

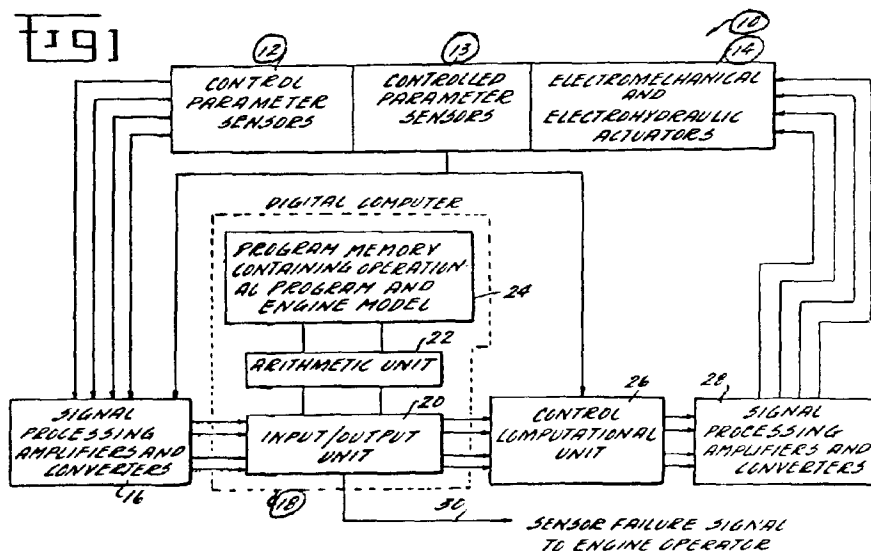
COMMISSIONER'S DECISION

Section 2, Disclaimed Subject Matter: GAS TURBINE ENGINE CONTROL

Applicant's system for controlling a gas turbine by a model generated signal in the event of an erroneous signal from a sensor being in excess of a tolerance value, is considered subject matter within the Act. No disclaimer is made in the disclosure, nor on file. Rejection withdrawn.

This decision deals with Applicant's request for review by the Commissioner of Patents of the Final Action of application 292,813, class 341-112, assigned to the General Electric Company. The invention is entitled METHOD AND APPARATUS FOR FAILURE DETECTION AND CORRECTION IN GAS TURBINE ENGINE CONTROL SYSTEM. The inventors are Henry A. Spang and Robert P. Wanger. The Examiner refused the application for being directed to non-statutory subject matter.

The application relates to failure correction of a control system 10 in a gas turbine engine as shown in Figure 1 below. Such engines include electrical sensors 12, 13 which measure engine control parameters, typically temperatures and pressures, and also engine controlled parameters, typically fuel flow. The sensor signals are used to control the position of actuators 14 which vary engine controlled parameters. A computer 18 uses the sensed values of the control and controlled parameters and the known engine behaviour characteristics which are calculated according to a mathematical model to compute output signals modifying the controlled parameters for maintaining a desired level of engine performance. The improvement resides in the replacement of an erroneous input signal generated from the mathematical model. The erroneous input signal is modified or replaced when the difference between the sensed signal and the computed estimate of the signal exceeds a certain tolerance value.



In the Final Action the Examiner rejected the application for lack of patentable subject matter since it defined a computer program, and for being directed to matter consisting of disclaimed commonly known apparatus.

He stated (in part):

...

Gas turbine engines having "electrical sensors" connected to "computational units" which may be "digital" belong to conventional engine control systems i.e. are prior art, as acknowledged and effectively disclaimed by the applicant (see page 1, lines 5-25).

...

The improvement is said to reside in the fact that in case of the loss of a sensor, the computer will continue to provide output signals to control the engine, because the computer is programmed to do so.

...

In response to the Final Action Applicant argued that the known elements of the combination are not disclaimed, as follows (in part):

...

It is respectfully requested therefore that the Commissioner disregard the Examiner's remarks in respect of disclaimer, it being understood that a combination claim, while it may implicitly disclaim the individual elements of the combination so defined, is none the less directed to the combination which itself is the invention defined by such a claim. Only combination claims are at issue in the present case and the discussion of patentable merits should be restricted to such combination claims.

...

The issue before the Board is whether or not the subject matter of the application is directed to statutory subject matter, and whether or not the subject matter is disclaimed by Applicant. Claim 1 reads:

An improved gas turbine engine control system of the type which comprises means for measuring and transmitting the values of engine control parameters, means for measuring and transmitting the values of engine controlled parameters, actuator means for setting values of engine controlled parameters and control computational means for receiving the control parameter values and the controlled parameter values and generating signals in

response thereto to position the actuator means and to modify the controlled parameter values in order to maintain a desired level of engine performance wherein the improvement comprises:

computer means disposed between the control parameter measuring and transmitting means and the control computational means which receives both the control parameter values and the controlled parameter values and calculates signals representing estimates of the engine control parameter values and transmits said signals to the control computational means.

Dealing first with the issue of disclaimed subject matter in the application, we note that the application refers to various elements to illustrate that suitable structure is known to carry out Applicant's conception of operation. We see no mention in the disclosure that they are disclaimed. We note also in Applicant's response that he says he has not filed any disclaimers under Section 52 of the Act. Applicant also urges that only combination claims are present in the disclosure, and no claims are directed to known elements per se. We are in agreement, for we find that the apparatus of failure detection and correction viewed as a whole is directed to a combination of elements. We dismiss therefore the rejection based on disclaimed subject matter.

We now deal with the rejection that the subject matter is a computer program and is not patentable subject matter. We are here guided by the decision of the Federal Court of Appeal in Schlumberger Canada Ltd. v. Commissioner of Patents (1981) 56 CPR 204, in which Pratte, J. commented as follows:

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.

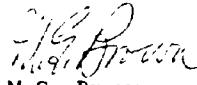
What is new here is the discovery that a model generated signal can replace an erroneous input signal from a faulty sensor in the feedback control loop of a gas turbine. The control is performed by means of a computer which continuously compares each control parameter sensor input signal with the model estimate

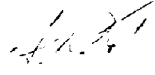
of the signal. In the event of the signal difference exceeding an arbitrary tolerance value, the faulty control sensor is inhibited and prevented from updating the engine model and the engine controlled parameter. The sole practical application of the engine model is in connection with the operation of the engine. The model gives the interrelationship between signal parameters to provide information for controlling any single parameter by means of the other parameters to provide a desired engine performance.

In summary, the calculated numbers, i.e. the control parameters, in this application are not the product or end result of the operation but rather are parameters to be used within a system of controlling an engine. In comparison, in Schlumberger the measured data were recomputed and plotted for interpretation by an operator. Applicant's system however produces an end result which is more than a mere calculation. It produces a control system for an engine. We find that the combination performs a function for which the patent laws were designed to protect, i.e. a system for controlling an engine, and thus the subject matter falls into the statutory subject matter category of Section 2 of the Patent Act.

We recommend that the rejection of the application for lack of patentable subject matter and for being disclaimed matter be withdrawn, and the application be returned to the Examiner.


A. McDonough
Chairman
Patent Appeal Board


M.G. Brown
Assistant Chairman


S.D. Kot
Member

I have reviewed the prosecution of this application and concur with the reasoning and findings of the Board. Accordingly, I am returning the application to the Examiner.


J.H.A. Gariépy
Commissioner of Patents

Agent for Applicant

Swabey, Mitchell, Houle, Marcoud & Sher
1001 boul. de Maisonneuve ouest,
Suite 800,
Montreal, Quebec,
H3A 3C8

Dated at Hull, Quebec

this 29th. day of August, 1984