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Datasheet for the decision of 9 October 2014

Case Number: T 1022/13 - 3.5.02

Application Number: 07024543.6

Publication Number: 1928093

IPC: H03M1/66, H03B28/00, G01S7/282, G01S7/35, G01S13/34

Language of the proceedings: EN

Title of invention:
Waveform generation method, waveform generation program, waveform generation circuit and radar apparatus

Applicant:
MITSUBISHI DENKI K.K.

Headword:

Relevant legal provisions:
EPC Art. 84

Keyword:
Claims - clarity - main request (no) - clarity - auxiliary request (yes)

Decisions cited:

Catchword:

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Case Number: T 1022/13 - 3.5.02

D E C I S I O N
of Technical Board of Appeal 3.5.02
of 9 October 2014

Appellant: (Applicant)	MITSUBISHI DENKI K.K. 7-3, Marunouchi 2-chome Chiyoda-ku Tokyo 100-8310 (JP)
Representative:	Bohnenberger, Johannes Meissner, Bolte & Partner GbR Postfach 86 06 24 81633 München (DE)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 3 December 2012 refusing European patent application No. 07024543.6 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	M. Ruggiu
Members:	M. Léouffre
	P. Mühlens

Summary of Facts and Submissions

I. The applicant has appealed on 7 February 2013 against the decision of the examining division, dispatched on 3 December 2012, on the refusal of the European patent application No. 07024543.6, which is a divisional of earlier application 03 792 829.8.

II. The reason given in the decision under appeal was that claim 1 of each request was not clear, contrary to the requirement of Article 84 EPC.

III. With the statement setting out the grounds of appeal, received on 15 April 2013, the appellant filed a new main request and a first auxiliary request and requested that that the case be remitted to the department of first instance for discussion of the novelty and inventiveness of the claims.

IV. In an annex to the summons to oral proceedings the board expressed the preliminary opinion that the claims of both the main and auxiliary requests did not appear to be clear (Article 84 EPC) and that objections under Article 123(2) or 76(1) EPC could be raised against a clarified claim 1.

V. With a letter dated 8 September 2014 the appellant filed a second and a third auxiliary requests.

VI. During the oral proceedings which took place as scheduled on 9 October 2014, the appellant filed a new auxiliary request and withdrew all previous auxiliary requests.

VII. The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis

of the claims of the main request filed with the grounds of appeal of 15 April 2013 or on the basis of claim 1 of the first auxiliary request filed in the oral proceedings of 9 October 2014.

VIII. Claim 1 of the main request reads as follows (features indexed by the board):

a) "An FM-CW radar device that generates a high frequency modulated signal
b) according to a target waveform (101), the target waveform (101) being representable in voltage-time space,
c) the FM-CW radar device comprising:
d) a D/A converter (3) adapted to output one of a plurality of output voltages (102),
e) each output voltage corresponding to one of a plurality of threshold voltages (102), wherein each of the plurality of threshold voltages (102) correspond to an integer multiple of the minimum resolution of the D/A converter (3);
f) a waveform memory (2) for storing waveform data, wherein the waveform data is a sequence of elements,
g) each element representing one of the plurality of threshold voltages (102)
h) such that the target waveform (101) being coincident with one of the plurality of threshold voltages (102) indicates one element of the waveform data;
i) a time memory (7) for storing a plurality of time intervals (Tl...Tn), wherein each time interval (Tl...Tn) of the plurality of time intervals (Tl...Tn) is a time interval between successive times (tl...tn)

j) at which the target waveform (101) in a time axis direction is coincident with any of the plurality of threshold voltages (102),
k) wherein any of the successive times (tl...tn) corresponds to one threshold voltage coincident with the target waveform (101), and a next time of the successive times (tl...tn) in a time axis direction corresponds to a threshold voltage (102) that is either increased or decreased by the minimum resolution of the D/A converter (3), or remains equal to the one threshold voltage (102);
l) a timing controller (5) for outputting a trigger signal to the waveform memory (7) and the D/A converter (3), the trigger signal corresponding to the time intervals (Tl...Tn), wherein the trigger signal initiates D/A conversion of the waveform data by outputting the waveform data from the waveform memory to the D/A converter
m) in synchronism with the trigger signal such that the D/A converter (3) outputs the output voltage corresponding to the waveform data for the duration of the time interval (Tl...Tn);
n) a low pass filter (4) for interpolating between output voltages of the D/A converter (3); and
o) an oscillator (802) for oscillating the modulated high frequency signal based on the output voltages of the D/A converter (3)."

Claim 2 of the main request is dependent on claim 1.

IX. The single claim of the auxiliary request reads as follows (features indexed by the board):

(a) "An FM-CW radar device that generates a modulated high frequency signal, the FM-CW radar device comprising:

(b) a D/A converter (3);
(c) a waveform memory (2) storing ouput values (v1,..,vn);
(d) a time memory (7) storing timer values corresponding to time intervals (T1, T2,...Tn);
(e) a timer (6) adapted to supply a trigger signal to a timing controller (5) at intervals according to the time intervals (T1, T2,...,Tn),
(f) wherein the timer values are chosen such that the time intervals (T1, T2,...,tn) are variable in length;
(g) the timing controller (5) adapted to output a trigger signal to the waveform memory (2) and the D/A converter (3),
(h) wherein the waveform memory (2) is adapted to output an output value (v1,..,vn) in synchronism with the trigger signal from the timing controller (5);
(i) a low pass filter (4) for interpolating between output values (v1,..,vn) outputted by the waveform memory (2); and
(j) an oscillator (802) for generating the modulated high frequency signal based on the output values (v1,...vn) of the D/A converter (3)."

X. The appellant argued essentially as follows:

The board alleged that the features relating to the target waveform and the threshold voltages rendered the subject-matter of claim 1 of the main request unclear because they were not features of the FM-CW radar device but resulted from an intellectual exercise aiming at defining the values stored in the memories of the radar device. However the objected features were technical features which substantiated how the data stored in the waveform memory and the time memory of

the radar device were defined. Actually the waveform data stored in the waveform memory corresponded to values stored in the time memory which defined variable time intervals.
This particular characteristic of the FM-CW radar device was emphasized in the claim of the auxiliary request wherein the waveform memory is adapted to output an output value in synchronism with a trigger signal issued by a timer at variable intervals according to the values in the time memory.

Reasons for the Decision

1. The appeal is admissible.

2. Main request

2.1 Claim 1 attempts to define a FM-CW radar device generating a high frequency modulated signal by referring to a target waveform, which appears to be "an ideal waveform without error that is essentially desired to output" (cf. page 13, lines 14 to 16 of the application as filed).
In the FM-CW radar device according to the invention output waveform values (v1 to vn) are set discretely and permanently stored in a waveform memory (2). Values representing output time intervals (T1 to Tn) are also permanently stored in a time memory (7) (see page 17, lines 9 to 24, page 18, lines 2 to 7). The device does not determine what are the values in the waveform memory (2) and in the time memory (7). These stored values are used by the FM-CW radar device to generate a high frequency signal and are not modified during operation of the device.

2.2 The high frequency signal is generated by the FM-CW radar device solely on the basis of the stored values

and not according to a target waveform as claimed in claim 1 (feature b)). There is also no target waveform which the high frequency signal would be compared to (feature h) and j)).

2.3 A threshold voltage is usually understood as a reference voltage which another value is compared to. In the radar device of the present invention neither the waveform data stored in the waveform memory nor the output voltages of the D/A converter are used as threshold voltages or compared to any threshold voltages. The features e), g) and h) relying to the threshold voltages are therefore not clear.

2.4 The feature o) ("an oscillator (802) for oscillating the modulated high frequency signal") is also not consistent with the description which recites that the "oscillator 802 generates a high frequency signal modulated with the FM signal" (cf. page 4, lines 11 to 14 of the application).

2.5 It follows that at least features b), e), g), h), j) and o) render the subject-matter of claim 1 of the main request unclear, contrary to Article 84 EPC.

3. Auxiliary request

3.1 The features a) to j) of the claim of the auxiliary request are supported by the original application as follows:
features a) and b) : original claim 1;
feature c): page 18, lines 2 to 4;
feature d): page 18, lines 4 to 6;
feature e): page 18, lines 19 to 21;
feature f): page 13, line 24 to page 4, line 2;

features g) and h): page 18, line 19 to page 19, line 4;
feature i): page 15, lines 8 to 13;
feature j): page 25, lines 16 to 21 and page 4, lines 8 to 14.

3.2 The features do not refer to a target waveform or threshold voltages, and the oscillator 802 is defined as generating the modulated frequency signal based on the output values of the D/A converter. Therefore, the objections mentioned under item 2 above and raised against claim 1 of the main request do not apply to the claim of the auxiliary request.

3.3 The claim of the auxiliary request being clear (Article 84 EPC) and complying with the requirements following from Article 123(2) EPC, the board exercising its discretionary power according to Article 111(1) EPC remits the case to the department of first instance for further prosecution, in particular for assessment of novelty and inventive step.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the department of first instance for further prosecution on the basis of claim 1 of the first auxiliary request filed in the oral proceedings of 9 October 2014.

The Registrar: The Chairman:

U. Bultmann M. Ruggiu

Decision electronically authenticated