Thank you for procuring this fine Hitachi Kokusai Electric color CCD camera. Before using the camera, please read this operation manual carefully and keep this manual on file for ready reference in the future.
IMPORTANT NOTICE

For U. S. A.
These products have been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. These products generate, use, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, they may cause harmful interference to radio communications. Operation of these products in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

WARNING
Changes or modifications not expressly approved by Hitachi Denki responsible for compliance could void the user’s authority to operate the equipment.

For Canada
These products do not exceed the class A limits for radio noise emissions from digital apparatus as set out in the radio interference regulations.

Le présent appareil n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de classe A prescrites dans le règlement sur le brouillage radioélectrique édicté par le ministre des communications du Canada.

Declaration of Conformity

Manufacturer’s Name:
Hitachi Koki Electric, Inc.

Manufacturer’s Address:
525H Rainbow Park Drive
Lake Forest, Illinois 60045

Supplementary Information:
The product conforms to the following Standards:
- EMC EN 55022:1998 / 901
- EN 60950:1991
- IEC 60456

Conforms to the following Directives:

Model Name:
Maki Hanae

Date of Issue:
July 26, 2006

Name of Interviewer:
Maki Hanae

Issued by:
Hitachi Koki Electric, Inc.
Operating considerations

Power supply
- Be sure to use the power source specified in the Major Specifications.
- Before plugging or unplugging a connector, be sure to turn off power.
- To plug or unplug a connector, be sure to hold the connector section.
- Note that it will take several seconds until a picture is displayed on the monitor after power on.

Handling
- Do not attempt to remove cover.
- When installing or removing a lens, be sure to use care that water or dust does not enter the inside of the camera.

Installing and storage
- Avoid installing or storing the camera in the following environments.
- Environments exposed to direct sunlight, rain or snow
- Environments where combustible or corrosive gas exists
- Excessively warm or cold environment (Operating ambient temperature: -10 to 50°C)
- Humid or dusty environment
- Place subjected to excessive vibration or shock
- Environment exposed to strong electric or magnetic field

Cleaning
- Use a blower or a lens brush to remove dusts on the lens or the optical filter.
- Wipe dirt on the case off with dry soft cloth. If dirt is hardened, wipe them off with cloth moistened with neutral detergent liquid; wipe the cover with dry cloth.
- Do not use benzine, thinner, alcohol, liquid cleaner or spray-type cleaner.
- In event dust or other debris is lodged between the CCD and optical filter, consult dealer for cleaning by an optical technician.

Phenomena inherent to CCD imaging device

Following are the phenomena inherent to a CCD imaging device, and not defects

1) Smear and blooming
   When strong light (lamp, fluorescent lamp, reflected light, etc.) is shot, pale bands are displayed vertically above and below the light.
   In this case, change the angle of the camera so that such strong light does not enter the camera through the lens.

2) Fixed pattern noise
   When the camera is operated in a high temperature, fixed pattern noise may appear on the entire screen.

3) Moire
   When fine patterns are shot, moire may be displayed.

4) Burning
   When excessively intense light comes to the CCD for a long time, the spectral filter in the CCD pixel may be deteriorated, and the colour of the corresponding portion may change.
   Avoid using the camera under such condition.
The KP-FD30 is a single CCD type RGB color camera which utilizes the progressive scan CCD image sensor with square pixel for VGA format of 1/2-inch which adopted the RGB primary color mosaic filter.

**Features**

- Analog RGB output (60 frame/second)
- Small, Compact, Self-contained
- High picture quality (Digital signal processing LSI (DSP))
- CCD drive functions (Preset electronic shutter, Variable electric shutter, Auto electronic shutter, frame / field on demand.)
- Auto level control (AVERAGE, AREA, PEAK/AVE)
- White balance (Auto, Preset, Manual)
- Auto iris lens (galvanometer type)
- Picture adjustment (Modes and settings can be selected and adjusted from.)
- NTSC (VBS, Y/C, RGB) output
  It can be set as the image output of NTSC system by Switch change.

**Composition**

- Camera (with C mount adaptor)
- Operation manual

**Optional accessories**

- DC input plug (R03-P3F) R03-P3F
- Lens plug (E4-191J-100) E4-191J-100
- MULTI cable plug
  - KEC-15P (Housing)
  - JK-SP2140 (Pin contact)
  - JK-C151C (Cover)

**Section names and functions**

1. C-mount adaptor
   (When using a CS-mount lens, remove the C-mount adaptor.)
2. Lens mount ring
3. Lens mount screws
4. Set up buttons [SET/UP/DOWN]
5. Video output connector [VIDEO OUT]
6. DC input connector [DC IN]
7. MULTI connector [MULTI] (inch size screws)
8. Lens connector [LENS]

Iris control voltage input (galvanometer) type lens

9. Camera rear switch
   Set the switch according to the type of video signal.
   - SW-1 ON (Upper side): VGA (progressive scan) mode
   - SW-2 OFF (Lower side): NTSC (2:1 interlace scan) mode

*Factory setting is VGA (progressive) mode.

**Note:** Please turn OFF SW-2 and 3 and 4. (They are not used.)
Connections

EXP. VGA (progressive scan) mode

In NTSC mode, connect RGB cable C-501RR/C-102RR or BNC cable to Color Monitor.
Connectors

- **Multi connector** (inch size screw)

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Signal name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>R/CC output</td>
</tr>
<tr>
<td>2</td>
<td>G/Y output</td>
</tr>
<tr>
<td>3</td>
<td>B/(VB) output</td>
</tr>
<tr>
<td>4</td>
<td>WE output</td>
</tr>
<tr>
<td>5</td>
<td>GND (TXD/RXD)</td>
</tr>
<tr>
<td>6</td>
<td>VIDEO GND</td>
</tr>
<tr>
<td>7</td>
<td>VIDEO GND</td>
</tr>
<tr>
<td>8</td>
<td>UNREG +12V input</td>
</tr>
<tr>
<td>9</td>
<td>TRIG input</td>
</tr>
<tr>
<td>10</td>
<td>GND</td>
</tr>
<tr>
<td>11</td>
<td>RXD</td>
</tr>
<tr>
<td>12</td>
<td>HD input / HD output / SYNC output</td>
</tr>
<tr>
<td>13</td>
<td>VD input / VD output</td>
</tr>
<tr>
<td>14</td>
<td>TXD</td>
</tr>
<tr>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>

- **DC input connector** [DC IN]

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Signal name</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>GND</td>
</tr>
<tr>
<td>B</td>
<td>+12V input</td>
</tr>
<tr>
<td>C</td>
<td>NC</td>
</tr>
</tbody>
</table>

- **Lens connector** [LENS]

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Signal name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Damp(-)</td>
</tr>
<tr>
<td>2</td>
<td>Damp(+)</td>
</tr>
<tr>
<td>3</td>
<td>Drive(+)</td>
</tr>
<tr>
<td>4</td>
<td>Drive(-)</td>
</tr>
</tbody>
</table>

- **Lens**

Note on lens selection
1) Observe the maximum size limit (A in the figure) when installing the lens. Internal damage can occur if a larger lens is used. If unavoidable, be sure to fix the lens itself on a support.

![Lens illustration](image)

A: Less than 4.1mm

Lens flange surface

DC control voltage [galvanometer] system should be used for an automatic iris lens.

Although arrangement of a lens connector is based on JEITA, the length of the cable between the main part of a lens and a plug is required 150mm or more.

- **Flangeback adjustment**

Flangeback adjustment is needed in cases where focus cannot be obtained by normal lens focus operation or focus is lost at the maximum telephoto and wide angle settings of a zoom lens. In such cases, open the lens iris and adjust as follows.

- **Fixed focus lens**
  1) Set the lens focus ring to infinity.
  2) Aim toward an object at least 20 meters distant.
  3) Loosen the (2) lens mount screws and turn the lens mount ring to adjust the focus. Use care not to disturb the lens focus ring.
  4) Tighten the lens mount screws.

- **Zoom lens**
  1) Set the lens to telephoto and aim toward an object at least 20 meters distant.
  2) Turn the lens focus ring to adjust the focus.
  3) Set the lens to wide angle. Loosen the (2) lens mount screws and turn the lens mount ring to adjust the focus. Use care not to disturb the lens focus ring.
  4) Again set to telephoto but adjust the focus by turning the lens mount.
  5) Repeat these steps and carefully adjust for best focus.
  6) Finally, tighten the lens mount screws.
1. Imaging device
   1/2-inch progressive scan interline CCD

2. Total number of pixels
   692(H) x 504(V)

3. No. of effective pixels
   659(H) x 494(V)

4. Unit cell size
   3.95(H) x 3.95(V)μm (Square pixel)

5. Color filter
   R, G, B primary color mosaic filters on chip

6. Scanning area
   6.52(H) x 4.89(V)mm

7. Progressive scan system (VGA mode)
   Horizontal 31.6kHz (15.734kHz)*3) ±0.5kHz
     Vertical 59.4kHz

8. (Switch change)
   2/1 interface scan (NTSC mode)

9. Frequency
   Horizontal 31.6kHz (15.734kHz)*3) ±0.5kHz
   Vertical 59.4kHz
   Burst (0-3 Vpp) 8 cycles

10. Sync system
    Internal/external (HD/VD auto selection*)

11. Internal sync output
    HD 31.6kHz (15.734kHz)*3) ±0.5kHz
    VD 59.4kHz

12. (Switch change)
    2/3 or 2/5 Vpp or 0/2.5 Vpp Negative

13. SYNC
    2/3 or 2/5 Vpp Negative
    2/3 3Vpp Negative

14. WEN
    5 Vpp Negative

15. TRIG
    Low 0 Vdc  High 2~5Vdc

16. Video signal output

17. Video signal processing
    Digital processing (input 10 bits)

18. White balance
    Selectable in 3 modes
    ATW / AWB / MANUAL

19. Manual Gain Adjustment at AGC OFF.
    Limit Gain Adjustable at AGC ON
    (0~Approx. 18dB)

20. Power supply
    DC +12V ± 10%

21. Power consumption
    Approx. 360mA

22. Lens mount
    CCD mount (Flange-back adjustment)

23. Ambient temperature
    -10°C to 50°C (14°F to 122°F)

24. Vibration endurance
    68.65 m/s^2 (10 to 200Hz; 30 minutes each on XYZ axes)

25. Shock
    490.3 m/s^2 (vertical, horizontal, once each face)

26. Environmental conditions
    Operating
    0°C to 40°C (32°F to 104°F)
    20% to 80% RH

27. Mass
    Approx. 220g (without lens)

Main specifications

1. Imaging device
   1/2-inch progressive scan interline CCD

2. Total number of pixels
   692(H) x 504(V)

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   659(H) x 494(V)

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5. Color filter
   R, G, B primary color mosaic filters on chip

6. Scanning area
   6.52(H) x 4.89(V)mm

7. Progressive scan system (VGA mode)
   Horizontal 31.6kHz (15.734kHz)*3) ±0.5kHz
   Vertical 59.4kHz

8. (Switch change)
   2/1 interface scan (NTSC mode)

9. Frequency
   Horizontal 31.6kHz (15.734kHz)*3) ±0.5kHz
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    Internal/external (HD/VD auto selection*)

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    HD 31.6kHz (15.734kHz)*3) ±0.5kHz
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    2/3 or 2/5 Vpp or 0/2.5 Vpp Negative

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    Limit Gain Adjustable at AGC ON
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26. Environmental conditions
    Operating
    0°C to 40°C (32°F to 104°F)
    20% to 80% RH

27. Mass
    Approx. 220g (without lens)
Remote Connection

This camera can perform remote control of various setup of a camera with a personal computer. Please perform wiring as shown in a figure to an optional remote plug, and connect with the remote connector on the back of a camera after checking wiring correctly.

Note
Please perform extraction and insertion of a remote plug after turning off a camera power supply.
When an item indicated by a mark is selected, pressing the SET button shifts to the next menu.

The camera setting and adjustments can be changed to conform to conditions of use. Use the setting menu indicated on the monitor screen to check and change the settings and adjustments. The setting menu is comprised as follows.

### Setting menu description

The camera setting and adjustments can be changed to conform to conditions of use. Use the setting menu indicated on the monitor screen to check and change the settings and adjustments. The setting menu is comprised as follows.

**Main menu**

- Camera title setting menu
- White balance setting menu
- Shutter speed setting menu
- AGC setting menu
- Auto level control menu
- Display on/off positioning setting

**Sub menu**

- WB area setting
- ALC area setting

### Menu Operation

Three rear panel setup buttons are used to shift the cursor and select items from the menus.

1. **Up button[UP]**
   - Shift the cursor in the upward direction or increase an adjustment value.

2. **Down button[DOWN]**
   - Shift the cursor in the downward direction or decrease an adjustment value.

3. **Set button[SET]**
   - Press to display the main menu or to change a setting.

### Main menu

1. **Main menu [MAIN MENU]**

   Press the SET button for at least 2 seconds to display the main menu on the monitor screen. Check the present settings at the main menu.

   - **Camera title setting menu**
   - **White balance setting menu**
   - **Shutter speed setting menu**
   - **AGC setting menu**
   - **Auto level control menu**
   - **Display on/off positioning setting**

2. **Camera title [CAMERA TITLE MENU]**

   One line of up to 24 alphanumeric characters can be displayed on the screen. Camera title and a display position are set up.

Note:

- If no button is pressed, the menu display extinguishes automatically after about 5 minutes.

When an item indicated by a mark is selected, pressing the SET button shifts to the next menu.
Note:
If the ratio of (PEAK) is enlarged, a picture level may flicker. In this case (PEAK) should reduce a ratio.

(3) Auto level control [ALC MENU]
Automatic light control mode is set up. This control is reflected during automatic level control operation of an automatic iris diaphragm lens, AGC, AES, etc.
There are the following three modes in automatic exposure control.

1. [AVE] Responds to the average lighting over a broad area.
2. [AREA] Exposure is controlled only by the luminosity level of specific area. (Scanning area is selectable from 9 areas.)
3. [PEAK/AVE] The peak level and the average level are used together and exposure is controlled.
   (The ratio of a peak value and average value is changeable.)

Title positioning setting
Press the Up and Down buttons to shift the characters horizontally. Afterwards, press Set to confirm the display position and return to the main menu.

Detection area setting
Shift the cursor to Area Select and press the Set button to display the detection area select menu. There are 9 light detect areas selected by the Up and Down buttons. Select the areas from nos. 1 to 9 that include the subject of main interest. After deciding the detection areas, press the Set button to return to the ALC menu.

Note:
If the ratio of (PEAK) is enlarged, a picture level may flicker. In this case (PEAK) should reduce a ratio.

Camera title position setting
Press the Up and Down buttons to shift the characters horizontally. Afterwards, press Set to confirm the display position and return to the main menu.
4) AGC setting [AGC MENU]
AGC (automatic gain control) mode is set up. Please set up according to the operating environment of the camera.

- **MODE ON**
  - **AGC OFF**
  - **AGC LIMIT**
  - **AGC FIXED GAIN**

5) Shutter speed setting [SHUTTER MENU]
Electronic shutter mode is set up. Please set up according to the operating environment of the camera.

- **MODE OFF**
  - **MODE VARIABLE**
  - **MODE PRESET**

---

**Electric shutter speed PRESET**
(Slow: 28 steps)
An image output becomes intermittent.
- Sensitivity goes up. However, the image output is intermittent.
- White flaws may become apparent at high Sensitivity; these are not due to malfunction.

**AGC OFF**

**AGC ON**

**MODE OFF (1/60)**

**MODE PRESET**

**MODE VARIABLE**

**MODE EXT TRIG**
6) White balance setting menu

White balance mode is set up. Please set up according to the operating environment of the camera.

- **WHITE BALANCE MENU**
  - **MODE**: MANUAL
  - **R-GAIN**: 000
  - **B-GAIN**: 000

- **WHITE BALANCE DETECTION AREA SELECT**
  - **MODE**: ATW
  - **WB AREA**: ON (NO.1)
  - **AREA SELECT**
    - **MODE**: ATW

- **WHITE BALANCE AREA**
  - **MODE**: AWC
  - **PRESET START**: PUSH SET
  - **R-GAIN OFFSET**: 000
  - **B-GAIN OFFSET**: 000

7) Sub menu

Changing the picture quality (video response) of the camera output image. Please set up according to the operating environment of the camera.

**SUB MENU**

- **ITEM**: PICTURE
  - **SYNC MODE**: HD/VD
  - **PHASE**: 000
  - **SYNC/HD OUT**: SYNC
  - **SYNC ON**: OFF
  - **OUTPUT**: R.G.B
  - **CAMERA RESET**: PUSH SET

- **ITEM**: PRESET
  - **SYNC MODE**: HD/VD
  - **PHASE**: 000
  - **SYNC/HD OUT**: SYNC
  - **SYNC ON**: OFF
  - **OUTPUT**: R.G.B
  - **CAMERA RESET**: PUSH SET

● Camera reset:

Press the Set button simultaneously for 2 seconds to return the initial setting. An underline portion is the setup at the time of factory shipments.
Internal switch setting

To access the internal switches, remove the four screws on the back panel of the camera. Carefully remove the pack panel. There are two internal switches that may need to be changed depending on the use and connection of the camera.

1) SW6001
   HD/SYNC, VD input-and-output change.
   Upper side: output*   *Factory setting is
   Lower side: input   HD/SYNC, VD output.

2) SW6002
   75-ohm termination change.
   Upper side: 75 ohm termination*   *Factory setting is
   Lower side: No termination   75ohm termination.

Cautions:
Before removal of the back panel, make sure that power is shut off to the camera.
Please remove the back panel carefully; there is a FPC cable that is connected between the back panel and the internal boards.
If the back panel is forcefully removed, there is a possibility of damaging the cable and connector.

HD/VD External Timing chart

<table>
<thead>
<tr>
<th>HD/VD inputs</th>
<th>1)VGA mode</th>
<th>2)NTSC mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>External HD</td>
<td></td>
<td>Even field</td>
</tr>
<tr>
<td>External VD</td>
<td></td>
<td>Odd field</td>
</tr>
<tr>
<td>Sync output</td>
<td></td>
<td></td>
</tr>
<tr>
<td>External HD</td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>Sync output</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Video out signal timing (VGA)

VGA mode timing chart

Vertical

Video output
VD out
WE out
HD out

Horizontal

Video out
HD out

Slow shutter mode timing

Slow shutter mode timing chart

Exp. Shutter speed: 1/30

Video
WE out

Exp. Shutter speed: 1/15

Video out
WE out

1H = 31.468 KHz = 31.778 us
1V = 50.94 Hz = 16.66 ms
Frame On Demand Function

ONE trigger mode Timing chart

Trigger pulse ........ Asynchronous

More than 33.36ms

More than 2μs

Integration time

Approx. 2.38μs

Approx. 3.8μs

Video output

Approx. 24μs~278μs

VD out

Approx. 24μs~978μs

Sync reset

Sync reset: Latch in Internal HD

TRIGGER POLARITY: POSITIVE

Fixed shutter mode Timing chart

Trigger pulse ........ Latch in Internal HD

More than 33.36ms

More than 2μs

Integration time

Shutter speed

Approx. 29.6μs~4.7μs

Video output

Approx. 21μs

VD out

Approx. 31μs

The fixed shutter time is the electronic shutter setting.

1H = 31.666kHz = 31.778μs

TRIGGER POLARITY: POSITIVE
Video out signal timing (NTSC)

NTSC mode timing chart

**Vertical ODD field**

- Video output
- VD out
- HD out

1H = 15.75 kHz = 63.56 μs

**Vertical EVEN field**

- Video output
- VD out
- HD out

**Horizontal**

- Video out
- HD out

1.7 μs

6.7 μs

5.3 μs

63.56 μs
(Important) About an external trigger signal prohibition period

When falling (rising) of a trigger pulse enters during the prohibition of the following figure, color reappearance may not be carried out correctly.
Please input the trigger pulse of the following specification not to input a trigger pulse during the prohibition.

VD out

SYNC

6.5 VSYN

6.5 VSYN

External trigger signal prohibition period.

External trigger signal prohibition period.

Trigger

The period to falling (rising) of the following trigger should not be set to 2nV-2nV+2H from falling (rising) of a front trigger pulse.
(V: vertical synchronous period, n: integer)