

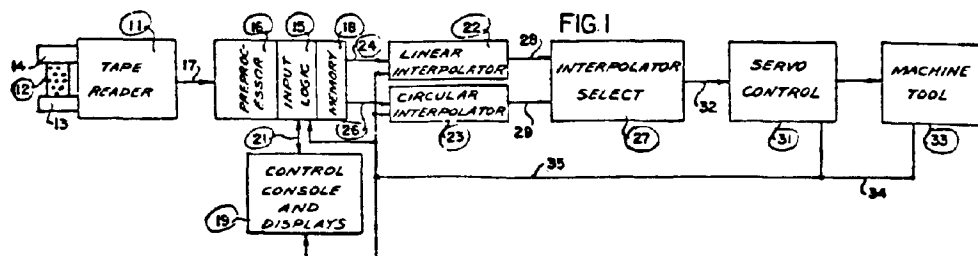
COMMISSIONER'S DECISION

Computer program; Inexplicit; Non-Statutory subject matter.

Overall combination of apparatus and data processing elements relate more than computer program, and may not be refused for being inexplicit, or for being a method of operating a computer. Rejection withdrawn.

This decision deals with a request for review by the Commissioner of Patents of the Examiner's Final Action dated February 21, 1979 on application 248,948. The application was filed on March 26, 1976 in the names of J.P. Heaman and J.A. Michaud and is entitled INTERPOLATION AND CONTROL APPARATUS AND METHOD FOR A NUMERICAL CONTROL SYSTEM. The application is assigned to the Bendix Corporation.

This application relates to a control system which is used to advance an element, such as a machine tool, plotter, or display along a linear path and a circular motion path. Figure 1, reproduced below, shows that a punched tape 12, which includes the instructions for the programmed positions that a machine tool 33 is to follow, is introduced into the tape reader 11 of the system. Preprocessor 16 processes the instructions into a form acceptable to the system logic, and they are then fed through the input logic 15 and are stored in memory 18. By this arrangement preprocessor 16 may receive different input data from the reader while previously input data is being executed by the parts of the system following after the memory. At this point we note that bilateral communication is established between the preprocessor and a control console 19 via cable 21, in order to provide an operator of the system with information on the operation.



The preprocessor is an arithmetic unit which uses known RQM logic circuitry to ready the input data for appropriate input into either a linear interpolator 22 or a circular interpolator 23. An intermediate rate processor 63 is included in the system, as shown in figure 2 reproduced below. It is placed between the preprocessor and the interpolators and provides additional signals which are specific for either the linear or circular interpolator. The intermediate processor receives two signals from the control console 19, one f_0 is used to initiate an override signal to the linear interpolator, the other ρ is an override signal to the circular interpolator. A signal 35 of actual work element operation is led directly to the input logic 15 as well as to the control console. Both of the override signals override the instructions sent by the preprocessor and are input to the system by means of the intermediate processor. Thus, the operator may initiate an override signal to either the linear interpolator or the circular interpolator, but not both together, for a given portion of the operation being performed by the work element. The override condition is applied before the interpolation mode is selected.

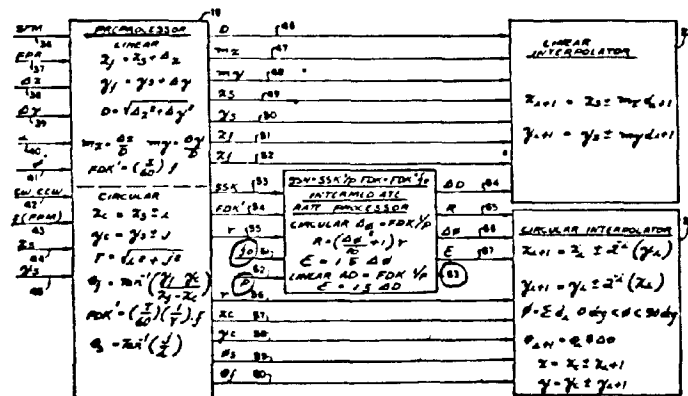


FIG. 2

In tracing the flow of processed instructions from logic 15 through memory 18, we note that linear interpolator 22 and circular interpolator 23 receive data via lines 24 and 26 respectively. By means of interpolator select 27 the system ensures that only one of the interpolators is active at one time. The data chosen by select 27 is fed to a servo control 31 which contains appropriate control means to drive the element 33.

In the Final Action, the Examiner refuses all claims and the application for being directed essentially to a computer program and therefore to unpatentable subject matter. He also refuses the application and claims 1 to 5 for being inexplicit, and additionally, claims 1 to 5 for lack of support. Also, claims 6 and 7 are refused for being directed to a method of operating prior art computers, or for being a method not carried out by new apparatus specially devised to implement a new method.

The Board will consider each of the examiners reasons for rejection in the light of the statements of Pratte J. in Schlumberger Canada Ltd. v The Commissioner of Patents 56 CPR (2d) at 204 (1981). The decision being handed down in 1981 was not, of course, available to assist the examiner when he wrote the Final Action on this case. In that decision involving computer-related subject matter, Pratte J. had these comments:

In order to determine whether the application discloses a patentable invention, it is first necessary to determine what, according to the application, has been discovered.

and

I am of opinion that the fact that a computer is or should be used to implement discovery does not change the nature of that discovery

Considering first what has been discovered, we find in the present application that the inventors realized that a more efficient machine tool control system could be obtained by providing both linear interpolation and circular interpolation and selecting between them to obtain improved control of movements of a work element. Of particular significance, we find the disclosure describes a combination of a preprocessor and an intermediate rate processor which cause a work element to be controlled in response to signals produced by the element during operation.

The Examiner's first ground for rejection is that the subject matter of the disclosure and claims is not patentable because it is essentially directed to a computer program. Applicant argues that his overall combination of elements provides an apparatus which includes both a linear and a circular interpolator and does not "...remotely approach being "essentially a computer program." "

Applicant also points out that the Examiner's discussion does not identify that a selection of use must be made between the interpolators. Applicant also refers to figure 8 as illustrating that fixed circuitry has been disclosed.

When we consider the arguments in light of figure 8, as well as figure 1, we view Applicant's overall subject matter as relating to a machine which lies in a patentable area. We find that some of the elements such as the preprocessor and the intermediate rate processor provide data processing functions, while others such as the interpolators and the interpolator select provide apparatus, and it is our view that the overall combination relates to more than merely a computer program.

The Board notes that in one part of the Examiner's analysis he says the preprocessor described in claim 1 is not widely known, and in another part that claim 1 consists of practically only one means, namely the preprocessor. Then he says he thinks that applicant has invented something, again namely the preprocessor of claim 1 lines 7 to 26.

As the Board understands the Applicant's arguments he maintains that his invention as claimed lies in the combination of elements which have been properly disclosed and that the elements themselves are known to persons skilled in the art, and need not be individually described in the disclosure or claims. The Examiner denies that the elements are known and insists that the claims are defective because a person skilled in the art would not be able, from this disclosure, to learn which elements to use and how to combine them to produce the required effect and, therefore, would not be able to understand the exact scope of the claims.

We find it helpful in determining the subject matter in Applicant's disclosure to refer to an earlier response by him:

It is believed that the disclosure is adequate to describe the invention accurately to one skilled in the art. Clearly elements which are widely known in the field to which the invention pertains need not be set out in detail. Turning first to the preprocessor 16, along with the input logic 15 and memory 18, these are common elements of almost every numerical control system which are simply designated "storage" or "computer" in the prior art (see cited references). These elements are so fundamental and well known that the prior art no longer feels it is necessary to break them out and show them as individual elements.

Because the preprocessed data stored in the system disclosed by the applicants differs somewhat from that stored by the prior art, the applicants were of the opinion that breakdown of this component would be helpful in the understanding of the invention. Further, since commercially available components are readily available to perform each of the stated arithmetic functions of the Preprocessor 16, a detailed circuit diagram would be superfluous. As stated in the disclosure, all these functions can be performed by commercial components and are collectively available in the form of hand calculators such as the Texas Instruments SR-50 which is the favorite of many engineers and is now widely used by high school and college students.

The basic circuit for calculating d_{j+1} or X_{j+1} are disclosed on the block diagram of Figure 8 which show the equivalent circuits for the circular interpolator. A person of ordinary skill in the art would have no difficulty in recognizing the equivalency of the two circuits. In addition, the applicants have even gone one step further and have referenced in the disclosure the article entitled "Cordic Technique Reduces Trigonometric Function Look-Up" by M. D. Perle, published in the June 1971 issue of "Computer Design" pp. 72 to 78. This article discloses the basic concept including the block diagram reproduced on Figure 8. The servo control 31 and the remainder of the system may be of conventional design as taught in the cited prior art.

The flow charts are present to assist in the discussion of the operation of the system and serve as a guideline for those who wish to practice the invention in the preferred software embodiment. It is believed that all of the essential detail is shown and is sufficient for a person having ordinary skills to practice the invention.

During prosecution the Examiner also discussed the relevance of a hand held calculator in Applicant's system. From the disclosure we see that reference is made to the kind of circuitry that may be used in the preprocessor. We find no statement that a hand held calculator is part of the system. We also see that the intermediate rate processor receives and processes additional input signals during operation which it is said cannot be processed in the preprocessor, and that the rate processor then provides separate additional signals to the interpolators. We find the discussion concerning the use of a hand held calculator obscures an appreciation of the overall combination.

We are persuaded therefore that more than a computer process is present, and according to Schlumberger, supra, the use of a computer or a computer program to implement the inventive idea should not necessarily remove the subject matter from a patentable area. The Board therefore considers that the objection against the disclosure and all the claims should not be sustained on the ground that they present solely a computer program.

The second ground of rejection was that the application and claims 1 to 5 are inexplicit and that claims 1 to 5 are not fully supported by the disclosure. With respect to the objection based on lack of support, we find all the elements recited in these claims are present in the disclosure. We disagree therefore with the examiner's argument that the disclosure does not support the claims.

On the ground of inexplicitness the examiner rejected the disclosure for being contrary to Section 36(1) of the Act in that it fails to set forth the structures or circuits to obtain the results claimed. He also rejected claims 1 to 5 "as being inexplicit". The examiner analysed claim 1 as follows:

The "preprocessor", according to claim 1, must possess quite a long list of attributes or intricate performance characteristics which it must be capable of satisfying, namely, it must be capable of:-

(lines 7 to 26 of claim 1 are recited)

It is held that a "preprocessor" which does all these things is not "widely known" and could not be readily built, in the absence of structural details.

and, with reference to MOPOP 8.02.02:

...applicant's "preprocessor" having all the hereabove-recited elaborate attributes (as claimed in claim 1) is not "old".

Neither is applicant's "preprocessor" one of a plurality i.e. "more than one" of old means, inventively combined: The apparatus of claim 1 consists of (and relies for its inventiveness on) practically only one means, namely the "preprocessor" delineated on line 7-line 26. (The remaining "interpolating means" on lines 27-32 merely receive data and pass it on, with no new or unexpected results, and has furthermore been disclaimed as being prior art).

...

and further:

The examiner prefers to think that the applicant has invented something, and that this is to be found in the elaborately claimed description of the "preprocessor" of claim 1 lines 7-26.

It is agreed that one could take the above-mentioned hand calculator, and go through the entire disclosure from page 7 to page 28, aided by drawings, and end up with a certain numerical figure indicating the increment that the "moving element" (tool, etc.) has to be moved; the process to be repeated for each increment.

However, (a) such a procedure would not be patentable consisting merely of calculations using a known hand calculator; (b) it would not be practical because of enormously excessive time it would take, and therefore would not obtain the stated goals of the invention, namely, of operating in "real time", and would thus lack utility.

Another way in which the hand calculator Texas Instruments SR-50 could conceivably be used would be to physically insert this hand calculator into an appropriate place in applicant's system and expect it to perform, at appropriate times, all the calculations of box 16 of Fig. 2 and to arrive at all the results of claim 1 lines 7-26.

It is therefore held that applicant has not disclosed sufficient apparatus specially devised to implement the required performance of the "preprocessor", as specified in claim 1 lines 7-26, for instance.

...

and about the circular interpolator:

(a) this "circular interpolating means" of claim 1 lines 30-32 constitutes only a small part of the apparatus claim 1 to which no inventiveness has been imputed so far; and

(b) this "circular interpolator" is disclosed by the applicant as being prior art (see page 19 lines 18-21).

...

In response the applicant said:

...the Board is courteously requested to refer to Figure 2 in conjunction with page 12 of the disclosure in which it will be noted that preprocessor 16 is an arithmetic unit which performs operations such as addition, subtraction, multiplication, division and taking of square roots. Applicant, clearly did not consider these operations to be defined as "intricate performance characteristics" and simply went on to point out at lines 24 and 25 that conventional "sophisticated pocket calculators presently used by many engineers" could perform these functions. Evidently, the Examiner disagrees with this and holds that no one skilled in the art reading this disclosure would be able to perform the operation $x_f = x_s + \Delta x$ given the two input terms.

...

Essentially, the inventors realized that an efficient machine tool control system could be realized by providing both linear interpolation and circular interpolation and selecting whichever of these was most efficient for the particular portion of the shape being machined. This realization that more efficient machinery could be produced by including both a linear interpolator and a circular interpolator and selecting between them is surely not a data processing step. Nor, applicant submits, is it in any way obvious. Certainly, the Examiner has not cited prior art on this point. Instead, the prosecution has focused solely on the fact that several of the elements in the overall combination do perform data processing functions.

In summary, applicant submits that the present claims relate to apparatus and set out a combination of elements used in such apparatus. It is acknowledged that some of these elements involve data processing. It is submitted that the overall combination of elements is novel and unobvious and that the essential feature of the inventive step was the realization that a better machine would be produced by having both linear and circular interpolation available so that the one best suited to the surface being machined could be employed. Applicant is entitled to patent protection for this advance.

...

In rejecting the disclosure for being inexplicit the Examiner says that the structures or circuits to obtain what is set forth in claim 1 lines 7 to 26 are not described. In his response, Applicant refers to figure 2 in conjunction with page 12, and argues with respect to the preprocessor. He also refers to his previous submission where he states that the functions could be performed by commercial components. He notes that neither the Examiner nor the Applicant

discusses the significance of the intermediate rate processor as described in the application, in controlling the actions of the interpolators in response to signals both from the preprocessor and the working element in operation. The Applicant dealt with the objection concerning the preprocessor by arguing in terms of a person skilled in the art. The Examiner made an objection in the Final Action, that due to the absence of structural details, the preprocessor could not be readily built. We find however that no clear evidence was presented by the Examiner to show why the preprocessor could not be built, nor why there was not sufficient detail to enable a person having ordinary skills to practice the invention. We note again that the Examiner has commented that he thinks the Applicant has invented something. We are unable therefore to support the grounds raised by the Examiner that the application is inexplicit.

We consider next the rejection of claims 1 to 5 on the ground that they are inexplicit. In determining this issue, we bear in mind our above views with respect to patentability and inexplicitness, and also note that no art has been cited.

In rejecting claim 1 the Examiner relies on the argument that in "...the absence of elaborate circuit connections between this calculator and the Applicant's system..." the hand calculator would not produce the results stated in lines 7 to 26. We do not share the Examiner's opinion that this forms a sound basis to reject claim 1. We find that the disclosure refers to a preprocessor which operates on predetermined instructions, and to an intermediate rate processor to obtain additional features not provided by the processor. While it may be that claim 1 is inexplicit, we disagree with the Examiner's reasoning for rejecting it.

We find in claim 2 that a feedback override means is added to the combination in claim 1, and even though this means does not identify the separate control of the interpolators as stated in the disclosure, we are of the opinion that claim 2 is directed to the combination found in the disclosure. Again while it may be that claim 2 is inexplicit, we are unable to sustain the Examiner's reasons for rejecting it.

We find that claims 3, 4 and 5 define characteristics of elements found in claims 1 and 2, and may not be rejected on the ground that they are inexplicit.

We are satisfied that the grounds for finding the claims inexplicit may not be supported, and we withdraw the rejection of claims 1 to 5 on those grounds.

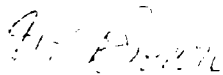
The remaining ground for rejection was made against claims 6 and 7, the two method or process claims. The rejection was expressed in two ways, first that they are directed to methods of operating prior art computers and second that they are not directed to methods carried out by new apparatus specifically devised to implement the new methods. For these reasons the claims were said to be directed to non-patentable subject matter.

The Examiner has cited guideline No. 5, as published in POR August 1, 1978, in support of his position. The Board would like to point out however that this guideline sets forth what the Board considered at that time would be patentable, not what the Board considered would not be patentable. In the Board's opinion it is not correct to use this guideline in the way it is now being used, that the absence of a new apparatus is conclusive of non-patentability.

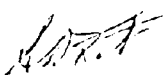
We are persuaded that claims 6 and 7 are directed to a method of controlling the path of an element in a machine combination and not to a method of operating a computer such as a hand calculator, for the reasons we have previously advanced with respect to the application. It may be that claims 6 and 7 have not sufficiently defined all the steps that have been disclosed, but this was not an issue in the Final Action, and we make no ruling in that regard.

In summary we are satisfied that the disclosure and claims are directed to matter which lies in a patentable field and we are unable to support a rejection that they present solely a computer program. We are satisfied that the reasons advanced by the Examiner for the rejection of the application and claims 1 to 5 for being inexplicit, and of claims 1 to 5 for lacking support, and for the rejection of claims 6 and 7 for being a method of operating a computer such as a hand calculator, are in each instance not proper.

We recommend therefore that the rejection of the application and claims for being directed to a computer program, and for being inexplicit, be withdrawn. We recommend withdrawal also of the rejection of the claims for lacking support, and for being a method of operating a computer. We recommend that the application be returned for prosecution leading to acceptable claims.

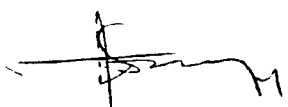


M.G. Brown
Acting Chairman
Patent Appeal Board



S.D. Kot
Member

I concur in the findings and recommendation of the Patent Appeal Board. Accordingly, I withdraw the Final Action and return the application for prosecution consistent with the recommendation.



J.H.A. Gariépy
Commissioner of Patents

Agent for Applicant

A.E. MacRae & Co.
Box 806, Station B
Ottawa, Ontario
K1P 5T4

Dated at Hull, Québec

this 16th. day of January, 1984