UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD, and

SAMSUNG ELECTRONICS AMERICA, INC.,

Petitioners,

v.

CELLECT, LLC,

Patent Owner.

Case IPR2020-00561

U.S. Patent No. 6,982,742

PETITION FOR *INTER PARTES* REVIEW

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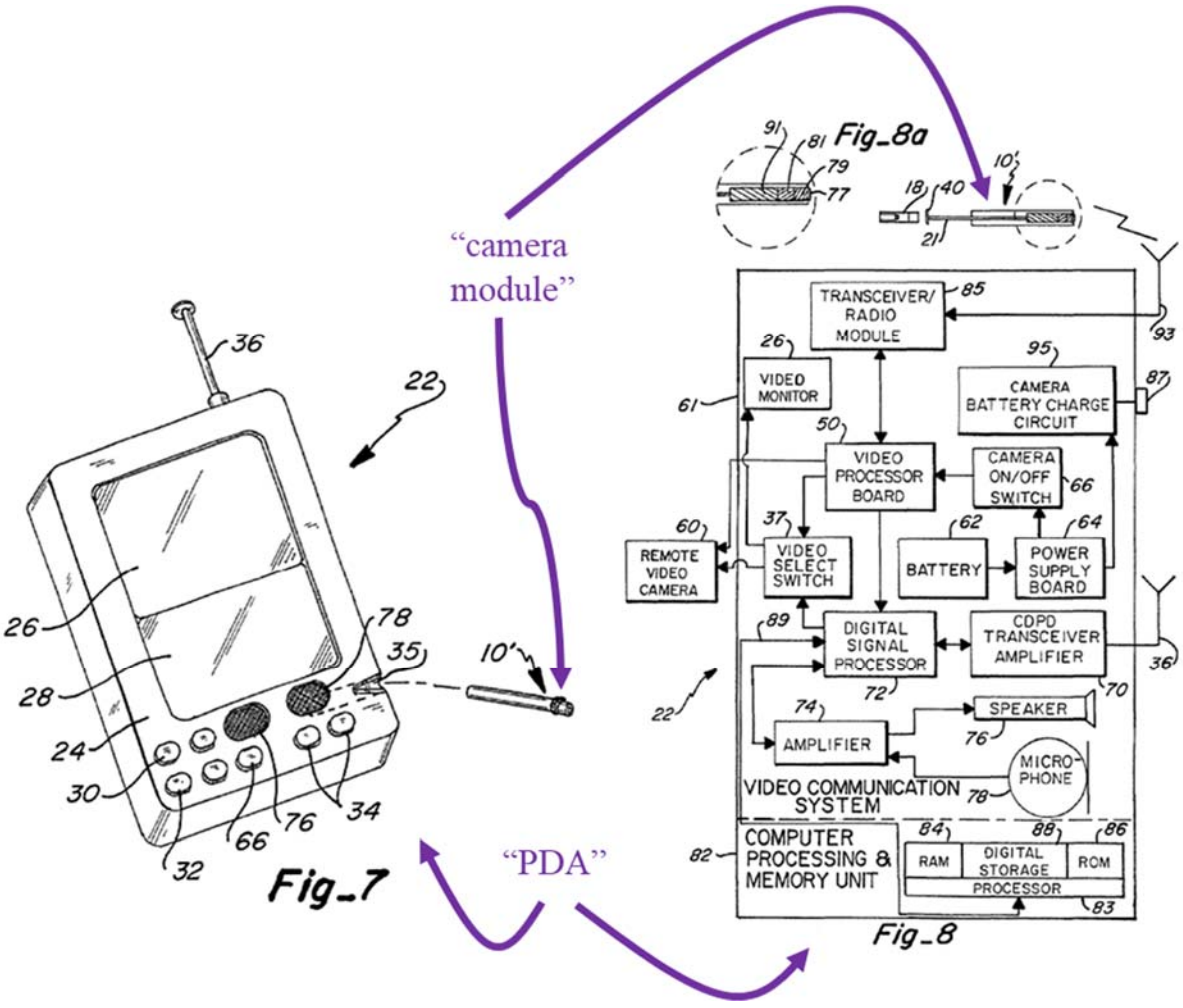
Pursuant to §§311-319 and §42,[1] Samsung Electronics Co., Ltd, and Samsung Electronics America, Inc., ("Petitioner") petition for *inter partes* review ("IPR") of claims 42, 58, and 66 ("Claims") of U.S. Patent 6,982,742 ("'742") (Ex. 1001), assigned to Cellect, LLC ("PO") according to USPTO records. There is a reasonable likelihood at least one challenged claim is unpatentable as explained herein. Petitioner requests review of the Claims, and judgment finding them unpatentable under §103.

I. INTRODUCTION

'742's purported invention is using a "reduced area imaging device" (*i.e.*, a camera) "in combination with a handheld computer or PDA." '742, 4:44-46, Abstract.

For example, as shown in Figures 7-8a, a camera module 10' is connected to a personal digital assistant ("PDA") 22.

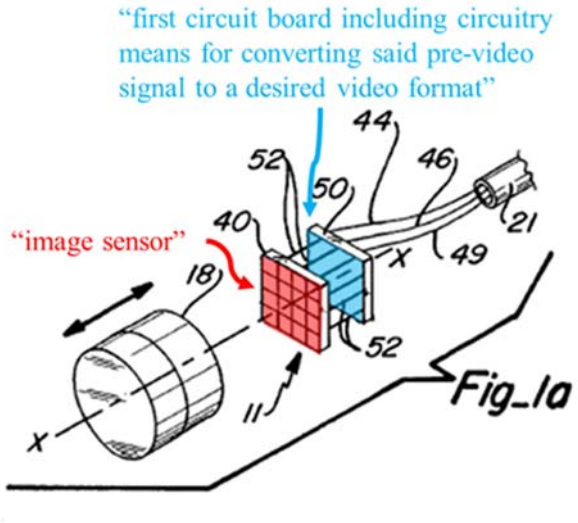
[1] Section cites are to 35 U.S.C. or 37 C.F.R. as context indicates, and all emphasis/annotations added unless noted. Annotations generally apply the language of the Claims.



'742, 12:61-13:7.

'742 places an image sensor and processing circuitry on different boards or chips. As in Figure 1a, '742 places an image sensor 40 outputting a pre-video signal

and video processing board 50 converting the pre-video signal to a post-video signal on separate planes in the camera module 10:[2]



'742, 10:5-:11. Within this arrangement, timing and control circuitry for the image sensor can be placed together with a pixel array in the image sensor 40, together with the image processing board 50, or separate from both. '742, 4:55-60, 14:49-51.

'742 admits PDAs "accommodat[ing]" cameras were well known in the art at the time of '742's filing. *E.g.*, '742, 3:46-63.

And '742 acknowledges it applies to a "standard PDA" known in this timeframe. *Id.*, 3:59-65. Indeed, PO has asserted in parallel litigation the claimed

[2] '742 states camera module 10' and 10 are interchangeable, "with the exception that there is no cable or cord interconnecting the camera module 10' to the PDA device 22." '742, 12:65-13:1.

PDAs were merely a combination of a "reduced area imaging device" and "products such as PDAs and wireless telephones *that existed at the time*." Ex. 1017, 6-7.[3] Others like **Harris** (Ex. 1052) had already taught a PDA including a camera. Harris, 1:23-34, Figs. 1-2.

The only purportedly novel feature in '742 is the concept of rearranging the pixel array of the image sensor, the timing and control circuitry, and the video processing board to minimize the size of the imaging device. For example, the Examiner allowed the Claims based on the claimed camera's location of timing and control circuitry and video processing circuitry. Ex. 1002, 120, 198. But, as '742 readily admits, complementary metal oxide semiconductors ("CMOS") imaging devices were well-known solid-state image sensors, and were known to be smaller and have simpler system interfaces than other solid-state image sensors. *E.g.*, '742, 1:30-38, 1:53-63. As discussed herein, it was already well-known to configure the components of a CMOS imaging device, including its image sensor and the related circuitry, in the very same way as '742 to minimize the overall size of the device.

As shown by **Swift** (Ex. 1005), it was known to organize the components of a CMOS imaging device such that the image sensor is located on a first plane, and

[3] Ex. 1017 is an interrogatory response explaining what PO asserts is sufficient to describe the Claims under §112.

the circuitry for converting the pre-video signal to a post-video signal is located on a circuit board in a second plane, shown in Figure 2:

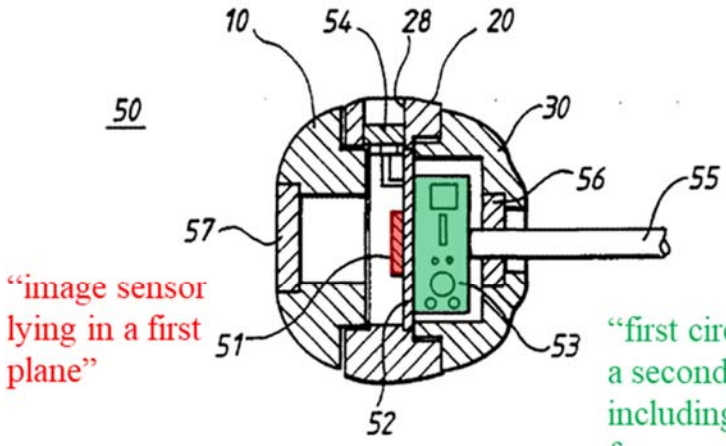


Fig.2.

"image sensor lying in a first plane"

"first circuit board lying in a second plane … including circuitry means for converting said pre-video signal to a desired video format"

E.g., Swift, 3:31-4:4, 8:31-9:3, 9:20-21, 18:25-33, Fig. 2. With respect to the image sensor itself and the placement of the timing and control circuitry,[4] **Ricquier** (Ex. 1038, 1033) discloses an image sensor having a CMOS pixel array and off-chip timing and control circuitry. *E.g.*, Ricquier, 3-4, Fig. 1. With respect to the video processing circuitry, **Tanaka** (Ex. 1009) discloses the same video processing circuitry described in '742's preferred embodiments. Tanaka, 3:48-53, 4:40-47, 4:48-53, Fig. 3.

[4] '742 admits these components are well-known. '742, 15:6-45, 17:1-7.

At best, the Claims are directed to an obvious combination of prior art elements combined according to known methods to yield predictable results. *KSR Intern. Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1731 (2007). Neikirk, ¶¶56-64. However, there are only a "finite number of identified, predictable solutions" for how to arrange the device elements, all of which would have been obvious to a person or ordinary skill. Neikirk, ¶56. Both the claimed components and the claimed arrangement of components were known in the prior art, and the combination amounts to little more than a "predictable use of prior art elements according to their established functions." *KSR*, 127 S.Ct. at 1732; *see also* Ex. 1045 (Guide to PCB Design, 1984), 15, 20. Neikirk, ¶¶56-57.

The USPTO did not apply any of the above prior art (or analogous references) during '742's prosecution. Had such been considered previously, the Claims would have been found unpatentable.

As explained herein, all the features of the Claims were known well before '742's earliest possible priority date, and the purported invention is little more than an obvious combination of prior art elements combined according to known methods to yield predictable results. *KSR*, 127 S.Ct. at 1731. Petitioner requests the Board institute trial and find the Claims unpatentable.

II. MANDATORY NOTICES (§42.8)

A. Real Party-In-Interest

Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. are real parties-in-interest. No other party had access to or control over the present Petition, and no other party funded or participated in preparation of the present Petition.

B. Related Matters

Cellect, LLC v. Samsung Electronics Co., Ltd et al., 1-19-cv-00438 (D. Colorado) ('742 claims 22, 42, 58, 66 asserted) (pending). An *ex parte* reexamination on claims 22, 42, 58, and 66 of the '742 patent is being filed concurrently herewith.

The following table lists matters regarding related patents:

Patent No.	IPR/Reexam
6,043,839	IPR2020-00472
6,275,255	IPR2020-00473
6,982,740	IPR2020-00474 *ex parte* reexam
9,186,052	IPR2020-00475 IPR2020-00512
9,198,565	IPR2020-00476
9,667,896	IPR2020-00477
6,424,369	IPR2020-00562 IPR2020-00563

	IPR2020-00564 *ex parte* reexam
6,452,626	IPR2020-00565 IPR2020-00566 IPR2020-00567 *ex parte* reexam
6,862,036	IPR2020-00568 IPR2020-00569
7,002,621	IPR2020-00571 IPR2020-00572 *ex parte* reexam

Petitioner is challenging '742 in three petitions based on different priority dates and provides a further explanation of these parallel petitions in Ex. 1070:

Petition	Priority Date	Claims
IPR2020-00559	8/23/2001	22, 42, 58, 66
IPR2020-00560	10/6/1997	22
This Petition	10/6/1997	42, 58, 66

C. Lead and Back-Up Counsel and Service Information

Scott A. McKeown (Reg. No. 42,866) (Lead)
ROPES & GRAY LLP
2099 Pennsylvania Avenue, NW
Washington, D.C. 20006-6807
Phone: 202-508-4740
Fax: 617-235-9492
scott.mckeown@ropesgray.com

James L. Davis, Jr. (Reg. No. 57,325) (Back-up)
ROPES & GRAY LLP
1900 University Avenue, 6th Floor
East Palo Alto, CA 94303-2284
Phone: 650-617-4000

Fax: 617-235-9492
james.l.davis@ropesgray.com
Samsung-Cellect-IPR@ropesgray.com

Alexander E. Middleton (Reg. No. 75,285) (Back-up)
Matthew R. Shapiro (Reg. No. 70,945) (Back-up)
1211 Avenue of the Americas
New York, NY 10036
Phone: 212-596-9000
Fax: 617-235-9492
alexander.middleton@ropesgray.com
matthew.shapiro@ropesgray.com

Customer No. 28120

Mailing address for all PTAB correspondence:
ROPES & GRAY LLP, IPRM—Floor 43
Prudential Tower, 800 Boylston Street,
Boston, MA 02199-3600

Petitioner consents to electronic service of documents to the email addresses of the counsel identified above.

III. PAYMENT OF FEES

The undersigned authorizes the Office to charge the fee required by §42.15(a) for this Petition for review to Deposit Account No. 18-1945, under Order No. 110797-0036-671. Any additional fees that might be due are also authorized.

IV. REQUIREMENTS FOR *INTER PARTES* REVIEW

A. Grounds for Standing

Pursuant to §42.104(a), Petitioner certifies '742 is available for IPR. Petitioner is not barred or estopped from requesting IPR challenging '742's Claims on the grounds identified herein.

B. Identification of Challenge

Pursuant to §§42.104(b), (b)(1), Petitioner requests IPR of '742 claims 42, 58, and 66, and that the Board cancel the same as unpatentable.[5]

1. The Specific Art on Which the Challenge is Based

Petitioner relies upon the following prior art:

Name	Exhibit	Filed	Published/Issued	Prior art under at least
Harris	1052	7/10/1996	12/28/1999	§102(e)
Swift	1005		12/21/1995	§102(b)
Ricquier	1038, 1033		5/27/1994	§102(b)
Tanaka	1009		10/13/1987	§102(b)
Tran	1051	10/29/1996	3/13/2001	§102(e)

Although **Harris** was applied in a rejection of a related application (*see* §VI), and cited during prosecution of '742 (Ex. 1002, 125, 176, 200), it was not applied to reject claims during '742's prosecution (*id.,* 114-21). None of the other references was cited or applied in a rejection during '742's prosecution. The Examiner never considered the combination of documents presented herein or the testimony of Petitioner's expert Dr. Dean Neikirk (Ex. 1004) regarding the scope and content of these documents. *See* Ex. 1002. The presented grounds are not cumulative of any

[5] Because the art predates '742's earliest alleged priority date, Petitioner takes no position as to the priority claims, but reserves its right to do so.

prior art previously considered, and are not the same or substantially the same as prior art or arguments previously considered. Co-pending district court proceedings also do not warrant the exercise of discretion under §314(a). *See*, *e.g.*, *Precision Planting, LLC v. Deere & Company*, IPR2019-01044, Paper 17, *9-18. Moreover, litigation is in its early stages—PO only served infringement contentions on 11/21/2019 and confirmed which claims it was asserting on 12/18/2019. The Board should not exercise its discretion to deny institution. §§314(a), 325(d).

2. Statutory Grounds on Which the Challenge is Based

Ground	§103 Grounds	Claims
1	Harris in view of Swift and Ricquier	42, 58, 66
2	Harris in view of Swift, Ricquier, and Tanaka	
3	Harris in view of Swift, Ricquier, and Tran	66
4	Harris in view of Swift, Ricquier, Tran, and Tanaka	

3. How the Claims Are Unpatentable

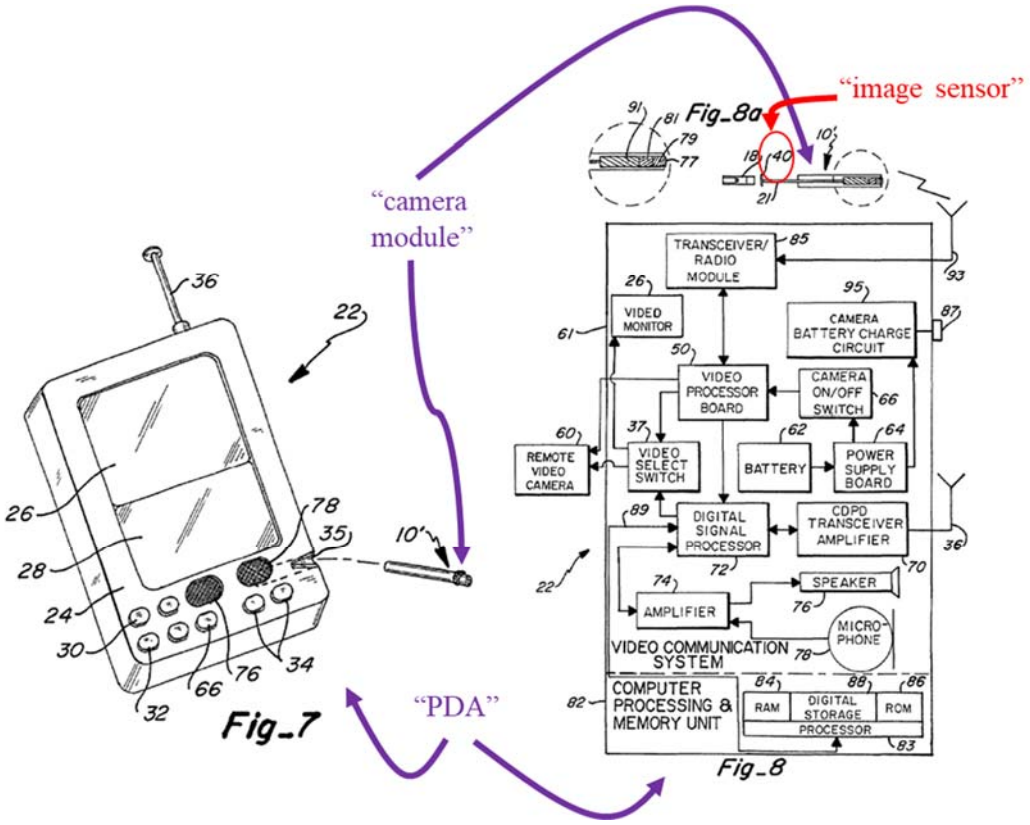
Petitioner provides the information required under §§42.104(b)(4)-(5) in §IX.

V. '742

'742 describes PDAs utilizing off-the-shelf solid state imaging technology allowing for configuring the imaging sensor to be smaller. '742, 1:21-26. '742 acknowledges it applies to a "standard PDA" that "accommodate[s]…digital cameras." *Id.*, 3:59-67. '742 further acknowledges the different types of solid state image sensors described, including charged coupled devices (CCD) and

complementary metal oxide semiconductors (CMOS), were known. *Id.*, 1:30-2:22, 3:46-63. '742 further acknowledges it was known for a CMOS imager to incorporate a number of other different electronic controls (*e.g.*, timing circuits) usually found on multiple circuit boards of much larger size. *Id.*, 1:60-2:5. Such a CMOS imager is referred to as a "camera on a chip." *Id.*, 2:5-7. Neikirk, ¶65.

'742 acknowledges preexisting "camera on a chip" systems could combine elements "usually found on circuit boards of much larger size…without significantly increasing the overall size" of the device. '742 1:63-2:3; Neikirk, ¶¶59-62. But '742 allegedly improves on this concept by "reducing [the camera's] profile area, and incorporating such a reduced area imaging device within a PDA such that minimal size and weight is added to the PDA, and further that the imaging device can be used to image selected targets by the user." *Id.*, 4:36-40, Abstract. Neikirk, ¶66. Such a combined PDA/camera is depicted in Figs. 7-8a reproduced below.



In PDA 22, an image sensor 40 is contained within camera module 10'. The image is received by the image sensor. *Id.*, 8:26-31, 13:45-47. Camera module 10' communicates wirelessly with the PDA base. *Id.*, 12:61-13:9. Board 50 contains processing circuitry conditioning the pre-video signal into in a form that can be viewed directly on a standard video device. *Id.*, 9:58-10:4, *see also id.*, 10:5-48, 14:47-15:3, Fig. 1a. Timing and control circuitry for controlling the timing of operation of the image sensor can be on circuit board 50, on the image sensor 40 itself (within camera module 10'), or separate from both. *Id.*, 15:46-56. Neikirk, ¶67. The PDA also includes certain "basic electronic components." *Id.*, 10:49-51. PO has conceded the claimed PDA devices were merely a combination of a "reduced

area imaging device" and "products such as PDAs and wireless telephones *that existed at the time*." Ex. 1017, 6-7; Neikirk, ¶¶65-68.

VI. PROSECUTION HISTORY

U.S. Patent Application 09/935,993, filed 8/23/2001, matured into '742. In '742's parent, U.S. Patent Application 09/638,976 ("'976), the applicant overcame a rejection based on **Harris,** but the applicant's arguments there are not relevant to the present petition. The applicant substantively addressed **Harris's** disclosure only in the context of other claims not challenged here, by arguing the '976 claims required a "flexible cable connection" between "the camera and the housing of the PDA"—a limitation not present in the Claims and which applicant asserted was not disclosed by **Harris's** teaching of "a wireless infrared communication between the camera and the housing 108." Ex. 1077, 134-36. However, the examiner never applied **Harris** to the Claims, which do recite a camera module communicating wirelessly with the PDA. Instead, the Examiner allowed in '742's first Office Action prosecution claims 1-77 (issued claims 1-77), rejecting only claims not at issue here. Ex. 1002, 114-121. In explaining his reasons for allowance in the first Office Action, the Examiner quoted claim language focused on the location of timing and control circuitry and video processing circuitry (which are not specified in **Harris**), and subsequently allowed the Claims using the same reasoning. *See id.*, 120, 198; Ex. 1001; Neikirk, ¶¶69-71.

VII. LEVEL OF ORDINARY SKILL

On or before 8/23/2001, a person of ordinary skill in the art ("POSITA") would have had a minimum of a Bachelor's degree in Electrical Engineering, Physics, or a related field, and approximately two years of professional experience in the field of imaging devices. Additional graduate education could substitute for professional experience, or significant experience in the field could substitute for formal education. Neikirk, ¶¶45-50.

Even if the Claims were entitled to an earlier filing date, the claims would still be obvious as discussed herein under a POSITA definition with an earlier effective filing date. Neikirk, ¶50.

VIII. CLAIM CONSTRUCTION

Terms of claims subject to IPR are to be construed according to the *Phillips* standard applied in district court. §42.100(b). Only terms necessary to resolve the controversy need to be construed. *Nidec Motor* v. *Zhongshan Broad Ocean Motor*, 868 F.3d 1013, 1017 (Fed. Cir. 2017).

With respect to the "circuitry means" terms recited in the Claims, the Federal Circuit has held "when the structure-connoting term 'circuit' is coupled with a description of the circuit's operation, sufficient structural meaning generally will be conveyed to [POSITAs], and §112(6) presumptively will not apply." *Linear Tech. v Impala Linear,* 379 F.3d 1311, 1320 (Fed. Cir. 2004). To the extent these terms are

instead interpreted under §112(6), the following constructions of functions and corresponding structures for implementing the functions should apply.

"[C]ircuitry means…for timing and control of said array of pixels" (Claim 58)/"circuitry means for timing and control of said array of pixels" (Claims 42, 66):

function: timing and control of the array of pixels;

structure: "Timing and Control Circuits" box 92 in Fig. 9a.

See '742, 5:2-5, 15:4-6, 16:9-11, Fig. 9a [6]

"[C]ircuitry means for processing and converting said pre-video signal to a desired video format" (Claims 42, 58, 66):

function: "processing and converting said pre-video signal to a desired video format" (claims 42, 58, 66);

structure: "processing circuitry which…converts the pre-video signal to a post-video signal which may be accepted by an NTSC/PAL compatible video device," in Fig. 9b.

See '742, 4:46-51, 4:65-5:2, 8:7-12, 9:28-63, 17:8-44, 18:11-17, Fig. 9b.

[6] Material incorporated by reference cannot be used for purposes of determining corresponding structure under §112(6). *See* MPEP § 2181(III).

With respect to these "circuitry means" limitations, despite PO's statement in district court in its infringement contentions that it would specifically identify terms believed to be governed by §112(6), it has only provided backup positions allegedly identifying the structure for claim terms including "means" without stating it believed any of these were subject to §112(6). PO's Infringement Contentions (Ex. 1039 at 16; Ex. 1040 at 6-11, 15-18, 46-51, 61-68). PO may be bound by this interpretation. *See* §301(a)(2). For purposes of this Petition only, and consistent with the statutory purpose of §301(a)(2), which precludes PO from advancing conflicting positions in litigation and before the agency, Petitioner applies PO's apparent constructions herein and the plain and ordinary meaning of the terms meaning consistent with the specification unless otherwise noted. However, regardless of whether §112(6) applies, the Claims are unpatentable under either construction for the reasons explained in §IX. Neikirk, ¶¶72-75.

IX. GROUNDS OF UNPATENTABILITY

'742 is directed to a PDA with "basic electronic components" wirelessly communicating with a camera module including an imaging device employing admittedly well-known structures such as an array of CMOS pixels, timing and control circuitry, and processing circuitry for converting pre-video signals to a desired video format. Neikirk 51-64. '742's alleged points of novelty—arranging timing and control circuitry either with the processing circuitry (claims 42 and 66)

or separate from the array and processing circuitry (claim 58)—were well-known implementation choices that would have been obvious to a POSITA as taught by **Ricquier**. Neikirk, ¶¶51-55. There are only a "finite number of identified, predictable solutions" for how to arrange the device elements. Neikirk, ¶56. The combination amounts to little more than a "predictable use of prior art elements according to their established functions." *KSR*, 127 S.Ct. at 1732; *see also* Ex. 1045 (Guide to PCB Design, 1984), 15, 20. Neikirk ¶¶56-57.

The prior art herein renders the Claims unpatentable. This Petition is supported by the Declaration of Dr. Dean Neikirk, which describes the scope and content of the prior art at the time of the '742's alleged invention. ("Neikirk," Ex. 1004 ¶¶1-455).

A. Ground 1: Claims 42, 58, and 66 are rendered obvious by Harris in View of Swift and Ricquier

Harris describes a PDA with a solid-state image sensor in a detachable camera module that wirelessly transmits video signals for display on the PDA's LCD screen and further transmission to another party. Neikirk, ¶¶77-79. **Swift** teaches a CMOS camera where the image sensor lies in a first plane and a video processing board connected to the image sensor lies in a second plane. Neikirk, ¶¶237-240. **Ricquier** teaches implementation details of an image sensor in a CMOS camera**,** such as an array of pixels and associated timing and control circuitry. Neikirk,

¶¶307-311. A POSITA would have been motivated to apply **Swift**'s and **Ricquier's** teachings of a solid-state camera and an image sensor in such a camera, respectively, in implementing **Harris's** solid-state camera—thus rendering the Claims obvious. Neikirk, ¶¶241-250, 312-315.

1. Overview of Harris

Harris teaches a PDA with a detachable camera module containing a solid-state image sensor. *E.g.*, Harris, 1:43-45, Fig. 1. The PDA has a display for displaying video either captured by the PDA's camera or received over a wireless communication link. *E.g.*, Harris, 5:45-54, 6:63-67, 9:44-55, 11:43-48, Figs. 1-2, 8. The PDA supports videoconferencing, allowing the user to select whether to display video from the camera or video received from the other party on the display, based on the position of switches in the latch between the camera module and main PDA housing. Harris, 7:41-53, 9:36-55, 11:43-48, 11:61-65, Fig. 1. The camera module includes wireless data transceiver 122 for exchanging "full motion video" over a wireless RF link with wireless data transceiver 117 in the PDA's main housing.[7] *E.g.* Harris, 5:38-44, Fig. 1. To the extent not expressly disclosed, a POSITA would

[7] While **Harris** labels IR channel modem 172 and IR channel modem 160 as being used for IR in Figure 1, **Harris** teaches that this link may also be any suitable wireless RF link. Harris, 5:38-44.

have understood Harris's "wireless data transceiver[s]" using a "wireless RF link" are "suitable" for "full motion video." Harris, 5:38-44, 9:36-55, 12:12-17; Ex. 1068, 6:60-65. Via a third "transceiver 126," the PDA exchanges video and audio data with another "communication device," such as a computer, over a wireless "communications link 106." *E.g.*, Harris, 2:55-3:8, 3:40-50; Neikirk, ¶¶77-78.

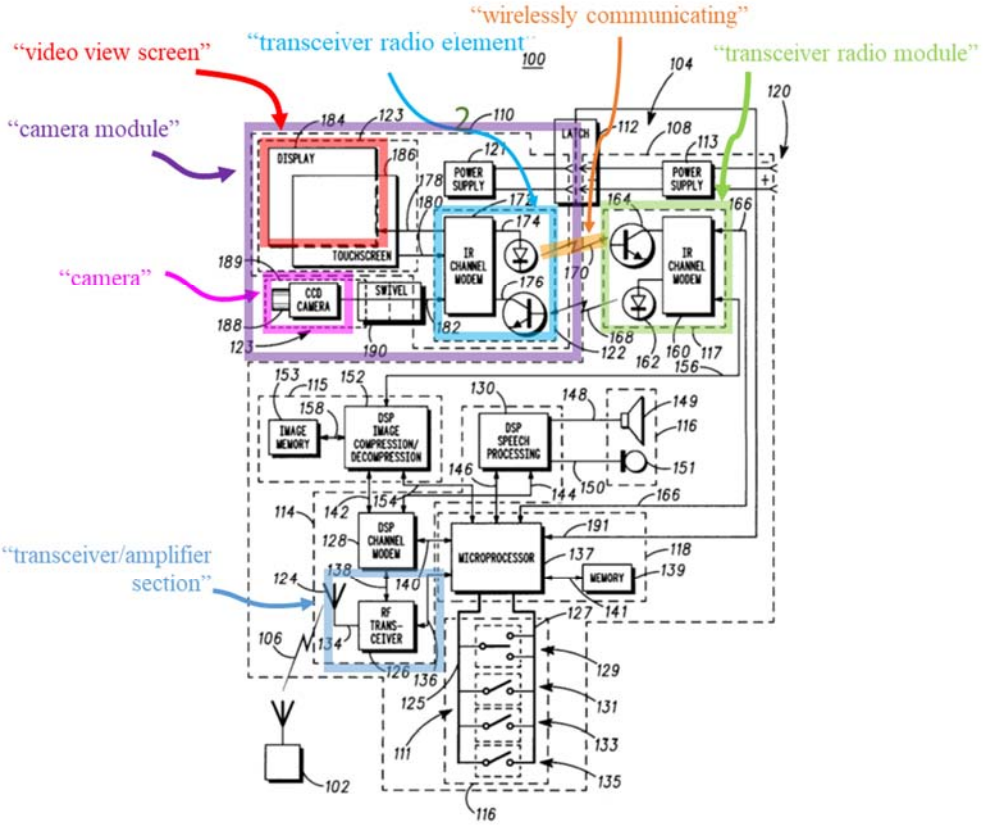


FIG. 1

Harris also discloses a DSP with three digital signal processing functions for videoconferencing: conditioning video from the camera module and video and audio received from another party, communicating with a speaker and microphone in the PDA to process audio signals, and communicating with the "transceiver 126" to

encode and decode two-way video and audio data exchanged with another party. Harris, 3:30-43, 4:4-11, 4:25-42, Figure 1. The PDA also includes respective "power suppl[ies]" in the PDA and camera module. Harris, 3:25-32, Fig. 1; Neikirk, ¶79.

2. Overview of Swift

Swift teaches a miniature video camera including a CMOS image sensor. *E.g.*, Swift, Abstract, 4:11-15. As shown in Figure 2 (below), the miniature video camera includes an image sensor 51 lying in a first plane and mounted on a circular circuit board 52 lying in a second plane. The camera also includes a rectangular circuit board 53, which includes various circuitry components "to provide power to the image sensor 51," and "process image signals received therefrom" and convert to "video signals," including a video processor. *E.g.*, Swift, 8:31-9:13, 3:32-4:4. A cable electrically couples the "printed circuit board 53" to "external processing circuitry." Swift, 9:5-18. Neikirk, ¶¶237-240.

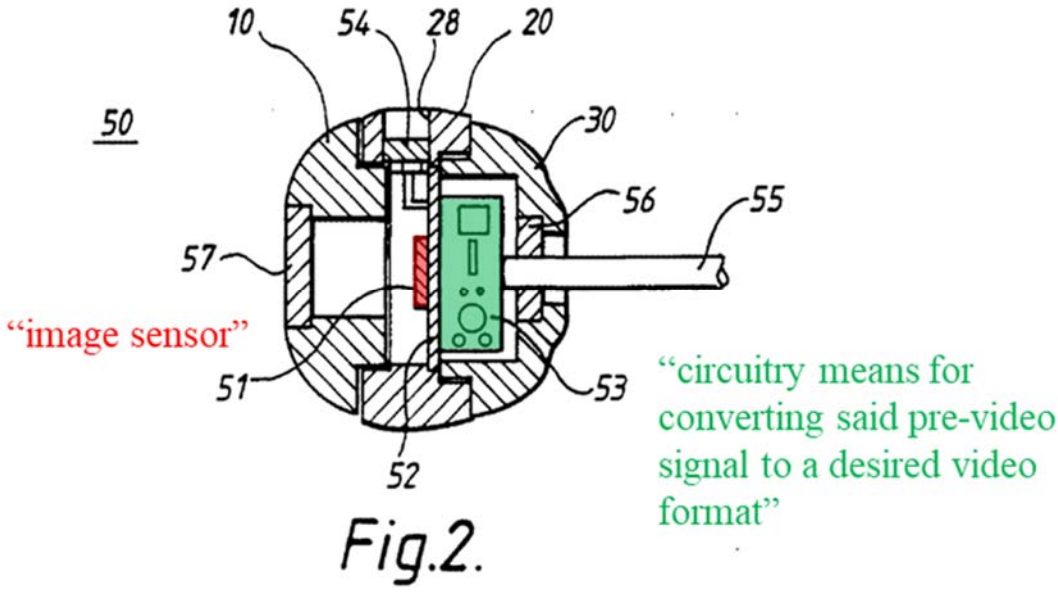


Fig.2.

3. Motivation to Apply Swift's Teachings to Harris

While **Harris** discloses a camera module housing a CCD camera, **Swift** discloses a CMOS "miniature camera 50" including a "CMOS" "image sensor 51" housed therein—a feature the '742 recognizes was well known. *E.g.*, **Swift**, 3:32-34; '742, 1:30-2:2; Neikirk, ¶¶241-242. Similarly, while **Harris** does not expressly state image data is converted to a desired video format for display, **Swift** expressly provides this additional implementation detail for a CMOS camera with processing circuitry—another feature the '742 recognizes was well known. *E.g.*, Swift, 9:5-13, 17:34-18:3, 18:8-11, Fig. 6; '742, 18:11-19:11; Neikirk, ¶243. While **Harris** does not expressly teach how components within its camera are connected to external circuitry, **Swift** teaches "circuit board 53," which processes image signals received

from a CMOS image sensor, is electrically coupled to external circuitry. **Swift,** 9:5-21, Fig. 2; Neikirk, ¶244.

A POSITA would have been motivated to apply **Swift's** teachings of a miniature camera housing a CMOS image sensor, compactly arranging circuitry components associated with a CMOS image sensor, electrically coupling the "circuit board 53" to external circuitry to output the video signal, and the implementation described above in implementing **Harris'** camera. Both **Harris** and **Swift** are in the same field of art and are analogous art to '742—all are in the same field related to compact solid-state image sensors for use in space-constrained devices. *E.g.*, '742, Abstract, 1:21-26, 4:44-46; Harris, 1:4-6, 1:23-28, 1:59-63; Swift, Abstract, 4:11-15; Neikirk, ¶¶245-246. **Harris** and **Swift** are also reasonably pertinent to the alleged problem(s) identified in the '742 of arranging the circuitry of a camera (such as an image sensor and supporting circuitry), including to minimize the size or profile area of the device. *E.g.*, '742, 3:64-4:4, 4:12-17, 4:34-40; Harris, 1:59-63; Swift, 1:7-18; Neikirk, ¶247. A POSITA would have been further motivated to apply **Swift's** teachings in implementing **Harris's** camera because, relative to other solid-state options (such as CCD), CMOS cameras (such as **Swift's** CMOS miniature camera) advantageously have "lower power-consumption," "small size," can be "made on standard semiconductor production lines," "cost[s] much less than CCDs," and can tolerate lower material quality. NASA (Ex. 1060; published

3/6/1995) at 54; Umeda (Ex. 1069; filed 1/30/1998), 1:22-58); Neikirk, ¶248. Relative to other CMOS camera options, **Swift's** teachings of a miniature camera reduce the camera space required in **Harris'** communication device 104, thereby satisfying **Harris's** desire to reduce overall size and cost of the communication device. *See, e.g.,* Swift, 1:10-18, 3:32-34; Harris, 1:59-63; Neikirk, ¶248. In addition, a POSITA would have been motivated to apply **Swift's** teachings of CMOS active pixel image sensor because, as '742 admits, active pixel sensor images result in lower noise than CCD or other solid state imagers, can be mass produced on standard semiconductor production lines, and can incorporate a number of other different electronic controls on a single circuit board. '742, 1:54-2:7; Neikirk, ¶248. In light of the above, a POSITA would have found it routine, straightforward and advantageous to apply **Swift's** teachings of CMOS active pixel camera and outputting the video signal in implementing **Harris's** solid-state camera 188, and would have known such a combination (yielding the claimed limitations) would predictably work and provide the expected functionality. Neikirk ¶¶249-250.

4. Overview of Ricquier and Motivation to Apply to Swift and Harris

Ricquier is a conference paper disseminated and available in libraries by 5/27/1994 and is a printed publication. Exs. 1033, 1038; Neikirk, ¶¶307-311, 444-451. **Ricquier** describes a dedicated imager for a camera programmed to operate in

several resolutions. *E.g.*, Ricquier, 2. The imager includes a CMOS photodiode array of 256*256 pixels addressable by column and row (*i.e.*, "X-Y addressable") using a timing controller implemented on an off-chip driving unit. *E.g.*, *id.* 4, 6, 10. Figure 1 shows a schematic representation of 2*2 of the 256*256 CMOS pixel array:

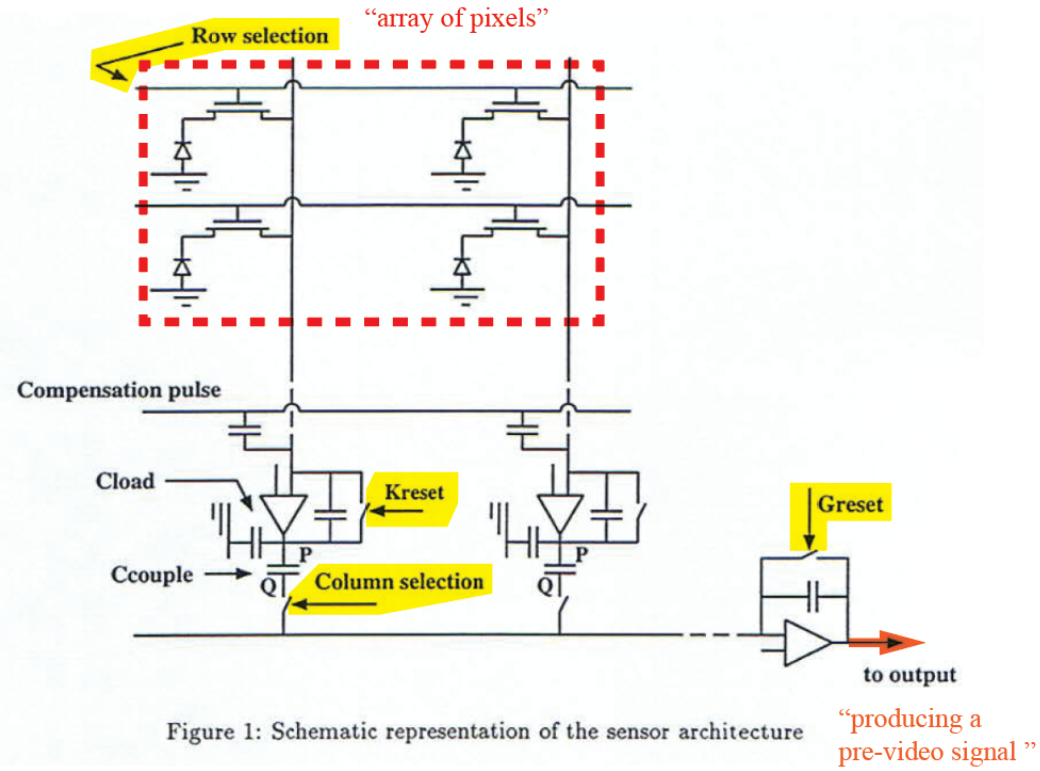


Figure 1: Schematic representation of the sensor architecture

E.g., id., 1, 3, 5, 9, Fig. 1; Niekirk, ¶309.

Ricquier teaches the "256*256 X-Y addressable photodiode array" acquires image data by sequentially driving row selection signals to "transfer[] in parallel a row of 256 charges to 256 charge sensitive amplifiers" and coupling these

"signals…to a single output amplifier." *E.g.*, Ricquier, 2-3. For each row of pixels, the "charges are converted simultaneously to a voltage at the output[s] of the…amplifiers located at the end of the column readout lines." *E.g.*, *id.* 3. A POSITA would have understood **Ricquier's** "output" at "a single output amplifier" is a pre-video signal produced by **Ricquier's** image sensor. *E.g.*, *id.* 2-4, Neikirk, ¶¶310-311. **Ricquier** teaches the readout of the X-Y addressable photodiode array is done by "controlling the clocking scheme" using a "timing controller" implemented on "an off-chip driving unit," which provides the "row selection," "column selection," and reset signal inputs (highlighted in Fig. 1 above) to the chip containing the pixel array. Neikirk, ¶311.

While **Swift** does not expressly state its CMOS active pixels are in an array, **Ricquier** provides this additional implementation description of a "256*256 X-Y addressable photodiode array…realised in a 1.5 μm standard CMOS technology." *E.g.*, Ricquier, 9. Similarly, while **Swift** does not expressly disclose how the timing of its pixels is controlled other than referring to sensor "selection and readout" circuitry, **Ricquier** discloses the readout from the "256*256 imager" is driven by a "timing controller (realised in an off-chip driving unit)," by "transfering…charges of different pixels" "to a single output amplifier." *E.g.*, Ricquier, Abstract, 3, 4, 9. Ricquier does not specify the timing controller's location other than that it is "off-chip" from the array of pixels. *E.g.*, Ricquier, 3, 4. Neikirk, ¶312.

A POSITA would have been motivated to apply **Ricquier's** explicit teachings in implementing **Swift's** "image sensor," which teachings would have been obvious to apply in implementing **Harris** (see §IX.A.4). Like Harris and Swift, **Ricquier** is also in the same field of art and is analogous art to '742—all are in the same field related to solid-state image sensors for use in cameras. *E.g.*, Ricquier, 2-3, 5, 9; Neikirk, ¶312. In addition, like Harris and Swift, **Ricquier** is also reasonably pertinent to the alleged problem(s) identified in '742 of arranging the circuitry of a camera (such as an image sensor and supporting circuitry), including to minimize the size or profile area of the device, for application in "industrial" applications, and to reduce image noise in CMOS sensors. *E.g.*, Ricquier, 2-3 (referring to use in "industrial applications"), 8 (noise reduction); Neikirk, ¶312. A POSITA would have been further motivated to apply **Ricquier's** teaching of placing the pixels of a CMOS image sensor in an array in implementing **Swift's** image sensor such that there would be an array of Swift's active pixels because the use of an array allows an "X-Y addressable imager architecture," which allows "multiple resolutions to be programmed." **Ricquier**, 2, 3; Neikirk, ¶312. By changing resolution, the frame rate of the image sensor can advantageously be changed-on-the-fly. **Ricquier**, 4; Neikirk, ¶312. A POSITA would have been further motivated to apply **Ricquier's** teachings in implementing **Swift's** image sensor teachings because of **Ricquier's** advantages of using a "timing controller" located off-chip, which adds flexibility in

selecting from the several design choices for "fitting…the components into the available space" and "placement" of circuitry to "allow for a more compact camera head." Ricquier, 3, 4; Ex. 1045, 15, 20; Ex. 1016, 3-4 (placing circuit components on opposite side of circuit board from image sensor results in "compact camera head"), Fig. 2; Neikirk, ¶312.

A POSITA would have been motivated to place **Ricquier's** timing and control circuitry in a second plane on either of **Swift's** two circuit boards 52 and 53 to minimize the overall camera size. For example, a POSITA would have been motivated to place **Ricquier's** timing and control circuitry on the opposite side of **Swift's** "circuit board 52" to "image sensor 51" to decrease the circumference of **Swift's** circuit board 52 and the number of lead wires while increasing reliability and matching characteristics. *See* Tanuma (Ex. 1016; published 5/14/1987), 3-4 (benefits of mounting image sensor chip on one side of a circuit board and other circuit components on the underside of the circuit board include that it "does not require many lead wires, so there is a high degree of reliability, and excellent matching characteristics…[and] allow[s] for a more compact camera head"), Fig. 2. Alternatively, a POSITA would have been motivated to place Ricquier's timing and control circuitry on a separate circuit board from circuit board 52 and 53 to reduce the device profile area. *See* Chamberlain (Ex. 1044, published 6/22/1993), 5:46-50, 1:61-66, 4:3-8, 7:52-62, 1:44-50, Figs. 17, 2 (depicting separate "driver board" with

an "image sensor," "logic board" controlling the "timing for the image sensor," and option boards in stacked relationship for "a compact, electronically expandable camera"); Ex. 1045, 15, 20; Ex. 1016, 3-4, Fig. 2; Roustaei (Ex. 1030, filed 8/1/1996), 43:38-44 ("*[T]he number of printed circuit boards is a design choice* …. whatever quantity *permits the device's components to be fitted into the dimensions of the intended housing*."), 54:7-11; Cotton (Ex. 1031, published 12/16/1986), 13:30-35; Crosetto (Ex. 1032, published 8/17/1994), 15:35-46; Ex. 1045 (Guide to PCB Design, 1984), 15, 20. Neikirk, ¶313.

As a further alternative, a POSITA would have also been motivated to place **Ricquier's** timing and control circuitry on **Swift's** "circuit board 53" to decrease component count on Swift's "circuit board 52" and consolidate timing and control circuitry with processing and converting circuitry in a single location to reduce complexity and avoid duplicate supporting circuitry. Hurwitz (Ex. 1042), 120 (Fig. 1 disclosing a single "ASIC/DSP" performing both timing and control and image processing of video signals). Thus, when applying **Ricquier's** teachings of placing timing and control circuitry on a separate chip in implementing **Swift's** teachings, a POSITA would have been motivated to locate video processing circuitry on circuit board 53, image sensor 51 on circuit board 52, and the timing controller in one of the following locations: 1) on the opposite side of circuit board 52 from image sensor 51; 2) along with **Swift's** video processing circuitry on circuit board 53; or 3) on a

separate circuit board from circuit boards 52 and 53. A POSITA would have had a reasonable expectation of success because "fitting of the components into the available space" and "placement" of circuitry is a common design consideration for portable devices. Ex. 1045, 15, 20; Ex. 1016, 3-4, Fig. 2; Neikirk, ¶313.

Moreover, a POSITA would have understood there is a finite number of known, predictable solutions to the placement of **Ricquier's** timing and control circuitry teachings in a system with a separate image sensor and image processing circuitry as disclosed in **Swift**, including: on the same side of circuit board 52 as "image sensor 51"; on the opposite side of circuit board 52 as "image sensor 51"; or on either side of "circuit board 53"; or on another board. *See* §IX.A.4, Neikirk, ¶314. It therefore would have been, at minimum, obvious to a POSITA to try placing Ricquier's timing and control circuitry either on the opposite side of "circuit board 52" from "image sensor 51" or on a separate circuit board (see discussion of '742 claim 58 below) or on "circuit board 53" (see discussion of '742 claims 42 and 66 below). Neirkirk, ¶314. In light of the above, a POSITA would have found it routine, straightforward and advantageous to apply **Ricquier's** teachings of arranging CMOS pixels in an array and an off-chip timing controller in implementing **Swift's** image sensor (which teachings would have been obvious to apply in implementing **Harris's** camera 188–*see* §IX.A.3), and would have known such a combination

(yielding the claimed limitations) would predictably work and provide the expected functionality. Neikirk, ¶315.

5. Claim Chart—Harris in view of Swift and Ricquier

Claim Elements	Harris in view of Swift and Ricquier
[42.pre] In a PDA having capability to transmit and receive data in a communications network, the improvement comprising:	**By drafting this claim in *Jepson* format according to §1.75(e), applicant admitted this limitation was "conventional or known." However, to the extent the preamble is limiting, Harris discloses a PDA** (*e.g.*, "communication device 104" serving as a "personal digital assistant") **having capability to transmit and receive data in a communications network** (*e.g.*, "data communications between the communication devices 102 and 104")**.** ***E.g.*, Harris:** **Harris** teaches a "multi-mode communication device" "combin[ing] a portable radiotelephone with a personal digital assistant" that bidirectionally communicates with other devices via "cellular radiotelephone service…two-way radio service…or the like." *See* Harris, 1:4-6, 1:43-45, 3:3-6. • **1:4-6** ("The present invention relates…to *a multi-mode communication device*.") • **1:43-45** ("[M]ulti-mode communication devices combine a portable radiotelephone with *a personal digital assistant*.") • **2:55-3:6** ("The communication system 100 of FIG. 1 includes *communication devices 102 and 104 that communicate over a communication link 106. The communication device 104 can be a wireless device….The communication link 106 supports data communications between the communication devices 102 and 104.*") • **Fig. 2:**

Claim Elements	Harris in view of Swift and Ricquier

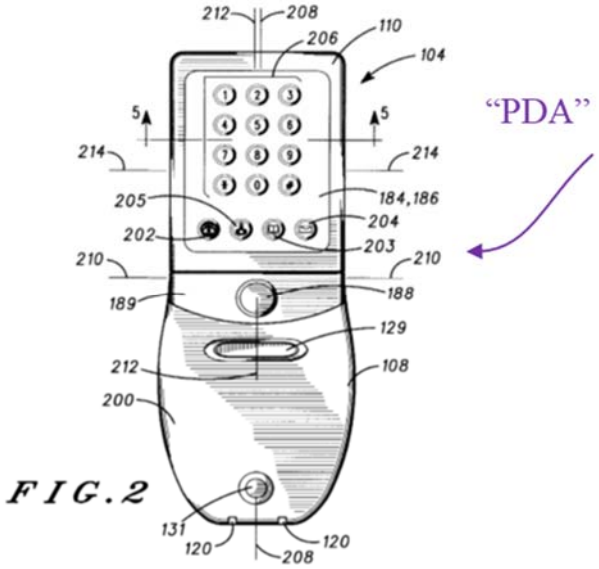


FIG. 2

- **Fig. 1:**

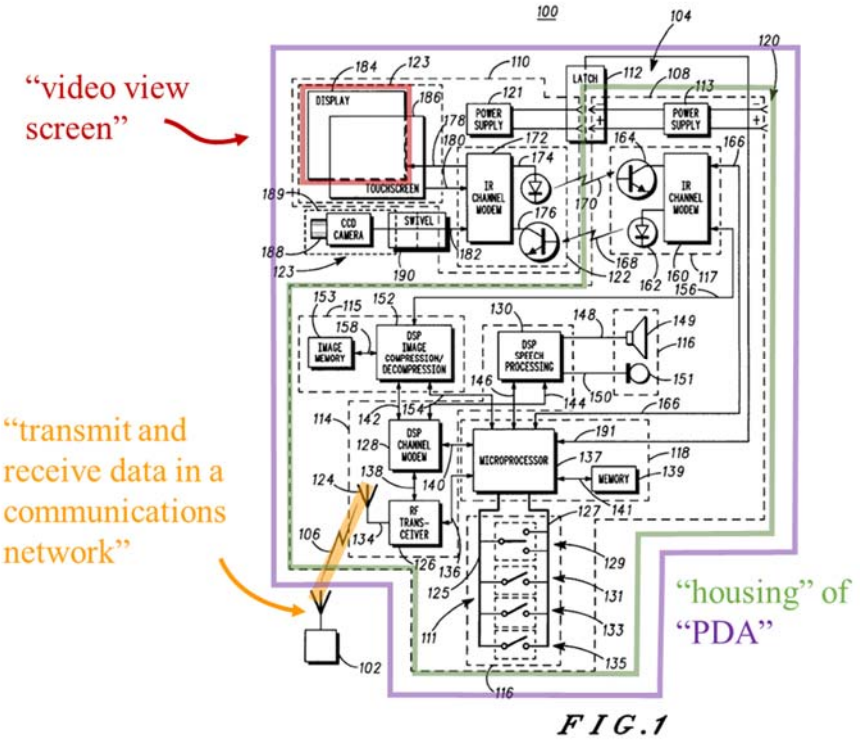
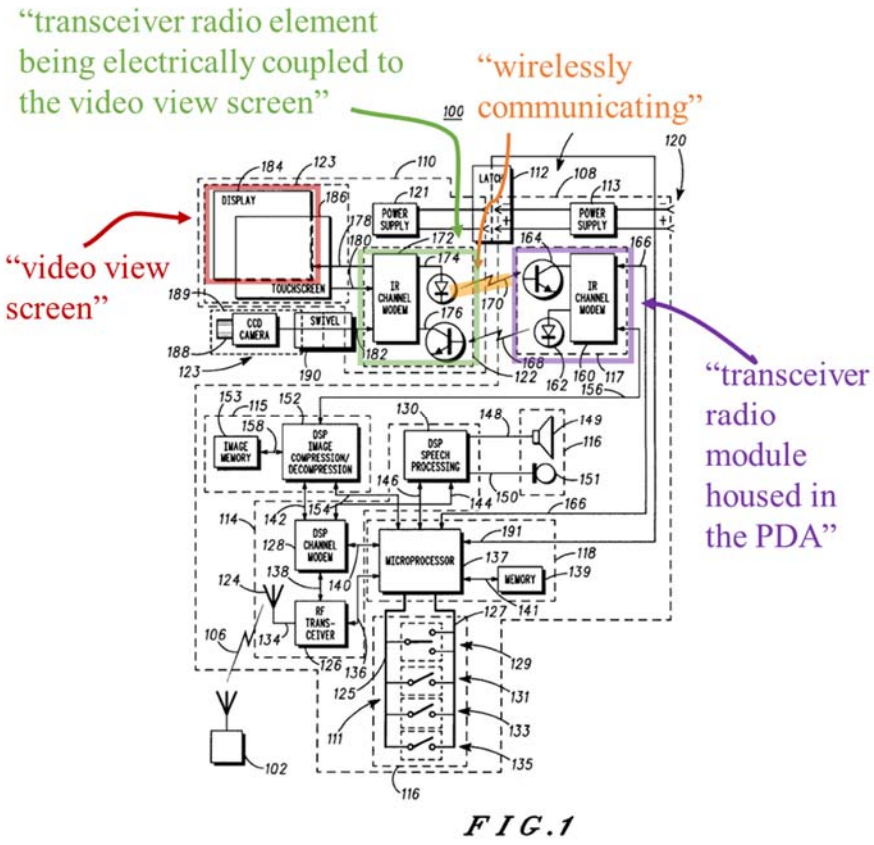
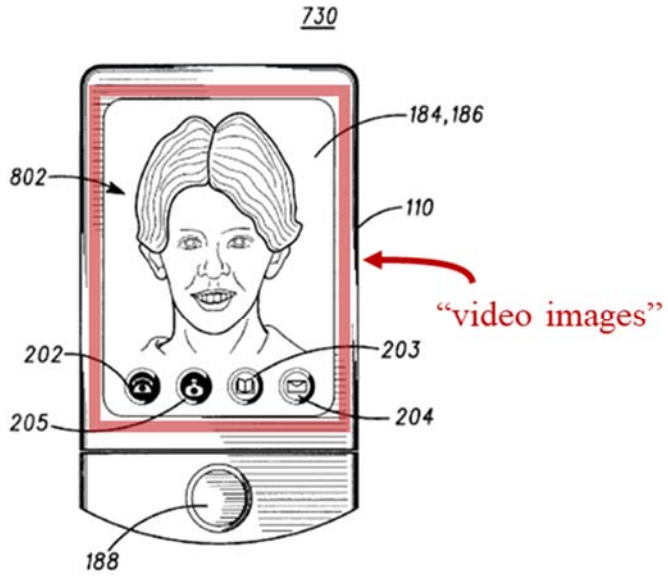
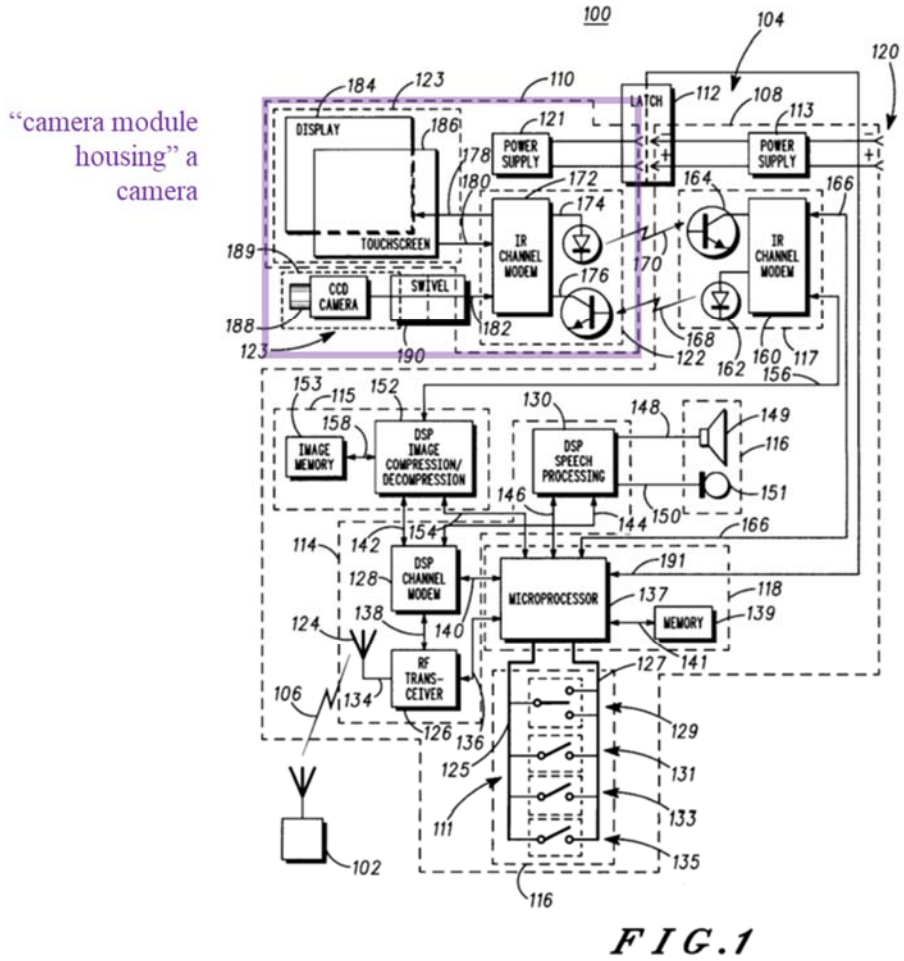


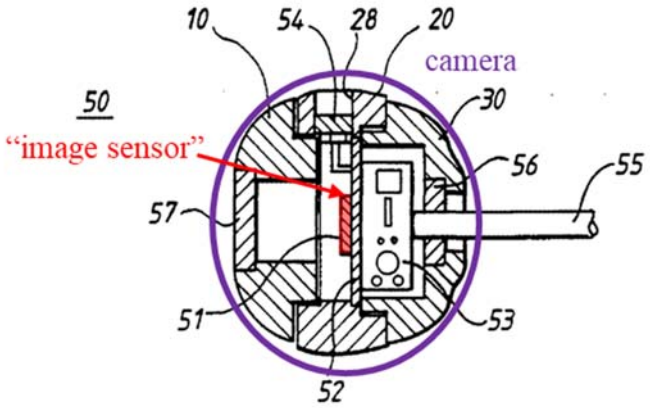
FIG. 1

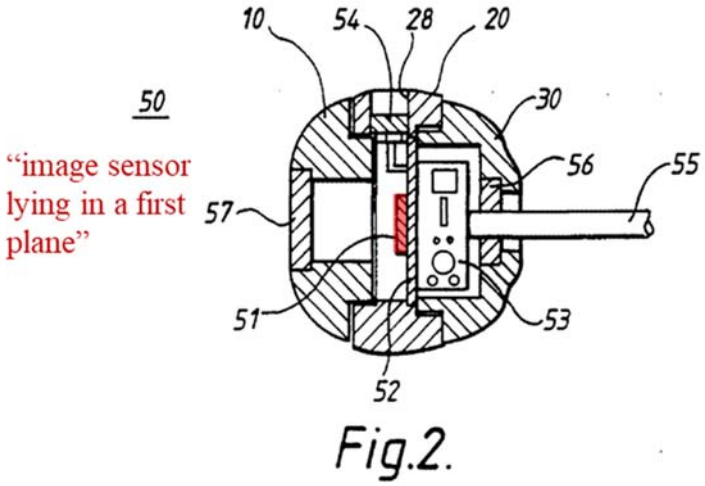
Claim Elements	Harris in view of Swift and Ricquier
	See also Harris, 1:46-50, 3:41-4:3, 4:27-50, 4:61-5:37, 6:63-67, Fig. 8. Neikirk, ¶¶316-317.
[42.a] a video system integral with said PDA for receiving and transmitting video images, and for viewing said images, said video system comprising:	**Harris discloses a video system integral with said PDA** (*e.g.*, "communication device 104" with "video conferencing") **for receiving and transmitting video images** (*e.g.,* "receives" and "transmit[s]" "RF signals" containing "video" "image data" over "communication link 106")**, and for viewing said images** (*e.g.*, displaying "video" "image data" received from "communication link 106" and "camera 188" on "display 184")**.** ***E.g.*, Harris:** **Harris** teaches a PDA "communication device 104" with "video capability" forming a video system for exchanging "video" "image data" with "communication device 102" over "communication link 106." *See* Harris, 1:9-12. In "video conferencing mode 730," "communication device 104" displays "full motion video" of "a second user 802, with which the instant user is telephonically communicating, on the display 184." *Id.*, 2:18-20, 5:42-44, 9:36-41, 9:44-59. "[D]isplay 184" also displays "image data captured by…camera 188." *Id.*, 3:45-50, 11:43-47. *See* [42.pre]. • **2:18-20** ("*[T]he communication device of FIG. 2 in a video conferencing mode*,….") • **2:55-3:6** ("*[C]ommunication devices 102 and 104 that communicate over a communication link 106. The communication device 102* is any device compatible with the communication device 104, *such as… a computer*, or the like.") • **3:45-50** ("The antenna 124 *receives incoming RF signals* of the communication link 106…. *Electrical transmit signals …are emitted by the antenna 124 as outgoing RF signals of the communication link 106.*")

Claim Elements	Harris in view of Swift and Ricquier
	• **5:45-64** ("*The user interface 123 includes a display 184…and a charge coupled device (CCD) camera 188…. [T]he display 184 displays receive decompressed image data*….") • **9:36-41** ("*[T]he controller 118 configures the communication device in a video conferencing mode* 730 of FIG. 7.") • **Fig. 1:**  FIG.1 • **Fig. 8:**

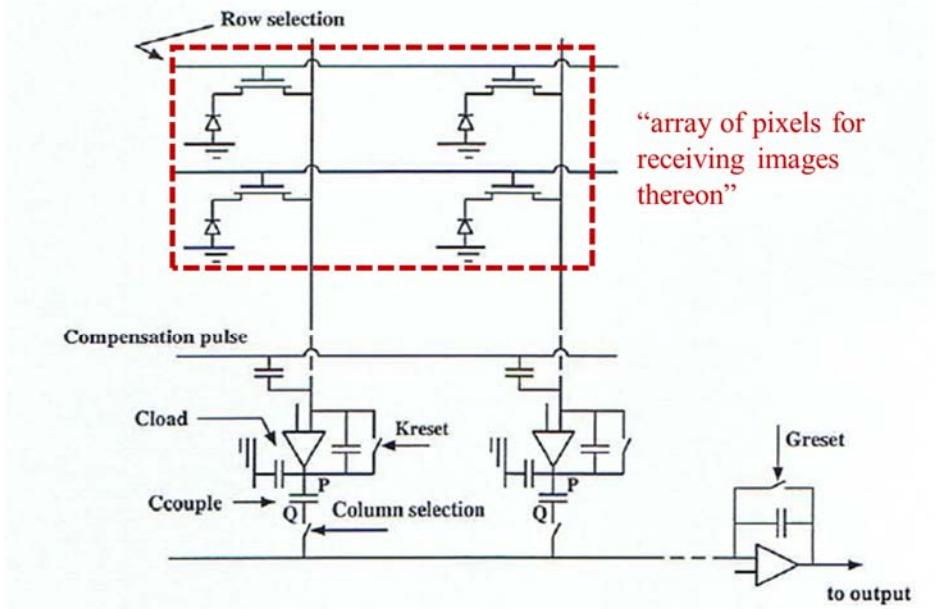
Claim Elements	Harris in view of Swift and Ricquier
	 FIG. 8 *See also* Harris, 1:9-12, 4:61-5-17, 5:38-44, 5:60-6:2, 9:44-59. Neikirk, ¶¶318-319.
[42.b] a camera module housing an image sensor therein,	**Harris discloses a camera module housing a camera therein** (*e.g.*, "second housing 110" and "third housing 189" including "camera 188")**.** ***E.g.*, Harris:** **Harris** teaches a "second housing" and 'third housing," which form a camera module, as shown in Fig. 1. The third housing houses a "camera 188" for capturing "video" "image data." *See* Harris, 3:9-18, 5:60-65. • **3:9-18** ("[A] second portion of circuitry primarily housed in *a second housing 110*…comprises a second wireless data transceiver 122….") • **5:60-6:2** ("*The CCD camera 188 is housed in a third housing 189 coupled to the housing 110* via a swivel 190.") • **Fig. 1:**

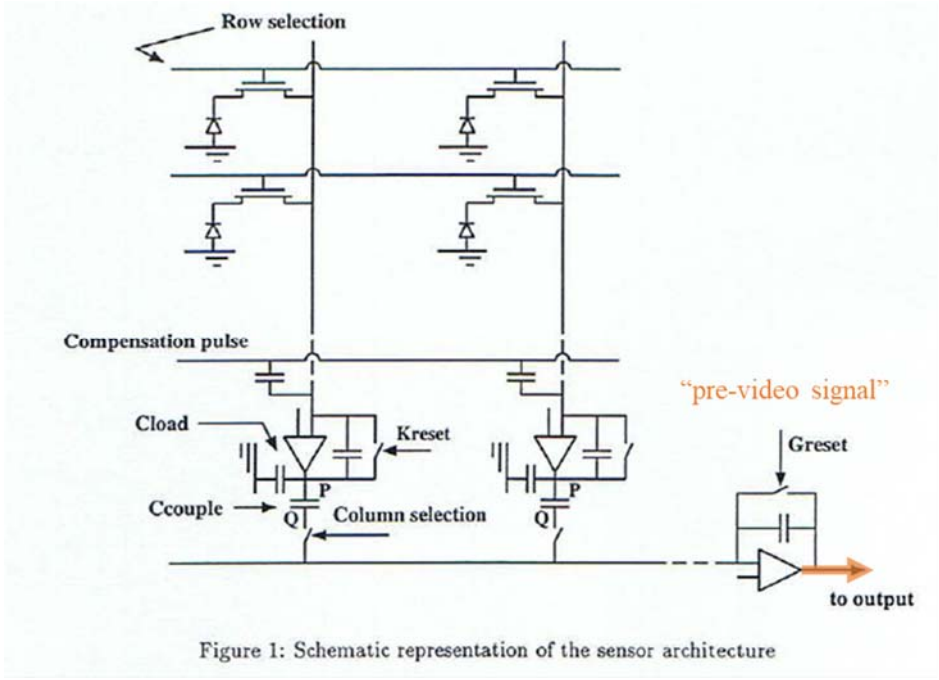
Claim Elements	Harris in view of Swift and Ricquier
	 FIG. 1 *See also* Harris, 5:32-34, 9:36-41, 11:43-47, 12:12-17. Neikirk, ¶¶320-321. **Swift discloses a camera including an image sensor** (*e.g.*, "miniature camera 50" with "image sensor 51" as shown in Fig. 2) **therein.** ***E.g.*, Swift:** While **Harris** teaches a camera module housing a CCD camera, **Swift** teaches a "miniature camera 50" including a "CMOS" "image sensor 51" housed therein, as shown in Fig. 2 below. **Swift**, 3:32-34, Fig. 2.

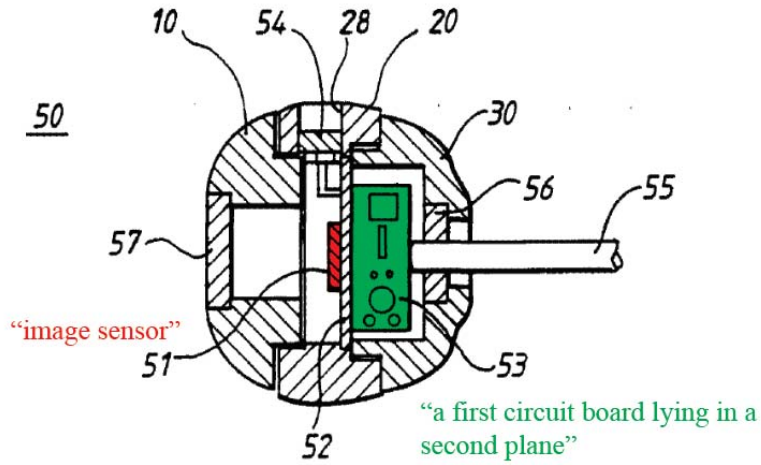
Claim Elements	Harris in view of Swift and Ricquier
	A POSITA would have been motivated to apply **Swift's** teachings of a miniature camera housing a CMOS image sensor in implementing **Harris's** camera as discussed in §IX.A.3. Neikirk, ¶323. • **3:32-34** ("[T]he present invention…is…*an image sensor assembly for a miniature camera*,") • **4:11-13** ("*[I]mage sensor is preferably a CMOS sensor*.") • **7:10-12** ("The *miniature camera 50* … shown in Figure 2….") • **8:31-9:19** ("An *image sensor 51 is mounted on a circular printed circuit board 52*….") • **Fig 2:**  Fig.2. *See also* Harris, 1:10-18. Neikirk, ¶¶322-323.
[42.c] said image sensor lying in a first plane and including an array of pixels for receiving images thereon,	**Swift discloses said image sensor** (*e.g.,* "image sensor 51") **lying in a first plane** (*e.g.*, as shown in Fig. 2)**.** ***E.g.*, Swift:** While **Harris** does not teach the components within its camera, **Swift** teaches the miniature camera includes an "image sensor 51" in a first plane, as shown in Figure 2. **Swift,** 8:31-9:19.

Claim Elements	Harris in view of Swift and Ricquier
	A POSITA would have been motivated to apply **Swift's** teachings of a miniature camera housing a CMOS image sensor in implementing **Harris's** camera as discussed in §IX.A.3. Neikirk, ¶327. *See* [42.b]. • **Fig 2:**  Fig.2. Neikirk, ¶¶324-325. **Ricquier discloses an image sensor** (*e.g.*, "image sensor"; "imager") **including an array of pixels for receiving images thereon** (*e.g.*, "pixel array" "[t]o realise the acquisition of image data" "images are formed on the sensor plane")**.** ***E.g.*, Ricquier:** While **Swift** does not expressly state that its CMOS active pixels for receiving images thereon are in an array, **Ricquier** provides this additional implementation detail of the "acquisition of image data" in an "image sensor" using a "256*256 X-Y addressable photodiode array…realised in a 1.5 µm standard CMOS technology." Ricquier, 9. As discussed in §§IX.A.3-4, POSITA would have been motivated to apply **Ricquier's** teachings of a CMOS array when

Claim Elements	Harris in view of Swift and Ricquier
	implementing **Swift's** image sensor 51 of a CMOS/APS type (thus forming a CMOS/APS array), which teachings would have been obvious to apply in implementing **Harris's** camera. Neikirk, ¶327. • **Abstract** ("*[A] dedicated imager* has been developed. The camera can be programmed to operate in several resolutions. This is done *by binning the signal charges of neighbouring pixels on the sensor plane itself*.…*This square 256*256 imager was fabricated in a standard 1.5 µm CMOS technology*.") • **1** ("In this paper an alternative *image sensor is presented*…") • **3** ("[T]his imager belongs to a class of X-Y addressable imager architectures….") • **3** ("To realise the acquisition of image data …an X-Y addressable architecture was selected.") • **5** ("*The pixel array consists of 256 by 256 square pixels* arranged on a pixel pitch of 19 µm *and realised in a 1.5 µm n-well CMOS technology.*") • **6** ("*[I]mages are formed on the sensor plane*….") • **Fig. 1:**

Claim Elements	Harris in view of Swift and Ricquier
	 Figure 1: Schematic representation of the sensor architecture Neikirk, ¶¶326-327.
[42.d] said image sensor producing a pre-video signal,	**Ricquier discloses said image sensor producing a pre-video signal** (*e.g.*, "image data" "output," as shown in Figure 1)**.** ***E.g.*, Ricquier:** **Ricquier** discloses image data readout from the "256*256 imager" is "output" from the array. Ricquier, Fig. 1, Abstract, 4. A POSITA would have understood **Ricquier's** "output" as shown in Figure 1 is a pre-video signal produced by said image sensor. Neikirk, ¶328. As discussed in §§IX.A.3-4, POSITA would have been motivated to apply **Ricquier's** teachings of an imager including a "timing controller" when implementing **Swift's** image sensor 51, which teachings would have been obvious to apply in implementing **Harris's** camera. Neikirk, ¶331. • **3** ("To realise the acquisition of image data …an X-Y addressable architecture was selected.")

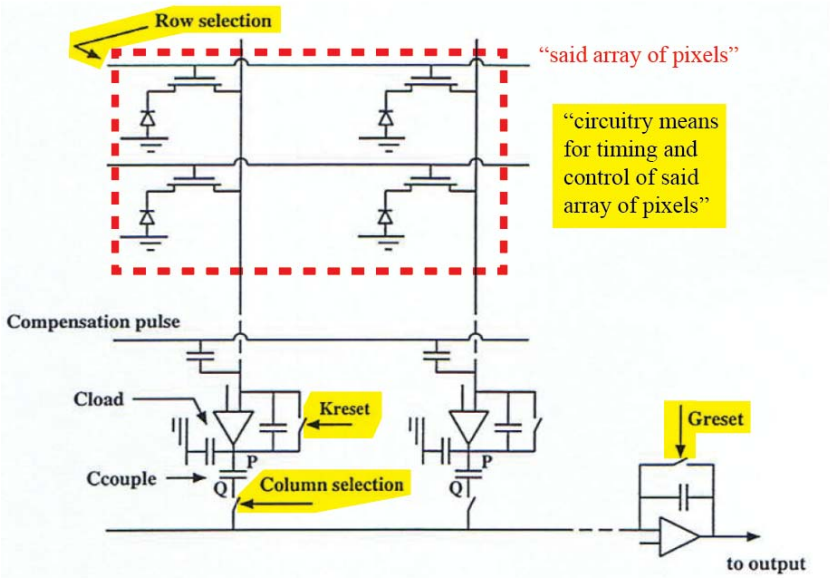
Claim Elements	Harris in view of Swift and Ricquier
	• **3** ("*The readout of the charge packets*…*proceeds as follows.* After *selecting* one particular *row of pixels,* these *charges are converted* simultaneously *to a voltage at the output* of the different charge sensitive amplifiers located at the end of the column readout lines.") • **Fig.1:**  Figure 1: Schematic representation of the sensor architecture *See also* Ricquier, Abstract, 4; Neikirk, ¶¶328-331.
[42.e] a first circuit board lying in a second plane and electrically coupled to said image sensor,	**Swift discloses a first circuit board** (*e.g.*, "circuit board 53") **lying in a second plane** (*e.g.*, plane defined by "circuit board 53," as shown in Fig. 2) **and electrically coupled to said image sensor** (*e.g.*, "provide power to the image sensor [and] process image signals received therefrom")**.** ***E.g.*, Swift:** While **Harris** does not teach the configuration of the components within its camera, **Swift** teaches the implementation of placing video processing circuitry on "circuit board 53," which is electrically coupled to the image sensor (to provide

Claim Elements	Harris in view of Swift and Ricquier
	power and process signals), and is in a second plane as shown in Fig. 2. As discussed in §IX.A.3, POSITA would have been motivated to apply **Swift's** teachings of a miniature camera housing a CMOS image sensor and processing circuitry in implementing **Harris's** camera. Neikirk, ¶335. • **9:5-13** ("*A further printed circuit board 53 is mounted on the first printed circuit board 52, substantially at right angles thereto*. Various *circuitry components* are mounted on the *circuit board 53, to provide power to the image sensor 51, process image signals received therefrom*…") • **Fig. 2:**  Fig.2. Neikirk, ¶¶ 332-335.
[42.f] said first circuit board including circuitry means for timing and	**Swift discloses said first circuit board** (*e.g.*, "circuit board 53") **including circuitry means for processing and converting said pre-video signal to a desired video format** (*e.g.*, "video processor"; "circuitry components are mounted on the circuit

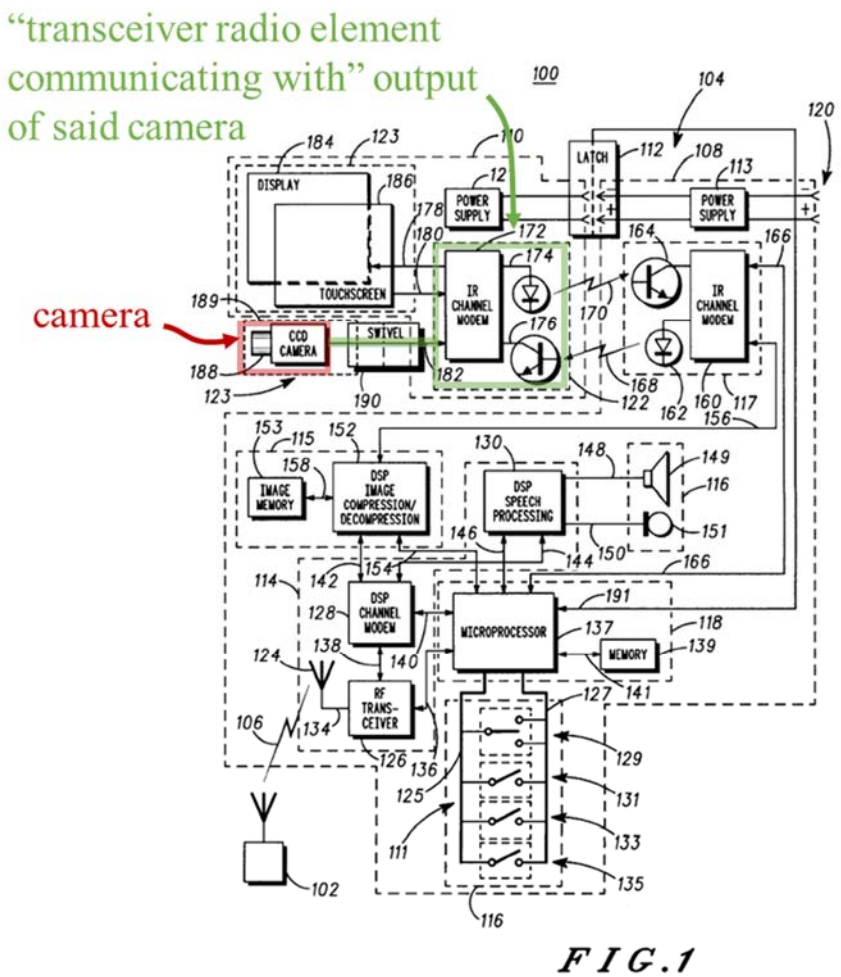
Claim Elements	Harris in view of Swift and Ricquier
control of said array of pixels and circuitry means for processing and converting said pre-video signal to a desired video format,	board 53, to…process image signals received [from image sensor 51]" into a "video signal" for a "video monitor or TV 154" to "display")**.** ***E.g.*, Swift:** **Swift** teaches circuitry components mounted on the circuit board 53 process image signals received from the image sensor 51 and convert them into a format that may be received by a monitor or a television. Swift, 9:5-13, 17:34-18:3, 18:8-11, Fig. 6. Neikirk, ¶¶336-337. As discussed in §IX.A.3, POSITA would have been motivated to apply **Swift's** teachings of a miniature camera housing a CMOS image sensor and processing circuitry in implementing **Harris's** camera. Neikirk, ¶337. *See* [42.e]. • **3:31-4:4** ("[T]here is provided an image sensor comprising a printed circuit board and, mounted thereon, the image sensor, *a video processor*….") • **9:5-13** • **15:7-8** ("*A video monitor or TV 154 is provided, to display a signal received from the camera 152*.") • **17:34-18:3** ("With *the video signals provided from the camera 152 as* either *video* or UHF *signals*, *viewing of an image from the camera 152 may be selected on the television at will*….") *See also* Swift, 2:20-25, 3:32-4:15, 12:30-13:1, 15:13-14, 18:8-11, 22:21-27, Fig. 2. Neikirk, ¶¶336-337. To the extent "circuitry means for processing and converting said pre-video signal to a desired video format" is construed under §112(6), **Swift's** "circuit board 53" that includes a "video processor"/"circuitry components" performs the function of

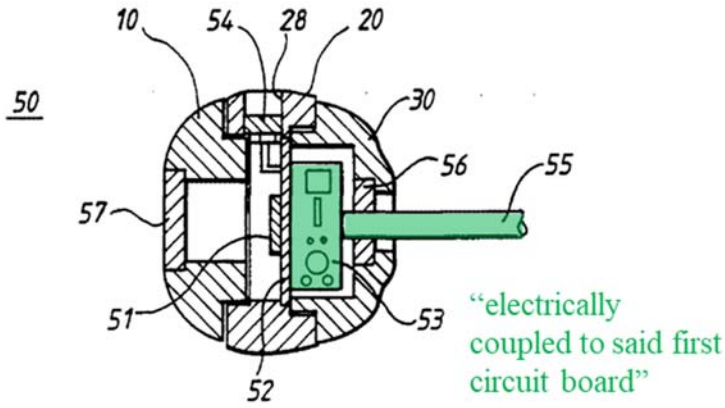
Claim Elements	Harris in view of Swift and Ricquier
	"processing and converting said pre-video signal to a desired video format" and has the same structure as "processing circuitry which…converts the pre-video signal to a post-video signal which may be accepted by a standard video device," disclosed in the '742. *See, e.g.*, '742, 4:46-51, 4:65-5:2, 8:7-12, 9:58-63, 17:8-44, 18:11-17, Fig. 9b (disclosing "video processing board 50"). *See* §VIII. Neikirk ¶337. To the extent further disclosure is required, for the reasons discussed above, **Swift's** "circuit board 53" that includes a "video processor"/"circuitry components" at minimum discloses the equivalent of the corresponding '742 structure by performing substantially the same function (processing and converting said pre-video signal to a desired video format) ('742, 4:65-5:2, 9:58-63), in substantially the same way (using electronic components) ('742, 4:4:65-5:2, 17:8-44), to achieve the same result (outputting a signal in a desired video format "accepted by a standard video device") ('742, 4:46-51, 4:65-5:2, 8:7-12, 9:58-63). Neikirk ¶337. **Ricquier discloses circuitry means for timing and control of said array of pixels** (*e.g.*, "timing controller" "controlling the sequence of addresses and reset pulses of" "photodiode array") **separate from the pixel array** (*e.g.*, "timing controller" is "realised…off-chip" from the "photodiode array" in an "external driving unit"). ***E.g.*, Ricquier:** While **Swift** does not expressly disclose how the timing of its pixels is controlled, **Ricquier** discloses an "off-chip" "timing controller" from the "X-Y addressable" photodiode array that generates the "X-Y addresses and control pulses" and uses "decoders [to] drive…row selection and column selection signal." Ricquier, 3, 4, 9. **Ricquier's** Fig. 1 (annotated below) depicts timing and control signals (yellow) from the off-chip timing controller applied to the read-out circuitry of the array. Ricquier, Fig. 1; Neikirk, ¶¶338.

Claim Elements	Harris in view of Swift and Ricquier
	As discussed in §§IX.A.3-4, POSITA would have been motivated to apply **Ricquier's** teachings of an imager including an "off-chip" "timing controller" when implementing **Swift's** image sensor 51, and to place the "timing controller" on **Swift's** "circuit board 53," which teachings would have been obvious to apply in implementing **Harris's** camera. Neikirk, ¶345. • **Abstract** ("*By controlling the sequence of addresses and reset pulses of the amplifiers, charges of different pixels are accumulated*. This way multiple resolutions can be programmed….") • **3** ("*Based on X-Y addresses and control pulses generated by an external driving unit, two decoders drive one particular row selection and column selection signal.*"), • **3** ("*The readout of the charge packets* that are accumulated during the integration time, proceeds as follows. *After selecting one particular row of pixels, these charges are converted simultaneously to a voltage at the output* of the different charge sensitive amplifiers located *at the end of the column readout lines.* …Based on *the column selection signals* these nodes Q are again discharged to their starting value, at the same time *creating a voltage variation at the output amplifier proportional to the charges at that column. Every column selection is followed by a reset pulse on the Greset switch* bringing back the output amplifier into its initial state. *After that, another charge packet can be received. After reading out a particular row of pixels, the Kreset switch is closed* causing the integration capacitor to discharge.") • **4** ("In order to limit the complexity of *the timing controller (realised in an off-chip driving unit)* only timing configurations of some very common patterns are provided….") • **4** ("*By using the Kreset switches and the Greset switch* in an appropriate way, it is possible to *accumulate charge*

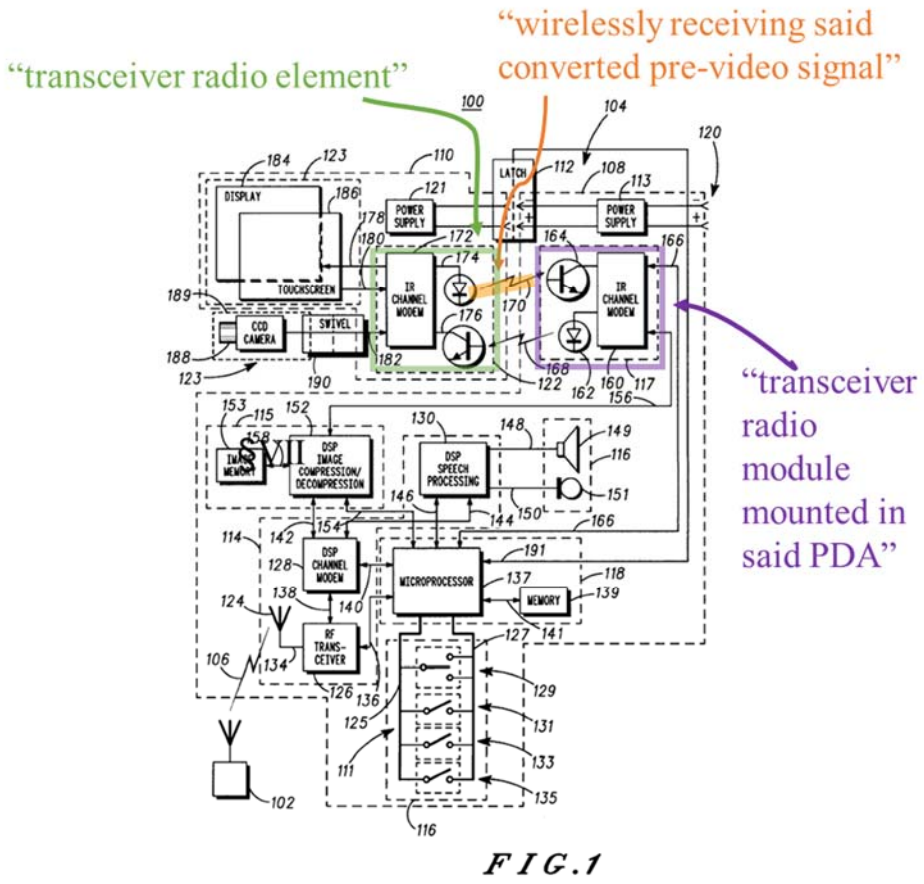
Claim Elements	Harris in view of Swift and Ricquier
	packets of different pixels or of different column amplifiers on the integration capacitors according to different patterns. So *by controlling the clocking scheme, the resolution of the imager can be altered* and it is even possible to create rectangular pixel patterns with a resolution varying across the rows. In order to limit the complexity of *the timing controller (realised in an off-chip driving unit)* only timing configurations of some very common patterns are provided : apart from the normal resolution (1 *1) also the addition of pixel charges in 2*2, 4*4 and 8*8 neighbourhoods was foreseen.") • **9** ("[A] 256*256 X-Y addressable photodiode array….") • **Fig. 1:**  Figure 1: Schematic representation of the sensor architecture *See also* Ricquier, 3-4, 9. Neikirk, ¶¶338-345. To the extent "circuitry means …for timing and control of said array of pixels" is construed under §112(6), as discussed above, **Ricquier's** "timing controller" performs the same function of timing and control of the array of pixels and has the same structure as "timing and control circuits 92," which control the

Claim Elements	Harris in view of Swift and Ricquier
	release of the image signal from the pixel array disclosed in the '742. *See* '742 5:2-5, 15:4-6, 16:9-11, Fig. 9a (disclosing "timing and control circuits 92"). *See* §VIII. Neikirk, ¶340. To the extent further disclosure is required, for the reasons discussed above, **Ricquier's** "timing controller" at minimum discloses the equivalent of the corresponding structure by performing substantially the same function (timing and control of the array of pixels) ('742, 5:2-5, 16:9-11), in substantially the same way (using electronic components) (*id.*, 5:2-5, 15:4-6), to achieve the same result (outputting images from the pixel array at a desired frame rate) (*id.*, 5:2-5, 16:9-11). Neikirk, ¶¶341-344.
[42.g] a transceiver radio element communicating with said firs [sic] circuit board for transmitting said converted pre-video signal;	**Harris discloses a transceiver radio element** (*e.g.,* "RF" "wireless data transceiver 122") **communicating with said camera** (*e.g.*, communicating with "camera 188" over "bus 182," as shown in Fig. 1) **for transmitting a converted pre-video signal** (*e.g.,* for transmitting "backward communication signal 170," containing "decompressed image data" "video")**.** ***E.g.*, Harris:** **Harris** teaches an "RF" "wireless data transceiver 122" housed in the "second housing" portion of the camera module and "electrically coupled" to the "camera 188" via "bus 182." *See* Harris, 3:13-18, 5:26-30, 5:60-61. The "wireless data transceiver 122" receives "transmit decompressed image data" from "camera 188" "on bus[] 182" for transmission by the wireless data transceiver over an "RF link." *Id.*, 5:26-30. *See* [42.a]. • **3:13-18** ("The wireless data transceiver 117 is for communicating with *a second portion of circuitry primarily housed in a second housing 110. The second portion of circuitry comprises a second wireless data*

Claim Elements	Harris in view of Swift and Ricquier
	transceiver 122, for communicating with the first wireless data transceiver 117, and a second user interface 123.") • **5:5-44** ("IR channel modem 172 drives the IR emitter 162 to *transmit the backward communication signal 170*…. *[T]he wireless data transceivers 117 and 122 can alternatively communicate via a wireless RF link* or any other suitable wireless means.") • **5:60-61** ("*The CCD camera 188 of FIG. 1 is electrically coupled to the IR channel modem 172 via bus 182*.") • **Fig. 1:** 

Claim Elements	Harris in view of Swift and Ricquier
	See also Harris, 3:41-4:3, 4:27-4:50, 4:61-5:37, 5:47-51, 6:41-43. Neikirk, ¶¶346-347. A POSITA would have understood that, when applying **Swift's** CMOS camera teachings in implementing **Harris**, the output of the circuit board 53 is the output of the camera and communicates with **Harris's** wireless data transceiver 122 for transmitting video images processed by the circuit board 53. *See also* §IX.A.3; Neikirk, ¶349; **Swift** teaches that "circuit board 53" communicates with external circuitry via "cable 55." Swift, 9:5-21, Fig. 2.  Fig.2. Neikirk ¶¶348-349.
[42.h] a transceiver radio module mounted in said PDA for wirelessly receiving said converted pre-video signal; and	**Harris discloses a transceiver radio module** (*e.g.,* "RF" "wireless data transceiver 117") **mounted in said PDA** (*e.g.*, in "first housing 108" of "communication device 104") **for wirelessly receiving said converted pre-video signal** (*e.g.*, receiving "decompressed image data" "video")**.** ***E.g.*, Harris:** **Harris** teaches a "wireless data transceiver 117" mounted in "first housing 108" of "communication device 104" of the PDA that communicates via "a wireless RF link" with the "wireless data transceiver 122" housed in the camera module to receive a

Claim Elements	Harris in view of Swift and Ricquier
	"backward communication signal 170" containing "transmit decompressed image data" for "full motion video." Harris, 3:9-18, 4:61-61, 5:5-8, 5:18-23, 5:38-44. A POSITA would have understood that Harris's "wireless data transceiver[s]" using a "wireless RF link" are "suitable" for "full motion video." Harris, 5:38-44, 9:36-55, 12:12-17; *see* §IX.A.1. *See* [42.pre], [42.a]. • **3:9-18** ("The *communication device 104 includes…a first housing 108*…. *The wireless data transceiver 117….*") • **5:38-44** ("*[T]he wireless data transceivers 117 and 122 can alternatively communicate via a wireless RF link* …to enable *full motion video*.") • **12:12-17** ("[T]he controller 118 controls the *wireless data transceivers 117 and 122 to initiate coupling of transmit image data captured by the CCD camera 188* to the image DSP 152 for storage in the image memory 153 *as a video clip*.") • **Fig. 1:**

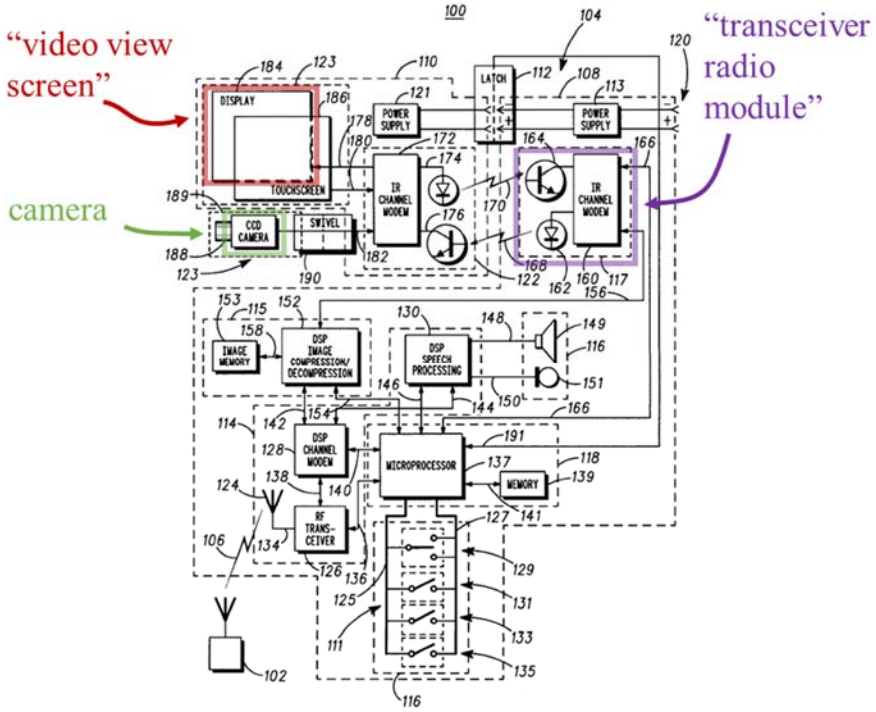
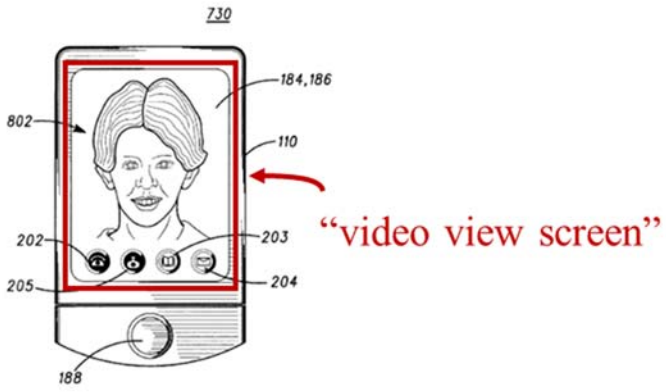
Claim Elements	Harris in view of Swift and Ricquier
	 *FIG.1* *See also* Harris 4:61-5-23. Neikirk, ¶¶350-351.
[42.i] a video view screen attached to said PDA for viewing said video images, said video view screen communicating with	**Harris discloses a video view screen** (*e.g.*, "display 184") **attached to said PDA** (*e.g.* on "the front surface 200" of the PDA) **for viewing said video images** (*e.g.,* viewing "decompressed image data" "video")**, said video view screen communicating with said transceiver radio module** (*e.g.*, via "bus[es] 178" and "180" and "wireless RF link" between "data transceiver[s] 117" and "122")**,**[8] **and displaying video images**

[8] To the extent Patent Owner argues "communicating with said transceiver radio module" requires communication from the video view screen ***to*** the transceiver radio

Claim Elements	Harris in view of Swift and Ricquier
said transceiver radio module, and displaying video images processed by said first circuit board.	**processed by said camera** (*e.g.*, displaying "video" "image data" from "camera 188")**.** ***E.g.*, Harris:** **Harris** teaches that the "display" is attached to "the front surface 200" of the PDA. *See* Harris, 2:55-65, 5:45-54. "[D]isplay 184" communicates with the "wireless data transceiver 117" via "bus 178" and "wireless RF link" between transceivers 117 and 122, as shown in Figure 1. *Id.,* 3:9-18, 4:61-5:11, 5:47-51, 5:23-37, 5:60-65. "[D]isplay 184" also displays "image data captured by…camera 188." *Id.*, 3:45-50, 11:43-47. *See* [42.pre], [42.a], [42.h]. • **5:32-34** ("The IR channel modem 172 may alternatively route *transmit decompressed image data directly from bus 182 to bus 178*….") • **5:38-44** ("*[W]ireless data transceivers 117 and 122 can alternatively communicate via a wireless RF link* …to enable *full motion video*.") • **5:45-64** ("*The user interface 123 includes a display 184…and a charge coupled device (CCD) camera 188…. [T]he display 184 displays receive decompressed image data*….")

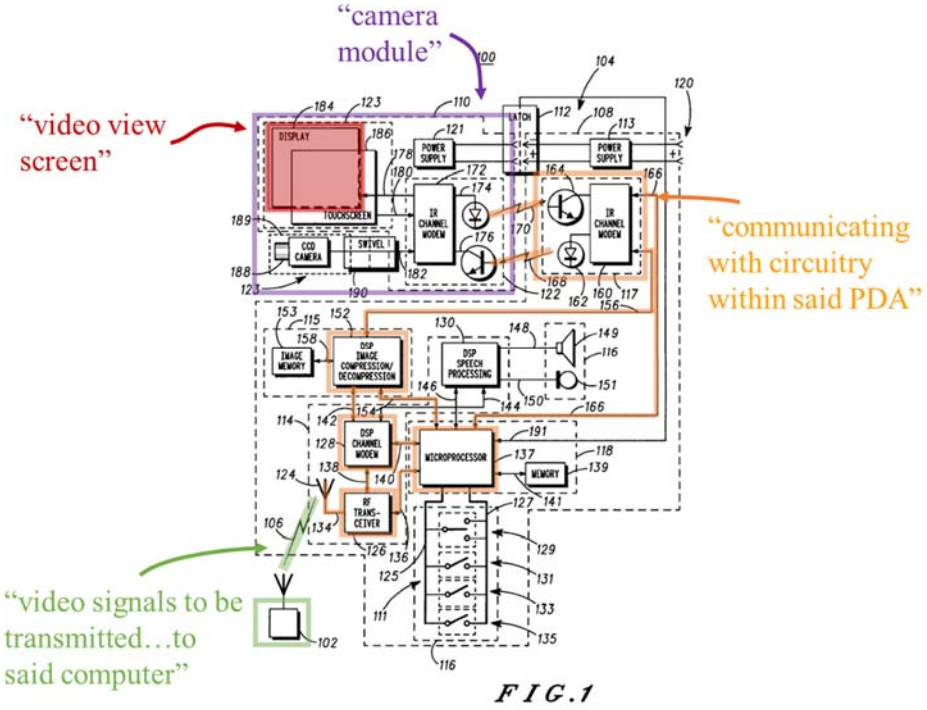
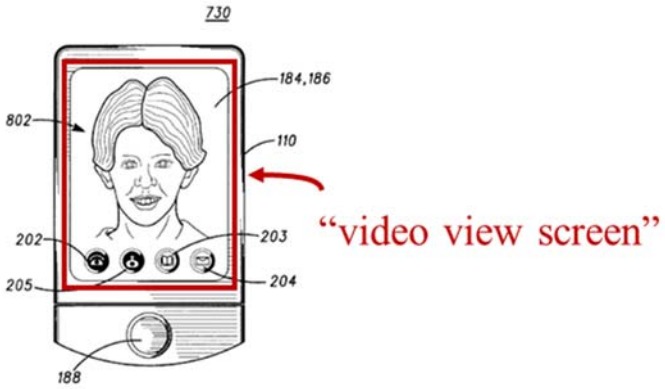
module, **Harris** further discloses its video view screen further includes "touchscreen 186" as shown in Fig. 8, which transmits "control data" ***to*** "data transceiver 117" via bus 180 and the "wireless RF link." Harris, 4:61-5:17, 5:45-59, Fig. 1.

Claim Elements	Harris in view of Swift and Ricquier
	• **5:60-6:2** ("The CCD *camera 188 captures an image and outputs the image as receive decompressed image data on bus 182*.") • **6:63-67** ("*The display 184 … comprise[s] a majority of the front surface 200 attributable to the housing 110*….") • **9:44-55** ("*The controller 118 displays a second user 802, with which the instant user is telephonically communicating, on the display 184.*") • **11:43-47** ("*[T]he controller 118 controls the wireless data transceiver 122 of housing 110 to route image data captured by the CCD camera 188 directly to the display 184*….") • **12:12-17** ("[T]he *wireless data transceivers 117 and 122 to initiate coupling of transmit image data captured by the CCD camera 188* to the image DSP 152 … *as a video clip*.") • **Fig. 1:**

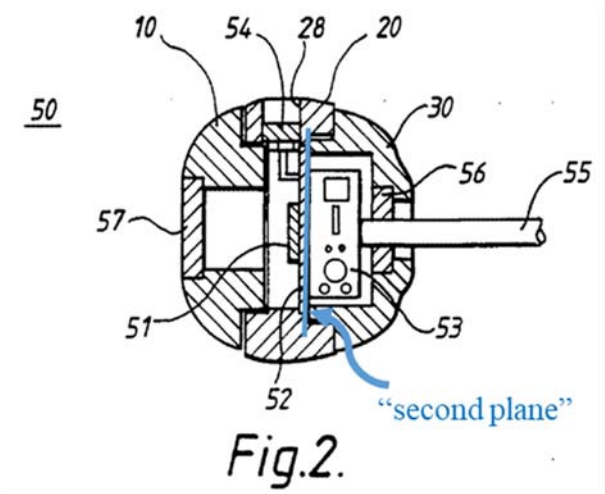
Claim Elements	Harris in view of Swift and Ricquier
	 FIG.1 • **Fig. 8:**  FIG.8 Neikirk, ¶¶352-353. **Swift discloses video images processed by said first circuit board** (*e.g.*, "circuitry components are mounted on the circuit

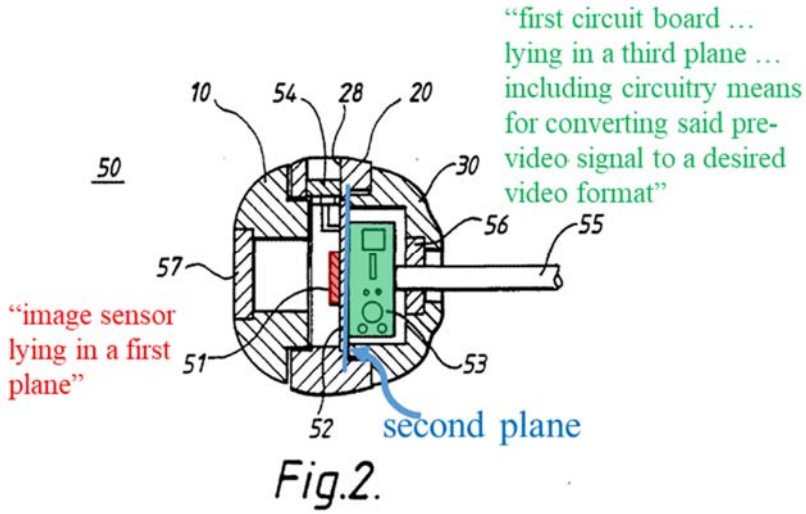
Claim Elements	Harris in view of Swift and Ricquier
	board 53, to…process image signals") **of said camera** (*e.g.*, "miniature camera 50")**.** *See* [42.f]. Neikirk, ¶353. A POSITA would have been motivated to apply **Swift's** teachings of a first circuit board processing and outputting video images in implementing **Harris's** camera as discussed in §IX.A.3. Neikirk, ¶354. A POSITA would have understood that, when applying **Swift's** CMOS camera teachings in implementing **Harris's** camera, the display displays images processed by the first circuit board. Neikirk, ¶¶353-354. *See* [42.e], [42.g]. *See also* §IX.A.3.
[58.pre] In a PDA having capability to transmit and receive data in a communications network, the PDA including a video view screen for viewing the video images, the improvement comprising:	*See* [42.pre], [42.a], [42.i]. Neikirk, ¶¶355-356.
[58.a] a camera module for taking video images, said camera module communicating with circuitry within said PDA enabling viewing of said video images on said PDA and enabling video signals to be transmitted from said	**Harris discloses a camera module for taking video images** (*e.g.*, "second housing 110" and "third housing 189" including "camera 188" for "captur[ing]" "video" "image data"; *see* [42.b])**, said camera module communicating with circuitry within said PDA** (*e.g.*, as shown in Fig. 1) **enabling viewing of said video images on said PDA** (*e.g.*, displaying "video" "image data" from "camera 188") **and enabling video signals to be transmitted from said camera module to the personal computer** (*e.g.*, "image data" from "camera 188" "emi[tted] by the antenna 124" to "communication device 102" "computer")**.**

Claim Elements	Harris in view of Swift and Ricquier
camera module to the personal computer,	***E.g.*, Harris:** **Harris** teaches a "second housing" and "third housing," which form a camera module, as shown in Fig. 1. The third housing includes "camera 188" for capturing video images and the "second housing" includes "wireless data transceiver 122," which communicates "signals," including "decompressed image data" with "wireless data transceiver 117" circuitry in the first housing. Harris, 3:9-18, 5:60-65. "[D]isplay 184," based on "forward control data" from "microprocessor 137," displays "full motion video" captured by the "camera" or received by the PDA from another "communication device 102," such as a "computer." *Id.* 4:61-5:11, 5: 47-51, 5:23-36, 5:60-65, 6:41-43. The PDA's "wireless data transceiver 117" in the "first housing" receives "full motion video," which components in the "first housing" compress, convert, and then transmit to "computer" "communication device 102" over "communication link 106." *Id.* 2:55-57, 2:61-65, 3:48-50, 3:55-58, 3:65-4:3, 4:27-29, 4:36-39, Fig. 1. *See* [42.a], [42.b], [42.i]. • **Fig. 1:**

Claim Elements	Harris in view of Swift and Ricquier
	 FIG.1 • **Fig. 8:**  FIG.8 *See also* Harris, 3:41-4:3, 4:27-4:50, 4:61-5:37, 5:47-51, 6:41-43. Neikirk, ¶¶357-358.
[58.b] said camera module including an image sensor housed therein, said image	*See* [42.b]-[42.c]. Neikirk, ¶¶359-362.

Claim Elements	Harris in view of Swift and Ricquier
sensor lying in a first plane and including an array of pixels for receiving images thereon,	
[58.c] said image sensor further including circuitry means electrically coupled to said array of said pixels for timing and control of said array of pixels,	**Ricquier discloses said image sensor further including circuitry means electrically coupled to said array of pixels** (*e.g.*, "off-chip" "timing controller" to "drive…row selection and column selection signal[s]" of "X-Y addressable photodiode array") **for timing and control of said array of pixels** (*e.g.*, "controlling the sequence of addresses and reset pulses of" "photodiode array")**.** *See* [42.f]. Neikirk, ¶¶363-365.
[58.d] said circuitry means for timing and control placed remote from said array of pixels on a second plane,	To the extent "remote from said array of pixels on a second plane" encompasses different circuits on the same circuit board, **Swift discloses a second plane** (*e.g.*, "circuit board 52")**.** ***E.g.*, Swift:** Swift discloses a "circuit board 52." Swift, 8:33-34, 9:5-10. A POSITA would have been motivated to apply **Swift's** teachings of a miniature camera housing a CMOS image sensor in implementing **Harris's** camera as discussed in §IX.A.3. Neikirk, ¶¶269, 323. • **Fig.2:**

Claim Elements	Harris in view of Swift and Ricquier
	 Fig.2. Neikirk, ¶¶366-367. **Ricquier discloses said circuitry means for timing and control placed remote from said array of pixels** (*e.g.*, "timing controller" is "realised…off-chip" from the "photodiode array" in an "external driving unit")**.** *See* [58.c], [42.f]. As discussed above in §IX.A.4, it would have been obvious to a POSITA to apply **Ricquier's** teachings of an "off-chip" "timing controller" in implementing **Swift's** teachings, such that a POSITA would have been motivated to locate timing controller on the opposite side of "circuit board 52" from "image sensor 51" in order to minimize the size of Swift's miniature camera. Neikirk, ¶369. Alternatively, to the extent "remote from said array of pixels on a second plane" does not encompass different circuits on the same circuit board, for the reasons discussed in §IX.A.4, a POSITA would have been motivated to place **Ricquier's** timing and control circuitry on a separate circuit board from circuit board 52 and 53 to reduce the profile area of the device. Neikirk, ¶370. Neikirk, ¶¶368-370.

Claim Elements	Harris in view of Swift and Ricquier
[58.e] said image sensor producing a pre-video signal,	*See* [42.d]. Neikirk, ¶¶371-373.
[58.f] a first circuit board electrically connected to said image sensor and lying in a third plane, said first circuit board including circuitry means for processing and converting said pre-video signal to a desired video format,	**Swift discloses a first circuit board electrically connected to said image sensor** (*see* [42.e]) **and lying in a third plane** (*e.g.*, plane defined by "circuit board 53," which is "substantially at right angle[]" to "circuit board 52" and the "image sensor" as shown in Fig. 2; *see* [42.e]), **said first circuit board including circuitry means for processing and converting said pre-video signal to a desired video format** (*see* [42.f]). ***E.g.*, Swift:** **Swift** discloses "circuit board 53" is on a third plane separate from "image sensor 51" and "circuit board 52." Swift, Fig. 2. *See* [42.e], [42.f]. • **Fig.2:**  Fig.2. Neikirk, ¶¶374-378.
[58.g] and a radio transceiver element communicating with	*See* [42.g]. Neikirk, ¶¶379-382.

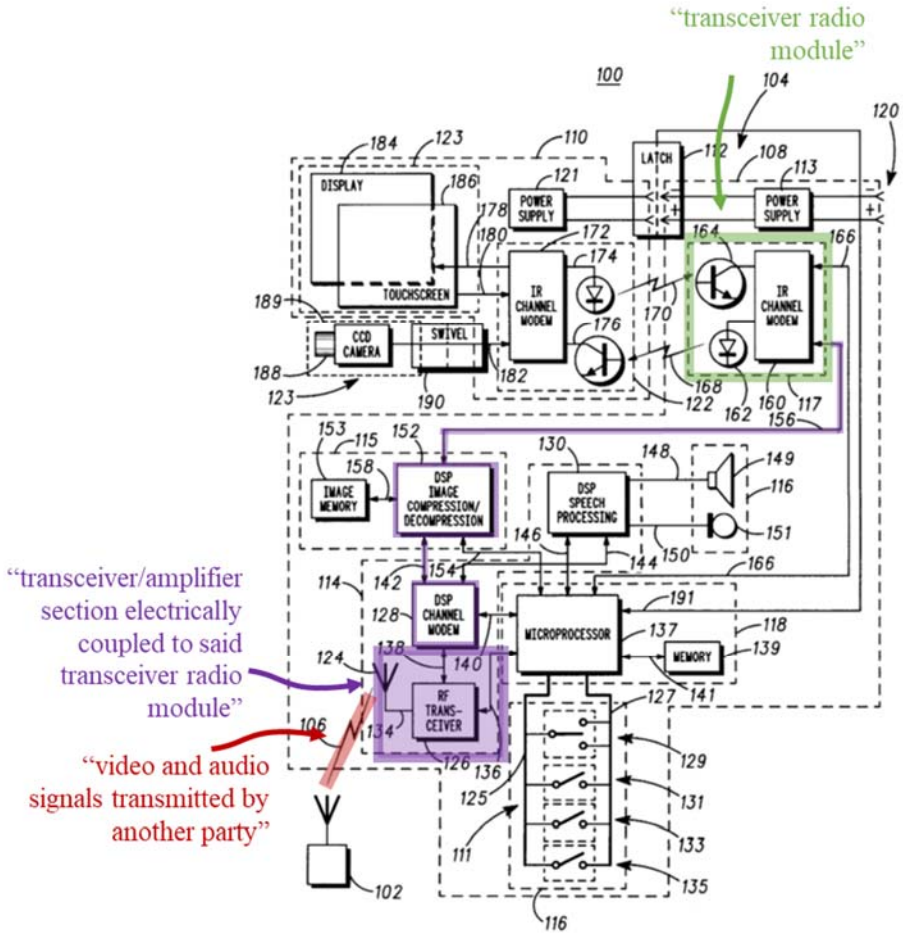
Claim Elements	Harris in view of Swift and Ricquier
said first circuit board for wirelessly transmitting said converted pre-video signal.	
[66.pre] A PDA having capability to transmit and receive data in a communications network, said PDA comprising:	*See* [42.pre]. Neikirk, ¶¶383-384.
[66.a] an image sensor lying in a first plane including an array of pixels for receiving images thereon, said image sensor producing a pre-video signal;	*See* [42.c], [42.d]. Neikirk, ¶¶385-387.
[66.b] a first circuit board electrically communicating with said image sensor, said first circuit board including circuitry means for timing and control of said array of pixels and circuitry means for processing and converting said pre-	*See* [42.e], [42.f]. Neikirk, ¶¶388-390.

Claim Elements	Harris in view of Swift and Ricquier
video signal to a desired video format;	
[66.c] a radio transceiver element communicating with said first circuit board for wirelessly transmitting said converted pre-video signal;	*See* [42.g]. Neikirk, ¶¶391-394.
[66.d] a camera module housing said image sensor, said first circuit board, and said transceiver radio element therein;	**Harris discloses a camera module housing said camera and said transceiver radio element therein** (*e.g.*, a "second housing 110" and a "third housing 189" collectively housing "camera 188" and "RF" "data transceiver 122")**.** ***E.g.*, Harris:** **Harris** teaches a "second housing 110" and a "third housing 189" that collectively house a "CCD camera 188" and "wireless data transceiver 122" therein. *See* [42.b], [42.g]. **Swift discloses a camera** (*e.g.*, "miniature camera 50") **with said image sensor** (*e.g.*, "image sensor 51") **and said first circuit board** (*e.g.*, "circuit board 53") **therein.** *See* [42.b], [42.e]. Neikirk, ¶¶395-397.
[66.e] a radio transceiver module housed within the PDA for wirelessly communicating with said radio transceiver	*See* [42.h]. Neikirk, ¶¶398-399.

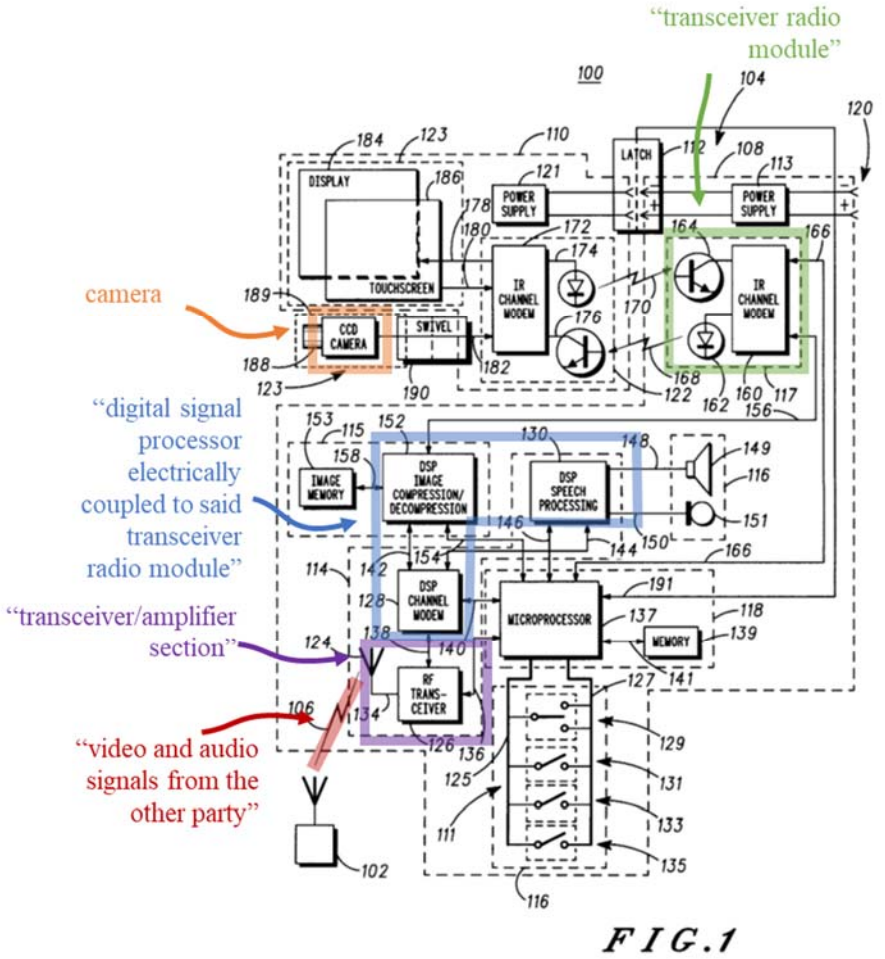
Claim Elements	Harris in view of Swift and Ricquier
element and receiving said converted pre-video signal;	
[66.f] a transceiver/amplifier section electrically coupled to said transceiver radio module for amplifying and further transmitting the converted pre-video signal, and for receiving, and amplifying video and audio signals transmitted by another party;	**Harris discloses a transceiver/amplifier section** (*e.g.,* "RF transceiver 126" and "antenna 124") **electrically coupled[9] to said transceiver radio module** (*e.g.,* "RF transceiver 126" coupled to "wireless data transceiver 117," as shown in Fig. 1) **for amplifying and further transmitting the converted pre-video signal** (*e.g.*, "RF transceiver 126…filter[s] and amplif[ies] electrical transmit signals…for emission by the antenna 124")**, and for receiving, and amplifying video and audio signals transmitted by another party** (*e.g.,* "antenna 124 receives incoming RF signals", which "RF transceiver 126…filters and steps down")**.** ***E.g.*, Harris:** **Harris** teaches "communication device 104" includes a "videoconferencing mode" in which "communication device 104" displays "full motion video" of "a second user 802, with which the instant user is telephonically communicating, on the display 184" and transmits "full motion video" to the second user's "communication device 102." Harris, 2:18-20, 5:42-44, 9:36-41, 9:44-59. **Harris** further teaches an "antenna 124" and an "RF transceiver 126" electrically coupled to the "wireless data transceiver 117" of the PDA for amplifying and further transmitting the video signals originating from the camera, and for receiving and converting "incoming RF signals of the communication link 106" into "electrical receive signals" which

[9] The '742 discloses that the transceiver radio module 85 can be indirectly electrically coupled to the transceiver/amplifier section 70. '742, Fig. 8.

Claim Elements	Harris in view of Swift and Ricquier
	contain "image data [and] speech data." *Id.*, 3:40-49, 3:50-58, 3:59-65. A POSITA would have understood the voltages received by the "antenna 134" would be very small, requiring the "RF transceiver 126" to amplify electrical receive signals received on wire 134 as part of the filtering and stepping down process before outputting "electrical receive signals…on bus 138." Harris, 3:59-65; Neikirk, ¶¶400-401. To the extent further disclosure is required, it would have been obvious to a POSITA for "RF transceiver 126" to amplify RF signals received by "antenna 124" to advantageously reduce noise and increase the likelihood that the DSP 128 correctly "demodulates and decodes electrical receive signals on bus 138…." Harris, 3:59-65. • **3:9-18** ("The *wireless data transceiver 117* is for communicating with a second portion of circuitry primarily housed in a second housing 110.") • **3:40-49** ("*The antenna 124 receives incoming RF signals* of the communication link 106….") • **3:50-58** ("*The RF transceiver 126 is coupled to the antenna via wire 134* and the controller 118 via bus 136. *The RF transceiver 126, in response to control signals on bus 136, filters and steps down the electrical receive signals on wire 134 into electrical receive signals output on bus 138. The RF transceiver 126 is responsive to control signals on bus 136 to filter and amplify electrical transmit signals on bus 138 for emission by the antenna 124 via wire 13*4.") • **Fig. 1:**

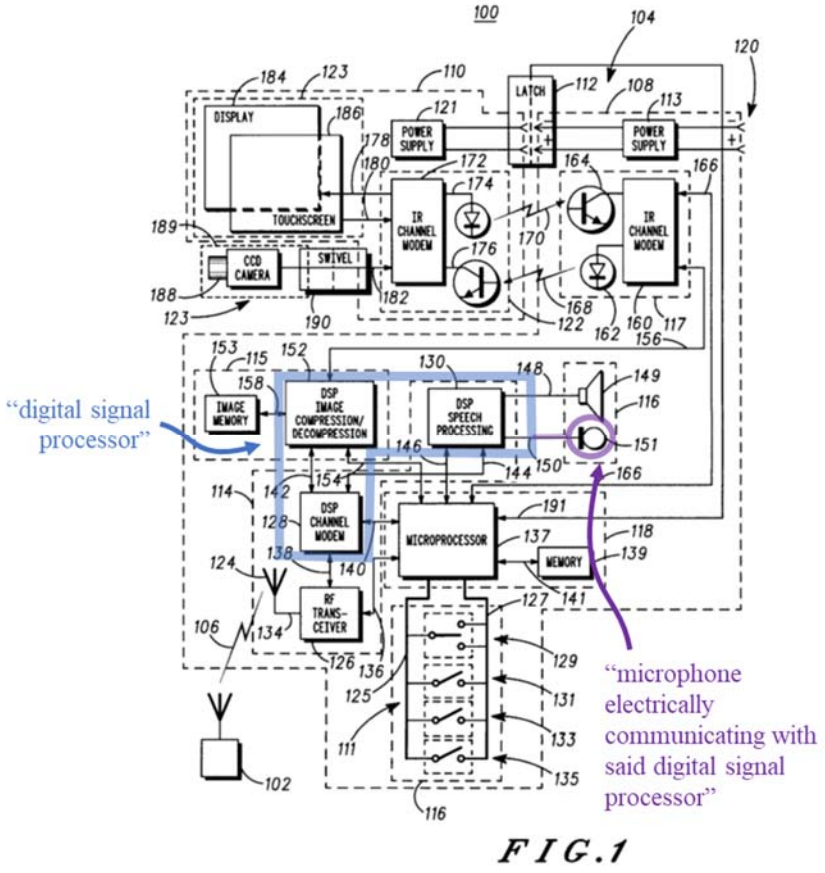
Claim Elements	Harris in view of Swift and Ricquier
	 FIG. 1 *See also* Harris, 3:19-24, 3:59-4:3, 4:25-50, 4:61-66, 5:8-11, 5:61-63, 9:44-55. Neikirk, ¶¶400-401.
[66.g] a digital signal processor electrically coupled to said transceiver radio module and said transceiver/amplifier section, said digital signal processor further conditioning said pre-video signal	**Harris discloses a digital signal processor** (*e.g.*, "image DSP 152" "channel modem DSP 128" and "speech processing DSP 130" "implemented using one…DSP[]") **electrically coupled to said transceiver radio module** (*e.g.,* coupled to "wireless" RF "data transceiver 117" via "bus 156" as shown in Fig. 1) **and said transceiver/amplifier section** (*e.g.*, coupled to "RF transceiver 126" by "bus 138")**, said digital signal processor further conditioning said pre-video signal which is first conditioned by said camera** (*e.g.,* "compress[es]…image data" received from "camera 188")**, and also for conditioning video**

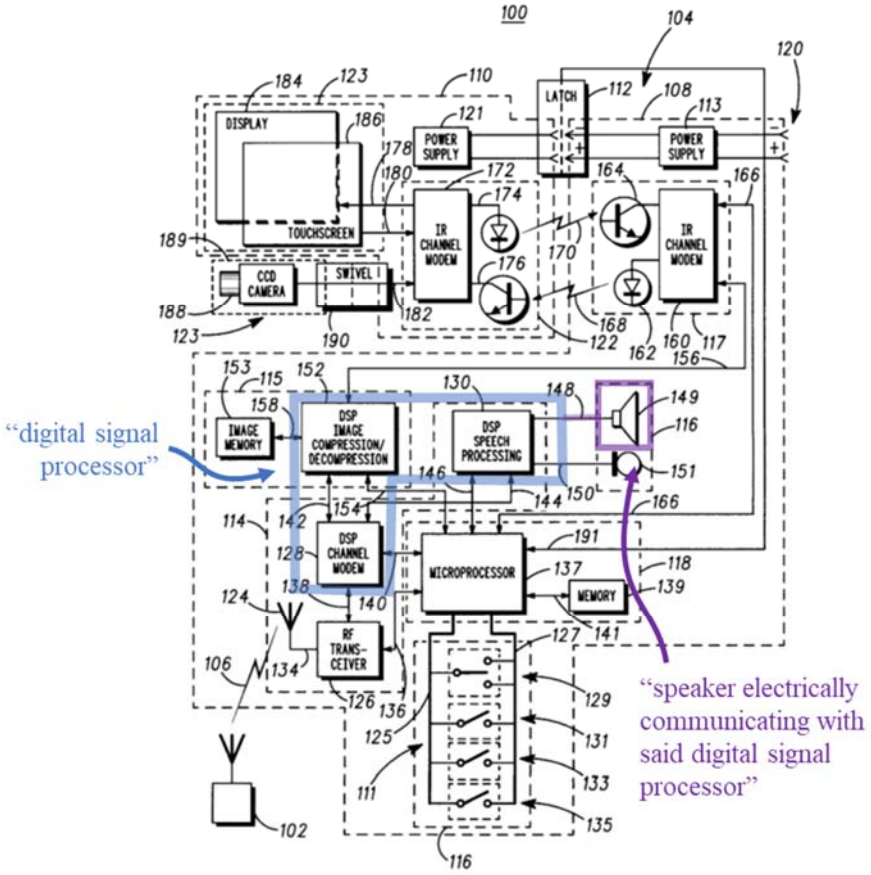
Claim Elements	Harris in view of Swift and Ricquier
which is first conditioned by said first circuit board, and also for conditioning video and audio signals received by said transceiver/amplifier section from the other party;	**and audio signals received by said transceiver/amplifier section from the other party** (*e.g.*, "demodulates and decodes electrical receive signals" into "image data" and "speech data")**.** ***E.g.*, Harris:** **Harris** teaches implementing the "image DSP," "channel modem DSP" and a "speech processing DSP" as "one" "digital signal processor (DSP)" to demodulate and decode "electrical receive signals," compress and decompress "image data," and process "the receive speech data." **Harris**, 4:4-11, 4:25-33, 4:46-50. The single DSP is coupled to "wireless data transceiver 117" via "bus 156" and "RF transceiver 126" via "bus 138." *Id.*, 3:40-43, 3:50-65, 4:36-46, Fig. 1. • **3:59-65** ("*[C]hannel modem DSP 128* is coupled to the RF transceiver 126 via bus 138….*demodulates and decodes electrical receive signals on bus 138 into receive compressed image data, receive speech data*….") • **4:4-11** ("*[S]peech processing DSP 130*….") • **4:25-33** ("*[I]mage DSP 152…decompresses receive compressed image data*…*into receive decompressed image data*….") • **4:36-42** ("*[I]mage DSP 152*…*compress[es] transmit decompressed image data* on bus 156 *into transmit compressed image data*….") • **4:46-50** ("*[C]hannel modem DSP 128, the speech processing DSP 130, and the image DSP 152 can be implemented using one…DSP[]*….") • **12:12-17** ("*[W]ireless data transceivers 117 and 122…initiate coupling of transmit image data captured by the CCD camera 188 to the image DSP 152*….") • **Fig. 1:**

Claim Elements	Harris in view of Swift and Ricquier
	 FIG.1 *See also* Harris, 3:40-43, 3:50-55, 4:43-46. Neikirk, ¶¶402-403. **Swift discloses said pre-video signal is first conditioned by said first circuit board.** *See* [66.b]. Neikirk, ¶¶404-405. *See* [66.b]-[66.c]. A POSITA would have understood that, when applying **Swift's** CMOS camera teachings in implementing **Harris's** camera, the output of circuit board 53 is the output of the camera. Neikirk, ¶405. *See* §IX.A.3.
[66.h] a microphone electrically communicating with said digital signal	**Harris discloses a microphone** (*e.g.,* "microphone 151") **electrically communicating** (*e.g.*, over "wire 150") **with said digital signal processor** (*e.g.*, DSPs 152, 128, 130 "implemented using one…DSP[]"; *see* [66.g]) **for receiving**

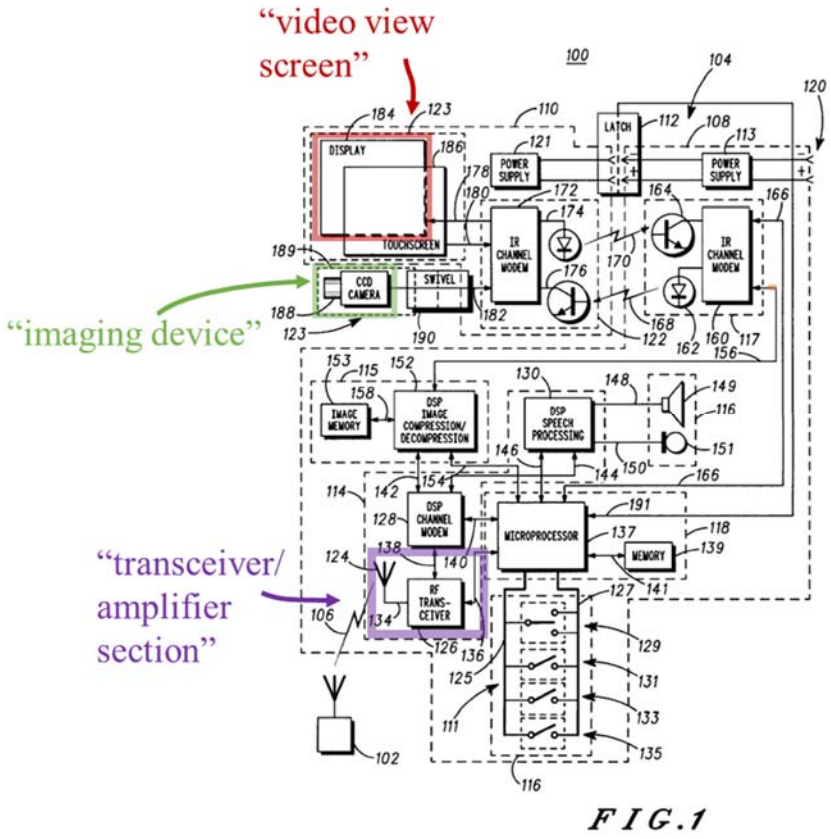
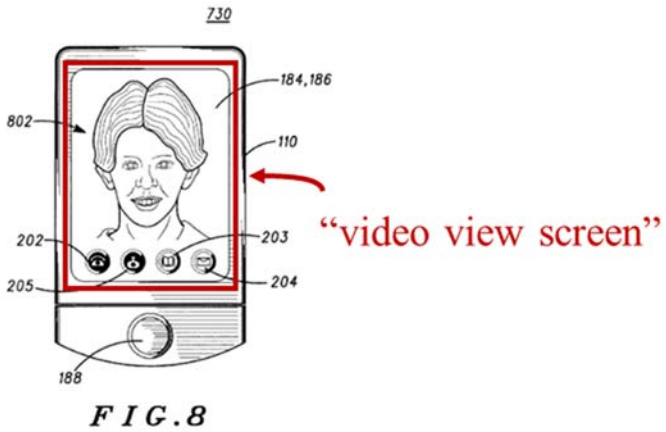
Claim Elements	Harris in view of Swift and Ricquier
processor for receiving sound and converting the sound to audio signals;	**sound** (*e.g.*, "receive audible voice signals") **and converting the sound to audio signals** (*e.g.*, "transduces audible voice signals into electrical speech signals")**.** ***E.g.*, Harris:** **Harris** teaches a "microphone 151 transduc[ing] audible voice signals into electrical speech signals on wire 150." Harris, 4:17-23. The "speech processing DSP" portion of the "one…DSP" receives the signals on wire 150 and processes them. *Id.*, 4:8-11, 4:17-23.[10] • **4:17-23** ("*The microphone 151 is coupled to the speech processing DSP 130 via wire 150*. The microphone 151 transduces audible voice signals into electrical speech signals on wire 150.") • **Claim 15** ("*[T]he microphone to receive audible voice signals* for conversion into speech data for transmission") • **Fig. 1:**

[10] "[W]ire 148" at Harris, 4:10, is a typo that instead refers to wire 150 as shown in Fig. 1. Neikirk, ¶218.

Claim Elements	Harris in view of Swift and Ricquier
	 FIG.1 *See also* Harris, 1:28-30, 4:8-11, 4:46-50. Neikirk, ¶¶406-407.
[66.i] a speaker electrically communicating with said digital signal processor for broadcasting audio signals;	**Harris discloses a speaker** (*e.g.,* "speaker 149") **electrically communicating** (*e.g.,* "via wire 148") **with said digital signal processor** (*e.g.*, DSPs 152, 128, 130 "implemented using one…DSP[]"; *see* [66.g]) **for broadcasting audio signals** (*e.g.*, "transduces electrical speech signals on wire 148 into audible voice signals")**.** ***E.g.*, Harris:** **Harris** teaches a "speaker" electrically communicating with the "speech processing DSP 130" portion of the "one…DSP" over "wire 148" for broadcasting audible voice signals.

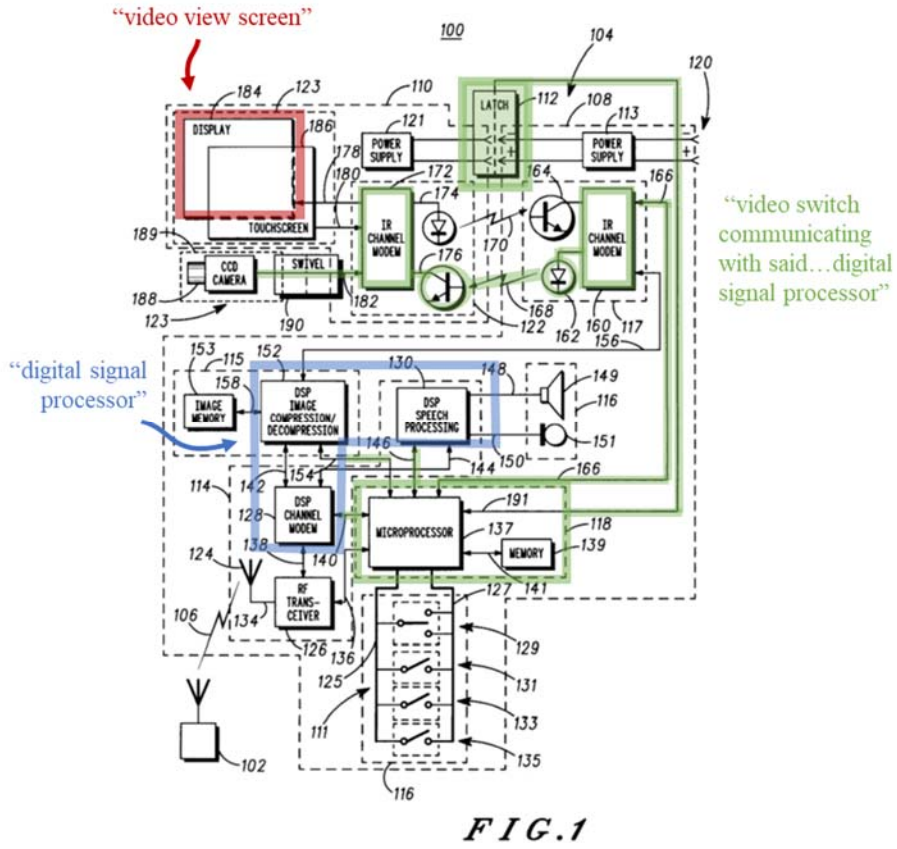
Claim Elements	Harris in view of Swift and Ricquier
	• **4:12-17** ("The *speaker 149 is coupled to the speech processing DSP130 via wire 148*. The speaker 149 transduces electrical speech signals on wire 148 into audible voice signals.") • **Fig. 1:**  FIG.1 *See also* Harris, 1:28-30, 4:46-50, Claim 15. Neikirk, ¶¶408-409.
[66.j] a video view screen attached to said PDA, said video view screen for selectively	**Harris discloses a video view screen attached to said PDA** (*see* [42.i])**, said video view screen for selectively displaying images from said imaging device** (*e.g.*, selectively "route…image data" "video" from "camera 188" to "display 184")**, and for selectively displaying video images received by**

Claim Elements	Harris in view of Swift and Ricquier
displaying images from said imaging device, and for selectively displaying video images received by said transceiver/amplifier section; and	**said transceiver/amplifier section** (*e.g.,* selectively route "image data" "video" received by "RF transceiver 126" and "antenna 124" to "display 184")**.** ***E.g.*, Harris:** **Harris** teaches the "second housing 110" of "communication device 104" includes a "display 184" that is responsive to "forward control signals" from a microprocessor to configure the display 184 to selectively display "full motion video" "image data" routed directly from the "camera 184" over bus 182 to bus 178. Harris, 5:32-34, 5:50-54, 6:41-49. The display is further responsive to forward control signals to selectively display "image data" "video" received by "RF transceiver 126" and "antenna 124" during a videoconference. *Id.*, 3:50-58, 3:61-4:3, 4:27-33, 4:64-5:5, 5:23-26, 5:50-54. *See* [42.a], [42.i], [66.f]. • **Fig. 1:**

Claim Elements	Harris in view of Swift and Ricquier
	 FIG. 1 • **Fig. 8:**  FIG. 8 *See also* Harris, 3:50-58, 3:61-4:3, 4:27-33, 4:64-5:5, 5:23-26, 5:50-54, 5:61-63, 6:41-49; Neikirk, ¶¶410-411.

Claim Elements	Harris in view of Swift and Ricquier
[66.k] a video switch communicating with said first circuit board and said digital signal processor for switching video images to be viewed on said video view screen; and	**Harris discloses a video switch** (*e.g.,* "the sensors 512, 514, 604, and 606" of the "latch 112") **communicating with said camera and said digital signal processor** (*e.g.,* "microprocessor 137" generates "forward control signals" to "camera 188" and DSPs 152, 128, 130 "implemented using one…DSP[]," in response to the "logic…level signal" from the sensors of "latch 112") **for switching video images to be viewed on said video view screen** (*e.g.,* "controller 118 transitions operation of the communication device 104" to display "video" "image data captured by the []camera 188 directly to the display 184" or to "display[] a second user 802, with which the instant user is telephonically communicating" based on the "signal from the sensor[s]" of "latch 112")**.** ***E.g.*, Harris:** **Harris** teaches a "latch 112" communicating with "camera 188" and digital signal processor via a "logic level signal" to "controller 118" on "bus 191." **Harris**, 3:61-65, 4:8-11, 4:27-30, 5:23-26, 6:41-49, 7:23-25, Fig. 1. The signal from the "sensor[s]" of "latch 112" configures the "operation of the communication device." *Id.*, 7:23-25, 7:41-53. A "logic low level" configures the device into "video conferencing mode" to "display[] a second user"; a logic high level configures the communication device in "camera mode" to display "image data captured by" the "camera 188." *Id.*, 8:50-52, 9:36-55, 10:42-49, 11:43-48, 11:61-65. *See* [66.g]. • **4:27-30** ("*The image DSP 152, in response to control signals on bus 154*, decompresses receive compressed image data….") • **6:41-49** ("*[M]icroprocessor 137 configures the display 184…with forward control signals*…. [M]icroprocessor 137 is *responsive to the position signal on bus 191*….")

Claim Elements	Harris in view of Swift and Ricquier
	• **7:41-53** ("*[T]urret 402 also includes sensors 512, 514, 604, and 606…electrically connected to the controller 118 via … bus 191*….When triggered, the sensors 512, 514, 604, and 606 output a logic high level signal….*When untriggered, the sensors 512, 514, 604, and 606 do not output a logic high level signal and their respective wires of the bus 191 remain at a logic low level*.") • **9:36-55** ("Upon detection, during a call, of detachment of the housings 108 and 110 from *the logic low level on all wires of the bus 191* and touching the touchscreen 186 at the camera softkey 205 via bus 166, *the controller 118 configures the communication device in a video conferencing mode 730* of FIG. 7….*The controller 118 displays a second user 802, with which the instant user is telephonically communicating, on the display 184*….This permits viewing of the second user 802 on the display 184….") • **10:42-46** ("*Upon detection of the logic high level signal* from the sensor 604 or 606 via bus 191, the controller 118 *transitions operation of the communication device 104 from the telephone mode 700 to the camera mode 706*….") • **11:39-48** ("In the camera mode 706…*Upon detection of the logic high level signal from the sensor 604* via bus 191, the controller 118 *controls the wireless data transceiver 122 of housing 110 to route image data captured by the CCD camera 188 directly to the display*….") • **Fig. 1:**

Claim Elements	Harris in view of Swift and Ricquier
	 FIG. 1 • **Fig. 5:**

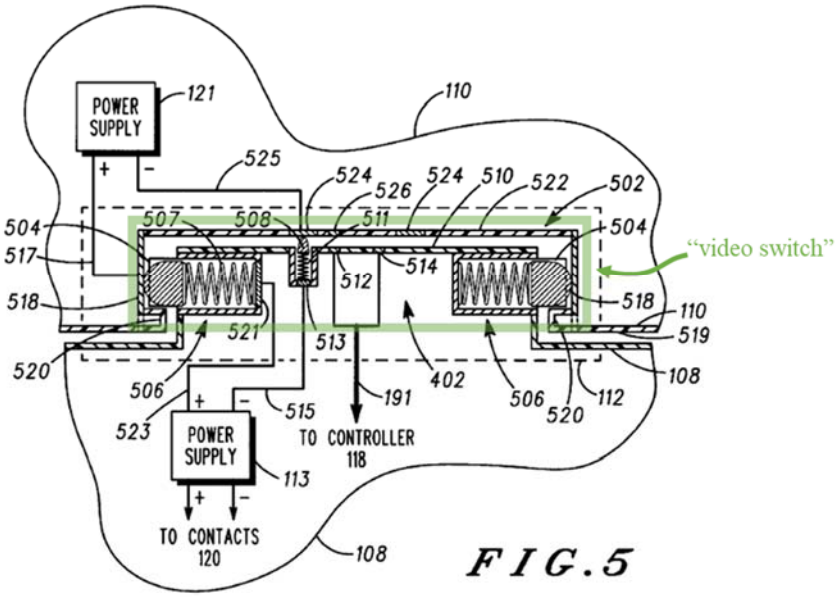


FIG. 5

- **Fig. 8:**

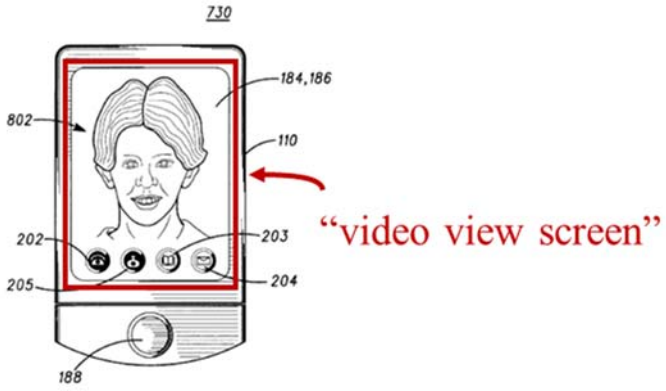


FIG. 8

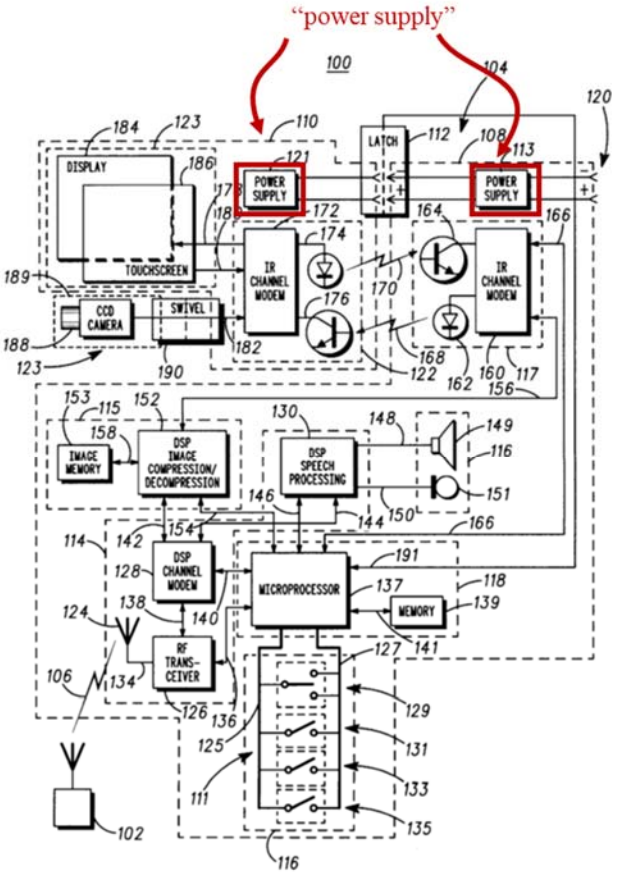
See also Harris, 3:61-65, 4:8-11, 5:23-26, 7:23-25, 8:50-52, 11:39-48, 11:61-65. Neikirk, ¶¶412-413.

Swift discloses external circuitry communicating with said first circuit board.

***E.g.*, Swift:**

See [42.g], [66.c].

Claim Elements	Harris in view of Swift and Ricquier
	As explained in §IX.A.3, a POSITA would have been motivated to apply **Swift's** teachings of a miniature CMOS imaging device and video processing board in implementing **Harris's** camera. Neikirk ¶415. *See* [66.b]-[66.c]. A POSITA would have understood that, when implementing **Swift's** CMOS camera teachings in implementing **Harris**, the output of "circuit board 53" is the output of the camera and communicates with the video switch. Neikirk ¶415. Neikirk, ¶¶414-415.
[66.l] a power supply mounted to said PDA for providing power thereto.	**Harris discloses a power supply mounted to said PDA** (*e.g.*, "the communication device 104 includes power supplies" 113 and 121) **for providing power thereto** (*e.g.*, "supplies power to the circuitry of the housing 108" and "supplies power to the circuitry of the housing 110")**.** ***E.g.*, Harris:** **Harris** teaches "power suppl[ies] 113" and "121" included in "the communication device" to supply "power to the PDA's circuitry. • **3:25-32** ("The communication device 104 includes power supplies 113 and 121….*[T]he power supply 113 supplies power to the circuitry of the housing 108*….*The power supply 121 supplies power to the circuitry of the housing 110*.") • **Fig. 1:**

Claim Elements	Harris in view of Swift and Ricquier
	 *FIG.1* *See also* **Harris**, 7:23-32, 7:34-39. Neikirk, ¶¶416-417.

B. Ground 3: Claim 66 is rendered obvious by Harris in View of Swift, Ricquier, and Tran

To the extent it is argued further disclosure of an amplifier section amplifying video and audio signals transmitted by another party is required for [66.f], **Tran**–incorporating by reference U.S. Application No. 08/461,646 ("'646") (Ex. 1057)—**discloses an amplifier section** (*e.g.,* "RF amplifier 140" of "RF receiver portion

132") **for amplifying video and audio signals transmitted by another party** (*e.g.,* "amplifier 140" "increases the low-level DPQSK RF signal [voice and video data] to a workable range")**.** Neikirk, ¶¶430-431.

Tran discloses a "wireless transceiver 31" using "a cellular telephone, whose block diagram and operation are discussed in detail in a co-pending U.S. application Ser. No. 08/461,646, hereby incorporated-by-reference." Tran, 7:59-63. This disclosure of the '646 application teaches a "RF amplifier 140" portion of "radio frequency (RF) transmitter/receiver 112" that "increases" received signals. Ex. 1057 ("'646"), 10:34-11:10, Figs. 10-12. The incorporated **'646** discloses the "receiver portion 132," which is "coupled to the antenna 76" is "fed to a receiver RF amplifier 140, which increases the low-level DPQSK RF signal to a workable range before feeding it to the mixer section." '646, 11:11-18; *see also id.* 10:24-11:18. The '646 further discloses "RF amplifier 140 is a broadband RF amplifier, which preferably has a variable gain control…." *Id.* Neikirk, ¶¶432-433.

A POSITA would have been motivated to apply **Tran's** explicit teachings (including the incorporated '646) of an RF amplifier for increasing received voice and video data signals in implementing **Harris's** communication device. Like Harris, **Tran** is also in the same field of art and is analogous art to '742—both are in the same field related to compact solid-state image sensors for use in space-constrained devices. *E.g.*, Tran, Abstract, 1:4-6, 4:67-5:1, 6:26-48; Neikirk, ¶434.

Like Harris, **Tran** is also reasonably pertinent to the alleged problem(s) identified in '742 of arranging camera circuitry (such as an image sensor and supporting circuitry), including to minimize the size or profile area of the device. *E.g.*, Tran, 4:67-5:1; Neikirk, ¶434.

A POSITA would have been motivated to apply **Tran's** wireless transceiver with the incorporated **'646** teachings of an RF amplifier for amplifying received signals in implementing **Harris's** "RF transceiver 126" to advantageously reduce noise and increase the likelihood the DSP 128 correctly "demodulates and decodes electrical receive signals on bus 138…." Harris, 3:59-65. Neikirk, ¶435. A POSITA would have had a reasonable expectation of success because both Harris and Tran disclose RF transceivers for communicating video and voice data over a cellular network. Harris, 3:1-8; Tran, 40-63; Neikirk, ¶435.

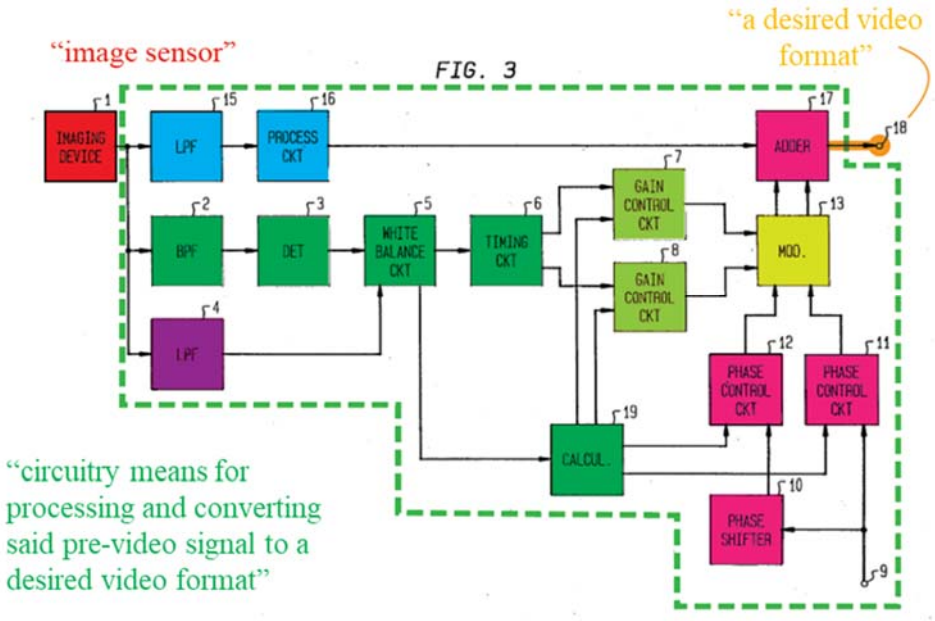
In light of the above, a POSITA would have found it routine, straightforward and advantageous to apply **Tran's** teachings of an RF amplifier in a wireless transceiver in implementing **Harris's** RF transceiver and would have known such a combination (yielding the claimed limitations) would predictably work and provide the expected functionality. Neikirk, ¶436.

C. Tanaka Grounds (Grounds 2, 4)

To the extent it is argued additional disclosure of "circuitry means for processing and converting said pre-video signal to a desired video format" is

required, the Claims are rendered obvious by **Harris** in view of **Swift**, **Ricquier**, and **Tanaka** (Ground 2), and claim 66 is rendered obvious by **Harris** in view of **Swift**, **Ricquier**, **Tran**, and **Tanaka** (Ground 4).

While **Harris** (as modified by **Swift's** teachings) does not describe its "video processor" and "circuitry components" that "process image signals received [from image sensor 51]" into a "video signal" in extensive detail, **Tanaka** provides additional implementation description of such a video processor, including a "white-balancing circuit" that converts the "output signal of an imaging device" into a "composite color video signal" as shown in Fig. 3, below. *E.g.*, Tanaka, Abstract, 1:66-2:6, 2:65-3:6, 3:48-53, 4:40-53.



Tanaka, Fig. 3; Neikirk, ¶¶418-419.

To the extent the "circuitry means for processing and converting said pre-video signal to a desired video format" ([42.f], [58.f], [66.b]) limitations are construed under §112(6) (see §VIII), the **Tanaka** Fig. 3 teachings disclose and/or render obvious the function of "processing and converting said pre-video signal to a desired video format" and the same structures and processing techniques as the "processing circuitry which…converts the pre-video signal to a post-video signal which may be accepted by an NTSC/PAL compatible video device," disclosed in '742. *Compare* **Tanaka** Fig. 3 *with* '742, Fig. 9b (disclosing a functionally identical arrangement of components, as shown by the color-coding of Tanaka Fig. 3 above and '742 Fig. 9b below, to convert the output received from the imager into a final video signal), 8:7-12, 17:10-44. Neikirk, ¶420.

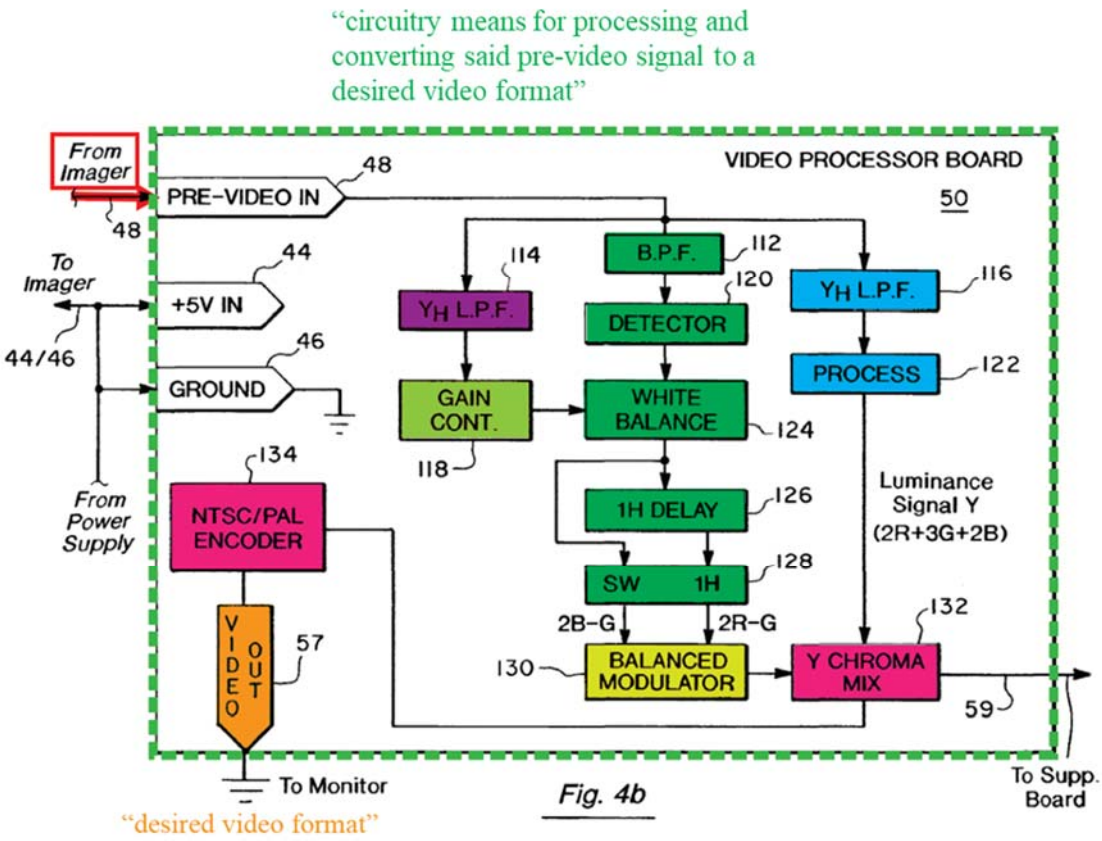


Fig. 4b

'742, Fig. 9b. Specifically, Tanaka and the '742 both disclose a low-pass-filter followed by a process circuit; a second low-pass-filter; a band-pass filter, detector, white balance circuit, delay/timing circuits; gain control; modulator; and mixer/adder/encoders that convert the pre-video signal from the imager into a desired video format. *E.g.*, Tanaka, 3:32-4:56, Fig. 3; '742, 17:10-44, Fig. 9b. The '742 describes the NTSC/PAL encoder 134 adds "*composite frequencies*" to produce the desired video format. '742, 17:37-44; Neikirk, ¶421. Similarly, Tanaka describes the output of "Adder 17" as "the *composite color video signal* whose color reproduction characteristic has been compensated," for output to a NTSC color

television. *E.g.*, Tanaka, 4:45-47, 1:66-2:6, 5:34-37, 2:65-3:47; Neikirk, ¶421. Thus, **Tanaka** discloses and/or renders obvious the same function of "processing and converting said pre-video signal to a desired video format" using the same or equivalent structure disclosed in '742. Neikirk, ¶421.

A POSITA would have been motivated to apply **Tanaka's** teachings of video processing circuitry in implementing the imaging device disclosed by **Harris** (as modified by **Swift's** teachings) in order to improve the quality of the images, including production of higher-quality video with truer colors. *E.g.,* Tanaka, 3:25-31, 4:28-34, 4:40-47; Neikirk, ¶¶422-423. Like Harris, Swift, and Ricquier, **Tanaka** is in the same field of art and is analogous to '742—all are in the same field related to imaging apparatuses. *E.g.*, Tanaka, Abstract, 1:61-65; Neikirk, ¶423. Like Harris, Swift, and Ricquier, **Tanaka** is reasonably pertinent to the alleged problem(s) identified in '742 of arranging camera circuitry (such as an image sensor and supporting circuitry). *E.g.*, Tanaka, 2:25-48; Neikirk, ¶423. **Tanaka** expressly discloses that through its use of a luminance signal and two color difference signals derived from the output of the imaging device, a higher quality video with more accurate colors is obtained. *E.g.*, Tanaka, 1:66-2:6. This technique advantageously compensates for the variations of the color temperature of the light. *Id.*, 3:25-31, 4:28-34, 4:40-47. Neikirk, ¶¶423-424.

To the extent it is argued **Tanaka's** teachings are limited to CCD image sensors, a POSITA would have understood systems and methods for processing the output of a CCD camera would be equally applicable to the output of other types of solid-state imaging devices, including CMOS imagers, or could be adapted for use with other types of solid-state imaging devices with minimal effort. This is confirmed in the prior art, which describes CCD and CMOS imaging technology as interchangeable components within the overall system. *See, e.g.*, Martin (Ex. 1010, filed 1/17/1995), 5:55-61, 12:62-13:9, 13:16-31 (disclosing processing circuit capable of generating video from the output of a "CMOS [APS] array, or either a Charge Injection Diode (CID) or a [CCD] camera array")); Olmstead (Ex. 1011, filed 12/21/1995) , 49:41-45 (disclosing it is possible to use "CMOS active pixel sensor arrays in place of CCD arrays" without changing the overall method of reading and processing images of bar codes); Rapa (Ex. 1012, filed 6/12/1997), 3:24-26 (disclosing a system processing signals to generate video output from "either a CCD …or an APS" image sensor). Neikirk, ¶¶425-428.

A POSITA would have found it routine, straightforward and advantageous to apply **Tanaka**'s teachings of circuitry for receiving and converting a signal from an image sensor into a desired video format in implementing the imaging device disclosed by **Harris** (as modified by the teachings discussed in Grounds 2 and 4–§§IX.A-B), and would have known such a combination (yielding the claimed

limitations) would predictably work and provide the expected functionality. Neikirk, ¶429.

X. SECONDARY CONSIDERATIONS

The Claims are obvious based on the references presented herein. PO's only purported evidence of secondary considerations during prosecution was an alleged unexpected result of decreased interference when image processing circuitry is removed from the same board or plane as the pixel array, during prosecution of the '839 patent—related to '742 through multiple intervening continuations-in-part. Ex. 1003, 83-95. Notably, the '839 Examiner did not find the evidence persuasive. *Id.*, 110-118, 148, 157. As explained above, **Swift** teaches placing the processing circuitry on a separate circuit board placed closely adjacent the CMOS pixel array (§IX.A.2). Thus, it was already known to locate the processing circuitry away from the image sensor, and the results of doing so were already known. Phillips (Ex. 1085; filed 8/31/1995) at 13:55-61. PO did not present any other evidence of secondary considerations during prosecution and the clear teachings in the prior art cannot be overcome by any supposed "secondary considerations." Neikirk, ¶¶437-443.

XI. CONCLUSION

Substantial, new, and noncumulative technical teachings have been presented for the Claims of the '742 patent, which are rendered obvious for the reasons set

forth above. Neikirk, ¶¶452-55. There is a reasonable likelihood Petitioner will prevail as to each of those claims. *Inter Partes* review of claims 42, 58, and 66 is accordingly requested.

Dated: February 16, 2020

/Scott A. McKeown/
Scott A. McKeown

CERTIFICATE OF COMPLIANCE

Pursuant to 37 CFR §42.24(a) and (d), the undersigned hereby certifies that this Petition for Inter Partes Review complies with the type-volume limitation of 37 CFR §42.24(a)(i) because, exclusive of the exempted portions, it contains 13,963 words as counted by the word processing program used to prepare the paper.

Dated: February 16, 2020

/Scott A. McKeown/
Scott A. McKeown

CERTIFICATE OF SERVICE

The undersigned certifies service pursuant to 37 C.F.R. §§ 42.6(e) and 42.105(b) on the Patent Owner by Fedex of a copy of this Petition for *Inter Partes* Review and supporting materials at the correspondence address of record for the '742 patent:

SHERIDAN ROSS PC
1560 Broadway, Suite 1200
Denver, CO 80202

Courtesy copies of the same documents were also served at the following email addresses of record for Cellect's litigation counsel for the subject patent in the district court litigation at the U.S. District Court for the District of Colorado, Case No. 1:19-cv-00438-CMA-MEH:

KRAMER LEVIN NAFTALIS & FRANKEL LLP
Paul J. Andre – pandre@kramerlevin.com
Jonathan S. Caplan – jcaplan@kramerlevin.com
Marcus A. Colucci – mcolucci@kramerlevin.com

EICHNER LAW
Kenneth F. Eichner– Ken@EichnerLaw.com
Lynn C. Hartfield – lynn@eichnerlaw.com

Dated: February 16, 2020

/Scott A. McKeown/
Scott A. McKeown