NEW

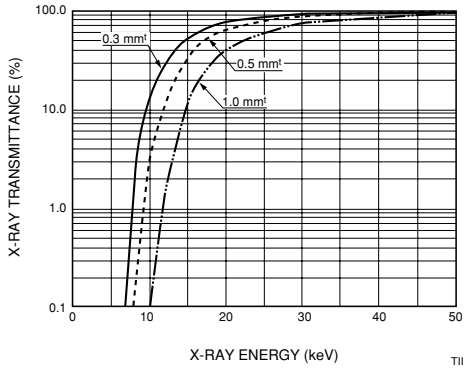
X-RAY I.I. CAMERA UNIT C7716, C7716-10

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**



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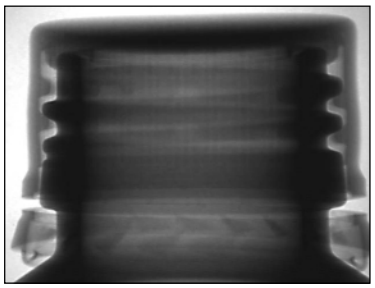
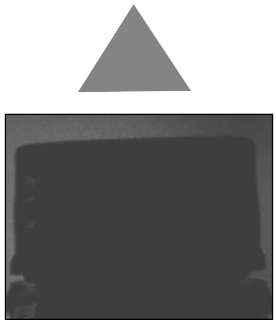


▲Plastic bottle with cap



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.

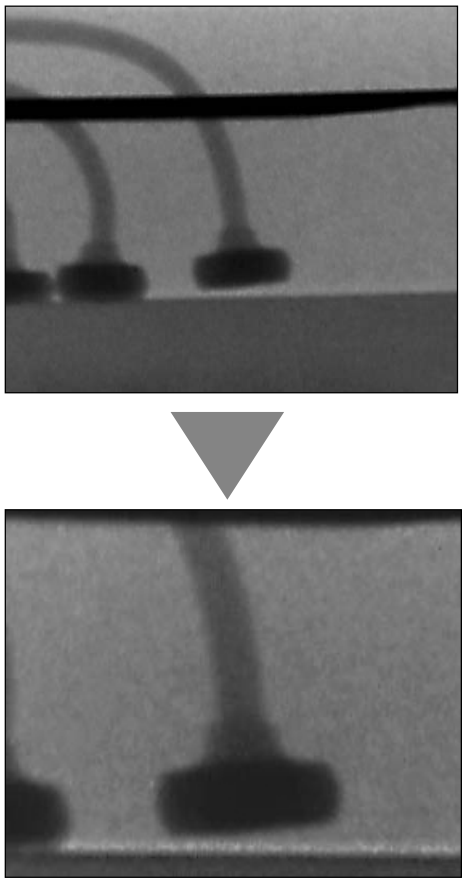
FEATURES

- **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 to1.8-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.)

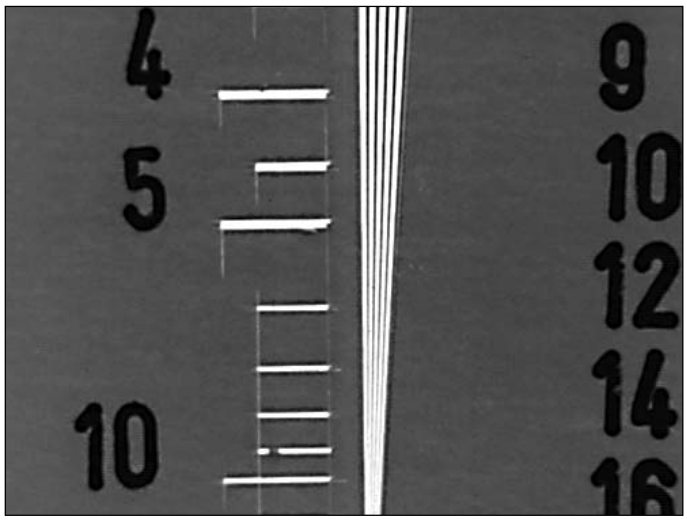
1.8-inch mode

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 μA)

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

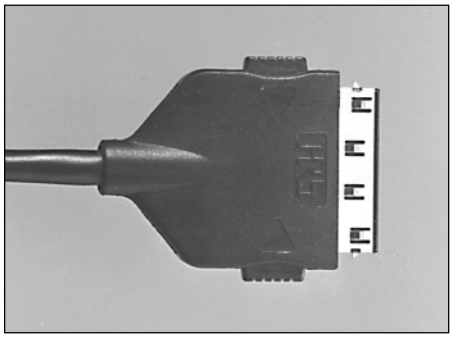
This is an image of a test chart taken with the C7716 operated in 1.8-inch mode.
As can be seen, the test chart image can be recognized with a high resolution up to 9.0 lp/mm.



▲ Test Chart: Nuclear Associates Carle 07-539
(X-ray tube voltage: 50 kV, tube current: 100 μA)

IMAGING EXAMPLES

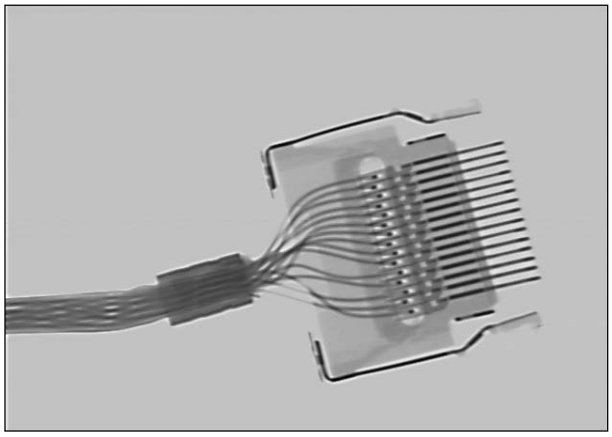
Normal Photographic Images



▲ LAN connector

Details of individual fine wires can be viewed distinctly.

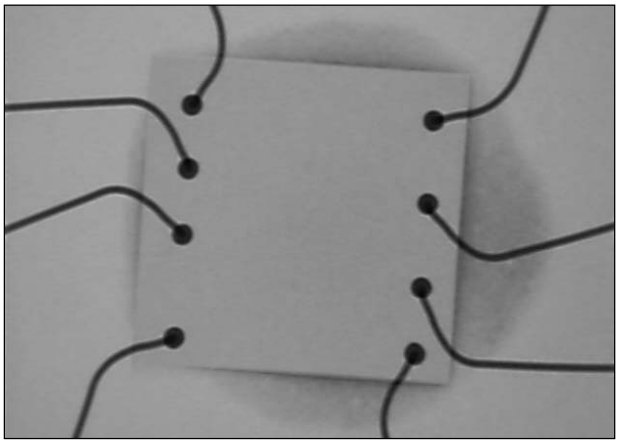
X-Ray Images



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

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

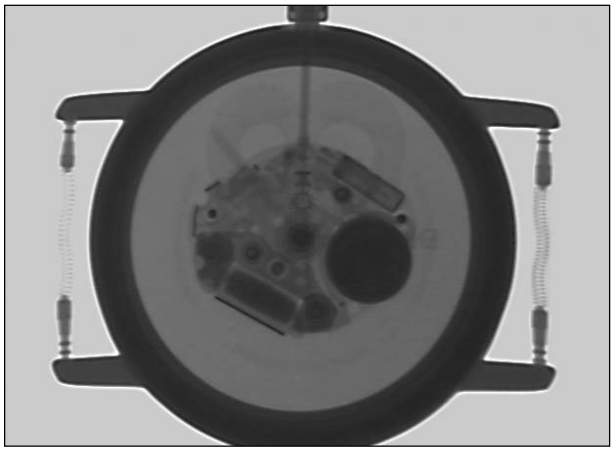
Internal IC wiring and even adhesive resin beneath the chip can be clearly observed.



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

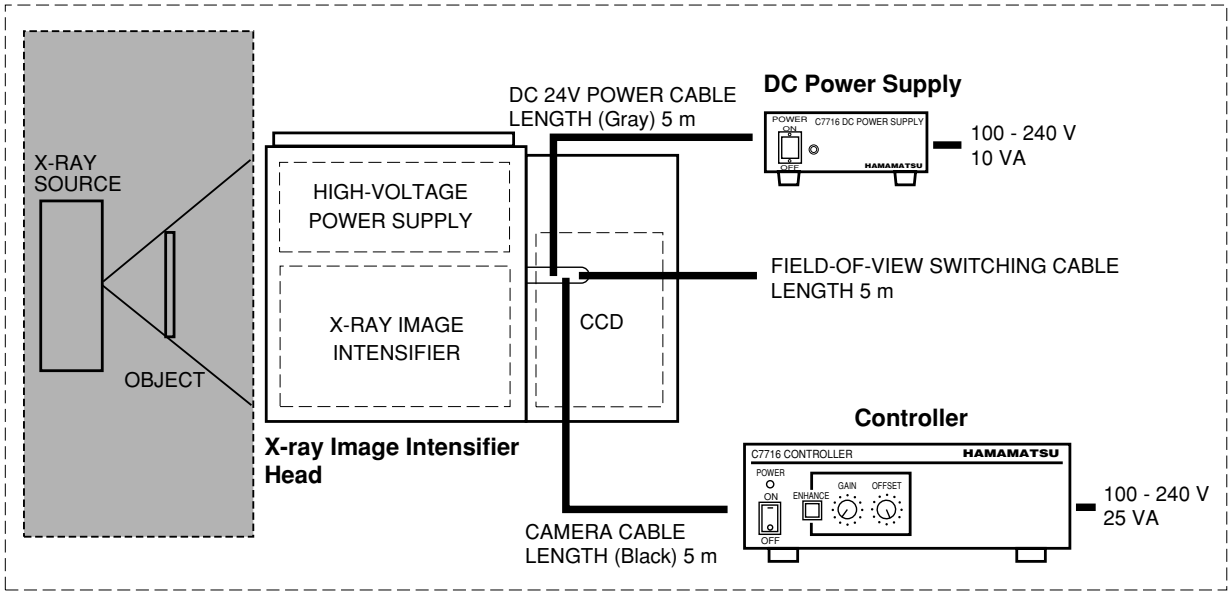
SPECIFICATIONS

Parameter			C7716	C7716-10	Unit
Input Window Material			Aluminum (less than 0.3 mmt)		—
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 Ratio 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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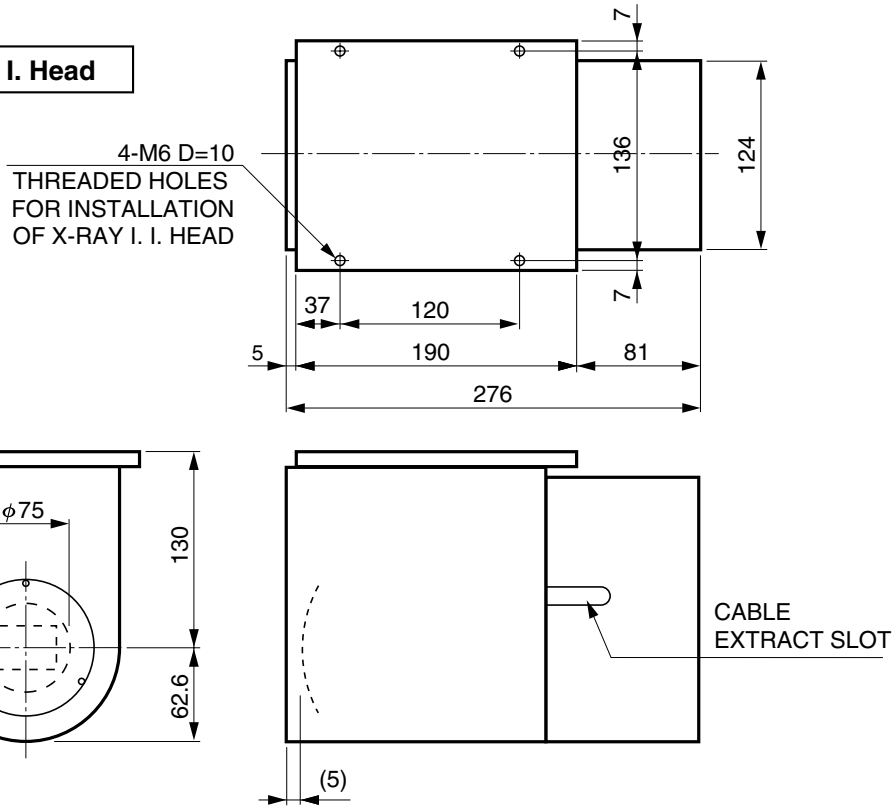
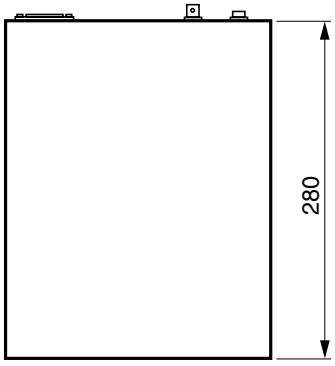
DIMENSIONS (Unit: mm)

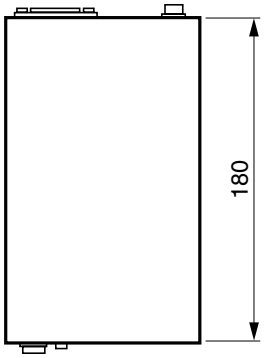
X-ray I. I. Head



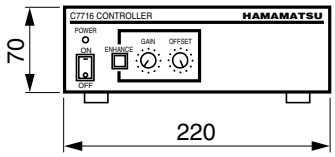
Controller



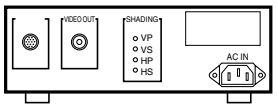
DC Power Supply



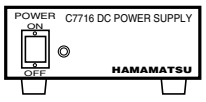
Front View



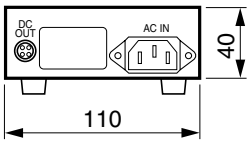
Rear View



Front View



Rear View



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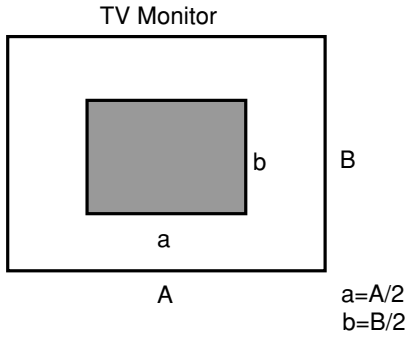
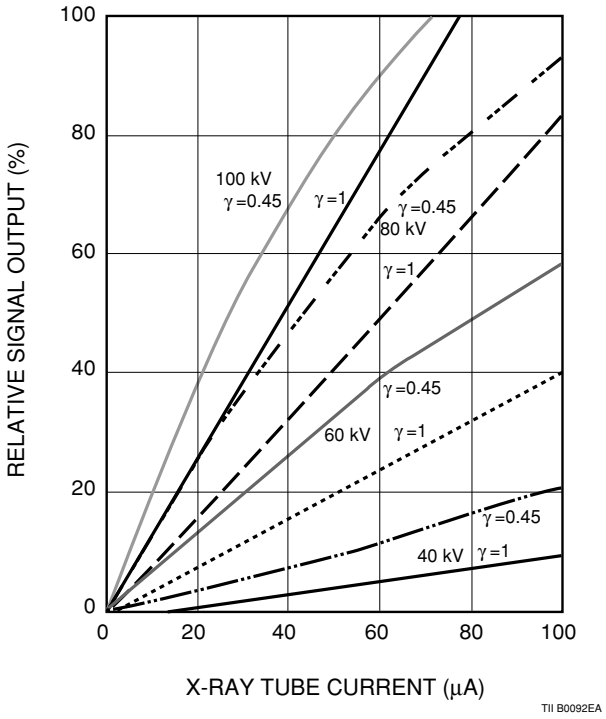
OUTPUT LINEARITY

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 × b) of the TV monitor.



Measurement conditions
X-ray tube to C7716 distance: 50 cm

● **Signal Output vs. X-Ray Tube Current**



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RELATED PRODUCTS

130 kV Microfocus X-Ray Source

The Hamamatsu microfocus X-ray source uses an X-ray tube with a vary 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

CE marking status underway

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