B/W CCD Camera
Model CS8560D
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.

TOSHIBA TELI CORPORATION

BEFORE USE - GENERAL SAFETY INSTRUCTIONS

Read the following safety precautions carefully before using this product. These 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 serial number, which is found on bottom chassis of your device. Keep this number for your record.

Model Name

Serial No.

Indication definitions

<table>
<thead>
<tr>
<th>Indication</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>WARNING</td>
<td>This indicates the existence of a hazard that death or catastrophic bodily injury(*1) may result from improper use.</td>
</tr>
<tr>
<td>CAUTION</td>
<td>This indicates the existence of a hazard that bodily injury(*2) or property damage(*3) may result from improper use.</td>
</tr>
</tbody>
</table>

Note:  
*1) Catastrophic bodily injury means loss of consciousness, burns, injuries sustained from shock, fracture, poisoning, etc. which leaves a sequel 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

<table>
<thead>
<tr>
<th>Indication</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>This mark indicates a prohibited action that must not be carried out. The actual prohibited action is indicated in the symbol or nearby graphically or described in text.</td>
<td></td>
</tr>
<tr>
<td>This indicates a mandatory action that must not be carried out. The actual instruction is indicated in the symbol or nearby graphically or described in text.</td>
<td></td>
</tr>
</tbody>
</table>

Handling Precautions

**WARNING**

- **Do not operate in places with possibility of becoming wet.** This may cause fire and/or electric shock.

- **Do not repair, disassemble and/or modify by yourself.** This may cause fire and/or electric shock. Be sure to contact your dealer for internal repair, check and cleaning of the product.

- **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 roughly, damaged, fabricated, heat forcefully, pulled, twisted, bundled, 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 dissipate.
  - If you do not follow the above, the heat generated by the product may cause fire.
  - Use in humid, smoky, vaporized or dusty places. A fire or an electric shock may occur in such places.
  - This might cause fire and/or electric shock.
  - Do not put the product in direct sunlight and/or high temperature. The temperature inside the product may cause fire.
  - Use the specified DC power cable or connection cable. Otherwise, a fire or an electric shock may occur.

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

- **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 to the place near the camera, and do not transmit a shock to the camera connector.

**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; use 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.
- Inconvenient 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 by the user and carried out by an unauthorized third party.
- Notwithstanding the foregoing, Teli’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 outdoors.
  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 or testing as necessary by the designer of such equipment or devices, or personnel related to the specifications.** Such designer or personnel shall assure 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 relating 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 prearranging theatres.
   - Elevator control equipment for lift as well as electric. fire, smoke.
   - Equipment mandatory to be installed by various laws and regulations such as the Fire Act or Building Standard Law.

  (*2) Equipment relating to maintenance of public services/functions involving factors of safety refers to:
   - Traffic control systems for air transportation, railways, roads, or marine transportation.
   - Equipment for nuclear power generation.
   - Equipment related to the 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 as if you carefully want to prevent cable-related problems such as cable breakdown and loosened 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.

- **Avoid humid, smoky, vaporized or dusty places.** Be particularly careful when using in places exposed to direct sunlight. When shooting in hot places, depending on the conditions of the object and the camera (for example when the gain is increased), noise is present in the form of vertical streaks or white dots may occur. This is not a malfunction.

- **Restriction for the lens combination.** This might cause interference stripes. This might cause 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 illumination with this camera when use.

- **When mounting a lens, take extra caution that the lens is not tilted, nor does flaw exist at the lens-mount-screw part. Also check to confirm that no dirt nor other foreign object is put inside the lens.** Mounting might cause the parts to become locked.

- **Do not shoot under intense light.** Avoid intense light such as spot light or part of the screen because it may cause blooming or smears. If 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.** Its inner CCD (charge-coupled device) might be damaged.

- **Avoid using the camera for a long time.**

- **Avoid using the camera in a commercial environment.** Stop supplying power for safety.

- **When cleaning the camera.** Always turn off the power and clean with a piece of soft dry cloth. To remove stubborn stains, use a soft cloth soaked in dilutized acid-free detergent. Do not use alcohol, benzine, thinner, etc. If used, coating and printed letters may be discolored.

- **Waste of this product should be separated and discarded in compliance with the various national and local ordinances.**

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.
1. PRODUCT DESCRIPTION
Model CS556D is a one-body-type 1/3"CCD camera with a VGA format all-pixel-data readout CCD. This model has two faster 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 pixels' data readout
With its built-in 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 pixels' data is 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 built-in RTS, the camera's CCD light-exposure operation 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 - reset mode, this model can capture images at an arbitrary timing caused by external HD signal.
(8) Multiple shutter
With this shutter, this model capture images at an arbitrary timing caused by external trigger signal, and then outputs video at an arbitrary timing caused by external HD signal.
(9) 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) Accessory ............................. 1
Operation Manual (Japanese) .......... 1
Operation Manual (English) .......... 1

4. OPTION UNIT
(1) DCC SYNC USB cable ................................. Model name: CPC3700 [2m,3m,5m,10m]
(2) Camera adapter ................................. Model name: CA170
(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, I ask you 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 (GAIN)
This potentiometer is enabled when DIP/SW 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 50-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

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

7. OPERATION MODE
CCU rear-panel DIP SW

<table>
<thead>
<tr>
<th>No.</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GAIN selection (GAIN)</td>
</tr>
<tr>
<td>2</td>
<td>FIX</td>
</tr>
<tr>
<td>3</td>
<td>5-shutter speed (SHU)</td>
</tr>
<tr>
<td>4</td>
<td>Video output mode (VIDEO)</td>
</tr>
<tr>
<td>5</td>
<td>Shutte mode (SMODE)</td>
</tr>
<tr>
<td>6</td>
<td>Partial scan (PART)</td>
</tr>
<tr>
<td>7</td>
<td>RTS Exposure (EXP)</td>
</tr>
</tbody>
</table>

*Initial factory setting: All OFF

(1) GAIN selection
Switches sensitivity setting
(1-1): FIX Factory-prefixed gain
(1-2): MANU Gain is adjustable via the manual gain potentiometer (M.GAIN)
*Factory-prefixed DIP SW setting

(2) Video output mode selection
Switches video format
(2-1): 1/60 150kHz Non-interface mode
As all pixels are read out in 1/60s, you will get images with the higher V resolution.
(2-2): 1/120 1/2120s 2:1 interface MUX mode
As vertical pixels are added in readout, the sensitivity is same as that of 1/60s non-interface mode during electronic shutter OFF. Twice greater sensitivity is obtained under shutter-speed range of 1/200 – 1/2000s.
*Rear-panel DIP SW setting

(3) Shutter mode selection
Switches shutter mode
(3-1): NOR mode Normal electronic shutter
Switches control via internal sync signal
High-Speed shutter: From 1/2000s through OFF (0 position)
*Rear-panel DIP SW setting

(3-2): RDM mode Random trigger shutter
Switches 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 it’s a shutter-speed SW is set in OFF position.
*There are the following in RDM mode.
(a) Non-reset mode (Under internal sync: external sync — Consistutive HD IN)
Exposure starts at the timing of TRIG signal IN. After each exposure is completed, the camera outputs video at each next HD IN timing.
(b) Non-reset mode (Under external sync: — Single HD IN)
After TRIG IN and exposure, the camera goes into standby until next est. HD IN.
(c) Vertical mode (Under internal sync: external sync — No HD IN)
Exposure starts at the timing of TRIG signal IN. After each exposure is completed, the camera outputs video immediately by resuming HD (it is not reset).
(d) HDIN reset mode (Under internal sync)
Exposure starts at TRIG signal input timing, resets HD, and outputs video immediately after exposure by resuming HD.
* Available under FIX mode, only.

*RST (Random Trigger Shutter) exposure selection
*FIX mode Exposure-time control via rear-panel DIP switch
*PULSE W mode Exposure-time control via TRIG signal pulse width

D3003420B
### [Internal sync spec]

- (1) BNC clock frequency: 24.545MHz (1CLK) ±20ppm
- (2) synch frequency: 31.406kHz (1H - 780CLK)
- (3) synch frequency: 59.49Hz (Under non-interface)
- 119.88Hz (Under 2.1 interface)

### [External sync spec]

- (1) External input signal: HD/VD
- (2) Input impedance: 75Ω (High impedance, switching via rear-panel SW)
- (3) Interface: 1/0s non-interface or 1/20s 2/1 interface
- (4) Polarity: Negative
- (6) Pulse width: HD: 3.2 ± 1μs (LOW)
- (7) Repeatability: f0 = 31.406kHz ±10%
- (8) Phase difference: IB ΔV: 0 ± 5μs, 1/2ΔV: ±5μs

### [Shutter spec]

- (1) Normal shutter: WEN radian timing pulse
- (2) Pulse width: 1H output

### [Electronic shutter spec]

- (1) Shutter-speed timing via rear-panel SW (Initial OFF)
- (2) Operation mode: Non-shutter OFF

### [Mechanical spec]

- (1) External dimension: 29 x 29 x 26.5(D)mm
- (2) Weight: Approximate 42g
- (3) Lens mount: C mount
- (4) Insulation: Circuit GND – Chassis electrically conducted

### [Ambient condition]

- Temperature: From 0°C to 40°C
- Humidity: From 30 to 80% (No condensation)
- Operation temperature: From -5°C to 45°C
- Storage temperature: From -20°C to 60°C
- EMC conditions (Electro-Magnetic Compatibility)
  - EMI (Electro-Magnetic Interference) EN61000-6-3 Conformity
  - EMS (Electro-Magnetic Susceptibility) EN61000-6-4 Conformity

### [Power source]

- DC 12V ±10%
- Ripple voltage: 50mV (p-p) or less

### [Gain]

- Fix (Fixed) gain: Factory-shipped preset level
- MANU (Manual) gain: Setting through GAIN VR

### [Gamma correction]

- Gamma = 1 (Fixed)

### [Input/output]

- Approx. 840mV (p-p) (Excluding SYNC)

### [Power consumption]

- Approx. 1.5W

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**Notes:**

- *Set WEN termination to the high impedance.

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**Specifications:**

- (1) Image sensor All Pixel Data Read
- (2) Total pixels 6920(H) x 504(V)
- (3) Active pixel 6560(H) x 494(V) (Under non-interface)
- (4) Video output pixels 648H x 494V (Under non-interface)
- (5) Scanning area 4.88H x 3.36V (Equivalent to 1/3 type CCD size)
- (6) Uncompressed size 7.4M (x 7.4M) (Block-spatial area)
- (7) Image output 525 lines
- (8) TV system Special format (Not conforming to EIA/CCIR)
- (9) Interface 1/2 interface
- (10) Resolution 485V (TTL line)
- (11) S/N Standard: 55dB+ (Electrical factory setting)
- (12) Illumination Standard: 400 Ix (F3.6)
- (13) Gain Minimum 4 lx (F3.4) (GAIN MAX, Approx. 50% video output)
- (14) Power consumption Approx. 15W

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**Notes:**

- *The exposure-time (shutter-speed) is determined by ext. VD signal interval.
- ** This function is enabled when the rear-panel shutter speed DIP SW is OFF.
- *** Supply continuous VD.