

NEW

X-RAY I.I. CAMERA UNIT C7716, C7716-10

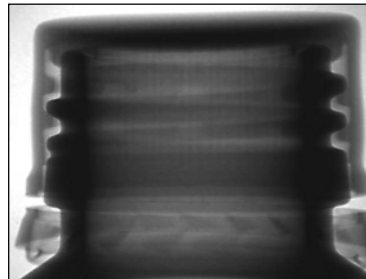
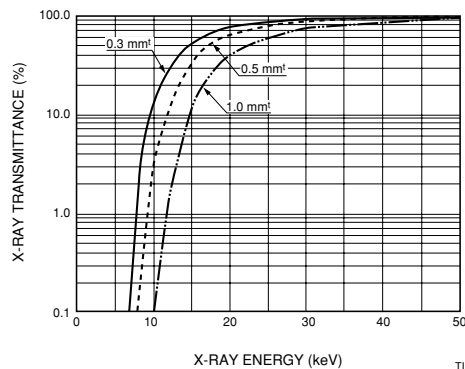
**3-inch/1.8-inch Dual Mode X-ray Image Intensifier (X-Ray I. I.)
Efficiently Coupled to CCD Camera**

**Captures sharp, clear X-ray images even from
light element materials!**

The C7716 series X-ray image intensifier (I. I.) camera unit now offers greatly improved X-ray detection efficiency even at low energy levels. This improvement stems primarily from a built-in X-ray image intensifier having an extremely thin aluminum input window. Its thickness is only 0.3 mm or less, virtually at the limit of present technology providing excellent X-ray transmittance and low scattering.

The results are sharp, clear, high-quality images taken at low energy X-ray levels down to several keV which penetrate plastic (PET) materials.

● **X-ray transmittance through different Al film thicknesses**



▲ Plastic bottle with cap



C7716 Series

**Input window
thickness 0.3 mm**

A sharp, clear X-ray image of a light element material can be taken through the 0.3 mm-thick input aluminum window. This has been impossible up until now with current X-ray cameras.

Current Model

**Input window
thickness 1.0 mm**

No X-ray image could be taken through the 1.0 mm-thick input aluminum window, at low energy levels around 10 keV.

OVERVIEW

The C7716 series is an X-ray image intensifier camera unit using a 3-inch/1.8-inch dual-mode X-ray image intensifier efficiently coupled to a built-in CCD camera.

FEATURES

- Feasible with light element materials
- High resolution, high contrast
- 3-inch/1.8-inch (75 mm/45 mm) dual mode
- Low distortion

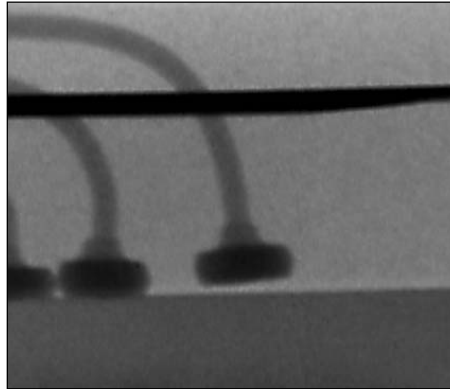


HAMAMATSU

3-inch/1.8-inch DUAL MODE

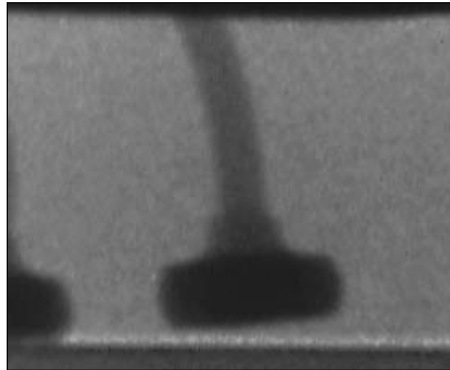
Despite its compact and lightweight body, the C7716 series image intensifier camera unit is able to magnify X-ray images instantaneously, while maintaining high image quality in combination with a switchable field-of-view function from 3-inch to 1.8-inch and high-sensitivity CCD camera.

Photographs shown at the right are taken with the C7716 series, using a Hamamatsu 100 kV microfocus X-ray source.



3-inch mode

A defective "wire bonding disconnection" in an IC package is difficult to observe in the 3-inch mode, but in the 1.8-inch mode... (See below.)



1.8-inch mode

The same defect can be distinctly observed by enlarging the image in the 1.8-inch mode.

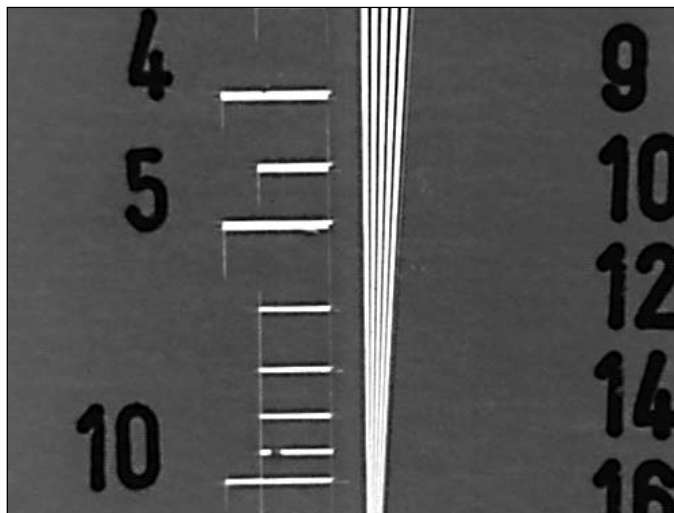
▲ IC wire bonding

(X-ray tube voltage: 100 kV, tube current: 100 μ A)

9.0 lp/mm HIGH RESOLUTION (1.8-inch mode)

This is an image of a test chart taken with the C7716 operated in 1.8-inch mode.

As can be seen, the test chart image can be recognized with a high resolution up to 9.0 lp/mm.

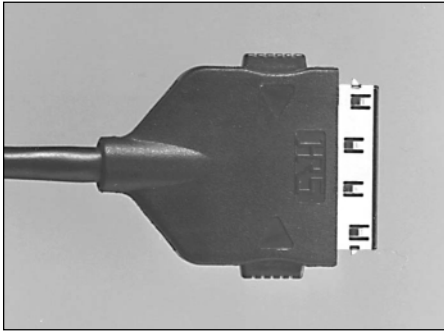


▲ Test Chart: Nuclear Associates Carle 07-539

(X-ray tube voltage: 50 kV, tube current: 100 μ A)

IMAGING EXAMPLES

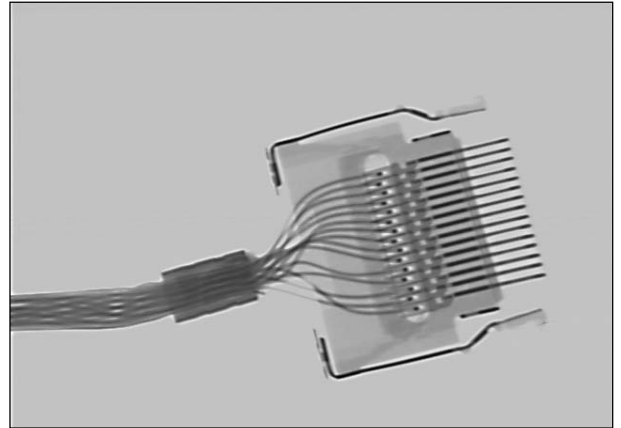
Normal Photographic Images



▲ LAN connector

Details of individual fine wires can be viewed distinctly.

X-Ray Images

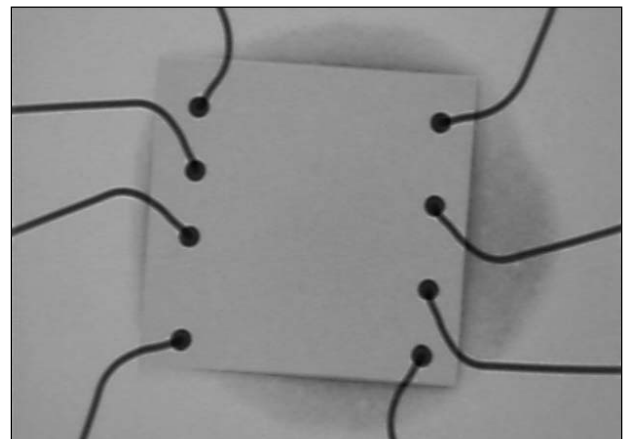


X-ray tube voltage: 83 kV, tube current: 100 μ A
3-inch mode



▲ Telephone card with built-in IC chip (inside circled area)

Internal IC wiring and even adhesive resin beneath the chip can be clearly observed.

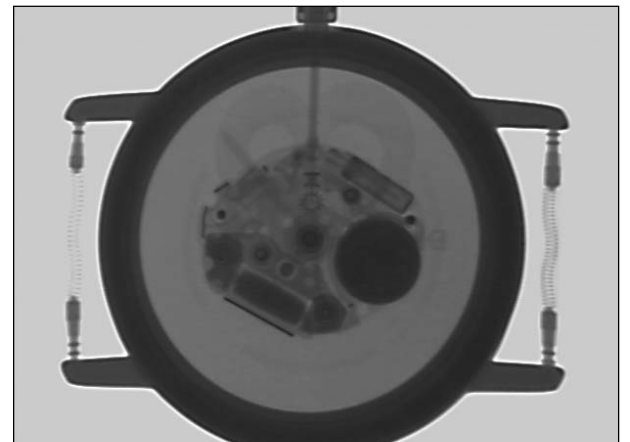


X-ray tube voltage: 50 kV, tube current: 100 μ A
3-inch mode



▲ Wristwatch

Even a very slight difference in the dial plate thickness (number "3") can be verified.



X-ray tube voltage: 100 kV, tube current: 60 μ A
3-inch mode

SPECIFICATIONS

Parameter		C7716	C7716-10	Unit
Input Window Material		Aluminum (less than 0.3 mm)		—
Input Phosphor		CsI		—
Output Phosphor		P-20 or equivalent		—
Imaging Area (on input surface)	3-inch mode	53 (H) × 39 (V) average	52 (H) × 39 (V) average	mm
	1.8-inch mode	33 (H) × 25 (V) average	31 (H) × 23 (V) average	mm
Resolution ^{A)} (on input surface)	3-inch mode	5.6 average		lp/mm
	1.8-inch mode	8 average		lp/mm
Scanning Method		NTSC/BW	CCIR	—
CCD	CCD Chip	2/3-inch FIT 410 000 pixels	2/3-inch FIT 480 000 pixels	—
	Aspect Ratio	4 : 3		—
	S/N ratio	61		dB
	Output Signal	Sync composite video signal 1.0 V p-p/75 Ω		—
Signal Processing Function	Enhancement Function	Gain control range: 1 to 30 times		—
		Offset control range: 0 to -100 %		—
	Shading Correction	Horizontal and vertical parabolic correction: ±30 %		—
		Horizontal and vertical slant correction: ±30 %		—
	AP Correction	0 to 9		dB
Gamma Correction		1 / 0.45		—
Input Voltage		100 to 240 (50/60 Hz)		Vac
Power Consumption		35		VA
Weight	Head	Approx. 8		kg
	Controller & DC Power Supply	Approx. 3		kg

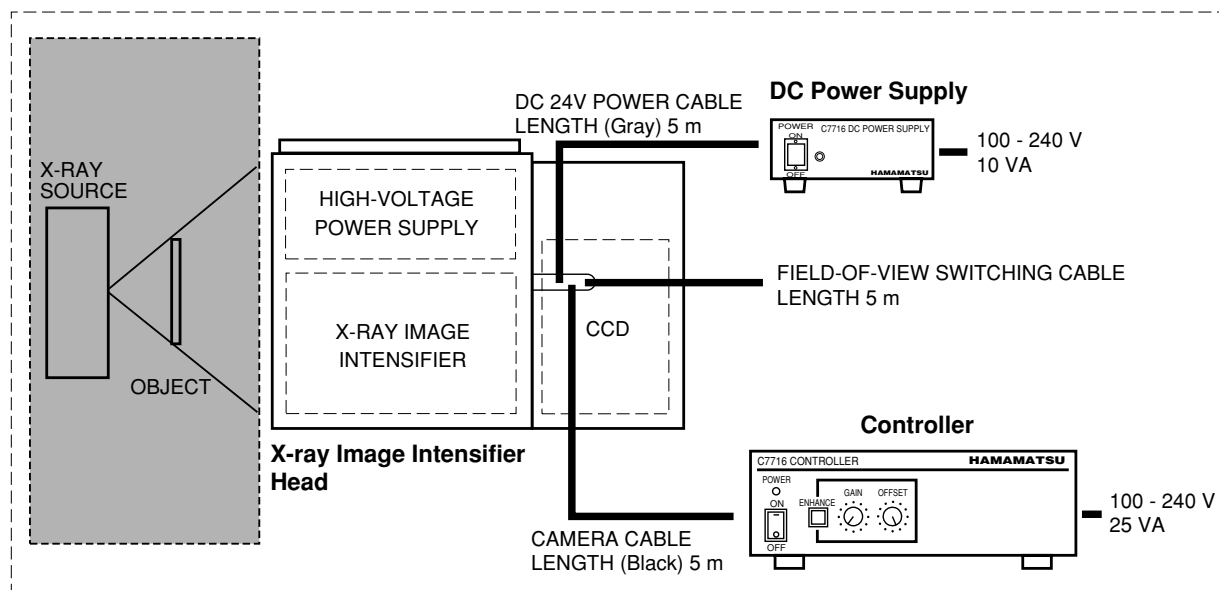
A) Measured with an optimum tube voltage, using an X-ray resolution chart directly fitted to the X-ray image intensifier.

NTSC B/W: National Television System Committee

CCIR: Comité Consultatif Internationale des Radio Communications

CONFIGURATION

Unit Configuration: **X-Ray I. I. Head** **CCD Controller** **DC Power Supply for X-Ray I. I.**



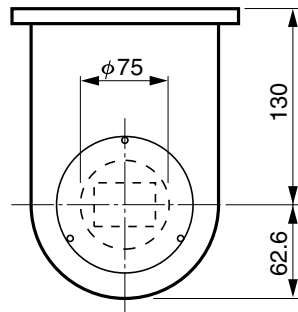
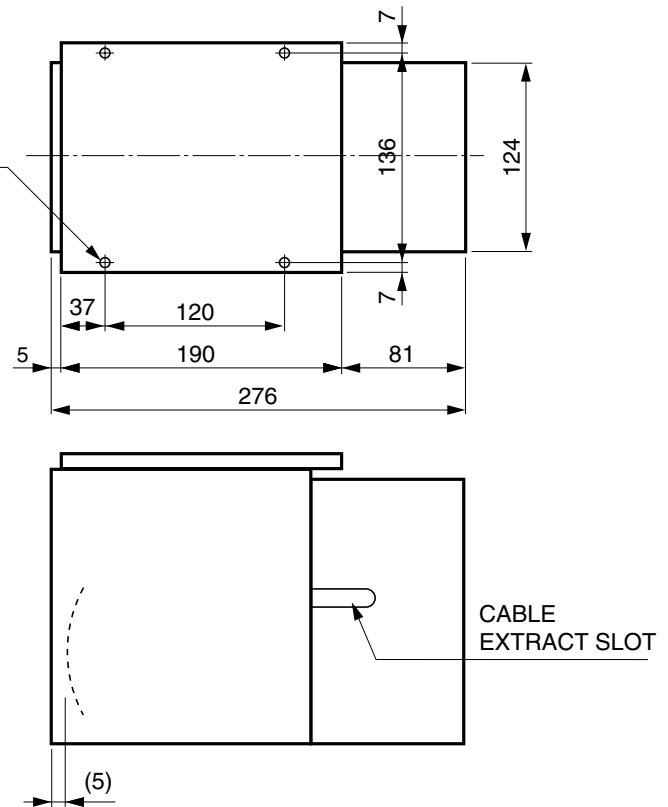
Optional 10-meter cables are also available.

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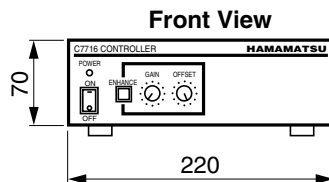
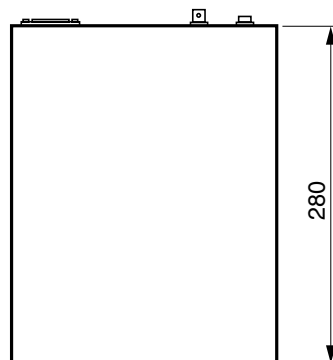
DIMENSIONS (Unit: mm)

X-ray I. I. Head

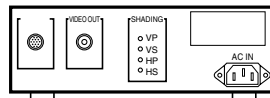
4-M6 D=10
THREADED HOLES
FOR INSTALLATION
OF X-RAY I. I. HEAD



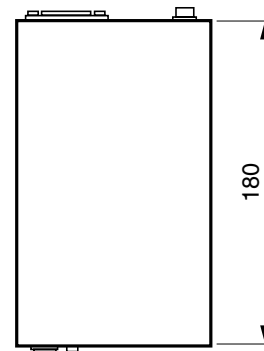
Controller



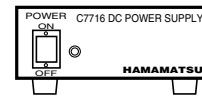
Rear View



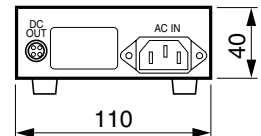
DC Power Supply



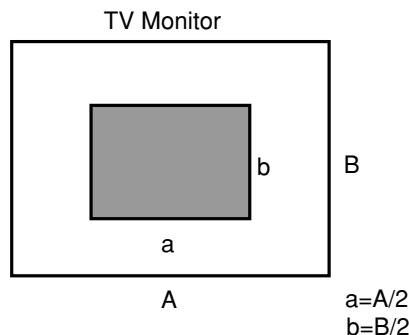
Front View



Rear View



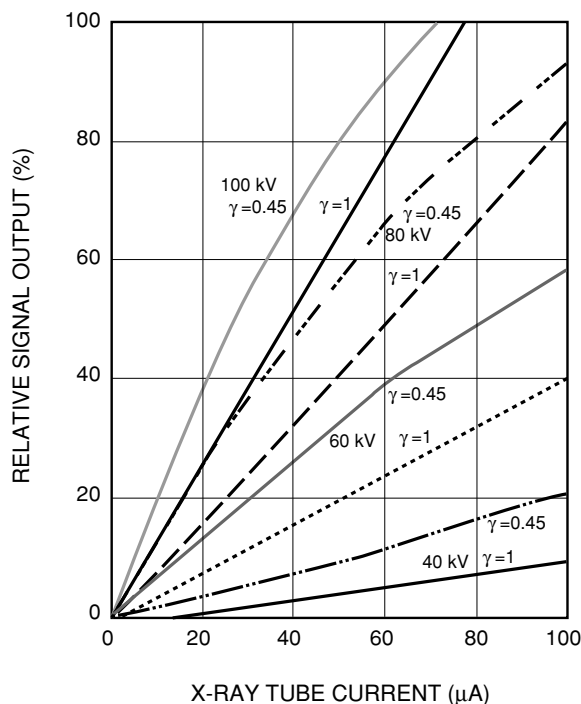
The graph at the right shows typical output linearity versus X-ray tube current characteristics for the C7716 series image intensifier camera unit. The signal output on the vertical axis represents an "average brightness value" within a certain area ($a \times b$) of the TV monitor.



Measurement conditions

X-ray tube to C7716 distance: 50 cm

● Signal Output vs. X-Ray Tube Current



TII B0092EA

RELATED PRODUCTS

130 kV Microfocus X-Ray Source

The Hamamatsu microfocus X-ray source uses an X-ray tube with a very small focal spot of 10 microns in diameter. This gives a sharp, clear image even at magnified image. When used with the C7716 series X-ray image intensifier camera unit, high-quality X-ray images can be taken in fine detail even under high magnification.

Besides the 130 kV model, Hamamatsu offers various models of microfocus X-ray sources, including 80 kV, 100 kV and 150 kV models. For more information about our microfocus X-ray sources, please access our home page below:

URL <http://www.hpk.co.jp/products/ETD/MFXE.htm>



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