

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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BLACKBERRY CORPORATION

Petitioner,  
v.

MAXELL LTD.,  
  
Patent Owner.

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CASE: IPR2019-00097  
Patent No. 9,100,604

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PETITION FOR INTER PARTES REVIEW  
OF U.S. PATENT NO. 9,100,604

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Patent Trial and Appeal Board  
P.O. Box 1450  
Alexandria, VA 22314-1450

October 16, 2018

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## EXHIBIT LIST

- Ex.1001 U.S. Patent No. 8,339,493 entitled Electric Camera, issued to Takahiro Nakano, Ryuji Nishimura, and Toshiro Kinugasa
- Ex.1002 U.S. Patent No. 8,059,177 entitled Electric Camera, issued to Takahiro Nakano, Ryuji Nishimura, and Toshiro Kinugasa
- Ex.1003 U.S. Patent No. 9,100,604 entitled Electric Camera, issued to Takahiro Nakano, Ryuji Nishimura, and Toshiro Kinugasa (“the ’604 Patent”)
- Ex.1004 Declaration of Dr. Eli Saber and Appendices
- Ex.1005 U.S. Patent No. 5,444,482 entitled Digital electronic camera for selectively recording a frame of still image and movie fields of image in a recording medium, issued to Takeshi Misawa and Takeshi Ohta (“Misawa ’482”)
- Ex.1006 U.S. Patent No. 6,700,607 entitled Image sensor driving method and electronic camera, issued to Takeshi Misawa (“Misawa ’607”)
- Ex.1007 U.S. Patent No 6,292,218 entitled Electronic camera for initiating capture of still images while previewing motion images, issued to Kenneth A. Parulski and Timothy J. Tredwell (“Parulski ’218”)
- Ex.1008 U.S. Patent No. 6,529,236 entitled Digital camera for outputting digital image signals and image reproducing device connectable thereto, issued to Mikio Watanabe (“Watanabe ’236”)
- Ex.1009 U.S. Patent No. 5,990,947 entitled Photographing apparatus and lens position control device, issued to Tadashi Okino and Harunobu Ichinose (“Okino ’947”)
- Ex.1010 U.S. Patent No. 6,757,013 entitled Image Pickup Apparatus with Electronic and Optical Zoom, issued to Kazuhiro Matsuzaka (“Matsuzaka ’013”)
- Ex.1011 Japanese Unexamined Patent Application Publication H3-117985  
Petition for Inter Partes Review of U.S. Pat. No. 9,100,604 entitled

Method for Driving a Solid-State Image Pickup Element, filed by Yoshida Egawa and Yukio Endo (“Egawa ’985”), in Japanese with certified English translation

- Ex.1012 File History of U.S. Patent No. 8,339,493
- Ex.1013 File History of U.S. Patent No. 8,059,177
- Ex.1014 File History of U.S. Patent No. 9,100,604
- Ex.1015 Maxell, Ltd. v. Huawei Tech. Co., 5:16-cv-178, D.I. 175 (Claim Construction Order dated January 31, 2018)
- Ex.1016 Excerpt of File History of U.S. Patent No. 6,765,616 (Office Action of November 26, 2003)
- Ex.1017 As-filed specification for U.S. Patent Application No. 07/997,862 (earliest U.S. benefit application to Okino ’947)
- Ex.1018 Declaration of Kenneth Parulski and Appendices
- Ex.1019 Curriculum Vitae of Dr. Eli Saber, Ph.D.

## **I. INTRODUCTION**

Pursuant to 35 U.S.C. § 311 and 37 C.F.R. § 42.100, BlackBerry Corporation (“BlackBerry” or “Petitioner”) petition for *inter partes* review (“IPR”) of Claims 1-5 of U.S. Patent No. 9,100,604 (“the ‘604 Patent,” Ex.1003).

The ‘604 Patent claims a camera with an image sensor driven in multiple readout modes. The sensor is driven to vertically mix or cull charges accumulated in individual pixels on the sensor using two different mixing/culling factors based on two different view angles requested by the camera operator using a switch. The same number of lines of output signals are generated regardless of the view angle. The view angle can be changed continuously using interpolation processing controlled by a zoom switch which can be interlocked with an optical zoom.

As set forth below, image sensors applying different mixing/culling drive modes to change the view angle were well-known in the art as of the ‘604 Patent’s January 2000 priority date, and others had already filed patents using similar sensors in still photography, video recording, and viewfinder monitoring. The use of interpolation to provide continuous electronic zooming was also well known, and had been combined with optical zooming in many prior patents. The claims of the ‘604 Patent include no meaningful features and present nothing novel over this prior art.

## **II. MANDATORY NOTICES UNDER 37 C.F.R. § 42.8(B)**

### **A. Real Party in Interest**

BlackBerry Corporation and BlackBerry Ltd. are the real parties in interest in filing this petition. No other party has financed or controlled this petition (or had the opportunity to exercise control over this petition) or otherwise meets the requirements of 35 U.S.C. §312(a)(2).

### **B. Related Matters**

#### **1. The ‘604 Patent**

##### **a. Lawsuits**

The ‘604 Patent is presently asserted against Olympus Corporation and Olympus America, Inc. in *Maxell, Ltd. v. Olympus Corp.*, C.A. No. 18-310 (D. Del.), against BlackBerry Corp. and BlackBerry Ltd. in *Maxell, Ltd. v. BlackBerry Corp.*, C.A. No. 17-1446 (D. Del.), and against BLU Products, Inc. in *Maxell, Ltd.v. BLU Prods., Inc.*, 1:18-cv-21231 (S.D. Fla.).

There are no other pending litigations in which the ‘604 Patent is asserted.

##### **b. Patent Office Proceedings**

There are two pending patent office proceedings involving the ‘604 Patent. The two pending patent office preceding are IPR2018-00909 and IPR2018-00908 both filed June 20, 2018 by Olympus Corporation.

Specifically, the instant petition presents a prior art combination in which a camera having a sensor that performs selective readout (*Misawa ‘607*) is enhanced

with electronic and optical zoom teachings (*Okino '947*).

## **2. Related Patents and Applications**

The '604 Patent claims the benefit of U.S. Patent Nos. 8,736,729; 8,339,493; 8,059,177; and 6,765,616, and further purports to be related to U.S. Patent No. 7,403,226.

U.S. Patent No 9,544,517 and U.S. Patent Application No. 15/386,656 both claim the benefit of the '604 Patent.

### **a. Lawsuits**

Olympus Corp. and Olympus America, Inc. have filed for a declaratory judgment of non-infringement of U.S. Patent No. 6,765,616 in *Olympus Corp. v. Maxell, Ltd.*, C.A. No. 18-216 (D. Del.). The defendant in that action has counterclaimed for infringement of U.S. Patent No. 6,765,616.

U.S. Patent Nos. 6,765,616 and 8,059,177 are presently asserted against Olympus Corporation and Olympus America, Inc. in *Maxell, Ltd. v. Olympus Corp.*, C.A. No. 18-310 (D. Del.).

U.S. Patent Nos. 8,339,493 and 8,736,729 are presently asserted against ZTE Corp. and ZTE (USA) Inc. in *Maxell, Ltd. v. ZTE Corp.*, 5:16-cv-179 (E.D. Tex.).

U.S. Patent Nos. 7,403,226 and 9,544,517 are presently asserted against ASUS Computer Int'l, Inc. and ASUS Computer Inc. in *Maxell, Ltd. v. ASUSTek Computer Inc.*, 2:17-cv-7528 (C.D. Cal.).



U.S. Patent No. 9,544,517 is also presently asserted against ZTE Corp. and ZTE (USA) Inc. in *Maxell, Ltd. v. ZTE Corp.*, 5:18-cv-34 (E.D. Tex.), and against Huawei Device Co., Ltd. and Huawei Device USA, Inc. in *Maxell, Ltd. v. Huawei Device Co.*, 5:18-cv-33 (E.D. Tex.).

U.S. Patent Nos. 6,765,616 is presently asserted against BlackBerry Corp. and BlackBerry Ltd. in *Maxell, Ltd. v. BlackBerry Corp.*, C.A. No. 17-1446 (D. Del.).

U.S. Patent No. 8,059,177 is presently asserted against BLU Products, Inc. in *Maxell, Ltd. v. BLU Prods., Inc.*, 1:18-cv-21231 (S.D. Fla.).

There are no other pending litigations in which a relative of the '604 Patent is asserted.

#### **b. Patent Office Proceedings**

ZTE Corp. petitioned for IPR of Claims 5 and 6 of U.S. Patent No. 8,339,493 (IPR2018-00236) and Claims 1-4 of 8,736,729 (IPR2018-00238). Both petitions were denied institution on June 1, 2018. Olympus Corp., Olympus America Inc., and Olympus America, Inc. petitioned for IPR of Claims 1-14 of U.S. Patent No. 8,339,493 (IPR2018-00904) and Claims 1-6 of the U.S. Patent No. 8,059,177 (IPR2018-00910).

U.S. Patent Application No. 15/386,656 is presently undergoing examination.

There are no other pending patent office proceedings involving a relative of the '604 Patent.

**C. Notice of Counsel and Service Information**

Pursuant to 37 C.F.R. §§42.8(b)(3), 42.8(b)(4) and 42.10(a), Petitioner appoints the following as their lead and back-up counsel.

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703-413-2220 (facsimile)

Petitioner consents to electronic service. Petitioner has executed and is concurrently filing a Power of Attorney appointing the above designated counsel.

### III. REQUIREMENTS FOR IPR

This Petition complies with all statutory requirements and requirements under 37 C.F.R. §§42.104, 42.105 and 42.15 and thus should be accorded a filing date as the date of filing of this Petition pursuant to 37 C.F.R. § 42.106.

#### A. Standing

Pursuant to 37 C.F.R. § 42.104(a), Petitioner certifies that the ‘604 Patent is available for IPR and the Petitioner is not barred or estopped from requesting IPR of the ‘604 Patent. Petitioner has standing, or meet all requirements, to file this Petition under 35 U.S.C. §§ 315(a)(1), 315(b), and 315(e)(1), and 37 C.F.R. §§ 42.73(d)(1), 42.101, and 42.102.

#### B. Identification of Challenge

Pursuant to 37 C.F.R. §§ 42.104(b) and 42.22, the precise relief requested by Petitioner is that the Board institute an IPR trial on Claims 1-5 of the ‘604 Patent on all ground presented herein and cancel those claims because they are invalid.

##### 1. Claims Challenged

Claims 1-5 of the ‘604 Patent are challenged in this Petition.

##### 2. The Prior Art

Ground	Challenged Claims	Grounds	References
1	Claim 1	Pre-AIA 35 U.S.C. § 103(a)	<i>Misawa ‘607</i> in view of the knowledge of a Person of Ordinary Skill in the Art

			("POSITA")
<b>2</b>	Claims 1-5	Pre-AIA 35 U.S.C. § 103(a)	<i>Misawa '607</i> in view of <i>Okino '947</i> and further in view of the knowledge of a POSITA

Full names of all prior art references are identified below and in the Exhibit List. None of these references were on record during examination of the '604 Patent.<sup>1</sup>

### **3. Fee for IPR (§ 42.15(a))**

Petitioner authorizes the Director to charge any fees required by 37 C.F.R. § 42.15(a) and not submitted with the Petition to Deposit Account No. 15-0030.

### **4. Supporting Evidence**

The Declaration of Eli Saber, Ph.D. (with appendices) and other evidence supporting the Petition are identified in the Exhibit List.

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<sup>1</sup> During examination of the '604 Patent the applicant provided an Information Disclosure Statement citing *inter alia* a Japanese-language copy of Japanese Patent Application JP-A-11-355665, to which *Misawa '607* claims priority. A translation of the application's abstract (only) was provided during prosecution of U.S. Patent No. 8,736,729. JP-A-11-355665 was never cited or relied upon during examination of the '604 Patent or any related patent.

## **5. Statutory Grounds**

Pursuant to 37 C.F.R. § 42.104(b)(2), the review of patentability of Claims 1-5 of the ‘604 Patent is governed by 35 U.S.C. §§ 102 and 103 in effect before March 16, 2013. Statutory provisions of 35 U.S.C. §§ 311-319 and 325 that took effect on September 16, 2012 govern this IPR.

## **6. How Claims Are Unpatentable**

Pursuant to 37 C.F.R. § 42.104(b)(4), Section VI of this Petition provides an explanation of how Claims 1-5 of the ‘604 Patent are unpatentable, including the identification of where each element of each claim is found in the cited prior art.

## **IV. OVERVIEW OF THE ‘604 PATENT**

### **A. Priority Date**

Application serial no. 14/264,243, which became the ‘604 Patent, was filed on April 29, 2014, as a continuation of a series of applications claiming the benefit of application serial no. 09/520,836, filed March 8, 2000. The ‘604 Patent also purports to claim the benefit of Japanese Patent Application No. 2000-006064, filed January 11, 2000. For purposes of this Petition only it is assumed that the ‘604 Patent is entitled to that date. All references herein are effective before that date.

### **B. State of the Art Before the ‘604 Patent**

As set forth in the Declaration of Eli Saber, well before 1999, electronic cameras having “megapixel” image sensors (*e.g.* image sensors with approximately

1280x960 pixels) and signal processing which generated image signals having many fewer pixel lines than the image sensor, to match the requirements of an integrated image display on the camera, were very well known and widely sold in the market. (Ex.1004 ¶¶101-106, 111, 117-119, 130-131, 159-160.) Electronic cameras which included monitoring in a still image mode, recording in a still mode, and recording in a moving mode were also well known. (Ex.1003 1:26-32, 2:8-12; Ex.1004 ¶¶83-84, 98-100, 119.) Various techniques for mixing and culling pixel lines, to reduce the number of pixel lines extracted from the sensor and permit corresponding images to be displayed on lower resolution camera displays, or to be recorded as lower resolution still images or lower resolution (*e.g.* NTSC resolution) video signals, were also well known. (Ex.1004 ¶¶52-56, 60-61, 70, 98-101, 105-106, 111-119, 130-139, 152-154, 159-167.) The use of drivers and associated timing generators to read out signal charges from a CCD image sensor using various read-out modes, and the use of signal processors to generate image signals from the read-out signal charges, were also well known. (Ex.1004 ¶¶53-56, 65-79, 86-87, 89, 94-97, 99, 114-119.) The use of switches to control camera operational modes and features like zooming and image acquisition was also well known. (Ex.1004 ¶¶51-52, 54-55, 57-58, 60, 62, 98-99, 101-103, 105-110, 116-119, 131, 140, 156, 172.) Finally, electronic zoom techniques using modified sensor readout, optionally integrated with optical zoom techniques, were also well

known. (Ex.1004 ¶¶86-87, 97, 107-108, 119, 169-175.)

### **C. Summary of the ‘604 Patent**

The ‘604 Patent describes a camera which uses an image sensing device “with a sufficient number of pixels for still images” but which can be driven to vertically mix or cull accumulated charges when acquiring moving images, thereby eliminating a purported “limit on the number of vertically arranged pixels” in an image sensor which can provide “detailed still images and a satisfactory moving video.” (Ex.1003 3:11-42.) The camera utilizes an image sensor containing N rows of pixels, where N is at least three times the number of effective scanning lines of a display screen. (*Id.* 3:20-26.)

According to the ‘604 Patent, capturing satisfactory quality moving and static images from a single camera is difficult to achieve because typical image sensors in video cameras have an insufficient number of pixels for detailed still images, while typical image sensors in still cameras have an abundance of pixels which requires large circuits and provides reduced dynamic image quality. (*Id.* 2:65-3:10.) The ‘604 Patent purports to solve this problem by teaching an image sensor which can be controlled to produce different output signals.

Independent Claim 1 recites an “electric camera” having an image sensing device with a light receiving surface, a driver, a view angle change switch, and a signal processing unit to generate image signals from the image sensing device

output. (*Id.* 16:2-29.) The light receiving surface has N rows of vertically arranged pixels, N being “greater than or equal to three times the quantity M of effective scanning lines of a display screen of a television system.” (*Id.* 16:6-8.)

The driver vertically mixes or culls signal charges at an interval “K” to produce an output signal whose vertical dimension corresponds to that of a television system display screen. (*Id.* 16:3-15.) Specifically, the driver switches between vertically mixing or culling signal charges at a first interval “K1” to a smaller second interval “K2” based on the setting of a view angle change switch, thereby producing output images of different view angles but the same number of scanning lines. (*Id.* 16:16-29.)

Claim 2 adds the limitation that the view angle change switch can “continuously” change the magnification and that magnified image signals are generated with “interpolation processing.” (*Id.* 16:30-37.) Claim 3 adds the limitation that the switch is interlocked with an optical zoom mechanism. (*Id.* 16:38-40.)

Independent Claim 4 recites an electric camera substantially like that recited in Claim 1, but refers to a “zoom switch” instead of a “view angle change switch,” and to “effective vertical lines of a television system” instead of “effective scanning lines of a display screen of a television system.” (*Id.* 16:41-52.) Claim 4 also refers to mixing or culling “vertical pixel lines of signals, at pixel intervals of



a quantity K of lines,” instead of mixing or culling “signal charges accumulated in individual pixels, at intervals of a quantity K of pixels.” (*Id.* 16:53-59.) Claim 4 further requires that image signals be generated “from different areas of the imaging device” that are “continuously changed,” while the quantity K is “discontinuously changed according to magnification factors.” (*Id.*)

Claim 5, like Claim 3, requires that the zoom switch be interlocked with an optical zoom mechanism. (*Id.* 16:60-62.)

#### **D. ‘604 Patent File History**

Application serial no. 14/264,243 was filed on April 29, 2014, as a continuation of application serial no. 13/681,495, which in turn was filed as a continuation of application serial no. 12/845,266, which in turn was filed as a continuation of application serial no. 10/660,710, which in turn was filed as a continuation of application serial no. 09/520,836, filed March 8, 2000. (Ex.1014 9.)

The application was filed with a single claim to a camera with an image sensing device, a driver that vertically mixes or culls signal charges, and a signal processing unit. (*Id.* 53.) That claim was initially rejected as anticipated by US Patent No. 6,661,451 to Kijima. (*Id.* 135.) In response, the applicant amended claim 1 essentially into its issued form by adding *inter alia* a view angle change switch to select between two culling/mixing factors K, and added new claims 2-5,

again essentially in their issued form. (*Id.* 161-163.)

In a subsequent rejection, the examiner rejected Claims 1 and 2 for obvious-type double patenting over related U.S. Patent No. 6,765,616; rejected Claim 3 for obvious-type double patenting over related U.S. Patent No. 6,765,616 in view of U.S. Patent No. 6,781,634 to Shiozaki; rejected Claim 4 for obvious-type double patenting over related U.S. Patent No. 7,403,226; and rejected Claim 5 for obvious-type double patenting over related U.S. Patent No. 7,403,226 in view of U.S. Patent No. 6,781,634 to Shiozaki. (*Id.* 174-180.)

In response, the applicant filed terminal disclaimers over U.S. Patent No. 6,765,616 and U.S. Patent No. 7,403,226, and amended the claims to correct informalities. (*Id.* 206-218.) The claims were then allowed. (*Id.* 228.)

#### **E. Level of Ordinary Skill in the Art**

A person of ordinary skill in the art (“POSITA”) at the time of the earliest effective filing date of the ‘604 Patent (assumed for purposes of this petition to be January 11, 2000) would possess at least a working knowledge of digital image acquisition devices, such as digital still or video cameras, and would understand how to specify the image sensor design (including control and readout) required for a particular device. (Ex.1004 ¶41.) The person would have an undergraduate Bachelor degree in Electrical or Computer Engineering, Computer Science, or an equivalent degree, and at least two years of professional experience working in the

field of digital image acquisition devices. (Ex.1004 ¶41.) Furthermore, the person would be familiar with the structure and operating principles of common image sensors (including *e.g.* CCD image sensors), contemporary television and video standards (including *e.g.* NTSC) and specifications of consumer digital cameras of the time. (Ex.1004 ¶41.)

## **V. PROPOSED CLAIM CONSTRUCTIONS**

The ‘604 Patent is not expected to expire during the pendency of this petition. The Board presently gives a claim in an unexpired patent “its broadest reasonable construction in light of the specification of the patent in which it appears” to a POSITA. 37 C.F.R. § 42.100(b). Under the broadest reasonable interpretation (“BRI”) standard, claim terms are given their “ordinary and customary meaning” as would be understood by a POSITA in the context of the entire disclosure. *In re Translogic Tech. Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). However, Petitioner anticipates that a regulatory change may require the PTAB to instead construe terms even in an unexpired patent under the standard in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (*en banc*).

Whether under the BRI or *Phillips* standard, the term “signal processing unit” should be construed as follows within the claims of the ‘604 Patent, and all other claim terms should be given their plain and ordinary meaning.

**A. “signal processing unit”**

The phrase “signal processing unit” should be construed as a “unit that performs signal processing on the output of the image sensing device.” (Ex.1004 ¶209.) The specification refers to a “signal processing circuit 7” that “performs color signal processing and luminance signal processing.” (Ex.1003 6:18-25; Ex.1004 ¶¶207, 209.)

A POSITA would have understood the term “signal processing unit” to connote definite structure within the claims of the ‘604 Patent. (Ex.1004 ¶211.) Accordingly, Petitioner submits that 35 U.S.C. § 112¶6 does not apply to this term. However, Petitioner acknowledges that the Examiner of related U.S. Patent No. 9,544,517 and related U.S. Patent Application No. 15/386,656 asserted during examination that 35 U.S.C. § 112¶6 should apply to this term as employed within the claims of that patent and application. Should the Board conclude that 35 U.S.C. § 112¶6 applies here, Petitioner in the alternative would meet its burden under 37 C.F.R. § 42.104(b)(3) by identifying the function of the signal processing unit as “generating image signals by using output signals of an image sensing device,” and the corresponding structure in the specification of the ‘604 Patent as at least gain adjust circuit 5, analog-digital (A/D) conversion circuit 6, signal processing circuit 7, vertical interpolation circuit 8, horizontal interpolation circuit 9, and control circuit 11. (Ex.1003 4:21-30; Ex.1004 ¶211.)

## **VI. THERE IS A REASONABLE LIKELIHOOD THAT AT LEAST ONE CLAIM OF THE ‘604 PATENT IS UNPATENTABLE**

A patent claim is invalid as obvious if the differences between the claimed subject matter and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art. 35 U.S.C. § 103(a). From the perspective of a POSITA, this Petition determines the scope and content of the cited prior art in the proposed invalidity grounds, analyzes the differences between the claimed invention and the cited prior art by considering the claimed invention as a whole and the cited prior art as a whole, and concludes that the prior art in the proposed invalidity grounds discloses all elements recited in Claims 1-5 and renders the claimed subject matter as a whole obvious and unpatentable.

### **A. Identification and Overview of Key Prior Art References**

#### **1. *Misawa* ‘607 (Ex.1006)**

U.S. Patent No. 6,700,607 (“*Misawa* ‘607”) is a patent filed by Takeshi Misawa. It was filed on June 4, 1999, issued on March 2, 2004, and was assigned to Fuji Photo Film Co., Ltd. It is prior art under 35 U.S.C. § 102(e).

*Misawa* ‘607 teaches an electronic camera and an image sensor driving method. (Ex.1006 1:8-13; Ex.1004 ¶130-131.) The camera includes a color CCD image sensor with a photosensitive array of 1280x1024 or 1280x960 pixels.

(Ex.1006 4:8-10; Ex.1004 ¶132.)

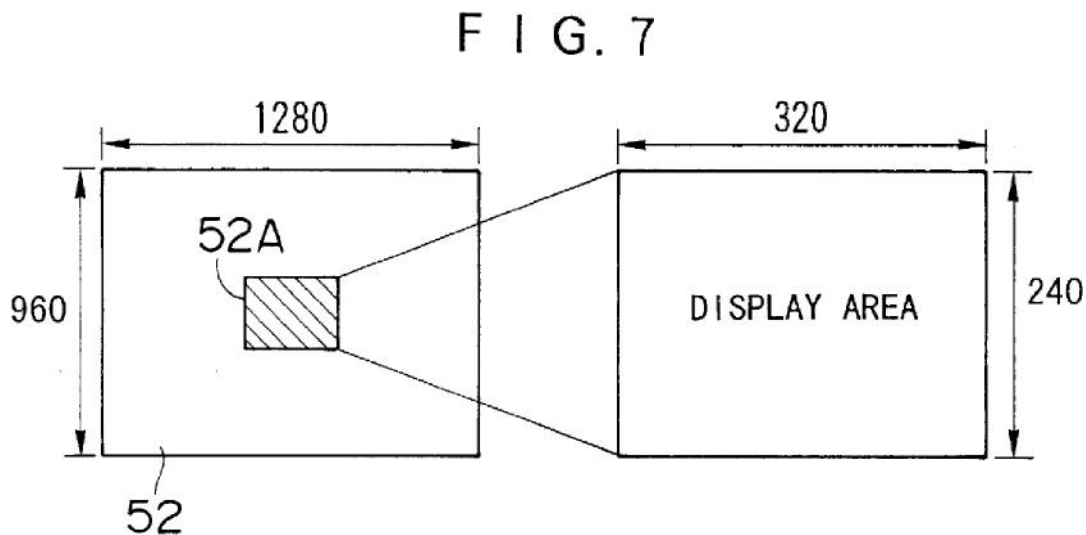
A control circuit and CPU drive the image sensor, whose output signal is processed by analog and digital circuits and then stored in memory. (Ex.1006 4:24-31, 5:50-60, 6:34-58; Ex.1004 ¶140.) The camera also includes a LCD electronic viewfinder, to *inter alia* display a captured still image or a “moving image” captured “before the input of the image-recording start signal” (*i.e.* a preview image). (Ex.1006 6:63-7:1, 7:63-8:3; Ex.1004 ¶138.) *Misawa ‘607* also teaches driving the sensor to read “1/2 of the photoelectric elements or all the photoelectric elements” to enable an “outside output mode” for an external display connected or a video output terminal and to further enable a macro image-capturing mode and a central part enlarging function. (Ex.1006 8:47-9:27; Ex.1004 ¶¶137, 141-146.)

*Misawa ‘607* teaches that, when capturing still images, a frame of image data is read from “all the photoelectric elements” of the image sensor. (Ex.1006 4:45-47, 6:32-34; Ex.1004 ¶139.) In contrast, when composing a still picture, preview images can be captured at a high refresh rate by driving the image sensor to read every fourth or eighth pixel line. (Ex.1006 1:65-2:5, 7:60-8:3; Ex.1004 ¶139.)

*Misawa ‘607* further teaches three different methods for providing a central part enlarging function which provide two additional view angles for which an area of 320 x 240 pixels is extracted and used. (Ex.1006 8:53-9:27; Fig. 7, Fig. 8, Fig.

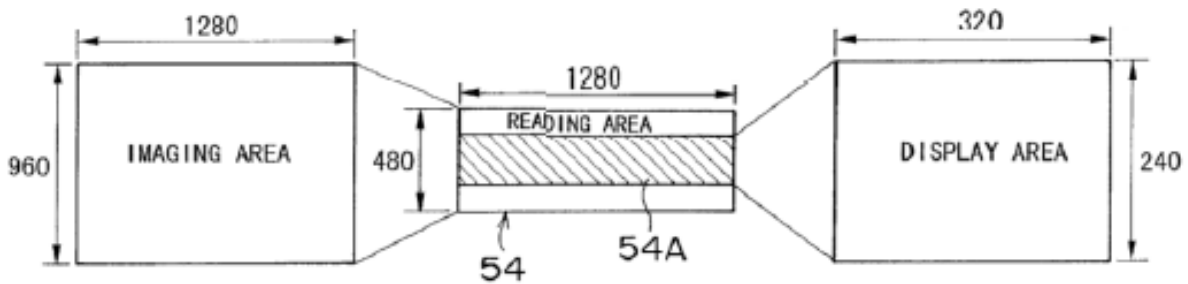
9, Fig. 10; Ex.1004 ¶141.) Both view angles that can be provided by the central part enlarging function are different from the view angle provided when the complete sensor area is used. (Ex.1004 ¶141.)

Fig. 7 below depicts the first “central part enlarging function” image-capturing method, where the image sensor is driven by reading all of the photoelectric elements, and only a central part 52A is displayed on an LCD having 320 x 240 pixels. (Ex.1006 8:49-52, 53-60; Fig. 7; Ex.1004 ¶142.)

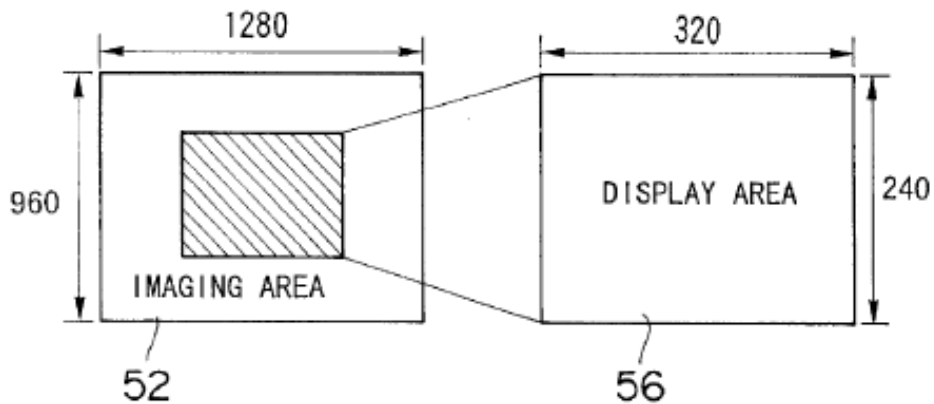


Figures 8 and 9 below depict the second “central part enlarging function” image-capturing method, where the image sensor is driven by reading 1/2 of the photoelectric elements, and an “area of 320 x 240 pixels, which is equivalent to a display area 56” is displayed on an LCD having 320 x 240 pixels. (Ex.1006 8:49-52, 61-9:4; Figs. 8, 9; Ex.1004 ¶¶143-144.)

F I G. 8



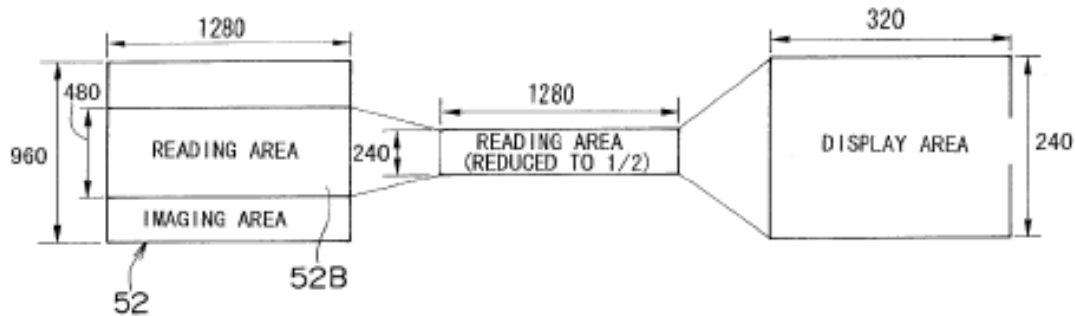
F I G. 9



*Misawa '607* also teaches a third “central part enlarging function” image-capturing method, in which only a vertically-central part 52B of the image sensor is read out, by reading 1/2 of the photoelectric elements in the vertical direction, as shown below in Fig. 10. (Ex.1006 8:49-52, 9:5-14; Fig. 10; Ex.1004 ¶145.)



F I G. 1 0



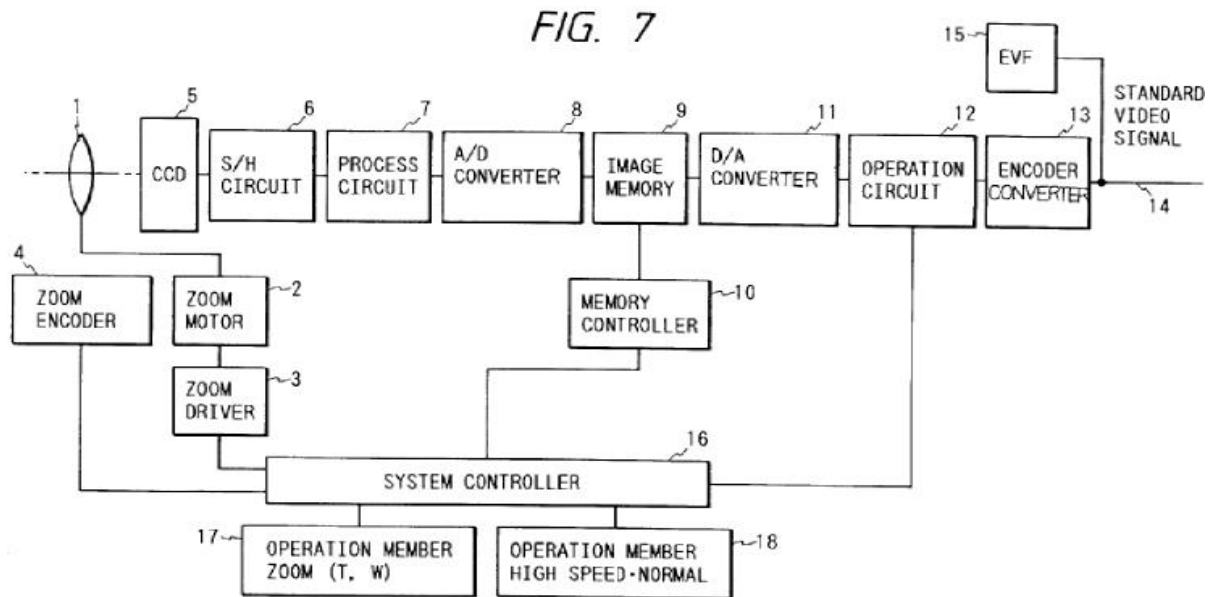
In the third method, the display area 56 is extracted from the imaging area 52 in the same way as shown in Fig. 9. The view angle depicted in Fig. 9 for the second and third methods is a much wider angle than the view angle depicted in Fig. 7 for the first method. (Ex.1006 8:53-9:14; Fig. 7, Fig. 9; Ex.1004 ¶146.)

## 2. *Okino '947* (Ex.1009)

U.S. Patent No. 5,990,947 ("*Okino '947*") is a patent filed by Tadashi Okino and Harunobu Ichinose. It was filed on July 14, 1998, issued on November 23, 1999, and claims the benefit *inter alia* of a December 29, 1992 U.S. patent application having an identical disclosure. (Ex.1017.) It was assigned to Canon Kabushiki Kaisha. It is prior art under 35 U.S.C. § 102(e).

*Okino '947* teaches a camera "having an optical zoom function using a zoom lens, and a so-called electronic zoom function achieved by electrical processing of an image pickup means." (Ex.1009 1:11-15; Ex.1004 ¶169.) The camera, shown in Fig. 7 below, includes an optical zoom lens 1 driven by a zoom motor 2, which

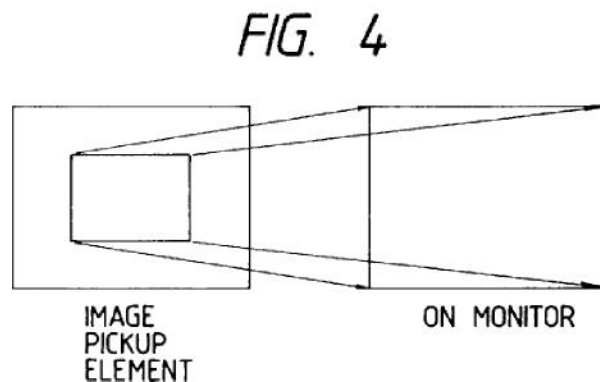
is controlled by a system controller 16 coupled to a zoom driver 3. (Ex.1004 ¶169.)



The signal from CCD image sensor 5 is processed by S/H (sample and hold) circuit 6 and process circuit 7, converted to a digital signal by A/D converter 8, and stored in image memory 9. An operation circuit 12 performs an interpolation operation to “attain an enlargement function.” An encoder 13 converts the output signal from the operation circuit into a “standard video signal such as an NTSC signal” which is used by an electronic viewfinder (EVF) 15 for “determining a composition, and confirming an object to be photographed.” A system controller 16 (*e.g.* a microprocessor) controls the circuit components. (Ex.1009 7:25-59; Fig. 7; Ex.1004 ¶¶170-171.)

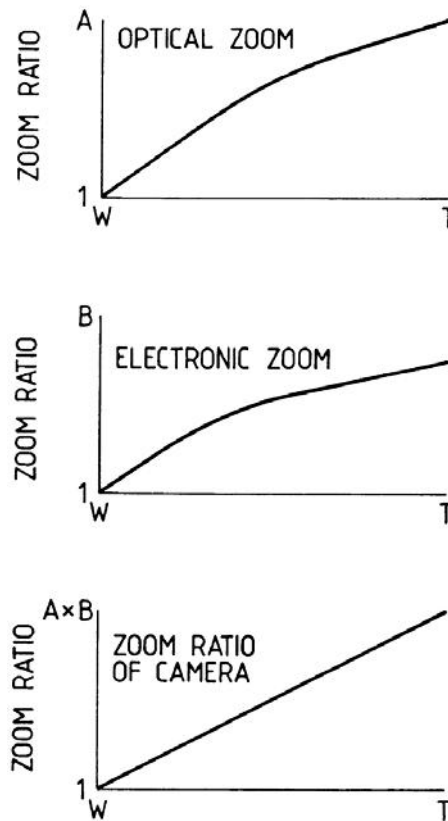
A “zoom operation member” 17, which is coupled to the system controller 16, controls both the optical zoom lens and the electronic zoom function, when another operating member 18 designates that the electronic zoom function should

be used. (Ex.1009 7:60-67.) Therefore, the switch which controls the view angle is a zoom switch which is interlocked with the optical zoom lens. (Ex.1004 ¶172.) When the electronic zoom function is used, “the central portion on the photo-sensitive surface of the image pickup element is displayed on a TV monitor in an enlarged scale,” as shown in Fig. 4 below. (Ex.1009 5:22-26, Fig. 4; Ex.1004 ¶173.)



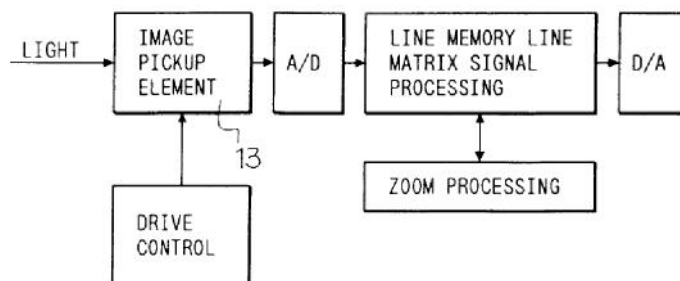
The electronic zoom can be used to continuously change the view angle, as shown by the electronic zoom graph in the center of Fig. 6 below. In this graph, the electronic zoom ratio continuously changes between a value of 1 and a value of B as the zoom setting is changed from the W (wide angle) setting to the T (telephoto) setting. One zooming operation (*e.g.* electronic zoom) is started before the other zooming operation (*e.g.* optical zooming) is stopped, “thus allowing a continuous, smooth zooming operation.” (Ex.1009 6:47-67; Fig.6; Ex.1004 ¶174.)

FIG. 6



*Okino '947* also teaches a block diagram, shown in Fig. 3 below, which depicts an arrangement for an “electronic zoom function.” (Ex.1009 5:14-26; Fig.3; Ex.1004 ¶175.)

FIG. 3



## **B. Legal Standards**

Examples of motivations for combining or modifying prior art references include “market forces,” “design incentives,” “interrelated teachings of multiple patents,” “any need or problem known in the field of endeavor at the time of invention and addressed by the patent,” and the “background knowledge,” “creativity,” and “common sense of the person of ordinary skill.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418–421 (2007). A combination or modification may be “obvious to try” if “[w]hen there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill [in the art] has good reason to pursue the known options within his or her technical grasp.” *Id.* at 421. “[T]he reason, suggestion, or motivation to combine may be found explicitly or implicitly: 1) in the prior art references themselves; 2) in the knowledge of those of ordinary skill in the art that certain references, or disclosures in those references, are of special interest or importance in the field; or 3) from the nature of the problem to be solved.” *Perfect Web Techs., Inc. v. InfoUSA, Inc.*, 587 F.3d 1324, 1329 (Fed. Cir. 2009) (citation omitted).

## **C. Claim 1 Is Rendered Obvious by *Misawa* ‘607 In View Of The Knowledge Of A POSITA.**

*Misawa* ‘607 teaches all elements of Claim 1. (Ex.1004 ¶468.) However, as set forth in element 1[E] below, if Patent Owner argues that the claims require a

single switch to change the view angle and that *Misawa '607* fails to disclose such a switch, a POSITA would have found it obvious to implement such a switch.

(Ex.1004 ¶468.)

## 1. Claim 1

### **Element 1[Preamble]: “An electric camera comprising:”**

*Misawa '607* teaches an electronic camera. (Ex.1006 1:8-13; Ex.1004 ¶470.)

### **Element 1[A]: “an image sensing device, with a light receiving surface having a quantity N of vertically arranged pixels, and an arbitrary quantity of pixels arranged horizontally,”**

*Misawa '607* teaches an image sensing device with a light receiving surface (“CCD 10” and “solid-state imaging device 28”) having N=960 vertically arranged pixels and 1280 pixels arranged horizontally. (Ex.1006 4:4-12, 6:16-20; Ex.1004 ¶471.)

### **Element 1[B]: “wherein N is greater than or equal to three times a quantity M of effective scanning lines of a display screen of a television system;”**

As the '604 patent states in the “Background of the Invention,” the NTSC television system has approximately **M=240** effective scanning lines per interlaced field (and thus approximately 480 total effective scanning lines per frame).

The NTSC system, for example, performs interlaced scanning on two fields, each of which has an effective scanning line number of about 240 lines (the number of scanning lines actually displayed on the monitor which is equal to the number of scanning lines in the vertical

blanking period subtracted from the total number of scanning lines in each field).

(Ex.1003 1:40-46, 5:6-13 (“[T]he number of effective scanning lines in the field of the NTSC system is assumed to be 240 lines . . . .”; Ex.1004 ¶¶472-473.)

A POSITA would have understood the “quantity M” in this claim element to refer to the number of effective scanning lines *per field* (and not per frame) as applied to a display screen for displaying interlaced television signals. (Ex.1004 ¶474.) The phrase “effective scan[ning] lines” is used in the ‘604 Patent to refer only to lines per field, and never lines per frame. (Ex.1003 1:40-46 *supra*, 5:6-13 *supra*, 7:48-53, 10:1-13, 10:30-40 (“effective scanning lines M of each field of the television system”), 12:46-54 (“effective scanning lines M of each field”), 15:20-30; Ex.1004 ¶474.) Moreover, construing the “quantity M” to refer to the number of effective scanning lines per frame would read out every embodiment in the specification, as the ‘604 Patent never describes sensors large enough to have three times as many vertically arranged pixels as the number of effective scanning lines *per frame* in the NTSC or PAL systems. (Ex.1004 ¶474.) Rather, the ‘604 Patent describes an image sensor with 1200 vertically arranged pixels, which is less than 1440, the value equal to 3 times the total number of effective scanning lines per frame in the NTSC television system. (Ex.1004 ¶474.)

*Misawa ‘607* teaches a display unit with a display screen (“LCD 40”). (Ex.1006 8:57-60, 9:1-4; Ex.1004 ¶475.) *Misawa ‘607* teaches that a “color

television signal format,” including *inter alia* “NTSC,” can be “adopted for display on the LCD 40.” (Ex.1006 8:4-11; Ex.1004 ¶475.)

To the extent this claim is deemed to positively recite the limitation “a display screen of a television system,” a POSITA would have understood the 240-line LCD display of *Misawa ‘607* to meet that limitation, and in particular, a display screen of the NTSC television system. (Ex.1004 ¶476.) *Misawa ‘607* expressly discloses that the NTSC television signal format can be adopted by the LCD. (Ex.1006 8:4-12; Ex.1004 ¶476.) Moreover, a POSITA would have been familiar with NTSC-compatible portable LCD televisions (on sale well before the time of the ‘604 patent’s effective filing date) having approximately 240 effective vertical lines. (Ex.1004 ¶¶80, 476.) A POSITA would also have been familiar with prior art video camcorders, like the Sharp ViewCam products, which had a large LCD electronic viewfinder with approximately 240 rows and could display NTSC video signals during both recording of the video signals onto magnetic videotape and play back of the recorded video signals. (Ex.1004 ¶¶83, 476.) Finally, a POSITA would have been familiar with the numerous other camcorders (on sale at the time of the ‘604 patent’s effective filing date) with similar LCD displays that could record and play back NTSC video. (Ex.1004 ¶476.)

Moreover, *Misawa ‘607* teaches a video output 41 for which the NTSC television signal format can be adopted. (Ex.1006 7:2-5; Ex.1004 ¶476.)



The **N=960** vertical lines of the *Misawa '607* image sensor is more than three times the 240 effective scanning lines per field of the NTSC television system. (Ex.1004 ¶477.)

**Element 1[C]: “a driver configured to drive the image sensing device to vertically mix or cull signal charges accumulated in individual pixels, at intervals of a quantity K of pixels, in order to produce a quantity of lines of output signals which corresponds to the quantity M of effective scanning lines,”**

*Misawa '607* teaches a driver (an “image sensor drive circuit,” comprising a “control circuit 46” and “CPU 48” which are “equivalent to a drive controller”). (Ex.1006 4:24-31, 5:50-60; Ex.1004 ¶478.)

*Misawa '607* teaches a first driver mode (“normal image capturing mode”) in which the driver is configured to drive a proportion of rows of the 960 rows of the image sensing device to vertically cull signal charges accumulated in individual pixels of every **K1=4** pixels to produce 240 lines of output signals (“if there are 960 pixels in a vertical direction, 240 pixels are read (in 1/4)”). (Ex.1006 5:12-23; 7:60-8:3; Ex.1004 ¶479.) The pictures are displayed as a moving image with a high refresh rate on the LCD display. (Ex.1006 3:15-23, 7:63-8:12, 10:3-34; Ex.1004 ¶479.)

*Misawa '607* further teaches a second driver mode (“central part enlarging function,” “third method”) in which the driver is configured to drive the image sensing device to vertically cull signal charges accumulated in individual pixels of

every  $K2=2$  pixels of a 480-line subset 52B of the image sensing device to produce 240 lines of output signals. (Ex.1006 8:49-52, 9:5-14, 9:25-27, Figs. 8, 9, 10; Ex.1004 ¶480.)

In both driver modes, the 240 lines of output signals correspond to the  $M=240$  effective scanning lines of the NTSC television system. (Ex.1004 ¶481.) *Misawa '607* further teaches that signals can be directly output in the NTSC color television signal format when that format is “adopted for display on the LCD 40.” (Ex.1006 8:4-11; Ex.1004 ¶481.)

**Element 1[D]: “wherein the quantity K is an integer less than or equal to an integer portion of a quotient of N divided by M;”**

The integer portion of the quotient of  $N=960$  divided by  $M=240$  is 4.  $K1=4$  is equal to 4.  $K2=2$  is less than 4. (Ex.1004 ¶482.)

**Element 1[E]: “a view angle change switch configured to input a request to change a view angle of a moving image; and”**

*Misawa '607* discloses that a request to change a view angle (“central part enlargement”) of a moving image (“moving image” displayed “before the input of the image-recording start signal”) is input by a switch (a “confirmation control part such as a central part enlargement button”). (Ex.1006 7:32-35, 8:45-52; Ex.1004 ¶483.) A POSITA would have understood from the disclosure in the ‘604 Patent that such a preview image is a “moving image” within the scope of the claims. (Ex.1004 ¶483; *see, e.g.*, Ex.1003 8:60-63, 12:20-23.)

*Misawa '607* also discloses that the control part 50 includes “a mode setting dial,” (Ex.1006 7:32-35), which a POSITA would have understood could be a multi-position rotary switch that the user can rotate to select from numerous mode settings. (Ex.1004 ¶484; *see, e.g.*, ¶¶108-110.)

A POSITA would have understood from the disclosure of *Misawa '607* that the “central part enlargement button” is a single switch that could directly switch between the “normal image capturing mode” (using K=4 with no enlargement) and the “central part enlarging function” (using K=2 with the enlargement shown in Figs. 9 and 10). (Ex.1004 ¶485.) The stated benefit of the “central part enlarging function” — namely, “confirming the focus” — is beneficial in both the “normal image capturing mode” and the “macro mode,” and nothing in the disclosure of *Misawa '607* requires that the “central part enlarging function” operate only in one such mode. (Ex.1006 8:45-9:14; Ex.1004 ¶485.) Accordingly, *Misawa '607* discloses this claim element.

Should Patent Owner argue that *Misawa '607* requires the “central part enlargement button” to operate only in “macro” mode (thereby requiring the operator to twice switch modes in order to change from the “normal image capturing mode” to the “central part enlarging function”) and further argue that the claims of the '604 Patent require a single switch to twice switch these modes, a POSITA would have nevertheless understood that the macro image-capturing

mode and the central part enlarging function could optionally be engaged using the same switch. (Ex.1004 ¶486.) For example, a POSITA would have found it obvious to implement the macro key and enlargement button in a single multi-position “switch” by which information for both features could be “input.” (Ex.1004 ¶486.) Such a switch, which could take the form of a dial, could allow a user to select among (1) normal image capture mode, (2) macro mode, and (3) “enlarged” macro mode (again, assuming *arguendo* that the “enlarging function” operated only in the macro mode). (Ex.1004 ¶486.) Alternatively, such a switch could take the form of a push button which enabled the user to repeatedly cycle between (1) normal image capture mode, (2) macro mode, and (3) “enlarged” macro mode each time the button was pressed. (Ex.1004 ¶486.)

*Misawa* ‘607 never illustrates or specifies a particular switch format for engaging the macro mode or the central part enlarging function; indeed, *Misawa* ‘607 characterizes the central part enlargement button as “possible” (*i.e.*, optional). (Ex.1006 8:45-52; Ex.1004 ¶487.) A variety of multi-position switches (including dials) had been commonly employed in cameras for over fifty years at the time of the ‘604 patent’s effective filing date. (Ex.1004 ¶487; *see, e.g. id.* ¶¶98-99, 101-103, 105-110, 116-118.) A multi-position switch would have been an obvious mechanism for selecting the driver modes disclosed in *Misawa* ‘607 in order to request a change in the view angle of the moving image displayed on the LCD 40

between the normal mode and the “enlarged” mode, whether or not the latter is engaged from within “macro” mode. (Ex.1004 ¶487.)

**Element 1[F]: “a signal processing unit configured to generate image signals by using the output signals of the image sensing device;”**

*Misawa* ‘607 teaches a signal processing unit (“analog signal processing part 30,” “A/D converter 32,” and “digital signal processing part 34”) configured to generate image signals by using the output signals of the image sensing device (“CCD 10” and “solid-state imaging device 28”). (Ex.1006 5:50-60, 6:34-58; Ex.1004 ¶488.)<sup>2</sup>

**Element 1[G]: “wherein when the request to change the view angle is to magnify an output image by the view angle change switch, the driver changes the quantity of K from a first value K1 to a second value K2, in order to read out image signals with the same quantity of output lines from different areas on the imaging sensing device wherein the first value K1 is larger than the second value K2;”**

*Misawa* ‘607 teaches that a user can request to change a view angle to magnify an output image (“enlarge” “the central part of the screen . . . for confirming the focus”) by requesting to change the view angle via the view angle change switch (a “central part enlargement button”). (Ex.1006 7:32-35, 8:45-52; Ex.1004 ¶489.) Upon such request, the driver changes the quantity of K from a first value K1=4 to a second value K2=2, in order to read out image signals with

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<sup>2</sup> The structure in *Misawa* ‘607 would meet this claim element whether or not this claim term is construed under 35 U.S.C. § 112¶6. (Ex.1004 ¶488.)

240 output lines from different areas on the imaging sensing device (*i.e.* the complete “imaging area 52 of the image sensor” before enlargement, and a “vertically-central part 52B . . . of the image sensor” during enlargement). (Ex.1006 7:55-8:3, 8:45-52, 9:5-14; Ex.1004 ¶489.)

Before and during enlargement, the quantity of output lines remains 240. (Ex.1004 ¶489.) K1=4 is larger than K2=2. (Ex.1004 ¶489.)

**Element 1[H]: “wherein the signal processing unit generates the image signals with the same scanning lines.”**

As described in reference to Element 1[G], whether in “normal image capturing mode” or the “central part enlarging function” “(third method),” the signal processing unit generates image signals with 240 scanning lines for viewing on the LCD display. (Ex.1006 3:15-23, 7:63-8:12, 10:3-34; Ex.1004 ¶490.)

**D. Claims 1-5 Are Rendered Obvious by *Misawa ‘607* In View of *Okino ‘947* and Further In View Of The Knowledge Of A POSITA.**

**1. Motivation to Combine References**

A POSITA would have known to combine the teachings of *Misawa ‘607* and *Okino ‘947* in the manner set forth in Claims 1-5. (Ex.1004 ¶491-500.)

*Misawa ‘607* teaches an electronic camera with a taking lens 22 which can be “a variable focal-length lens such as a zoom lens,” and also teaches that the “focus and zoom of the taking lens 22 are controlled through the control circuit 46.” (Ex.1006 5:61-65; Ex.1004 ¶491.) However, *Misawa ‘607* does not provide

any details describing the design of the zoom lens, nor how such a zoom lens is controlled “according to the signals inputted from the control part 50,” nor how the focus and zoom are operated together. (Ex.1006 5:61-65, 7:32-35; Ex.1004 ¶491.)

A POSITA would have looked to a reference such as *Okino '947* for its teachings concerning control of “an optical zoom function using a zoom lens.” (Ex.1009 1:12-13; Ex.1004 ¶492.) *Okino '947* provides a comprehensive design for an optical zoom function to serve as “a variable focal-length lens such a zoom lens” according to the teachings of *Misawa '607*. (Ex.1006 5:61-65; Ex.1004 ¶492.)

Moreover, when implementing the optical zoom teachings of *Okino '947*, a POSITA would have been motivated to further implement its “electronic zoom” teachings because, as set forth below as described in *Okino '947*, their combination overcomes known difficulties in maintaining focus during a zooming operation. (Ex.1004 ¶492.)

*Okino '947* teaches how a zoom lens comprising four lens groups is designed and controlled in order to provide a zooming operation in a photographic apparatus (such as the electronic camera of *Misawa '607*). *Okino '947* teaches that the first and third lens groups have positive refracting power and always remain stationary, and that the second lens group (which is a variator with a negative refractive power) and the fourth lens group (which is a compensator with positive

refractive power) “are moved along the optical axis to perform a zooming operation.” It also teaches that a stepping motor 9 moves the fourth lens group “to attain a focusing operation” and that an “E<sup>2</sup>PROM stores the focusing position of the fourth lens group according to the object distance and the position of the second lens group.” (Ex.1009 4:35-50, 5:8-11; Ex.1004 ¶493.

*Okino '947* also teaches that if the optical zoom lens is zoomed in (*i.e.* changed from a wide angle setting to a more telephoto setting) while in a blurred (*i.e.* out of focus) state, the blur will increase as the zoom lens setting becomes more telephoto. This is because the second and fourth lens groups are continuously moved in an out-of-focus state during the optical zoom operation. (Ex.1009 6:5-13; Ex.1004 ¶494.) In other words, it is difficult to adjust the fourth lens group to correct the focus while simultaneously moving the second and fourth lens groups to perform optical zoom. (Ex.1004 ¶494¶493.) *Okino '947* teaches that in this situation, “when a focus detection device determines an out-of-focus state during a zooming operation, the optical zoom function is switched to the electronic zoom function, and the focusing lens is moved based on the output from the focus detection device to enter the in-focus region.” (Ex.1009 6:34-38, 6:56-61; Ex.1004 ¶494.) Thus, by using continuous electronic zoom in this situation, rather than optical zoom, the lens can be focused by moving only the fourth lens group while the image is zoomed (*i.e.* in a telephoto state). Once proper focus is



achieved using the continuous electronic zoom function, the optical zoom function can be used. (Ex.1009 6:34-42; Ex.1004 ¶494.)

Therefore, a POSITA implementing the optical zoom lens system of *Okino* '947 as the “taking lens” of the electronic camera taught by *Misawa* '607 would have been motivated to include both *Okino* '947's optical zoom function *and* its continuous electronic zoom function in order to allow proper focusing during zoom operations. (Ex.1009 6:34-42; Ex.1004 ¶495.)

*Okino* '947 further teaches that “since a zooming operation can be completely electronically realized, the zooming speed can be arbitrarily increased (or decreased). Therefore, there is almost no limitation upon setting of the zooming speed.” (Ex.1009 7:9-12; Ex.1004 ¶496.) A POSITA would have recognized that providing a fast zooming operation is a desirable feature in a digital camera, and would therefore be separately motivated to include continuous electronic zoom as taught by *Okino* '947 in the electronic camera teachings of *Misawa* '607. (Ex.1004 ¶496.) A POSITA would also have been separately motivated to add *Okino* '947's electronic zoom teachings to *Misawa* '607's camera teachings to provide increased zoom range beyond the range of the optical zoom taking lens recited in *Misawa* '607, a feature expressly highlighted in *Okino* '947 and which consumers had come to desire as of the effective date of the '604 Patent. (Ex.1009 5:27-37; Ex.1004 ¶496.)

A POSITA would have found it simple and straightforward to apply *Okino '947*'s combined teachings regarding continuous electronic and optical zooming to the camera of *Misawa '607*. (Ex.1004 ¶497.) *Misawa '607* never specifies a particular zoom lens configuration to be used as a “taking lens,” nor suggests incompatibility with the zoom lens configuration taught by *Okino '947*.

(Ex.1004 ¶497.) A POSITA would have had a basic knowledge of optical properties for zoom lenses, and could, from the additional detailed guidance of *Okino '947*, successfully implement its electronic and optical zooming techniques within the electronic camera teachings of *Misawa '607* in the manner set forth below. (Ex.1004 ¶497.)

*Misawa '607* teaches that its driver can operate in multiple modes to drive different proportions of rows of its image sensing device to produce a consistent number of lines of output signals from different regions of the image sensing device (and, accordingly, different view angles). (Ex.1006 5:12-23; 7:60-8:3; 9:5-27; Ex.1004 ¶498.) *Misawa '607* uses that driver to “enlarge” “the central part of the screen . . . for confirming the focus.” (Ex.1006 8:45-52; Ex.1004 ¶498.)

A POSITA would have understood that *Misawa '607*'s driver would be able to drive different proportions of rows from different regions of the image sensing device when generating a zoomed-in (*i.e.* more telephoto) moving preview image under the interpolative electronic zooming taught by *Okino '947*. (Ex.1006 9:5-27;

Ex.1004 ¶498.) Selective readout of sensor rows and sensor regions is a functionality already present in the driver taught by *Misawa '607*, and a POSITA would have understood that such functionality could be desirably employed to improve the resolution of an interpolated preview image when the chosen electronic zoom ratio results in readout from an interior region of the display. (Ex.1004 ¶499.) Such implementation would be simple and straightforward, and (as set forth below) would result in a preview image generated from every fourth line of the sensor when utilizing an electronic zoom ratio resulting in a large view angle corresponding to a region of the sensor comprising more than 480 total adjacent lines, and a preview image generated from every second line of the sensor when utilizing an electronic zoom ratio resulting in a smaller view angle corresponding to an interior region of 480 adjacent lines or fewer. (Ex.1004 ¶499.) Such a readout method would accordingly ensure maximum resolution of the preview image while maintaining a fast refresh rate. (Ex.1004 ¶499.) (A POSITA would have understood that any still image acquired for storage from the previewed view angle would nonetheless use all image pixels from that region.) (Ex.1004 ¶499.)

This combination of *Misawa '607* and *Okino '947* would meet the limitations of Claims 1-5, as set forth below.

## 2. Claim 1

### **Element 1[Preamble]: “An electric camera comprising:”**

*Misawa '607* teaches an electronic camera. (Ex.1006 1:8-13; Ex.1004 ¶502.) *Okino '947* teaches *inter alia* optical and continuous electronic zooming methods for a “photographing apparatus,” which a POSITA would have understood could be an electronic camera. (Ex.1009 1:11-15; Ex.1004 ¶502.)

### **Element 1[A]: “an image sensing device, with a light receiving surface having a quantity N of vertically arranged pixels, and an arbitrary quantity of pixels arranged horizontally,”**

*Misawa '607* teaches an image sensing device with a light receiving surface (“CCD 10” and “solid-state imaging device 28”) having N=960 vertically arranged pixels and 1280 pixels arranged horizontally. (Ex.1006 4:4-12, 6:16-20; Ex.1004 ¶503.) The CCD and imaging device correspond to the “image pickup element 13” of *Okino '947* such that, when the optical and electronic zoom teachings of *Okino '947* are applied to the camera and image sensor teachings of *Misawa '607*, “an optical image formed by a zoom lens” is “convert[ed] . . . into an electrical signal.” (Ex.1009 4:51-53, Ex.1004 ¶503.)

### **Element 1[B]: “wherein N is greater than or equal to three times a quantity M of effective scanning lines of a display screen of a television system;”**

*Misawa '607* teaches all limitations of this element as set forth in Section VI.C, Ground 1 above. (Ex.1004 ¶¶470-475, 504.) The N=960 vertical lines of

the *Misawa '607* image sensor is more than three times the 240 effective scanning lines per field of the NTSC television system. (Ex.1004 ¶504.)

Moreover, *Okino '947* separately and expressly teaches outputting “a standard video signal 29 such as NTSC/PAL signal” to an “electronic view finder (EVF) . . . for confirming a photographing frame.” (Ex.1009 10:30-35; Ex.1004 ¶505.) Such a signal would be provided as the 240 effective scanning lines per field of the NTSC television system to the *Misawa '607* LCD display screen. (Ex.1004 ¶505.) The N=960 vertical lines of the *Misawa '607* image sensor is more than three times the 240 effective scanning lines per field of the NTSC output signal taught by *Okino '947*. (Ex.1004 ¶505.)

**Element 1[C]: “a driver configured to drive the image sensing device to vertically mix or cull signal charges accumulated in individual pixels, at intervals of a quantity K of pixels, in order to produce a quantity of lines of output signals which corresponds to the quantity M of effective scanning lines,”**

*Misawa '607* teaches all limitations of this element as set forth in Section VI.C, Ground 1, Element 1[C] above. (Ex.1004 ¶¶478-481, 506.) As set forth in Section VI.D.1 *supra* and with respect to Element 1[E] below, the driver modes of *Misawa '607* can be advantageously employed alongside the zooming teachings of *Okino '947* to change the view angle via a continuous electronic zoom coupled to an optical zoom when capturing a still image. (Ex.1004 ¶¶506, 508.)

**Element 1[D]: “wherein the quantity K is an integer less than or equal to an integer portion of a quotient of N divided by M;”**

*Misawa '607* teaches all limitations of this element as set forth in Section VI.C, Ground 1, Element 1[D] above. (Ex.1004 ¶¶482, 507.)

**Element 1[E]: “a view angle change switch configured to input a request to change a view angle of a moving image; and”**

*Okino '947* teaches a view angle change switch (“zooming operation member 17”) for changing a view angle of an image. (Ex.1009 7:60-67.) As set forth above, a POSITA would have been motivated to add the electronic and optical zooming features of *Okino '947* to the camera taught by *Misawa '607*. (Section VI.D.I *supra*; Ex.1004 ¶508.) Such modification would allow the camera user to use a single switch to change the view angle via a continuous electronic zoom coupled to an optical zoom when capturing a still image. (Ex.1004 ¶508.) The zoomed-in image could be previewed as a moving image on the LCD display. (Ex.1006 6:63-7:1, 10:3-34; Ex.1004 ¶508.) A POSITA would have understood from the disclosure in the '604 Patent that such a preview image is a “moving image” within the scope of the claims. (Ex.1004 ¶508; *see, e.g.*, Ex.1003 8:60-63, 12:20-23.)

**Element 1[F]: “a signal processing unit configured to generate image signals by using the output signals of the image sensing device;”**

*Misawa '607* teaches a signal processing unit (“analog signal processing part 30,” “A/D converter 32,” “digital signal processing part 34,” “memory 36,” and

“D/A 38”) configured to generate image signals by using the output signals of the image sensing device (“CCD 10” and “solid-state imaging device 28”). (Ex.1006 5:50-60, 6:34-58; Ex.1004 ¶509.)

*Okino* '947 teaches a similar signal processing unit (“sample & hold (S/H) circuit 6,” “process circuit 7,” “A/D conversion circuit 8,” “image memory 9,” “memory controller 10,” “D/A conversion circuit 11,” “operation circuit 12,” and “encoder circuit (converter) 13”) which, among other tasks, performs interpolation operations for an “enlargement function” when generating image signals. (Ex.1009 7:38-54; Ex.1004 ¶510.) Such interpolation teachings could readily be implemented in the signal processing unit of *Misawa* '607, which includes both analog and digital signal processing parts for performing pixel-level or line-level modifications of an image signal, as set forth below. (Ex.1004 ¶510.)<sup>3</sup>

**Element 1[G]: “wherein when the request to change the view angle is to magnify an output image by the view angle change switch, the driver changes the quantity of K from a first value K1 to a second value K2, in order to read out image signals with the same quantity of output lines from different areas on the imaging sensing device wherein the first value K1 is larger than the second value K2;”**

*Misawa* '607 teaches that a moving preview image—useful for framing an

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<sup>3</sup> The structure in *Misawa* '607 and *Okino* '947 would meet this claim element whether or not this claim term is construed under 35 U.S.C. § 112¶6. (Ex.1004 ¶510.)

image to be acquired—can be displayed on the LCD before input of an image-recording start signal, and that such a preview image can be advantageously enlarged (and, correspondingly, the view angle reduced) in order to confirm focus. (Ex.1006 6:63-7:1, 8:18-52; Ex.1004 ¶511.) *Misawa '607* further teaches that upon reducing the view angle to confirm focus, the image sensor changes drive modes to vertically cull signal charges by different proportions to increase the effective resolution of the preview image within the enlarged area. (Ex.1006 9:5-14, 9:25-27, Figs. 8, 9; Ex.1004 ¶511.) Specifically, *Misawa '607* teaches that the driver changes the quantity of K from a first value  $K1=4$  to a second value  $K2=2$ , in order to read out image signals with the same number of output lines (240) from different areas on the imaging sensing device (*i.e.* the complete “imaging area 52 of the image sensor” versus a “vertically-central part 52B . . . of the image sensor”). (Ex.1006 7:55-8:3, 8:45-52, 9:5-14; Ex.1004 ¶511.)  $K1=4$  is larger than  $K2=2$ . (Ex.1004 ¶511.)<sup>4</sup>

A POSITA applying the zooming features of *Okino '947* to the image sensor

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<sup>4</sup> *Misawa '607* also envisions additional step-wise view angle changes, and teaches that upon even greater enlargement of the image the image sensor again changes drive modes to cease culling signal charges from an interior area of the sensor to further increase the resolution of the preview image within the utilized area. (Ex.1006 8:53-60; Fig. 7; Ex.1004 ¶543.)



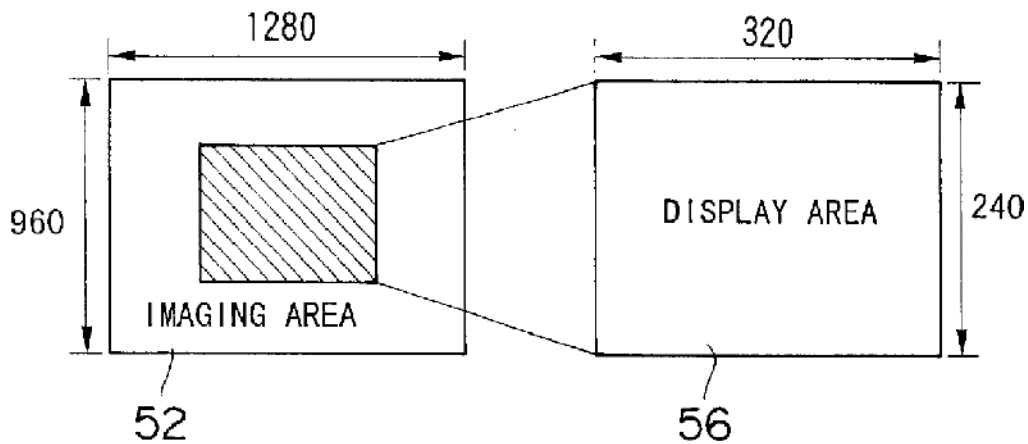
and image preview teachings of *Misawa '607* would be motivated to have the driver extract different proportions of rows from different regions of the image sensing device when generating a zoomed-in moving preview image by operation of the view angle change switch (“zooming operation member 17”) during the interpolative electronic zooming taught by *Okino '947*. (Ex.1006 8:53-9:14; Figs. 7, 9, 10; Ex.1009 5:14-37, 6:6-9, 6:48-51, Figs. 3, 7; Ex.1004 ¶512.)

Selective readout of sensor rows and sensor regions is a functionality already present in the driver taught by *Misawa '607*, and a POSITA would have understood that such functionality could be desirably employed to improve the resolution of an interpolated preview image when the chosen electronic zoom ratio results in readout from an interior region of the display. (Ex.1004 ¶512.) Such implementation would be simple and straightforward, and would ensure maximum resolution of a preview image while maintaining a fast refresh rate. (Ex.1004 ¶512.)

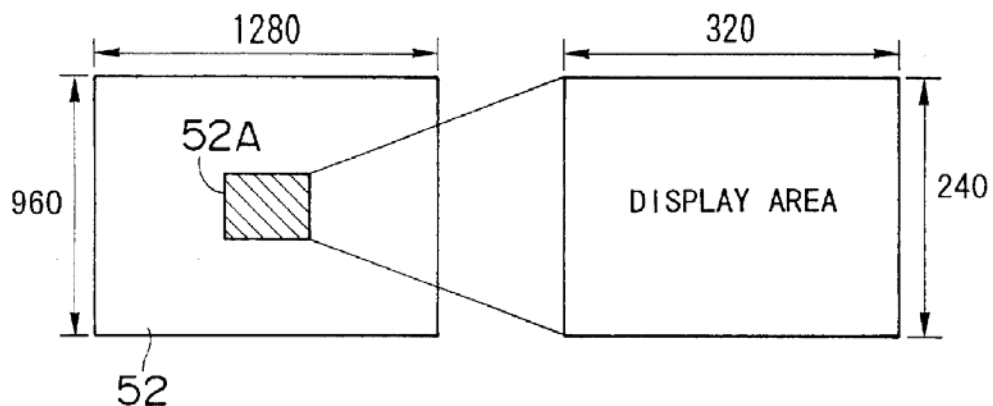
Under such combined teachings, an electronic zoom ratio resulting in a view angle *wider than* that obtained from the interior hatched portion of the image sensor region illustrated in *Misawa '607*'s Fig. 9 would cause the driver to cull the sensor by  $K1=4$  lines to produce a preview image (which would undergo an interpolation operation to attain the required enlargement needed to fit the LCD display), while a zoom ratio resulting in a view angle *equal to or narrower than*

that obtained from the interior hatched portion of the image sensor region 10 illustrated in Fig. 9, but still *wider than* the region 52A shown in Fig. 7, would instead cause the driver to cull the sensor by K2=2 lines to produce the preview image (which would also undergo an interpolation operation to attain the required enlargement needed to fit the LCD display). (Ex.1006 8:53-9:14; Figs. 8, 9; Ex.1004 ¶512.)

F I G . 9



F I G . 7



A POSITA would have been motivated to implement such a combination by

the express teaching of *Okino* '947 that “deterioration of image quality caused by the electronic zoom function” should be reduced when possible, and by the express teaching of *Misawa* '607 that a preview image of maximum resolution is desirable for focus confirmation. (Ex.1006 8:45-52; Ex.1009 11:55-63; Ex.1004 ¶513.)

Such combination could be implemented using (a) the driver teachings already used by *Misawa* '607 for focus confirmation along with (b) the zoom and signal processing teachings of *Okino* '947. (Ex.1004 ¶513.) *Okino* '947 teaches that the zoom ratio of the camera is equal to  $A \times B$ , where A is the optical zoom ratio and B is the electronic zoom ratio, and further teaches that “a smooth zooming operation” is desirable and that “the composition can be instantaneously determined using the electronic zoom function” after which the optical zoom lens is “moved to a magnification position determined by the electronic zoom function thereby eliminating deterioration of image quality caused by the electronic zoom function.” (Ex.1009 6:19-33, 7:16-20, Fig. 6; Ex.1004 ¶513.) This means that the magnification position of the electronic zoom (*i.e.* electronic zoom ratio) is necessarily maintained in memory and updated during each “step-up” operation 103 and “step-down” operation 106 in Fig. 8. (Ex.1004 ¶513.) This electronic zoom ratio is used to control an interpolation operation which performs an electronic zoom function that magnifies a portion of an image read from image memory 9. (Ex.1009 8:26-46; Ex.1004 ¶513.)

A POSITA would have found it straightforward to implement an interpolation operation which performs an electronic zoom function to magnify a portion of an image read from image memory 36 of *Misawa* '607. (Ex.1004 ¶514.)

A POSITA would also have found it straightforward to use the current electronic zoom ratio to instruct the sensor driver of *Misawa* '607 in changing the mixing/culling ratio, since the zoom position and electronic zoom information would directly correlate to the area of the image sensor being utilized and thereby determine the appropriate culling ratio in the manner already taught by *Misawa* '607. (Ex.1006 8:53-9:14; Figs. 7, 9, 10; Ex.1004 ¶514.)<sup>5</sup>

**Element 1[H]: “wherein the signal processing unit generates the image signals with the same scanning lines.”**

*Misawa* '607 teaches that regardless of enlargement mode, preview image signals should be generated with 240 scanning lines for viewing on the LCD display. (Ex.1006 3:15-23, 7:63-8:12, 10:3-34; Ex.1004 ¶515.)

*Okino* '947 teaches that its signal processing unit is configured to generate magnified image signals (“enlargement function,” “changing the read magnification”) with interpolation processing (“executes an interpolation

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<sup>5</sup> Although not required by the claims, a POSITA would have understood that any still image acquired for storage from the previewed view angle would nonetheless use all image pixels from that region. (Ex.1004 ¶514.)

operation”) according to the magnification factor set by the view angle switch (“zooming operation member 17”) to produce output signals with the same number of scanning lines. (Ex.1009 5:42-47, 7:38-51, 7:63-67; 8:26-37; Ex.1004 ¶516.)

Applying the zoom teachings of *Okino* '947 to the image preview teachings of *Misawa* '607 as set forth above, a POSITA would have understood that a preview image which had fewer than 240 rows of image data (such as when a user sets a view angle with a sensor readout region smaller than the fixed image readout areas in *Misawa* '607, *i.e.*, a readout region (1) smaller than the entire sensor area but wider than that obtained from the interior hatched portion of the image sensor region illustrated in *Misawa* '607's Fig. 9, in which  $K=4$ , or (2) even smaller than the interior hatched portion of the image sensor region illustrated in Fig. 9 but still wider than the region 52 A shown in Fig. 7, in which  $K=2$ ) would be enlarged by the interpolation operation to produce image signals with 240 scanning lines for viewing on the LCD display. (Ex.1006 8:53-9:14; Figs. 7, 9; Ex.1009 7:35-67; Ex.1004 ¶517.) A POSITA would have been motivated to perform such interpolation processing to advantageously utilize the complete display screen of the LCD display. (Ex.1004 ¶517.)

### 3. Claim 2

**Element 2[A]: “An electric camera according to the claim 1, wherein the view angle change switch is configured to input the request to continuously change the view angle of the moving image,”**

*Okino '947* teaches that the view angle change switch (“zooming operation member 17”) is configured to input a request to continuously change the view angle (“one zooming operation is started before the other zooming operation is stopped, thus allowing a continuous, smooth zooming operation,” “performs thin-out processing,” “zooming speed can be arbitrarily increased or decreased”) (Ex.1009 4:51-62, 6:64-67, 7:6-22, 7:60-67; Fig. 5, Fig. 6; Ex.1004 ¶519.) As set forth above, a POSITA applying the zooming features of *Okino '947* to the image sensor and image preview teachings of *Misawa '607* would be motivated to have the driver discontinuously change the image sensor drive mode during a continuous view angle change which reduces the view angle, to maximize preview image resolution for a given view angle selected by the user. (Element 1[G] *supra*; Ex.1004 ¶519.)

*Misawa '607* teaches that images generated by the image sensing device—obtained from optical images through *inter alia* taking lens 22, as modified by any signal processing — are previewed as a moving image on LCD 40 before recording. (Ex.1006 7:55-8:3, 8:28-43, 10:64-11:3; Ex.1004 ¶520.)

**Element 2[B]: “wherein the signal processing unit is configured to generate magnified image signals with interpolation processing, according to a magnification factor set by the view angle switch.”**

*Okino '947* teaches that the signal processing unit is configured to generate magnified image signals (“enlargement function,” “changing the read magnification”) with interpolation processing (“executes an interpolation operation”) according to a magnification factor set by the view angle switch (“zooming operation member 17”). (Ex.1009 5:42-47, 7:38-51, 7:63-67, 8:26-37; Ex.1004 ¶521.) *Okino '947* teaches that analog interpolation processing is performed by an “operation circuit 12” which a POSITA would have understood could be implemented between “D/A 38” and “LCD 40” of *Misawa '607* to generate magnified image signals with interpolation processing. (Ex.1009 7:47-50, Fig. 7; Ex.1006 6:59-61, Fig. 5; Ex.1004 ¶521.)

A POSITA would have understood the limitation of “interpolation processing” to encompass both analog and digital interpolation processing. (Ex.1004 ¶522.) The ‘604 Patent provides examples of digital interpolation (Ex.1003 11:22-64, 12:10-20, 12:34-39) but nowhere limits the claims to digital interpolation. (Ex.1004 ¶522.) Accordingly, *Okino '947* teaches this limitation as set forth above.

If Patent Owner contends (or the PTAB finds) that the claimed “interpolation processing” encompasses only digital interpolation processing, or

that the analog interpolation taught in *Okino* '947 otherwise fails to teach this claim element, a POSITA would alternatively have found it obvious to use digital interpolation to generate magnified image signals for display on LCD 40 of *Misawa* '607. (Ex.1004 ¶523.) Such digital interpolation is taught *e.g.* in the block diagram of Figure 3 of *Okino* '947, which depicts “an arrangement for realizing an electronic zoom function” including a “zoom processing” element operating on the digital line memory prior to conversion by a digital/analog converter for display. (Ex.1009 5:14-26, Figs. 3, 4; Ex.1004 ¶523.) Such digital interpolation techniques were also in the general knowledge of a POSITA at the time of the invention, as acknowledged by the '604 Patent's reference to such digital interpolation techniques as “ordinary.” (See Ex. 1003 12:10-20, 12:34-39; Ex.1004 ¶524.) A POSITA would have been motivated to alternatively implement such digital interpolation on the image signals in “memory 36” of *Misawa* '607 to facilitate *Misawa* '607's stated desire to use higher-quality images during image preview to confirm focus, as a POSITA would have known that digital interpolation (as compared to analog interpolation) generally provides a less noisy and more consistent moving image for preview display. (Ex.1006 2:47-55, 8:45-47; Ex.1004 ¶524.)

Therefore, whether “interpolation processing” is construed to encompass both analog interpolation processing and digital interpolation processing, or only



digital interpolation processing, this claim element is taught by *Okino '947*.

(Ex.1004 ¶525.)

#### 4. Claim 3

**“An electric camera according to the claim 2, wherein the view angle switch includes a zoom switch interlocked with an optical zoom mechanism.”**

*Okino '947* teaches that the view angle change switch is a zoom switch (“zooming operation member 17”) interlocked with an optical zoom mechanism (operation member 17 controls “the electronic zoom function together with the normal zoom function”). (Ex.1009 5:27-6:54, 8:13-19; Ex.1004 ¶527.) *Okino '947* gives multiple examples of “simultaneously driving the optical and electronic zoom functions . . . thus allowing a continuous, smooth zooming operation.” (Ex.1009 6:47-67, Fig. 5, Fig. 6; Ex.1004 ¶527.) In one such example, interlocking allows the camera to perform an initial electronic zoom of arbitrary speed (*e.g.* so that “a composition can be instantaneously determined”), and thereafter move the optical zoom lens into position to “eliminat[e] deterioration of image quality caused by the electronic zoom function” without disturbing the composition of the photograph. (Ex.1009 7:6-21, Fig. 8; Ex.1004 ¶527.)

A specific example of interlocking is shown *e.g.* in Fig. 8 of *Okino '947* where, once a desired view angle set by the zoom switch (*i.e.* operation member 17) has been obtained by electronic zoom, the camera incrementally increases the

optical zoom and correspondingly decreases the electronic zoom while maintaining the view angle until maximum resolution has been obtained. (Ex.1009 8:26-9:17, Fig. 8 steps 102-106; Ex.1004 ¶528.)

## **5. Claim 4**

### **Element 4[Pre]: “An electric camera comprising:”**

*Misawa '607* teaches an electronic camera. (Ex.1006 1:8-13; Ex.1004 ¶530.) *Okino '947* teaches a lens position control method for a “photographing apparatus” which a POSITA would have understood could be an electronic camera. (Ex.1009 1:11-15; Ex.1004 ¶530.)

### **Element 4[A]: “an image sensing device, with a light receiving surface having a quantity N of pixels arranged vertically, and an arbitrary quantity of pixels arranged horizontally,”**

*Misawa '607* teaches an image sensing device with a light receiving surface (“CCD 10” and “solid-state imaging device 28”) having N=960 vertically arranged pixels and 1280 pixels arranged horizontally. (Ex.1006 4:4-12, 6:16-20; Ex.1004¶531.) The CCD and imaging device correspond to the “image pickup element 13 of *Okino '947* such that, when the optical and electronic zoom teachings of *Okino '947* are applied to the camera and image sensor teachings of *Misawa '607*, “an optical image formed by a zoom lens” is “convert[ed] . . . into an electrical signal.” (Ex.1009 4:51-53, Ex.1004 ¶531.)

**Element 4[B]: “wherein N is greater than three times a quantity M of effective vertical lines of a television system;”**

As the ‘604 patent states in the “Background of the Invention,” the NTSC television system has approximately **M=240** effective vertical lines per interlaced field (and thus approximately 480 total effective vertical lines per frame).

The NTSC system, for example, performs interlaced scanning on two fields, each of which has an effective scanning line number of about 240 lines (the number of scanning lines actually displayed on the monitor which is equal to the number of scanning lines in the vertical blanking period subtracted from the total number of scanning lines in each field).

(Ex.1003 1:40-46, 5:6-13 (“[T]he number of effective scanning lines in the field of the NTSC system is assumed to be 240 lines . . . .”; Ex.1004 ¶532.)

A POSITA would have understood the “quantity M” in this claim element to refer to the number of effective vertical lines *per field* (and not per frame).

(Ex.1004 ¶533.) The phrase “effective vertical lines” is not used in the ‘604 Patent specification, but the similar phrase “effective scan[ning] lines” is used in the ‘604 Patent specification to refer only to lines per field, and never lines per frame.

(Ex.1003 1:40-46 *supra*, 5:6-13 *supra*, 7:48-53, 10:1-13, 10:30-40 (“effective scanning lines M of each field of the television system”), 12:46-54 (“effective scanning lines M of each field”), 15:20-30; Ex.1004 ¶533.) Moreover, construing

the “quantity M” to refer to the number of effective vertical lines per frame would read out every embodiment in the specification, as the ‘604 Patent never describes sensors large enough to have three times as many vertically arranged pixels as the number of effective vertical lines *per frame* in the NTSC or PAL systems.

(Ex.1004 ¶533.) Rather, the ‘604 Patent describes an image sensor with 1200 vertically arranged pixels, which is less than 1440, the value equal to 3 times the total number of effective scanning lines per frame in the NTSC television system. (Ex.1004 ¶533.)

*Misawa ‘607* teaches a display unit with a display screen (“LCD 40”) having a display area of 320 x 240 pixels, or 240 effective scanning lines. (Ex.1006 8:57-60, 9:1-4; Ex.1004 ¶534.) *Misawa ‘607* teaches that a “color television signal format,” including *inter alia* “NTSC,” can be “adopted for display on the LCD 40.” (Ex.1006 8:4-11; Ex.1004 ¶534.)

To the extent this claim is deemed to positively recite the limitation “a display screen of a television system,” a POSITA would have understood the 240-line LCD display of *Misawa ‘607* to meet that limitation, and in particular, a display screen of the NTSC television system. (Ex.1004 ¶535.) *Misawa ‘607* expressly discloses that the NTSC television signal format can be adopted by the LCD. (Ex.1006 8:4-12; Ex.1004 ¶535.) Moreover, a POSITA would have been familiar with NTSC-compatible portable LCD televisions (on sale well before the

time of the '604 patent's effective filing date) having approximately 240 effective vertical lines. (Ex.1004 ¶¶80, 535.) A POSITA would also have been familiar with prior art video camcorders, like the Sharp ViewCam products, which had a large LCD electronic viewfinder with approximately 240 rows and could display NTSC video signals during both recording of the video signals onto magnetic videotape and play back of the recorded video signals. (Ex.1004 ¶¶83, 535.) Finally, a POSITA would have been familiar with the numerous other camcorders (on sale at the time of the '604 patent's effective filing date) with similar LCD displays that could record and play back NTSC video. (Ex.1004 ¶535.)

Moreover, *Okino '947* separately and expressly teaches outputting “a standard video signal 29 such as an NTSC/PAL signal” to an “electronic view finder (EVF) 30 . . . for confirming a photographing frame.” (Ex.1009 10:30-35; Ex.1004 ¶536.) Such a signal would be provided as the 240 effective scanning lines per field of the NTSC television system to the *Misawa '607* LCD display screen. (Ex.1004 ¶536.)

The **N=960** vertical lines of the *Misawa '607* image sensor is more than three times the 240 effective scanning lines per field of the NTSC output signal taught by *Okino '947*. (Ex.1004 ¶537.)

**Element 4[C]: “a signal processing unit configured to generate and output image signals with the quantity M of effective vertical lines of the television system, by using output signals of the image sensing device,”**

*Misawa* ‘607 teaches a signal processing unit (“analog signal processing part 30,” “A/D converter 32,” “digital signal processing part 34,” “memory 36,” and “D/A 38”) configured to generate image signals by using the output signals of the image sensing device (“CCD 10” and “solid-state imaging device 28”). (Ex.1006 5:50-60, 6:34-58; Ex.1004 ¶538.)

*Okino* ‘947 teaches a similar signal processing unit (“sample & hold (S/H) circuit 6,” “process circuit 7,” “A/D conversion circuit 8,” “image memory 9,” “memory controller 10,” “D/A conversion circuit 11,” “operation circuit 12,” and “encoder circuit (converter) 13”) which, among other tasks, performs interpolation operations for an “enlargement function” when generating image signals. (Ex.1009 7:38-54; Ex.1004 ¶539.) Such interpolation teachings could readily be implemented in the signal processing unit of *Misawa* ‘607, which includes both analog and digital signal processing parts for performing pixel-level or line-level modifications of an image signal, as set forth below. (Ex.1004 ¶539.)<sup>6</sup>

*Misawa* ‘607 teaches that regardless of enlargement mode, image signals

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<sup>6</sup> The structure in *Misawa* ‘607 and *Okino* ‘947 would meet this claim element whether or not this claim term is construed under 35 U.S.C. § 112¶6. (Ex.1004 ¶539.)

should be generated with 240 scanning lines for viewing on the LCD display.

(Ex.1006 3:15-23, 7:63-8:12, 10:3-34; Ex.1004 ¶540.)

*Okino '947* teaches that its signal processing unit is configured to generate magnified image signals (“enlargement function,” “changing the read magnification”) with interpolation processing (“executes an interpolation operation”) according to the magnification factor set by the view angle switch (“zooming operation member 17.”) (Ex.1009 5:42-47, 7:38-51, 7:63-67, 8:26-37; Ex.1004 ¶541.) Applying the zoom teachings of *Okino '947* to the image preview teachings of *Misawa '607* as set forth above, a POSITA would have understood that a preview image which had fewer than 240 rows of image data (such as when a user sets a view angle with a sensor readout region smaller than the fixed image readout areas in *Misawa '607*, i.e., a readout region (1) smaller than the entire sensor area but wider than that obtained from the interior hatched portion of the image sensor region illustrated in *Misawa '607*’s Fig. 9, in which K=4 or (2) even smaller than the interior hatched portion of the image sensor region illustrated in Fig. 9 but still wider than the region 52A shown in Fig. 7, in which K=2) would be expanded by the interpolation operation to produce image signals with 240 scanning lines for viewing on the LCD display. (Ex.1006 8:53-9:14; Figs. 7, 9; Ex.1009 7:35-67; Ex.1004 ¶541.)

**Element 4[D]: “a zoom switch configured to enable a user to input zooming operation information,”**

*Okino '947* teaches a zoom switch (“zooming operation member 17”) configured to enable a user to input zooming operation information to change a view angle of an image. (Ex.1009 7:60-67.) As set forth above, a POSITA would have been motivated to add the electronic and optical zooming features of *Okino '947* to the camera taught by *Misawa '607*. (Section VI.D.I *supra*; Ex.1004 ¶542.) Such modification would allow the camera user to use a single switch to change the view angle via a continuous electronic zoom coupled to an optical zoom when capturing a still image. (Ex.1004 ¶542.) The zoomed-in image could be previewed as moving image on the LCD display. (Ex.1006 6:63-7:1, 10:3-34; Ex.1004 ¶542.)

**Element 4[E]: “wherein the signal processing unit generates the image signals, read out with mixing or culling vertical pixel lines of signals, at pixel intervals of a quantity K of lines, from different areas of the imaging device,”**

*Misawa '607* teaches that preview image signals are generated for an LCD display from different areas of the imaging device when framing an image to be acquired. Specifically, *Misawa '607* teaches that a preview image can be generated by reading out a proportion of rows of the 960 rows of the image sensing device to vertically cull signal charges accumulated in individual pixels of every **K1=4** pixels to produce 240 lines of output signals (“if there are 960 pixels in a



vertical direction, 240 pixels are read (in 1/4”). (Ex.1006 5:12-23; 7:60-8:3; Ex. 1004 ¶543.) *Misawa* ‘607 further teaches that an enlarged preview image can be generated from an interior area of the imaging device in order to confirm focus, by culling signal charges accumulated in individual pixels of every **K2=2** pixels of a different, 480-line subset 52B of the image sensing device to again produce 240 lines of output signals. (Ex.1006 6:63-7:1, 8:18-52, 9:5-14, 9:25-27, Figs. 8, 9; 20 Ex.1004 ¶543.)<sup>7</sup> *Okino* ‘947 teaches that the signal processing unit reads signal charges from the image sensing device, optionally performs an interpolative electronic zooming operation (“enlargement function”), and then outputs image signals. (Ex.1009 7:34-67; Ex.1004 ¶544.) As set forth with respect to Element 4[C] *supra*, applying the zoom teachings of *Okino* ‘947 to the image preview teachings of *Misawa* ‘607 would result in the signal processing unit generating preview images having mixed or culled vertical pixel lines, from different areas of the imaging device, under interpolative electronic zooming to produce image signals with 240 scanning lines for viewing on the LCD display. (Ex.1006 8:53-

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<sup>7</sup> *Misawa* ‘607 also teaches generating images from an even smaller area of the imaging device, such that upon even greater enlargement of the image, the image sensor again changes drive modes to cease culling signal charges from an interior area of the sensor to further increase the effective resolution of the preview image within the utilized area. (Ex.1006 8:53-60; Fig. 7; Ex.1004 ¶543.)

9:14; Figs. 7, 9; Ex.1009 7:35-67; Ex.1004 ¶544.)

**Element 4[F]: “the areas being continuously changed, and the quantity K being discontinuously changed according to magnification factors.”**

*Okino '947* teaches that the zoom switch (“zooming operation member 17”) is configured to input a request to continuously change the view angle (“one zooming operation is started before the other zooming operation is stopped, thus allowing a continuous, smooth zooming operation”). (Ex.1009 4:51-62, 6:64-67, 7:6-22, 7:60-67; Fig. 5, Fig. 6; Ex.1004 ¶545.) During such continuous view angle change, the optical and electronic zoom functions are “simultaneously driv[en],” and the electronic zoom results in a continuous change to the utilized area of the imaging device. (Ex.1009 5:27-6:54, 8:13-19, Fig. 5, Fig. 6; Ex.1004 ¶545.)

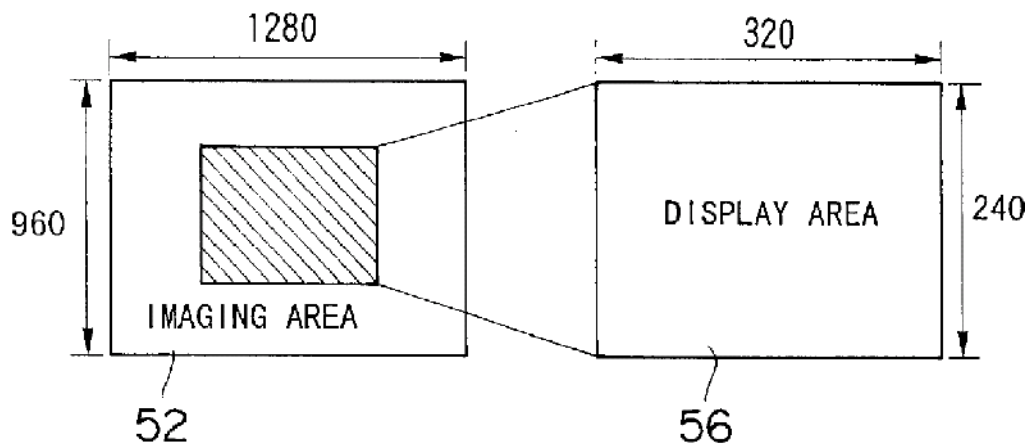
A POSITA applying the zooming features of *Okino '947* to the image sensor and image preview teachings of *Misawa '607* would be motivated to have the driver change the image sensor drive mode when continuously changing magnification factors by operation of the zoom switch to maximize preview image resolution for a given view angle selected by the user (and thus the utilized area of the imaging device). (Ex.1006 8:53-9:14; Figs. 7, 9, 10; Ex.1004 ¶546.) *Misawa '607* teaches that its driver can operate in multiple modes to drive different proportions of rows of its image sensing device to produce a consistent number of lines of output signals from different regions of the image sensing device (and, accordingly, different view angles). (Ex.1006 5:12-23; 7:60-8:3; 9:5-27; Ex.1004

¶547.) *Misawa '607* uses its driver to “enlarge” “the central part of the screen . . . for confirming the focus.” (Ex.1006 8:45-52; Ex.1004 ¶547.) A POSITA would have understood that *Misawa '607*’s driver would be able to drive different proportions of rows from different regions of the image sensing device when generating a zoomed-in moving preview image under the interpolative electronic zooming taught by *Okino '947*. (Ex.1006 9:5-27; Ex.1004 ¶547.)

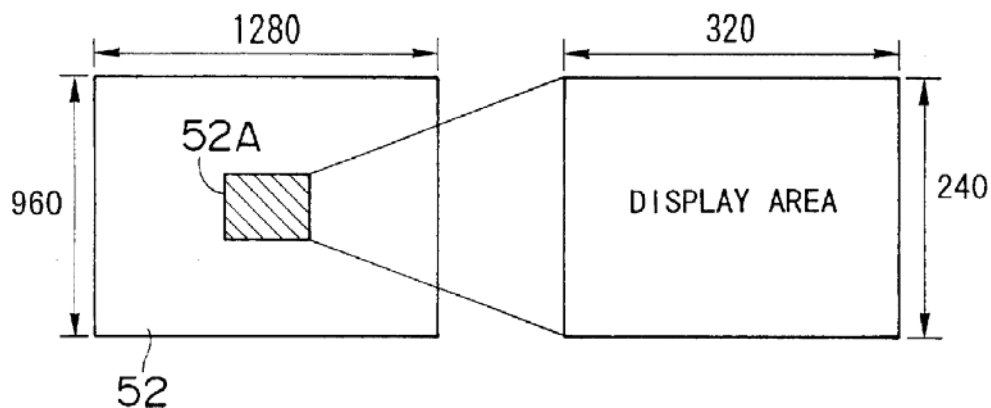
Selective readout of sensor rows and sensor regions is a functionality already present in the driver taught by *Misawa '607*, and a POSITA would have understood that such functionality could be desirably employed to improve the resolution of an interpolated preview image when the chosen electronic zoom ratio results in readout from an interior region of the display. (Ex.1004 ¶548.) Under such combined teachings, a magnification factor using an image sensor region 56 larger than that illustrated in *Misawa '607*’s Fig. 9 would cause the driver to cull the sensor by  $K1=4$  lines to produce a preview image (which would undergo an interpolation operation to obtain the required enlargement needed to fit the LCD display), while a magnification factor using an image sensor region 56 smaller than that illustrated in Fig. 9 below, but larger than the region 52A shown in Fig. 7 below, would cause the driver to discontinuously change the culling ratio to  $K2=2$  lines to produce the preview image (which would also undergo an interpolation operation to attain the required enlargement needed to fit the LCD display).

(Ex.1006 8:53-9:14; Fig. 7, Fig. 9; Ex.1004 ¶549.)

F I G . 9



F I G . 7



A POSITA would have been motivated to implement such a combination by the express teaching of *Okino* '947 that “deterioration of image quality caused by the electronic zoom function” should be reduced when possible and the express teaching of *Misawa* '607 that a preview image of maximum resolution is desirable for focus confirmation. (Ex.1006 8:45-52; Ex.1009 11:55-63; Ex.1004 ¶550.)

Such combination could be implemented using the driver teachings of *Misawa* '607 and the zoom and signal processing teachings of *Okino* '947. (Ex.1004 ¶550.) *Okino* '947 teaches that magnification information corresponding to the zoom position is maintained in memory and can be used to control an interpolation operation which performs an electronic zoom function that magnifies a portion of an image read from image memory 9. (Ex.1009 5:42-47, 5:56-6:54, 7:35-67; Ex.1004 ¶550.) A POSITA would have found it straightforward to implement an interpolation operation which performs an electronic zoom function that magnifies a portion of an image read from image memory 36 of *Misawa* '607 and to use the stored magnification information to further control the sensor driver of *Misawa* '607 to change the mixing/culling ratio when zoomed in by way of the zoom switch ("zooming operation member 17"), since the zoom position and electronic zoom information would directly correlate to the area of the image sensor being utilized and thereby determine the appropriate culling ratio in the manner already taught by *Misawa* '607. (Ex.1006 8:53-9:14; Figs. 7, 9, 10; Ex.1004 ¶550.)<sup>8</sup>

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<sup>8</sup> Although not required by the claims, a POSITA would have understood that any still image acquired for storage from the previewed view angle would nonetheless use all image pixels from that region. (Ex.1004 ¶550.)

## 6. Claim 5

**“An electric camera according to the claim 4, wherein the zoom switch is interlocked with an optical zoom mechanism.”**

*Okino '947* teaches that the zoom switch (“zooming operation member 17”) is interlocked with an optical zoom mechanism (operation member 17 controls “the electronic zoom function together with the normal zoom function”). (Ex.1009 5:27-6:54, 8:13-19; Ex.1004 ¶552.) *Okino '947* gives multiple examples of “simultaneously driving the optical and electronic zoom functions . . . thus allowing a continuous, smooth zooming operation.” (Ex.1009 6:47-67, Fig. 5, Fig 6; Ex.1004 ¶552.) In one such example, interlocking allows the camera to perform an initial electronic zoom of arbitrary speed (*e.g.* so that “a composition can be instantaneously determined”), and thereafter move the optical zoom lens into position to “eliminat[e] deterioration of image quality caused by the electronic zoom function” without disturbing the composition of the photograph. (Ex.1009 7:6-21, Fig. 8; Ex.1004 ¶552.)

A specific example of interlocking is shown *e.g.* in Fig. 8 of *Okino '947*, where once a desired view angle set by the zoom switch (*i.e.* operation member 17) has been obtained by electronic zoom, the camera incrementally increases the optical zoom and correspondingly decreases the electronic zoom while maintaining the view angle until maximum resolution has been obtained. (Ex.1009 8:26-9:17, Fig. 8 steps 102-106; Ex.1004 ¶553.)

## VII. CONCLUSION

Petitioner has demonstrated a reasonable likelihood that Claims 1-5 of the '604 Patent are invalid. Petitioner respectfully requests that trial on the '604 Patent be instituted. In addition, Petitioner has shown, by a preponderance of the evidence as presented, that Claims 1-5 are invalid and thus must be canceled.

Respectfully submitted,

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Dated: October 16, 2018

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## **CERTIFICATE OF SERVICE**

The undersigned certifies service pursuant to 37 C.F.R. §§ 42.6(e) and 42.105(b) on Patent Owner by USPS Express Mail of a copy of this Petition for *Inter Partes* Review and supporting materials at the correspondence address of record for the '604 patent:

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## **CERTIFICATE OF COMPLIANCE**

The undersigned certifies this document complies with the type-volume limitation of 37 C.F.R. § 42.24. The petition contains 13,072 words, as calculated by the Microsoft Word program excluding the parts of the brief exempted by 37 C.F.R. § 42.24(a).

Dated: October 16, 2018

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