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**D E C I S I O N**  
**of 4 July 2000**

**Case Number:** T 0207/98 - 3.5.2

**Application Number:** 89306144.0

**Publication Number:** 0347249

**IPC:** G04C 3/14

**Language of the proceedings:** EN

**Title of invention:**

An IC chip for an analog electronic watch

**Patentee:**

SEIKO EPSON CORPORATION

**Opponent:**

Eta SA Fabriques d'Ebauches

**Headword:**

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**Relevant legal provisions:**

EPC Art. 56

**Keyword:**

"Inventive step - yes"

**Decisions cited:**

-

**Catchword:**

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Case Number: T 0207/98 - 3.5.2

**D E C I S I O N**  
**of the Technical Board of Appeal 3.5.2**  
**of 4 July 2000**

**Appellant:** SEIKO EPSON CORPORATION  
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**Decision under appeal:** Decision of the Opposition Division of the  
European Patent Office posted 11 December 1997  
revoking European patent No. 0 347 249 pursuant  
to Article 102(1) EPC.

**Composition of the Board:**

**Chairman:** W. J. L. Wheeler  
**Members:** R. G. O'Connell  
B. J. Schachenmann

## Summary of Facts and Submissions

I. This is an appeal from the revocation by the opposition division of European patent No. 347 249. The reasons given for the revocation were that the amended claims filed with the letter of 11 December 1995 were not clear and contravened Article 123(2) and (3) EPC, and that the subject-matter of the claims as granted did not involve an inventive step, having regard to the following prior art:

E1: GB-A-2 087 601

E2: US-A-4 694 410

and common general knowledge in the art.

Another piece of prior art referred to in the opposition and in the present appeal is:

E3: "Electronics sourcebook for Technicians and Engineers" (McGraw Hill), 1988, chapter 18: Microprocessors and Microcomputers.

II. Claim 1 as granted is worded as follows:

"1. An IC chip for an analog electronic watch, comprising a plurality of motor drivers (213, 214, 215, 216) and motor drive controlling circuit means (212) for selectively supplying the motor drivers with driving signals, characterised by a core CPU (201), and a program memory (202) for storing software for actuating the core CPU, the motor drive controlling circuit means (212) supplying predetermined driving signals according to commands of the software, and including a plurality of drive pulse forming circuits (221, 222, 223, 224, 225) for generating different

waveforms of motor driving pulses and a motor drive system controlling circuit (219) for determining which waveform of driving pulse is to be selected for a step motor according to commands on software."

Claims 2 to 5 are dependent on claim 1.

III. Oral proceedings were held before the board on 4 July 2000.

IV. The appellant argued essentially as follows:

The conclusion in the decision under appeal that claim 1 of the opposed patent did not involve an inventive step having regard to prior art documents E1 and E2 and alleged common general knowledge in the art was not well-founded since it did not refer to any evidence of the latter. The failure to substantiate an assertion on which the conclusion depended constituted a substantial procedural violation.

The decision under appeal also implied that the invention did not work. This amounted to introducing a new ground of opposition, namely insufficiency (Article 100(b) EPC) without formally raising it during the proceedings, which constituted a second substantial procedural violation.

Significant features of the claimed invention included a plurality of drive pulse forming circuits for generating different waveforms of motor drive pulses and a motor drive system controlling circuit for determining which waveform of driving pulse is to be selected for a step motor according to commands on software. These features in the claim were supported in

the description at column 5, lines 16 to 27 and at column 7, lines 6 to 20 and 37 to 44 which describe how the motor drive controlling circuit 212 includes a motor drive system controlling circuit 219 which stores a drive system for each motor and according to commands from the software forms and generates control signals, namely, signal Sa for selecting a forward drive I, signal Sb for selecting a forward drive II, signal Sc for selecting a reverse drive I, signal Sd for selecting a reverse drive II, and signal Se for selecting a forward corrective drive.

The advantage of the claimed chip arrangement was that the motor drivers could be driven in accordance with functional needs by software which could be written as required. This in turn reduced the time required to adapt the watch to changing market requirements; cf opposed patent at column 1, lines 14 to 23 and column 17, lines 27 to 41.

E1 did not disclose an IC chip, CPU or software control. It did disclose waveform generating circuits for normal and rapid drive but these were applied consecutively rather than concurrently under software control as required by claim 1.

E2, cf column 11, lines 15 to 21, had waveform forming circuits for each motor. The waveform forming circuits were not used in common.

Neither E1 nor E2 disclosed different waveforms applied as required to different motors.

V. The respondents' arguments can be summarised as follows:

*Alleged procedural violations*

The common general knowledge in the art relied on by the opposition division in the decision under appeal was that evidenced by E3 - a chapter from a standard textbook - which had been referred to several times in the oral proceedings before the opposition division and in the written opposition procedure as evidence of the elementary facts relating to microprocessors and controllers and the known advantages of software control. It was also listed as E3 in the section of the decision under appeal entitled "PRIOR ART" as one of the documents cited by the opponent and referred to in the decision. In the circumstances, the reference to "the common general knowledge in the art mentioned above" at the end of point 8 in the decision under appeal was understandable in the context of the opposition procedure as a whole. It should also be noted that E2 itself disclosed a CPU at column 2, line 60 to column 3, line 3 and column 10, lines 54 to 66 and pointed to the advantages of such an implementation for reducing design lead time.

The decision under appeal did not improperly introduce a new ground of insufficiency. It merely pointed out that the alleged advantage of reduced power consumption could not be taken into account in assessing inventive step since there was no disclosure in the patent of how this could be achieved, indeed the subject was not even mentioned in the patent. There had never been a suggestion that the chip as described did not work.

*Inventive step*

E1 disclosed the generation of four different pulse

drive waveforms - two forward speeds and two reverse speeds - which could be applied selectively to electromechanical transducers (pulse motors) 36 and 44; cf E1, page 4, lines 26 to 37 and lines 105 to 112. This kind of flexible generation, control and selective application of drive waveforms was therefore already known in the art.

E2 disclosed the selective application of forward or reverse pulse drive waveforms to a pulse motor under the control of a core CPU and a program memory (E2, column 2, lines 63 to 65 and column 3, lines 47 to 49). Although the main embodiments disclosed in E2 related to a water depth gauge fitted in a wrist watch the document included a specific teaching at column 11, lines 5 to 7 that the same software control principles could be applied to driving the second hand of the watch. The advantages of a CPU based software design in terms of reduced development time for design variants were explicitly mentioned in E2 at column 10, lines 54 to 66.

It would be obvious for the person skilled in the art to apply the CPU based software control taught in E2 to the hardwired circuitry implementing multiple timekeeping and alarm functions taught in E1 so as to realise these advantages. The precise degree to which waveform generating functions were used in common was a matter of design choice. If concurrent drive was to be avoided in the interests of low peak current drain then more commonality of drivers and waveform generation was possible; if concurrent drive was preferred or acceptable then separate drivers were needed. No inventive step was involved for the person skilled in the art in choosing the degree of flexibility of

control appropriate to the functional requirements. It was a matter of common sense to duplicate only those control, waveform generation and pulse drive elements which could not be used in common.

VI. The appellant requested (main request) that the decision under appeal be set aside and that the patent be maintained unamended. Three auxiliary requests were contained in the appellant's letter dated 3 July 2000.

VII. The respondent requested that the appeal be dismissed.

### **Reasons for the Decision**

1. The appeal is admissible.

2. *Alleged procedural violations*

2.1 Reference to common general knowledge in the art without supporting evidence

The decision under appeal concludes its discussion of inventive step in relation to claim 1 of the patent as granted with a reference to "E1, E2 and the common general knowledge in the art mentioned above". In the preceding sentence there is a reference to "the general knowledge of the person skilled in the art" at the priority date that "power ICs are manufactured". Since no document is referred to, the board interprets this as an assertion by the opposition division that such knowledge of the feasibility of circuit integration of the scale required was notorious in the art in the sense that the opposition division could properly rely on it without supporting evidence. The appellant does



not contest the factual accuracy of the assertion but objects to it being presented as "common general knowledge in the art" in the decision under appeal without evidential support. Given that the argument would not be altered in substance if it had been expressed as being obvious at the priority date for the person skilled in the art to integrate more functions in combining the teachings of E1 and E2, the board regards the impugned formulation as being a minor error of expression rather than of substantive reasoning. It did not constitute a substantial procedural violation.

2.2 Alleged new ground of insufficiency

The board adopts and approves the respondent's arguments on this point, cf V above. No such new ground is implied in the reasoning of the decision under appeal and consequently there is no question of a substantial procedural violation being involved.

3. *Inventive step (main request)*

3.1 It is common ground among the parties and it also accords with the judgement of the board that prior art document E1 represents the closest prior art. It describes an analog display watch in which the hour hand is driven by a first pulse motor through a reducing gear train operating second, minute and hour hands to display current time and in which the hour hand is also selectively drivable directly by a second pulse motor to display a set alarm time. Battery peak current is reduced by staggering the pulse trains driving the respective motors, ie the motors are driven separately but not concurrently.

- 3.2 In E1 the disclosure of the electrical control aspects of the watch is in the form of a block circuit diagram showing components and circuit blocks. There is no discussion of how these separate circuits might be physically realised, eg on an integrated circuit (IC) chip. In particular there is no suggestion that a CPU with stored program, ie software control should be employed.
- 3.3 Starting from the closest prior art E1 the objective technical problem solved by the claimed IC chip is to implement the control functions of an electronic analog display watch in such a way that existing functions can easily be modified or added to; cf opposed patent column 1, lines 30 to 36.
- 3.4 This problem is solved in accordance with claim 1 of the opposed patent by resorting to the measures specified in the characterising portion of the claim, viz a core CPU (201), and a program memory (202) for storing software for actuating the core CPU, the motor drive controlling circuit means (212) supplying predetermined driving signals according to commands of the software, and providing a plurality of drive pulse forming circuits (221, 222, 223, 224, 225) for generating different waveforms of motor driving pulses and a motor drive system controlling circuit (219) for determining which waveform of driving pulse is to be selected for a step motor according to commands on software.
- 3.5 Prior art document E2 discloses an electronic analog display watch which incorporates a water depth gauge. For this purpose a small dedicated analog display is located within the watch face. As shown in Fig. 2 of E2

the gear train actuating the pointer of this gauge is driven by a pulse motor whose motor drive circuit is selectively fed with forward and reverse drive pulses from a pair of signal generating circuits. In order to generate the control signal pair for the latter circuits the watch is equipped with a microcomputer(E2, column 2, line 60 ff) comprising a core CPU and a program memory for storing software for actuating the core CPU. The control signal pair is supplied according to commands of the software from an output port coupled to the CPU bus and having respective control signal outputs. The CPU receives via an input port coupled to the bus a digital signal representing the pressure measured by a water pressure sensor incorporated in the watch. In the Fig. 4 embodiment a single chip CMOS type microcomputer is used (E2, column 6, lines 41 to 43).

- 3.6 At column 10, line 50 ff E2 suggests that the CPU system described could be used to display other physical quantities, in particular time-varying quantities. It is pointed out there that the incorporation of a C-MOS type microcomputer in a watch is made possible by reducing its size and power consumption, *inter alia* by using a pulse motor. The advantage of software control in terms of a short lead time for producing design variants is mentioned.
  
- 3.7 In the main embodiment described in E2 the sole function of the CPU system is to enable the output of the water pressure sensor to drive an analog display pointer. The only connection with the watch proper is that the sensor and CPU are housed in the watch, powered by a common battery and that the depth pointer is located on the face of the watch. In particular, the CPU system is not involved in the timekeeping functions

of the watch. However the description of E2 concludes with the following remarks:

"If the water depth gauge is so designed that a sixty step advance by a pulse motor in one direction causes a 360 degree rotation of the pointer of the water depth gauge, the pointer of the water depth gauge can be used as a second hand of the watch. Then the watch need be designed so as to be switchable from time measuring mode by operating the crown or an extra button for the purpose. A motor drive integrated circuit may be designed to include a register and a counter for counting the number of motor-driving pulses. Then the total advance of the pulse motor may be controlled by detecting the correspondence between the content of the register and the count of the counter.

When occasions demand, a motor drive integrated circuit may be designed to include a plurality of groups, each consisting of a register, motor-driving signal generator, motor driving circuit and other elements, each group allotted to each of the corresponding plurality of pulse motors."

- 3.8 Document E3 is a chapter from a textbook for technicians and engineers which documents the fact that microprocessors and microcomputers and their programming were part of the common general knowledge in the art at the priority date of the opposed patent, viz June 1988. The introduction to E3 (18.1) lists a number of applications of microprocessor CPUs but does not mention watches and in particular not analog display watches. E3 provides formal confirmation of the fact that the person skilled in the art would readily understand the references in E2 to microprocessor CPUs.

3.9 In the judgement of the board a person skilled in the art starting from E1 and addressing the problem specified at 3.3 above would look at E2 since it addresses the problem of providing additional functions in analog display watches in a flexible manner and in particular of reducing design lead times in the provision of novel functions. Furthermore the board judges that the skilled person would be led by the concluding remarks, especially the final paragraph, in E2 to consider converting the E1 circuit based design to a CPU based software design. In so doing, however, the board is not convinced that the person skilled in the art would arrive at the particular solution claimed in claim 1 of the opposed patent. Both the Fig. 2 and the Fig. 4 embodiments described in E2 represent a fully centralised software control of the pulse motor, and the board's understanding of the last paragraph of E2 is that each group would be separately individually and directly controlled by the CPU software. Nothing in E1 or E2, or indeed E3, would lead the person skilled in the art to provide a motor drive system controlling circuit as specified in claim 1 as an interface between the centralised software control and the plurality of drive pulse forming circuits. This provides enhanced flexibility in selecting one of different waveforms to be applied to the different motors as compared with the hardware design of E1 while avoiding burdening the CPU with the detailed control of the driving circuits of each motor as would be implied by a straightforward application of the teaching of E2. In the judgement of the board, to represent the subject-matter of claim 1 as a mere application of CMOS microprocessor control to the E1 design does less than justice to the proprietor's case.

- 3.10 The board concludes therefore that, having regard to the prior art on file, the claimed integrated circuit chip for an analog electronic watch is not obvious for the person skilled in the art so that the subject matter of claim 1 is to be considered as involving an inventive step within the meaning of Article 56 EPC.
4. Since the respondent opponent has not shown that the subject-matter of claim 1 does not involve an inventive step the main request of the proprietor's appeal has to be granted. The auxiliary requests need not be considered.

## **Order**

### **For these reasons it is decided that:**

1. The decision under appeal is set aside.
2. The patent is maintained unamended.

The Registrar:

The Chairman:

M. Kiehl

W. J. L. Wheeler