ITE/ARIB Hi-Vision Test Sequence 2nd Edition

Reference Manual

The Institute of Image Information and Television Engineers

The Association of Radio Industries and Businesses

The sequences in this manual are to be used only for the following purposes:

1) Technical evaluation for:
- Research and development of systems and devices
- Testing during equipment manufacturing process
- Transmission line evaluation in broadcasting and communications
- Equipment maintenance

2) Exhibition during:
- Presentation in seminars, workshops, and conferences
- Exhibits on equipment performance and function[1]
  (Except for sales promotion purposes)

Prior permission from ITE must be obtained to use the sequences for this purpose. See the ITE website for details:http://www.ite.or.jp/shuppan/testchart_index.html

Background of the publication of the "Hi-Vision Test Sequences 2nd Edition"

The Institute of Image Information and Television Engineers has contributed to the development of image media through the publication of test sequences for the evaluation of standard and high-definition television systems. With the digitalization of all broadcasting systems, the current test sequences were revised to come up with the Second Edition Hi-Vision Test Sequences.

The current edition was published in 1993 during a time when Hi-Vision cameras were still very expensive. They were developed as standard input images for system evaluation and image quality check for use in research and development and for promotion of the widespread use of Hi-Vision equipment. Many Hi-Vision devices have been developed using these test sequences, resulting in stability of operation of high-definition equipment.

Ten years after the first edition, however, all related disciplines have undergone remarkable progress, thus, requiring revisions in certain parts, for example:

- Since it was created with 1035 system standards, there are fewer active scanning lines compared to the current 1080 system.
- Since it was created with 8-bit digital recording, it lacks depth compared to the 10-bit now currently in use.
- Since many of the images were taken with an image pickup tube camera, signal-to-noise ratio is lower compared to images taken with current CCD cameras.
- Due to advancement in high efficiency digital coding, more complex images for evaluation have become necessary, etc.

The Institute of Image Information and Television Engineers, in cooperation with the Association of Radio Industries and Businesses, has addressed these issues and added test sequences for progressive 1080/60P systems to come up with the second edition of the "Hi-Vision Test Sequences."

We believe that this compilation of test sequences will be useful not only for broadcasting and communication but also for all areas of life such as entertainment, education, and medicine, wherein higher quality images have become important in improving the quality of life.

The rapid advances in performance of computers have now made processing of complex images possible even without special devices. Thus, this second edition is very timely, enabling, on personal computers, the processing, image compression, and evaluation of high-definition images for use in different fields. This new edition is expected to be of use to many people and to enhance the research and development in image and video media technology as well as in other new areas of application.

September, 2009

Masayuki TANIMOTO
Pregident of the Institute of Image Information and Television Engineers

Introducing Hi-Vision Test Sequence 2nd Edition

The “Study Group for the Quality Evaluation Methods” of the “Association of Radio Industries and Businesses (ARIB)” promotes the study on methods to evaluate video and sound quality, and produces test sequences for use in video quality evaluations. The test sequences are indispensable in developing technical methods, and in studying and verifying the operating conditions. They also play an important role as the criterion for evaluating the quality of video equipment, displays, and audio-visual systems.

We have already produced various test sequences. When our group was formerly known as the “Broadcasting Technology Association,” it produced “Standard Motion Sequences for Subjective Assessment of High-Definition Television (Hi-Vision) Systems” in 1993 in cooperation with “The Institute of Television Engineers” (now called “The Institute of Image Information and Television Engineers (ITE)”). This work has greatly contributed to promoting the growth of High-Definition TV (HDTV) systems and digital broadcasting/communication for many years. However, more than 10 years have passed since the previous test sequence was issued, and the performance of video equipment has greatly improved in capture devices, recording media, and image formatting. It is therefore necessary to develop new test sequences that enable the evaluation of state-of-the-art video equipment and systems.

To respond to the need for video systems that have increasingly advanced quality and that provide a variety of video services, we have produced a new test sequence called “ITE/ARIB Hi-Vision Test Sequence 2nd Edition” and have released it under the supervision of ITE.

This test sequence was planned and produced taking advice from many specialists engaged in the field of video, including broadcasters and video equipment manufacturers, and has the following characteristics.

- HDTV pictures with active scanning of 1080 lines conforming to ITU-R Recommendations
- 10-bit/pixel uncompressed pictures produced by the latest HDTV camera and recording and editing systems
- Two types of scenes: “attribute-general,” similar to typical broadcast program content, and “attribute-specific” for a specific evaluation
- Sequences both in 1080/60I and 1080/60P formats, and partly in 1080/50I and 1080/24P formats
- RGB 4:4:4 format data available in addition to YCbCr 4:2:2 format data
- A wide variety of scenes such as night scenery, live music, drama, and sports

“ITE/ARIB Hi-Vision Test Sequence 2nd Edition” has been produced through discussions between the specialists in picture quality evaluation in ARIB and ITE with experience and expertise accumulated over a long period. We hope this test sequence will be put to broad use to promote the study of video technologies in the next generation and to help various requirements foreseeable in the forthcoming digital video media era.

September, 2009

Eisuke NAKASU, Chairman
Study Group for the Quality Evaluation Method
Association of Radio Industries and Businesses

This test sequence was produced by the following members:

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Table of Contents

1. Introduction

The Institute of Image Information and Television Engineers (ITE) has produced a wide variety of test materials to offer easy and accurate techniques to assess image quality and evaluate the performance of imaging devices, systems, and applications. In particular, the "Hi-Vision Test Sequence" [1], which consists of several high-definition video sequences in a digital format, has been widely used in a community. Moreover, converted versions of these sequences, i.e. the "SD Test Sequence" [2] (standard definition video) and "DVD Edition of HD, SD, and SIF Test Sequences" [3] (high definition, standard definition, and standard image format videos) have also been produced.

Although the above "Hi-Vision Test Sequence" series has contributed to the advancement of imaging systems over a long period, it is becoming rather difficult to satisfy all demands for test materials as the quality of cameras and the fidelity of displays improve remarkably. In order to meet such demands, ITE has been working on new test sequences in collaboration with the Association of Radio Industries and Businesses (ARIB), and as a result, the "ITE/ARIB Hi-Vision Test Sequence 2nd Edition" is about to be released.

The release of the "ITE/ARIB Hi-Vision Test Sequence 2nd Edition" is not intended to simply replace the former edition, but to supplement the conventional test sequences. Therefore, image formats in this edition are different from those of the former one, as indicated in Table 1-1.

Table 1-1 Image formats.

Series	A	B	C
Number of pixels	1920×1080		
Bit depth	10 bits		
Signal level	Compliant with Recommendation ITU-R BT.709[1]		
Color space	RGB	YCbCr[2,3]	YCbCr[2]
Color sampling	4:4:4	4:2:2[3]	4:2:2
Scanning	Interlaced	Progressive	Interlaced
Frame rate	29.97 Hz (59.94i)[4]	59.94 Hz (59.94p)[5]	29.97 Hz (59.94i)[4]

All sequences are newly shot for the "ITE/ARIB Hi-Vision Test Sequence 2nd Edition" using the current video systems. Three kinds of image formats: 59.94i/RGB 4:4:4 (series A), 59.94p/YCbCr 4:2:2 (series B), and 59.94i/YCbCr 4:2:2 (series C) were adopted considering both the present situation and technical trends. Basically, we first shot content for series A,

[1] R, G, B and Y components: 64 (IRE=0%)–940 (IRE=100%), Cb and Cr compnments: 64–960 (zero level=512).
[2] A color conversion matrix is compliant with the 1125/60/2:1 system of ITU-R Rec. BT.709.
[3] Four sequences use the RGB 4:4:4 format.
[4] Four sequences use a frame rate of 25 Hz (50i).
[5] Four sequences use a frame rate of 24 Hz (24p).

and then shot similar content for series B using the same camera. This means the shooting conditions for the similar content in both series were almost the same. However, their video sources were different and there was a small time lag in the shooting. Format conversion was applied to some video sequences when video effects such as dissolving and superimposing were added by the editing system. In contrast, the content of series C was simply converted from that of series A. Therefore, their video sources were identical. Tables 1-2 and 1-3 list the respective equipment and camera specifications used for the shooting. In addition, camera settings commonly used throughout the shooting are listed in Table 1-4.

Table 1-2 Equipment used for shooting.

Camera	HDTV camera (HDC-1500, Sony)
Lens	Cinema lens (Canon or Fujinon)
Recorder	Uncompressed HDTV hard disk recorder (HR-7401, Astrodesign, Inc.)

Table 1-3 Camera specifications [4].

Pickup device	Three 2/3-inch type progressive scan CCD
Active Pixels	1920 (horizontal) × 1080 (vertical)
Built-in filters	ND: clear, 1/4 ND, 1/8 ND, 1/16 ND, 1/64 ND CC: Cross, 3200K, 4300K, 6,300K, 8000K
Sensitivity	F10.0 at 2000 lx (89.9% reflectivity)
Signal-to noise ratio	54 dB (Typical)
Horizontal resolution	1,000 TV lines (at center of screen)
Registration	Within 0.02% for total area (not including lens distortion)

Table 1-4 Common camera settings.

White balance	Auto
Gamma correction	$\gamma = 0.45$ (ITU-R Rec. BT.709)
Black (set up) level	IRE ≈ 5%
White clip level	IRE ≈ 108%

[1] Reference manual of "Hi-Vision Test Sequence", Oct. 1993.
[2] Reference manual of "SD Test Sequence", Apr. 1999.
[3] Reference manual of "DVD Edition of HD, SD and SIF Test Sequences", Aug. 2003.
[4] SONY HD color camera HDC1500 series operation manual.

2. Formats

Specifications of DVDs and file formats in the distribution of the sequences are as follows:

2.1 Specifications of DVDs

Each DVD contains a single sequence for distribution. Table 2-1 shows specifications of the respective categories of the DVDs.

Table 2-1 DVD specifications

Series	A (interlaced)	B (progressive)		C (converted from A)
Image format	4:4:4／59.94i 4:4:4／50i	4:2:2／59.94p	4:4:4／24p	4:2:2／59.94i 4:2:2／50i
Color space	RGB	YCbCr	RGB	YCbCr
File format	Sequential TIFF	Sequential YUV	Sequential TIFF	Sequential YUV
Video length	Title (1 sec.) + Main (15 sec.)	Title (1 sec.) + Main (15 sec.)	Title (1 sec.) + Main (15 sec.)	Title (1 sec.) + Main (15 sec.)
Number of files	480 (400 for 50i)	960	384	480 (400 for 50i)
File name(*)	sXXX_NNNNNN.tif	sXXX_NNNNNN.yuv10	sXXX_NNNNNN.tif	sXXX_NNNNNN.yuv
Media	Single-sided/ dual layer DVD	Single-sided/ dual layer DVD	Single-sided/ dual layer DVD	Single-sided/ single layer DVD

(*)XXX and NNNNNN indicate scene no. (3 digits) and frame no. (6 digits), respectively.

In addition to the above video content, a PDF file of the original reference manual (written in Japanese) is included in each DVD.

2.2 File format

2.2.1 RGB 4:4:4 (10 bit)

Video data of two interlaced video fields are combined once into a frame and then recorded in a single Tagged Image File Format (TIFF) file (specified by the Adobe Developers Association). Accordingly, each file contains the TIFF header and tag information as well as pixel data of the full image size (1920 × 1080 pixels, RGB). The number of files corresponds to the video length. In each frame, the first field is mapped into the odd lines (including the first line of the frame data), and the second one is mapped into the even lines. This is called “top field first” and is illustrated in Figure 2-1.

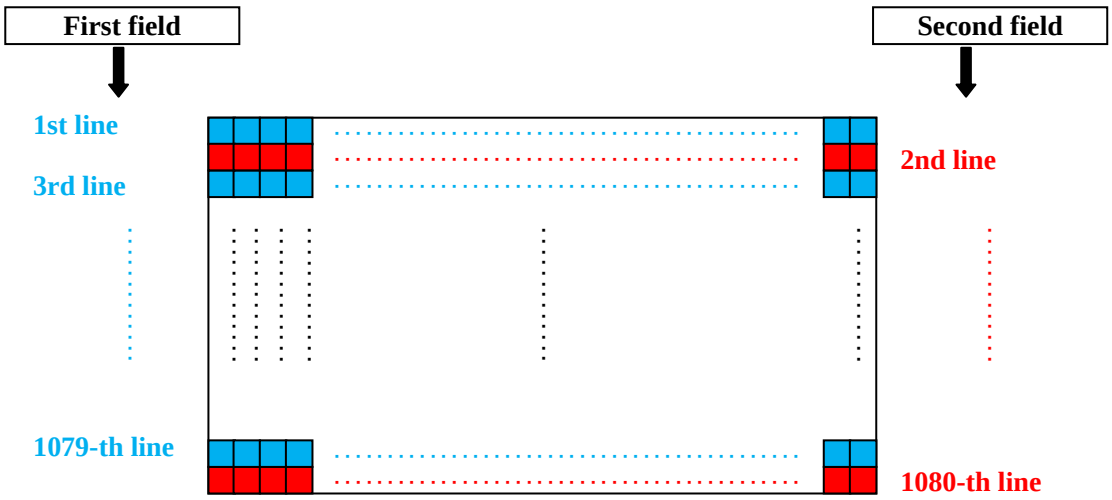


Figure 2-1 Structure of video data.

In the TIFF file, pixel values of RGB components are treated as 16-bit integers. Since the actual pixel value has only a 10-bit depth, it is stored in the higher 10 bits of the 16-bit integer, and the remaining 6 bits are set to "0."

Byte order in the TIFF file is low-to-high (little endian). The arrangement of pixel data in the file is illustrated in Figure 2-2.

The filename is formatted as "sXXX_NNNNN.tif," where XXX indicates a three-digit scene number, and NNNNNN indicates a six-digit frame number. Each sequence contains a title part 1 second long followed by the main part 15 seconds long. Therefore, every sequence is 16 seconds long in total, but the number of files depends on the frame rate, as shown below:

- For series A (59.94i), there are 480 files, and the frame number (NNNNNN) ranges from 000000 to 000479.
- For series A (50i), there are 400 files, and the frame number (NNNNNN) ranges from 000000 to 000399.
- For series B (24p), there are 384 files, and the frame number (NNNNNN) ranges from 000000 to 000383.

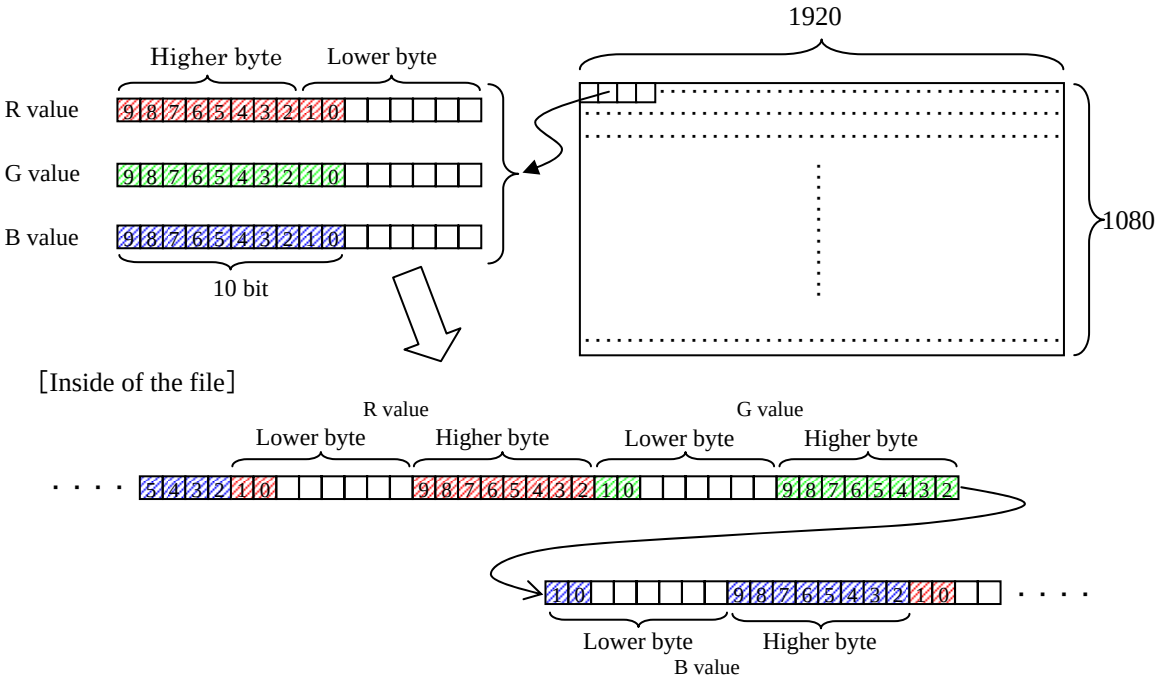


Figure 2-2 Data arrangement for RGB 4:4:4 (10 bit).

2.2.2 YUV 4:2:2 (10bit)

Only video data of the full image size (1920 × 1080 pixels, YCbCr) are stored in a single file without header or timing information.

For interlaced video content, two video fields are combined into a frame before being stored in the file. In this case, the first field is mapped into the odd lines (including the first line of the frame data), and the second one is mapped into the even lines, i.e. "top field first" is applied as in the RGB 4:4:4 (10 bit) mentioned before.

As shown in Figure 2-3, the Y component of the video data contains 1920 × 1080 samples, whereas each of the Cb and Cr components has 960 × 1080 samples. The horizontal positions of the Cb and Cr samples are aligned to those of the odd samples in the Y component.

In the file, sample values are arranged in the order of U, Y, V, Y, … where U and V indicate Cb and Cr components, respectively. Three 10-bit sample values are stored in the higher 30 bits of a 4-byte (32 bits) integer, and the remaining lower 2 bits are set to "0." As a result, 12 data samples within 6 pixels, i.e. 6 Y samples and 3 pairs of Cb and Cr samples, are packed into the 16-byte data in the file, as shown in Figure 2-4.

The filename is formatted as "sXXX_NNNNN.yuv10," where XXX indicates a three-digit scene number and NNNNNN indicates a six-digit frame number. Each sequence contains a title part 1 second long followed by the main part 15 seconds long. Therefore, every sequence has a total length of 16 seconds, but the number of files depends on the frame rates, as shown below:

- For series B (59.94i), there are 960 files, and the frame number (NNNNNN) ranges from 000000 to 000959.
- For series C (59.94i), there are 480 files, and the frame number (NNNNNN) ranges from 000000 to 000479.
- For series C (50i), there are 400 files, and the frame number (NNNNNN) ranges from 000000 to 000399.

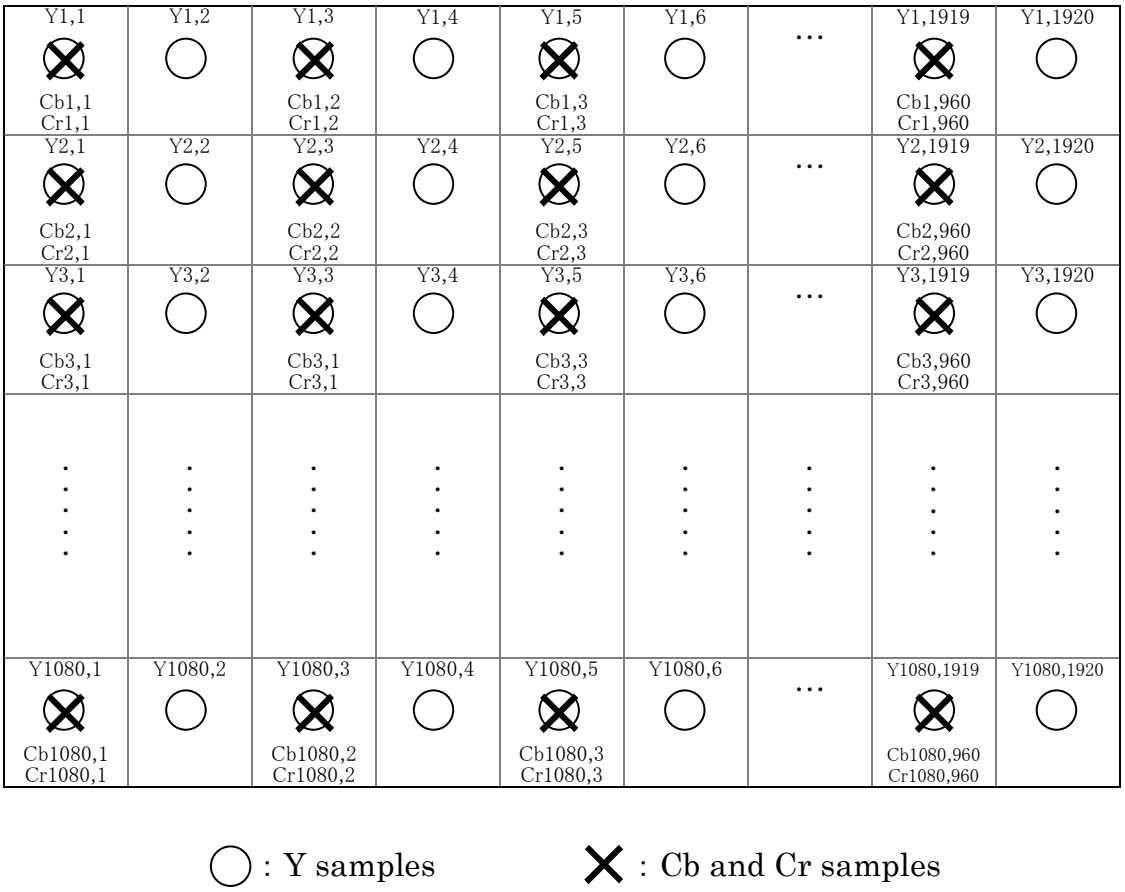


Figure 2-3 Sampling positions in a frame.

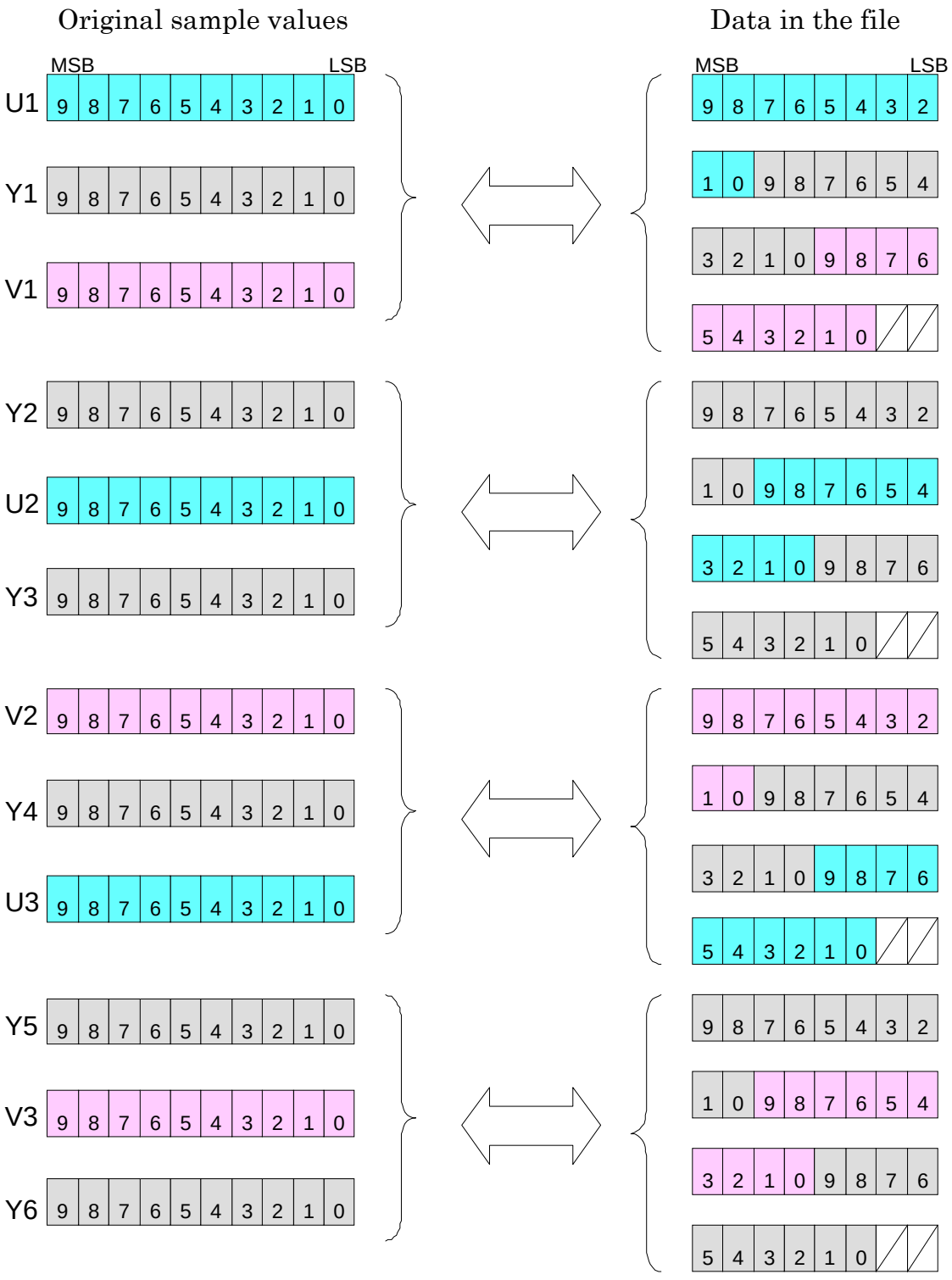


Figure 2-4　Data arrangement for YUV 4:2:2 (10 bit).

3. Sequences

3.1 Categories and scene number

Sequences in the "ITE/ARIB Hi-Vision Test Sequence 2nd Edition" are categorized into three series: A (RGB 4:4:4/Interlaced), B (YCbCr 4:2:2/Progressive), and C (YCbCr 4:2:2/Interlaced), according to the image format. Moreover, sequences of each series can be classified into two types of scenes with different use purpose for evaluation: "General" – content similar to a typical broadcast program, and "Specific" – content suitable for specific evaluations.

Each sequence has three digits of a scene number: the left-most digit distinguishes the series, and the last two digits are serial numbers assigned to the respective scenes. When sequences of a different series share the same serial number, their content is similar to each other, and their titles are also identical with a few exceptions.

Table 3-1 summarizes the relationship between the above categories and the scene number.

Table 3-1 Categories and scene numbers.

Series	Image format	Attribute	Scene number
A	RGB 4:4:4/ 59.94i/10 bit	General	No.101–126
		Specific	No.151–169[6]
	RGB 4:4:4/ 50i/10 bit	Specific	No.153, 154, 157 and 158
B	YCbCr 4:2:2/ 59.94p/10 bit	General	No.201–218
		Specific	No.251–265[7]
	RGB 4:4:4/ 24p/10 bit	General	No. 253, 254, 257 and 258
C	YCbCr 4:2:2/ 59.94i/10 bit	General	No.101–126
		Specific	No.151–169[6]
	YCbCr 4:2:2/ 50i/10 bit	Specific	No. 153, 154, 157 and 158

3.2 Descriptions of the content

Each sequence contains a title part 1 second long followed by the main part 15 seconds long. This means the beginning of each sequence simply shows its title for 1 second. Therefore, this title part is omitted in the following descriptions.

Titles of the sequences are listed in Table 3-2. The details of the content will be

[6] Excluding the scenes No.153, 154, 157 and 158
[7] Excluding the scenes No.253, 254, 257 and 258

explained afterwards.

Table 3-2 Title list

No.	Title
101	Ginkgo trees
102	Truck train
103	Cosmos flowers
104	Red leaves (pan up)
105	Sunlight through leaves
106	Red leaves (pan down)
107	Woman at harbor (circle dolly)
108	Fountain (follow)
109	Fountain (dolly)
110	Studio concert (confetti)
111	Studio concert
112	Drama set (day)
113	Drama set (night)
114	Basketball
115	Evening scene (zoom out)
116	Evening scene (fixed)
117	Night scene (fixed)
118	Horse racing (dirt)
119	Horse racing (turf)
120	Woman at harbor (dolly in, zoom back)
121	Torch bearer
122	Children's dance
123	Children's dance (loose shot)
124	March
125	Marathon (pan up)
126	Marathon (fixed)
151	Rotating disk 59.94I
152	Rotating disk 59.94I with 1/120 sec. shutter
153	Rotating disk 50I
154	Rotating disk 50I with 1/100 sec. shutter
155	Pendulum 59.94I
156	Pendulum 59.94I with 1/120 sec. shutter
157	Pendulum 50I

No.	Title
201	Ginkgo trees
202	Truck train
203	Cosmos flowers
204	Red leaves (pan up)
205	Sunlight through leaves
206	Red leaves (pan down)
207	Woman at harbor (circle dolly)
208	Fountain (follow)
209	Fountain (dolly)
210	Studio concert (confetti)
211	Studio concert
212	Drama set (day)
213	Drama set (night)
214	Basketball
215	Twilight scene (zoom out)
216	Twilight scene (fixed)
217	Night scene (fixed)
218	Horse racing (dirt)
251	Rotating disk 59.94P
252	Rotating disk 59.94P with 1/120 sec. shutter
253	Rotating disk 24P
254	Rotating disk 24P with 1/48 sec. shutter
255	Pendulum 59.94P
256	Pendulum 59.94P with 1/120 sec. shutter
257	Pendulum 24P

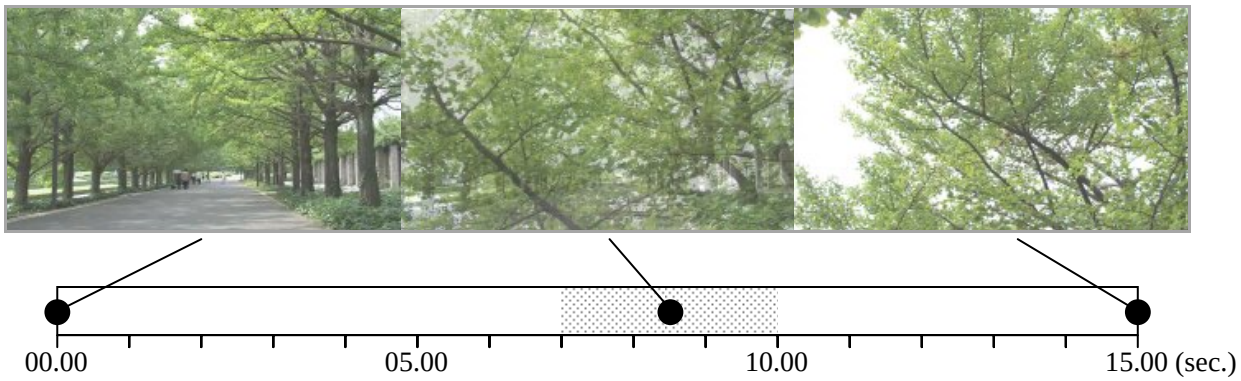
158	Pendulum 50I with 1/100 sec. shutter
159	Colorful world A
160	Colorful world B
161	Black dress
162	White dress
163	Woman with bouquet
164	Flash photography
165	Fountain (chromakey)
166	Night port (camera gain: normal)
167	Night port (camera gain: +6 dB)
168	Night port (camera gain: +12 dB)
169	Glasses

258	Pendulum 24P with 1/48 sec. shutter
259	Colorful world A
260	Colorful world B
261	Black dress
262	White dress
263	Woman with bouquet
264	Flash photography
265	Fountain (chromakey)

Series A
(General: 26, Specific: 19)

No. 101 Ginkgo trees

File name: s101_000000.tif–s101_000479.tif



Description

The sequence, which was taken from a moving camera dolly, shows a row of Ginkgo trees with luxuriant green leaves. The first part is a slow and loose dolly-in shot of a street that is lined with trees, and shows a fine texture image of tree leaves and sunlight beaming through the trees into the pavement. The latter half is a dolly-out shot, opposite direction of the first half, from under the leaves of the trees, whose branches make complex movements as the wind sways them. The transition from the first to the second half of the video is made through a three-second-dissolve effect using linear weights.

The sharp texture with the movements in the first half of the video is suitable for evaluating resolution of moving areas and interferences caused by digital encoding. The movement of the trees is different depending on their distance, thus it can be used in evaluating motion adaptive processing. The dissolve transition part is useful for shot transition detection and movement detection and in evaluating effect on motion adaptive processing.

Shooting data

Image format	59.94i 4:4:4
Location	Showa Kinen park
Date	Sep. 25, 2008
Weather	Clear
Camera motion*	Dolly in : dolly out

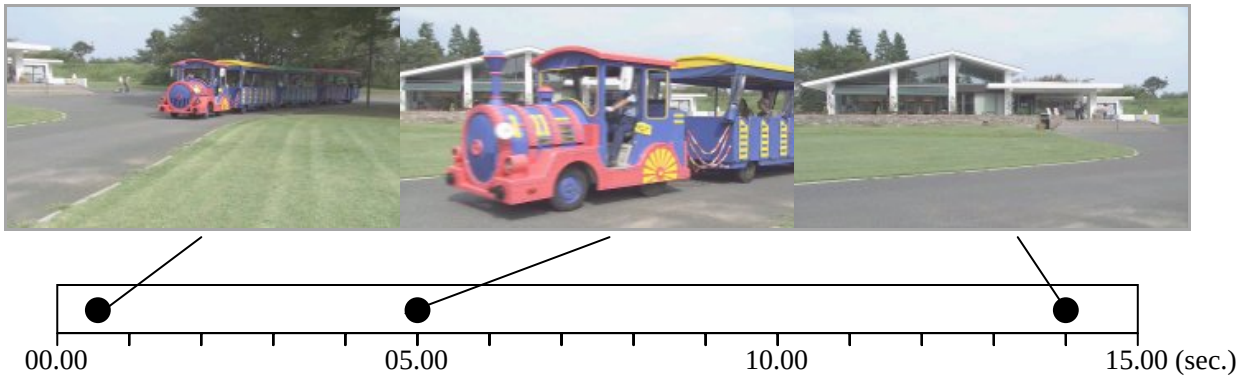
Focal length	14 mm	
Focus position*	30 ft : 10 ft	
F value	4	
Built-in filter	ND	1/8
	CC	6300 K
External filter*	1/2 ND : —	
Elec. shutter	OFF	
Gain value	0 dB	
Video effect	Dissolve	

*Former part : Latter part

Acknowledgements: The contents were produced with permission from the Ministry of Land, Infrastructure, Transport and Tourism, Kanto Regional Development Bureau, Showa Kinen Park.

No. 102 Truck train

File name: s102_000000.tif–s102_000479.tif



Description

The sequence shows a lateral pan shot of a truck train that comes from the far right to the front left of the frame along a road in a park. The camera stops when the building comes in the middle of the view, after which the truck train is shown quickly moving by.

The grass, the road, and the stonewall of the building in the background are suitable for checking fine texture quality. The truck train, which is colored red, blue, green, and yellow, can be used for evaluating color reproducibility. The background can also be seen between the cars and through the posts as the train moves by, making it useful for assessing motion adaptive processing effect.

Shooting data

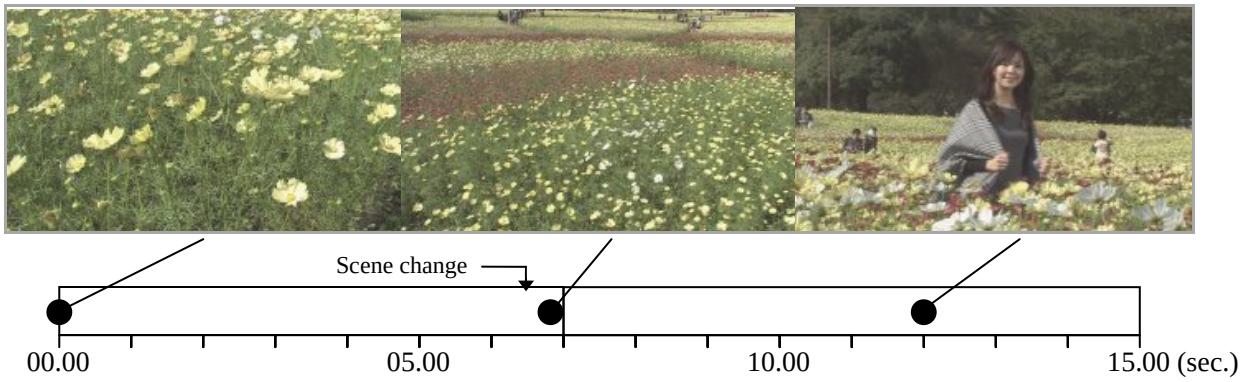
Image format	59.94i 4:4:4
Location	Showa Kinen park
Date	Sep. 25, 2008
Weather	Clear
Camera motion	Pan

Focal length	15 mm	
Focus position	Unknown	
F value	5.6	
Built-in filter	ND	1/8
	CC	6300 K
External filter	1/2 ND	
Elec. shutter	OFF	
Gain value	0 dB	
Video effect	—	

Acknowledgements: The contents were produced with permission from the Ministry of Land, Infrastructure, Transport and Tourism, Kanto Regional Development Bureau, Showa Kinen Park.

No. 103 Cosmos flowers

File name: s103_000000.tif–s103_000479.tif



Description

The first half of the sequence begins with a close up image of cosmos flowers being swayed by the wind, then the scene shifts to a loose shot that was taken as the camera was carried up by a crane, through which the focus shifts from the flowers in the front to the flowers in the far side. The latter half, which was taken through a horizontal pan shot to the right and marked by a cut in the sequence, shows a woman walking across the cosmos field. After the camera stops, the woman continues to walk out of the frame to the right.

The irregular swaying of the cosmos flowers and leaves that fill the whole screen and the slowly changing area of focus are suitable for evaluating resolution, color reproducibility, and motion adaptive processing, and for observing blocking artifacts caused by digital encoding. The woman in the latter half of the video is wearing a houndstooth check shawl, which is useful in checking aliasing and deterioration due to digital encoding.

Shooting data

Image format	59.94i 4:4:4
Location	Showa Kinen park
Date	Oct. 28, 2008
Weather	Clear
Camera motion*	Crane up : follow pan

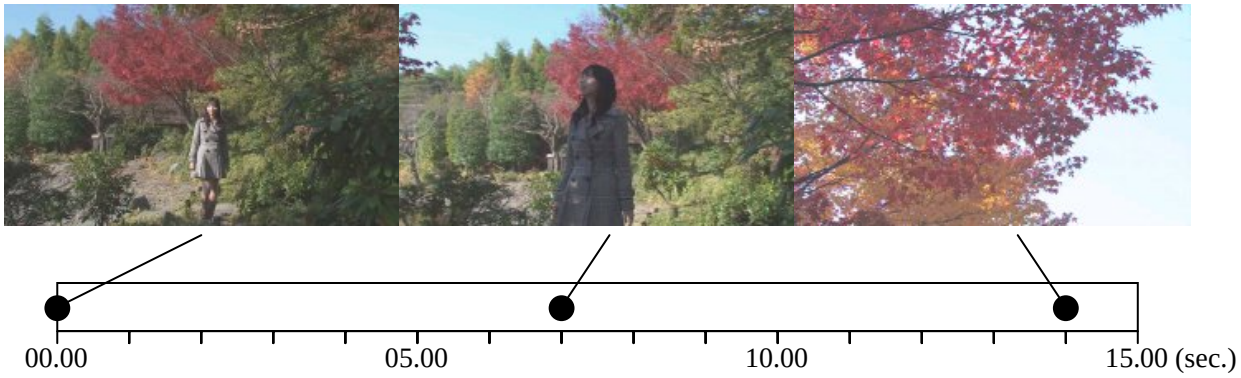
Focal length	Variable (21×zoom)	
Focus position*	3–20 ft : 30 ft	
F value	8 : 16	
Built-in filter	ND*	1/8 : clear
	CC	6300 K
External filter	1/2 ND	
Elec. shutter	OFF	
Gain value	0 dB	
Video effect	—	

*Former part : Latter part

Acknowledgements: The contents were produced with permission from the Ministry of Land, Infrastructure, Transport and Tourism, Kanto Regional Development Bureau, Showa Kinen Park.

No. 104 Red leaves (pan up)

File name: s104_000000.tif–s104_000479.tif



Description

The sequence shows a woman walking through a park lined with trees that are putting on their autumn color. The woman then stops to gaze up a tree. The camera follows the woman as she walks from the far side of the park towards the front. When she stops, the camera follows her gaze to make a diagonal pan up shot and captures the red leaves that fill the whole screen, showing the blue sky in the background.

The scenery of trees with red, yellow, and green leaves shown in different degrees of brightness is useful for checking color reproducibility and resolution. The latter part of the video showing camera pan up movement in addition to the swaying of the red leaves caused by the wind is suitable for observing effect of motion adaptive processing and deterioration caused by digital encoding.

Shooting data

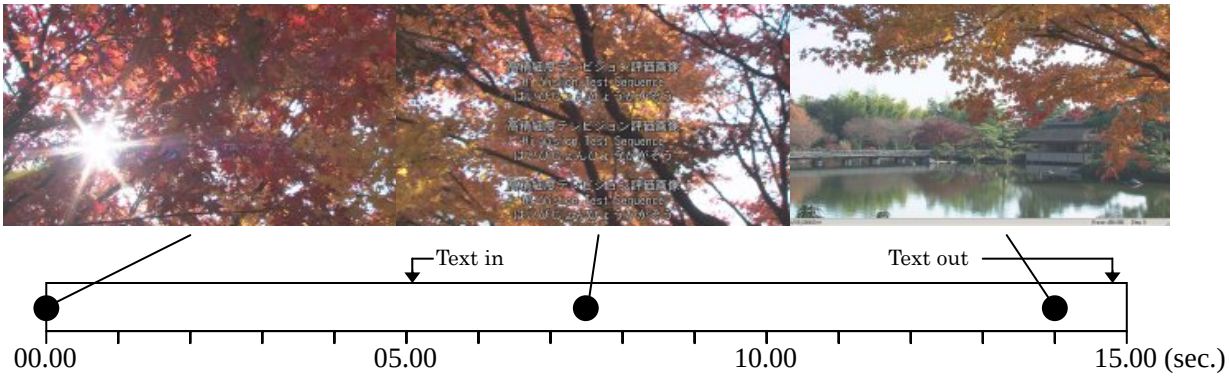
Image format	59.94i 4:4:4
Location	Showa Kinen park
Date	Dec. 4, 2008
Weather	Clear
Camera motion	Pan up

Focal length	Variable (21×zoom)	
Focus position	7.5 ft	
F value	8–2.8	
Built-in filter	ND	1/8
	CC	6300 K
External filter	—	
Elec. shutter	OFF	
Gain value	0 dB	
Video effect	—	

Acknowledgements: The contents were produced with permission from the Ministry of Land, Infrastructure, Transport and Tourism, Kanto Regional Development Bureau, Showa Kinen Park.

No. 105 Sunlight through leaves

File name: s105_000000.tif–s105_000479.tif



Description

The sequence begins with a scene showing sunlight shining through a thicket of red leaves and, as the camera makes a diagonal pan down to the left, it reveals a Japanese garden in the far end of the lake. In the latter part of the video, superimposed text moving upward at 300 pixels/sec is shown.

The lens flare from the ray of sunlight shining through the leaves in the beginning undergoes complex changes as the camera moves. The different directions in which the background and the superimposed text move are suitable for observing accuracy of motion detection and for checking mosquito noise and other deterioration effects caused by digital encoding.

Shooting data

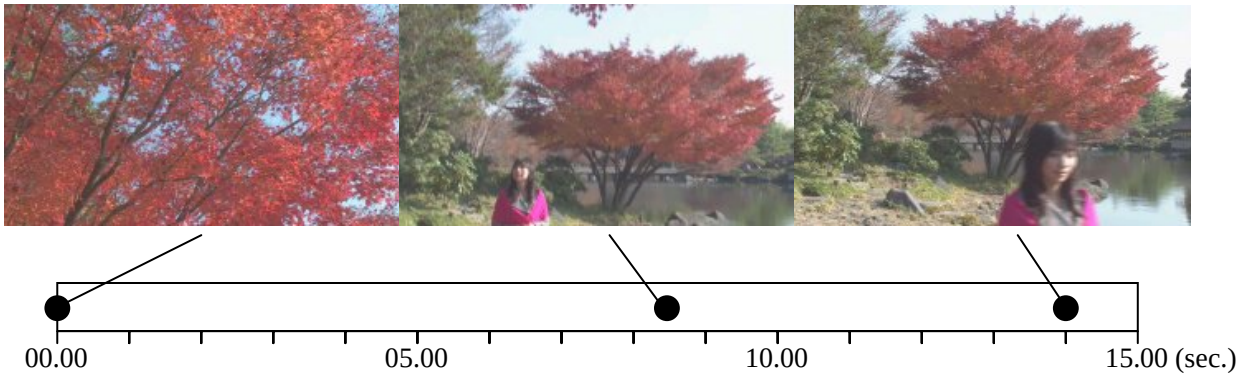
Image format	59.94i 4:4:4
Location	Showa Kinen park
Date	Dec. 4, 2008
Weather	Clear
Camera motion	Pan down

Focal length	Variable (21×zoom)	
Focus position	200 ft	
F value	16	
Built-in filter	ND	Clear
	CC	6300 K
External filter	—	
Elec. shutter	OFF	
Gain value	0 dB	
Video effect	Vertical scrolling text	

Acknowledgements: The contents were produced with permission from the Ministry of Land, Infrastructure, Transport and Tourism, Kanto Regional Development Bureau, Showa Kinen Park.

No. 106 Red leaves (pan down)

File name: s106_000000.tif–s106_000479.tif



Description

The sequence begins with a shot of branches of red leaves that fill the screen, and as the camera stops after a pan down shot, a woman, who is looking up the red leaves while walking, comes into view. The woman appears from the far left side and walks across the front of the camera forward to the right until she disappears from the frame.

The red leaves in the first half of the video are shown in vivid contrast to the blue sky in the background, providing excellent material for assessing resolution and color reproducibility. The combined movement of the camera as it pans up and the red leaves swaying in the wind is suitable for observing deterioration caused by digital encoding. The movement of the water surface as the woman disappears from view is also notable.

Shooting data

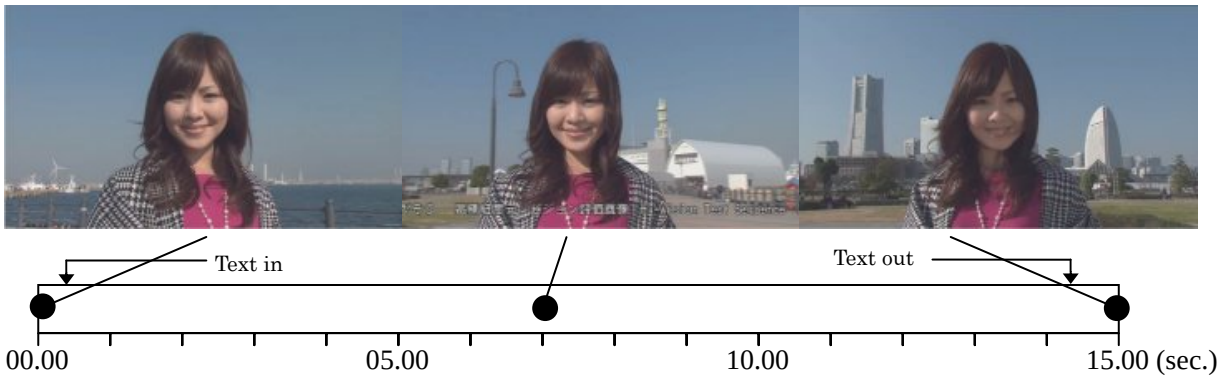
Image format	59.94i 4:4:4
Location	Showa Kinen park
Date	Dec. 4, 2008
Weather	Clear
Camera motion	Pan down

Focal length	Variable (21×zoom)	
Focus position	18 ft	
F value	16	
Built-in filter	ND	Clear
	CC	6300 K
External filter	—	
Elec. shutter	OFF	
Gain value	0 dB	
Video effect	—	

Acknowledgements: The contents were produced with permission from the Ministry of Land, Infrastructure, Transport and Tourism, Kanto Regional Development Bureau, Showa Kinen Park.

No. 107 Woman at harbor (circle dolly)

File name: s107_000000.tif–s107_000479.tif



Description

The sequence, which shows a woman set in the center of the screen while only the background moves horizontally at a fixed speed, is taken using a circle dolly. Since the human subject on focus is rotating against the background, the way the light shines on her face is also changing. The fine climate under which it was taken resulted in a very bright and clear image. Text moving from right to left at 600 pixels/sec is superimposed in the lower portion of the screen.

A wealth of information can be observed by showing a moving background around a fixed subject, such as fine details of changes in the woman's skin, hair, etc., as she rotates. The different directions in which the background and the superimposed text move are suitable for observing the accuracy of motion detection and for checking mosquito noise and other deteriorations caused by digital encoding.

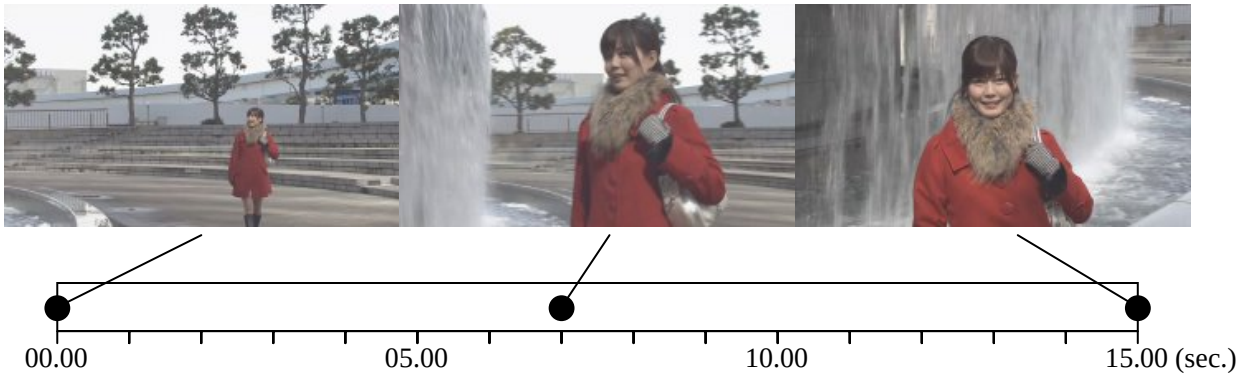
Shooting data

Image format	59.94i 4:4:4
Location	Yokohama Minato Mirai area
Date	Dec. 12, 2008
Weather	Clear
Camera motion	Circle dolly

Focal length	10.5 mm	
Focus position	3.75 ft	
F value	12	
Built-in filter	ND	1/8
	CC	6300 K
External filter	—	
Elec. shutter	OFF	
Gain value	0 dB	
Video effect	Horizontal scrolling text	

No. 108 Fountain (follow)

File name: s108_000000.tif–s108_000479.tif



Description

In this sequence, the camera follows a woman walking through a park. In the first half of the video, the woman walks from the far side towards the front near the fountain. As the camera follows the woman, the curtain fountain comes into view. The latter half shows the woman sitting in front of the fountain, after which the camera stops almost completely as the woman sits still.

The complex movement of the fountain and the bubbling water surface in the background are useful for observing distortions on the subject, on the clothes, etc. caused by digital encoding. The striking changes in the direction and size of the woman and also in the background are useful for evaluation of tracking and detection of human subjects. The continuous and dramatic changes of the images from the first half to the latter half of the video provide useful material for evaluating quality of various types of video processing techniques.

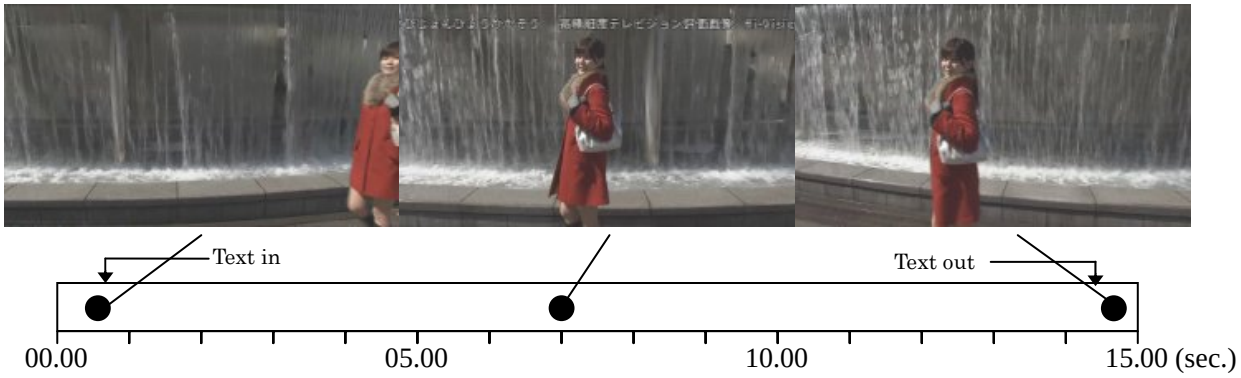
Shooting data

Image format	59.94i 4:4:4
Location	Daiba Promenade Park
Date	Mar. 5, 2009
Weather	Clear
Camera motion	Pan & Follow

Focal length	18 mm	
Focus position	40–8.6 ft	
F value	5.6	
Built-in filter	ND	1/8
	CC	6300 K
External filter	—	
Elec. shutter	OFF	
Gain value	0 dB	
Video effect	—	

No. 109 Fountain (dolly)

File name: s109_000000.tif–s109_000479.tif



Description

The sequence shows a woman walking across the frame in front of a curtain fountain. Other than at the beginning and end parts of the sequence, the woman remains at the center of the frame, looking in the same the direction all the time. Text moving to the left at 600 pixels/sec is superimposed on the upper part of the screen.

The complex movements in the background—the flow of water, the bubbling water surface, and the spray of water—are useful in assessing digital encoding distortions, which often appear on the face and around superimposed text.

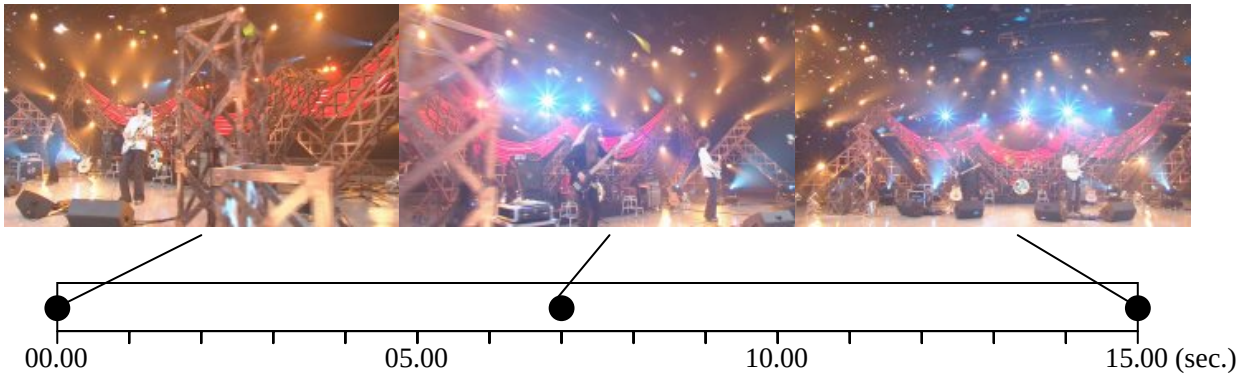
Shooting data

Image format	59.94i 4:4:4
Location	Daiba Promenade Park
Date	Mar. 5, 2009
Weather	Clear
Camera motion	On the rail

Focal length	6.8 mm	
Focus position	6.5 ft	
F value	10	
Built-in filter	ND	1/8
	CC	6300 K
External filter	—	
Elec. shutter	OFF	
Gain value	0 dB	
Video effect	Horizontal scrolling text	

No. 110 Studio concert (confetti)

File name: s110_000000.tif–s110_000479.tif



Description

The sequence shows performers and equipment in changing light conditions from a camera dolly. It shows a loose shot of the performers, the stage, and the lights, and includes complex movements and patterns. The flow of confetti adds irregularity to the movements in the sequence.

The light gradations are useful for evaluating tone fidelity, and the movement of many objects is suitable for assessing digital encoding and other video processing effects.

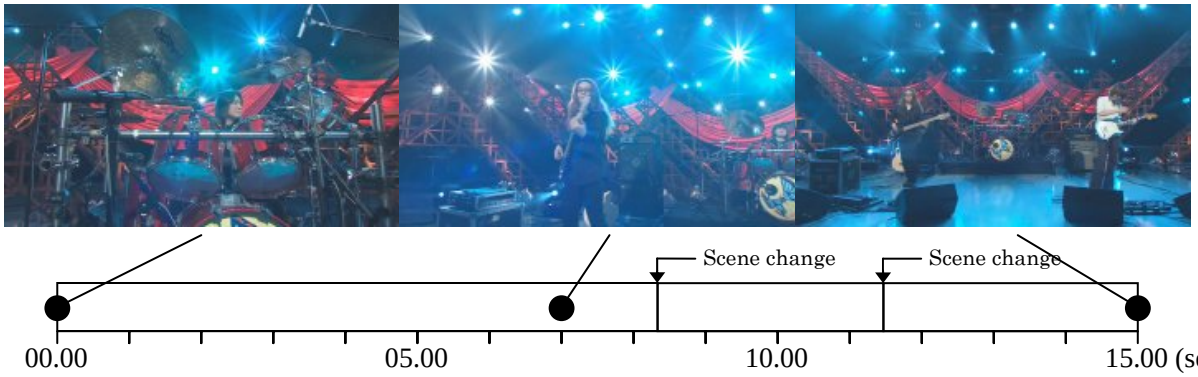
Shooting data

Image format	59.94i 4:4:4
Location	Studio in TV Asahi
Date	Feb. 18, 2009
Weather	—
Camera motion	Dolly

Focal length	Variable（5×6 zoom）	
Focus position	Follow	
F value	5.6	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. shutter	OFF	
Gain value	0 dB	
Video effect	—	

No. 111 Studio concert

File name: s111_000000.tif–s111_000479.tif



Description

The sequence shows performers and equipment in changing light conditions. Most of the shots are relatively tight shots. In addition to the blinking of the lights, the occlusion of light by the performers, by the musical instruments, and by the stage props makes the changes in light conditions very striking.

The striking changes in light conditions make motion vector detection and motion compensation processing difficult, making it useful in evaluating the efficiency of the digital encoding. The many light gradations are useful in evaluating gradation fidelity.

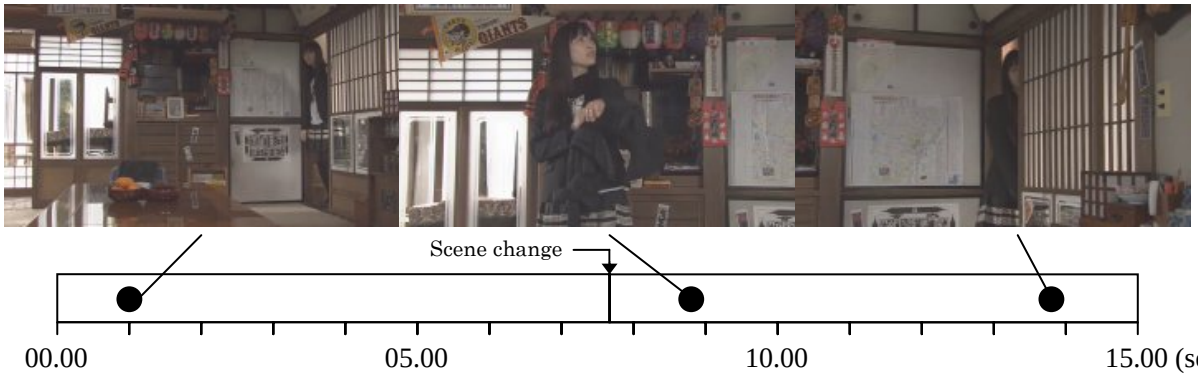
Shooting data

Image format	59.94i 4:4:4
Location	Studio in TV Asahi
Date	Feb. 18, 2009
Weather	—
Camera motion	Dolly

Focal length	Variable (5×6 zoom)	
Focus position	Follow	
F value	5.6	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. shutter	OFF	
Gain value	0 dB	
Video effect	—	

No. 112 Drama set (day)

File name: s112_000000.tif–s112_000479.tif



Description

The sequence shows a woman walking across a room in a drama set. The first part was taken using a camera dolly, wherein the direction of the room shifts while depth of view is maintained. The latter half is a pan follow shot of the woman. The walls of the room have posters that have text and patterns on them. Light from the inner garden floods into the room.

Since the sequence shows many fine patterns and text, it is useful in evaluating resolution. The first part of the video shows a shift in the view of the room, which is suitable for evaluating frame rate conversion, digital encoding, and other motion compensation processing. It is also useful in evaluating preservation of texture of highlighted areas after digital encoding and other image processing.

Shooting data

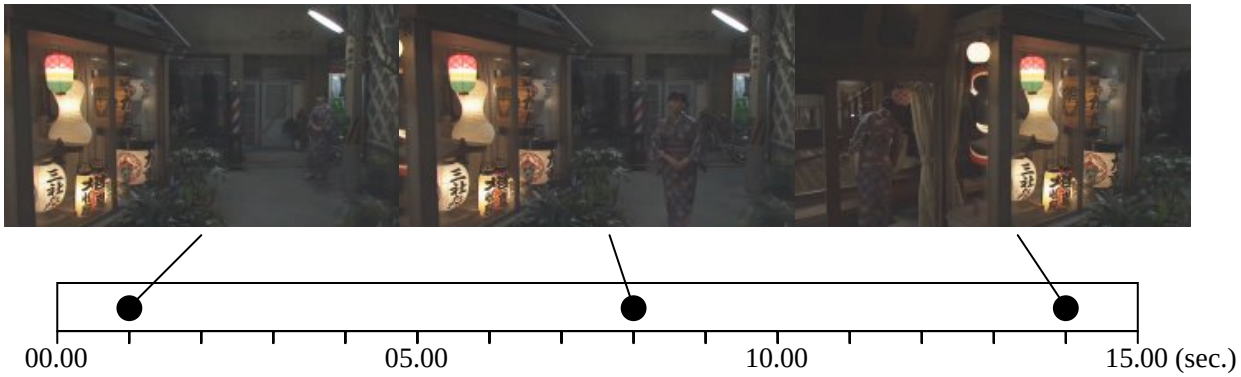
Image format	59.94i 4:4:4
Location	Fuji Television WANGAN STUDIO
Date	Feb. 27, 2009
Weather	—
Camera motion*	Dolly : Pan & Follow

Focal length*	10 mm : 16 mm	
Focus position *	13 ft : 11 ft	
F value	2.8	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. shutter	OFF	
Gain value	0 dB	
Video effect	—	

* Former part : Latter part

No. 113 Drama set (night)

File name: s113_000000.tif–s113_000479.tif



Description

The sequence shows a pan follow shot of a woman who walks through a drama set. The street light and lanterns appear very bright amid the dark night setting.

There is relatively a lot of noise, with many fine objects such as branches of trees and shrubs shown, making it suitable for assessing noise reduction processing. It is also suitable for assessing preservation of texture of dark parts after digital encoding and other image processing procedures. The bright streetlight against a relatively dark background provides useful material for assessing contrast.

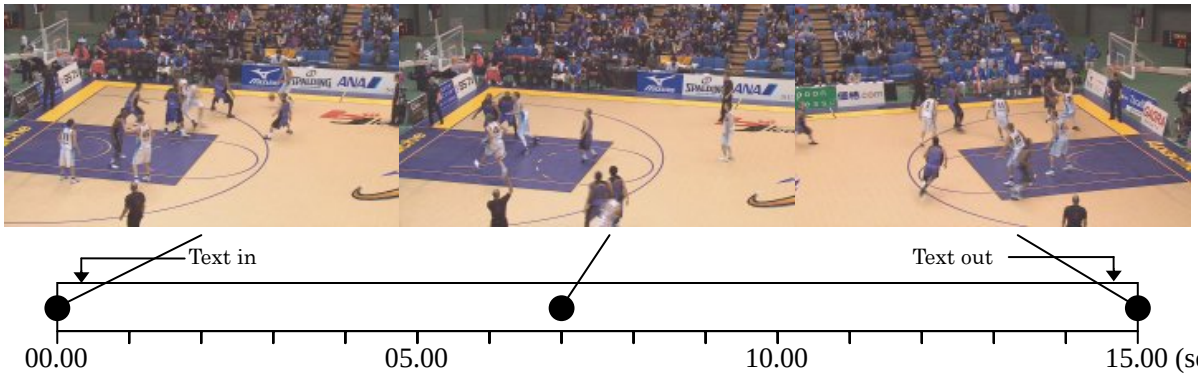
Shooting data

Image format	59.94i 4:4:4
Location	Fuji Television WANGAN STUDIO
Date	Feb. 27, 2009
Weather	—
Camera motion	Pan & Follow

Focal length	8 mm	
Focus position	Follow	
F value	2.8	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. shutter	OFF	
Gain value	0 dB	
Video effect	—	

No. 114 Basketball

File name: s114_000000.tif–s114_000479.tif



Description

The sequence shows a pan follow shot of a basketball game taken from the upper part of the courtside. It includes the players as well as a view of the bleachers and shows fine movements such as clapping of hands. It also shows, between the court and the bleachers, billboards that have logo marks and text objects on them. In the upper part of the screen, text moving to the left at 600 pixels/sec is superimposed.

The rapid movement of the ball and the human subjects and the panning of the camera provide useful material for evaluating frame rate conversion and other motion adaptive processing procedures. It also includes a lot of occlusion, making it useful for assessment of tracking of the ball and the human subjects. Since the sequence includes a flat-surfaced court along with complex-textured bleachers, it is useful for evaluating digital encoding processes and other adaptive processing procedures.

Shooting data

Image format	59.94i 4:4:4
Location	Komazawa Gymnasium
Date	Mar. 5, 2009
Weather	—
Camera motion	Pan & Follow

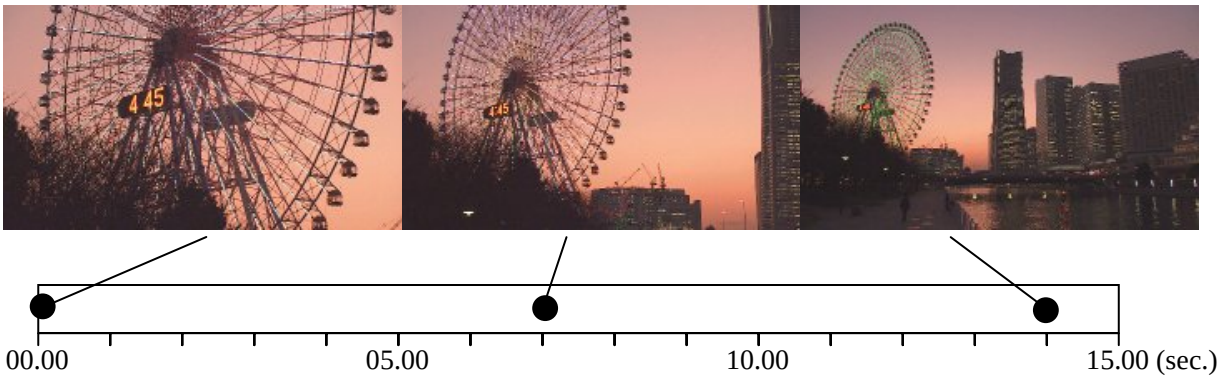
Focal length	Variable (21×zoom)	
Focus position	150 ft	
F value	4	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. shutter*	1/100 sec.	
Gain value	0 dB	
Video effect	Horizontal scrolling text	

*1/100 sec Electronic shutter was applied due to lighting flicker in the gymnasium.

Acknowledgements: The contents were produced with permission from the BASKETBALL JAPAN LEAGUE.

No. 115 Evening scene (zoom out)

File name: s115_000000.tif–s115_000479.tif



Description

The sequence shows a zoom-out shot of a Ferris wheel taken in the evening, showing high-rise buildings and the evening sky in the background. The geometrical lines of the Ferris wheel make it a high frequency image. In the latter part of the sequence, high-rise buildings come into view, resulting in an image composed of many fine and complex straight lines.

This can be used for observing gradation of dark parts in images showing an evening scene. The slow zoom-out makes it suitable for assessing pseudo contours and jaggies arising from the edge of the Ferris wheel.

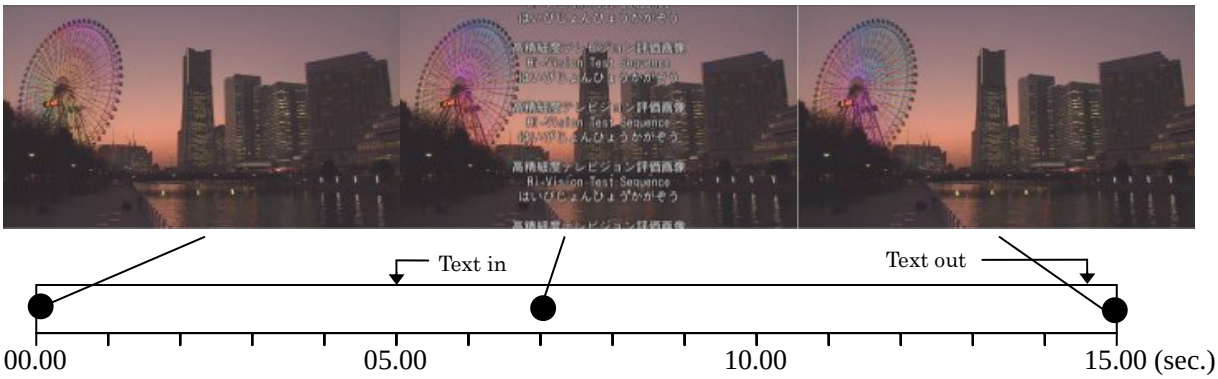
Shooting data

Image format	59.94i 4:4:4
Location	Yokohama Minato Mirai area
Date	Dec. 12, 2008
Weather	Clear
Camera motion	Zoom out

Focal length	Variable (21×zoom)	
Focus position	∞	
F value	2.8	
Built-in filter	ND	Clear
	CC	6300 K
External filter	—	
Elec. shutter	OFF	
Gain value	0 dB	
Video effect	—	

No. 116 Evening scene (fixed)

File name: s116_000000.tif–s116_000479.tif



Description

The sequence shows a Ferris wheel against an evening sky and high-rise buildings in the dark, and includes many fine and complex lines. The slow rotation and the changing colors of the Ferris wheel are very vivid, and the flicker of light reflected on the surface of the river can be seen. Text moving vertically at 300 pixels/sec is superimposed in the middle part of the frame.

The evening scene was taken using a fixed shot, which has parts that are relatively bright, making it ideal for assessing light gradation. The superimposed text that rolls vertically can be used for evaluating digital encoding effects and mosquito noise arising around the contours of superimposed text.

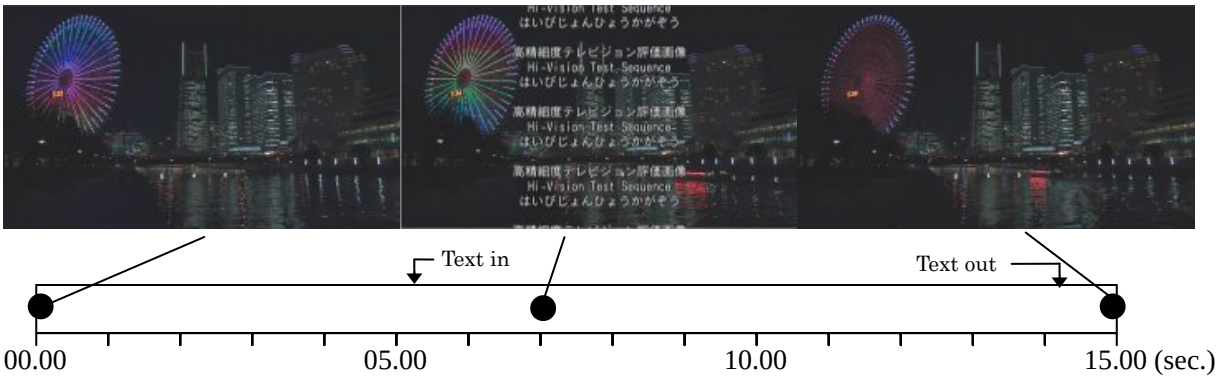
Shooting data

Image format	59.94i 4:4:4
Location	Yokohama Minato Mirai area
Date	Dec. 12, 2008
Weather	Clear
Camera motion	Fixed

Focal length	8 mm	
Focus position	∞	
F value	2.8	
Built-in filter	ND	Clear
	CC	6300 K
External filter	—	
Elec. shutter	OFF	
Gain value	0 dB	
Video effect	Vertical scrolling text	

No. 117 Night scene (fixed)

File name: s117_000000.tif–s117_000479.tif



Description

The sequence shows a Ferris wheel against a night sky and high-rise buildings in the dark, and includes many fine and complex lines. The slow rotation and the changing colors of the Ferris wheel are very vivid, and the flicker of light reflected on the surface of the river can be seen. Text moving vertically at 300 pixels/sec is superimposed in the middle part of the screen.

The night scene was taken using a fixed shot and is ideal for assessing resolution of dark parts of the image. The flickering effect of the light in the dark part of the image can be seen. The superimposed text that rolls vertically can be used for assessing digital encoding effects and mosquito noise arising around the contours of superimposed text.

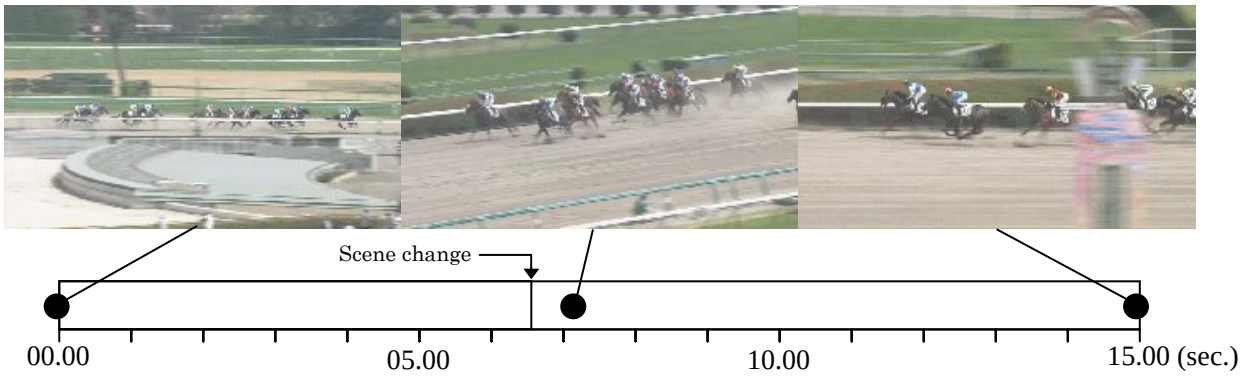
Shooting data

Image format	59.94i 4:4:4
Location	Yokohama Minato Mirai area
Date	Dec. 12, 2008
Weather	Clear
Camera motion	Fixed

Focal length	8 mm	
Focus position	∞	
F value	2.8	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. shutter	OFF	
Gain value	0 dB	
Video effect	Vertical scrolling text	

No. 118 Horse racing (dirt)

File name: s118_000000.tif–s118_000479.tif



Description

The sequence shows a horse race on a dirt racetrack. The first half was shot at a relatively fast panning speed from the backstretch of the racetrack as the camera follows the running horses, showing the lawn seats in the middle of the tracks, the tracks, and the lawn and the row of trees in the outer part of the tracks. The latter part, marked by a cut, is a pan follow shot of the leading group of horses, showing the tracks, the lawn in the center of the oval, and other structures in the background.

The first half is ideal for evaluating dynamic resolution during high-speed panning. In the latter half, the horses and the jockeys are shot more closely, focusing on the movement of the legs and the cloud of dust blown up the air, which is useful for evaluating digital encoding, resolution, and motion adaptive processing.

Shooting data

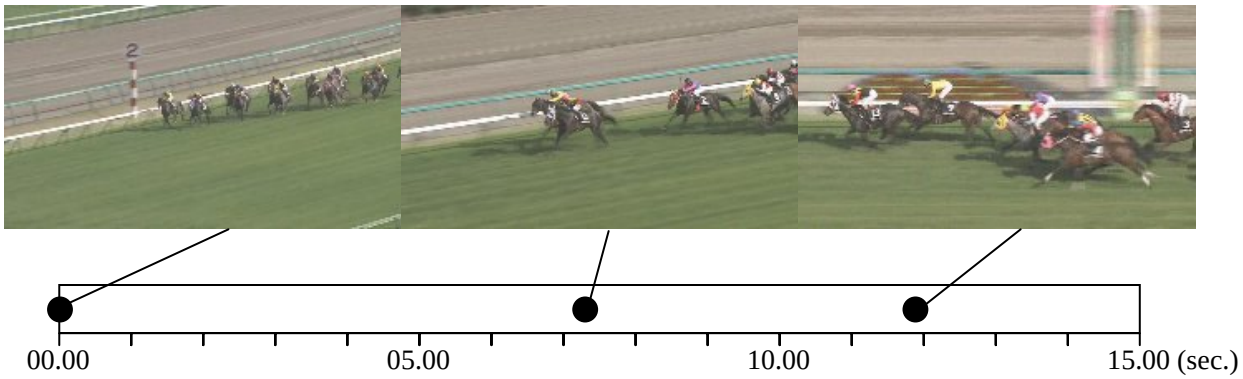
Image format	59.94i 4:4:4
Location	Nakayama racecourse
Date	Apr. 12, 2009
Weather	Clear
Camera motion	Pan & Follow

Focal length	Variable (21×zoom)	
Focus position	∞	
F value	8	
Built-in filter	ND	1/8
	CC	6300 K
External filter	—	
Elec. shutter	OFF	
Gain value	0 dB	
Video effect	—	

Acknowledgements: The contents were produced with permission from JRA

No. 119 Horse racing (turf)

File name: s119_000000.tif–s119_000479.tif



Description

The sequence shows a horse race on a turf racetrack. It was taken using a pan follow shot of the leading horses running from the right side to the left side, showing the dirt racetrack beside the turf racetrack.

This is a close shot of the horses and the jockeys where the legs and the turf cover a large area of the screen, making it ideal for evaluating deterioration arising from digital encoding and the decrease in resolution of the turf portion. Also, the pan follow shot and the inclusion of fast movements of the horses' legs and the jockeys' whips, make it ideal for assessing motion adaptive processing.

Shooting data

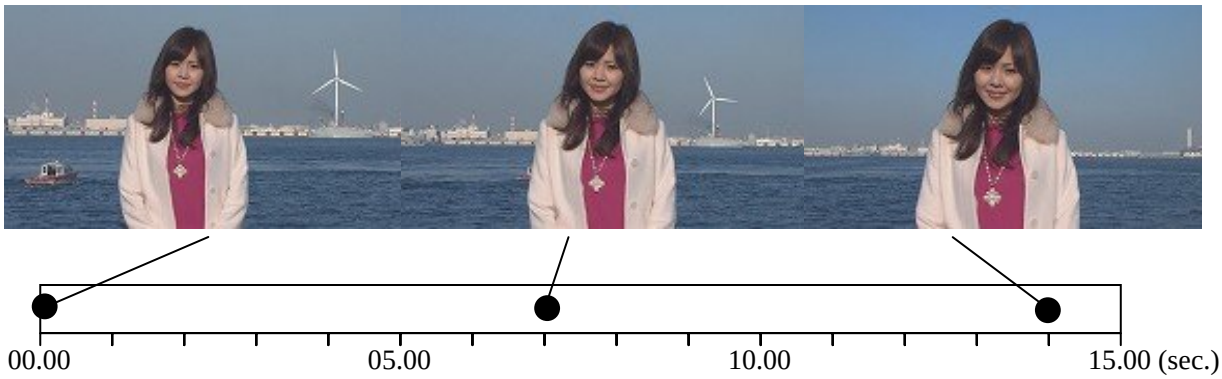
Image format	59.94i 4:4:4
Location	Nakayama racecourse
Date	Apr. 12, 2009
Weather	Clear
Camera motion	Pan & Follow

Focal length	Variable (21×zoom)	
Focus position	∞	
F value	8	
Built-in filter	ND	1/8
	CC	6300 K
External filter	—	
Elec. shutter	OFF	
Gain value	0 dB	
Video effect	—	

Acknowledgements: The contents were produced with permission from JRA

No. 120 Woman at harbor (dolly in, zoom back)

File name: s120_000000.tif–s120_000479.tif



Description

The sequence shows a human object that moves closer to the front as the background move to the rear. It shows the texture of the person's skin, hair, and clothes, and the luster of the accessories she is wearing. The opposite movements of the human object and the background create an interesting effect. The sequence was taken outdoors under clear skies, resulting in an image with a high degree of brightness.

The human subject is focused at almost a constant size while only the background changes, affecting the texture of the human subject's skin and hair in a way that provides a wealth of observable changes.

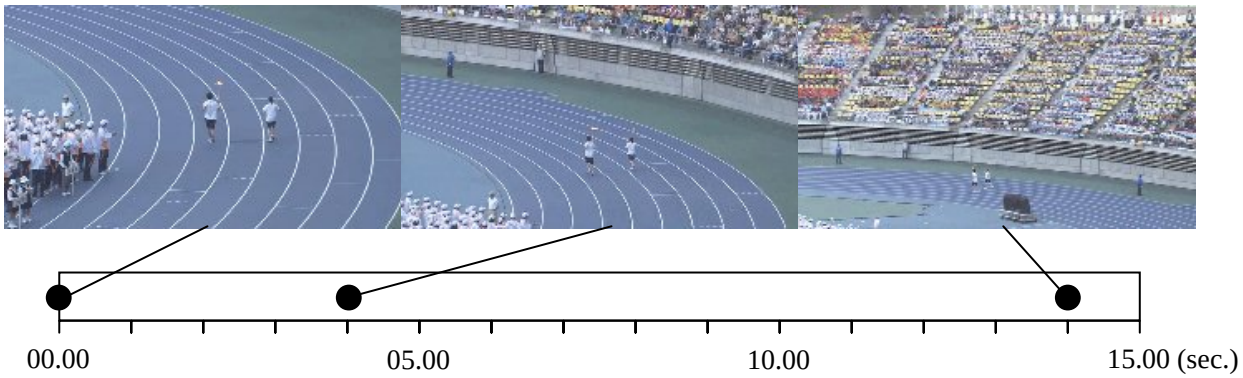
Shooting data

Image format	59.94i 4:4:4
Location	Yokohama Minato Mirai area
Date	Dec. 12, 2008
Weather	Clear
Camera motion	Dolly in / Zoom back

Focal length	30–12 mm	
Focus position	6–15 ft	
F value	10	
Built-in filter	ND	3
	CC	6300 K
External filter	—	
Elec. shutter	OFF	
Gain value	0 dB	
Video effect	—	

No. 121 Torch bearer

File name: s121_000000.tif–s121_000479.tif



Description

The sequence shows torch bearers running across athletic tracks, taken through a follow shot at a high-angle view from the main stand. In the latter part, the camera tilts up to include a view of part of the stands as it follows the torch bearers through the curve.

The first half shows a clear view of the even patterns of the track lines, which is ideal for assessing jaggies, pseudo contours, and ringing effects. In the latter half, which features a contrasting mixture of the information-rich audience stands and the plain and even tracks, is ideal for evaluating distortions that usually arise in plain surfaces and during coding bit rate tests in the digital encoding process.

Shooting data

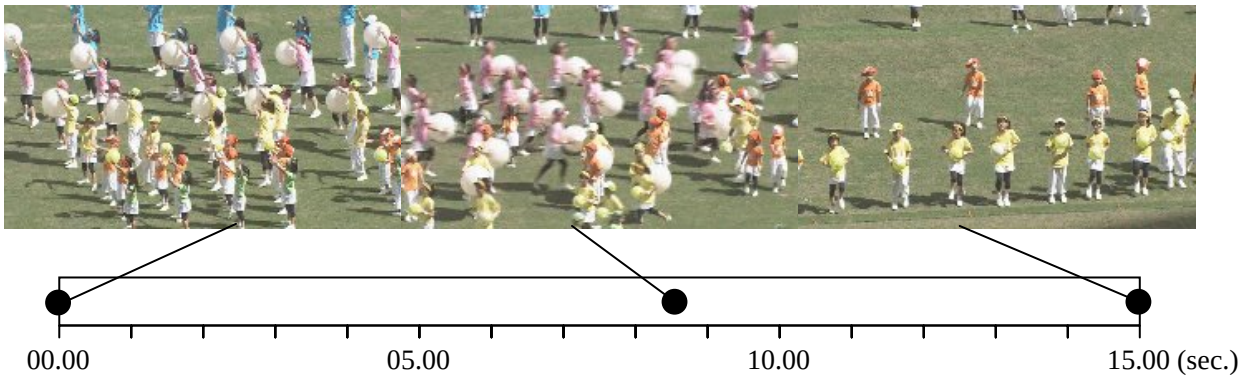
Image format	59.94i 4:4:4
Location	Oita Kyushu Sekiyu Dome
Date	Sep. 27, 2008
Weather	Clear
Camera motion	Pan & Follow

Focal length	Variable (21×zoom)	
Focus position	200 ft	
F value	5.6	
Built-in filter	ND	Clear
	CC	6300 K
External filter	—	
Elec. shutter	OFF	
Gain value	0 dB	
Video effect	—	

Acknowledgements: The contents were produced with permission from 63th National Athletic Meet in Oita Prefecture.

No. 122 Children's dance

File name: s122_000000.tif–s122_000479.tif



Description

The sequence shows children performing a dance on an athletic field taken at a high-angle view from the main stand. The children appear at around 1/3 of the height of the screen and move around in various speeds and directions as they perform.

Deterioration in image quality usually appears above the subjects during digital encoding. The sequence also shows portions where the camera is not moving and portions where it pans at slow speed, which are both useful for observing how resolution of the grass surface is maintained.

Shooting data

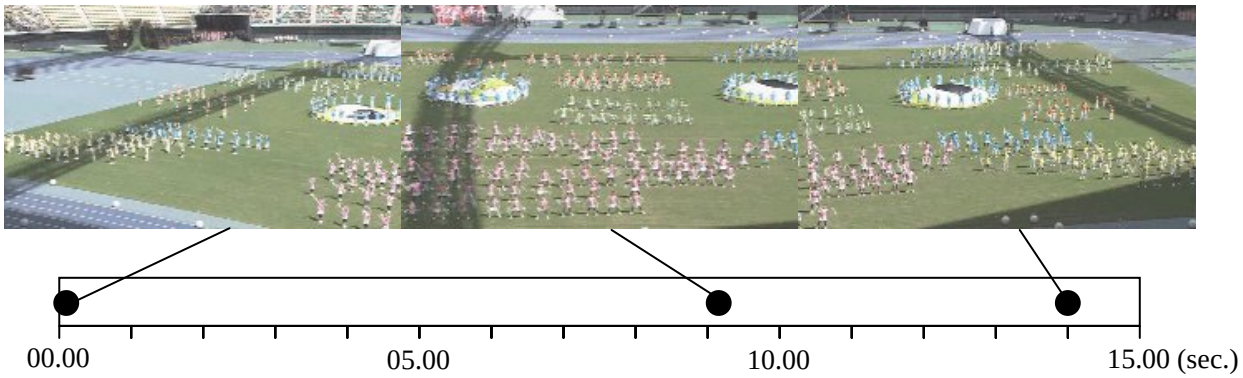
Image format	59.94i 4:4:4
Location	Oita Kyushu Sekiyu Dome
Date	Sep. 27, 2008
Weather	Clear
Camera motion	Pan & Follow

Focal length	Variable (21×zoom)	
Focus position	200 ft	
F value	8	
Built-in filter	ND	1/8
	CC	6300 K
External filter	—	
Elec. shutter	OFF	
Gain value	0 dB	
Video effect	—	

Acknowledgements: The contents were produced with permission from 63th National Athletic Meet in Oita Prefecture.

No. 123 Children's dance (loose shot)

File name: s123_000000.tif–s123_000479.tif



Description

The sequence shows children performing a dance on an athletic field taken at a high-angle view from the main stand. This is a loose left-to-right panning shot taken far enough to show a full view of the lawn area between the home straight and the back straight.

The dance with waving ribbons action on a flat lawn background resulted in an image that undergoes striking changes at localized areas, making it suitable for evaluating deterioration arising from digital encoding. In particular, it is ideal for looking at mosquito noise around the moving objects and at disruption in flat areas.

Shooting data

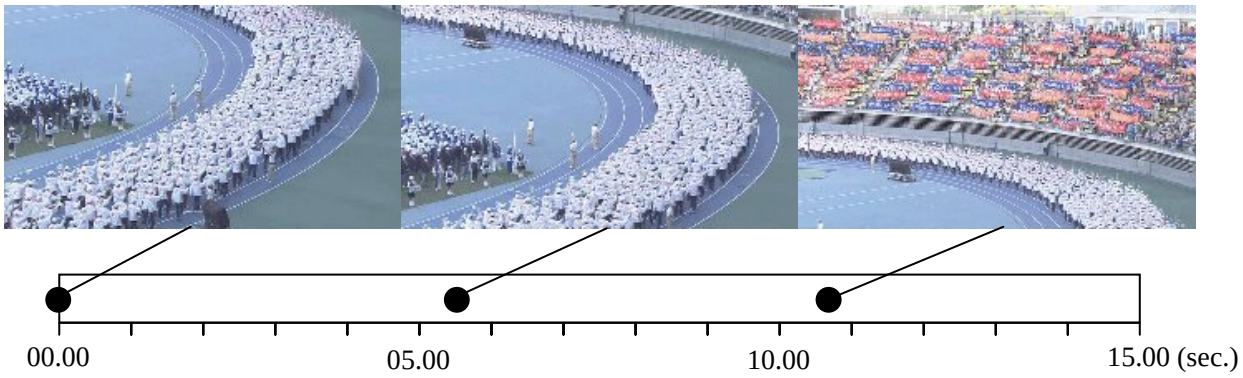
Image format	59.94i 4:4:4
Location	Oita Kyushu Sekiyu Dome
Date	Sep. 27, 2008
Weather	Clear
Camera motion	Pan & Follow

Focal length	Variable (21×zoom)	
Focus position	200 ft	
F value	8	
Built-in filter	ND	1/8
	CC	6300 K
External filter	—	
Elec. shutter	OFF	
Gain value	0 dB	
Video effect	—	

Acknowledgements: The contents were produced with permission from 63th National Athletic Meet in Oita Prefecture.

No. 124 March

File name: s124_000000.tif–s124_000479.tif



Description

The sequence, taken at a high-angle view from the main stand, features a group of athletes waving small flags as they march in along the tracks of an athletic stadium. In the first part, the camera follows the marching athletes, and in the latter half, the camera tilts up to put the audience in view as it continues to follow the marching athletes. The audience, which fills up the stands completely, waves multicolored banners, resulting in an image that features a wealth of information.

The images are suitable for checking mosquito noise, block noise, and other artifacts that arise around the group of athletes and the audience in the stands when assessing deterioration arising from digital encoding. While the image shows information-rich patterns, it also features areas that are relatively plain, enhancing detection of flicker-like image deterioration.

Shooting data

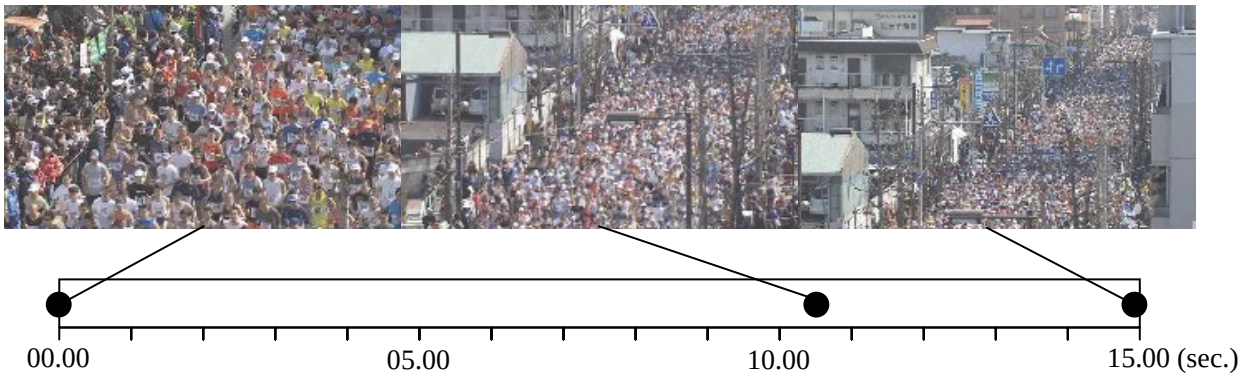
Image format	59.94i 4:4:4
Location	Oita Kyushu Sekiyu Dome
Date	Sep. 27, 2008
Weather	Clear
Camera motion	Pan & Follow

Focal length	Variable (21×zoom)	
Focus position	200 ft	
F value	5.6	
Built-in filter	ND	1/8
	CC	6300 K
External filter	—	
Elec. shutter	OFF	
Gain value	0 dB	
Video effect	—	

Acknowledgements: The contents were produced with permission from 63th National Athletic Meet in Oita Prefecture.

No. 125 Marathon (pan up)

File name: s125_000000.tif–s125_000479.tif



Description

The sequence shows an overlooking shot taken from a building along the road that is completely filled with marathon runners shown running from the upper part to the bottom part of the screen. It shows a pan follow shot opposite the direction the runners are running, in an angle wide enough to show the road from side to side.

The irregular movement of the runners, who are wearing variously colored running wear, particularly in the first half, makes it ideal for assessing image deterioration from digital encoding that arise around the running subjects. As the camera pans up, the buildings along the road come into view, enabling easier detection of coding deterioration that arise on the relatively flat wall surfaces of the buildings.

Shooting data

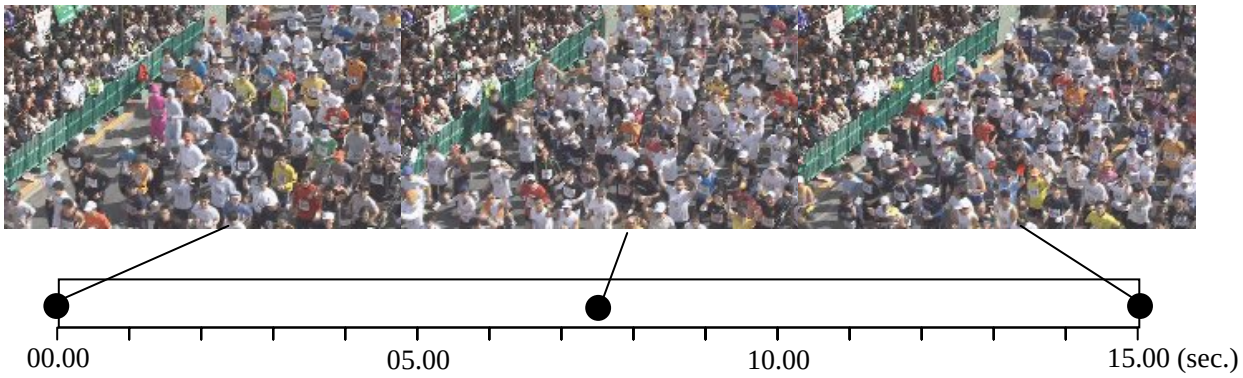
Image format	59.94i 4:4:4
Location	Along the course of Ohme Road Race
Date	Feb. 15, 2009
Weather	Clear
Camera motion	Pan & Up

Focal length	Variable (21×zoom)	
Focus position	∞	
F value	5.6	
Built-in filter	ND	1/16
	CC	6300 K
External filter	—	
Elec. shutter	OFF	
Gain value	0 dB	
Video effect	—	

Acknowledgement: The contents were produced with permission from Ohme Road Race organizer and the Hochi Shimbun.

No. 126 Marathon (fixed)

File name: s126_000000.tif–s126_000479.tif



Description

The sequence shows an overlooking shot taken from a building along the road that is completely filled with marathon runners shown running from the upper part to the bottom part of the screen. The camera is fixed, showing the runners, the subject of the shoot, at 1/3 of the height of the screen.

The relatively closer view of the subjects enables easier detection of deterioration in image quality. The irregular movement of the runners, who are wearing variously colored running wear, makes it ideal for assessing image deterioration from digital encoding.

Shooting data

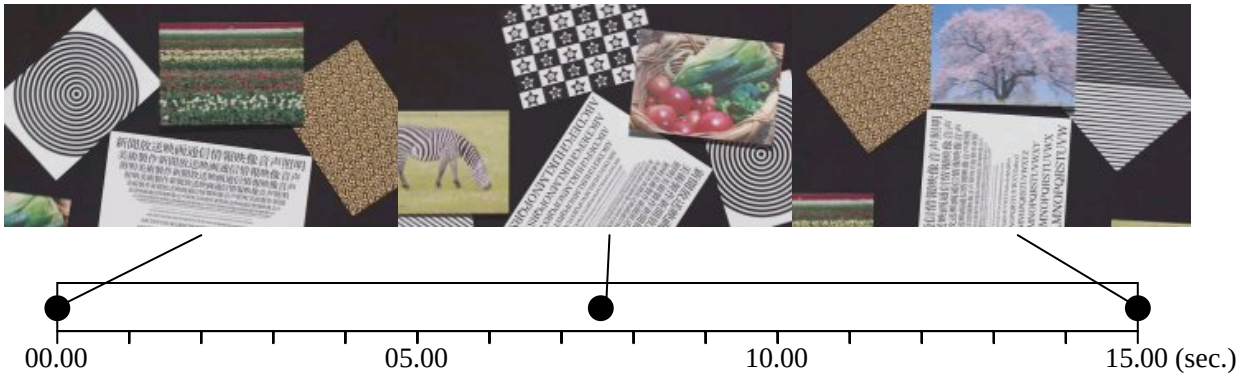
Image format	59.94i 4:4:4
Location	Along the course of Ohme Road Race
Date	Feb. 15, 2009
Weather	Clear
Camera motion	Fixed

Focal length	Variable (21×zoom)	
Focus position	∞	
F value	5.6	
Built-in filter	ND	1/16
	CC	6300 K
External filter	—	
Elec. shutter	OFF	
Gain value	0 dB	
Video effect	—	

Acknowledgement: The contents were produced with permission from Ohme Road Race organizer and the Hochi Shimbun.

No. 151 Rotating disk 59.94I

File name: s151_000000.tif–s151_000479.tif



Description

The sequence shows a fixed shot of a black disk that is rotating clockwise and on which panels showing text, texture patterns, and photos are mounted. The photo panels, which are fixed only on their top edge, moves in short, quick swings as the disk rotates.

The variation in rotation speed that depends on the distance of the panels from center of the disk provides excellent material for evaluating motion detection and resolution of moving areas. The diagonal and circular patterns are useful for observing image lags, pseudo contours, motion blurs, and aliasing. The legibility of the text could also be useful.

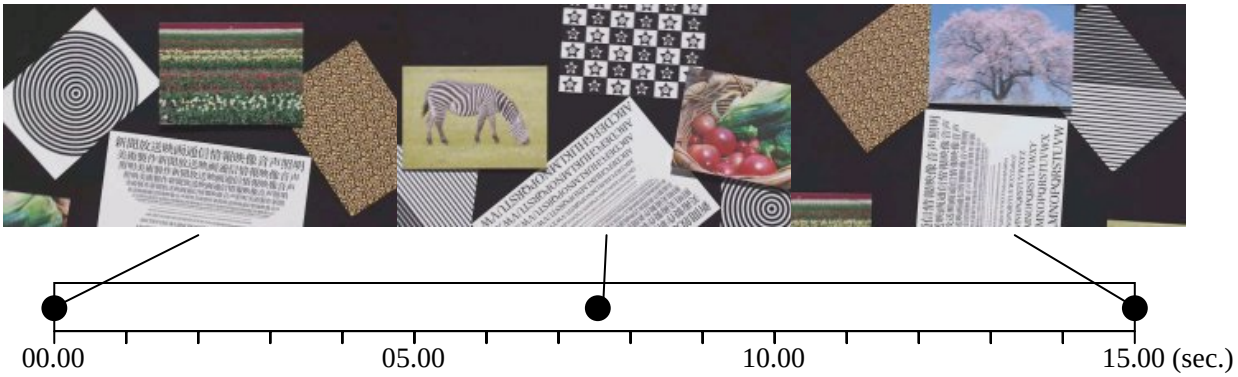
Shooting data

Image format	59.94i 4:4:4
Location	Studio in Fuji TV
Date	Mar. 6, 2009
Weather	—
Camera motion	Fixed

Focal length	46 mm	
Focus position	10 ft	
F value	5.6	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. shutter	OFF	
Gain value	0 dB	
Video effect	—	

No. 152 Rotating disk 59.94I with 1/120 sec. shutter

File name: s152_000000.tif–s152_000479.tif



Description

The sequence shows a fixed shot of a black disk that is rotating clockwise and on which panels showing text, texture patterns, and photos are mounted. The photo panels, which are fixed only on the top edges, move in short, quick swings as the disk rotates.

The variation in rotation speed that depends on the distance of the panels from center of the disk provides excellent material for evaluating motion detection and resolution of moving areas. The diagonal and circular patterns are useful for observing image lags, pseudo contours, motion blurs, and aliasing. The legibility of the text could also be useful.

The composition and shooting conditions are almost the same as No. 151 Rotating disk 59.94I, but the electronic shutter was turned ON, setting exposure time to 1/120 sec, which is half of the regular shot (shutter OFF).

As an effect of the electronic shutter being ON, spatial resolution of the moving regions is increased while inter-frame correlation is reduced. As such, it can be used to see how motion adaptive processing and digital encoding are affected. Also, in comparison with No. 154 Rotating disk 50I with 1/100 sec. shutter, it can be used for assessing frame rate conversion.

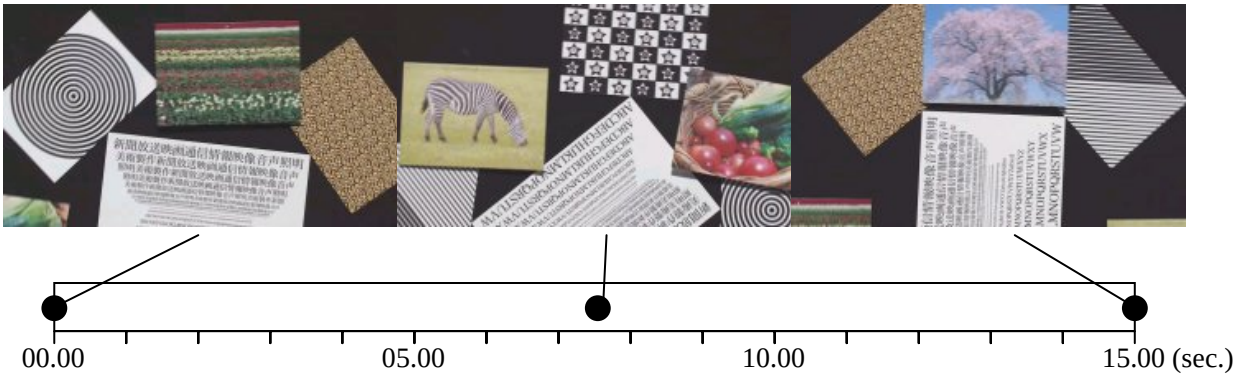
Shooting data

Image format	59.94i 4:4:4
Location	Studio in Fuji TV
Date	Mar. 6, 2009
Weather	—
Camera motion	Fixed

Focal length	46 mm	
Focus position	10 ft	
F value	4	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. shutter	1/120 sec.	
Gain value	0 dB	
Video effect	—	

No. 153 Rotating disk 50I

File name: s153_000000.tif–s153_000399.tif



Description

The sequence shows a fixed shot of a black disk that is rotating clockwise and on which panels showing text, texture patterns, and photos are mounted. The photo panels, which are fixed only on the top edges, move in short, quick swings as the disk rotates.

The variation in rotation speed that depends on the distance of the panels from center of the disk provides excellent material for evaluating motion detection and resolution of moving areas. The diagonal and circular patterns are useful for observing image lags, pseudo contours, motion blurs, and aliasing. The legibility of the text could also be useful.

The composition and shooting conditions are almost the same as No. 151 Rotating disk 59.94I, but the frame rate was set at 50i (50 fields/sec). This sequence is mainly useful for assessing frame rate conversion.

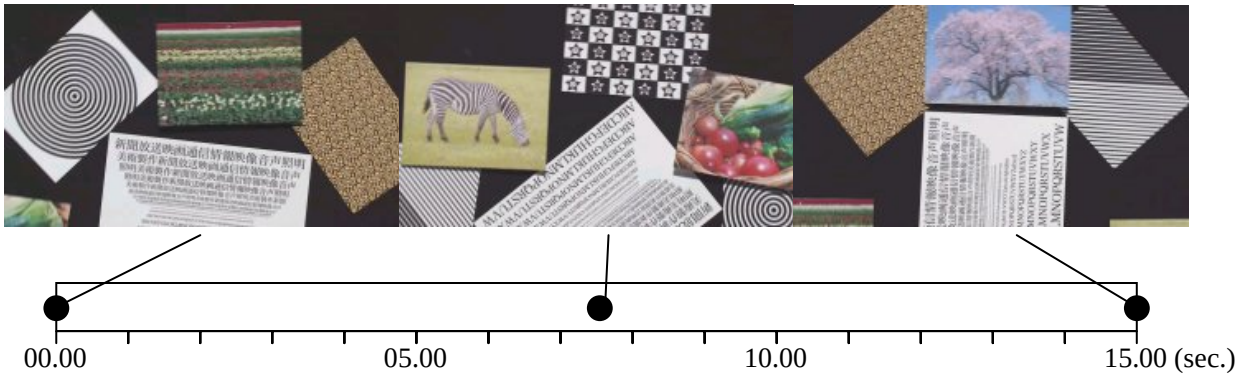
Shooting data

Image format	50i 4:4:4
Location	Studio in Fuji TV
Date	Mar. 6, 2009
Weather	—
Camera motion	Fixed

Focal length	46 mm	
Focus position	10 ft	
F value	5.6	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. shutter	OFF	
Gain value	0 dB	
Video effect	—	

No. 154 Rotating disk 50I with 1/100 sec. shutter

File name: s154_000000.tif–s154_000399.tif



Description

The sequence shows a fixed shot of a black disk that is rotating clockwise and on which panels showing text, texture patterns, and photos are mounted. The photo panels, which are fixed only on the top edges, move in short, quick swings as the disk rotates.

The variation in rotation speed that depends on the distance of the panels from center of the disk provides excellent material for evaluating motion detection and resolution of moving areas. The diagonal and circular patterns are useful for observing image lags, pseudo contours, motion blurs, and aliasing. The legibility of the text could also be useful.

The compositionand shooting conditions are almost the same as No. 153 Rotating disk 50I, but the electronic shutter was turned ON, setting exposure time to 1/100 sec, which is half of the regular shot (shutter OFF).

As an effect of the electronic shutter being ON, spatial resolution of the moving regions is increased while inter-frame correlation is reduced. As such, it can be used to see how motion adaptive processing and digital encoding are affected. Also, in comparison with No. 152 Rotating disk 59.94I with 1/120 sec. shutter, it can be used for assessing frame rate conversion.

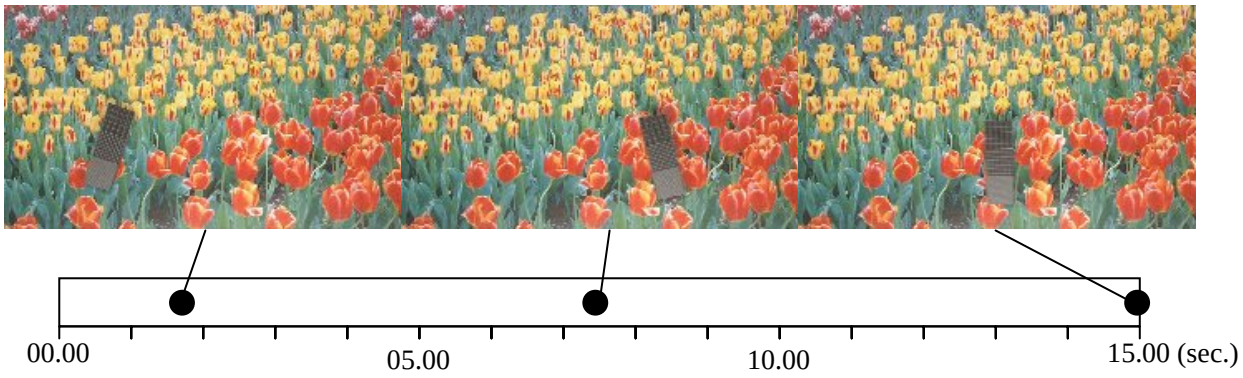
Shooting data

Image format	50i 4:4:4
Location	Studio in Fuji TV
Date	Mar. 6, 2009
Weather	—
Camera motion	Fixed

Focal length	46 mm	
Focus position	10 ft	
F value	4	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. shutter	1/100 sec.	
Gain value	0 dB	
Video effect	—	

No. 155 Pendulum 59.94I

File name: s155_000000.tif–s155_000479.tif



Description

The sequence shows a pendulum, slowly swinging until it stops, against a picture of a tulip garden as background. The pendulum is vertically long, and is colored white over a black background, presenting three kinds of details that can be used in assessing image-processing effects.

It is useful for assessing motion adaptive processing in frame rate conversion during format conversion and display speed driving. Response performance of display devices can be assessed by measuring the residual image of the swinging pendulum.

It must be noted that since each image was taken by actually letting the pendulum swing each time, the movements of the pendulum in No. 155 to No. 158 sequences are not completely the same.

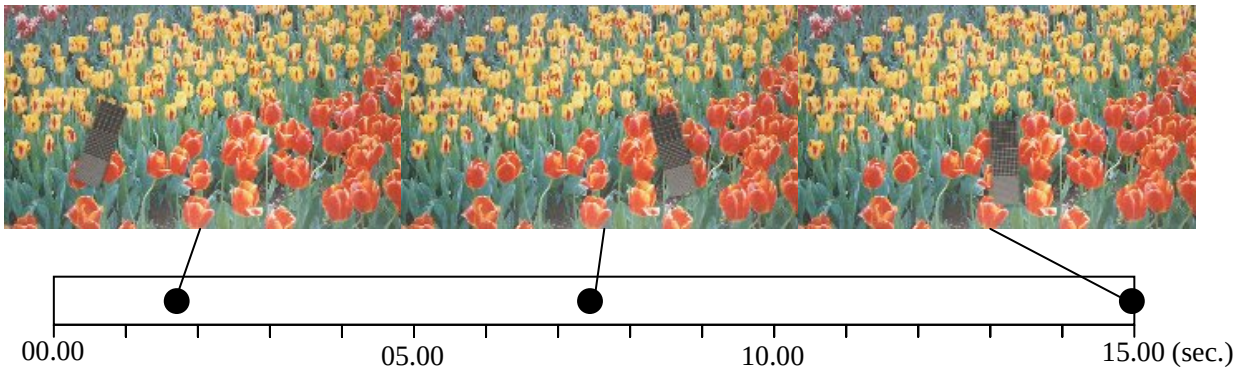
Shooting data

Image format	59.94i 4:4:4
Location	Studio in Fuji TV
Date	Mar. 6, 2009
Weather	—
Camera motion	Fixed

Focal length	35 mm	
Focus position	9.5 ft	
F value	8	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. shutter	OFF	
Gain value	0 dB	
Video effect	—	

No. 156 Pendulum 59.94I with 1/120 sec. shutter

File name: s156_000000.tif–s156_000479.tif



Description

The sequence shows a pendulum, slowly swinging until it stops, against a picture of a tulip garden as background. The pendulum is vertically long, and is colored white over a black background, presenting three kinds of details that can be used in assessing image-processing effects.

It is useful for assessing motion adaptive processing in frame rate conversion during format conversion and display speed driving. Response performance of display devices can be assessed by measuring the residual image of the swinging pendulum.

The pattern and shooting conditions are almost the same as No. 155 Pendulum 59.94I, but the electronic shutter was turned ON, setting exposure time to 1/120 sec, which is half of the regular shot (shutter OFF).

As an effect of the electronic shutter being ON, the spatial resolution of the moving regions is increased while the inter-frame correlation is reduced. As such, it can be used to determine how motion adaptive processing and digital encoding are affected. Also, in comparison with No. 158 Pendulum 50I with 1/100 sec shutter, it can be used for assessing frame rate conversion.

It must be noted that since each image was taken by actually letting the pendulum swing each time, the movements of the pendulum in No. 155 to No. 158 sequences are not completely the same.

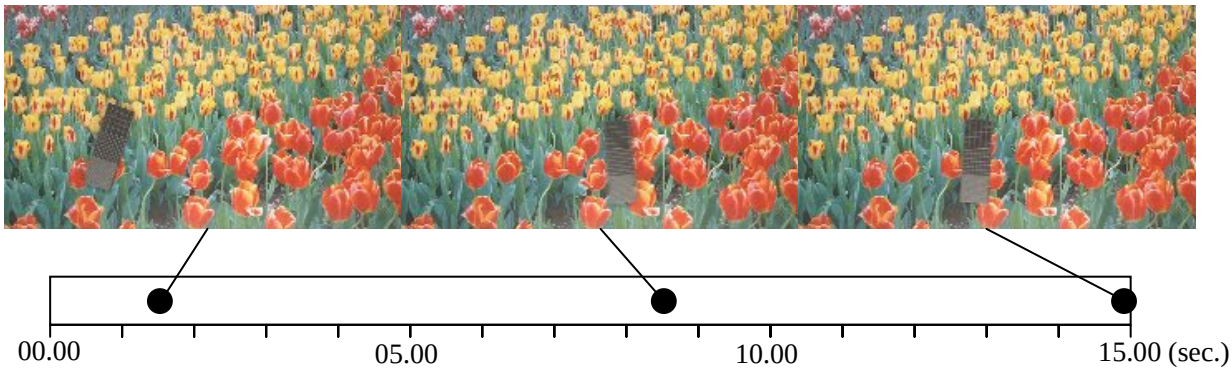
Shooting data

Image format	59.94i 4:4:4
Location	Studio in Fuji TV
Date	Mar. 6, 2009
Weather	—
Camera motion	Fixed

Focal length	35 mm	
Focus position	9.5 ft	
F value	5.6	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. shutter	1/120 sec.	
Gain value	0 dB	
Video effect	—	

No. 157 Pendulum 50I

File name: s157_000000.tif–s157_000399.tif



Description

The sequence shows a pendulum, slowly swinging until it stops, against a picture of a tulip garden as background. The pendulum is vertically long, and is colored white over a black background, presenting three kinds of details that can be used in assessing image-processing effects.

It is useful for assessing motion adaptive processing in frame rate conversion during format conversion and display speed driving. Response performance of display devices can be assessed by measuring the residual image of the swinging pendulum.

The pattern and shooting conditions are almost the same as No. 155 Pendulum 59.94I, but the frame rate was set at 50i (50 fields/sec). This sequence is mainly useful for assessing frame rate conversion.

It must be noted that since each image was taken by actually letting the pendulum swing each time, the movements of the pendulum in No. 155 to No. 158 sequences are not completely the same.

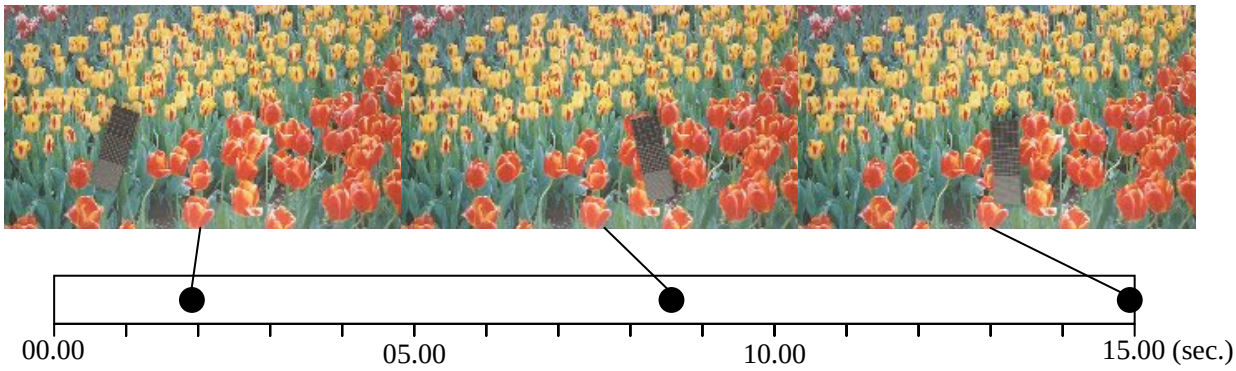
Shooting data

Image format	50i 4:4:4
Location	Studio in Fuji TV
Date	Mar. 6, 2009
Weather	—
Camera motion	Fixed

Focal length	35 mm	
Focus position	9.5 ft	
F value	8	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. shutter	OFF	
Gain value	0 dB	
Video effect	—	

No. 158 Pendulum 50I with 1/100 sec. shutter

File name: s158_000000.tif–s158_000399.tif



Description

The sequence shows a pendulum, slowly swinging until it stops, against a picture of a tulip garden as background. The pendulum is vertically long, and is colored white over a black background, presenting three kinds of details that can be used in assessing image-processing effects.

It is useful for assessing motion adaptive processing in frame rate conversion during format conversion and display speed driving. Response performance of display devices can be assessed by measuring the residual image of the swinging pendulum.

The pattern and shooting conditions are almost the same as No. 157 Pendulum 50I, but the electronic shutter was turned ON, setting exposure time to 1/100 sec, which is half of the regular shot (shutter OFF).

As an effect of the electronic shutter being ON, the spatial resolution of the moving regions is increased while the inter-frame correlation is reduced. As such, it can be used to determine how motion adaptive processing and digital encoding are affected. Also, in comparison with No. 156 Pendulum 59.94I with 1/120 sec shutter, it can be used for assessing frame rate conversion.

It must be noted that since each image was taken by actually letting the pendulum swing each time, the movements of the pendulum in No. 155 to No. 158 sequences are not completely the same.

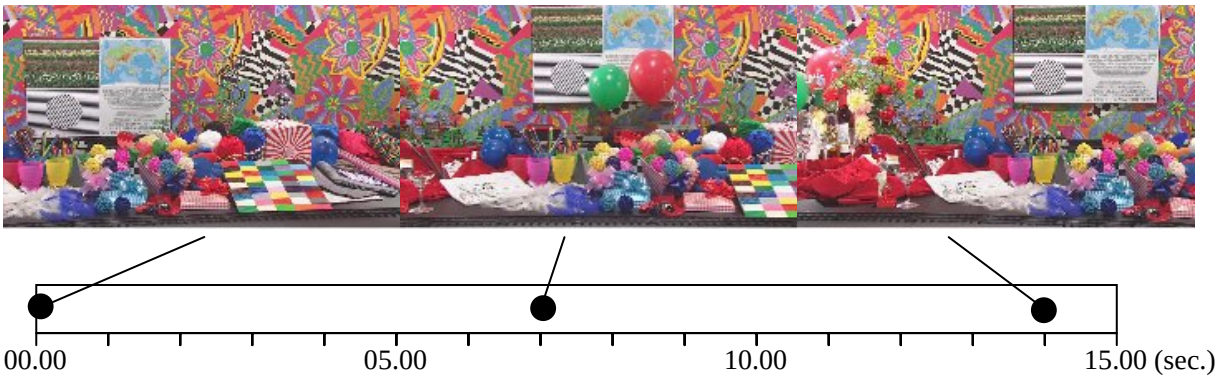
Shooting data

Image format	50i 4:4:4
Location	Studio in Fuji TV
Date	Mar. 6, 2009
Weather	—
Camera motion	Fixed

Focal length	35 mm	
Focus position	9.5 ft	
F value	5.6	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. shutter	1/100 sec.	
Gain value	0 dB	
Video effect	—	

No. 159 Colorful world A

File name: s159_000000.tif–s159_000479.tif



Description

The sequence shows an image of small objects with high color saturation taken under studio lighting. A train model runs between the foreground and the background, which shows a moving chart.

The overall richness in chromatic components makes it suitable for evaluating color reproducibility and resolution. The moving train and the high color saturation of the foreground and the background enable observing effects to motion compensation during digital encoding.

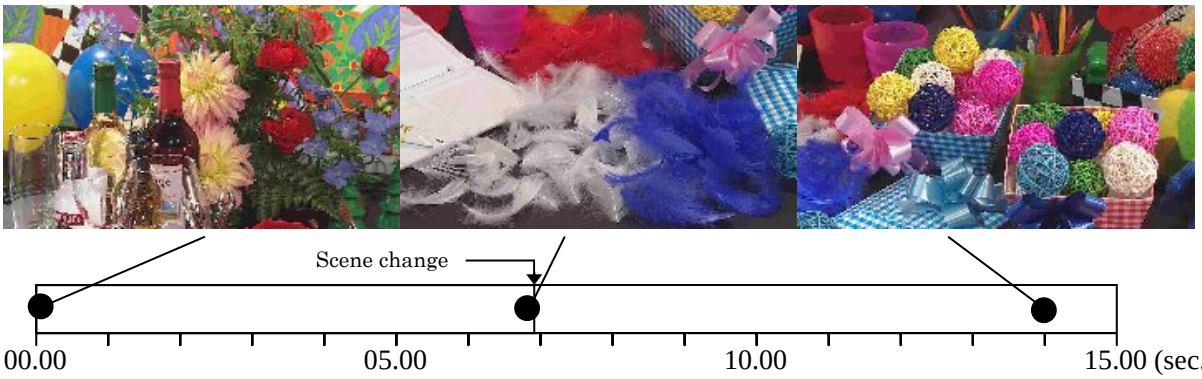
Shooting data

Image format	59.94i 4:4:4
Location	Studio in Fuji TV
Date	Mar. 6, 2009
Weather	—
Camera motion	Pan / Fixed

Focal length	17 mm	
Focus position	8.5 ft	
F value	8	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. shutter	OFF	
Gain value	0 dB	
Video effect	—	

No. 160 Colorful world B

File name: s160_000000.tif–s160_000479.tif



Description

The sequence shows an image of small objects with high color saturation taken under studio lighting. In the first half, the camera pans diagonally down to the right, while in the later half, it pans to the left.

The overall richness in chromatic components makes it suitable for evaluating color reproducibility and resolution. Since the camera pans at a relatively high speed, it can be used to observe the effects to motion compensation during digital encoding.

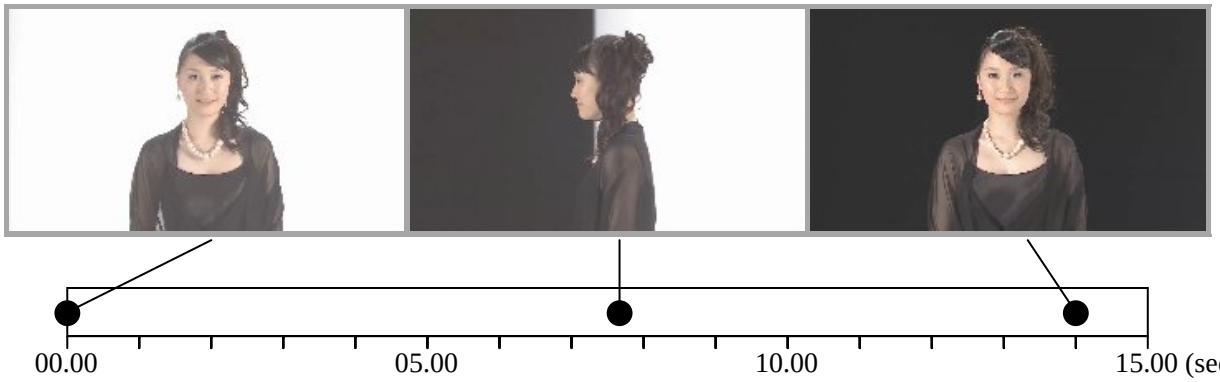
Shooting data

Image format	59.94i 4:4:4
Location	Studio in Fuji TV
Date	Mar. 6, 2009
Weather	—
Camera motion	Pan & Follow

Focal length	17 mm	
Focus position	8.5 ft	
F value	8	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. shutter	OFF	
Gain value	0 dB	
Video effect	—	

No. 161 Black dress

File name: s161_000000.tif–s161_000479.tif



Description

The sequence shows, in the first half, a woman wearing a black dress standing in front of a white background, who then walks towards a black background where she stands in the rest of the video. These series of movements are captured with a pan follow shot. The IRE setting for the white background is around 108 %.

The drastic change in background brightness makes it suitable for assessing fluctuations in luminance and changes in white balance. The latter half, in which the black dress and hair are shown against a black background, is useful for assessing resolution of dark portions of the image.

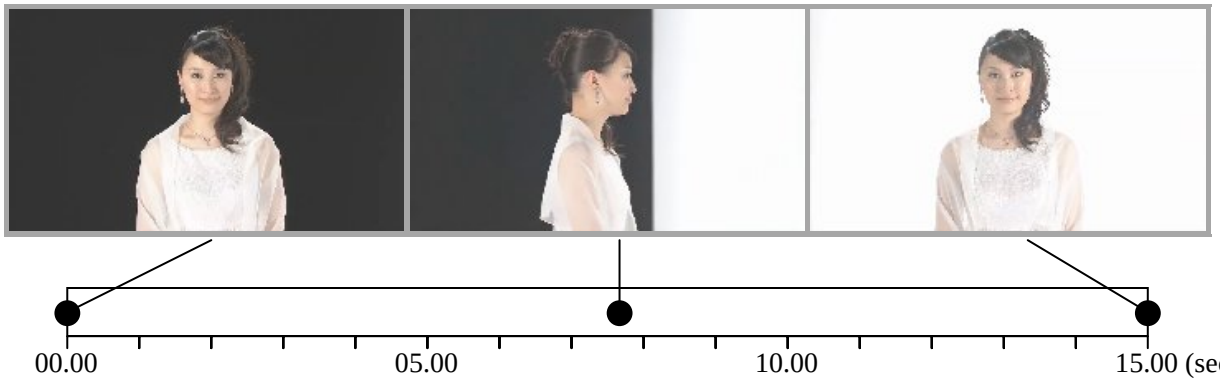
Shooting data

Image format	59.94i 4:4:4
Location	Fuji Television WANGAN STUDIO
Date	Feb. 27, 2009
Weather	—
Camera motion	Pan & Follow

Focal length	33 mm	
Focus position	14 ft	
F value	5.6	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. Shutter	OFF	
Gain value	0 dB	
Video effect	—	

No. 162 White dress

File name: s162_000000.tif–s162_000479.tif



Description

The sequence shows, in the first half, a woman wearing a white dress standing in front of a black background, who then walks towards a white background where she stands for the rest of the video. These series of movements are captured with a pan follow shot. The IRE setting for the white background is around 108 %. The image is shot so that the maximum IRE setting for the white dress approaches 108 %.

The drastic change in background brightness makes it suitable for assessing fluctuations in luminance and changes in white balance. The texture of the white dress is useful for assessing resolution of bright portions of the image.

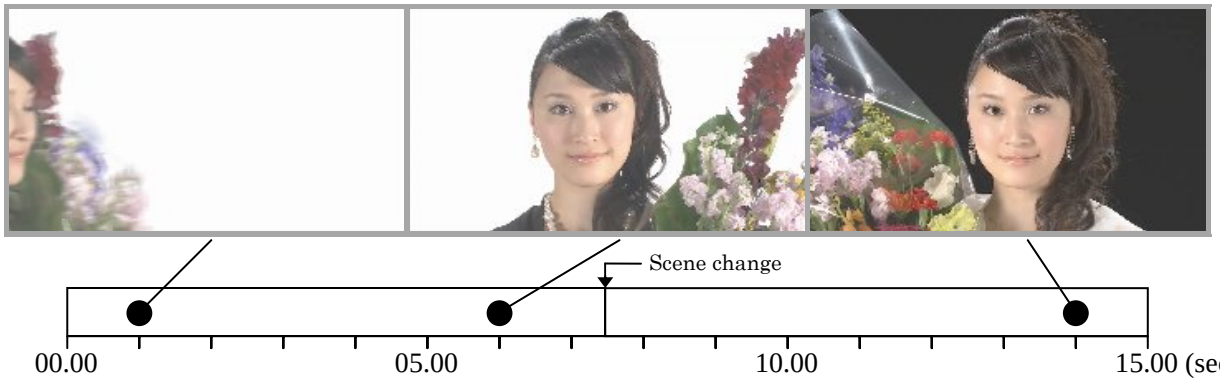
Shooting data

Image format	59.94i 4:4:4
Location	Fuji Television WANGAN STUDIO
Date	Feb. 27, 2009
Weather	—
Camera motion	Pan & Follow

Focal length	33 mm	
Focus position	14 ft	
F value	5.6	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. Shutter	OFF	
Gain value	0 dB	
Video effect	—	

No. 163 Woman with bouquet

File name: s163_000000.tif–s163_000479.tif



Description

The first half of the sequence shows a woman wearing a white dress and carrying a bouquet of flowers walking in from the left in front of a white background. The latter half shows her wearing a black dress walk in from the right in front of a black background.

The image is a close-up shot taken under studio lighting, making it suitable for assessing memory color of skin and texture fidelity. The clear cellophane film wrapping of the bouquet is useful for assessing texture fidelity.

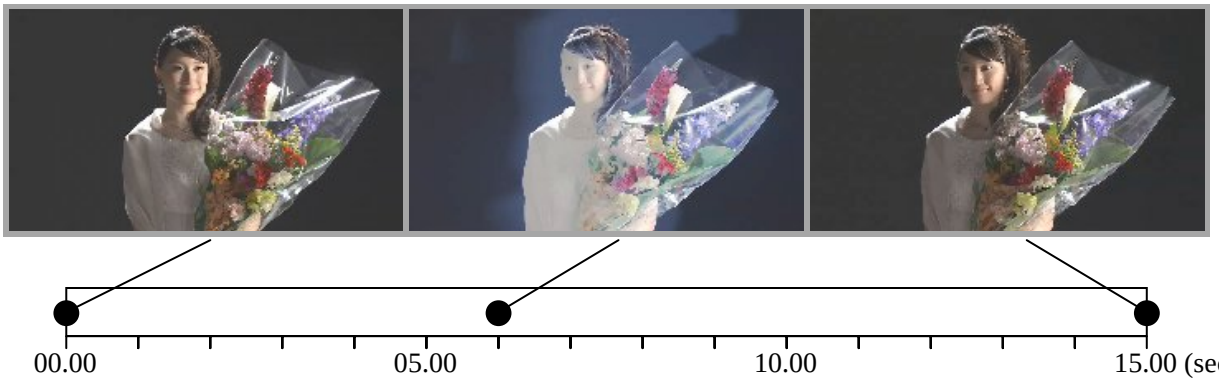
Shooting data

Image format	59.94i 4:4:4
Location	Fuji Television WANGAN STUDIO
Date	Feb. 27, 2009
Weather	—
Camera motion	Fixed

Focal length	67 mm	
Focus position	14 ft	
F value	5.6	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. Shutter	OFF	
Gain value	0 dB	
Video effect	—	

No. 164 Flash photography

File name: s164_000000.tif–s164_000479.tif



Description

The sequence shows a woman in front of a black background being showered by camera flashes.

The shower of flashes causes the inter-frame correlation to be greatly reduced, making it suitable for assessing motion compensation and other temporal image processing. The clear cellophane film wrapping of the bouquet is useful for assessing texture fidelity.

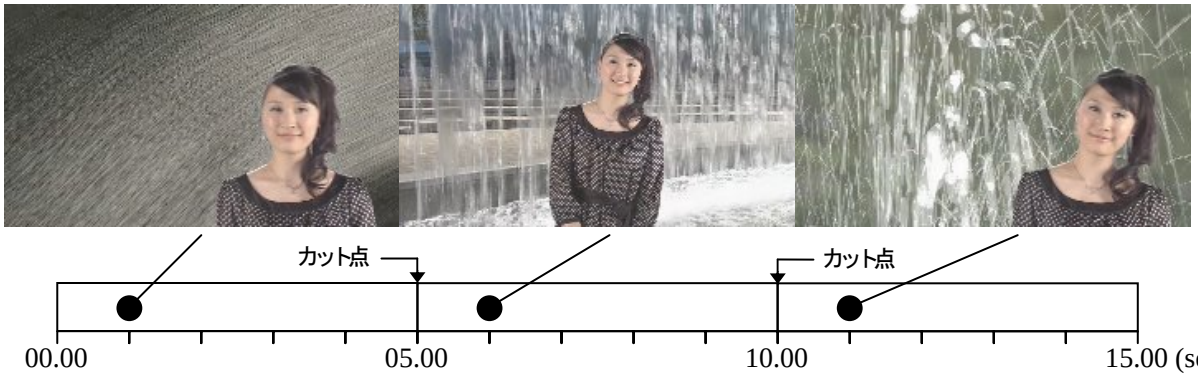
Shooting data

Image format	59.94i 4:4:4
Location	Fuji Television WANGAN STUDIO
Date	Feb. 27, 2009
Weather	—
Camera motion	Fixed

Focal length	33 mm	
Focus position	14 ft	
F value	2.8	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. Shutter	OFF	
Gain value	0 dB	
Video effect	—	

No. 165 Fountain (chromakey)

File name: s165_000000.tif–s165_000479.tif



Description

This sequence is a chroma key composite image of the woman and the background. The focus is both on the subject and the background, which is of three types: a shower of water, a curtain fountain, and a spray fountain.

It is suitable for assessing of digital encoding; particularly, the first background—the shower of water— produces a lot of information and causes distortions on the woman's face and texture of the clothes.

Shooting data

Image format	59.94i 4:4:4
Location+	Fuji Television WANGAN STUDIO, WOWOW building
Date+	Feb. 27, 2009, Mar. 5, 2009
Weather	—, Clear
Camera motion+	Fixed Fixed

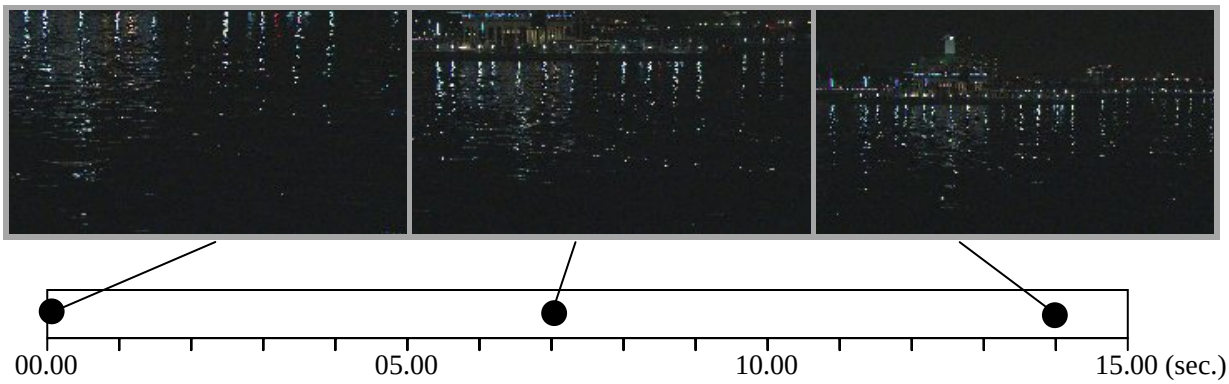
Focal length+*	25 mm : 18 mm : 25 mm 37 mm : 100 mm : 9.2 mm	
Focus position+*	10 ft 10 ft : 10 ft : 12 ft	
F value+	5.6 8	
Built-in filter	ND +	Clear 1/8
	CC+	3200 K 6200 K
External filter	—	
Elec. Shutter	OFF	
Gain value	0 dB	
Video effect	Chroma key composition	

+Upper row = subject, Lower row = background

*Former part : Middle part : Latter part

No. 166 Night port (camera gain: normal)

File name: s166_000000.tif–s166_000479.tif



Description

The image shows the surface of water by night, showing a shimmering reflection of the lights around it. As the camera pans up, the lighted buildings come into view.

The fine movements of the water surface can be useful in assessing deterioration in encoding. The effect on the digital encoding process of camera noise arising from shooting dark images can be observed.

The image is basically the same at that of No. 167 Night port (camera gain: +6 dB) and No. 168 Night port (camera gain: +12 dB), with only the camera gain settings changed. Used together, they can be suitable for assessing changes in signal-to-noise ratio.

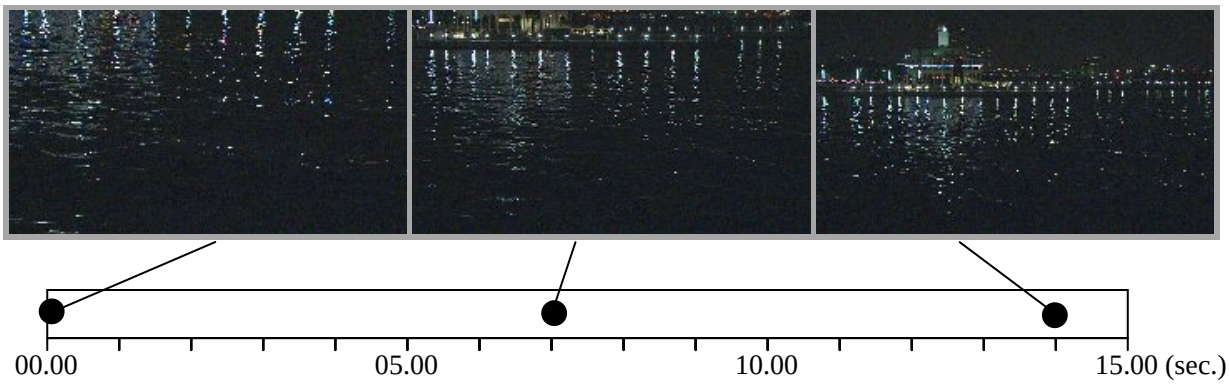
Shooting data

Image format	59.94i 4:4:4
Location	Yokohama Minato Mirai area
Date	Dec. 12, 2008
Weather	Clear
Camera motion	Pan & Up

Focal length	22 mm	
Focus position	∞	
F value	2.8	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. shutter	OFF	
Gain value	0 dB	
Video effect	—	

No. 167 Night port (camera gain: +6 dB)

File name: s167_000000.tif–s167_000479.tif



Description

The image shows the surface of water by night, showing a shimmering reflection of the lights around it. As the camera pans up, the lighted buildings come into view.

The fine movements of the water surface can be useful in assessing deterioration in encoding. The effect on the digital encoding process of camera noise arising from shooting dark images can be observed.

The image is basically the same at that of No. 166 Night port (camera gain: 0 dB) and No. 168 Night port (camera gain: +12 dB), with only the camera gain settings changed. Used together, they can be suitable for assessing changes in signal-to-noise ratio.

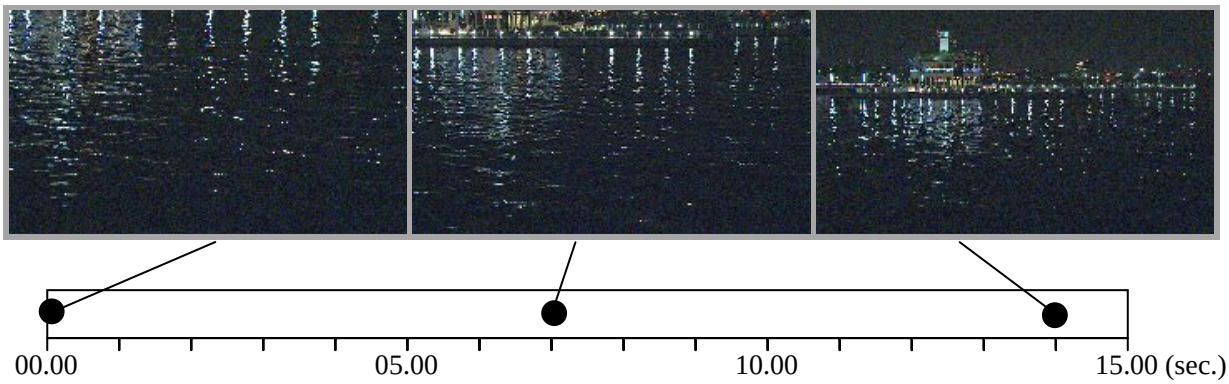
Shooting data

Image format	59.94i 4:4:4
Location	Yokohama Minato Mirai area
Date	Dec. 12, 2008
Weather	Clear
Camera motion	Pan & Up

Focal length	22 mm	
Focus position	∞	
F value	2.8	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. shutter	OFF	
Gain value	+6 dB	
Video effect	—	

No. 168 Night port (camera gain: +12 dB)

File name: s168_000000.tif–s168_000479.tif



Description

The image shows the surface of water by night, showing a shimmering reflection of the lights around it. As the camera pans up, the lighted buildings come into view.

The fine movements of the water surface can be useful in assessing deterioration in encoding. The effect on the digital encoding process of camera noise arising from shooting dark images can be observed.

The image is basically the same at that of No. 166 Night port (camera gain: 0 dB) and No. 167 Night port (camera gain: +6 dB), with only the camera gain settings changed. Used together, they can be suitable for assessing changes in signal-to-noise ratio.

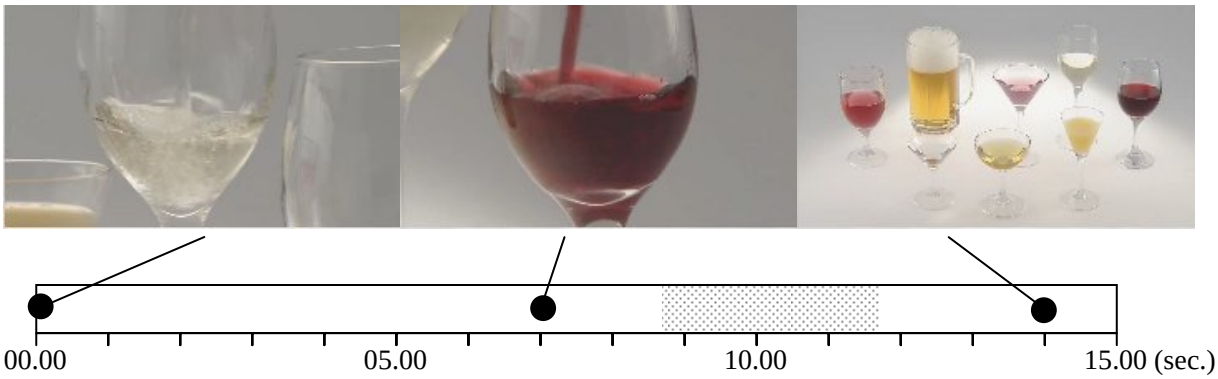
Shooting data

Image format	59.94i 4:4:4
Location	Yokohama Minato Mirai area
Date	Dec. 12, 2008
Weather	Clear
Camera motion	Pan & Up

Focal length	22 mm	
Focus position	∞	
F value	2.8	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. shutter	OFF	
Gain value	+12 dB	
Video effect	—	

No. 169 Glasses

File name: s169_000000.tif–s169_000479.tif



Description

The sequence shows white wine and red wine being poured into different glasses. After they dissolve, an image of glasses with different kinds of drinks in them is shown.

The irregular flow of liquid during the pouring of the wine enables observing effects on motion compensation during digital encoding. It can also be used in assessing texture of the glasses and memory color of the wine, beer, and other drinks.

Shooting data

Image format	59.94i 4:4:4
Location	Studio in Fuji TV
Date	Mar. 6. 2009
Weather	—
Camera motion	Fixed

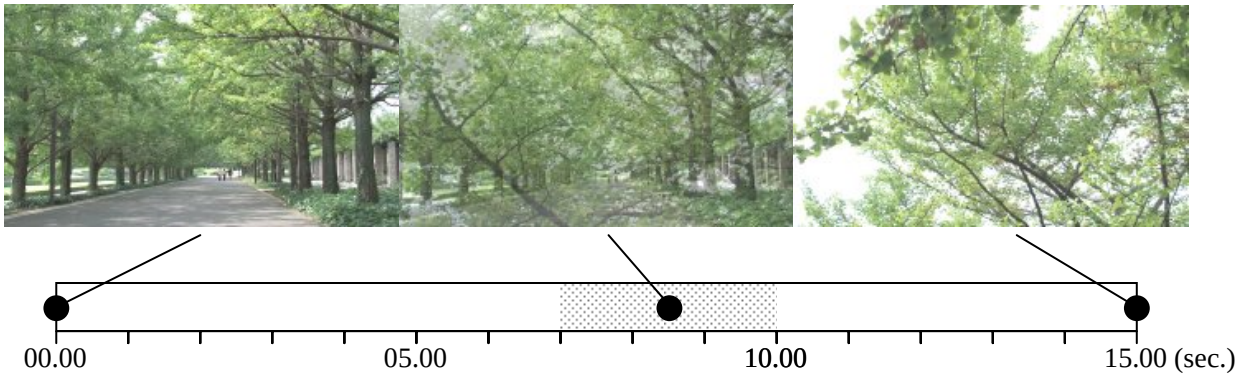
Focal length*	90 mm : 13 mm	
Focus position*	4.25 ft : 5 ft	
F value*	11 : 11	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. shutter	OFF	
Gain value	0 dB	
Video effect	Dissolve	

* Former part : Latter part

Series B
(General: 18, Specific: 15)

No. 201 Ginkgo trees

File name: s201_000000.yuv10–s201_000959.yuv10



Description

The sequence, which was taken from a moving camera dolly, shows a row of Ginkgo trees with luxuriant green leaves. The first part is a slow and loose dolly-in shot of a street that is lined with trees, and shows a fine texture image of tree leaves and sunlight beaming through the trees into the pavement. The latter half is a dolly-out shot, opposite direction of the first half, from under the leaves of the trees, whose branches make complex movements as the wind sways them. The transition from the first to the second half of the video is made through a three-second-dissolve effect using linear weights.

The sharp texture with the movements in the first half of the video is suitable for evaluating resolution of moving areas and interferences caused by digital encoding. The movement of the trees is different depending on their distance, thus it can be used in evaluating motion adaptive processing. The dissolve transition part is useful for shot transition detection and movement detection and in evaluating effect on motion adaptive processing.

Shooting data

Image format	59.94p 4:2:2
Location	Showa Kinen park
Date	Sep. 25, 2008
Weather	Clear
Camera motion*	Dolly in : dolly out

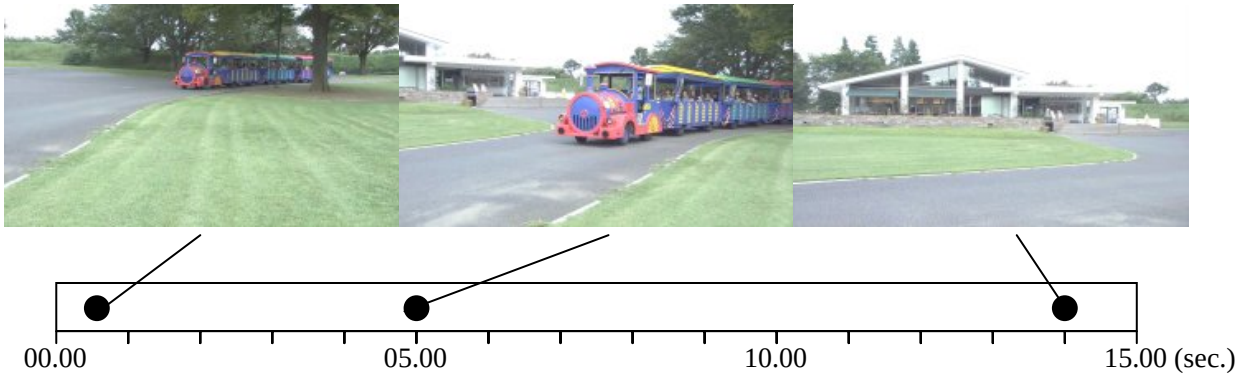
Focal length	14 mm	
Focus position*	30 ft : 10 ft	
F value	4	
Built-in filter	ND	1/4
	CC	6300 K
External filter	—	
Elec. shutter	OFF	
Gain value	–3 dB	
Video effect	Dissolve	

*Former part : Latter part

Acknowledgements: The contents were produced with permission from the Ministry of Land, Infrastructure, Transport and Tourism, Kanto Regional Development Bureau, Showa Kinen Park.

No. 202 Truck train

File name: s202_000000.yuv10–s202_000959.yuv10



Description

The sequence shows a lateral pan shot of a truck train that comes from the far right to the front left of the frame along a road in a park. The camera stops when the building comes in the middle of the view, after which the truck train is shown quickly moving by.

The grass, the road, and the stonewall of the building in the background are suitable for checking fine texture quality. The truck rain, which is colored red, blue, green, and yellow, can be used for evaluating color reproducibility. The background can also be seen between the cars and through the posts as the train moves by, making it useful for assessing motion adaptive processing effect.

Shooting data

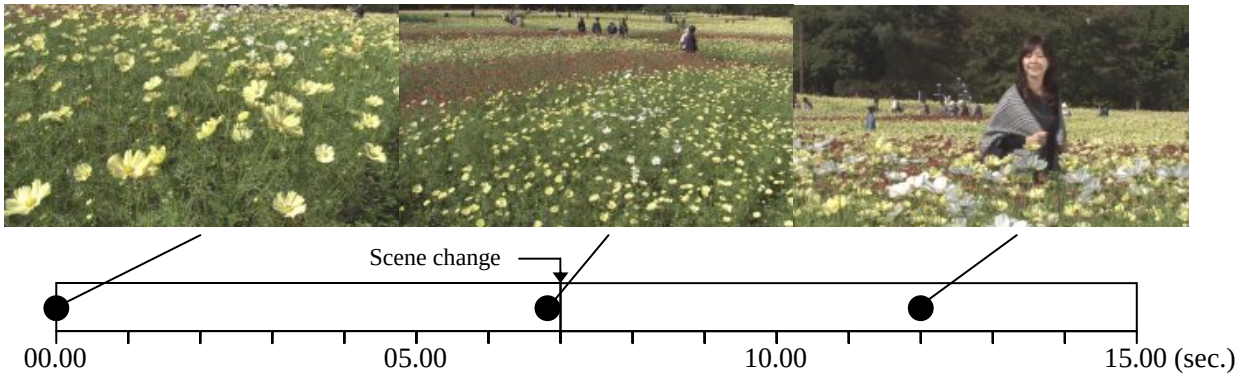
Image format	59.94p 4:2:2
Location	Showa Kinen park
Date	Sep. 25, 2008
Weather	Clear
Camera motion	Pan

Focal length	15 mm	
Focus position	20 ft	
F value	5.6	
Built-in filter	ND	1/4
	CC	6300 K
External filter	Polarizing filter	
Elec. shutter	OFF	
Gain value	–3 dB	
Video effect	—	

Acknowledgements: The contents were produced with permission from the Ministry of Land, Infrastructure, Transport and Tourism, Kanto Regional Development Bureau, Showa Kinen Park.

No. 203 Cosmos flowers

File name: s203_000000.yuv10–s203_000959.yuv10



Description

The first half of the sequence begins with a close up image of cosmos flowers being swayed by the wind, then the scene shifts to a loose shot that was taken as the camera was carried up by a crane, through which the focus shifts from the flowers in the front to the flowers in the far side. The latter half, which was taken through a horizontal pan shot to the right and marked by a cut in the sequence, shows a woman walking across the cosmos field. After the camera stops, the woman continues to walk out of the frame to the right.

The irregular swaying of the cosmos flowers and leaves that fill the whole screen and the slowly changing area of focus are suitable for evaluating resolution, color reproducibility, and motion adaptive processing, and for observing blocking artifacts caused by digital encoding. The woman in the latter half of the video is wearing a houndstooth check shawl, which is useful in checking aliasing and deterioration due to digital encoding.

Shooting data

Image format	59.94p 4:2:2
Location	Showa Kinen park
Date	Oct. 28, 2008
Weather	Clear
Camera motion*	Crane up : follow pan

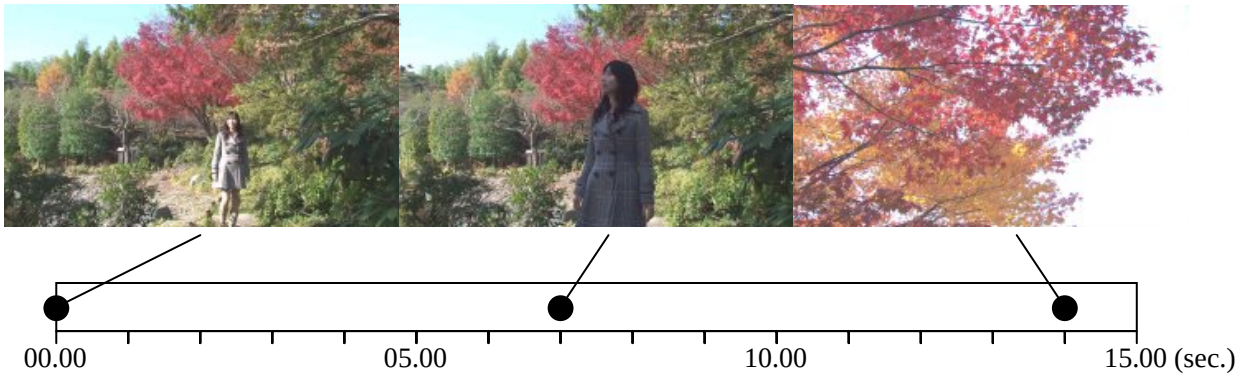
Focal length	Variable (21×zoom)	
Focus position*	3–20 ft : 30 ft	
F value*	8 : 16	
Built-in filter	ND*	1/8 : Clear
	CC	6300 K
External filter	1/2 ND	
Elec. shutter	OFF	
Gain value	–3 dB	
Video effect	—	

*Former part : Latter part

Acknowledgements: The contents were produced with permission from the Ministry of Land, Infrastructure, Transport and Tourism, Kanto Regional Development Bureau, Showa Kinen Park.

No. 204 Red leaves (pan up)

File name: s204_000000.yuv10–s204_000959.yuv10



Description

The sequence shows a woman walking through a park lined with trees that are putting on their autumn color. The woman then stops to gaze up a tree. The camera follows the woman as she walks from the far side of the park towards the front. When she stops, the camera follows her gaze to make a diagonal pan up shot and captures the red leaves that fill the whole screen, showing the blue sky in the background.

The scenery of trees with red, yellow, and green leaves shown in different degrees of brightness is useful for checking color reproducibility and resolution. The latter part of the video showing camera pan up movement in addition to the swaying of the red leaves caused by the wind is suitable for observing effect of motion adaptive processing and deterioration caused by digital encoding.

Shooting data

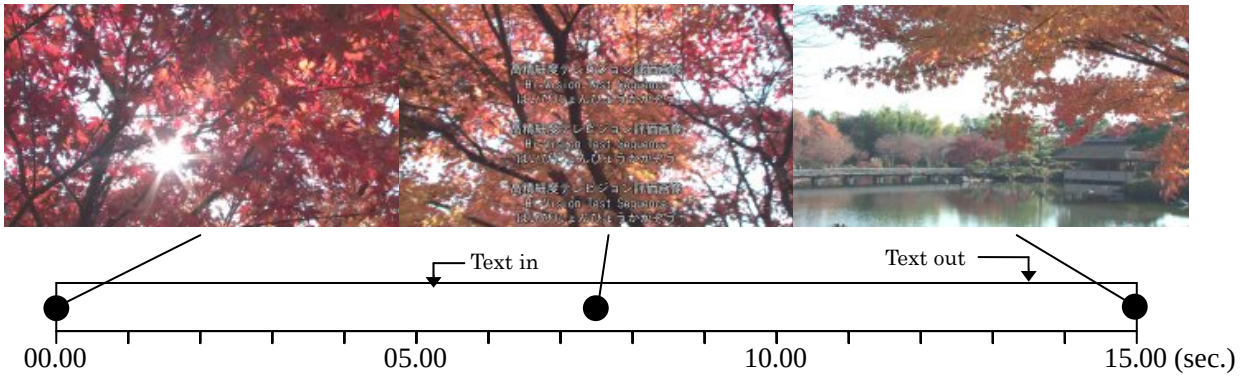
Image format	59.94p 4:2:2
Location	Showa Kinen park
Date	Dec. 4, 2008
Weather	Clear
Camera motion	Pan up

Focal length	Variable (21×zoom)	
Focus position	7.5 ft	
F value	5.6–2.8	
Built-in filter	ND	1/4
	CC	6300 K
External filter	—	
Elec. shutter	OFF	
Gain value	–3 dB	
Video effect	—	

Acknowledgements: The contents were produced with permission from the Ministry of Land, Infrastructure, Transport and Tourism, Kanto Regional Development Bureau, Showa Kinen Park.

No. 205 Sunlight through leaves

File name: s205_000000.yuv10–s205_000959.yuv10



Description

The sequence begins with a scene showing sunlight shining through a thicket of red leaves and, as the camera makes a diagonal pan down to the left, it reveals a Japanese garden in the far end of the lake. In the latter part of the video, superimposed text moving upward at 300 pixels/sec is shown.

The lens flare from the ray of sunlight shining through the leaves in the beginning undergoes complex changes as the camera moves. The different directions in which the background and the superimposed text move are suitable for observing accuracy of motion detection and for checking mosquito noise and other deterioration effects caused by digital encoding.

Shooting data

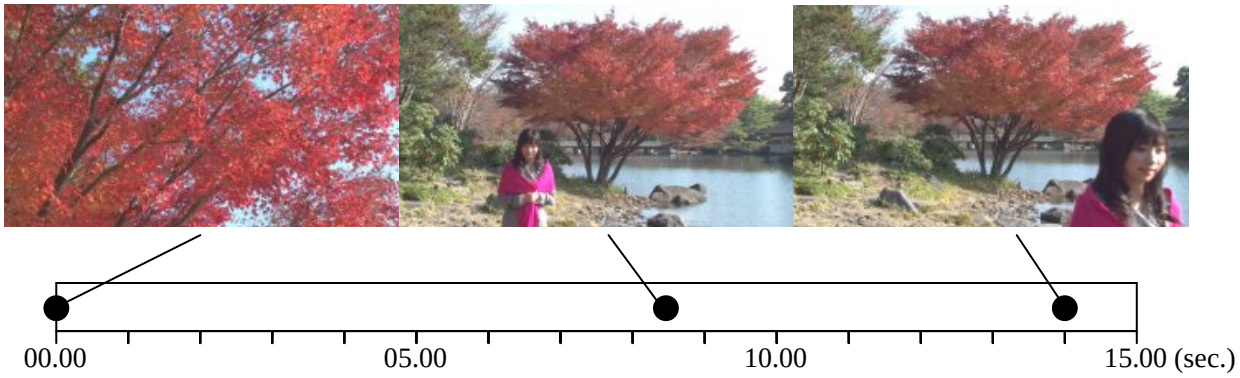
Image format	59.94p 4:2:2
Location	Showa Kinen park
Date	Dec. 4, 2008
Weather	Clear
Camera motion	Pan down

Focal length	Variable (21×zoom)	
Focus position	200 ft	
F value	11	
Built-in filter	ND	Clear
	CC	6300 K
External filter	—	
Elec. shutter	OFF	
Gain value	–3 dB	
Video effect	Vertical scrolling text	

Acknowledgements: The contents were produced with permission from the Ministry of Land, Infrastructure, Transport and Tourism, Kanto Regional Development Bureau, Showa Kinen Park.

No. 206 Red leaves (pan down)

File name: s206_000000.yuv10–s206_000959.yuv10



Description

The sequence begins with a shot of branches of red leaves that fill the screen, and as the camera stops after a pan down shot, a woman, who is looking up the red leaves while walking, comes into view. The woman appears from the far left side and walks across the front of the camera forward to the right until she disappears from the frame.

The red leaves in the first half of the video are shown in vivid contrast to the blue sky in the background, providing excellent material for assessing resolution and color reproducibility. The combined movement of the camera as it pans up and the red leaves swaying in the wind is suitable for observing deterioration caused by digital encoding. The movement of the water surface as the woman disappears from view is also notable.

Shooting data

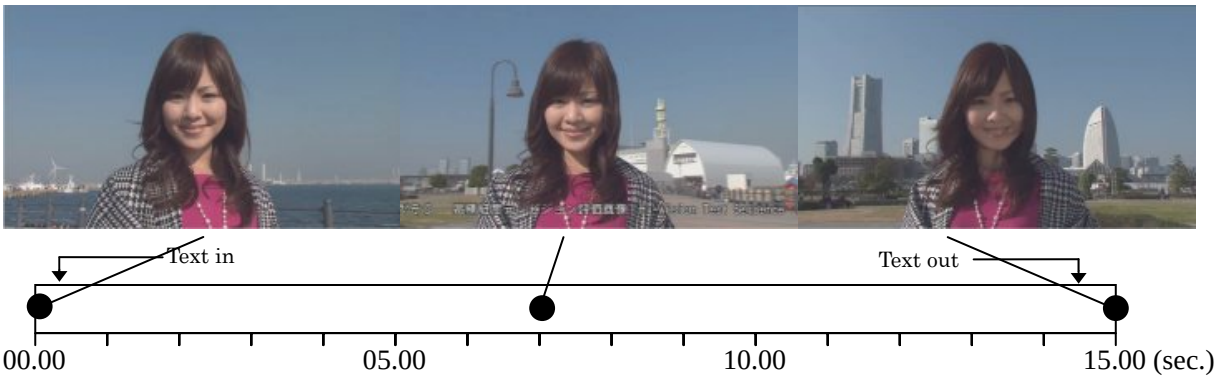
Image format	59.94p 4:2:2
Location	Showa Kinen park
Date	Dec. 4, 2008
Weather	Clear
Camera motion	Pan down

Focal length	Variable (21×zoom)	
Focus position	21 ft	
F value	11	
Built-in filter	ND	Clear
	CC	6300 K
External filter	—	
Elec. shutter	OFF	
Gain value	–3 dB	
Video effect	—	

Acknowledgements: The contents were produced with permission from the Ministry of Land, Infrastructure, Transport and Tourism, Kanto Regional Development Bureau, Showa Kinen Park.

No. 207 Woman at harbor (circle dolly)

File name: s207_000000.yuv10–s207_000959.yuv10



Description

The sequence, which shows a woman set in the center of the screen while only the background moves horizontally at a fixed speed, is taken using a circle dolly. Since the human subject on focus is rotating against the background, the way the light shines on her face is also changing. The fine climate under which it was taken resulted in a very bright and clear image. Text moving from right to left at 600 pixels/sec is superimposed in the lower portion of the screen.

A wealth of information can be observed by showing a moving background around a fixed subject, such as fine details of changes in the woman's skin, hair, etc., as she rotates. The different directions in which the background and the superimposed text move are suitable for observing the accuracy of motion detection and for checking mosquito noise and other deteriorations caused by digital encoding.

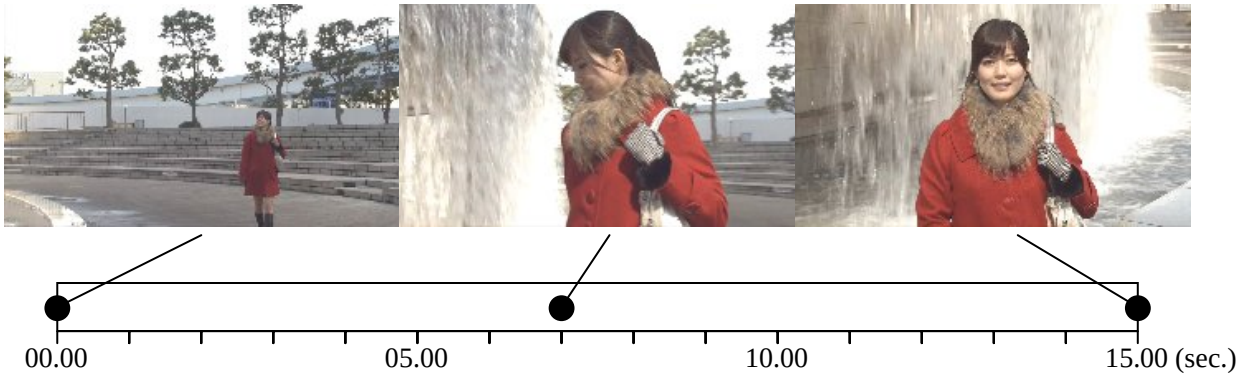
Shooting data

Image format	59.94p 4:2:2
Location	Yokohama Minato Mirai area
Date	Dec. 12, 2008
Weather	Clear
Camera motion	Circle dolly

Focal length	10 mm	
Focus position	3.75 ft	
F value	12	
Built-in filter	ND	1/4
	CC	6300 K
External filter	—	
Elec. shutter	OFF	
Gain value	−3 dB	
Video effect	Horizontal scrolling text	

No. 208 Fountain (follow)

File name: s208_000000.yuv10–s208_000959.yuv10



Description

In this sequence, the camera follows a woman walking through a park. In the first half of the video, the woman walks from the far side towards the front near the fountain. As the camera follows the woman, the curtain fountain comes into view. The latter half shows the woman sitting in front of the fountain, after which the camera stops almost completely as the woman sits still.

The complex movement of the fountain and the bubbling water surface in the background are useful for observing distortions on the subject, on the clothes, etc. caused by digital encoding. The striking changes in the direction and size of the woman and also in the background are useful for evaluation of tracking and detection of human subjects. The continuous and dramatic changes of the images from the first half to the latter half of the video provide useful material for evaluating quality of various types of video processing techniques.

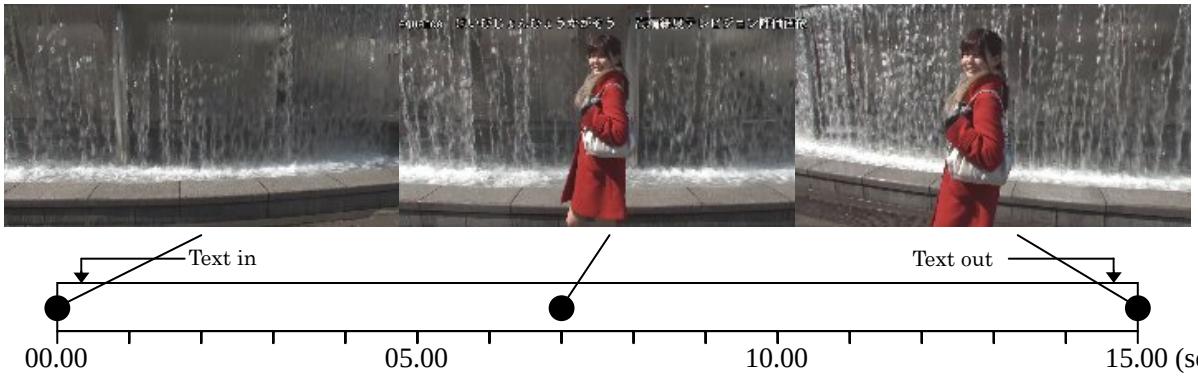
Shooting data

Image format	59.94p 4:2:2
Location	Daiba Promenade Park
Date	Mar. 5, 2009
Weather	Clear
Camera motion	Pan & Follow

Focal length	18 mm	
Focus position	40–8.6 ft	
F value	4.5	
Built-in filter	ND	1/4
	CC	6300 K
External filter	—	
Elec. shutter	OFF	
Gain value	−3 dB	
Video effect	—	

No. 209 Fountain (dolly)

File name: s209_000000.yuv10–s209_000959.yuv10



Description

The sequence shows a woman walking across the frame in front of a curtain fountain. Other than at the beginning and end parts of the sequence the woman remains at the center of the frame, looking in the same the direction all the time. Text moving to the left at 600 pixels/sec is superimposed on the upper part of the screen.

The complex movements in the background—the flow of water, the bubbling water surface, and the spray of water—are useful in assessing digital encoding distortions, which often appear on the face and around superimposed text.

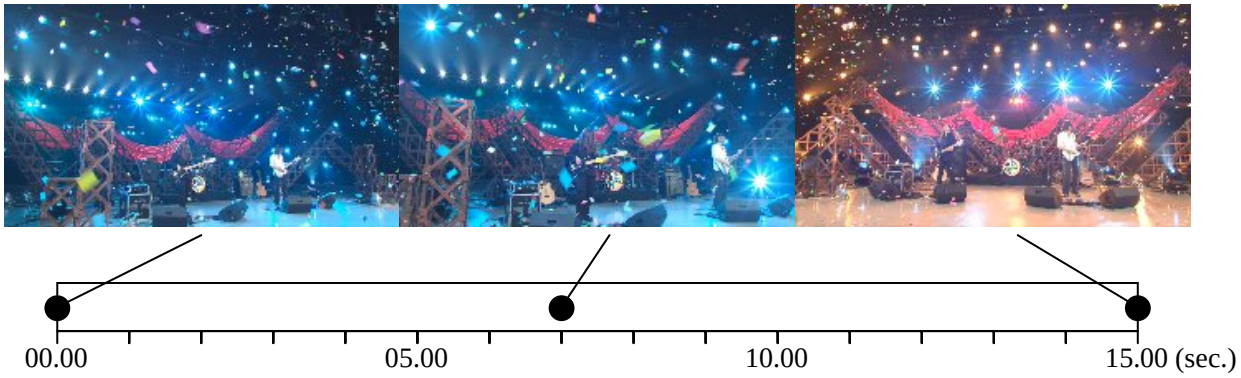
Shooting data

Image format	59.94p 4:2:2
Location	Daiba Promenade Park
Date	Mar. 5, 2009
Weather	Clear
Camera motion	On the rail

Focal length	6.8 mm	
Focus position	6.5 ft	
F value	5.6 1/2	
Built-in filter	ND	1/8
	CC	6300 K
External filter	—	
Elec. shutter	OFF	
Gain value	−3 dB	
Video effect	Horizontal scrolling text	

No. 210 Studio concert (confetti)

File name: s210_000000.yuv10–s210_000959.yuv10



Description

The sequence shows performers and equipment in changing light conditions from a camera dolly. It shows a loose shot of the performers, the stage, and the lights, and includes complex movements and patterns. The flow of confetti adds irregularity to the movements in the sequence.

The light gradations are useful for evaluating tone fidelity, and the movement of many objects is suitable for assessing digital encoding and other video processing effects.

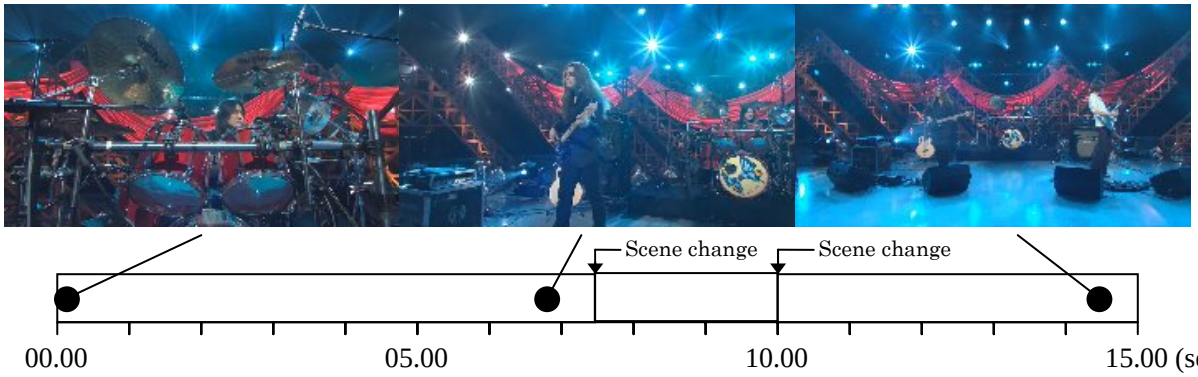
Shooting data

Image format	59.94p 4:2:2
Location	Studio in TV Asahi
Date	Feb. 18, 2009
Weather	—
Camera motion	Dolly

Focal length	Variable（5×5 Zoom）	
Focus position	Follow	
F value	4	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. shutter	OFF	
Gain value	−3 dB	
Video effect	—	

No. 211 Studio concert

File name: s211_000000.yuv10–s211_000959.yuv10



Description

The sequence shows performers and equipment in changing light conditions. Most of the shots are relatively tight, and the light-dark changes are very striking. In addition to the blinking of the lights, the occlusion of light by the performers, by the musical instruments, and by the stage props makes the changes in light conditions very striking.

The striking changes in light conditions make motion vector detection and motion compensation processing difficult, making it useful in evaluating the efficiency of the digital encoding. The many light gradations are useful in evaluating gradation fidelity.

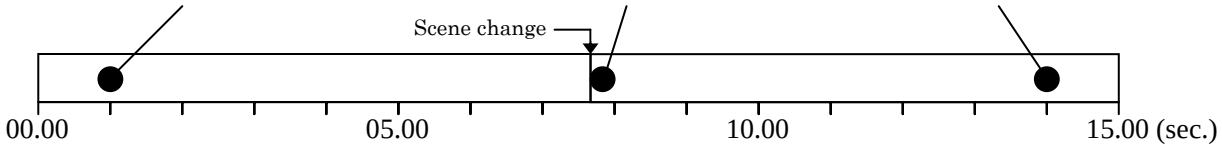
Shooting data

Image format	59.94p 4:2:2
Location	Studio in TV Asahi
Date	Feb. 18, 2009
Weather	—
Camera motion	Dolly

Focal length	Variable（5×5 Zoom）	
Focus position	Follow	
F value	4	
Built-in filter	ND	Clear
	CC	3200K
External filter	—	
Elec. Shutter	OFF	
Gain value	−3 dB	
Video effect	—	

No. 212 Drama set (day)

File name: s212_000000.yuv10–s212_000959.yuv10



Description

The sequence shows a woman walking across a room in a drama set. The first part is taken using a camera dolly, wherein the direction of the room shifts while depth of view is maintained. The latter half is a pan follow shot of the woman. The walls of the room have posters that have text and patterns on them. Light from the inner garden floods into the room.

Since the sequence shows many fine patterns and text, it is useful in evaluating resolution. The first part of the video shows a shift in the view of the room, which is suitable for evaluating frame rate conversion, digital encoding, and other motion compensation processing. It is also useful in evaluating preservation of texture of highlighted areas after digital encoding and other image processing.

Shooting data

Image format	59.94p 4:2:2
Location	Fuji Television WANGAN STUDIO
Date	Feb. 27, 2009
Weather	—
Camera motion*	Dolly : Pan & Follow

Focal length*	10 mm : 16 mm	
Focus posision*	13 ft : 11 ft	
F value	2	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec shutter	OFF	
Gain value	−3 dB	
Video effect	—	

*Former part : Latter part

No. 213 Drama set (night)

File name: s213_000000.yuv10–s213_000959.yuv10

Description

The sequence shows a pan follow shot of a woman who walks through a drama set. The street light and lanterns appear very bright amid the dark night setting.

There is relatively a lot of noise, with many fine objects such as branches of trees and shrubs shown, making it suitable for assessing noise reduction processing. It is also suitable for assessing preservation of texture of dark parts after digital encoding and other image processing procedures. The bright streetlight against a relatively dark background provides useful material for assessing contrast.

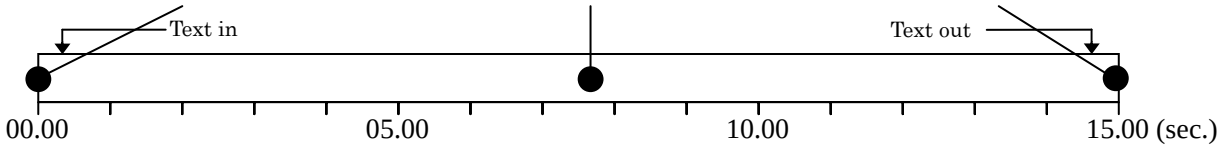
Shooting data

Image format	59.94p 4:2:2
Location	Fuji Television WANGAN STUDIO
Date	Feb. 27, 2009
Weather	—
Camera motion	Pan & Follow

Focal lengtnh	8 mm	
Focus position	Follow	
F value	2	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. shutter	OFF	
Gain value	−3 dB	
Video effect	—	

No. 214 Basketball

File name: s214_000000.yuv10–s214_000959.yuv10



Description

The sequence shows a pan follow shot of a basketball game taken from the upper part of the courtside. It includes the players as well as a view of the bleachers and shows fine movements such as clapping of hands. It also shows, between the court and the bleachers, billboards that have logo marks and text objects on them. In the upper part of the screen, text moving to the left at 600 pixels/sec is superimposed.

The rapid movement of the ball and the human subjects and the panning of the camera provide useful material for evaluating frame rate conversion and other motion adaptive processing procedures. It also includes a lot of occlusion, making it useful for assessment of tracking of the ball and the human subjects. Since the sequence includes a flat-surfaced court along with complex-textured bleachers, it is useful for evaluating digital encoding processes and other adaptive processing procedures.

Shooting data

Image format	59.94p 4:2:2
Location	Komazawa Gymnasium
Date	Mar. 5, 2009
Weather	—
Camera motion	Pan & Follow

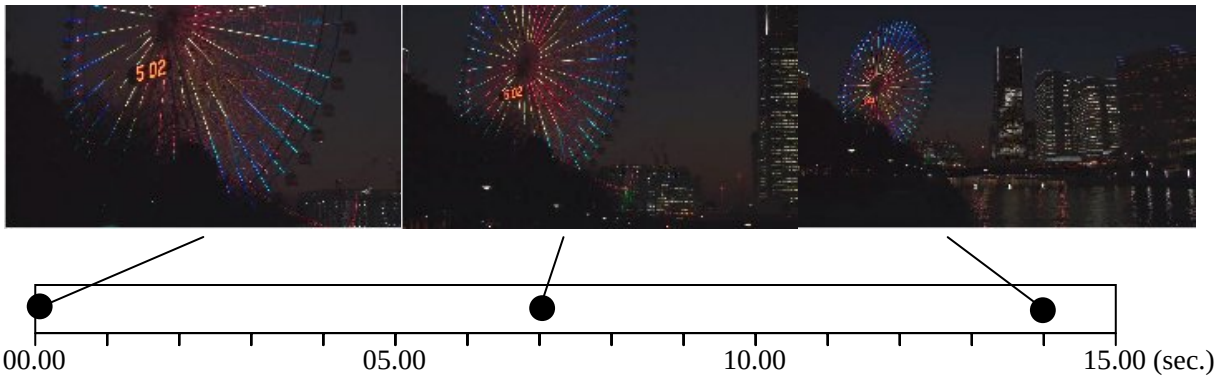
Focal length	Variable（21×zoom）	
Focus position	150 ft	
F value	2.8	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. shutter*	1/100 sec	
Gain value	−3 dB	
Video effect	Horizontal srolling text	

*1/100 sec Electronic shutter was applied due to lighting flicker in the gymnasium

Acknowledgements: The contents were produced with permission from the BASKETBALL JAPAN LEAGUE.

No. 215 Twilight scene (zoom out)

File name: s215_000000.yuv10–s215_000959.yuv10



Description

The sequence shows a zoom-out shot of a Ferris wheel taken at twilight, showing high-rise buildings and the night sky in the background. The geometrical lines of the Ferris wheel make it a high frequency image. In the latter part of the sequence, high-rise buildings come into view, resulting in an image composed of many fine and complex straight lines.

This can be used for observing gradation of dark parts in images showing a twilight scene. The slow zoom-out makes it suitable for assessing pseudo contours and jaggies arising from the edge of the Ferris wheel.

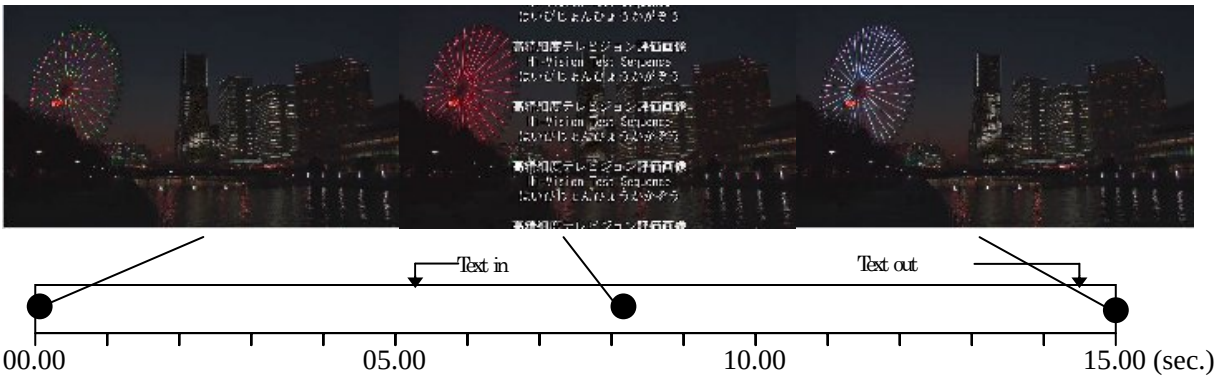
Shooting data

Image format	59.94p 4:2:2
Location	Yokohama Minato Mirai area
Date	Dec. 12, 2008
Weather	Clear
Camera motion	Zoom out

Focal length	Variable (21×zoom)	
Focus position	∞	
F value	2.8	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. shutter	OFF	
Gain value	−3 dB	
Video effect	—	

No. 216 Twilight scene (fixed)

File name: s216_000000.yuv10–s216_000959.yuv10



Description

The sequence shows a Ferris wheel against a twilight sky and high-rise buildings in the dark, and includes many fine and complex lines. The slow rotation and the changing colors of the Ferris wheel are very vivid, and the flicker of light reflected on the surface of the river can be seen. Text moving vertically at 300 pixels/sec is superimposed in the middle part of the frame.

The twilight scene was taken using a fixed shot, and is useful for assessing contrast with the lights. The superimposed text that rolls vertically can be used for evaluating digital encoding effects and mosquito noise arising around the contours of superimposed text.

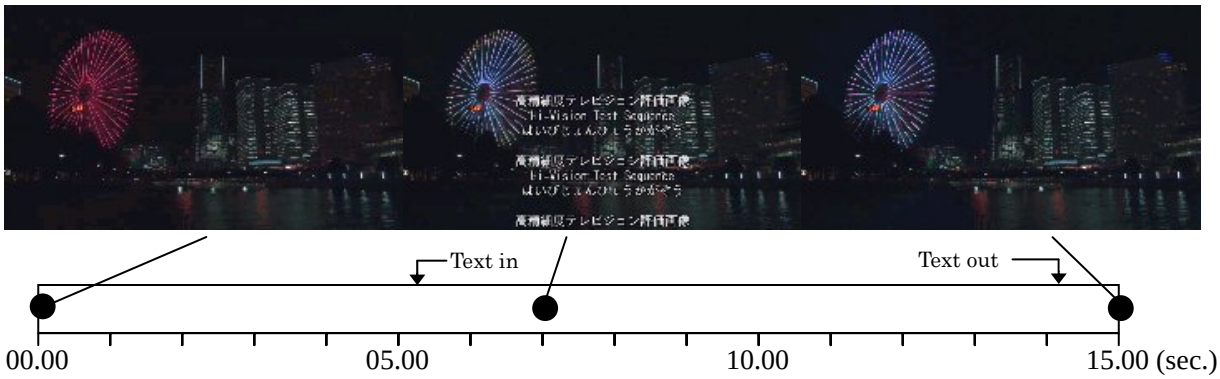
Shooting data

Image format	59.94p 4:2:2
Location	Yokohama Minato Mirai area
Date	Dec. 12, 2008
Weather	Clear
Camera motion	Fixed

Focal length	7 mm	
Focus position	∞	
F value	2.8	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. shutter	OFF	
Gain value	−3 dB	
Video effect	Vertical scrolling text	

No. 217 Night scene (fixed)

File name: s217_000000.yuv10–s217_000959.yuv10



Description

The sequence shows a Ferris wheel against a night sky and high-rise buildings in the dark, and includes many fine and complex lines. The slow rotation and the changing colors of the Ferris wheel are very vivid, and the flicker of light reflected on the surface of the river can be seen. Text moving vertically at 300 pixels/sec is superimposed in the middle part of the screen.

The night scene was taken using a fixed shot and is ideal for assessing resolution of dark parts of the image. The flickering effect of the light in the dark part of the image can be seen. The superimposed text that rolls vertically can be used for assessing digital encoding effects and mosquito noise arising around the contours of superimposed text.

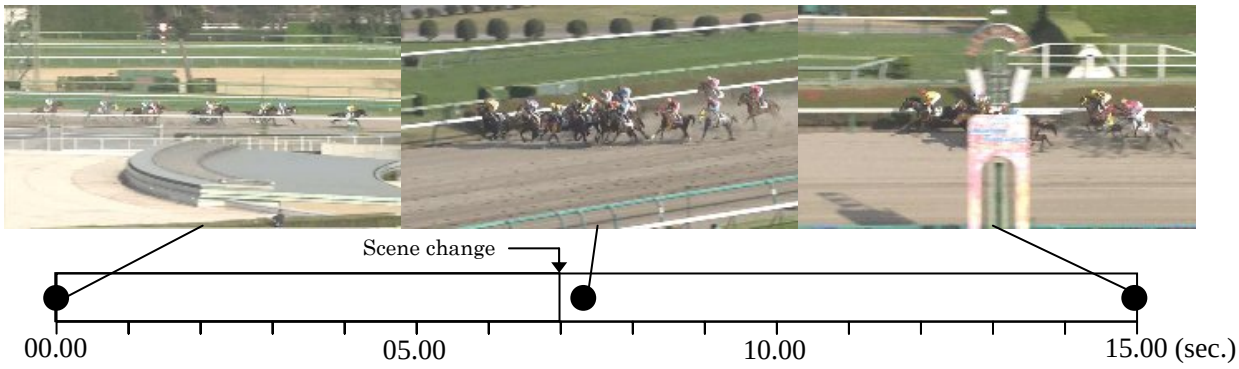
Shooting data

Image format	59.94p 4:2:2
Location	Yokohama Minato Mirai area
Date	Dec. 12, 2008
Weather	Clear
Camera motion	Fixed

Focal length	7 mm	
Focus position	∞	
F value	2.8	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. shutter	OFF	
Gain value	0 dB	
Video effect	Vertical scrolling text	

No. 218 Horse racing (dirt)

File name: s218_000000.yuv10–s218_000959.yuv10



Description

The sequence shows a horse race on a dirt racetrack. The first half was shot at a relatively fast panning speed from the backstretch of the racetrack as the camera follows the running horses, showing the lawn seats in the middle of the tracks, the tracks, and the lawn and the row of trees in the outer part of the tracks. The latter part, marked by a cut, is a pan follow shot of the leading group of horses, showing the tracks, the lawn in the center of the oval, and other structures in the background.

The first half is ideal for evaluating dynamic resolution during high-speed panning. In the latter half, the horses and the jockeys are shot more closely, focusing on the movement of the legs and the cloud of dust blown up the air, which is useful for evaluating digital encoding, resolution, and motion adaptive processing.

Shooting data

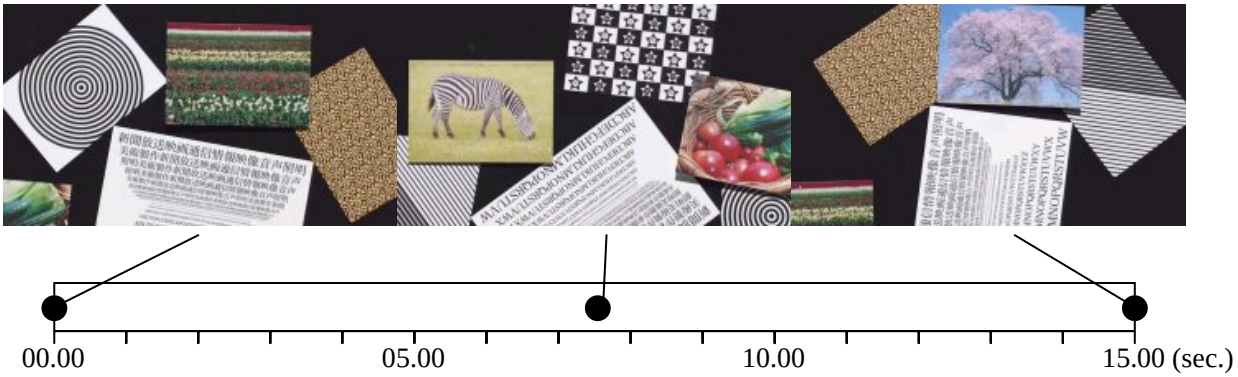
Image format	59.94p 4:2:2
Location	Nakayama racecourse
Date	Apr. 12, 2009
Weather	Clear
Camera motion	Pan & Follow

Focal length	Variable (21×zoom)	
Focus position	∞	
F value	8	
Built-in filter	ND	1/4
	CC	6300 K
External filter	—	
Elec. shutter	OFF	
Gain value	−3 dB	
Video effect	—	

Acknowledgements: The contents were produced with permission from JRA

No. 251 Rotating disk 59.94P

File name: s251_000000.yuv10–s251_000959.yuv10



Description

The sequence shows a fixed shot of a black disk that is rotating clockwise and on which panels showing text, texture patterns, and photos are mounted. The photo panels, which are fixed only on their top edges, move in short, quick swings as the disk rotates.

The variation in rotation speed that depends on the distance of the panels from center of the disk provides excellent material for evaluating motion detection and resolution of moving areas. The diagonal and circular patterns are useful for observing image lags, pseudo contours, motion blurs, and aliasing. The legibility of the text could also be useful.

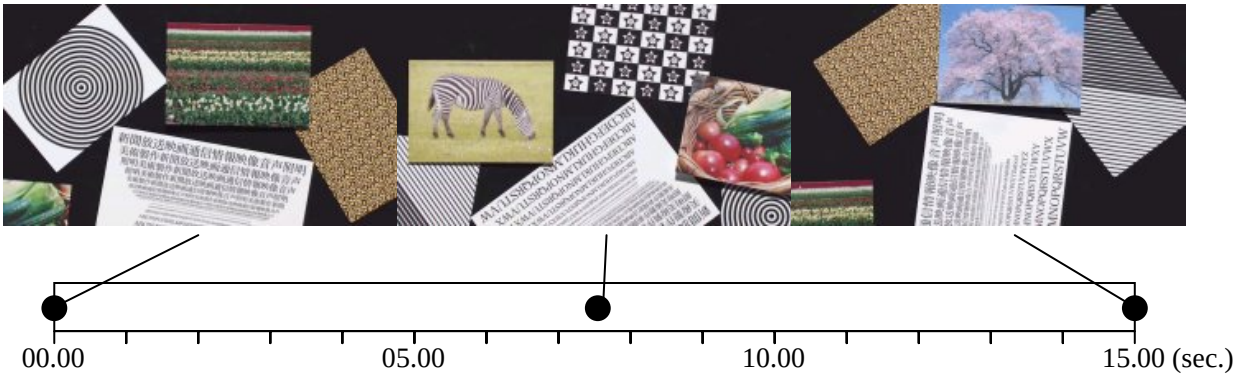
Shooting data

Image format	59.94p 4:2:2
Location	Studio in Fuji TV
Date	Mar. 6, 2009
Weather	—
Camera motion	Fixed

Focal length	46 mm	
Focus position	10 ft	
F value	4.5	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. shutter	OFF	
Gain value	−3 dB	
Video effect	—	

No. 252 Rotating disk 59.94P with 1/120 sec. shutter

File name: s252_000000.yuv10–s252_000959.yuv10



Description

The sequence shows a fixed shot of a black disk that is rotating clockwise and on which panels showing text, texture patterns, and photos are mounted. The photo panels, which are fixed only on the top edges, move in short, quick swings as the disk rotates.

The variation in rotation speed that depends on the distance of the panels from center of the disk provides excellent material for evaluating motion detection and resolution of moving areas. The diagonal and circular patterns are useful for observing image lags, pseudo contours, motion blurs, and aliasing. The legibility of the text could also be useful.

The composition and shooting conditions are almost the same as No. 251 Rotating disk 59.94P, but the electronic shutter was turned ON, setting exposure time to 1/120 sec, which is half of the regular shot (shutter OFF).

As an effect of the electronic shutter being ON, spatial resolution of the moving regions is increased while inter-frame correlation is reduced. As such, it can be used to see how motion adaptive processing and digital encoding are affected. Also, in comparison with No. 254 Rotating disk 24P with 1/48 sec shutter, it can be used for assessing frame rate conversion.

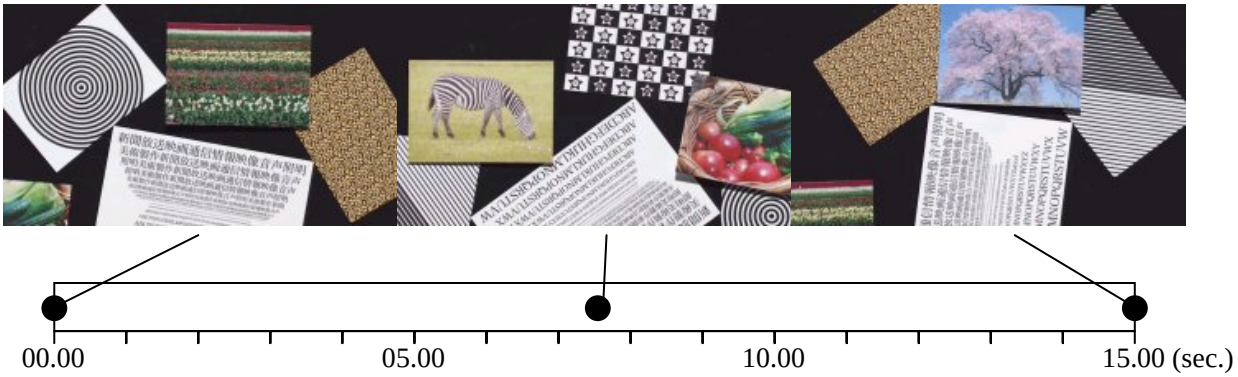
Shooting data

Image format	59.94p 4:2:2
Location	Studio in Fuji TV
Date	Mar. 6, 2009
Weather	—
Camera motion	Fixed

Focal length	46 mm	
Focus position	10 ft	
F value	2.8	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. shutter	1/120	
Gain value	−3 dB	
Video effect	—	

No. 253 Rotating disk 24P

File name: s253_000000.tif–s253_000383.tif



Description

The sequence shows a fixed shot of a black disk that is rotating clockwise and on which panels showing text, texture patterns, and photos are mounted. The photo panels, which are fixed only on the top edges, move in short, quick swings as the disk rotates.

The variation in rotation speed that depends on the distance of the panels from center of the disk provides excellent material for evaluating motion detection and resolution of moving areas. The diagonal and circular patterns are useful for observing image lags, pseudo contours, motion blurs, and aliasing. The legibility of the text could also be useful.

The composition and shooting conditions are almost the same as No. 251 Rotating disk 59.94P, but the frame rate was set at 24p (24 frames/sec). This sequence is mainly useful for assessing frame rate conversion. Color space and sampling structure used for this sequence is RGB 4:4:4 (TIFF format).

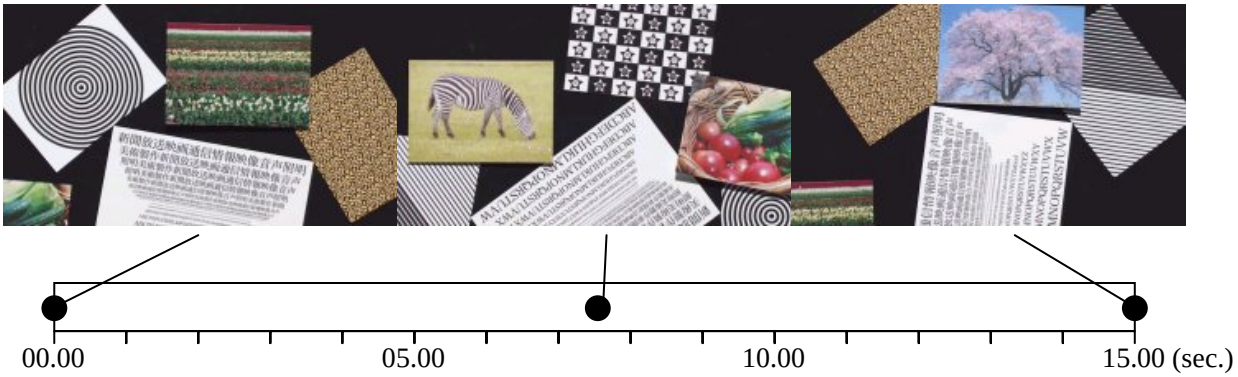
Shooting data

Image format	24p 4:4:4
Location	Studio in Fuji TV
Date	Mar. 6, 2009
Weather	—
Camera motion	Fixed

Focal length	46 mm	
Focus position	10 ft	
F value	5.6 1/2	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. shutter	OFF	
Gain value	−3 dB	
Video effect	—	

No. 254 Rotating disk 24P with 1/48 sec. shutter

File name: s254_000000.tif–s254_000383.tif



Description

The sequence shows a fixed shot of a black disk that is rotating clockwise and on which panels showing text, texture patterns, and photos are mounted. The photo panels, which are fixed only on the top edges, move in short, quick swings as the disk rotates.

The variation in rotation speed that depends on the distance of the panels from center of the disk provides excellent material for evaluating motion detection and resolution of moving areas. The diagonal and circular patterns are useful for observing image lags, pseudo contours, motion blurs, and aliasing. The legibility of the text could also be useful.

The composition and shooting conditions are almost the same as No. 253 Rotating disk 24P, but the electronic shutter was turned ON, setting exposure time to 1/48 sec, which is half of the regular shot (shutter OFF).

As an effect of the electronic shutter being ON, spatial resolution of the moving regions is increased while inter-frame correlation is reduced. As such, it can be used to see how motion adaptive processing and digital encoding are affected. Also, in comparison with No. 252 Rotating disk 59.94P with 1/120 sec. shutter, it can be used for assessing frame rate conversion. Color space and sampling structure used for this sequence is RGB 4:4:4 (TIFF format).

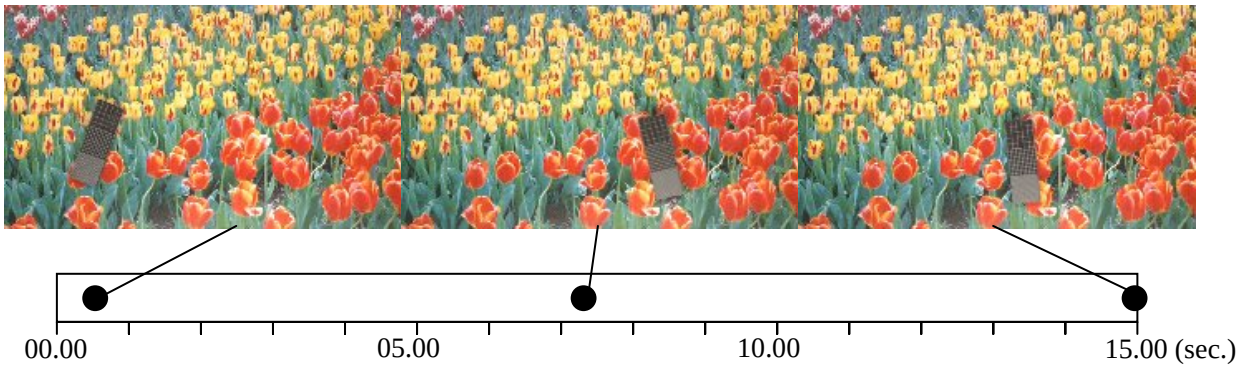
Shooting data

Image format	24p 4:4:4
Location	Studio in Fuji TV
Date	Mar. 6, 2009
Weather	—
Camera motion	Fixed

Focal length	46 mm	
Focus position	10 ft	
F value	4.5	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. shutter	1/48	
Gain value	−3 dB	
Video effect	—	

No. 255 Pendulum 59.94P

File name: s255_000000.yuv10–s255_000959.yuv10



Description

The sequence shows a pendulum slowly swinging until it stops against a picture of a tulip garden as background. The pendulum is vertically long, and is colored white over a black background, presenting three kinds of details that can be used in assessing image-processing effects.

It is useful for assessing motion adaptive processing in frame rate conversion during format conversion and display speed driving. Response performance of display devices can be assessed by measuring the residual image of the swinging pendulum.

It must be noted that since each image was taken by actually letting the pendulum swing each time, the movements of the pendulum in No. 255 to No. 258 sequences are not completely the same.

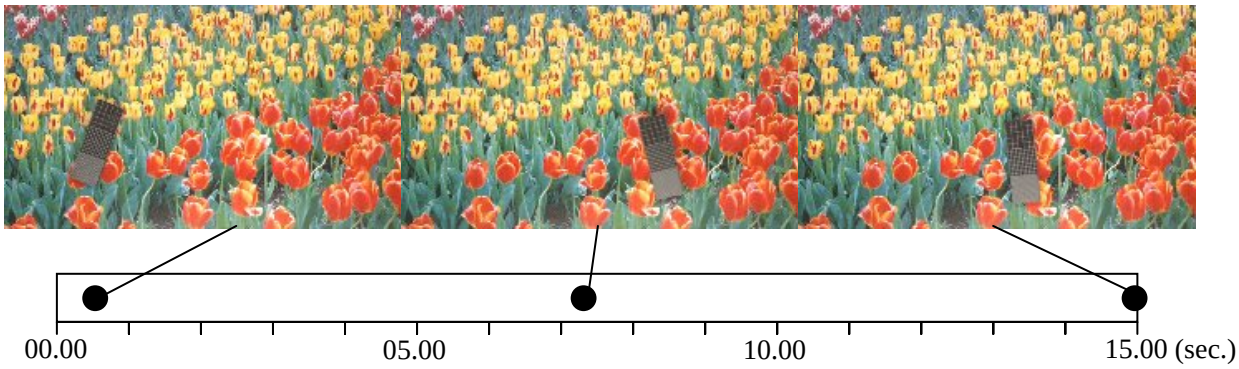
Shooting data

Image format	59.94p 4:2:2
Location	Studio in Fuji TV
Date	Mar. 6, 2009
Weather	—
Camera motion	Fixed

Focal length	35 mm	
Focus position	9.5 ft	
F value	5.6	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. shutter	OFF	
Gain value	−3 dB	
Video effect	—	

No. 256 Pendulum 59.94P with 1/120 sec. shutter

File name: s256_000000.yuv10–s256_000959.yuv10



Description

The sequence shows a pendulum, slowly swinging until it stops, against a picture of a tulip garden as background. The pendulum is vertically long, and is colored white over a black background, presenting three kinds of details that can be used in assessing image-processing effects.

It is useful for assessing motion adaptive processing in frame rate conversion during format conversion and display speed driving. Response performance of display devices can be assessed by measuring the residual image of the swinging pendulum.

The pattern and shooting conditions are almost the same as No. 255 Pendulum 59.94P, but the electronic shutter was turned ON, setting exposure time to 1/120 sec, which is half of the regular shot (shutter OFF).

As an effect of the electronic shutter being ON, the spatial resolution of the moving regions is increased while the inter-frame correlation is reduced. As such, it can be used to determine how motion adaptive processing and digital encoding are affected. Also, in comparison with No. 258 Pendulum 24P with 1/48 sec shutter, it can be used for assessing frame rate conversion.

It must be noted that since each image was taken by actually letting the pendulum swing each time, the movements of the pendulum in No. 255 to No. 258 sequences are not completely the same.

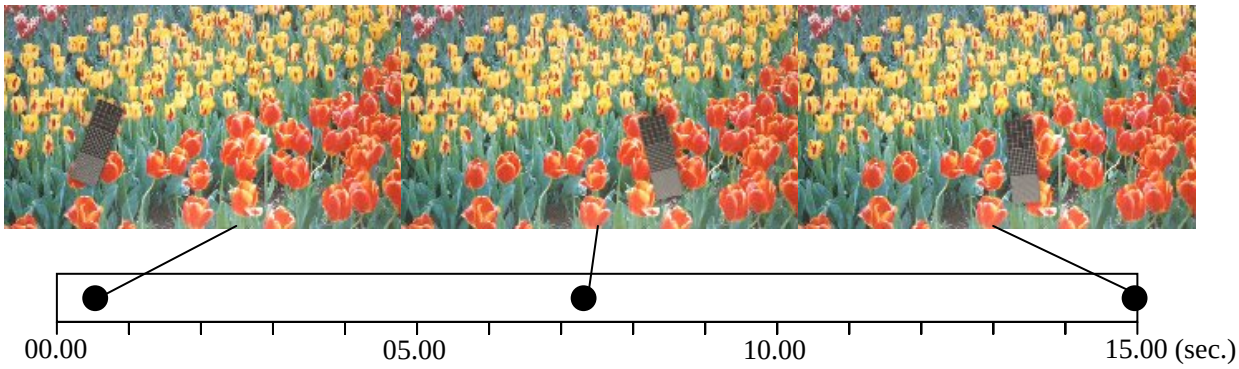
Shooting data

Image format	59.94p 4:2:2
Location	Studio in Fuji TV
Date	Mar. 6, 2009
Weather	—
Camera motion	Fixed

Focal length	35 mm	
Focus position	9.5 ft	
F value	4	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. shutter	1/120	
Gain value	−3 dB	
Video effect	—	

No. 257 Pendulum 24P

File name: s257_000000.tif–s257_000383.tif



Description

The sequence shows a pendulum, slowly swinging until it stops, against a picture of a tulip garden as background. The pendulum is vertically long, and is colored white over a black background, presenting three kinds of details that can be used in assessing image-processing effects.

It is useful for assessing motion adaptive processing in frame rate conversion during format conversion and display speed driving. Response performance of display devices can be assessed by measuring the residual image of the swinging pendulum.

The pattern and shooting conditions are almost the same as No. 255 Pendulum 59.94P, but the frame rate was set at 24P (24 frames/sec). This sequence is mainly useful for assessing frame rate conversion.

It must be noted that since each image was taken by actually letting the pendulum swing each time, the movements of the pendulum in No. 255 to No. 258 sequences are not completely the same. Color space and sampling structure used for this sequence is RGB 4:4:4 (TIFF format).

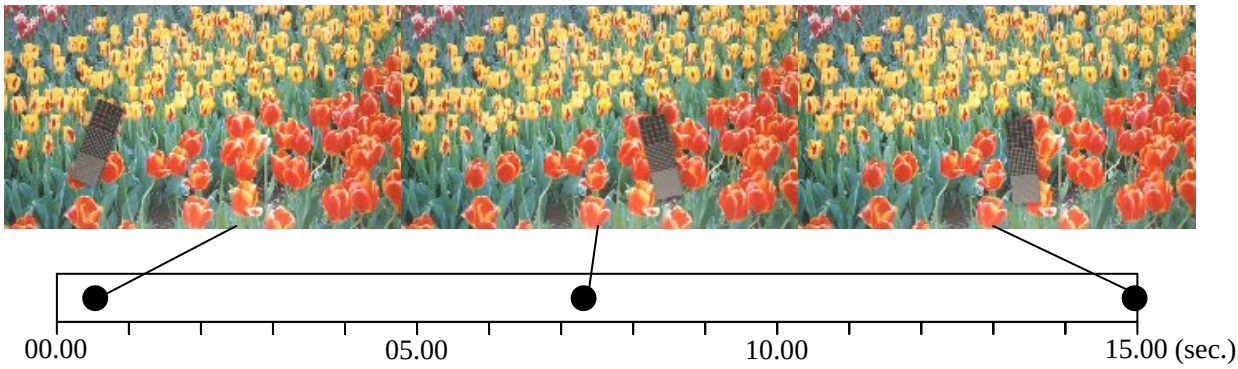
Shooting data

Image format	24p 4:4:4
Location	Studio in Fuji TV
Date	Mar. 6, 2009
Weather	—
Camera motion	Fixed

Focal length	35 mm	
Focus position	9.5 ft	
F value	5.6	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. shutter	OFF	
Gain value	−3 dB	
Video effect	—	

No. 258 Pendulum 24P with 1/48 sec. shutter

File name: s258_000000.tif–s258_000383.tif



Description

The sequence shows a pendulum, slowly swinging until it stops, against a picture of a tulip garden as background. The pendulum is vertically long, and is colored white over a black background, presenting three kinds of details that can be used in assessing image-processing effects.

It is useful for assessing motion adaptive processing in frame rate conversion during format conversion and display speed driving. Response performance of display devices can be assessed by measuring the residual image of the swinging pendulum.

The pattern and shooting conditions are almost the same as No. 257 Pendulum 24P, but the electronic shutter was turned ON, setting exposure time to 1/48 sec, which is half of the regular shot (shutter OFF).

As an effect of the electronic shutter being ON, the spatial resolution of the moving regions is increased while the inter-frame correlation is reduced. As such, it can be used to determine how motion adaptive processing and digital encoding are affected. Also, in comparison with No. 256 Pendulum 59.94P with 1/120 sec shutter, it can be used for assessing frame rate conversion.

It must be noted that since each image was taken by actually letting the pendulum swing each time, the movements of the pendulum in No. 255 to No. 258 sequences are not completely the same. Color space and sampling structure used for this sequence is RGB 4:4:4 (TIFF format).

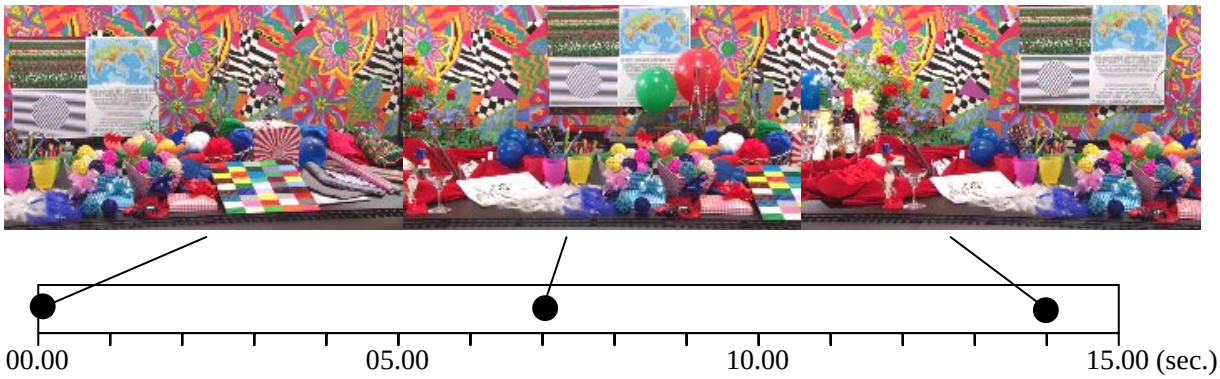
Shooting data

Image format	24p 4:4:4
Location	Studio in Fuji TV
Date	Mar. 6, 2009
Weather	—
Camera motion	Fixed

Focal length	35 mm	
Focus position	9.5 ft	
F value	4	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. shutter	1/48	
Gain value	−3 dB	
Video effect	—	

No. 259 Colorful world A

File name: s259_000000.yuv10–s259_000959.yuv10



Description

The sequence shows an image of small objects with high color saturation taken under studio lighting. A train model runs between the foreground and the background, which shows a moving chart.

The overall richness in chromatic components makes it suitable for evaluating color reproducibility and resolution. The moving train and the high color saturation of the foreground and the background enable observing effects to motion compensation during digital encoding.

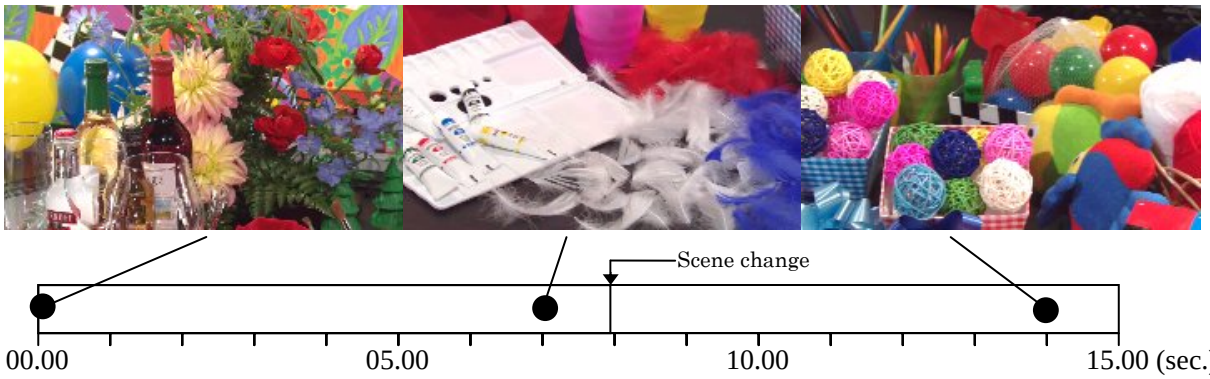
Shooting data

Image format	59.94p 4:2:2
Location	Studio in Fuji TV
Date	Mar. 6, 2009
Weather	—
Camera motion	Pan / Fixed

Focal length	17 mm	
Focus position	8.5 ft	
F value	5.6	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. shutter	OFF	
Gain value	−3 dB	
Video effect	—	

No. 260 Colorful world B

File name: s260_000000.yuv10–s260_000959.yuv10



Description

The sequence shows an image of small objects with high color saturation taken under studio lighting. In the first half, the camera pans diagonally down to the right, while in the later half, it pans to the left.

The overall richness in chromatic components makes it suitable for evaluating color reproducibility and resolution. Since the camera pans at a relatively high speed, it can be used to observe the effects to motion compensation during digital encoding.

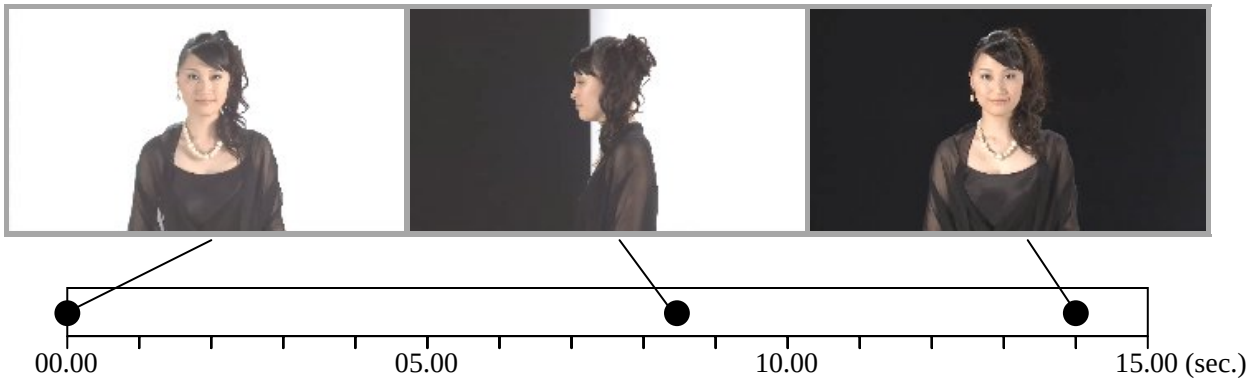
Shooting data

Image format	59.94p 4:2:2
Location	Studio in Fuji TV
Date	Mar. 6, 2009
Weather	—
Camera motion	Pan & Follow

Focal length	17 mm	
Focus position	8.5 ft	
F value	5.6	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. shutter	OFF	
Gain value	−3 dB	
Video effect	—	

No. 261 Black dress

File name: s261_000000.yuv10–s261_000959.yuv10



Description

The sequence shows, in the first half, a woman wearing a black dress standing in front of a white background, who then walks towards a black background where she stands for the rest of the video. These series of movements are captured with a pan follow shot. The IRE setting for the white background is around 108 %.

The drastic change in background brightness makes it suitable for assessing fluctuations in luminance and changes in white balance. The latter half, in which the black dress and hair are shown against a black background, is useful for assessing resolution of dark portions of the image.

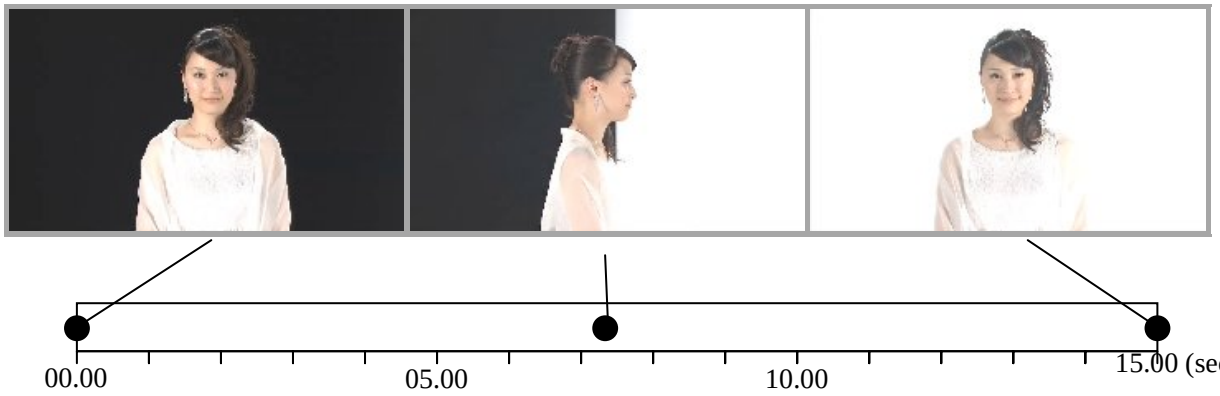
Shooting data

Image format	59.94p 4:2:2
Location	Fuji Television WANGAN STUDIO
Date	Feb. 27, 2009
Weather	—
Camera motion	Pan & Follow

Focal length	33 mm	
Focus position	14 ft	
F value	4	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. Shutter	OFF	
Gain value	−3 dB	
Video effect	—	

No. 262 White dress

File name: s262_000000.yuv10–s262_000959.yuv10



Description

The sequence shows, in the first half, a woman wearing a white dress standing in front of a black background, who then walks towards a white background where she stands for the rest of the video. These series of movements are captured with a pan follow shot. The IRE setting for the white background is around 108 %. The image is shot so that the maximum IRE setting for the white dress approaches 108 %.

The drastic change in background brightness makes it suitable for assessing fluctuations in luminance and changes in white balance. The texture of the white dress is useful for assessing resolution of bright portions of the image.

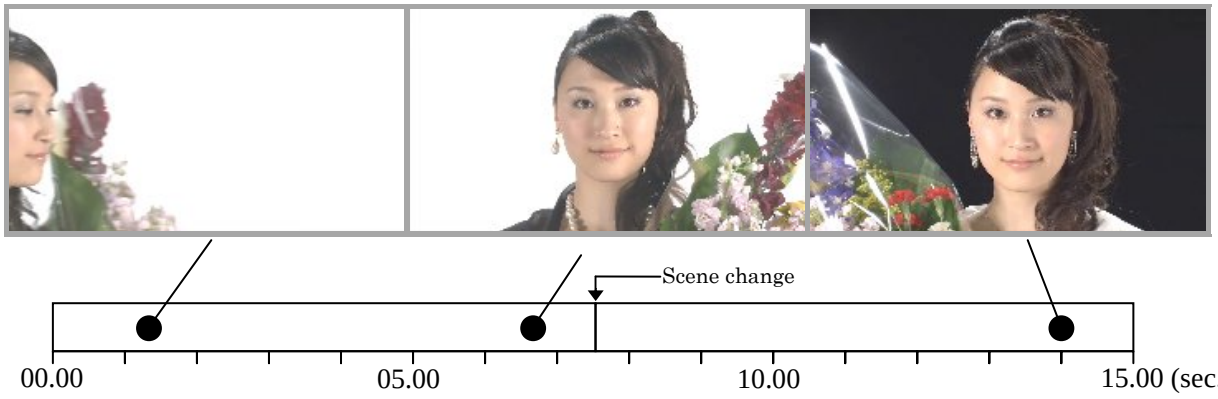
Shooting data

Image format	59.94p 4:2:2
Location	Fuji Television WANGAN STUDIO
Date	Feb. 27, 2009
Weather	—
Camera motion	Pan & Follow

Focal length	33 mm	
Focus position	14 ft	
F value	4	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. Shutter	OFF	
Gain value	−3 dB	
Video effect	—	

No. 263 Woman with bouquet

File name: s263_000000.yuv10–s263_000959.yuv10



Description

The first half of the sequence shows a woman wearing a white dress and carrying a bouquet of flowers walking in from the left in front of a white background. The latter half shows her wearing a black dress walk in from the right in front of a black background.

The image is a close-up shot taken under studio lighting, making it suitable for assessing memory color of skin and texture fidelity. The clear cellophane film wrapping of the bouquet is useful for assessing texture fidelity.

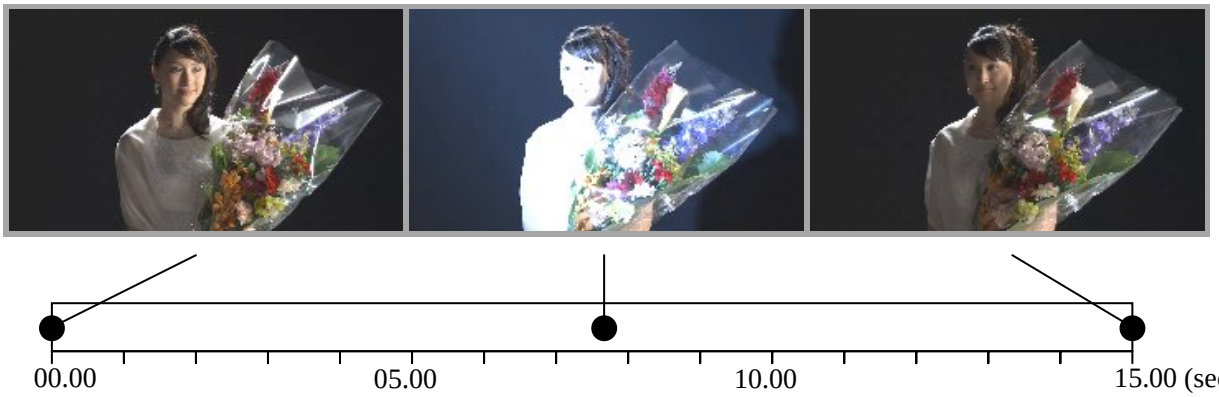
Shooting data

Image format	59.94p 4:2:2
Location	Fuji Television WANGAN STUDIO
Date	Feb. 27, 2009
Weather	—
Camera motion	Fixed

Focal length	67 mm	
Focus position	14 ft	
F value	4	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. Shutter	OFF	
Gain value	−3 dB	
Video effect	—	

No. 264 Flash photography

File name: s264_000000.yuv10–s264_000959.yuv10



Description

The sequence shows a woman in front of a black background being showered by camera flashes.

The shower of flashes causes the inter-frame correlation to be greatly reduced, making it suitable for assessing motion compensation and other temporal image processing. The clear cellophane film wrapping of the bouquet is useful for assessing texture fidelity.

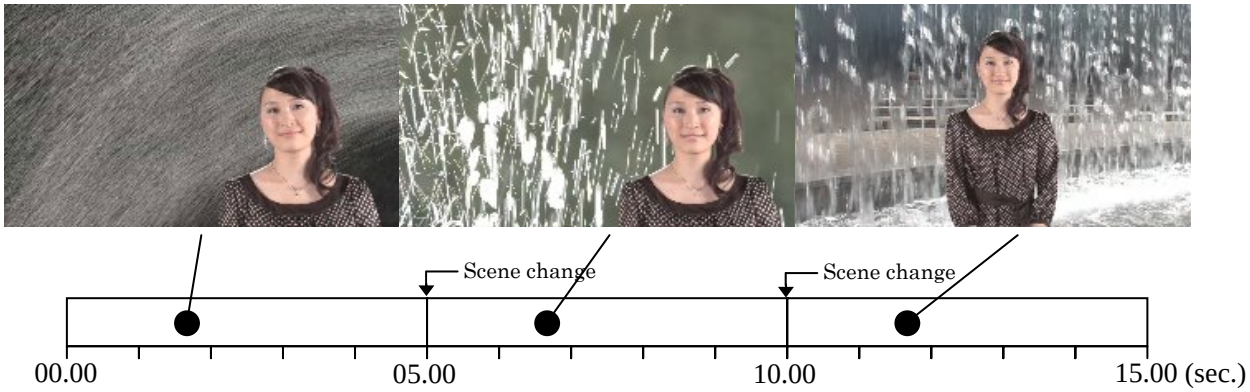
Shooting data

Image format	59.94p 4:2:2
Location	Fuji Television WANGAN STUDIO
Date	Feb. 27, 2009
Weather	—
Camera motion	Fixed

Focal length	33 mm	
Focus position	14 ft	
F value	2	
Built-in filter	ND	Clear
	CC	3200 K
External filter	—	
Elec. Shutter	OFF	
Gain value	−3 dB	
Video effect	—	

No. 265 Fountain (chromakey)

File name: s265_000000.yuv10–s265_000959.yuv10



Description

This sequence is a chroma key composite image of the woman and the background. The focus is both on the subject and the background, which is of three types: a shower of water, a curtain fountain, and a spray fountain.

It is suitable for assessing of digital encoding; particularly, the first background—the shower of water— produces a lot of information and causes distortions on the woman's face and texture of the clothes.

Shooting data

Image format	59.94p 4:2:2
Location+	Fuji Television WANGAN STUDIO, WOWOW building
Date+	Feb. 27, 2009, Mar. 5, 2009
Weather+	— Clear
Camera motion+	Fixed Fixed

Focal length+*	25 mm : 18 mm : 25 mm 37 mm : 100 mm : 9.2 mm	
Focus position+*	10 ft 10 ft : 10 ft : 12 ft	
F value+	4 5.6	
Built-in filter	ND+	Clear 1/8
	CC+	3200 K 6300 K
External filter	—	
Elec. Shutter	OFF	
Gain value	−3 dB	
Video effect	Chroma key composition	

+ Upper row = subject, Lower row = background

*Former part : Middle part : Latter part

Appendix A: Sample Code

A.1 Loading RGB 4:4:4 image data

As mentioned in section 2.2.1, the Tagged Image File Format (TIFF) is used for distributing RGB 4:4:4 (10 bit) image data. An open source library called "Lib TIFF" may help us to write a program for loading TIFF images in C language. Figure A-1 is a sample C source code for loading RGB 4:4:4 image data from the TIFF file. Another source code using only the ANSI C standard library is also shown in Figure A-2. For more information on "Lib TIFF," see the official website: http://www.libtiff.org/.

```
/* Loading RGB 4:4:4 image data using libtiff */
#include <stdio.h>
#include <tiffio.h>
#define FILENAME "s101_000030.tif"      /* File name */
#define WIDTH  1920                     /* Image width */
#define HEIGHT 1080                     /* Image height */
unsigned short R[HEIGHT][WIDTH];        /* Array for R component */
unsigned short G[HEIGHT][WIDTH];        /* Array for G component */
unsigned short B[HEIGHT][WIDTH];        /* Array for B component */

int main()
{
    TIFF *tif;
    unsigned char *scanline;
    int k, x, y;

    /* File open */
    if ((tif = TIFFOpen(FILENAME, "r")) == NULL) {
        printf("Read error (%s)!¥n", FILENAME);
        return (-1);
    }
    /* Allocate a buffer for one line data */
    scanline = _TIFFmalloc(TIFFScanlineSize(tif));
    /* Converting 16 bit to 10 bit data */
    for (y = 0; y < HEIGHT; y++) {
        TIFFReadScanline(tif, scanline, y, 0);
        for (x = k = 0; x < WIDTH; x++) {
            R[y][x] = (scanline[k + 1] << 8 | scanline[k + 0]) >> 6;
            G[y][x] = (scanline[k + 3] << 8 | scanline[k + 2]) >> 6;
            B[y][x] = (scanline[k + 5] << 8 | scanline[k + 4]) >> 6;
            k += 6;
        }
    }
    /* File close */
    _TIFFfree(scanline);
    TIFFClose(tif);

    return (0);
}
```

Figure A-1 Sample C code for loading RGB 4:4:4 image data using "Lib TIFF".

```
/* Loading RGB 4:4:4 image data without libtiff */
#include <stdio.h>
#define FILENAME "s101_000030.tif"      /* File name */
#define WIDTH  1920                     /* Image width */
#define HEIGHT 1080                     /* Image height */
unsigned short R[HEIGHT][WIDTH];        /* Array for R component */
unsigned short G[HEIGHT][WIDTH];        /* Array for G component */
unsigned short B[HEIGHT][WIDTH];        /* Array for B component */

/* Read a two byte integer */
short getshort(FILE *fp)
{
    unsigned char buf[2];
    fread(buf, 2, 1, fp);
    return (buf[1] << 8 | buf[0]);
}

/* Read a four byte integer */
long getlong(FILE *fp)
{
    unsigned char buf[4];
    fread(buf, 4, 1, fp);
    return (buf[3] << 24 | buf[2] << 16 | buf[1] << 8 | buf[0]);
}

/* Seek to the beginning of image data */
int seektodata(FILE *fp)
{
    int i;
    long offset = 0;

    /* Check the TIFF ID (magic number) */
    if (getshort(fp) != 0x4949) return (-1);
    if (getshort(fp) != 0x002a) return (-1);

    /* Seek to the beginning of IFD (Image File Directory) data */
    fseek(fp, getlong(fp), SEEK_SET);
    for (i = getshort(fp); i > 0; i--) {
        /* Ignore all tags except for the StripOffsets */
        if (getshort(fp) == 0x0111) {
            getshort(fp);       /* Ignore the Field Type data */
            /* Check the number of values */
            if (getlong(fp) > 1) {
                /* Indirect access */
                fseek(fp, getlong(fp), SEEK_SET);
            }
            offset =  getlong(fp);
            break;
        }
        /* Seek to the next entry */
        fseek(fp, 2 + 4 + 4, SEEK_CUR);
    }

    if (!offset) return (-1);   /* Seek Error! */
    fseek(fp, offset, SEEK_SET);
    return (0);
}
```

(Continue to the next page)

```
int main()
{
    FILE *fp;
    int x, y;

    /* File open */
    if ((fp = fopen(FILENAME, "r")) == NULL) {
        printf("Read error (%s)!¥n", FILENAME);
        return (-1);
    }
    if (seektodata(fp)) {    /* Seek error? */
        printf("Unsupported format!¥n");
        return (-1);
    }
    /* Converting 16 bit to 10 bit data */
    for (y = 0; y < HEIGHT; y++) {
        for (x = 0; x < WIDTH; x++) {
            R[y][x] = (getshort(fp) >> 6) & 0x3ff;
            G[y][x] = (getshort(fp) >> 6) & 0x3ff;
            B[y][x] = (getshort(fp) >> 6) & 0x3ff;
        }
    }
    /* File close */
    fclose(fp);

    return (0);
}
```

Figure A-2　Sample C code for loading RGB 4:4:4 image data without “Lib TIFF”.

A.2 Loading YUV 4:2:2 image data

As mentioned in section 2.2.2, YUV 4:2:2 (10 bit) image data are directly stored in a file through a bit packing operation. A sample C code for loading YUV 4:2:2 image data from the file is shown in Figure A-3.

```
/* Loading YUV 4:2:2 image data */
#include <stdio.h>
#define FILENAME "s201_000060.yuv10"    /* File name */
#define WIDTH  1920                     /* Image width */
#define HEIGHT 1080                     /* Image height */
unsigned short Y[HEIGHT][WIDTH];        /* Array for Y component */
unsigned short U[HEIGHT][WIDTH/2];      /* Array for U component */
unsigned short V[HEIGHT][WIDTH/2];      /* Array for V component */

int main()
{
    FILE *fp;
    unsigned char buf[16];
    int k, x, y;

    /* File open */
    if ((fp = fopen(FILENAME, "r")) == NULL) {
        printf("Read error (%s)!¥n", FILENAME);
        return (-1);
    }
    for (y = 0; y < HEIGHT; y++) {
        for (x = k = 0; x < WIDTH;) {
            /* Read the data for six pixels */
            fread(buf, 16, 1, fp);
            U[y][k]   = ((buf[0] << 2)  | (buf[1] >> 6))  & 0x3ff;
            Y[y][x++] = ((buf[1] << 4)  | (buf[2] >> 4))  & 0x3ff;
            V[y][k++] = ((buf[2] << 6)  | (buf[3] >> 2))  & 0x3ff;
            Y[y][x++] = ((buf[4] << 2)  | (buf[5] >> 6))  & 0x3ff;
            U[y][k]   = ((buf[5] << 4)  | (buf[6] >> 4))  & 0x3ff;
            Y[y][x++] = ((buf[6] << 6)  | (buf[7] >> 2))  & 0x3ff;
            V[y][k++] = ((buf[8] << 2)  | (buf[9] >> 6))  & 0x3ff;
            Y[y][x++] = ((buf[9] << 4)  | (buf[10] >> 4)) & 0x3ff;
            U[y][k]   = ((buf[10] << 6) | (buf[11] >> 2)) & 0x3ff;
            Y[y][x++] = ((buf[12] << 2) | (buf[13] >> 6)) & 0x3ff;
            V[y][k++] = ((buf[13] << 4) | (buf[14] >> 4)) & 0x3ff;
            Y[y][x++] = ((buf[14] << 6) | (buf[15] >> 2)) & 0x3ff;
        }
    }
    /* File close */
    fclose(fp);

    return (0);
}
```

Figure A-3　Sample C code for loading YUV 4:2:2 image data.

Appendix B: Conversion from series A to series C

Image data of series C were converted simply from series A data. Detailed procedures are described below.

First, RGB 4:4:4 image data are converted into the YCbCr color space. Then the resulting chroma (Cb and Cr) samples are horizontally subsampled by a factor of 2. Finally, rounding and clipping operations are performed to obtain 10-bit samples of YCbCr 4:2:2 image data.

B.1 RGB to YCbCr conversion

R, G, and B values at each pixel are converted into Y, Cb, and Cr values using the following equations. These equations are specified in ITU-R Recommendation BT.709 and Recommendation BT.1361.

$$Y = \mathrm{clip}(R * 0.2126 + G * 0.7152 + B * 0.0722),$$

$$Cb = \mathrm{clip}((-R * 0.2126 - G * 0.7152 + B * 0.9278) / 1.8556 * (224 / 219) + 512),$$

$$Cr = \mathrm{clip}((R * 0.7874 - G * 0.7152 - B * 0.0722) / 1.5748 * (224 / 219) + 512),$$

where clip() is a clipping function defined as:

$$\mathrm{clip}(x) = \begin{cases} 4 & (x < 4) \\ 1019 & (x > 1019) \\ x & (otherwise) \end{cases} .$$

B.2 Subsampling in horizontal direction

A low-pass filter is horizontally applied to chroma (Cb and Cr) components. Then the resulting values are subsampled at the positions shown in Figure 2-3. Coefficients of the low-pass filter are as follows:

[21 0 –52 0 159 256 159 0 –52 0 21] / 512

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