

United States District Court  
Northern District of California

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28

UNITED STATES DISTRICT COURT  
NORTHERN DISTRICT OF CALIFORNIA

ENPLAS DISPLAY DEVICE CORPORATION (“EDD”),  
Plaintiff,  
v.  
SEOUL SEMICONDUCTOR COMPANY, LTD. (“SSC”),  
Defendant.

Case No. 13-cv-05038 NC

**[DRAFT] PRELIMINARY JURY INSTRUCTIONS**

**I. Introduction**

Ladies and gentlemen: You are now the jury in this case. It is my duty to instruct you on the law.

These instructions are preliminary instructions to help you understand the principles that apply to civil trials and to help you understand the evidence as you listen to it. You will be allowed to keep this set throughout the trial to which to refer. This set of instructions is not to be taken home and must remain in the jury room when you leave in the evenings. At the end of the trial, I will give you a final set of instructions. It is the final set of instructions that will govern your deliberations.

You must not infer from these instructions or from anything I may say or do as indicating that I have an opinion regarding the evidence or what your verdict should be.

It is your duty to find the facts from all the evidence in the case. To those facts you

Case No. 13-cv-05038 NC

1 will apply the law as I give it to you. You must follow the law as I give it to you whether  
2 you agree with it or not. And you must not be influenced by any personal likes or dislikes,  
3 opinions, prejudices, or sympathy. That means that you must decide the case solely on the  
4 evidence before you. You will recall that you took an oath to do so.

5 In following my instructions, you must follow all of them and not single out some  
6 and ignore others; they are all important.

7 **II. Summary of the Claims in this Case**

8 To help you follow the evidence, I will give you a brief summary of the positions of  
9 the parties:

10 The Plaintiff in this case is Enplas Display Device Corporation, who may be  
11 referred to as “EDD.” EDD is a Japanese company that makes a number of devices,  
12 including plastic lenses that are used with light emitting diodes, or LEDs, for backlighting  
13 LCD televisions and signs. EDD sells its lenses to other companies, for use in what you  
14 will hear referred to as light bars. Light bars are used for backlighting LCD televisions  
15 and signs.

16 The Defendant in this case is Seoul Semiconductor Co., Ltd., who may be referred  
17 to as “SSC.” SSC is a Korean company that manufactures and sells both individual LEDs  
18 and packaged LEDs, some of which are used in light bars for LCD TV backlighting units.  
19 SSC is the current owner of the two United States Patents, U.S. Patent Number 6,473,554  
20 and U.S. Patent Number 6,007,209. These patents may be referred to as “the ’554 patent”  
21 and “the ’209 patent.”

22 In 2013, SSC sent a letter to EDD stating its belief that EDD was inducing  
23 infringement of the ’554 and ’209 patents. In response, EDD filed a lawsuit to seek a  
24 judgment that these SSC patents are invalid and not infringed. SSC thereafter filed its  
25 counterclaims seeking a judgment that these SSC patents are infringed and damages for  
26 this infringement.

27 I will tell you more about the details of the law you must apply, both before and  
28 after the parties present their evidence in support of their claims and defenses.

1 I, the parties, and their attorneys sincerely thank you for your time and attention  
2 during these proceedings.

3 **III. Burden of Proof**

4 When a party has the burden of proof on any claim or affirmative defense by a  
5 preponderance of the evidence, it means you must be persuaded by the evidence that the  
6 claim or affirmative defense is more probably true than not true.

7 You should base your decision on all of the evidence, regardless of which party  
8 presented it.

9 **IV. Evidence**

10 **A. Evidence You May Consider**

11 The evidence you are to consider in deciding what the facts are consists of:

- 12 (1) the sworn testimony of any witness;
- 13 (2) the exhibits which are received into evidence; and
- 14 (3) any facts to which the lawyers have agreed.

15 **B. Things You May Not Consider**

16 In reaching your verdict, you may consider only the testimony and exhibits received  
17 into evidence. Certain things are not evidence, and you may not consider them in deciding  
18 what the facts are. I will list them for you:

19 (1) Arguments and statements by lawyers are not evidence. The lawyers are not  
20 witnesses. What they have said in their opening statements, closing arguments, and at  
21 other times is intended to help you interpret the evidence, but it is not evidence. If the  
22 facts as you remember them differ from the way the lawyers have stated them, your  
23 memory of them controls.

24 (2) Questions and objections by lawyers are not evidence. Attorneys have a duty to  
25 their clients to object when they believe a question is improper under the rules of evidence.  
26 You should not be influenced by the objection or by the court's ruling on it.

27 (3) Testimony that has been excluded or stricken, or that you have been instructed  
28 to disregard, is not evidence and must not be considered. In addition sometimes testimony

1 and exhibits are received only for a limited purpose; when I give a limiting instruction, you  
2 must follow it.

3 (4) Anything you may have seen or heard when the court was not in session is not  
4 evidence. You are to decide the case solely on the evidence received at the trial.

5 **C. Charts and Summaries Not Received in Evidence**

6 Certain charts and summaries not received in evidence may be shown to you in  
7 order to help explain that contents of books, records, documents, or other evidence in the  
8 case. You may hear these charts and summaries referred to as “demonstratives” or  
9 “demonstrative evidence.” In this case, the parties intend to use powerpoint presentations  
10 and visual charts as demonstratives. They are not themselves evidence or proof of any  
11 facts. If they do not correctly reflect the facts or figures shown by the evidence in the case,  
12 you should disregard these charts and summaries and determine the facts from the  
13 underlying evidence.

14 **D. Charts and Summaries in Evidence**

15 Certain charts and summaries may be received into evidence to illustrate  
16 information brought out in the trial. Charts and summaries are only as good as the  
17 underlying evidence that supports them. You should, therefore, give them only such  
18 weight as you think the underlying evidence deserves.

19 **E. Types of Evidence**

20 Evidence may be direct or circumstantial. Direct evidence is direct proof of a fact,  
21 such as testimony by a witness about what that witness personally saw or heard or did.  
22 Circumstantial evidence is proof of one or more facts from which you could find another  
23 fact. You should consider both kinds of evidence. The law makes no distinction between  
24 the weight to be given to either direct or circumstantial evidence. It is for you to decide  
25 how much weight to give to any evidence.

26 **F. Use of Interrogatories of a Party**

27 Evidence may be presented to you in the form of answers of one of the parties to  
28 written interrogatories and/or requests for admission submitted by the other side. These

1 answers were given in writing and under oath, before the actual trial, in response to  
2 questions that were submitted in writing under established court procedures. You should  
3 consider the answers, insofar as possible, in the same way as if they were made from the  
4 witness stand.

5 **G. Use of Request for Admission of a Party**

6 Before trial, each party has the right to ask another party to admit in writing that  
7 certain facts are true. If the other party admits those facts, you must accept them as true  
8 and conclusively proved in this case.

9 **H. Evidence for a Limited Purpose**

10 Some evidence may be admitted for a limited purpose only.

11 When I instruct you that an item of evidence has been admitted for a limited  
12 purpose, you must consider it only for that limited purpose and for no other.

13 **I. The Court's Ruling on Objections**

14 There are rules of evidence that control what can be received into evidence. When  
15 a lawyer asks a question or offers an exhibit into evidence and a lawyer on the other side  
16 thinks that it is not permitted by the rules of evidence, that lawyer may object. If I overrule  
17 the objection, the question may be answered or the exhibit received. If I sustain the  
18 objection, the question cannot be answered, and the exhibit cannot be received. Whenever  
19 I sustain an objection to a question, you must ignore the question and must not guess what  
20 the answer might have been.

21 Sometimes I may order that evidence be stricken from the record and that you  
22 disregard or ignore the evidence. That means that when you are deciding the case, you  
23 must not consider the evidence that I told you to disregard.

24 **V. Witnesses**

25 **A. Evaluation of Witness Testimony**

26 In deciding the facts in this case, you may have to decide which testimony to  
27 believe and which testimony not to believe. You may believe everything a witness says, or  
28 part of it, or none of it. Proof of a fact does not necessarily depend on the number of

1 witnesses who testify about it.

2 In considering the testimony of any witness, you may take into account:

3 (1) the opportunity and ability of the witness to see or hear or know the things  
4 testified to;

5 (2) the witness's memory;

6 (3) the witness's manner while testifying;

7 (4) the witness's interest in the outcome of the case and any bias or prejudice;

8 (5) whether other evidence contradicted the witness's testimony;

9 (6) the reasonableness of the witness's testimony in light of all the evidence; and

10 (7) any other factors that bear on believability.

11 The weight of the evidence as to a fact does not necessarily depend on the number  
12 of witnesses who testify about it.

13 **B. Impeachment Evidence**

14 The evidence that a witness lied under oath or gave different or inconsistent  
15 testimony on a prior occasion may be considered, along with all other evidence, in  
16 deciding whether or not to believe the witness and how much, if any, weight to give to that  
17 witness' testimony.

18 **C. English Translation**

19 Languages other than English will be used during this trial. Each witness has the  
20 right to testify in their native language. In this case, some witnesses will testify in  
21 Japanese and some will testify in Korean, through the use of an official court interpreter.

22 When a witness testifies in a language other than English, the evidence to be  
23 considered by you is only that provided through the official court interpreters. Although  
24 some of you may know Japanese, Korean, or other languages used in this case, it is  
25 important that all jurors consider the same evidence. Therefore, you must accept the  
26 English interpretation provided by the official court interpreter. You must disregard any  
27 different meaning.

28 You must not make any assumptions about a witness or a party based upon their

1 use of an interpreter to assist that witness or party. Again, each witness is entitled to  
2 testify in their native language even if they have some understanding of English.

3 **D. Expert Witnesses**

4 Some witnesses, because of education or experience, are permitted to state opinions  
5 and the reasons for those opinions.

6 Opinion testimony should be judged just like any other testimony. You may accept  
7 it or reject it, and give it as much weight as you think it deserves, considering the witness's  
8 education and experience, the reasons given for the opinion, and all the other evidence in  
9 the case.

10 **E. Deposition Testimony**

11 A deposition is the sworn testimony of a witness taken before trial. The witness is  
12 placed under oath to tell the truth and lawyers for each party may ask questions. The  
13 questions and answers are recorded. When a person is unavailable to testify at trial, the  
14 deposition of that person may be used at the trial.

15 You should consider deposition testimony, presented to you in court in lieu of live  
16 testimony, insofar as possible, in the same way as if the witness had been present to testify.

17 Do not place any significance on the behavior or tone of voice of any person  
18 reading the questions or answers.

19 **F. Impeachment Evidence**

20 The evidence that a witness lied under oath on a prior occasion may be considered,  
21 along with all other evidence, in deciding whether or not to believe the witness and how  
22 much weight to give to the testimony of the witness and for no other purpose.

23 **VI. Conduct of the Jury**

24 **A. Prohibitions on Your Activities**

25 I will now say a few words about your conduct as jurors.

26 First, keep an open mind throughout the trial, and do not decide what the verdict  
27 should be until you and your fellow jurors have completed your deliberations at the end of  
28 the case.

1           Second, because you must decide this case based only on the evidence received in  
2 the case and on my instructions as to the law that applies, you must not be exposed to any  
3 other information about the case or to the issues it involves during the course of your jury  
4 duty. Thus, until the end of the case or unless I tell you otherwise:

5           Do not communicate with anyone in any way and do not let anyone else  
6 communicate with you in any way about the merits of the case or anything to do with it.  
7 This includes discussing the case in person, in writing, by phone or electronic means, via  
8 e-mail, text messaging, or any Internet chat room, blog, Web site or other feature. This  
9 applies to communicating with your fellow jurors until I give you the case for deliberation,  
10 and it applies to communicating with everyone else including your family members, your  
11 employer, the media or press, and the people involved in the trial, although you may notify  
12 your family and your employer that you have been seated as a juror in the case. But, if you  
13 are asked or approached in any way about your jury service or anything about this case,  
14 you must respond that you have been ordered not to discuss the matter and to report the  
15 contact to the court.

16           Because you will receive all the evidence and legal instruction you properly may  
17 consider to return a verdict: do not read, watch, or listen to any news or media accounts or  
18 commentary about the case or anything to do with it; do not do any research, such as  
19 consulting dictionaries, searching the Internet or using other reference materials; and do  
20 not make any investigation or in any other way try to learn about the case on your own.

21           The law requires these restrictions to ensure the parties have a fair trial based on the  
22 same evidence that each party has had an opportunity to address. A juror who violates  
23 these restrictions jeopardizes the fairness of these proceedings, and a mistrial could result  
24 that would require the entire trial process to start over. If any juror is exposed to any  
25 outside information, please notify the court immediately.

26           **B. Taking Notes**

27           During deliberations, you will have to make your decision based on what you recall  
28 of the evidence. You will not have a transcript of the trial. I urge you to pay close



1 attention to the testimony as it is given.

2 If at any time you cannot hear or see the testimony, evidence, questions or  
3 arguments, let me know so that I can correct the problem.

4 If you wish, you may take notes to help you remember the evidence. If you do take  
5 notes, please keep them to yourself until you and your fellow jurors go to the jury room to  
6 decide the case. Do not let note-taking distract you. When you leave, your notes should  
7 be left in the jury room. No one will read your notes. They will be destroyed at the  
8 conclusion of the case.

9 Whether or not you take notes, you should rely on your own memory of the  
10 evidence. Notes are only to assist your memory. You should not be overly influenced by  
11 your notes or those of your fellow jurors.

12 **C. Questions to Witnesses**

13 You will be allowed to propose written questions to witnesses after the lawyers  
14 have completed their questioning of each witness. You may propose questions in order to  
15 clarify the testimony, but you are not to express any opinion about the testimony or argue  
16 with a witness. If you propose any questions, remember that your role is that of a neutral  
17 fact finder, not an advocate.

18 Before I excuse each witness, I will offer you the opportunity to write out a question  
19 on a form provided by the court. Do not sign the question. I will review the question with  
20 the attorneys to determine if it is legally proper.

21 There are some proposed questions that I will not permit, or will not ask in the  
22 wording submitted by the juror. This might happen either due to the rules of evidence or  
23 other legal reasons, or because the question is expected to be answered later in the case. If  
24 I do not ask a proposed question, or if I rephrase it, do not speculate as to the reasons. Do  
25 not give undue weight to questions you or other jurors propose. You should evaluate the  
26 answers to those questions in the same manner you evaluate all of the other evidence.

27 By giving you the opportunity to propose questions, I am not requesting or  
28 suggesting that you do so. It will often be the case that a lawyer has not asked a question

1 because it is legally objectionable or because a later witness may be addressing that  
2 subject.

3 **D. Bench Conferences and Recesses**

4 From time to time during the trial, it may become necessary for me to talk with the  
5 attorneys out of the hearing of the jury, either by having a conference at the bench when  
6 the jury is present in the courtroom, or by calling a recess. Please understand that while  
7 you are waiting, we are working. The purpose of these conferences is not to keep relevant  
8 information from you, but to decide how certain evidence is to be treated under the rules of  
9 evidence and to avoid confusion and error.

10 Of course, we will do what we can to keep the number and length of these  
11 conferences to a minimum. I may not always grant an attorney's request for a conference.  
12 Do not consider my granting or denying a request for a conference as any indication of my  
13 opinion of the case or of what your verdict should be.

14 **VII. Patent Background**

15 You will now be shown a video on what a patent is and how one is obtained. You  
16 will also receive an exhibit of a model patent to assist you in the presentation.

17 **VIII. Summary of Contentions**

18 To help you follow the evidence, I will now give you a summary of the positions of  
19 the parties.

20 The parties in this case are Enplas Display Device Corporation, which may be  
21 referred to as EDD, and Seoul Semiconductor Company Limited, which may be referred to  
22 as SSC. The patents involved in this case are United States Patent Number 6,473,554,  
23 which lists David Pelka and John Popovich as the inventors, and United States Patent  
24 Number 6,007,209, which lists David Pelka as the inventor. For convenience, the parties  
25 and I will often refer to these patents as the '554 and '209 patents, the '554 and '209  
26 patents being the last three numbers of their patent number. These two patents may be  
27 referred to collectively as "the patents-in-suit."

28 EDD filed suit in this court seeking a declaration from the Court that it did not

1 infringe the '554 and/or '209 patents and additionally that the claims are invalid.  
2 Invalidity is a defense to infringement. SSC in return alleged that EDD infringes claims 1,  
3 2, 6, 30, 31, 33, 34, 35, 36, and 37 of the '554 patent and claim 20 of the '209 patent and  
4 maintains that the claims are valid. SSC has sought money damages from EDD for  
5 actively inducing infringement of these claims of the '554 and '209 patent by others. The  
6 products that are alleged to infringe the '554 patent are Enplas Light Enhancer Cap lenses  
7 with model numbers #9854D, #9854E, and #9879. The products that are alleged to  
8 infringe the '209 patent are Enplas Light Enhancer Cap lenses with model numbers  
9 #9853A, #9854D, #9854E, #9879, and #4922.

10 Your job will be to decide whether claims 1, 2, 6, 30, 31, 33, 34, 35, 36, and 37 of  
11 the '554 patent and claim 20 of the '209 patent have been infringed and whether those  
12 claims are invalid. If you decide that any valid claim of the '554 or '209 patents has been  
13 infringed, you will then need to decide any money damages to be awarded to SSC to  
14 compensate it for the infringement. You will also need to make a finding as to whether the  
15 infringement was willful. If you decide that any infringement was willful, that decision  
16 should not affect any damage award you give. I will take willfulness into account later.

17 You may hear evidence that EDD's parent Enplas Corporation has its own patent(s)  
18 or that EDD improved on the '554 and/or '209 patents. A party can still infringe even if it  
19 has its own patents in the same area. You will be instructed after trial as to what, if any,  
20 relevance these facts have to the particular issues in this case. Meanwhile, please keep an  
21 open mind.

22 Before you decide whether EDD has infringed the claims of the patents or whether  
23 the claims are invalid, you will need to understand the patent claims. As the video  
24 described, the patent claims are numbered sentences at the end of the patent that describe  
25 the boundaries of the patent's protection. It is my job as judge to explain to you the  
26 meaning of any language in the claims that needs interpretation.

27 I have already determined the meaning of certain terms of the claims of the '554  
28 and '209 patents. You have been given a document reflecting those meanings. You are to

1 apply my definitions of these terms throughout this case. However, my interpretation of  
2 the language of the claims should not be taken as an indication that I have a view regarding  
3 issues such as infringement and invalidity. Those issues are yours to decide. I will  
4 provide you with more detailed instructions on the meaning of the claims before you retire  
5 to deliberate your verdict.

6 **IX. Trial**

7 The trial will now begin. First, each side may make an opening statement. An  
8 opening statement is not evidence. It is simply an outline to help you understand what that  
9 party expects the evidence will show.

10 The presentation of evidence will then begin. Witnesses will take the witness stand  
11 and the documents will be offered and admitted into evidence. There are two standards of  
12 proof that you will apply to the evidence, depending on the issue you are deciding. On  
13 some issues, you must decide whether something is more likely true than not. On other  
14 issues you must use a higher standard and decide whether it is highly probable that  
15 something is true.

16 SSC will present its evidence on its contention that some of the claims of the '554  
17 and '209 patents are infringed by EDD and that the infringement has been and continues to  
18 be willful. These witnesses will be questioned by SSC's counsel in what is called direct  
19 examination. After the direct examination of a witness is completed, the opposing side has  
20 an opportunity to cross-examine the witness. To prove infringement of any claim, SSC  
21 must persuade you that it is more likely than not that EDD has infringed that claim. To  
22 persuade you that any infringement was willful, SSC must prove that it is highly probable  
23 that the infringement was willful. SSC will also present evidence of the damages it seeks  
24 as compensation for the alleged infringement. This does not mean that the Court has  
25 already determined that SSC is entitled to damages. That is for you to decide if you find  
26 any of the asserted claims infringed and not invalid.

27 After SSC has presented its witnesses, EDD will call its witnesses, who will also be  
28 examined and cross-examined. EDD will present its evidence to respond to SSC's

1 contentions concerning infringement, willfulness and damages. EDD will also present  
2 evidence in support of its contentions that the claims of the '554 and '209 patents are  
3 invalid. To prove invalidity of any claim, EDD must persuade you that it is highly  
4 probable that the claim is invalid.

5 SSC will then return and will put on evidence responding to EDD's contention that  
6 the claims of the '554 and '209 patents are invalid. SSC will also have the option to put on  
7 what is referred to as "rebuttal" evidence to any evidence offered by EDD of non-  
8 infringement or lack of willfulness.

9 Finally, EDD will have the option to put on "rebuttal" evidence to any evidence  
10 offered by SSC on the validity of the asserted claims of the '554 and '209 patents.

11 Because the evidence is introduced piecemeal, you need to keep an open mind as  
12 the evidence comes in and wait for all the evidence before you make any decisions. In  
13 other words, you should keep an open mind throughout the entire trial.

14 The parties may present the testimony of a witness by reading from his or her  
15 deposition transcript or playing a videotape of the witness's deposition testimony. A  
16 deposition is the sworn testimony of a witness taken before trial and is entitled to the same  
17 consideration as if the witness had testified at trial.

18 After the evidence has been presented, the attorneys will make closing arguments.  
19 Closing arguments are not evidence.

20 Then, I will instruct you on the law that applies to the case and both sides will make  
21 closing arguments.

22 After that, you will go to the jury room to deliberate on your verdict.

23 **IT IS SO ORDERED.**

24  
25  
26  
27  
28

Dated: February 23, 2016

  
NATHANAEL M. COUSINS  
United States Magistrate Judge

1 **Claim Construction**

2 You should apply the following constructions to the claims of the '554 patent:

- 3 • The term “total internal reflection” means “the total reflection that occurs  
4 when light strikes an interface at an angles of incidence (with respect to the  
5 normal) greater than the critical angle”
- 6 • The term “the critical angle of total internal reflection” means “the angle of  
7 incidence (with respect to the normal) above which total internal reflection  
8 occurs”
- 9 • The term “cusp” means “an area where two curves meet”
- 10 • The term “totally internally reflecting” means “reflecting by total internal  
11 reflection”
- 12 • The term “illumination coupler embedded in an interior region of said  
13 waveguide” does not require a construction
- 14 • The term “TIR surface” means “a surface angled with respect to a light  
15 source to produce total internal reflection within a device”
- 16 • The term “waveguide” means “an optical device that redirects light  
17 propagating between its surfaces”

18 For claim language where I have not provided you with any meaning, the claim  
19 language’s plain and ordinary meaning to a person of ordinary skill in the art at the time of  
20 the invention applies.

21 For all claim language of the '209 patent you should apply the claim language’s  
22 plain and ordinary meaning to a person of ordinary skill in the art at the time of the  
23 invention.

24  
25  
26  
27  
28

# The Patent Process: An Overview for Jurors

A PROGRAM FROM THE FEDERAL JUDICIAL CENTER

## Sample Patent

For use by jurors viewing

Video #4342-V/13

These materials were undertaken in furtherance of the Center's statutory mission to develop educational materials for the judicial branch. While publication signifies that the Center regards the information herein as responsible and valuable, it does not reflect official policy or recommendations of the Board of the Federal Judicial Center.



### **FJC Online**

the Federal Judicial Center's website on the federal courts' intranet, at <http://fjconline.fjc.dcn/>



US008412345B2

(12) **United States Patent**  
**Plinge et al.**

(10) **Patent No: 8,412,345 B2**

(45) **Date of Patent: Apr. 2, 2013**

714/775

(54) **VERSATILE WRISTWATCH SYSTEM**

See application file for complete search history.

(75) **Inventors: Walter Plinge, Georgina Spelvin, both of New York, NY**

(56) **References Cited**

(73) Assignee: **Acme Products**, Monument Valley, AZ

U.S. PATENT DOCUMENTS

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

3,131,393 A	*	4/1964	Arthur et al. ....	714/123
3,427,520 A		2/1969	Charles et al. ....	714/234
5,228,133 A	*	7/1993	Moimeme et al. ....	714/345
7,069,247 B2		6/2006	Mich et al. ....	714/456

(21) Appl. No.: **12/876,543**

OTHER PUBLICATIONS

(22) **Filed: May 28, 2010**

Portable 2 Way Wrist T.V., Dick Tracy Comic Strips, Wash. Post, Apr. 26, 1964.

(65) **Prior Publication Data**

\* cited by examiner

US 2010/0027123 A1 Dec. 2, 2010

*Primary Examiner* – Benita Millman

**Related U.S. Application Data**

(60) Provisional application No. 61/999,111, filed on May 28, 2009.

(57) **ABSTRACT**

A wristwatch system is provided having a piezoelectric crystal and a microcontroller, along with a software-defined radio and a digital signal processor. Communicatively coupled with the microcontroller are input/output devices including a touchscreen display and a microphone and speaker. Together with suitable software, the system provides not only a time-of-day display but also a two-way wrist radio transceiver, a television receiver, and a mobile telephone function.

(51) **Int. Cl.**  
**G06F 07/02** (2006.01)

(52) **U.S. Cl.**  
USPC ..... **714/776; 297/452**

(58) **Field of Classification Search** ..... **714/776.**

**8 Claims, 1 Drawing Sheet**

**FIG. 1**

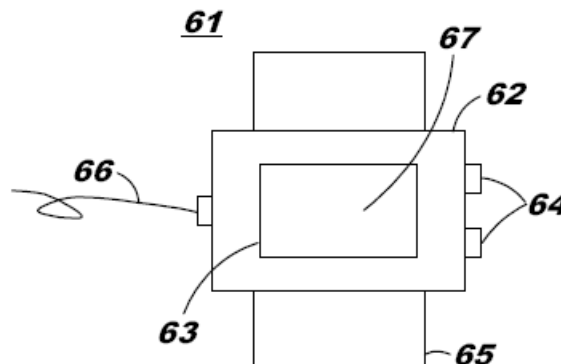




FIG. 1

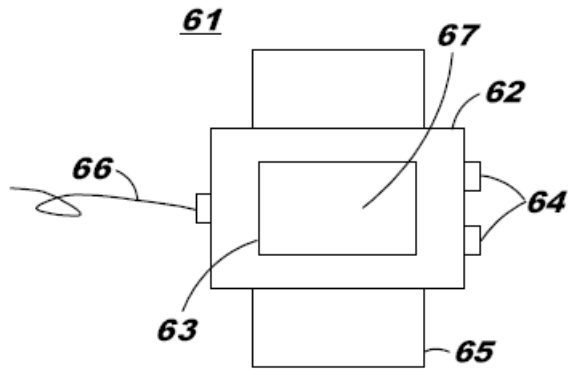


FIG. 2

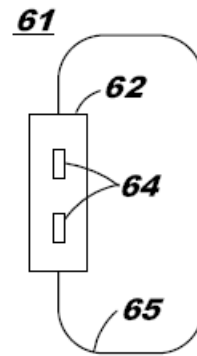
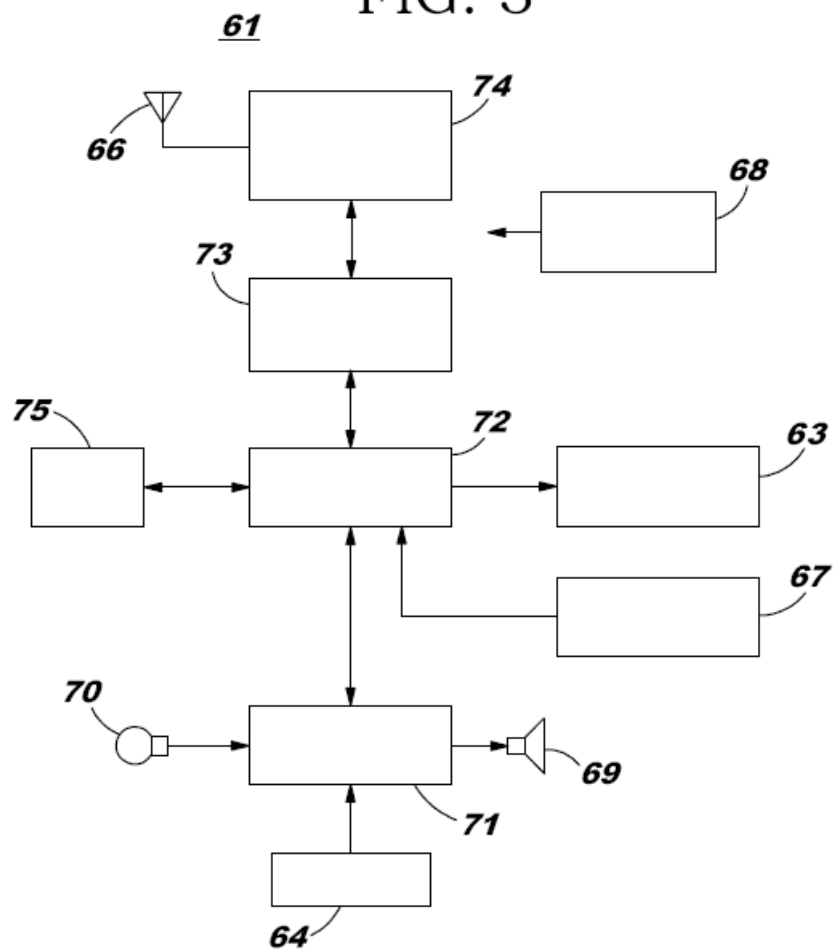


FIG. 3



## VERSATILE WRISTWATCH SYSTEM

## BACKGROUND

Wristwatches became popular in the 1920s. The earliest wristwatches were purely mechanical in function, relying upon a balance wheel to keep time. By the time of the present day, it has become commonplace for a wristwatch to rely upon a piezoelectric crystal to keep time. The display may be an analog display, with hands showing the time, or may be a digital display, for example making use of a liquid crystal display.

It would be helpful if a wristwatch were able to provide a variety of functions in addition to displaying the time of day, for example by means of electromagnetic transmission and reception.

## SUMMARY OF THE INVENTION

A wristwatch system is provided having a piezoelectric crystal and a microcontroller, along with a software-defined radio and a digital signal processor. Communicatively coupled with the microcontroller are input/output devices including a touchscreen display and a microphone and speaker. Together with suitable software, the system provides not only a time-of-day display but also a two-way wrist radio transceiver, a television receiver, and a mobile telephone function.

## BRIEF DESCRIPTION OF THE DRAWINGS

The invention is described with respect to a drawing in several figures, of which:

Fig. 1 is a plan view of a versatile wristwatch system according to the invention;

Fig. 2 is a side view of the system of Fig. 1; and

Fig. 3 is a functional block diagram of the system of Fig. 1.

Where possible, like reference numerals are employed among the figures to denote like parts or components.

## DETAILED DESCRIPTION

The invention will now be described in some detail with reference to the figures.

Turning to Fig. 1, what is shown is a plan view of a versatile wristwatch system 61 according to the invention. The system 61 has a case 62, a watchband 65, push buttons 64, a display 63, and an antenna 66. In one embodiment, the antenna 66 extends at least twenty centimeters in length. The case 62 may be metal in which case the antenna 66 is external to the case.

Fig. 2 is a side view of the system 61 of Fig. 1. In one embodiment the watchband 65 has a clasp that permits adjusting the watchband 65 to accommodate the size of a particular wrist. The wrist is omitted for clarity in Fig. 2.

Fig. 3 is a functional block diagram of the system 61 of Fig. 1. A microcontroller 72 is powered by a power source 68. In one embodiment the power source 68 is a disposable and replaceable electrochemical cell, such as a lithium cell. The energy budget of the system 61 is such that the lithium cell can typically last for at least one hour.

The display 63 is controlled by the microcontroller 72, and a touchpad 67 overlays the display 63 and communicates to the microcontroller 72. In this way the touchpad 67 serves as a human input device for the microcontroller 72. A time base 75 is communicatively coupled with the microcontroller 72; the typical time base 75 comprises a piezo-electric crystal. A digital signal processor 73 ("DSP") is communicatively coupled with the microcontroller 72 and is likewise powered by the power source 68. A software-defined radio 74 ("SDR") is communicatively coupled with the DSP 73 and is likewise powered by the power source 68. The microcontroller 72, the DSP 73, the SDR 74, the time base 75, and the power source 68 are all contained within the case 62. The microcontroller 72 comprises a memory (omitted for clarity in Fig. 3) which stores software in the form of instructions. The instructions permit the microcontroller 72 to bring about the results described in connection with the invention.

The display 63 may be an organic light-emitting diode (OLED) display with a resolution of at least 60 by 100 pixels, each pixel controllable to 24 bits of color. The microcontroller 72 operates the time base 75 so as to keep track of the passage of time, and from time to time causes the display 63 to display information indicative of the time of day.

From time to time, the system 61 acquires an electromagnetic signal at the antenna 66. The electromagnetic signal is received in the SDR 74, and the received electromagnetic signal is demodulated in the DSP 73. The microcontroller 72 receives the demodulated received electromagnetic signal and drives a

# US 8,412,345 B2

3

human interface device accordingly. In one embodiment the electromagnetic signal is a television signal and the human interface device is the display 63. In another embodiment the electromagnetic signal is a mobile telephone signal and the human interface device is a speaker 69.

The alert reader will have no difficulty devising myriad obvious variations and improvements of the disclosed embodiments, all of which are intended to be encompassed within the claims which follow.

## We claim:

1. A versatile wristwatch system comprising;  
a microcontroller powered by a power source;  
a display controlled by the microcontroller;  
a touchpad overlaying the display and communicating to the microcontroller;  
a time base communicatively coupled with the microcontroller;  
a digital signal processor communicatively coupled with the microcontroller; and  
a software-defined radio communicatively coupled with the digital signal processor;  
a power source powering the microcontroller, the digital signal processor, and the software-defined radio;  
the microcontroller, the digital signal processor, the software-defined radio, and the power source all contained within a case,  
the system further comprising a watchband connected with the case and adjustably sized for encirclement of a human wrist.
2. The system of claim 1 wherein the power source is a lithium cell.
3. The system of claim 1 wherein the display has a resolution of at least 60 by 100 pixels, each pixel controllable to 24 bits of color.
4. The system of claim 1 wherein the time base comprises a piezoelectric crystal.

4

5. The system of claim 1 further comprising an antenna external to the case and extending at least twenty centimeters in length.

6. A method for use with a wristwatch having a case with respect to a time of day and with respect to passage of time, the method comprising:

operating a time base within the case by a microcontroller within the case so as to keep track of the passage of time;

displaying upon a display within the case information indicative of the time of day;

acquiring an electromagnetic signal at an antenna external to the case;

receiving the electromagnetic signal in a software-defined radio located within the case and connected with the antenna;

demodulating the received electromagnetic signal in a digital signal processor located within the case and communicatively coupled with the software-defined radio;

driving a human interface device by a microcontroller located within the case as a function of the demodulated received electromagnetic signal.

7. The method of claim 6 wherein the electromagnetic signal is a television signal and the human interface device is a display within the case.

8. The method of claim 6 wherein the electromagnetic signal is a mobile telephone signal and the human interface device is a speaker within the case.

\* \* \* \* \*