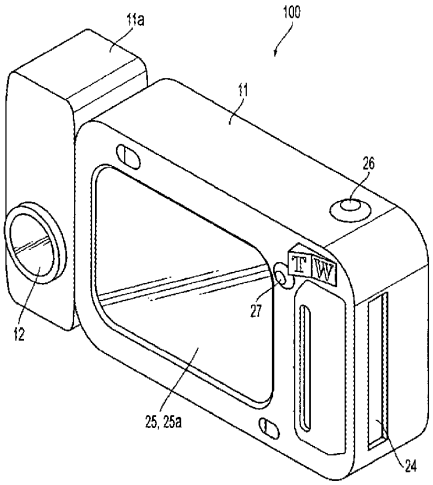
reduction), and generate the image for display or storage. *See, e.g., Anderson*, 4:9-34 (discussing a DSP receiving raw CCD image data and performing image processing). Modifying (to the extent any modification is needed) of the *Casio* digital camera's signal processor to perform the mixing or culling to provide the decreased resolution for the LCD monitor or for storage during the moving video mode would have been a common sense implementation of a signal processing unit as expected for use in a digital camera performing the disclosed functionality of *Casio*. Therefore, *Casio* either teaches or renders obvious the *Casio* signal processor (alone or as modified by *Juen* per Claim 5(b)) implementing standard pixel conversion techniques.

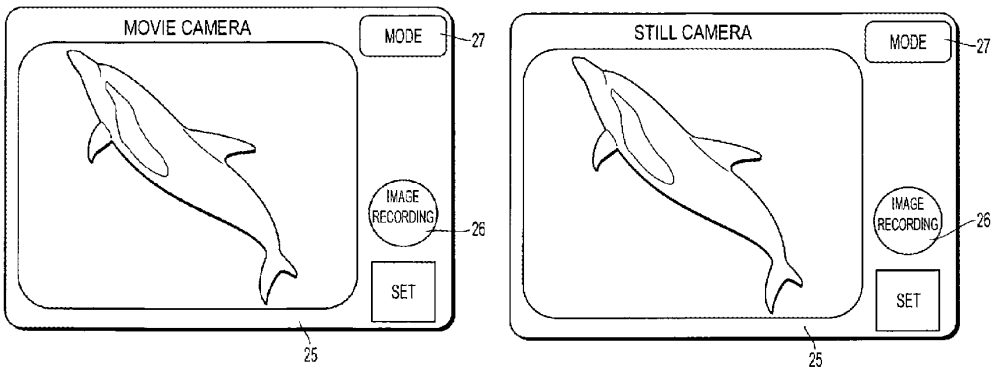
165. Similarly, for the functionality claimed in Claim 5(d), the mapped signal processing unit for Claim 5(b) either performs the claimed function of Claim 5(d) of generating the image signal by using all signal charges to provide N pixel lines, or such would have been obvious. Similar to my opinions regarding the same signal processing unit performing the mixing and culling, I understand from *Casio* or otherwise find it obvious that this same signal processing unit would use all signal charges in generating the image signal. In my opinion, any modification of the *Casio* digital camera (to the extent needed) would involve simply using the signal processing unit to generate and store an image at the full resolution of the CCD, as opposed to using the signal processing unit for mixing and culling.

166. A digital camera designer would have desirably used the same processor for mixing or culling the signal charges or using all the signal charges for ease of installation and design, lower cost, lower weight of the digital camera, and less possibility for malfunction. It would have been common sense to use the same signal processing unit to generate the image at N pixel lines and to mix or cull the signal charges for intervals of a first or second distance so as to avoid duplicative processors for performing similar functionality. A digital camera designer would have

programmed the processor to receive the CCD data, perform any signal processing (such as pixel resolution reduction), and generate the image for display or storage. *See, e.g., Anderson*, 4:9-34 (discussing a DSP receiving raw CCD image data and performing image processing). Programming of a single signal processing unit to ensure system compatibility would have been desirable. A POSITA would thus have understood and been reasonably motivated to use the same signal processing unit for reducing the pixel resolution when monitoring in a static image mode on the display or recording a movie (video) or reading out all signal charges when recording a static image to accomplish desirable ease of manufacture and lower cost.

167. *Juen* also expressly teaches the same signal processing unit performing mixing or culling of signal charges and using all signal charges. *Juen* teaches an electronic camera that includes both a movie recording mode and a still image mode:






(*Juen,* Figs. 8, 16-17, 5:42-52, 7:36-50). As I discussed for Claim 5(b), *Juen* teaches a "signal processing unit" comprising a picture image signal processor 15 and an image density converter 16 that collectively receive the output from the CCD, process the output into image signals, and convert the pixel resolution of the image signal. *Juen* also teaches the picture image signal processor shares the still image and moving image recording processes, thus indicating the same processor performs image generation for the still recording and movie recording modes. (*Juen*, 9:52-58; *see also id.* at 3:45-55). *Juen* also teaches the image is shown on the included display 25 during both monitoring in a static image mode and when monitoring the moving video. (*Juen,* 7:36-40 ("after the liquid crystal display screen 25 is changed to the display used for the still mode"), Figs. 7-8 and 16-17, 7:51-53 (teaching the image density converter 16 retrieving image information that has been digitized from camera part 11a, shown in Fig. 7 as including DSP 15, i.e., the image signal processor)).

168. A POSITA would have found it obvious to and would have been motivated to modify the digital camera disclosed in *Casio* to include the *Juen* signal processor 15 and image density converter 16 for generating the image signals by mixing or culling at intervals of a first distance when displaying on the LCD, for generating the image signals by mixing or culling at intervals of a second distance when recording in a moving video mode, or for using all signal

charges when recording a static image, each of which is otherwise taught by *Casio*. Because *Juen* teaches a digital camera including both the still and moving video modes, and further because *Juen* teaches converting the pixel resolution of the CCD image to match a suitable scan format of the display (*Juen*, 3:56–4:13), the *Juen* camera is operable to perform the generation of image signals for various modes of operation. It would have been obvious to modify the *Casio* digital camera to include *Juen's* signal processor and converter to accomplish the functionality already disclosed in *Casio* of recording movies in 320 x 240 resolution, recording static images at a 1280 x 960 resolution, and monitoring in a static image mode on the LCD for composing the image. Using the same signal processing unit for performing the mixing or culling at different pixel intervals or using all signal charges would have entailed use of *Juen's* known signal processor and converter with the similar digital camera of *Casio* to improve the *Casio* digital camera in the same way. There would have been a reasonable expectation of success given that both *Casio* and *Juen* disclose digital cameras operable to generate image signals in various modes of operation. The hardware and software configurations to be made to the *Casio* digital camera (to the extent needed) would have included adding the *Juen* signal processor and converter to perform the already-disclosed functionality in *Casio* of generating the image signals from the 1280 x 960 CCD at a lesser resolution for movie recording (i.e., the disclosed 320 x 240 resolution in *Casio*) and for monitoring in a static image mode on the LCD. Because *Casio* already teaches the modes of operation and claimed functionality, any software or firmware changes would either be minimal or well within the skilled person's expertise. Additionally, it would have been desirable to use the same signal processing unit for the reasons I discussed in ¶ 166, above, including ease of installation and design, lower cost, lower weight of the digital camera, less possibility for

malfunction, simpler programming, and ensuring compatibility with other hardware and software components of the camera.

## VII. OPINIONS REGARDING THE COMBINATION OF *CASIO* IN VIEW OF *JUEN* AND/OR *TAKASE* AND FURTHER IN VIEW OF *MISAWA* FOR CLAIM 6

169. I have been asked to opine as to whether *Misawa* teaches (a) an image-instability detector, as recited in claim 6 of the '493 Patent.

### A. Claim 6

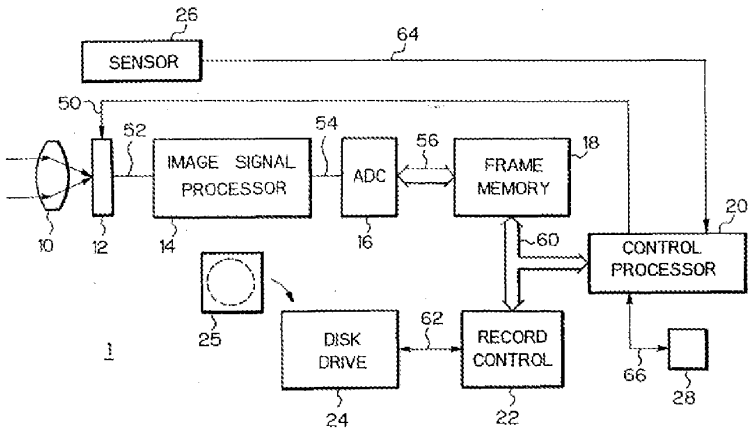
#### *1. Claim 6[Pre]: "An electric camera according to the claim 5"*

170. I note that Claim 6 depends directly from Claim 5. I incorporate my opinions and analyses provided for Claim 5 into this discussion of Claim 6.

#### *2. Claim 6(a): "further comprising: an image-instability detector which detects an image-instability of the electric camera"*

171. *Misawa* teaches an image instability detector. *Misawa* teaches a digital electronic camera for recording still images and video frames. (*Misawa*, Title). *Misawa* includes a "sensor 26 for sensing movement or viblation [sic] of camera 1," shown in Fig. 1, and the sensor may be a "piezoelectric gyroscopic transducer…adapted to sense any mechanical movement." (*Misawa*, 3:7-8, 4:60–5:8).

*Fig. 1*




(*Misawa*, Fig. 1).

172. *Misawa* teaches a detector, namely sensor 26, that may be a gyroscopic transducer. (*Misawa*, 3:7-8, 4:60–5:8). This gyroscopic transducer is a gyroscopic sensor or the like, capable of detecting an image instability of the camera.

173. Additionally, the *Misawa* sensor 26 detects instability caused by vertical and/or horizontal movement of the electric camera. *Misawa* teaches "movement detector 314 receives a movement signal from sensor 26" and "generates movement data representing how digital camera moves or vibrates," which is "delivered to correction processor 316." (*Misawa*, 8:7-16, 7:30-33 (compensating for "unintentional movement")). A POSITA would have understood "movement data" generated based on information from the gyroscopic transducer (sensor 26) is indicative of instability caused by vertical and/or horizontal movement of the video camera."

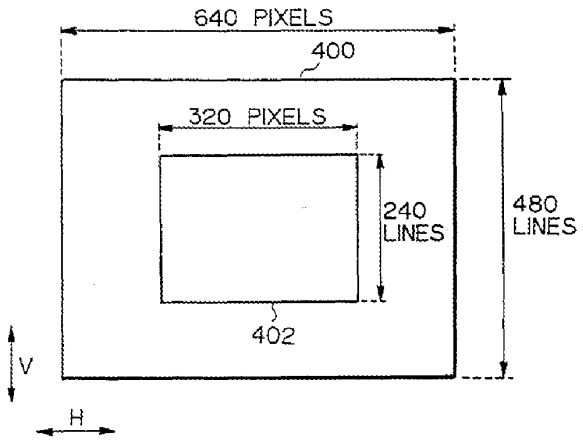
***3. Claim 6(b): "wherein when recording in the moving video mode, in order to correct the image-instability, the signal processing unit generates the image signals by changing the pixel lines used, and the portion of the pixel lines used, according to an amount of image-instability detected by the instability detector"***

174. As I discussed for Claim 5(b), *Casio* in view of *Juen* teaches a signal processing unit that generates image signals. As I also discussed for Claim 5(f), *Casio* in view of *Juen* teaches during the moving video mode, the signal processing unit generates the image signals by using a portion of, or the entirety of pixel lines which have been mixed or culled from the N number of vertically arranged pixel lines. *Misawa* further teaches changing the pixel lines used, and the portion of the pixel lines used, according to an amount of image-instability detected by the instability detector to correct the image-instability.

175. *Misawa* teaches an "image sensor 12 for producing pixel signals associated with the optical image thus formed." (*Misawa*, 2:55-59). *Misawa* also teaches "an image signal processor 14 for processing the pixel signals produced to develop image signals representative of the optical image captured." (*Misawa*, 2:55-61, 3:14-48, 6:32-37 (teaching moving picture mode and informing correction processor 316 that movie mode is selected)). Because *Misawa* teaches a moving picture mode and that correction processing is done in this mode, *Misawa* teaches that when recording in the moving video mode, generating image signals to correct image instability.

176. *Misawa* teaches "read-out processor 308 is also adapted to compensate for blur which would otherwise be caused by unintentional movement of camera 1" and "responds to correction data provided from correction processor 316." (*Misawa*, 7:30-35, 9:49-56). As shown in Figure 4B, "read-out processor 308 changes in response to the correction signal the position of area 402 within the imaging field 400 and generates the address representing the altered position of area 402." (*Misawa*, 7:40-43, 9:52-61 (teaching correcting the position of area 402 for imaging field 400 when in movie picture mode)).

Fig. 4B




(*Misawa*, Fig. 4B, 9:57–10:2 (teaching consecutively reading out the correction position data for area 402 during the movie picture mode)). "Area 402 is smaller than the entire frame 400, thus utilizing portions of the image data associated with a peripheral portion adjacent to and surrounding area 402 for the purpose of compensating for blur." (*Misawa*, 10:39-51, 10:8-15 (teaching compressing and recording to memory the movie image frames), 2:9-15).

177. *Misawa* thus teaches that when recording in the movie image mode and to correct image-instability (i.e., blur), the image signals are generated by changing the part of pixel lines used from the image data (field 400), and a portion of the pixel lines is used (area 402) according to the correction data indicative of an amount of image-instability detected by sensor 26.

178. A POSITA would have found it obvious to and would have been motivated to include an image instability detector, as taught by *Misawa*, in the camera of *Casio* (as modified by *Juen*) to compensate for image blur. (*Misawa*, Abstract). It also would have been obvious to a POSITA to generate the image signals by changing the pixel lines, as taught by *Misawa*, in the camera of *Casio* (as modified by *Juen*) to compensate for image blur. *Casio* recognizes the need

for an image instability detector, as the camera includes a "Camera shake indicator," thus indicating the camera already includes a sensor for determining the movement of the camera. (*Casio*, 30). *Misawa* further teaches the need for compensating for movement of the camera during a movie recording mode. (*Misawa*, 2:9-15). Applying *Misawa's* technique would have been met with a reasonable expectation of success given the *Casio* camera already indicates a camera shake indicator and, therefore, some detector is used. Modifying the hardware and software components would have entailed incorporating a sensor as taught by *Misawa* and the algorithm disclosed in *Misawa*, both of which would have been within the expertise of a POSITA. Additionally, the *Misawa* method would have been particularly desirable for adding to the *Casio* camera given that *Misawa* recognizes the desire to "permit the size of the visualized image frame to continuously be changed during imaging operation …." (*Misawa*, 7:19-29). A POSITA would have understood the *Misawa* method may be implemented efficiently by the *Casio* camera when switching between static and movie recording modes and without increasing processing time. *Misawa* specifically discusses the advantage of being able to record movie videos at the same pixel signal transfer rate as still images while compensating for blur caused by unintentional movement. (*Misawa*, 11:11-30).

**[REMAINDER OF PAGE INTENTIONALLY LEFT BLANK]**

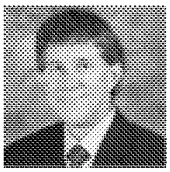
## VIII. CONCLUSION

I declare that all statements made herein of my knowledge are true, and that all statements made on information and belief are believed to be true, and that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Date: December 10, 2020

By: 
Jeffrey J. Rodriguez

# Jeffrey J. Rodriguez, Ph.D.



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## Overview

Prof. Rodriguez has extensive experience in the field of electrical and computer engineering. His areas of expertise include image/video/signal processing and analysis, biomedical data analysis, communication systems, microprocessor systems, electric circuits, and related software development. At the University of Arizona, he is a faculty member in the Dept. of Electrical and Computer Engineering and Director of the Signal and Image Laboratory (SaIL).

He served as Co-Director of Connection One, a National Science Foundation multi-university research center on communication circuits and systems. In addition to more than 150 publications in the field, he has been very active in professional activities as a Senior Member of the Institute of Electrical and Electronics Engineers (IEEE) Signal Processing Society.

Prof. Rodriguez served as General Chair of the 2016 IEEE Southwest Symp. on Image Analysis and Interpretation (SSIAI). In addition, during 2005–2011 he served on the IEEE Signal Processing Society Technical Committee on Image, Video, and Multidimensional Signal Processing. He served as General Chair of the 2007 IEEE Intl. Conf. on Image Processing (ICIP), as well as General Chair of SSIAI 2014, General Chair of SSMSD 2003, General Chair of SSIAI 1998, and Vice Chair of SSIAI 2004, as well as positions on numerous other professional committees. From 1996 to 2000, Prof. Rodriguez was Associate Editor of the journal, *IEEE Transactions on Image Processing.*

## Expertise

Image processing & analysis (filtering, enhancement, segmentation, pattern recognition, restoration, super-resolution, JPEG, watermarking, inpainting, etc.)

Video processing & analysis (filtering, enhancement, segmentation, pattern recognition, motion estimation, tracking, MPEG, watermarking, etc.)

Signal processing & analysis (speech, audio, filtering, Fourier analysis, etc.)

Biomedical data analysis

Computational photography (deblurring, enhancement, high dynamic range imaging, super-resolution, etc.)

Communication systems (cellular communication systems, signal conditioning, data compression, image & video communication, etc.)

Microprocessor systems (architecture, interfacing, programming, GPUs, etc.)

Electric circuits (analog and digital)

Software analysis (C, C++, MATLAB, etc.)

## Education

Ph.D., The University of Texas at Austin, Electrical Engineering, May 1990

S.M., Massachusetts Institute of Technology, Electrical Engineering, June 1986

B.S., The University of Texas at Austin, Electrical Engineering, May 1984

## Employment

- 1990–present: The University of Arizona, Dept. of Electrical and Computer Engineering
  - 1997–present, Associate Professor of Electrical and Computer Engineering, with tenure
  - 2000–2003, 2005–2016: Director of ECE Graduate Studies
  - 2002–present: Faculty member in the Biomedical Engineering Graduate Interdisciplinary Program
  - 2009–2014, Director of Image Analysis, Cancer Imaging Shared Services, Arizona Cancer Center
  - 2003–2008: Co-Director of Connection One, a National Science Foundation industry/university cooperative research center for communication circuits and systems
  - 1990–1997: Assistant Professor of Electrical and Computer Engineering
- 1986–1990: The University of Texas at Austin, Graduate Research Assistant in Dept. of Electrical Engineering
- 1985: Massachusetts Institute of Technology, Graduate Research Assistant in Dept. of Electrical Engineering
- 1982–1985 (summers): IBM Corp. (Austin, Texas) – hardware design and system programming
- 1980–1981 (summers): Texas Instruments, Inc. (Austin, Texas) – software quality assurance

## Consulting

Deposed 12 times. Testified in court 5 times.

*Confidential IPR Matter*
Dates: Feb. 2020 – present

*Confidential IPR Matter*
Dates: Feb. 2020 – present

*Inter Partes Review of Patent No. 6,349,154*, Case IPR2020-00479
Court: U.S. Patent and Trademark Office, Patent Trial and Appeal Board
Dates: June 2019 –
Client: Google LLC (pet.)
Patent Owner: Uniloc 2017 LLC
Counsel: Paul Hastings LLP
Technology: Image and video data compression systems

*Inter Partes Review of Patent No. 6,329,934*, Case IPR2020-00448
Court: U.S. Patent and Trademark Office, Patent Trial and Appeal Board
Dates: June 2019 –
Client: Google LLC (pet.)
Patent Owner: Uniloc 2017 LLC
Counsel: Paul Hastings LLP
Technology: Image and video data compression systems

*Inter Partes Review of Patent No. 6,329,934*, Case IPR2020-00447
Court: U.S. Patent and Trademark Office, Patent Trial and Appeal Board
Dates: June 2019 –
Client: Google LLC (pet.)
Patent Owner: Uniloc 2017 LLC
Counsel: Paul Hastings LLP
Technology: Image and video data compression systems

*Inter Partes Review of Patent No. 9,769,477*, Case IPR2019-01035
Court: U.S. Patent and Trademark Office, Patent Trial and Appeal Board
Dates: April 2019 –
Client: Google LLC (pet.)
Patent Owner: Realtime Adaptive Streaming LLC
Counsel: Paul Hastings LLP
Technology: Image and video data compression systems
Deposed Feb. 2020

*Inter Partes Review of Patent No. RE46,777*, Case IPR2019-01037
Court: U.S. Patent and Trademark Office, Patent Trial and Appeal Board
Dates: April 2019 –
Client: Google LLC (pet.)
Patent Owner: Realtime Adaptive Streaming LLC
Counsel: Paul Hastings LLP
Technology: Image and video data compression systems

*Inter Partes Review of Patent No. 7,386,046*, Case IPR2019-01033
Court: U.S. Patent and Trademark Office, Patent Trial and Appeal Board
Dates: April 2019 –
Client: Google LLC (pet.)
Patent Owner: Realtime Adaptive Streaming LLC
Counsel: Paul Hastings LLP
Technology: Image and video data compression systems

*In the Matter of Certain Infotainment Systems, Components Thereof, and Automobiles Containing the Same*, Inv. No. 337-TA-1119
Court: U.S. International Trade Commission
Dates: Oct. 2018 –
Client: Broadcom, Limited (compl.)
Respondents: Toyota Motor Corporation, Panasonic Corporation, Denso Ten Limited, Renesas Electronics Corporation, Japan Radio Co., Ltd., et al.
Counsel: Steptoe & Johnson LLP
Technology: Graphics/image/video processing for automobile infotainment systems
Deposed April 2019
Testified and cross-examined at trial, June 2019

*Confidential IPR Matter*
Dates: July 2018 – Sept. 2018

*Confidential ITC Matter*
Dates: May 2018 – June 2018

*Inter Partes Review of Patent No. 8,508,751*
Court: U.S. Patent and Trademark Office, Patent Trial and Appeal Board
Dates: April 2018 – May 2019
Client: Pathway Innovations and Technologies, Inc. (patent owner)
Petitioners: AVer Information Inc. and iPEVO, Inc.
San Diego IP Law Group LLP
Technology: Document cameras and video processing
Deposed Sept. 20, 2018

*In the Matter of Certain Digital Cable and Satellite Products, Set-Top Boxes, Gateways, and Components Thereof*, Inv. No. 337-TA-1049
Court: U.S. International Trade Commission
Dates: July 2017 – Nov. 2017
Client: ARRIS International plc; ARRIS Group, Inc.; ARRIS Technology, Inc.; ARRIS Enterprises LLC; ARRIS Solutions, Inc.; ARRIS Global Ltd. (formerly Pace Ltd.); Pace Americas, LLC; Pace Americas Holdings, Inc.; Pace USA LLC; and Pace Americas Investments, LLC (resp.)
Complainant: Sony Corporation and Sony Electronics Inc.
Counsel: Fish and Richardson P.C.
Technology: Video receiver and video processing

*Inter Partes Review of Patent No. 7,720,294*
Court: U.S. Patent and Trademark Office, Patent Trial and Appeal Board
Dates: June 2017 – Sept. 2017
Client: Broadcom Corp. (patent owner)
Petitioner: Advanced Micro Devices, Inc.
Counsel: Swanson & Bratschun, LLC
Technology: Video decoding

*Inter Partes Review of Patent No. 7,472,151*
Court: U.S. Patent and Trademark Office, Patent Trial and Appeal Board
Dates: June 2017 – Sept. 2017
Client: Broadcom Corp. (patent owner)
Petitioner: Advanced Micro Devices, Inc.
Counsel: Swanson & Bratschun, LLC
Technology: Video decoding

*In the Matter of Certain Document Cameras and Software for Use Therewith*, Inv. No. 337-TA-1045
Court: U.S. International Trade Commission
Dates: May 2017 – Nov. 2017
Client: Pathway Innovations and Technologies, Inc. (compl.)
Respondents: iPEVO, Inc. AVer Information, Inc. and Lumens Integration, Inc.
Counsel: San Diego IP Law Group LLP
Technology: Document cameras and video processing
Deposed Oct. 2017

*Inter Partes Review of Patent No. 8,032,919*
Court: U.S. Patent and Trademark Office, Patent Trial and Appeal Board
Dates: May 2017 – Nov. 2017
Client: ARRIS International plc, ARRIS Group, Inc., ARRIS Technology, Inc., ARRIS Enterprises, LLC, ARRIS Solutions, Inc., ARRIS Global Ltd. and ARRIS U.S. Holdings, Inc. (pet.)
Patent owner: Sony Corporation
Counsel: Fish & Richardson
Technology: Video receiver and video processing

*Inter Partes Review of Patent No. 6,467,093*
Court: U.S. Patent and Trademark Office, Patent Trial and Appeal Board
Dates: May 2017 – Nov. 2017
Client: ARRIS International plc, ARRIS Group, Inc., ARRIS Technology, Inc., ARRIS Enterprises, LLC, ARRIS Solutions, Inc., ARRIS Global Ltd. and ARRIS U.S. Holdings, Inc. (pet.)
Patent owner: Sony Corporation
Counsel: Fish & Richardson
Technology: Video receiver and video processing

*Sony Corporation v. ARRIS Global Ltd. and Pace Americas, LLC*
(formerly *Sony Corporation v. Pace plc and Pace Americas, LLC*)
Court: U.S. District Court for the District of Delaware
Dates: March 2017 – Nov. 2017
Client: Pace plc and Pace Americas, LLC (bought by ARRIS Group) (def.)
Counsel: Fish & Richardson
Technology: Video communication and encryption

*Inter Partes Review of Patent No. 8,147,332*
Court: U.S. Patent and Trademark Office, Patent Trial and Appeal Board
Dates: March 2017 – June 2017
Client: Broadcom Corp. (patent owner)
Petitioner: Sony Corporation
Counsel: Swanson & Bratschun, LLC
Technology: Video game systems

*Broadcom Corp. et al. v. Sony Corp. et al.*, Case No. 16-cv-1052-JVS-JCG
Court: U.S. District Court for the Central District of California, Santa Ana Division
Dates: Feb. 2016 – June 2017
Client: Broadcom Limited (pl.)
Counsel: Thompson & Knight LLP
Technology: Video processing systems, video game systems

*Reckitt Benckiser LLC v. Amneal Pharmaceuticals LLC, et al.*, Civil Action No. 15-2155 (RMB)(JS)(Consolidated)
Court: U.S. District Court for the District of New Jersey
Dates: March 2017 – May 2017
Client: Dr. Reddy's Laboratories (def.)
Counsel: Budd Larner P.C.
Technology: Image analysis of pharmaceutical tablets
Deposed May 2017
Testified at trial, May 2017

*eWatch v. Apple, Inc., et al.,* Case No. 2:13-cv-01061
Court: U.S. District Court for the Eastern District of Texas
Dates: Nov. 2016 – Jan. 2017
Client: ZTE (USA), Inc. (def.)
Counsel: Pillsbury Winthrop Shaw Pittman LLP
Technology: Cellular camera phones, image transmission over wireless network

*Inter Partes Review of Patent No. 7,085,123*
Court: U.S. Patent and Trademark Office, Patent Trial and Appeal Board
Dates: Mar. 2016 – Dec. 2016
Client: Mazda Motor Corp. (pet.)
Patent owner: Power Regeneration LLC
Counsel: DLA Piper LLP
Technology: Power supply circuits

*Inter Partes Review of Patent No. 7,558,472*
Court: U.S. Patent and Trademark Office, Patent Trial and Appeal Board
Dates: Jun. 2016 – Nov. 2016
Client: Samsung Electronics Co., Ltd., Samsung Electronics America, Inc., and Samsung Telecommunications America, LLC (pet.)
Patent owner: TiVo Inc.
Counsel: Fish & Richardson P.C.
Technology: Video processing hardware and software

*Inter Partes Review of Patent No. 8,457,476*
Court: U.S. Patent and Trademark Office, Patent Trial and Appeal Board
Dates: Jun. 2016 – Nov. 2016
Client: Samsung Electronics Co., Ltd., Samsung Electronics America, Inc., and Samsung Telecommunications America, LLC (pet.)
Patent owner: TiVo Inc.
Counsel: Fish & Richardson P.C.
Technology: Video processing hardware and software

*Saint Lawrence Communications LLC v. HTC Corporation and HTC America, Inc.*, Case No. 2:15-cv-00919
Court: U.S. District Court, Eastern District of Texas, Marshall Division
Dates: Apr. 2016 – Nov. 2016
Client: HTC Corporation and HTC America, Inc. (def.)
Counsel: Cooley LLP
Technology: Speech and audio compression

*In the Matter of Certain Computing or Graphics Systems, Components Thereof, and Vehicles Containing Same*, ITC Inv. No. 337-TA-984
Court: U.S. International Trade Commission
Dates: Feb. 2016 – Nov. 2016
Client: Bayerische Motoren Werke AG, BMW of North America, LLC, BMW Manufacturing Co., LLC, Renesas Electronics Corporation, and Renesas Electronics America Inc. (resp.)
Complainant: Advanced Silicon Technologies Inc.
Counsel: DLA Piper LLP (for BMW), Foley & Lardner LLP (for Renesas)
Technology: Memory controllers for data processing systems

*TiVo Inc. v. Samsung Electronics Co., Ltd., Samsung Electronics America, Inc., and Samsung Telecommunications America, LLC*
Court: U.S. District Court for the Eastern District of Texas, Marshall Division
Dates: Dec. 2015 – Mar. 2016
Client: Samsung Electronics Co., Ltd., Samsung Electronics America, Inc., and Samsung Telecommunications America, LLC (def.)
Counsel: Fish & Richardson
Technology: Video processing hardware and software

*Civolution B.V. v. Doremi Labs, Inc.*, No. 2:14-CV-00962-JAK-RZ
Court: U.S. District Court, Central District of California, Western Division
Dates: Dec. 2014 – Jan. 2016
Client: Doremi Labs, Inc. (def.)
Counsel: Gibson, Dunn & Crutcher LLP
Technology: Video watermarking to detect cinematic copies
Deposed May 2015

*e-Watch, Inc. et al. v. LG Electronics et al.*, No. 2:13-cv-01064
Court: U.S. District Court, Eastern District of Texas, Marshall Division
Dates: Feb. 2015 – Oct. 2015
Client: LG Electronics, Inc., LG Electronics U.S.A., Inc., LG Electronics Mobilecomm U.S.A., Inc. (def.)
Counsel: Fish & Richardson P.C.
Technology: Cellular camera phone, image transmission over wireless network

*Invensys Systems, Inc. v. Emerson Electric Co. and Micro Motion Inc. USA*, No. 6:12-cv-00799-LED
Court: U.S. District Court, Eastern District of Texas, Tyler Division
Dates: Jan. 2014 – Apr. 2015
Client: Invensys Systems, Inc. (pl. and counter-claim def.)
Counsel: DLA Piper LLP
Technology: Digital controllers for digital flow meters
Deposed Nov. 2014

*Inter Partes Review of Patent No. 7,103,380*
Court: U.S. Patent and Trademark Office, Patent Trial and Appeal Board
Dates: Sept. 2013 – Dec. 2014
Client: Apple Inc. (pet.)
Patent owner: NetAirus Technologies LLC
Counsel: Sterne, Kessler, Goldstein & Fox
Technology: Wireless communication (cellular and Wi-Fi)

*NetAirus Technologies, LLC v. Apple Inc.*, No. 10-CV-03257-JAK
Court: U.S. District Court, Central District of California
Dates: June 2011 – Dec. 2014
Client: Apple Inc. (def.)
Counsel: Milbank, Tweed, Hadley, & McCloy LLP
Technology: Wireless communication (cellular and Wi-Fi)
Deposed Aug. 2013
Testified and cross-examined at jury trial, Nov. 2013
Jury verdict: no infringement by Apple; NetAirus patent claims are invalid
Affirmed by U.S. Court of Appeals for the Federal Circuit, Dec. 2014

*Motorola Mobility, Inc. et al. v. TiVo Inc.*, No. 5:11-cv-00053-MHS-CMC
Court: U.S. District Court, Eastern District of Texas, Texarkana Division
Dates: Sept. 2012 – June 2013
Client: Motorola Mobility, Inc., General Instrument Corp., Time Warner Cable, Inc. and Time Warner Cable LLC (counter-claim def.)
Counsel: DLA Piper LLP; Quinn Emanuel Urquhart & Sullivan, LLP
Technology: Video processing hardware and software
Deposed April 2013

*MedioStream, Inc. v. Microsoft Corporation et al.*, No. 5:11-CV-2525; transferred from Texas case *MedioStream, Inc. v. Microsoft Corporation et al.*, No. 2:08-CV-369-CE; merged from *MedioStream, Inc. v. Acer America Corp. et al.*, No. 2:07-CV-376-CE
Court: U.S. District Court, Northern District of California, San Jose Division, transferred from Eastern District of Texas, Marshall Division
Dates: Aug. 2010 – March 2013
Client: Apple Inc. (def.)
Counsel: Milbank, Tweed, Hadley, & McCloy LLP
Technology: Video compression, video format conversion, transcoding

*TASER International, Inc. Re-Issue Application*
Court: U.S. Patent and Trademark Office
Dates: Feb. 2013
Client: TASER International, Inc. (pet'r)
Technology: Electric circuits for stun guns

*TASER International, Inc. v. Stinger Systems, Inc.; James F. McNulty, Jr.; and Robert Gruder*, No. 2:09-CV-00289-KJD-PAL
Court: U.S. District Court, District of Nevada
Dates: July 2011 – Sept. 2012
Client: TASER International, Inc. (pl.)
Counsel: Perkins Coie LLP
Technology: Electric circuits for stun guns

*LSI Corporation v. Vizio, Inc.*, No. SACV10-01602 AG AJW
Court: U.S. District Court for the Central District of California
Dates: July 2011 – June 2012
Client: LSI Corporation (pl.)
Counsel: Thompson & Knight LLP
Technology: Digital video coding (MPEG) hardware & software

*TASER International, Inc. v. Stinger Systems, Inc.*, No. CV07-0042-PHX-MHM/JHT; also *Motion for Contempt against Karbon Arms LLC and Robert Gruder*
Court: U.S. District Court, District of Arizona
Dates: Aug. 2007 – Jan. 2012
Client: TASER International, Inc. (pl.)
Counsel: Perkins Coie LLP
Technology: Electric circuits for stun guns
Testified and cross-examined at Markman hearing, May 2008
Deposed Nov. 2011
Testified and cross-examined at contempt hearing, Dec. 2011

*SanDisk Corp. v. LSI Corp. et al.*, No. C-09-02727-WHA
Court: U.S. District Court, Northern District of California
Dates: Nov. 2009 – March 2010
Client: LSI Corp. (pl.)
Counsel: Thompson & Knight LLP
Technology: MPEG video and audio data compression

*Trover Group, Inc., and Security Center, Inc. v. Diebold, Incorporated*, No. 2:06-cv-00445-TJW
Court: U.S. District Court, Eastern District of Texas, Marshall Division
Dates: Oct. 2008 – April 2009
Client: Diebold, Inc. (def.)
Counsel: Thompson & Knight LLP
Technology: Image and video compression, storage, and retrieval in video security/surveillance systems

*In Re: Katz Interactive Call Processing Patent Litigation*, No. 07-ML-01816 FGK (FFMx) (*Ronald A. Katz Technology Licensing, LP v. American Airlines et al.*, No. CV 07-2196 RGK (FFMx))
Court: U.S. District Court, Central District of California
Dates: Feb. 2008 – May 2008
Client: National Railroad Passenger Corp. (d/b/a Amtrak) (def.)
Counsel: Steptoe & Johnson LLP
Technology: Telephone interface using voice prompts to collect data from caller

*TASER International, Inc. v. Thomas G. Watkins III and Jane Doe Watkins, husband and wife*, No. CV2005-002509
Court: Superior Court of Arizona, Maricopa County
Dates: May 2006 – Spring 2007
Client: TASER International, Inc. (pl.)
Counsel: Perkins Coie LLP
Technology: Electric circuits for stun guns

*Vision BioSystems (USA) Trading, Inc. v. Ventana Medical Systems, Inc.*, No. 03-CV-10391-GAO; *Ventana Medical Systems, Inc. v. Vision BioSystems, Inc.*, No. 05-CV-10614-GAO
Court: U.S. District Court, District of Massachusetts
Dates: Sept. 2005 – May 2007
Client: Ventana Medical Systems, Inc. (pl.)
Counsel: Wilson Sonsini Goodrich & Rosati
Technology: Instrumentation for automated immunostaining

*Forgent Networks, Inc. v. Echostar Technologies Corp. et al.*, No. 2-05CV-318-LED, transferred to No. 6:06-CV-208-LED
Court: U.S. District Court, Eastern District of Texas, Marshall Division, transferred to Tyler Division
Dates: May 2006 – May 2007
Client: Digeo, Inc. (def.)
Counsel: Perkins Coie LLP
Joint Counsel: Morrison Foerster; Dewey Ballantine LLP; Jones Day
Technology: Video processing systems
Deposed March 2007

*Ventana Medical Systems, Inc. v. Biogenex Laboratories, Inc.*, No. CIV 03-92 TUC RCC
Court: U.S. District Court, District of Arizona
Dates: Aug. 2004 – May 2007
Client: Ventana Medical Systems, Inc. (pl.)
Counsel: Wilson Sonsini Goodrich & Rosati
Technology: Instrumentation for automated immunostaining
Deposed June 2005

*Ventana Medical Systems, Inc. v. DakoCytomation California, Inc.*, No. CIV 04-1522-GMS
Court: U.S. District Court, District of Delaware
Dates: Sept. 2005
Client: Ventana Medical Systems, Inc. (pl.)
Counsel: Wilson Sonsini Goodrich & Rosati
Technology: Instrumentation for automated immunostaining

*Kyocera International, Inc. v. Nokia, Inc.*, No. 04-CV-1992W-JFS
Court: U.S. District Court, Southern District of California
Dates: July 2005 – Aug. 2005
Client: Nokia, Inc. (def.)
Counsel: Jones Day
Technology: Cellular camera phone communications

*Active Recognition Technologies, Inc.*
Dates: Oct. 2003
Technology: Image processing for automated license plate recognition

*Aerotech Laboratories, Inc.*
Dates: April 2000
Technology: Image processing for automated recognition of fungal spores

## Honors, Awards, and Memberships

Senior Member, Institute of Electrical and Electronics Engineers, IEEE Signal Processing Society

Best Poster Award. Douglas W. Todd, Rohit C. Philip, Maki Niihori, Jeffrey J. Rodriguez, and Abraham Jacob, "High-Throughput Behavioral Zebrafish Assay for Drug Development Targeting Hearing Loss", AOS 149th Annual Meeting, American Otological Society, May 20-21, 2016, Chicago, IL.

Best Paper Award. Abhinav K. Jha, Matthew A. Kupinski, Jeffrey J. Rodriguez, Renu M. Stephen, and Alison T. Stopeck, "Evaluating Segmentation Algorithms for Diffusion-Weighted MR Images: A Task-Based Approach," in *Image Perception, Observer Performance, and Technology Assessment*, David J. Manning and Craig K. Abbey, Eds., Proc. of SPIE, vol. 7627, pp. 76270L-1 to 76270L-8. Presented at SPIE Medical Imaging 2010, San Diego, CA, Feb. 13–18, 2010.

IEEE/HKN Outstanding Teaching Award, 1992

Andersen Consulting Outstanding Faculty Award, 1992

Honor societies: Eta Kappa Nu, Tau Beta Pi, Phi Kappa Phi, Sigma Xi

National Science Foundation Graduate Fellowship, 1985–1988

## Teaching Experience

Digital Image Analysis

Digital Image Processing

Digital Signal Processing
Advanced Digital Signal Processing
Signals and Systems
Electric Circuits

## University Service Activities

- Dept. of ECE Graduate Studies Committee, 2019-present
- Dept. of ECE Graduate Recruiting and Awards Committee, 2001–2003, 2005–2018
- Director of ECE Graduate Studies and Chair of the Dept. of ECE Graduate Studies Committee, 2000–2003, 2005–2016
- Dept. of ECE Executive Committee, 2001–2003, 2005–2016
- Dept. of ECE Annual Performance Review Committee, Spring 2015
- Dept. of ECE Committee on Committees, 2013-2016
- Chair, Dept. of ECE Faculty Search Committee, 2013
- BME Faculty Search Committee, 2008
- Search Committee for the Dean of the Eller College of Business and Public Administration, 2003–2004
- Dept. of ECE Graduate Studies Committee, 2003–2004
- Chair, College of Engineering Graduate Studies Committee, 2001–2003
- Co-Chair, Dept. of ECE Student/Faculty Interaction Committee, 2001–2002
- Dept. of ECE Undergraduate Mentoring Committee, 2001–2002
- College of Engineering Advisory Committee, 1998–2002
- Faculty co-advisor for Eta Kappa Nu chapter(electrical engineering honor society), 1994–2002
- Chair, Dept. of ECE Instructional Equipment and Software Planning Committee, 1998–2001
- Faculty Co-Advisor, Dept. of ECE Graduate Student Activities Committee (GSAC), 1995–2000
- Dept. of ECE Teaching Load Committee, Fall 2000
- Dept. of ECE Annual Performance Review Committee, Fall 2000
- Dept. of ECE Graduate Studies Committee, Fall 1997
- Search Committee for Head of Dept. of ECE, 1996–1997
- Dept. of ECE Computer Policy Committee, 1994–1997
- Dept. of ECE Student Recruiting Committee, 1995–1996
- Small Grants Peer Review Panel, U.A. Office of Vice President for Research, April 1993
- Dept. of ECE Subcommittee on Computer Programming Curriculum, 1992
- Dept. of ECE Seminar Series Committee, 1991–1992

## Professional Service Activities

Treasurer, 2020 IEEE Southwest Symp. on Image Analysis and Interpretation
Treasurer, 2018 IEEE Southwest Symp. on Image Analysis and Interpretation
Technical Program Committee, 2018 IEEE Southwest Symp. on Image Analysis and Interpretation
Session Chair, 2016 IEEE Intl. Conf. on Image Processing
Technical Program Committee, 2016 IEEE Intl. Conf. on Image Processing

General Chair, 2016 IEEE Southwest Symp. on Image Analysis and Interpretation

Chair, Steering Committee, IEEE Southwest Symp. on Image Analysis and Interpretation, 2007–present

Technical Program Committee, 2014 IEEE Intl. Conf. on Image Processing

General Chair, 2014 IEEE Southwest Symp. on Image Analysis and Interpretation

Reviewer, 2013 IEEE Intl. Conf. on Image Processing

Finance Chair, 2012 IEEE Southwest Symp. on Image Analysis and Interpretation

Reviewer, 2012 IEEE Intl. Conf. on Image Processing

Program Committee, 2012 IEEE Southwest Symp. on Image Analysis and Interpretation

Finance Chair, 2010 IEEE Southwest Symp. on Image Analysis and Interpretation

Program Committee, 2010 IEEE Southwest Symp. on Image Analysis and Interpretation

Reviewer, 2010 IEEE Intl. Conf. on Image Processing

Reviewer, 2010 IEEE Intl. Conf. on Acoustics, Speech, and Signal Processing

Awards Subcommittee, IEEE Signal Processing Society Technical Committee on Image, Video, and Multidimensional Signal Processing (IVMSP), 2008–2010

Program Committee, 2009 IASTED Intl. Conf. on Signal Processing, Pattern Recognition and Applications (SPPRA)

IEEE Signal Processing Society Technical Committee on Image, Video, and Multidimensional Signal Processing (IVMSP), 2005–2011

Reviewer, 2008 IEEE Intl. Conf. on Image Processing

Program Committee, 2008 IEEE Southwest Symp. on Image Analysis and Interpretation

Member, IEEE Signal Processing Society Technical Directions Board, 2007

IEEE Signal Processing Conference Board, 2006–2008

Reviewer, NSF Industry/University Cooperative Research Program, 2007

General Chair, 2007 IEEE Intl. Conf. on Image Processing

Program Committee, 2006 IEEE Intl. Conf. on Image Processing

Program Committee, 2006 IEEE Southwest Symp. on Image Analysis and Interpretation

Program Committee, 2005 IEEE Intl. Conf. on Image Processing

Reviewer, 2005 IEEE Intl. Conf. on Acoustics, Speech, and Signal Processing

Vice Chair, 2004 IEEE Southwest Symp. on Image Analysis and Interpretation

Program Committee, 2004 IEEE Intl. Conf. on Image Processing

Special Editor, Integrated Computer-Aided Engineering, 2003–2004

General Chair, 2003 IEEE Southwest Symp. on Mixed-Signal Design

Program Committee, 2003 IEEE Intl. Conf. on Image Processing

Program Committee, 2002 IEEE Intl. Conf. on Image Processing

Program Committee, 2002 Southwest Symp. on Image Analysis and Interpretation

Organizing Committee, 2002 IEEE Intl. Symp. on Circuits and Systems

Reviewer, 2002 IEEE Intl. Conf. on Acoustics, Speech, and Signal Processing

Program Committee, 2001 IEEE Intl. Conf. on Image Processing

Organizing Committee, 2001 Southwest Symp. on Mixed-Signal Design

Associate Editor, IEEE Trans. on Image Processing, 1996–2000

Vice Chair, 2000 IEEE Southwest Symp. on Image Analysis and Interpretation

Reviewer, 2000 IEEE Intl. Conf. on Acoustics, Speech, and Signal Processing

Program Committee, 2000 Intl. Conf. on Pattern Recognition

Organizing Committee, 2000 Southwest Symp. on Mixed-Signal Design

Publications Chair, 1999 IEEE Intl. Conf. on Acoustics, Speech, and Signal Processing

Organizing Committee, 1999 Southwest Symp. on Mixed-Signal Design

Program Committee, 1999 IEEE Intl. Conf. on Image Processing

Area Program Chair, 1999 IEEE-CS Conf. on Computer Vision and Pattern Recognition

General Chair, 1998 IEEE Southwest Symp. on Image Analysis and Interpretation

Program Committee, 1998 IEEE Intl. Conf. on Image Processing

Program Committee, Area Coordinator, 1997 IEEE Intl. Conf. on Image Processing

Organizing Committee, 1997 IEEE Intl. Performance, Computing, and Communications Conf.

National Science Foundation Reviewer for BIR Division, Sept. 1996

Program Committee, 1996 IEEE Intl Conf. on Image Processing

Program Chair, 1996 IEEE Southwest Symp. on Image Analysis and Interpretation

Organizing Committee, 1996 IEEE Intl. Phoenix Conf. on Computers and Communication

Program Committee, 1995 SPIE Intl. Symp. on Optics, Imaging, and Instrumentation: Applications of Digital Image Processing XVIII

Organizing Committee, 1995 IEEE Intl. Phoenix Conf. on Computers and Communication

Program Committee, 1995 IEEE Intl. Phoenix Conf. on Computers and Communication

Session Chair, 1994 SPIE Intl. Symp. on Optics, Imaging, and Instrumentation: Applications of Digital Image Processing XVII

Program Committee, 1994 IEEE Intl. Phoenix Conf. on Computers and Communication

National Science Foundation Review Panelist for DUE Division, Washington, D.C., Feb. 1993

Program Committee, 1993 IEEE Intl. Phoenix Conf. on Computers and Communication

Technical reviewer for numerous technical conferences, journals, and book publishers

## Completed Theses and Dissertations Supervised

Sree Ramya Surya Prabha Malladi, Ph.D., Aug. 2019, *Superpixel Segmentation Systems: Design and Analysis*.

Ramaprasad Kulkarni, Ph.D., May 2018, *Image Segmentation and Analysis Methods and Their Evaluation on Synthesized Porous Media Data.*

Ding Ding, Ph.D., Aug. 2017, *Image Inpainting Based on Exemplars and Sparse Representation*.

Sundaresh Ram, Ph.D., Aug. 2017, *Sparse Representations and Nonlinear Image Processing for Inverse Imaging Solutions*.

Xin Gao, M.S., Dec. 2016, *Automatic Detection, Segmentation and Tracking of Vehicles in Wide-Area Aerial Imagery.*

Mohammed Alfowzan, Ph.D., Dec. 2016, *Solutions to Space-Time Inverse Problems.*

Douglas W. Todd, M.S., Aug. 2016, *Zebrafish Video Analysis System for High-Throughput Drug Assay.*

José A. Rosado-Toro, Ph.D., May 2016, *Right Ventricle Segmentation Using Cardiac Magnetic Resonance Images*.

Basel Salahieh, Ph.D., Dec. 2015, *Computational Imaging for Miniature Cameras*.

Jianbo Shao, M.S., Aug. 2015, *Analysis and Processing of Primary Cilia in Microscopy Images*.

Vijai T. Jayadevan, M.S., Dec. 2013, *Forecasting Solar Power Intermittency Using Ground-Based Sky Imaging*.

Sundaresh Ram, M.S., Dec. 2010, *3-D Fluorescent Spot Segmentation in Confocal Microscopic Images*.

Abhinav Kumar Jha, M.S., Aug. 2009, *ADC Estimation in Diffusion-Weighted Images*.

Rohit Chacko Philip, M.S., Dec. 2008, *Seed Pruning for Multi-Resolution Segmentation of Vasculature in Immunohistochemical Images*.

Sivaramakrishnan Rajaraman, M.S., Dec. 2008, *Automated Registration of Breath-Hold DCE-MRI Images of Human Volunteers in Cancer Clinical Trials*.

Naren Vijayakumar, M.S., Dec. 2008, *Multimodality Image Registration Using Gradient Information and Clustering*.

Sunil Seepuri, M.S., Aug. 2008, *An Integrated Tool for 3-D Segmentation of Internal Hemoglobin in TEM Images*.

Santosh V. Chapaneri, M.S., Aug. 2008, *Content-Adaptive Improved Error Concealment Methods for H.264/AVC Video Communication*.

Narasimhan Rajagopalan, M.S., May 2008, *An Integrated Technique for Segmentation and Volume Estimation in Spots in 3-D Human Cell Cultures Using Watersnakes*.

Mehul Patel, M.S., May 2008, *Image Analysis Algorithms for Ovarian Cancer Detection Using Confocal Microendoscopy*.

Luca Caucci, M.S., May 2007, *Point Detection and Hotelling Discriminant: An Application in Adaptive Optics*.

Mingkuan Liu, Ph.D., Dec. 2006, *QoS Improvement Schemes for Real-Time Wireless VoIP*.

Natalia Gaviria Gomez, Ph.D., Aug. 2006, *Genetic Algorithms for Optimization of Wireless Devices*.

Diljith M. Thodi, M.S., Aug. 2005, *Techniques to Improve the Performance of Expansion-Embedding-Based Reversible Watermarking Algorithms*.

Neema K. Shetty, M.S., Aug. 2005, *Improving Image Fidelity of Equalized Spectrum Watermarking Scheme Using Perceptual Modeling*.

Nikhil S. Rajguru, M.S., Aug. 2005, *A Level-Set Approach to 3-D Segmentation of Lesions from T1-Weighted Spin-Echo DCE-MR Images*.

Vivek Shankar, M.S., May 2005, *Texture-Based Automated Lithological Classification Using Aeromagnetic Anomaly Images*.

Saurabh Srivastava, M.S., Dec. 2004, *Computer-Aided Identification of Ovarian Cancer in Confocal Microendoscope Images*.

Mary L. Cassabaum, Ph.D., Aug. 2004, *Exploiting High Dimensional Data for Signal Characterization and Classification in Feature Space*.

Ranjini T. Rajeevan, M.S., Aug. 2004, *Automated Segmentation of Lesions in Magnetic Resonance Images of the Brain*.

Chetankumar Krishnamurty, M.S., Aug. 2004, *Automated Lesion Segmentation and Tracking in Echo-Planar Diffusion-Weighted Liver MRI*.

Siddharth Mathur, M.S., Dec. 2003, *Variable-Length Vocal-Tract Modeling for Speech Synthesis*.

Victor Gajendran, M.S., Dec. 2003, *Towards a Completely Automated Chromosome Counting System*.

Amarpreet S. Chawla, M.S. Aug. 2003, *Analysis of Image Quality of Medical Imaging Displays*.

Sundararajan Sankaranarayanan, M.S., August 2003, *Design and Analysis of an Improved Data Acquisition System for Digital Flow Cytometry*.

Bo Xia, M.S., May 2002, *An Improved Digital System Design for Flow Cytometric Analysis*.

Phillip A. Mlsna, Ph.D., May 2001, *Color Sets with Morphological and B-Spline Enhancements for Content-Based Image Retrieval*.

Te-shen Liang, Ph.D., May 2000, *Methods for Improved Robustness of Image Watermarking Algorithms*.

Bruce A. Thomas, Ph.D., Dec. 1999, *New Aspects of Digital Color Image Enhancement*.

David E. Hoyer, M.S., May 1996, *Performance Analysis of Vector and Scalar Median Filtering*.

Qiang Zhang, M.S., May 1996, *A Recursive Technique for 3–D Histogram Enhancement of Color Images*.

Te-shen "Dickson" Liang, M.S., Aug. 1995, *Segmentation of MR Cranial Images Using Mathematical Morphology and Fuzzy Clustering*.

Mahesh Godavarti, M.S., Aug. 1995, *Digital Signal Processing and Neural Networks in Flow Cytometry*.

Troy A. Berchem, M.S., May 1995, *A Digital Reconstruction System for Real-Time Magnetic Resonance Imaging*.

Richard P. Mackey, M.S., May 1995, *An Asynchronous, Single-Chip, LMS Based, Adaptive Echo Canceller*.

Jesse C. Ma, M.S., Dec. 1994, *Segmentation of 3–D MR Images Using the Fuzzy C-Means Algorithm and a Neural Network*.

Nick A. Zilmer, M.S., May 1994, *Analysis of the Use of Digital Signal Processing in Flow Cytometry*.

James L. Lee, M.S., Dec. 1993, *Automated Segmentation of Magnetic Resonance Images of the Brain*.

Phillip A. Mlsna, M.S., Dec. 1992, *Color Image Enhancement by Three-Dimensional Histogram Modification*.

Christopher C. (Chuen-Chi) Yang, M.S., Dec. 1992, *Effects of Coordinate Systems on Color Image Processing*.

## Peer-Reviewed Journal Papers

Note: "doi:" = "http://doi.org/".


[1] Sree Ramya S. P. Malladi, Sundaresh Ram, and Jeffrey J. Rodriguez, "Evaluation of Under-Segmentation Metrics Used for Superpixel Segmentation Quality Assessment," *IEEE Trans. on Pattern Analysis and Machine Intelligence*, submitted.

[2] Sree Ramya S. P. Malladi, Sundaresh Ram, and Jeffrey J. Rodriguez, "Image Denoising Using Superpixel-Based PCA," *IEEE Trans. on Multimedia*, submitted.

[3] Sundaresh Ram and Jeffrey J. Rodriguez, "Robust Segmentation of Cell Nuclei in 3-D Microscopy Images," *IEEE Trans. on Image Processing,* submitted.

[4] Xin Gao, Sundaresh Ram, and Jeffrey J. Rodriguez, "A Post-Processing Scheme for the Performance Improvement of Vehicle Detection in Wide-Area Aerial Imagery," *Signal, Image and Video Processing*, accepted for publication.

[5] Ding Ding, Sundaresh Ram, and Jeffrey J. Rodriguez, "Perceptually Aware Image Inpainting," *Pattern Recognition*, vol. 83, Nov. 2018, pp. 174-184, doi: 10.1016/j.patcog.2018.05.025.

[6] Rodrigo Savage, Jeffrey J. Rodriguez, Leon Palafox, Clayton T. Morrison, Kobus Barnard, and Shane Byrne, "A Bayesian Approach to Automatic Crater Shape Analysis from a Single HiRISE Image," *IEEE Trans. on Geoscience and Remote Sensing,* vol. 56, no. 10, Oct. 2018, pp. 5802-5812, doi:10.1109/TGRS.2018.2825608.

[7] Ding Ding, Sundaresh Ram, and Jeffrey J. Rodriguez, "Image Inpainting Using Nonlocal Texture Matching and Nonlinear Filtering," *IEEE Trans. on Image Processing*, vol. 28, no. 4, April 2019, pp. 1705-1719, doi:10.1109/TIP.2018.2880681.

[8] Bofan Song, Sumsum Sunny, Ross D. Uthoff, Sanjana Patrick, Amritha Suresh, Trupti Kolur, G. Keerthi, Afarin Anbarani, Petra Wilder-Smith, Moni Abraham Kuriakose, Praveen Birur, Jeffrey J. Rodriguez, and Rongguang Liang, "Automatic Classification of Dual-Modality, Smartphone-Based Oral Dysplasia and Malignancy Images Using Deep Learning," *Biomedical Optics Express*, vol. 9, no. 11, Nov. 2018, pp. 5318-5329, doi:10.1364/BOE.9.005318.

[9] Rohit C. Philip, Jeffrey J. Rodriguez, Maki Niihori, Ross H. Francis, Jordan A. Mudery, Justin S. Caskey, Elizabeth Krupinski, Abraham Jacob, "Automated High-Throughput Damage Scoring of Zebrafish Lateral Line Hair Cells After Ototoxin Exposure," *Zebrafish*, vol. 15, no. 2, April 2018, pp. 145-155, doi:10.1089/zeb.2017.1451.

[10] Sundaresh Ram, Forest Danford, Stephen Howerton, Jeffrey J. Rodriguez, and Jonathan P. Vande Geest, "Three-Dimensional Segmentation of the Ex-Vivo Anterior Lamina Cribrosa from Second-Harmonic Imaging Microscopy," *IEEE Trans. on Biomedical Engineering*, vol. 65, no. 7, July 2018, pp. 1617-1629, doi:10.1109/TBME.2017.2674521.

[11] Douglas W. Todd, Rohit C. Philip, Maki Niihori, Ryan A. Ringle, Kelsey R. Coyle, Sobia F. Zehri, Jordan A. Mudery, Ross H. Francis, Jeffrey J. Rodriguez, and Abraham Jacob, "A Fully Automated High-Throughput Zebrafish Behavioral Ototoxicity Assay," *Zebrafish,* vol. 14, no. 4, Aug. 2017, pp. 331-342, doi:10.1089/zeb.2016.1412.

[12] José A. Rosado-Toro, Aiden Abidov, María I. Altbach, Isabel B. Oliva, Jeffrey J. Rodríguez, and Ryan J. Avery, "Segmentation of the Right Ventricle in Four Chamber Cine Cardiac MR Images using Polar Dynamic Programming," *Computerized Medical Imaging and Graphics*, vol. 62, Dec. 2017, pp. 15-25, doi:10.1016/j.compmedimag.2017.08.002.

[13] José A. Rosado-Toro, María I. Altbach, and Jeffrey J. Rodríguez, "Dynamic Programming Using Polar Variance for Image Segmentation," *IEEE Trans. on Image Processing*, vol. 25, no. 12, Dec. 2016, pp. 5857-5866, doi:10.1109/TIP.2016.2615809.

[14] Abhinav K. Jha, Jeffrey J. Rodriguez, and Alison T. Stopeck, "A Maximum-Likelihood Method to Estimate a Single ADC Value of Lesions Using Diffusion MRI," *Magnetic Resonance in Medicine*, vol. 76, no. 6, Dec. 2016, pp. 1919-1931, doi:10.1002/mrm.26072.

[15] Basel Salahieh, Jeffrey J. Rodriguez, Sean Stetson, and Rongguang Liang, "Single-Image Full-Focus Reconstruction Using Depth-Based Deconvolution," *Optical Engineering*, vol. 56, no. 4, Sept. 30, 2016, pp. 041302-1 to 041302-10, doi:10.1117/1.OE.56.4.041302.

[16] Sundaresh Ram and Jeffrey J. Rodriguez, "Size-Invariant Detection of Cell Nuclei in Microscopy Images," *IEEE Trans. on Medical Imaging*, vol. 35, no. 7, July 2016, pp. 1753-1764, doi:10.1109/TMI.2016.2527740.

[17] Shaun Pacheco, Basel Salahieh, Tom Milster, Jeffrey J. Rodriguez, and Rongguang Liang, "Transfer Function Analysis in Epi-Illumination Fourier Ptychography," *Optics Letters*, vol. 40, no. 22, Nov. 15, 2015, pp. 5343-5346, doi:10.1364/OL.40.005343.

[18] Basel Salahieh, Jeffrey J. Rodriguez, and Rongguang Liang, "Direct Superresolution for Realistic Image Reconstruction," *Optics Express*, vol. 23, no. 20, Oct. 5, 2015, pp. 26124-26138, doi:10.1364/OE.23.026124.

[19] Renu M. Stephen, Abhinav K. Jha, Denise J. Roe, Theodore P. Trouard, Jean-Philippe Galons, Matthew A. Kupinski, Georgette Frey, Haiyan Cui, Scott Squire, Mark D. Pagel, Jeffrey J. Rodriguez, Robert J. Gillies, and Alison T. Stopeck, "Diffusion MRI with Semi-Automated Segmentation Can Serve as a Restricted Predictive Biomarker of the Therapeutic Response of Liver Metastasis," *Magnetic Resonance Imaging*, vol. 33, no. 10, Dec. 2015, pp. 1267-1273, doi:10.1016/j.mri.2015.08.006.

[20] Vijai T. Jayadevan, Jeffrey J. Rodriguez, and Alexander D. Cronin, "A New Contrast Enhancing Feature for Cloud Detection in Ground-Based Sky Images," *Journal of Atmospheric and Oceanic Technology*, vol. 32, no. 2, Feb. 2015, pp. 209-219, doi:10.1175/JTECH-D-14-00053.1.

[21] José A. Rosado-Toro, Tomoe Barr, Jean-Phillipe Galons, Marilyn T. Marron, Alison Stopeck, Cynthia Thomson, Patricia Thompson, Danielle Carroll, Eszter Wolf, María Altbach, Jeffrey J. Rodríguez, "Automated Breast Segmentation of Fat and Water MR Images Using Dynamic Programming," *Academic Radiology*, vol. 22, no. 2, Feb. 2015, pp. 139-148, doi:10.1016/j.acra.2014.09.015.

[22] James L. Huang and Jeffrey J. Rodriguez, "Non-Rigid Registration Using Gradient of Self-Similarity Response," *Image and Vision Computing*, vol. 32, no. 11, Nov. 2014, pp. 825-834, doi:10.1016/j.imavis.2014.06.005.

[23] Basel Salahieh, Zhenyue Chen, Jeffrey J. Rodriguez, and Rongguang Liang, "Multi-Polarization Fringe Projection Imaging for High Dynamic Range Objects," *Optics Express*, vol. 22, no. 8, April 21, 2014, pp. 10064-10071, doi:10.1364/OE.22.010064.

[24] Sivaramakrishnan Rajaraman, Jeffrey J. Rodriguez, and Natarajan Raghunand, "Response to Andrew Melbourne, 'Comment on: Automated Registration of Sequential Breath-Hold Dynamic Contrast-Enhanced MR Images: A Comparison of Three Techniques,'" *Magnetic Resonance Imaging*, vol. 31, no. 2, Feb. 2013, pp. 326-328, doi:10.1016/j.mri.2012.07.011.

[25] Abhinav K. Jha, Matthew A. Kupinski, Jeffrey J. Rodriguez, Renu M. Stephen, and Alison T. Stopeck, "Corrigendum: Task-Based Evaluation of Segmentation Algorithms for Diffusion-Weighted MRI without Using a Gold Standard," *Physics in Medicine and Biology*, vol. 58, no. 1, Jan. 7, 2013, p. 183, doi:10.1088/0031-9155/58/1/183.

[26] Jennifer M. Watson, Photini F. Rice, Samuel L. Marion, Molly A. Brewer, John R. Davis, Jeffrey J. Rodriguez, Urs Utzinger, Patricia B. Hoyer, and Jennifer K. Barton, "Analysis of Second-Harmonic Generation Microscopy in a Mouse Model of Ovarian Carcinoma," *Journal of Biomedical Optics*, vol. 17, no. 7, July 2012, pp. 076002-1 to 076002-9, doi:10.1117/1.JBO.17.7.076002.

[27] Sundaresh Ram, Jeffrey J. Rodriguez, and Giovanni Bosco, "Segmentation and Detection of Fluorescent 3D Spots," *Cytometry: Part A*, vol. 81A, no. 3, March 2012, pp. 198–212, doi:10.1002/cyto.a.22017.

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## Keynote/Plenary Presentations

"Image Analysis Applications in Microscopy," Plenary Speaker, 2008 IEEE Southwest Symp. on Image Analysis and Interpretation, Santa Fe, NM, March 26, 2008.

"Texture Analysis for Automated Classification of Digital Images," Keynote Speaker, Seventh IASTED Intl. Conf. on Signal and Image Processing, Honolulu, HI, August 15, 2005.

## Other Presentations without Proceedings

Shaun Pacheco, Basel Salahieh, Guoan Zheng, Thomas D. Milster, Jeffrey Rodriguez, and Rongguang Liang, "Reflective Fourier Ptychography" (presentation), in *Design and Quality for Biomedical Technologies IX*, Proc. SPIE 9700 (Ramesh Raghavachari and Rongguang Liang, eds.), 97000P, doi:10.1117/12.2236358. Presented at SPIE BIOS, San Francisco, CA, Feb. 13-18, 2016.

"Video Processing System for Zebrafish Behavioral Assay," Invited Speaker, Arizona Cancer Center Collaborative Cancer Grand Rounds, Tucson, AZ, Sept. 18, 2015.

"Automated Detection and Segmentation of FISH Spots," Invited Speaker, 2011 Arizona Imaging and Microanalysis Society Annual Meeting, Tucson, AZ, March 24, 2011.

"Color Image Enhancement and Coordinate Systems," Invited Speaker, IEEE Signal Processing Society Phoenix Chapter, May 1992.

"Digital Image Processing," Tutorial Speaker, IEEE Intl. Phoenix Conf. on Computers and Communication, April 1992.

"Color Image Enhancement Techniques," Invited Speaker, Dept. of Computer Science, University of California at Santa Barbara, April 1991.

## Grants and Contracts

National Institutes of Health / National Institute of Biomedical Imaging and Bioengineering, Grant No. 1UH2EB022623-01, "Low-Cost Mobile Oral Cancer Screening for Low Resource Setting," co-investigator (with R. Liang), 9/1/2016 – 8/31/2018.

The Sensor Group LLC, "Automated Analysis of Images of Electric Power Equipment," principal investigator, 5/23/2016 – 8/22/2016.

National Institutes of Health / National Eye Institute, Grant No. R01EY020890, "Extracelluar Matrix Organization and Biomechanics of the Lamina Cribrosa and Peripapillary Sclera," co-investigator starting Jan. 2015 (with J. P. Vande Geest), Aug. 2011 – July 2016.

National Institutes of Health / National Heart, Lung, and Blood Institute, Grant No. T32HL007955, "Cardiovascular Biomedical Engineering Training Grant," participant starting July 2014 (with J. Barton, PI), May 2000 – June 2016.

Google Inc., "Computational Depth-Based Restoration Technique for Full-Focus Imaging," co-investigator (with R. Liang), 9/1/2014 – 9/1/2015.

National Institutes of Health / National Cancer Institute, Grant No. CA023074, "Cancer Center Support Grant," principal investigator (with D. S. Alberts and other principal investigators), July 2009 – June 2014.

University of Arizona Technology Research Initiative Fund, TRIF Imaging Fellowship for student (R. Kulkarni), "Multiphase Segmentation of 3-D CT Images of Porous Materials," co-investigator (with M. Tuller), Aug. 2013 – May 2014.

Split Engineering LLC, "Image Analysis for Rock Particle Segmentation," principal investigator, May 2012 – May 2013.

NSF I/UCRC Connection One, "Content-Adaptive Improved Error Concealment Method for H.264/AVC Encoded Video Streaming," principal investigator, Jan. 2008 – June 2008.

National Institutes of Health / National Institute of Biomedical Imaging and Bioengineering, "Graduate Training in Biomedical Imaging and Spectroscopy," Grant No. 5T32EB000809-05, participant (with A. Gmitro et al.), May 2003 – April 2008.

National Institutes of Health, "Advanced Intravital Microscope," participant (with U. Utzinger et al.), April 2007 – March 2008.

National Institutes of Health / National Cancer Institute, "Diagnosis of Ovarian Cancer by Confocal Microendoscopy," Grant No. 5R01CA115780-03, co-investigator (with A. F. Gmitro), July 2005 – June 2009.

National Science Foundation Industry/University Research Center (I/UCRC), "Connection One: Communication Circuits and Systems Center," Grant No. EEC-0333046, principal investigator, July 2003 – June 2008.

Texas Instruments, NSF I/UCRC Connection One Membership, Aug. 2005 – June 2008.

Analog Devices, NSF I/UCRC Connection One Membership, July 2003 – June 2008.

Raytheon, NSF I/UCRC Connection One Membership, July 2003 – June 2008.

BAE Systems, "Modeling and Simulation of MANET, IPv6 Interfaces and Optical Switching Architectures for Advanced Mobile Network-Centric Platforms," co-investigator (with K. M. McNeill), Oct. 2003 – Sept. 2007 (my involvement began July 2005).

NSF I/UCRC Connection One, "Integrated Management/Control Plane Architecture with VoIP Application," principal investigator, Aug. 2005 – Aug. 2006.

BAE Systems, NSF I/UCRC Connection One Membership, Jan. 2004 – June 2006.

Cisco Systems, NSF I/UCRC Connection One Membership, July 2003 – June 2006.

NSF I/UCRC Connection One, "Adaptive Voice Quality Enhancement Mechanisms for VoIP," coinvestigator (with K. M. McNeill), Aug. 2004 – Aug. 2006.

NSF I/UCRC Connection One, "Integrated Management Control Plane Architecture for Heterogeneous Networks," co-investigator (with K. M. McNeill), Aug. 2003 – July 2005 (my involvement began July 2005).

State of Arizona Prop. 301 Information Technology Committee, "Connection One: Communication Circuits and Systems Center," principal investigator, July 2003 – June 2006.

National Science Foundation, "Planning Grant for NSF I/UCRC Connection One: Communication Circuits and Systems Center," Grant No. EEC-0245729, principal investigator, Feb. 2003 – Jan. 2004.

The University of Arizona Prop. 301 Small Grants Program in Imaging and Image Science, "Automated Analysis of Chromosome Images for Cytogenetic Applications," principal investigator, Jan.–Dec. 2002.

UA Office of the Dean of Students, "Student/Faculty Interaction Program," principal investigator (with J. D. Carothers), Aug. 2001 – Dec. 2002.

National Institutes of Health, "Wavelet Analysis of Flow Cytometric Information," co-investigator (with D. W. Galbraith), Sept. 1998 – Sept. 2001.

National Science Foundation, "Flow Cytometry: Digital Processing of Molecular Information," Grant No. BIR-9604929, co-investigator (with D. W. Galbraith), Feb. 1997 – Jan. 2001.

UA College of Engineering, Arizona Software Institute, "A Software Toolbox for Multimedia Indexing and Retrieval," principal investigator, July 1999 – Feb. 2000.

Hughes Missile Systems Company, "Signature Prediction of Targets Given 2–D Views," principal investigator, Nov. 1996 – June 1997.

National Science Foundation, "Flow Cytometry: Digital Processing of Molecular Information," Grant No. BIR-9513602, co-investigator (with D. W. Galbraith), March 1996 – Feb. 1997.

Hughes Missile Systems Company, "Reference Generation with Gray Shade Signature Overlay," principal investigator, Feb. 1996 – June 1997.

Motorola, Inc. (SSTG), "Telecommunications Analysis," co-investigator (with J. D. Carothers and I. Widjaja), Aug. 1996 – Dec. 1996.

Motorola, Inc. (GSTG), "Optimization for Data Visualization," co-investigator (with J. D. Carothers and I. Widjaja), Jan. 1996 – Dec. 1996.

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National Science Foundation, "Flow Cytometry: Digital Processing of Molecular Information," Grant No. BIR-9116067, co-investigator (with D. W. Galbraith), July 1992 – Dec. 1995.

Motorola, Inc. (GSTG), "Optimization for Data Visualization," co-investigator (with J. D. Carothers and M. K. Liu), Jan. 1995 – Dec. 1995.

AT&T Foundation, "Digital Retrieval and Visualization of 3–D Magnetic Resonance Images," principal investigator, Oct. 1994 – Oct. 1995.

Hughes Missile Systems Company, "Reconstruction of 3–D Geometry of Objects from Limited Views," principal investigator, July 1994 – July 1995.

Texas Instruments, Inc., software donation, TMS320C30 C-compiler/assembler/linker package, April 1995.

Motorola, Inc. (GSTG), "Multidimensional Algorithms for Biomedical Image Analysis," principal investigator, May 1994 – Feb. 1995.

National Science Foundation, "Digital Image Archiving and Viewing Station," Grant No. CDA- 9212524, co-investigator (with R. A. Schowengerdt and R. N. Strickland), Sept. 1992 – Aug. 1994.

University of Arizona, Office of Vice President for Research, "Coordinate Systems for Processing Digital Color Images," principal investigator, Jan. 1992 – Dec. 1992.

National Science Foundation, "Color Image Enhancement and Segmentation for Computer Vision," Grant No. IRI-9112350, principal investigator, July 1991 – Sept. 1992.

# Electronic Patent Application Fee Transmittal

| | |
|---|---|
| **Application Number:** | |
| **Filing Date:** | |
| **Title of Invention:** | ELECTRIC CAMERA |
| **First Named Inventor/Applicant Name:** | Takahiro Nakano |
| **Filer:** | Jennifer C. Bailey/Chalynda Giles |
| **Attorney Docket Number:** | 2638-19.00 |

Filed as Large Entity

**Filing Fees for ex parte reexam**

| Description | Fee Code | Quantity | Amount | Sub-Total in USD($) |
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| **Basic Filing:** | | | | |
| EX PARTE REEXAMINATION (1.510(A)) NON-STREAMLINED | 1812 | 1 | 12600 | 12600 |
| **Pages:** | | | | |
| **Claims:** | | | | |
| **Miscellaneous-Filing:** | | | | |
| **Petition:** | | | | |
| **Patent-Appeals-and-Interference:** | | | | |
| **Post-Allowance-and-Post-Issuance:** | | | | |

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| **Extension-of-Time:** | | | | |
| **Miscellaneous:** | | | | |
| | | | **Total in USD ($)** | **12600** |

| Electronic Acknowledgement Receipt | |
|---|---|
| **EFS ID:** | 41338247 |
| **Application Number:** | 90014628 |
| **International Application Number:** | |
| **Confirmation Number:** | 6100 |
| **Title of Invention:** | ELECTRIC CAMERA |
| **First Named Inventor/Applicant Name:** | Takahiro Nakano |
| **Customer Number:** | 118925 |
| **Filer:** | Jennifer C. Bailey/Chalynda Giles |
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| **Attorney Docket Number:** | 2638-19.00 |
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| The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:<br>37 CFR 1.21 (Miscellaneous fees and charges)<br>37 CFR 1.20 (Post Issuance fees) | |

37 CFR 1.19 (Document supply fees)

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|---|---|---|---|---|---|
| 1 | Copy of patent for which reexamination is requested | EX1001_US8339493B2_Reexam_Patent.pdf | 1285382<br>41e0551010be2c07b6bc4feb140e5134e7067cf5 | no | 20 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 2 | Non Patent Literature | EX1002_12845266_8339493_File_History.pdf | 10548755<br>5edecd37e70f93c303048c5c9f3db87b33812869 | no | 285 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 3 | Other Reference-Patent/App/Search documents | EX1005_US7903162_Juen.pdf | 1740964<br>38cdadabf7d3c70ef524cd1fd66c996c48d35304 | no | 25 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 4 | Other Reference-Patent/App/Search documents | EX1006_US5444482_Misawa.pdf | 1679917<br>047171a1d5c3e0281da22ca3dec9e674a6e1cd86 | no | 13 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 5 | Reexam - Affidavit/Decl/Exhibit Filed by 3rd Party | EX1007_Declaration_Edward_Lang.pdf | 500069<br>592da4497ae5641061af9885343a3f8679e7cdde | no | 2 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 6 | Reexam - Affidavit/Decl/Exhibit Filed by 3rd Party | EX1008_Declaration_Grace_Siller.pdf | 10732780<br>99bd49182619461af0d013ec0431e01dd3ad9f56 | no | 64 |
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| 7 | Reexam - Affidavit/Decl/Exhibit Filed by 3rd Party | EX1009_Declaration_Susan_Vanderschans_Casio_Press_Release_Declaration.pdf | 759257<br>2f7c175356afa67abb438da5dda51f61f4adba34 | no | 6 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 8 | Non Patent Literature | EX1011_10462403_15959774_Application_File_History.pdf | 19701148<br>51e98ffb2acaeefda80e92f108c8c5d351a30e78 | no | 492 |
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| 9 | Non Patent Literature | EX1012_10554917_15386656_Application_File_History.pdf | 20300401<br>ea0d144824be6db3534a962ae8bfda4d75e4b07b | no | 515 |
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| 10 | Other Reference-Patent/App/Search documents | EX1013_US5502483_Takase.pdf | 1235023<br>209131ef0d009942586 4d740d3f3bef8d6bdd529 | no | 12 |
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| 11 | Other Reference-Patent/App/Search documents | EX1014_US4949117_Heyningen.pdf | 732309<br>ee1b9a3454f9c9295aa15f38c8e99423759c996e | no | 11 |
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| 12 | Other Reference-Patent/App/Search documents | EX1015_US5150109_Berry.pdf | 595641<br>fdbd500a4914010877a30eb40fb86a71323a3851 | no | 7 |
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| 13 | Other Reference-Patent/App/Search documents | EX1017_US5642171_Baumgartner.pdf | 2306675<br>d698140e302abcbfaa13999de80904a11e22f8a1 | no | 20 |
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| 14 | Other Reference-Patent/App/Search documents | EX1019_US4740828_Kinoshita.pdf | 1968019<br>fa5780baa5d7473fecc4f4b7ac893b26e8e10f5c | no | 21 |
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| 15 | Other Reference-Patent/App/Search documents | EX1022_US6512541_Dunton.pdf | 1343570<br>cbdd89be3ab98789312aab6457e7c274c28e4e9f | no | 14 |
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| 16 | Other Reference-Patent/App/Search documents | EX1023_US6563535_Anderson.pdf | 1900363<br>7c8789cfc2350b54f33c923f8efecb2cf35724b0 | no | 25 |
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| 17 | Other Reference-Patent/App/Search documents | EX1024_US4612575_Ishman.pdf | 1358705<br>5b4757463e44056c856d732d8f779980360e8d94 | no | 10 |
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| 18 | Other Reference-Patent/App/Search documents | EX1016_US6335760_Sato_Final.pdf | 2017171<br>ff531f438cf621af25c9f3894614322cb33de1e7 | no | 22 |
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| **Information:** | | | | | |
| 19 | Other Reference-Patent/App/Search documents | EX1020_US6018363_Horii_Final.pdf | 3024553<br>70b891662cea4032f62023945bfc060d96d81984 | no | 34 |
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| 20 | Foreign Reference | EX1021_EP0802688B1_Inoue_Final.pdf | 2782699<br>9c1d61deb0dedf2cf371ef5732505fb112c419d7 | no | 29 |
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| 21 | Non Patent Literature | EX1025_Complaint_for_Patent_Infringement_03152019_Final.pdf | 1631156<br>c3a3f336fbcd7417f7bf322aa4c1a841eabf376d | no | 65 |
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| 22 | Other Reference-Patent/App/Search documents | EX1028_US6963361.pdf | 1715336<br>7fa7ab33fae3e4cedcae079712b72e66c34ff6d6 | no | 35 |
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| **Information:** | | | | | |
| 23 | Non Patent Literature | EX1018_CCD_Textbook_Final1.pdf | 8897155<br>3532fca0a743dc9fabd62ef5839c24294a974a94 | no | 404 |
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| 24 | Non Patent Literature | EX1026_Markman_Order_Final.pdf | 484783<br>f9bd8df857b523f17cc35b8a8be51e1668775f84 | no | 58 |
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| 25 | Non Patent Literature | EX1027_IPR202000597_PO_Preliminary_Response_Final.pdf | 2025089<br>7fb9553831af071100fa9f1cbb3685f76ff7b7e4 | no | 78 |
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| 26 | Non Patent Literature | EX1004_Casio_QV8000SX_Users_Guide_Part1.pdf | 20920298<br>8eba7f8ca0d85d1fde514e10666cbcc568c84191 | no | 59 |
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| 27 | Non Patent Literature | EX1004_Casio_QV8000SX_Users_Guide_Part2.pdf | 20893032<br>de8e5f0dbc4d74780a82c9dc0038b0947aaa4bbf | no | 59 |
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| 28 | Non Patent Literature | EX1004_Casio_QV8000SX_Users_Guide_Part3.pdf | 5445748<br>576dda650e7877def86d4388b81c2c82ae5b9433 | no | 9 |
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| 29 | Reexam - Affidavit/Decl/Exhibit Filed by 3rd Party | EX1010_Declaration_Etchells_Part2.pdf | 20732736<br>af4a2071950f5e94e11f831bdf3009ac355f40b4 | no | 57 |
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| 30 | Reexam - Affidavit/Decl/Exhibit Filed by 3rd Party | EX1010_Declaration_Etchells_Part3.pdf | 18635452<br>c2c127cd8044510830776a114a0ce1d49ba0efd5 | no | 31 |
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| **Information:** | | | | | |
| 31 | Reexam Miscellaneous Incoming Letter | 01_Request_Reexamination_Transmittal_493_Patent.pdf | 243261<br>8c35bc23f71748628886443157edcf62ce15b574 | no | 4 |
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| 32 | Reexam - Info Disclosure Statement Filed by 3rd Party | 03_Information_Disclosure_Statement_Reexam_8339493.pdf | 123714<br>39103edba06d48f00244035fceb7e41a6b53e296 | no | 2 |
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| 33 | Reexam - Affidavit/Decl/Exhibit Filed by 3rd Party | EX1010_Declaration_Etchells_Final1_Part1.pdf | 2615006<br>d3f7c83539ed48b434db408a3473ca779c1e2bfd | no | 86 |
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| 34 | Receipt of Orig. Ex Parte Request by Third Party | 02_Request_for_Reexam_8339493_Patent.pdf | 5303060<br>9b477af68543741b5f305dc2a3b154c780f6414b | no | 69 |
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| 35 | Reexam - Affidavit/Decl/Exhibit Filed by 3rd Party | EX1003_Rodriguez_Declaration_Reexam_Final.pdf | 6703258<br>7831239c74b892dcab132fc3a1944bd84d6729a8 | no | 135 |
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| 36 | Fee Worksheet (SB06) | fee-info.pdf | 30023<br>c4e7780f7e747be9ff5d35b9b88ebd79809d96fb | no | 2 |
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