Ask your dealer to perform a periodical check and internal cleaning (approx. once every five years). Don't mistake the product may cause fire and/or trouble. For check and cleaning cost, please consult your dealer.

DISCLAIMER (LIMITED WARRANTY)
We disclaim any responsibility and shall be held harmless for any damages or losses incurred by the user in any of the following cases:
- Fire, earthquake or any other act of God; acts by third parties; misuse by the user, whether intentional or accidental; and under extreme operating conditions.
- Malfunction or non-function resulting in indirect, additional or consequential damages, including but not limited to loss of expected income and suspension of business activities.
- Incorrect use not in compliance with instructions in this instruction specifications and manual.
- Malfunctions resulting from misconnection to other equipment.
- Repairs or modifications made by the user or caused to be made by the user and carried out by an unauthorized third party.
- Notwithstanding the foregoing, Telco's liabilities shall not, in any circumstances, exceed the purchase price of the product.
- About the item which does not have a publication in the specifications and manual of this product, it considers as the outside for a guarantee.

RESTRICTION FOR USE
- Should the equipment be used in the following conditions or environments, give consideration to safety measures and inform us of such usage:
  1. Use of the equipment in the conditions or environment contrary to those specified, or use in areas where fire, explosion, or other accidents may cause severe harm.
  2. Use of the equipment in applications expected to cause potential hazard to people or property, which require special safety measures to be adopted.
- This product can be used under diverse operating conditions. Determination of applicability of equipment or devices concerned shall be determined after analysis on testing as necessary by the designer of such equipment or devices, or personnel related to the specifications. Such designer or personal shall assume the performance and safety of the equipment or devices.
- This product is not designed or manufactured to be used for control of equipment directly concerned with human life (*1) or equipment related to maintenance of public services functions involving factors of safety (*2). Therefore, the product shall not be used for such applications:
  (*1): Equipment directly concerned with human life refers to:
  - Medical equipment such as life-support systems, equipment for prening theatres.
  - Exhaust control equipment for exhaust generation of toxic fumes or smoke.
  - Equipment mandatory to be installed by various laws and regulations such as the Fire Act or Building Standard Law.
  (*2): Equipment related to above.
- Equipment relating to maintenance of public services functions involving factors of safety refers to:
  - Traffic control systems for air transportations, railways, roads, or marine transportations
  - Equipment for nuclear power generation
  - Equipment related to above.

CAUTIONS ON USE
- Carefully handle the units.
  Do not drop, or give a strong shock or vibration to the camera. This may cause problems. Treat the camera carefully to prevent cable problems, such as cable breakdown and loose connections.
- Operating ambient temperature and humidity.
  Do not use the camera in places where temperature and humidity exceed the specifications. Picture quality will lower and internal parts may be damaged. Be particularly careful when using in places exposed to direct sunlight. When using in hot places, depending on the conditions of the object and the camera (for example when the gatten is contracted), noise in the form of vertical stripes or white dots may occur. This is not a malfunction.
- Restriction for the lens combination.
  This camera may form a ghost to image area depending on the combination of a lens and an illumination with this camera. But this is not a failure of this camera. Therefore, please check the combination of the lens and the illumination with this camera when use.
  When mounting a lens, take extra caution so that the lens is not tilted, nor does flaw exist at the lens-mount-sectur part. Also check to confirm that no dirt on other foreign object is put inside improper mounting might cause the parts to become locked.
  Do not shoot under of light.
  Avoid intense light such as spot light on part of the screen because it may cause burning or blurs. Intense light falls on the screen, vertical stripes may appear on the screen, but this is not a malfunction.
- Do not expose the camera’s image-pickup-plane to sunlight or other intense light directly.
  In its CCD Charge-transfer device might be damaged.
- Moist.
  When this stripe patterns are shot, stripe patterns that are not actually there (moire) may appears as interference strips. This is not a malfunction.
- Undesirable noise.
  If the camera or the cables are located near something which emit strong magnetism or near something which emit strong electric wave, undesirable noise may appear on the screen. In such a case, try to change the location of the camera or the cable wiring.
- Handling of the protection cap.
  When the camera is not in use, put a lens-cap onto the camera head for protection of the image-pickup-plane.
  When not using the camera for a longtime. Stop supplying power for safety.
- Cleaning the camera.
  Always turn off the power and clean with a piece of soft dry cloth.
- If you don’t wrap the product in an inflammable material, such as cloth.
  Do not put the product in a narrow space, since the heat generated from the product may be difficult to emit.

Equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment 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.

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 accept any interference received, including interference that may cause undesired operation.

This equipment has 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. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment 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.

TOSHIBA TELC CORPORATION

B/W CCD Camera
Model CS8570D
Operation Manual

Thank you for purchasing our B/W CCD camera. This operation manual contains many important information such as how to use this product correctly and safely. Please read through this manual carefully. After reading, keep this manual by the side of this product for your future reference.

Before General Safety Instructions

Read the following safety instructions carefully using this product. This instructions contain valuable information on safe and proper use that will prevent harm and damage to the operator and other persons. Make sure that you fully understand the following details (indications, graphic symbols) before proceeding to the remaining sections in this manual.

Owner's Record

Please fill in the blank below the model name and product serial number, which is found on bottom chassis of your device. Keep this number for your record.

Model Name: [ ]

Serial No.: [ ]

Note: *1: Catastrophic bodily injury loss of eyesight, burns (high and low temperature), shocked, fracture, poisoning, etc., which leaves a sequela and require hospitalization or prolonged treatment.
*2: Bodily injury means injuries, burns and electric shock which does not require hospitalization or prolonged treatment.
*3: Property damage means extended harm to home, household effects, domesticated animals, and pets.

Graphic symbol definitions

Indication Meaning

WARNING This indicates the existence of a hazard that death or catastrophic bodily injury(*1) may result from improper use.

CAUTION This indicates the existence of a hazard that bodily injury(*2) or property damage(*3) may result from improper use.

Handling Precautions

WARNING

Stop operation immediately when any abnormality or defect occurs.

Use during an abnormal condition, such as emitting smoke, burning odors, damage from dropping invasion of foreign objects, etc. may cause fire and/or electric shock. Be always sure to disconnect the power plug from the electrical outlet (socket) at once and contact your dealer.

Do not operate in places with possibility of becoming wet.

This may cause fire and/or electric shock.

Do not repair, dismantle or modify by yourself.

This may cause fire and/or electric shock. Be always sure to contact your dealer for internal repair, check and cleaning of the product.

Don’t place things or materials on the unit.

Ingress of foreign materials such as metallic things and liquid into the unit may cause a fire or an electric shock.

Do not put the product in an unstable, slanting and/or vibrated place.

Drop and/or fall of the product may cause injury.

Do not touch the power cord or other connection cables during a thunderstorm.

This might cause electric shock.

Use the specified power supply.

Use of an unspecified power supply may result in fire or electric shock.

Do not handle rough, damaged, fabricated, heat forcefully, pulled, twisted, handled, placed under heavy objects or heated the power cord, connection cable. Otherwise, fire or electric shock may result.

CAUTION

Note the following instructions when installing:

-Do not wrap the product in an inflammable material, such as cloth.
-Do not put the product in a narrow space, since the heat generated from the product may be difficult to emit.
-Do not use motors, fans, lamps, or other devices which produce heat near the product.
-Do not use in humid, smoky, vaporized or dusty areas.
-Do not leave the product in an environment above 60℃. Otherwise, fire or electric shock may occur.

Use the specified DC power cable or connection cable.

Otherwise, a fire or an electric shock may occur.

Note:

- Turn OFF the power in the case of connection.
  Turn OFF the power in the case of connection of power cable or connection cable.
  Otherwise, an electric shock or a malfunction may occur.

Do not expose its camera head to any intensive light (such as direct sunlight).

Otherwise, its inner image pickup device might get damaged.

Avoid short-circuiting signal output.

Otherwise, a malfunction may occur.

Avoid giving a strong shock against the camera body.

It might cause a breakdown or damage.

If your camera is used in a system where its camera connector is subjected to strong repetitive shocks, its camera connector is possible to break down. If you intend to use your camera in such a situation, if possible, bundle and fix a camera cable in the place near the camera, and do not transmit a shock to the camera connector.

*1: Catastrophic bodily injury loss of eyesight, burns (high and low temperature), shocked, fracture, poisoning, etc., which leaves a sequela and require hospitalization or prolonged treatment.
*2: Bodily injury means injuries, burns and electric shock which does not require hospitalization or prolonged treatment.
*3: Property damage means extended harm to home, household effects, domesticated animals, and pets.
1. PRODUCT DESCRIPTION

Model CS5770 is a one-body type F/CW CCD camera with a VGA format all-pixel-data readout CCD. This model has twice greater driving frequency of conventional cameras to achieve fast-speed data-processing. The model is suited for high-speed, high-resolution image processing use. Its compact, light-weight body is ideal for system integration.

2. FEATURES

(1) Double-speed scan
This model reads out image-data twice as fast as conventional cameras do.

(2) All pix's data readout
With its builtin all-pixel-data-readout CCD, this model can read out image-data just in approximately 1/60 sec. A frame-shutter reads out all data even under RTS (Random Trigger Shutter) mode.

(3) High vertical resolution
As all pix's data are read out even under RTS mode (in 1/60 sec), images with no deterioration in vertical resolution are obtained.

(4) Square grid pattern CCD
Pixels in CCD are aligned in square grid pattern. This makes it easier to perform computation correctly for image processing use.

(5) External Sync
The camera is switched over to external synchronization operation automatically when external HD signal is input.

(6) Random trigger shutter function
With a builtin RTS, the camera's CCD starts light-exposure in synchronization with external trigger signals. This function enables the camera to capture fast-moving subjects at constant position for precise image processing.

(7) Reset: Reset
Under the reset/toggle mode, this model can capture images at an arbitrary timing clock by external trigger signal, and then outputs video at an arbitrary timing clock by external trigger signal.

(8) Partial scan
Under the partial scan mode, only 1/2 or 1/4 screen center portion of image information is read out, resulting in a faster operation.

(10) Ultra-compact & light-weight camera head
The model features its ultra-compact and light-weight camera head, freeing you from your integration-space problem. In addition, it has an excellent shock and vibration resistance.

3. CONFIGURATION

(1) Camera body ................................. 1
(2) Accessories ................................. 1
Operation Manual (Japanese) ............... 1
Operation Manual (English) ................. 1

4. OPTION UNIT

(1) DC Sync-Off adapter ................. Model name: CPR23750 [25m,35m,50m,100m]
(2) Camera adapter ......................... Model name: C-S170
(3) Camera-mounting kit ..................... Model name: CPT8500

*Contact your dealer / distributor for details of option units.
*Conformity of an option part and EMC conditions
About the conformity of EMC standard of this machine, it has guaranteed in the conditions combined with the above-mentioned option part.
When used combined parts other than specification of our company, it is your request to have final EMC conformity checked of a visitor with a machine and the whole equipment.

5. EXPLANATION OF REAR PANEL

① Manual gain adjustment potentiometer (5GAINT)
This potentiometer is enabled when DIPSW No. 1 (GAIN selection) is in ON.
When you turn clockwise to right, camera sensitivity level goes up.

② Mode selection rear DIP SW
This is the camera mode selection switch.

③ Ext-sync input impedance selection SW
This SW switches external-sync input impedance. When set in right side, the input impedance is 75-ohm termination. When set in left, it is 10-ohm. (The initial factory setting is in OFF position.)

④ VIDEO OUT: DC IN / SYNC
This connector is for DC power input, external sync signal input, and video output.

6. CONNECTION

6-1 Connection examples

7. OPERATION MODE

7-1 DC IN / SYNCH connector

(1) Compatible connector
IR10A-10P-12S (Supplied by HIBO SE ELECT.)

(2) Pin assignment

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DC12V GND</td>
</tr>
<tr>
<td>2</td>
<td>DC12V</td>
</tr>
<tr>
<td>3</td>
<td>VIDEO GND</td>
</tr>
<tr>
<td>4</td>
<td>VIDEO OUT</td>
</tr>
<tr>
<td>5</td>
<td>HD GND</td>
</tr>
<tr>
<td>6</td>
<td>HD IN</td>
</tr>
<tr>
<td>7</td>
<td>HD IN</td>
</tr>
<tr>
<td>8</td>
<td>THRG GND</td>
</tr>
<tr>
<td>9</td>
<td>NC</td>
</tr>
<tr>
<td>10</td>
<td>WEN OUT</td>
</tr>
<tr>
<td>11</td>
<td>TRIG IN</td>
</tr>
<tr>
<td>12</td>
<td>VD GND</td>
</tr>
</tbody>
</table>

Before connecting / disconnecting the connector, make sure the camera power is OFF.
** For board connection, check compatibility.

7-2 DC IN / SYNCH connector

CCU rear-panel DIP SW

<table>
<thead>
<tr>
<th>No.</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GAIN selection (GAINT)</td>
</tr>
<tr>
<td>2</td>
<td>FIX</td>
</tr>
<tr>
<td>3</td>
<td>Factory, prefixed gain</td>
</tr>
<tr>
<td>4</td>
<td>Gain is adjustable via the manual gain potentiometer (5GAINT)</td>
</tr>
</tbody>
</table>

- Rear-panel DIP SW setting

<table>
<thead>
<tr>
<th>No.</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ON</td>
</tr>
<tr>
<td>2</td>
<td>OFF</td>
</tr>
</tbody>
</table>

7-3 Video output mode selection

Switches video format
(2-1) 1/50 1/60: Non-interface mode
All pixels are read out in 1/60s, you will get images with the higher resolution.
(2-2) 1/120: 1/120s or 2-frame interface MIX mode
As vertical pixels are added in readout, the sensitivity is same as that of 1/60s non-interface mode during electronic shutter. Twice greater sensitivity is obtained under shutter-speed range of 1/200 – 1/2000.

- Rear-panel DIP SW setting

<table>
<thead>
<tr>
<th>No.</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1/50</td>
</tr>
<tr>
<td>2</td>
<td>1/60</td>
</tr>
<tr>
<td>3</td>
<td>OFF</td>
</tr>
</tbody>
</table>

7-4 Shutter mode selection

Switches shutter mode
(3-1) NOR mode
Normal electronic shutter
High-Speed shutter: From 1/2000s through OFF (8 position)
- Rear-panel DIP SW setting

<table>
<thead>
<tr>
<th>No.</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>OFF</td>
</tr>
<tr>
<td>2</td>
<td>OFF</td>
</tr>
<tr>
<td>3</td>
<td>OFF</td>
</tr>
<tr>
<td>4</td>
<td>OFF</td>
</tr>
</tbody>
</table>

7-5 E-shutter speed setting (SHUT)

<table>
<thead>
<tr>
<th>No.</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1200s</td>
</tr>
<tr>
<td>2</td>
<td>2500s</td>
</tr>
<tr>
<td>3</td>
<td>1,000s</td>
</tr>
<tr>
<td>4</td>
<td>1,000s</td>
</tr>
</tbody>
</table>

- Don't set Electronic shutter-speed in OFF under RTS mode.

7-6 Random trigger shutter

- Random trigger shutter

Exposure control via ext. trigger or ext. sync. input

Notes: *
RDM selection is automatic with TRIG status
** Neither under FIX, nor PULSE W mode, RTS doesn’t work. If E-shutter speed SW is set in OFF position.

There are the following in RDM mode.
(a) Non-reset mode (Under internal sync / external sync — Consecutive VD IN)
Exposure starts at the timing of TRIG signal IN. After each exposure is completed, the camera outputs video at each nest VD IN timing.
(b) Non-reset mode (Under external sync — Single VD)
After TRIG IN and exposure, the camera goes into standby until next nest VD IN.
(c) Reset mode (Under internal sync / external sync — No VD IN)
Exposure starts at the timing of TRIG signal IN. After each exposure is completed, the camera outputs video immediately by resetting VD (HD is not reset)
(d) SYNCH reset mode (Under internal sync)
Exposure starts at TRIG signal input timing, resets HD, and outputs video immediately after exposure by resetting VD.

* Available under FIX mode only.

- RTS (Random Trigger Shutter) exposure selection

Notes: * Random trigger shutter exposure selection

Exposure control via ext. trigger or ext. sync. input

Notes: *
RDM selection is automatic with TRIG status
** Neither under FIX, nor PULSE W mode, RTS doesn’t work. If E-shutter speed SW is set in OFF position.

There are the following in RDM mode.
(a) Non-reset mode (Under internal sync / external sync — Consecutive VD IN)
Exposure starts at the timing of TRIG signal IN. After each exposure is completed, the camera outputs video at each nest VD IN timing.
(b) Non-reset mode (Under external sync — Single VD)
After TRIG IN and exposure, the camera goes into standby until next nest VD IN.
(c) Reset mode (Under internal sync / external sync — No VD IN)
Exposure starts at the timing of TRIG signal IN. After each exposure is completed, the camera outputs video immediately by resetting VD (HD is not reset)
(d) SYNCH reset mode (Under internal sync)
Exposure starts at TRIG signal input timing, resets HD, and outputs video immediately after exposure by resetting VD.

* Available under FIX mode only.
### [Internal sync spec]  
1. (1) BNC clock frequency: 24.545Hz (1kHz) ± 20ppm  
2. (2) BNC signal frequency: 31.40kHz (HE-780kHz)  
3. (3) BNC sync frequency: 59.94kHz (Under non-interlace)  
4. 119.88kHz (Under 2:1 interlace)  

### [External sync spec]  
1. (1) External input signal: HD/SD  
2. Input impedance: 75Ω. High impedance (switching via rear-panel SW)  
   (Initial factory setting: High)  
3. Input level: 2-V (0-0.8V) or 2-V (0.8V) or 2-V (5V)  
4. Interface: 1/05 non-interlace or 1/2:2:1 interlace  
5. Polarity: Negative  
6. Pulse width: HD: 3.2 ± 1 μs (LOW)  
   SD: From 125 through 400 μs (LOW)  
7. Repeated frequency: \( f_r = \frac{1}{T} \), \( f_r = \frac{1}{2} \) (265.2 or 525 μs)  
8. Phase difference: \( \Delta \phi \) (HD/SD: 0.5 ≤ \( \Delta \phi \) ≤ 2.5 μs)  

### [Shutter trigger spec]  
1. (1) Exposure-starting-size signal in random trigger shutter mode  
   (Low level: 0.5-3V[p-p])  
2. (2) Input impedance: High impedance (HE)  
3. Capturing timing: Rising edge detection (Positive)  
4. Pulse width: Minimum 2 μs  
5. Maximum 1.8 μs  

### [Sync signal spec]  
1. (1) Polarity: Negative  
2. (2) Pulse width: 11 output  

### [Electronic shutter spec]  
1. (1) Normal shutter: Shutter-speed setting via rear-panel SW (Initial: OFF)  
2. (2) Operation mode:  
   - RST shutter mode automatically switches over through TRIG IN  
   - RST disabled under electronic shutter OFF  
   - Multiple shutter via ext. trigger signal and ext. VD signal  
   - Operation like No. 3, 6 above  
3. (3) Restart / Reset  
   (Switching via rear-panel SW, Initial: OFF)  
   Notes:  
   - The exposure-time (shutter-speed) is determined by ext. VD interval.  
   - "Enhanced" when rear-panel DIP SW OFF  
   - "Provide Considerate HD"  

### [Mechanical spec]  
1. (1) External dimension: 29 x 29 x 26.5[mm] (Not including protrusion)  
2. Weight: Refer to the attached external view drawing  
3. Enlargement: Approximately 42g  
4. Mount: C mount  
5. Internal GND / insulation: Circuit GND – Chassis electrically conducted  

### [Ambient condition]  
1. (1) Environmental condition:  
   - Performance guaranteed: Temperature: From 0 through 40°C  
   - Humidity: From 30 through 90% (No condensing)  
   - Operation guaranteed: Temperature: From -5 through 45°C  
   - Humidity: From 10 through 90% (No condensing)  
   - Storage: Temperature: From -20 through 60°C  
   - Humidity: From 10 through 90% (No condensing)  
2. (2) EMC conditions (Electro-Magnetic Compatibility):  
   - EMI (Electro-Magnetic Interference): EN61000-6-4 Conformity  
   - EMS (Electro-Magnetic Susceptibility): EN61000-6-2 Conformity  

### 8. SPECIFICATIONS  

#### [Basic spec]  
1. (1) Sensor: All Pixel's Data Read  
2. (2) Input level: 692(V) / 500(V)  
3. (3) Active pixel: 659(H) x 494(V)  
4. Video output level: 0.8Vp-p / 0.8Vp-p (1:4 non-interlace)  
5. Scanning area: 6.4H x 4.8V (mm) (Equivalent to 1/3 type CCD size)  
6. Cell size: 9.9 μx 9.9 μx mm (Square-grid array)  
7. (7) Scanning lines: 525 lines  
8. (8) TV system: Special format (Non-conforming to EIA/CCIR)  
9. (9) Interface: 1.6 flow, non-interlace mode  
10. (10) Resolution: 1280 x 720 interlace mode  
11. (11) Sync system: Internal External automatic switch-over  
12. (12) Aspect ratio: 4:3  
13. (13) Video output: 1.0 Vp-p / 72 Ω, DC coupled, 1 line  
14. (14) Resolution: 483 TV lines(H)  
15. (15) Standard: 352 TV lines(V) (Initial factory setting)  
16. (16) Illumination: Standard 400 f(1.0 / 1.5) (GAIN MAX, Approx. 30 % video output)  
17. (17) Gain: 5.6V (F3.6)  
18. (18) Gamma correction: Gamma = 1 (Fixed)  
19. (19) White clip level: Approx. 850 Vp-p (excluding SY/NC)  
20. (20) Power source: DC12V ±10%  
21. (21) Ripple voltage: 50mVp-p or less  
22. (22) Power consumption: Approx. 1.5W
(2) 60Hz Non-interface mode

(3) 120Hz 2:1 Interface mode

8. EXTERNAL VIEW DRAWING

Specification
Material
Lens mount, Rear panel: Aluminum die-cast
Cover: Anticorrosion aluminum alloy
Processing
Lens mount, Rear panel: Cation coating (Black)
Cover: Leather satin coating (Black)

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