MARYLAND PATENT LAW ASSOCIATION
October 14, 1993

PANEL DISCUSSION OF PATENTABILITY OF SOFTWARE AND ALGORITHM RELATED INVENTIONS (Under 35 U.S.C. §101)

Moderator: Rene D. Tegtmeyer (Fish & Richardson)

Panelists: Robert G. Sterne (Sterne, Kessler, Goldstein & Fox)
Fred McKelvey (Solicitor, Patent & Trademark Office)

OUTLINE OF TOPICS FOR DISCUSSION

I. THE BIG PICTURE:

1. View of Business

Rob Sterne: The business persons dilemma with the state of unrest in the protection of software by patents.

- The Problem Broadly - Application of §101
- Need for Protection
- Need for Predictability/Certainty
- How the Innovative Companies (and others) are Affected

Computer graphics not patentable R.S.
Everything else is patentable

2. View of the PTO

Fred McKelvey: The PTO's Role in the Software Protection Issue

- How the PTO Implements Judicial Interpretation of §101 to Software
- How PTO Policy is Set in this Area (and other areas)
- How §101 Issues are Handled in the PTO (Who?, Review?, Central Control?, etc.)
- Limitations and Considerations on PTO Implementation of §101 (e.g., PTO can't certify questions to the court)
- Industry, Congressional and Administration Interest

Not everything is patentable F.M.

II. THE POLICY ISSUES: WHAT SUBJECT MATTER SHOULD BE PROTECTED UNDER §101?

1. Should any method or process implemented on a computer be patentable?
   - The Business View
   - The PTO View
   - The Judicial Precedent
2. Should a program represented in physical form (magnetic, laser or other) on a disk be patentable subject matter?
3. Treatment of the issue in the August 1992 Report of the Advisory Commission to the Department of Commerce.
   - Possible PTO Hearings
   - PTO Search Files and Examination

III. THE PTO §101 (or related) REJECTION AND HOW TO RESPOND

1. Specific Situations
   - §101 Mathematical Rejections
     - Freeman-Walter-Abele 2-part test
     - The Arrhythmia Research Case
   - §101 Computer Software Rejections and Responding to them
     - What method or process is patentable subject matter.
     - The §103 rejection approach
     - PTO Handling of:
       - end use limitations
       - data gathering steps
       - transformation of something physical
       - structural limitations in process claims
   - Responding to PTO Rejections
2. PTO Notices
   1989 Legal Analysis
   1990 Interpreting Iwahashi

Note: Statements made by the panelists are for educational purposes and should not be regarded as necessarily expressing the views or positions of the panelists.

24853.W11

MARYLAND PATENT LAW ASSOCIATION
PANEL DISCUSSION
October 14, 1993
BACKGROUND INFORMATION

DETERMINING WHETHER CLAIMS CONTAINING MATHEMATICAL ALGORITHMS ARE DIRECTED TO PATENTABLE SUBJECT MATTER UNDER 35 U.S.C. §101

I. FREEMAN-WALTER-ABELE 2-PART TEST:

(1) Determine whether a mathematical algorithm (or procedure to solve a mathematical problem) is directly or indirectly recited in the claim.

(2) If so, determine whether the mathematical algorithm is applied in any manner to physical elements or process steps.

II. OTHER FACTORS CONSIDERED:

(1) Post Solution Activity - significant or insignificant?

Compare:

(A) Adjusting an Alarm Limit - NOT SUFFICIENT (*Parker v. Flook*) 437 U.S. 584 (1978) and

(B) Processing a windshear signal to provide an indication of its magnitude - NOT SUFFICIENT (*Safe Flight Instrument Corp. v. Sundstrand Data Control*, 10 U.S.P.Q.2d 1733 (D.Del. 1989))

with

(C) Processing data to generate a number representing a measure of specified heart activity - SUFFICIENT (*Arrhythmia Research Technology Inc. v. Corazonix Corp.*, 22 U.S.P.Q.2d 1033 (Fed. Cir. 1992).

(2) Field of Use Limitations in a claim preamble -

Compare:

(A) "Commissioner-designated" Board panel decision in *Ex parte Akamatsu*, 22 U.S.P.Q.2d 1915 (1992) involving a method for graphics interpolation in which display points are stored, calculated, and interpolated points displayed - NOT SUFFICIENT

with

the Board's later decision in *Ex parte Veldhuis*, (BNA PTCJ Vol. 44 at 486 September 17, 1992) in which a method for replacing invalid signal samples with valid signal samples - SUFFICIENT. (Subject matter is mobile telephone system signals. The Board relied on Arrhythmia and distinguished Akamatsu on the thin basis that Akamatsu did not improve the quality of signal but increased resolution by adding display points.)

(3) Data Gathering Steps -

Compare:

(A) Method for diagnosing an abnormal condition in a patient in *In re Grams*, 12 U.S.P.Q.2d 1824 (Fed. Cir. 1990) involving gathering and inputting test data, making calculations and displaying the resulting parameters for determining the presence of the abnormal condition - NOT SUFFICIENT.

with

(B) *Arrhythmia Research Technology, Inc. v. Corazonix Corp.*, 22 U.S.P.Q.2d 1033 (Fed. Cir. 1992) where method and apparatus claims for analyzing electrocardiograph signals by converting, applying, determining and comparing the signals to measure "late potentials" (a measure of heart activity which according to the specification may indicate ventricular tachycardia, an acute type of heart arrhythmia). (Note that the court made reference to the signals involved and said that the view that there is nothing necessarily physical about electric signals is incorrect.)

(4) Transformation of Something Physical -

Compare:

(A) *In re Richman*, 195 U.S.P.Q. 240 (CCPA 1977) where a method of calculating the airborne radar boresight correction angle from a plurality of signals sets - NOT SUFFICIENT.

with

(B) *In re Taner*, 214 U.S.P.Q. 618 (CCPA 1982) where substantially spherical seismic signals were converted into a form representing the earth's response to cylindrical or plane waves - SUFFICIENT.

(5) Structural limitations in Process Claims -

(See the text in the 1989 PTO Legal Analysis of §101)

25089.W11

(187) **Patentable Subject Matter**

Mathematical Algorithms and Computer Programs

The following represents a recent legal analysis done by Associate Solicitor Lee E. Barrett, an attorney in the Office of the Solicitor of the Patent and Trademark Office, on the subject of the patentability of mathematical algorithms and computer programs. The analysis is published for the benefit of the public.

August 9, 1989 FRED E. McKELVEY
Solicitor

Table of Contents

Discussion

I. *Statutory Subject Matter - 35 U.S.C. § 101*

Inventions may be patented only if they fall within one of the four statutory classes of subject matter of 35 U.S.C. § 101: "process, machine, manufacture, or composition of matter." *See Kewanee Oil Co. v. Bicron Corp.*, 416 U.S. 470, 483, 181 USPQ 673, 679 (1974):

> [N]o patent is available for a discovery, however useful, novel, and nonobvious, unless it falls within one of the express categories of patentable subject matter of 35 U.S.C. § 101.

Subject matter that does not fall within one of the statutory classes of 35 U.S.C. § 101 is said to be "nonstatutory" or to be "unpatentable subject matter."

The broad language of § 101 is intended to delineate a "general industrial boundary" of patentable invention. *In re Bergy*, 596 F.2d 952, 974 n.11, 201 USPQ 352, 372 n.11 (CCPA 1979), *vacated*, 444 U.S. 1028, *aff'd sub nom., Diamond v. Chakrabarty*, 447 U.S. 303, 206 USPQ 193 (1980). The first statutory class, process, is defined in 35 U.S.C. § 100(b) and refers to *acts*, while the last three classes, machine, manufacture and composition of matter, refer to physical *things*; therefore, the general field of patentable invention consists of new acts and new things. *Id.* The classes relevant to this discussion are "process" and "machine." A "process" is equivalent to a "method." *Bergy*, 596 F.2d at 965, 201 USPQ at 364. The term "machine" is used interchangeably with "apparatus." *In re Prater*, 415 F.2d 1393, 1395 n.11, 162 USPQ 541, 543 n.11 (CCPA 1969).

The question of whether a claimed invention satisfies the other conditions for patentability is "wholly apart from whether the invention falls into a category of statutory subject matter" (emphasis deleted). *Diamond v. Diehr*, 450 U.S. 175, 190, 209 USPQ 1, 9 (1981) (citing *Bergy*, 596 F.2d at 961, 201 USPQ at 361). As stated in *Parker v. Flook*, 437 U.S. 584, 593, 198 USPQ 193, 198-99 (1978):

> The obligation to determine what type of discovery is sought to be patented must precede the determination of whether that discovery is, in fact, new [i.e., novel under § 102] or obvious [§ 103].

See also In re Sarkar, 588 F.2d 1330, 1333 n.10, 200 USPQ 132, 137 n.10 (CCPA 1978) ("If the subject matter as claimed is subject to patenting, i.e., if it falls within § 101, it must then be examined for compliance with §§ 102 and 103").

Legislative history indicates that Congress contemplated that the subject matter provisions be given a broad construction and were intended to "include anything under the sun that is made by man." *Diamond v. Chakrabarty*, 447 U.S. at 309, 206 USPQ at 197. Any process, machine, manufacture, or composition of matter constitutes statutory subject matter *unless* it falls within a judicially determined exception to § 101. *In re Pardo*, 684 F.2d 912, 916, 214 USPQ 673, 677 (CCPA 1982). Exceptions include laws of nature, physical phenomena and abstract ideas. *Diehr*, 450 U.S. at 185, 209 USPQ at 7, and cases cited therein. This analysis addresses whether mathematical algorithms and computer programs are statutory subject matter.

II. *Mathematical Algorithms*

A. *Mathematical algorithms per se are not a statutory "process" under § 101*

A mathematical algorithm is defined as a "procedure for solving a given type of mathematical problem." *Gottschalk v. Benson*, 409 U.S. 63, 65, 175 USPQ 673, 674 (1972); *Flook*, 437 U.S. at 585 n.1, 198 USPQ at 195 n.1; *Diehr*, 450 U.S. at 186, 209 USPQ at 8. Mathematical algorithms are nonstatutory because they have been determined not to fall within the § 101 statutory class of a "process." *Benson*, "[A]n algorithm, or mathematical formula, is like a law of nature, which cannot be the subject of a patent." *Diehr*, 450 U.S. at 186, 209 USPQ at 8. The exception applies only to *mathematical* algorithms since any process is an "algorithm" in the sense that it is a step-by-step procedure to arrive at a given result. *In re Walter*, 618 F.2d 758, 764 n.4, 205 USPQ 397, 405 n.4. (CCPA 1980); *Pardo*, 684 F.2d at 915, 214 USPQ at 676.

Although mathematical algorithms *per se* are nonstatutory, as stated in *Diehr*, 450 U.S. at 187-88, 209 USPQ at 8-9:

> [A] claim drawn to subject matter otherwise statutory does not become nonstatutory simply because it uses a mathematical formula, computer program, or digital computer. . . . [I]n *Parker v. Flook* we stated that "a process is not unpatentable simply because it contains a law of nature or a mathematical algorithm." 437 U.S. at 590. It is now commonplace that an *application* of a law of nature or mathematical formula to a known structure or process may well be deserving of patent protection. As Justice Stone explained four decades ago:
>
> > "While a scientific truth, or the mathematical expression of it, is not a patentable invention, a novel and useful structure created with the aid of knowledge of scientific truth may be." *Mackay Radio & Telegraph Co. v. Radio Corp. of America*, 306 U.S. 86, 94 (1939). [Citations omitted.]

The Supreme Court thus recognizes that mathematical algorithms are "the basic tools of scientific and technological work," *Benson*, 409 U.S. at 67, 175 USPQ at 675, and should not be the subject of exclusive rights, whereas technological application of scientific principles and mathematical algorithms furthers the constitutional purpose of promoting "the Progress of . . . Useful arts." U.S. Const. art. I, § 8. It is also recognized that mathematical algorithms may be the most precise way to describe the invention.

Where claims involve mathematical algorithms, as stated in *In re Abele*, 684 F.2d 902, 907, 214 USPQ 682, 687 (CCPA 1982):

> The goal is to answer the question "What did applicants invent?" If the claimed invention is a mathematical algorithm, it is improper subject matter for patent protection, whereas if the claimed invention is an application of the algorithm, § 101 will not bar the grant of a patent.

The tests for determining whether claims containing mathematical algorithms are statutory have gradually evolved in the courts since the Supreme Court's decision in *Benson* in 1972.

B. *Evolution of the two-part test for mathematical algorithm-statutory subject matter*

The proper legal analysis of mathematical algorithm-statutory subject matter cases is the two-part test of *In re Freeman*, 573 F.2d 1237, 197 USPQ 464 (CCPA 1978), as modified by *Walter* and *Abele*. *See In re Meyer*, 688 F.2d 789, 796, 215 USPQ 193, 198 (CCPA 1982) ("A more comprehensive test for cases involving mathematical algorithms is set forth in *In re Abele*"). A review of the evolution of the analysis provides some useful insights into the application of the test.

In *Benson*, the Supreme Court concluded that claims directed to a particular algorithm for converting binary coded decimal numbers to binary numbers was not statutory subject matter. The Supreme Court further concluded that any patent issued on those claims "would wholly pre-empt the mathematical formula and in practical effect would be a patent on the algorithm itself." 409 U.S. at 72, 175 USPQ at 676. These two conclusions formed the basis for the two-part analysis of the Court of Customs and Patent Appeals (CCPA) in *Freeman*, 573 F.2d at 1245, 197 USPQ at 471:

> First, it must be determined whether the claim directly or indirectly recites an "algorithm" in the *Benson* sense of that term, for a claim which fails even to recite an algorithm clearly cannot wholly preempt an algorithm. Second, the claim must be further analyzed to ascertain whether in its entirety it wholly preempts that algorithm.

In 1978, the Supreme Court held in *Flook* that a claim need "not . . . cover every conceivable application of the formula" to be nonstatutory. 437 U.S. at 586, 198 USPQ at 196. This decision left undefined what constitutes statutory subject matter. In *Walter*, the CCPA modified the second step of *Freeman* to require a more positive approach to determining what is claimed, 618 F.2d at 767, 205 USPQ at 407:

> If it appears that the mathematical algorithm is implemented in a specific manner to define structural relationships between the physical elements of the claim (in apparatus claims) or to refine or limit claim steps (in process claims), the claim being otherwise statutory, the claim passes muster under § 101. If, however, the mathematical algorithm is merely presented and solved by the claimed invention, as was the case in *Benson* and *Flook*, and is not applied in any manner to physical elements or process steps, no amount of post-solution activity will render the claim statutory; nor is it saved by a preamble merely reciting the field of use of the mathematical algorithm.

The CCPA noted that while the second step of *Freeman* was "*stated* in terms of preemption" it had consistently been applied "in the spirit of the foregoing principles." 618 F.2d at 767, 205 USPQ at 407.

In *Abele*, the CCPA further modified the second part of the test to provide a more comprehensive test, 684 F.2d at 906-7, 214 USPQ at 686:

> Appellants summarize the *Walter* test as setting forth two ends of a spectrum: what is now clearly nonstatutory, i.e., claims in which an algorithm is merely presented and solved by the claimed invention (preemption), and what is clearly statutory, i.e., claims in which an algorithm is implemented in a specific manner *to define structural relationships* between the physical elements of the claim (in an apparatus claim) or *to refine or limit steps* (in a process). Appellants urge that the statement of the test in *Walter* fails to provide a useful tool for analyzing claims in the "gray area" which falls between the two ends of that spectrum. We agree that the board's understanding and application of the *Walter* analysis justifies appellant's position. However, the *Walter* analysis quoted above does not limit patentable subject matter only to claims in which structural relationships or process steps are defined, limited or refined by the application of the algorithm.
>
> Rather, *Walter* should be read as requiring no more than that the algorithm be "applied in any manner to physical elements or process steps," provided that its application is circumscribed by more than a field of use limitation or non-essential post-solution activity. Thus, if the claim would be "otherwise statutory," *id.*, albeit inoperative or less useful without the algorithm, the claim likewise presents statutory subject matter when the algorithm is included. This broad reading of *Walter*, we conclude, is in accord with the Supreme Court decisions [holding "that a claim drawn to subject matter otherwise statutory does not become nonstatutory simply because it uses a mathematical formula, computer program, or digital computer," *Diamond v. Diehr*, 450 U.S. at 187, 209 USPQ at 8].

The reason for the modification of the test was because, as noted in *Abele*, 684 F.2d at 909, 214 USPQ at 688:

> The algorithm [in *Abele*] does not necessarily refine or limit the earlier steps of production and detection as would be required to achieve the status of patentable subject matter by the board's narrow reading of *Walter*.

The second test of *Abele* suggests that the determination of whether the algorithm is "applied in any manner to physical element or process steps" may be made by viewing the claims without the algorithm and determining whether what remains is "otherwise statutory." This analysis focuses on identifying the statutory process in the claim and is consistent with previous cases such as *Walter*, 618 F.2d at 769, 205 USPQ at 409 ("Examination of each claim demonstrates that each has no substance apart from the calculations involved"). The technique of viewing the claim without the mathematical algorithm is not inconsistent with the requirement that claims must be considered "as a whole" under § 101.

The requirement that claims be considered "as a whole" arose out of the now rejected "point of novelty" approach to statutory subject matter. Under the "point of novelty" approach, if a claim considered without the nonstatutory subject matter was unpatentable over the prior art (i.e., if the algorithm was at the "point of novelty" of the claim), the claims were found to not recite statutory subject matter. This approach was

consistently rejected by the CCPA. *See In re Chatfield*, 545 F.2d 152, 191 USPQ 730 (CCPA 1976), *cert. denied*, 434 U.S. 875 (1977); *In re Deutsch*, 553 F.2d 689, 193 USPQ 645 (CCPA 1977); *In re de Castelet*, 562 F.2d 1236, 195 USPQ 439 (CCPA 1977); *Freeman; Sarkar; Walter*. The point of novelty approach was finally put to rest in *Diehr*, 450 U.S. at 188-89, 209 USPQ at 9:

> In determining the eligibility of respondents' claimed process for patent protection under § 101, their claims must be considered as a whole. It is inappropriate to dissect the claims into old and new elements and then to ignore the presence of the old elements in the analysis. . . . The "novelty" of any element or steps in a process, or even of the process itself, is of no relevance in determining whether the subject matter of a claim falls within the § 101 categories of possibly patentable subject matter.

Under the second test of *Abele*, the claims are considered without the algorithm to determine whether what remains is "otherwise statutory," *not* to determine whether what remains is novel and nonobvious.

C. *Application of the two-part test*

1. *Step 1 - presence of a mathematical algorithm*

a. *Mathematical algorithm*

A mathematical algorithm is a "procedure for solving a given type of mathematical problem." In this sense, a mathematical algorithm refers "to methods of calculation, mathematical formulas, and mathematical procedures generally," *Walter*, 618 F.2d at 764-65 n.4, 205 USPQ at 405 n.4. "The type of mathematical computation involved does not determine whether a procedure is statutory or nonstatutory." *In re Gelnovatch*, 595 F.2d 32, 41, 201 USPQ 136, 145 (CCPA 1979). A "claim for an improved method of calculation, even when tied to a specific end use, is unpatentable subject matter under § 101," *Flook*, 437 U.S. at 595 n.18, 198 USPQ at 199 n.18.

Mathematical algorithms may represent scientific principles, laws of nature, or ideas or mental processes for solving complex problems. *See Meyer*, 688 F.2d at 794-95, 215 USPQ at 197:

> Scientific principles, such as the relationship between mass and energy [$E = mc^2$], and laws of nature, such as the acceleration of gravity, namely $a = 32$ ft./sec.^{2}, can be represented in mathematical format. However, some mathematical algorithms and formulae do not represent scientific principles or laws of nature; they represent ideas or mental processes and are simply logical vehicles for communicating possible solutions to complex problems.

See also Safe Flight Instrument Corp. v. Sundstrand Data Control, Inc., 706 F. Supp. 1146, 10 USPQ2d 1733 (D.Del. 1989) (mathematical algorithm representing a natural phenomenon, windshear). No distinction is made between mathematical algorithms invented by man, and mathematical algorithms representing discoveries of scientific principles and laws of nature which reveal a relationship that has always existed.

b. *"Process" versus "apparatus" claims*

Since mathematical algorithms have been determined not to fall within the § 101 statutory class of a "process," attempts have been made to circumvent the nonstatutory subject matter rejection by drafting mathematical algorithms as "machine" claims. The technique used is to draft the method steps in terms of "means for" language permitted by 35 U.S.C. § 112, sixth paragraph. While such a claim is technically a "machine" or "apparatus" claim, the courts have held that form of the claim does not control whether the subject matter is statutory. *See In re Maucorps*, 609 F.2d 481, 485, 203 USPQ 812, 815-16 (CCPA 1979):

> Labels are not determinative in § 101 inquiries. "*Benson* applies equally whether an invention is claimed as an apparatus or process, because the form of the claim is often an exercise in drafting." *In re Johnson*, 589 F.2d 1070, 1077, 200 USPQ 199, 206 ([CCPA] 1978). "Though a claim expressed in 'means for' (functional) terms [under 35 U.S.C. § 112, sixth paragraph] is said to be an apparatus claim, the subject matter as a whole of that claim may be indistinguishable from that of a method claim drawn to the steps performed by the 'means.'" *In re Freeman*, 573 F.2d at 1247, 197 USPQ at 472. Moreover, that the claimed computing system may be a "machine" within "the ordinary sense of the word," as appellant argues, is irrelevant. The holding in *Benson* "forecloses a purely literal reading of § 101."

The test for determining whether "means for" apparatus claims should be treated as method claims is stated in *Walter*, 618 F.2d at 768, 205 USPQ at 408:

> If the functionally-defined disclosed means and their equivalents are so broad that they encompass any and every means for performing the recited functions, the apparatus claim is an attempt to exalt form over substance since the claim is really to the method or series of functions itself . . . . In such cases the burden must be placed on the applicant to demonstrate that the claims are truly drawn to specific apparatus distinct from other apparatus capable of performing the identical functions.
>
> If this burden has not been discharged, the apparatus claim will be treated as if it were drawn to the method or process which encompasses all of the claimed "means." *See In re Maucorps*, 609 F.2d at 485, 203 USPQ at 815-816; *In re Johnson*, 589 F.2d at 1077, 200 USPQ at 206; *In re Freeman*, 573 F.2d at 1247, 197 USPQ at 472. The statutory nature of the claim under § 101 will then depend on whether the corresponding method is statutory.

See also Meyer, 688 F.2d at 795 n.3, 215 USPQ at 198 n.3; *Abele*, 684 F.2d at 909, 214 USPQ at 688; *Pardo*, 684 F.2d at 916 n.6, 214 USPQ at 677 n.6; *Arshal v. United States*, 621 F.2d 421, 427-28, 208 USPQ 397, 404 (Ct. Cl. 1980), *cert. denied*, 449 U.S. 1077 (1981), *reh'g denied*, 450 U.S. 1050 (1981). In *Maucorps*, the limitation of various "means" in claim 1 to include certain "electric circuits" did not prevent the claim from being treated as a method. A claim is not presumed to be statutory simply because it is in apparatus form.

c. *Form of the mathematical algorithm*

The first step of the analysis is to determine whether the claim directly or indirectly recites a mathematical algorithm. A mathematical algorithm can appear in many forms. As stated in *Freeman*, 573 F.2d at 1246, 197 USPQ at 471:

> The manner in which a claim recites a mathematical algorithm may vary considerably. In some claims, a formula or equation may be expressed in traditional mathematical symbols so as to be immediately recognizable as a mathematical algorithm. *See, e.g., In re Richman*, 563 F.2d 1026, 195 USPQ 340 ([CCPA] 1977); *In re Flook*, 559 F.2d 21, 195 USPQ 9 ([CCPA] 1977), *cert. granted sub nom., Parker v. Flook*, [437 U.S. 584] (1978). Other claims may use prose to express a mathematical computation or to indirectly recite a mathematical equation or formula by means of a prose equivalent therefor. *See, e.g., In re de Castelet, supra* (claims 6 and 7); *In re Waldbaum*, 559 F.2d 611, 194 USPQ 465 ([CCPA] 1977). A claim which substitutes, for a mathematical formula in algebraic form, "words which mean the same thing," nonetheless recites an algorithm in the *Benson* sense. *In re Richman, supra* 563 F.2d at 1030, 195 USPQ at 344. Indeed, the claims at issue in *Benson* did not contain a formula or equation expressed in mathematical symbols.

Claims which include mathematical formulas or calculations expressed in mathematical symbols clearly include a mathematical algorithm. Mathematical algorithms in prose form may be expressed as literal translations of the mathematical algorithm (e.g., substituting the expression "division" or "taking the ratio" for a division sign) or may be expressed in words which indicate the mathematical algorithm. *See Safe Flight Instrument*, 706 F. Supp. at 1148, 10 USPQ2d at 1734 (subtracting); *Abele*, 684 F.2d at 908 n.8, 214 USPQ at 687 n.8 ("The algorithm, calculating the difference, is defined in the specification as a Gaussian weighting function"); *In re Taner*, 681 F.2d 787, 790, 214 USPQ 678, 681 (CCPA 1982) (summing); *In re Johnson*, 589 F.2d 1070, 1079, 200 USPQ 199, 208 (CCPA 1978) ("'computing' connotes the execution of one or a sequence of mathematical operations"); *In re Waldbaum*, 559 F.2d 611, 194 USPQ 465 (CCPA 1977) (method of claim 1 "to count" the number of busy lines "solves a mathematical problem, to wit, *counting* a number of busy lines in a telephone system," *In re Bradley*, 600 F.2d 807, 810 n.4, 202 USPQ 480, 484 n.4 (CCPA 1979), *aff'd by an equally divided court sub nom., Diamond v. Bradley*, 450 U.S. 381, 209 USPQ 97 (1981)).

It is not always possible to determine by inspection of the claim whether it indirectly recites a mathematical algorithm; in such instances the analysis "requires careful interpretation of each claim in the light of its supporting disclosure." *Johnson*, 589 F.2d at 1079, 200 USPQ at 208. *See also id.* at 1078-79, 200 USPQ at 208 ("the flow diagrams which form part of the specification disclose explicit mathematical equations which are to be used in conjunction with each of these [claimed] steps [of 'determining' or 'correlating']"); *Waldbaum*, 559 F.2d 611, 194 USPQ 465 ("series of steps for manipulating binary numbers within a procedure for calculating the number of binary 1's and 0's present" was considered a mathematical algorithm, *Gelnovatch*, 595 F.2d at 39, 201 USPQ at 143); *In re Sherwood*, 613 F.2d 809, 818, 204 USPQ 537, 545 (CCPA 1980), *cert. denied*, 450 U.S. 994 (1981) ("claims must be said to include the indirect recitation of a mathematical equation"); *Meyer*, 688 F.2d at 795, 215 USPQ at 198 (claims indirectly "recite a mathematical algorithm, which represents a mental process that a neurologist should follow").

2. *Step 2- is the mathematical algorithm "applied in any manner to physical elements or process steps?"*

The second test is to determine whether the mathematical algorithm is "applied in any manner to physical elements or process steps." The guideline for the analysis should be the CCPA's suggestion in *Abele* to view the claim without the mathematical algorithm to determine whether what remains is "otherwise statutory"; if it is, it does not become nonstatutory simply because it uses a mathematical algorithm. It is recognized that "[t]he line between a patentable 'process' and an unpatentable 'principle' is not always clear." *Flook*, 437 U.S. at 589, 198 USPQ at 197. There are no definitive "tests for determining whether a claim positively recites statutory subject matter." *Meyer*, 688 F.2d at 796 n.4, 215 USPQ at 198 n.4. Nevertheless, some useful guidelines may be synthesized out of the court decisions.

a. *Post-solution activity*

If the only limitation aside from the mathematical algorithm is insignificant or non-essential "post-solution activity," the claimed subject matter is nonstatutory. *Flook*, 437 U.S. at 590, 198 USPQ at 197:

> The notion that post-solution activity . . . can transform an unpatentable principle into a patentable process exalts form over substance. A competent draftsman could attach some form of post-solution activity to almost any mathematical formula; the Pythagorean theorem would not have been patentable, or partially patentable, because a patent application contained a final step indicating that the formula, when solved, could be usefully applied to existing surveying techniques.

Insignificant post-solution activity by itself is insufficient to constitute a statutory process. In *Flook*, the final step of adjusting an alarm limit was not sufficient. *See also Safe Flight* (final step of "means for processing said windshear signal to provide an indication representing the magnitude thereof" not sufficient); *Abele*, 684 F.2d at 909, 214 USPQ at 688 (final step of display: "that the result is displayed as a shade of gray rather than as simply a number provides no greater or better information, considering the broad range of applications encompassed by the claims"); *Walter*, 618 F.2d at 770, 205 USPQ at 409 (final step in dependent claim of magnetic recording: "If § 101 could be satisfied by the mere recordation of the results of a nonstatutory process on some record medium, even the most unskilled patent draftsman could provide for such a step"); *Gelnovatch*, 595 F.2d at 41 n.7, 201 USPQ at 145 n.7 (final step of storing outputs: "each of the steps of the claimed process, except perhaps the final step of equating the process outputs to the values of the last set of process inputs, directly or indirectly recites a mathematical computation"); *Sarkar*, 588 F.2d at 1332 n.6, 200 USPQ at 136 n.6 (final step of constructing an obstruction at a location determined by a mathematical model: "Sarkar no longer relies upon bridge of dam construction as post-solution activity steps effective to bring his process within § 101"); *de Castelet*, 562 F.2d at 1244, 195 USPQ at 446 (final step of transmitting: "That the computer is instructed to transmit electrical signals, representing the result of its calculations . . . does not transform the claim into one for a process merely *using* an algorithm").

The absence of post-solution activity or the fact that any post-solution activity may be trivial is only one factor to be considered. On one hand, as stated in *Walter*, 618 F.2d at 767-68, 205 USPQ at 407:

> if the end-product of a claimed invention is a *pure number*, as in *Benson* and *Flook*, the invention is nonstatutory regardless of any post-solution activity which makes it available for use by a person or machine for other purposes.

On the other hand, as stated in *Abele*, 684 F.2d at 908 n.9, 214 USPQ at 687 n.9:

> "the fact that [the] equation is the final step is not determinative of the section 101 issue." *In re Richman*, 563 F.2d at 1030, 195 USPQ at 343. *Accord, In re Taner*, 681 F.2d 787 ([CCPA] 1982), *overruling In re Christensen*, 478 F.2d 1392, 178 USPQ 35 ([CCPA] 1973).

The particular order of the steps should not be determinative of the statutory subject matter inquiry.

b. *Field of use limitations*

A mathematical algorithm is not made statutory by "attempting to limit the use of the formula to a particular technological environment." *Diehr*, 450 U.S. at 191, 209 USPQ at 10. Thus, "field of use" or "end use" limitations in the claim preamble are insufficient to constitute a statutory process. This is consistent with the usual treatment of preambles as merely setting forth the environment. *See Flook* (the preamble, while limiting the application of the claimed method to "a process comprising the catalytic chemical conversion of hydrocarbons" did not serve to render the method statutory); *Walter*, 618 F.2d at 769, 205 USPQ at 409 ("Although the claim preambles relate the claimed invention to the art of seismic prospecting, the claims themselves are not drawn to methods of or apparatus for seismic prospecting"); *de Castelet*, 562 F.2d at 1244 n.6, 195 USPQ at 446 n.6 ("The potential for misconstruction of preamble language requires that compelling reason exist before that language may be given weight"). *Compare Waldbaum*, 559 F.2d at 616 n.6, 194 USPQ 469 n.6 (portion of preambles referred to in method portion of claims "are necessary for completeness of the claims and are proper limitations thereto").

c. *Data-gathering steps*

If the only limitations in the claims in addition to the mathematical algorithm are data-gathering steps which "merely determine values for the variables used in the mathematical formulae used in making the calculations," such antecedent steps are insufficient to change a nonstatutory method of calculation into a statutory process. *See In re Richman*, 563 F.2d at 1030, 195 USPQ at 343; *Sarkar*, 588 F.2d at 1335, 200 USPQ at 139 ("If the steps of gathering and substituting values were alone sufficient, every mathematical equation, formula, or algorithm having any practical use would be per se subject to patenting as a 'process' under § 101"); *Gelnovatch*, 595 F.2d at 41 n.7, 201 USPQ at 145 n.7 ("claimed step of perturbing the values of a set of process inputs (step 3), in addition to being a mathematical operation, appears to be a data-gathering step").

Where the claim "presents data gathering steps not dictated by the algorithm but by other limitations which require certain antecedent steps" the claim may present statutory subject matter. *Abele*, 684 F.2d at 908, 214 USPQ at 687.

d. *Transformation of something physical*

In determining whether the claim recites a statutory process or a nonstatutory mathematical algorithm, it is useful to analyze whether there is transformation of something physical into a different form. One distinction is made between transformation of physical "signals" from one physical state to a different physical state, a statutory process in the electrical arts, and mere mathematical manipulation of "data" which, by itself, is not a statutory process. *Compare Taner* (conversion of "substantially spherical seismic signals" into "a form representing the earth's response to cylindrical or plane waves" was statutory process); *Sherwood*, 613 F.2d at 819, 204 USPQ at 546 (conversion of amplitude-versus-time seismic traces into amplitude-versus-depth seismic traces was statutory process because it "converts one physical thing into another physical thing just as any other electrical circuitry would do"); and *Johnson* (technique for removing unwanted noise from a seismic trace was statutory process); *with Walter*, 618 F.2d at 768, 770, 205 USPQ at 407, 409 (if "the claimed invention produces a physical thing . . . the fact that it is represented in numerical form does not render the claim nonstatutory" but finding that the "signals" claimed "may represent either physical quantities or abstract quantities" and thus were to the algorithm itself and not a particular application); *Richman* (method of calculating airborne radar boresight correction angle from "a plurality of signal sets" not statutory); *Gelnovatch*, 595 F.2d at 42, 201 USPQ at 145 (where "the claims solely recite a method whereby a set of numbers is computed from a different set of numbers by merely performing a series of mathematical computations, the claims do not set forth a statutory process"); and *Benson* (conversion of binary coded decimal numbers into pure binary numbers not statutory). It is manifest that the statutory nature of the subject matter does not depend on the labels "signals" or "data."

e. *Structural limitations in process claims*

Another issue is the effect of structural limitations in method claims. While structural limitations in method claims are not improper, they are usually not entitled to patentable weight unless they somehow affect or form an essential part of the process. *See Benson*, 409 U.S. at 73, 175 USPQ at 677 (claim 8 recited use of a "reentrant shift register"); *Waldbaum*, 559 F.2d at 616, 194 USPQ at 469 (machine limitations in data processor method claims); *de Castelet*, 562 F.2d at 1244, 195 USPQ at 447 ("Claims to nonstatutory processes do not automatically and invariably become patentable upon incorporation of reference to apparatus"). The related problem of specific structural language in apparatus claims has been treated, *supra*, in section II.C.1.b.

D. *Examples*

1. *Diamond v. Diehr*

The following claim was held to recite statutory subject matter.

> 1. A method of operating a rubber-molding press for precision molded compounds with the aid of a digital computer, comprising: providing said computer with a data base for said press including at least, natural logarithm conversion data (ln), the activation energy constant (C) unique to each batch of said compound being molded, and a constant (x) dependent upon the geometry of the particular mold of the press, initiating an interval timer in said computer upon the closure of the press for monitoring the elapsed time of said closure, constantly determining the termperature (Z) of the mold at a location closely adjacent to the mold cavity in the press during molding, constantly providing the computer with the temperature (Z), repetitively calculating in the computer, at frequent intervals during each cure, the Arrhenius equation for reaction time during the cure, which is ln v = CZ + x where v is the total required cure time, repetitively comparing in the computer at said frequent intervals during the cure each said calculation of the total required cure time calculated with the Arrhenius equation and said elapsed time, and opening the press automatically when a said comparison indicates equivalence.

Step 1 The claim contains an equation for controlling the in-mold time: ln v = CZ + x.

Step 2 The claimed subject matter is statutory because it recites an "otherwise statutory" process in addition to the mathematical algorithm. As stated in *Abele*, 684 F.2d at 907, 214 USPQ at 686:

> In *Diehr*, were the claims to be read without the algorithm, the process would still be a process for curing rubber, although it might not work as well since the in-mold time would not be as accurately controlled.

The steps in the process, 450 U.S. at 187, 209 USPQ at 8:

> include installing rubber in a press, closing the mold, constantly determining the temperature of the mold, constantly recalculating the appropriate cure time through the use of the formula and a digital computer, and automatically opening the press at the proper time.

The statutory nature of the claim is not based on the post-solution activity of opening the press, but on the application of the mathematical algorithm to the whole process.

2. *Parker v. Flook*

The following claim in *Flook* was held to recite nonstatutory subject matter.

> 1. A method for updating the value of at least one alarm limit on at least one process variable involved in a process comprising the catalytic chemical conversion of hydrocarbons wherein said alarm limit has a current value of
>
> Bo + K
>
> wherein Bo is the current alarm base and K is a predetermined alarm offset which comprises:
> (1) determining the present value of said process variable, said present value being defined as PVL;
> (2) determining a new alarm base B1 using the following equation:
>
> B1 = Bo(1.0 - F) + PVL(F)
>
> where F is a predetermined number greater than zero and less than 1.0;
> (3) determining an updated alarm limit which is defined as B1 + K; and thereafter
> (4) adjusting said alarm limit to said updated alarm limit value.

Step 1 The claim contains a mathematical algorithm comprising determining a new alarm base in step (2) and computing an "alarm limit" in step (3).

Step 2 When viewed without the steps of the mathematical algorithm, steps (2) and (3), the only limitations remaining are the preamble limitation restricting the field of use to "a process comprising the catalytic chemical conversion of hydrocarbons"; the data-gathering step of step (1); and the post-solution step of step (4). None of these limitations comprises an "otherwise statutory" process. The claim seeks to protect a method for computing an "alarm limit" rather than the application of the computation within an otherwise statutory process.

3. *In re Abele*

In *Abele*, claim 5 was held to recite nonstatutory subject matter under § 101 whereas dependent claim 6 was statutory.

> 5. A method of displaying data in a field comprising the steps of calculating the difference between the local value of the data at a data point in the field and the average value of the data in a region of the field which surrounds said point for each point in said field, and displaying the value of said difference as a signed gray scale at a point in a picture which corresponds to said data point.
> 6. The method of claim 5 wherein said data is X-ray attenuation data produced in a two dimensional field by a computed tomography scanner.

Step 1 Claim 5 contains a mathematical algorithm, "calculating the difference," which is defined in the specification as a Gaussian weighting function.

Step 2 When claim 5 is viewed without the mathematical algorithm, the only remaining limitation is the post-solution activity of displaying the result. The display by itself did not constitute an "otherwise statutory" process. The court held that "the algorithm is neither explicitly nor implicitly applied to any certain process." 684 F.2d at 909, 214 USPQ at 688. However, when dependent claim 6 is added to the limitations of claim 5, 684 F.2d at 908, 214 USPQ at 687-88:

> Were we to view the claim absent the algorithm, the production, detection and display steps would still be present and would result in a conventional CAT-scan process. . . . [W]e view the production, detection, and display steps as manifestly statutory subject matter and are not swayed from this conclusion by the presence of an algorithm in the claimed method.

III. *Computer Programs*

A. *"Computer programs" versus "computer processes"*

A "process" or "algorithm" is a step-by-step procedure to arrive at a given result. In the patent area, a "computer process" or "computer algorithm" is a process, i.e., a series of steps, which is performed by a computer. A "[computer] program is a sequence of coded instructions for a digital computer." *Benson*, 409 U.S. at 65, 175 USPQ at 674. Computer programs are equivalently known as "software."

Unfortunately for discussion in this area, "[b]oth the series of steps performed by a computer, and the software directing those steps, have acquired the name 'computer programs.'" *Gelnovatch*, 595 F.2d at 45 n.5, 201 USPQ at 148 n.5 (Markey, C.J., dissenting). What is sought to be protected by patent is the underlying process. As stated in *Gelnovatch*, 595 F.2d at 44, 201 USPQ at 147:

> Confusion may be avoided if it be realized that what is at issue is not the "program," i.e., the software, but the process steps which the software directs the computer to perform.

See, e.g., Maucorps, 609 F.2d at 483, 203 USPQ at 814 ("The [claimed] invention is implemented via a computer program written in FORTRAN IV, either built into the calculating machine, or loaded into a general purpose computer").

B. *Statutory nature of computer processes*

1. *The Supreme Court has not ruled on the patentability of computer programs.*

The Supreme Court has not ruled on whether computer processes are *per se* statutory or nonstatutory. The decisions in *Benson*, *Flook* and *Diehr* all dealt with claims viewed as mathematical algorithms. In *Benson* and *Diehr*, the claims contained mathematical algorithms implemented by a computer. In *Benson*, the Court held that the claims preempted the use of the mathematical algorithm, but did not hold that "any program servicing a computer" would be nonstatutory. In *Diehr*, the Court held that the claims otherwise defined a statutory process for curing rubber, and that the inclusion of a mathematical algorithm or computer program did not make claim nonstatutory. The claim in *Flook* did not involve a computer process.

In *Dann v. Johnston*, 425 U.S. 219, 189 USPQ 257 (1976), *rev'g on other grounds, In re Johnston*, 502 F.2d 765, 183 USPQ 172 (CCPA 1974), which involved a "machine system for automatic record-keeping of bank checks and deposits," the Court declined to discuss the § 101 issue of the general patentability of computer programs, 425 U.S. at 220, 189 USPQ at 258:

> We find no need to treat that question in this case, however, because we conclude that in any event respondent's system is unpatentable on grounds of obviousness. 35 U.S.C. § 103.

In *Diamond v. Bradley*, an equally divided Supreme Court affirmed the CCPA's decision in *Bradley*. The claims were directed to computer "firmware," which refers to microinstructions permanently embodied in hardware elements, and not to a computer application or process. The CCPA found that the claims literally recited a machine and that, in applying the two-part test of *Freeman*, the claims did not recite a mathematical algorithm.

2. *The CCPA has held that computer processes are statutory unless they fall within a judicially determined exemption*

In *Pardo*, the most recent CCPA case on computer processes, the CCPA stated that, 684 F.2d at 916, 214 USPQ at 677:

> any process, machine, manufacture, or composition of matter constitutes statutory subject matter *unless* it falls within a judicially determined exception to section 101.

The major (and perhaps only) exception in the area of computer processes is the mathematical algorithm. Although not binding precedent on the Federal Circuit, the district court in *Paine, Webber, Jackson & Curtis, Inc. v. Merrill Lynch, Pierce, Fenner & Smith*, 564 F. Supp. 1358, 1367, 218 USPQ 212, 218 (D. Del. 1983) stated:

> The CCPA [has] . . . held that a computer algorithm, as opposed to a mathematical algorithm, is patentable subject matter.

If a computer process claim does not contain a mathematical algorithm in the *Benson* sense, the second step of the *Freeman-Walter-Abele* test is not reached, and the claimed subject matter will usually be statutory.

The traditional approach by the CCPA to the PTO's rejection of computer processes as nonstatutory subject matter has been to apply the two-part test for mathematical algorithms and to find statutory subject matter if the claims do not recite a mathematical algorithm. See *Pardo*, 684 F.2d at 916, 214 USPQ at 676 (process for converting source program into object program: "we are unable to find any mathematical formula, calculation, or algorithm either directly or indirectly recited in the claimed steps of examining, compiling, storing, and executing"); *In re Toma*, 575 F.2d 872, 877, 197 USPQ 852, 856 (CCPA 1978) (process for translating a source natural language, e.g., Russian, to a target natural language, e.g., English: "[we] are unable to find any direct or indirect recitation of a procedure for solving a *mathematical* problem"); *In re Phillips*, 608 F.2d 879, 883, 203 USPQ 971, 975 (CCPA 1979) (process for preparing architectural specifications: "Our analysis of the claims on appeal reveals no recitation, directly or indirectly, of an algorithm in the *Benson* and *Flook* sense"); *Freeman*, 573 F.2d at 1246, 197 USPQ at 471 ("The method claims here at issue do not recite process steps which are themselves mathematical calculations, formulae, or equations"); *Deutsch*, 553 F.2d 689, 692, 193 USPQ 645, 648 (CCPA 1977) (method of operating a system of manufacturing plants: "Nothing in the methods claimed by Deutsch preempts a mathematical formula, an algorithm, or any specific computer program"); *Chatfield*, 545 F.2d at 158, 191 USPQ at 736 (method of reassigning priorities within a computer: "[the] independent claims contain neither a mathematical formula nor a mathematical algorithm").

If the computer process is found to contain a mathematical algorithm, it must then pass the second part of the *Freeman-Walter-Abele* test for statutory subject matter. *See, e.g., Sherwood; Maucorps; Gelnovatch.*

Arguably, other exceptions such as "methods of doing business" and "mental steps" may be raised if a claim is not a true computer process, but merely recites that an otherwise nonstatutory process is performed on a computer. *de Castelet*, 562 F.2d at 1244, 195 USPQ at 447 ("Claims to nonstatutory processes do not automatically and invariable become patentable upon incorporation of reference to apparatus"). These would appear to be exceptions with very narrow application to claims which are not limited to implementation by a machine. For example, while a "method of doing business" *per se* is not statutory subject matter, "a method of operation on a computer to effectuate a business activity" has been held to be statutory subject matter. *Paine, Webber v. Merrill Lynch*, 564 F. Supp. at 1369, 218 USPQ at 220. *See also Deutsch*, 553 F.2d at 692 n.5, 193 USPQ at 648 n.5 (claims were not a method of doing business because "[t]hey do not merely facilitate business dealings"); *Johnston, rev'd on other grounds, Dann v. Johnston* (apparatus claims directed to system for automatic record-keeping of bank checks and deposits did not cover a method of doing business). Similarly, machine or computer implementation of "mental steps" is statutory subject matter. *Prater; In re Bernhart*, 417 F.2d 1395, 163 USPQ 611 (CCPA 1969); *In re Musgrave*, 431 F.2d 882, 167 USPQ 280 (CCPA 1970). *See also Toma* (computer implemented method for translation of natural languages is statutory).

Chronological Order Case List

In re Prater, 415 F.2d 1393, 162 USPQ 541 (CCPA 1969)
In re Bernhart, 417 F.2d 1395, 163 USPQ 611 (CCPA 1969)
In re Musgrave, 431 F.2d 882, 167 USPQ 280 (CCPA 1970)
Gottschalk v. Benson, 409 U.S. 63, 175 USPQ 673 (1972)
In re Christensen, 478 F.2d 1392, 178 USPQ 35 (CCPA 1973)
Dann v. Johnston, 425 U.S. 219, 189 USPQ 257 (1976), *rev'g on other grounds, In re Johnston*, 502 F.2d 765, 183 USPQ 172 (CCPA 1974)
In re Noll, 545 F.2d 141, 191 USPQ 721 (CCPA 1976), *cert. denied*, 434 U.S. 875, 195 USPQ 465 (1977)
In re Chatfield, 545 F.2d 152, 191 USPQ 730 (CCPA 1976), *cert. denied*, 434 U.S. 875, 195 USPQ 465 (1977)
In re Deutsch, 553 F.2d 689, 193 USPQ 645 (CCPA 1977)
In re Waldbaum, 559 F.2d 611, 194 USPQ 465 (CCPA 1977)
In re Richman, 563 F.2d 1026, 195 USPQ 340 (CCPA 1977)
In re de Castelet, 562 F.2d 1236, 195 USPQ 439 (CCPA 1977)
In re Freeman, 573 F.2d 1237, 197 USPQ 464 (CCPA 1978)
In re Toma, 575 F.2d 872, 197 USPQ 852 (CCPA 1978)
Parker v. Flook, 437 U.S. 584, 198 USPQ 193 (1978)
In re Sarkar, 588 F.2d 1330, 200 USPQ 132 (CCPA 1978)
Hirschfeld v. Banner, 462 F. Supp. 135, 200 USPQ 276 (D.D.C. 1978), *aff'd without opinion*, 615 F.2d 1368 (D.C. Cir. 1980), *cert. denied*, 450 U.S. 994, 210 USPQ 776 (1981)
In re Gelnovatch, 595 F.2d 32, 201 USPQ 136 (CCPA 1979)
In re Maucorps, 609 F.2d 481, 203 USPQ 812 (CCPA 1979)
In re Phillips, 608 F.2d 879, 203 USPQ 971 (CCPA 1979)
In re Sherwood, 613 F.2d 809, 204 USPQ 537 (CCPA 1980), *cert. denied*, 450 U.S. 994, 210 USPQ 776 (1981)
In re Walter, 618 F.2d 758, 205 USPQ 397 (CCPA 1980)
Arshal v. United States, 621 F.2d 421, 208 USPQ 397 (Ct. Cl. 1980), *cert. denied*, 449 U.S. 1077 (1981), *reh'g denied*, 450 U.S. 1050 (1981)
Diamond v. Diehr, 450 U.S. 175, 209 USPQ 1 (1981)
Diamond v. Bradley, 450 U.S. 381, 209 USPQ 97 (1981), *aff'g by an equally divided Court, In re Bradley*, 600 F.2d 807, 202 USPQ 480 (CCPA 1979)
In re Pardo, 684 F.2d 912, 214 USPQ 673 (CCPA 1982)
In re Taner, 681 F.2d 787, 214 USPQ 678 (CCPA 1982)
In re Abele, 684 F.2d 902, 214 USPQ 682 (CCPA 1982)
In re Meyer, 688 F.2d 789, 215 USPQ 193 (CCPA 1982)
Paine, Webber, Jackson & Curtis, Inc. v. Merrill Lynch, Pierce, Fenner & Smith, 564 F. Supp. 1358, 218 USPQ 212 (D. Del. 1983)
Safe Flight Instrument Corp. v. Sundstrand Data Control, Inc., 706 F. Supp. 1146, 10 USPQ2d 1733 (D. Del. 1989)

(188) Notice Interpreting In Re Iwahashi (Fed. Cir. 1989)

The Patent and Trademark Office's (PTO's) policy on the patentability of claims reciting mathematical algorithms and computer programs, published at 1106 Off. Gaz. Pat. Office 5-12 (Sept. 5, 1989), is unaffected by *In re Iwahashi*, 888 F.2d 1370, 12 USPQ2d 1980 (Fed. Cir. 1989). The following comments are intended as the PTO's interpretation of *Iwahashi*.

Iwahashi reversed a rejection of appellants' apparatus claim 1 (the sole claim) under 35 U.S.C. §101. The rejection maintained that claim 1 was directed to nonstatutory subject matter in the form of a mathematical algorithm. Appellants developed an approximation to the conventional equation for auto-correlation coefficients for use in pattern recognition which uses a term which is the square of the sum of two variables, instead of the product of the two variables. Appellants' claim to an auto-correlation unit is in "means-plus-function" format except for a recited "read only memory" ("ROM") for implementing the squaring term. PTO argued that the term "read only memory" as used in this claim is as broad as a means-plus-function recitation with the result that the claim is effectively entirely in means-plus-function format and indistinguishable for §101 purposes from a method claim; it was argued that such a corresponding method claim would be nonstatutory. *See In re Freeman*, 573 F.2d 1237, 1247, 197 USPQ 464, 472 (CCPA 1978); *In re Walter*, 618 F.2d 758, 768, 205 USPQ 397, 407-08 (CCPA 1980); *In re Abele*, 684 F.2d 902, 909, 214 USPQ 682, 688 (CCPA 1982); *In re Meyer*, 688 F.2d 789, 796, 215 USPQ 193, 198-99 (CCPA 1982); and 1106 Off. Gaz. Pat. Office at 8, under "'Process' versus 'apparatus' claims." PTO also argued that appellants' apparatus claim is nonstatutory when directly analyzed according to the two-part *Freeman-Walter* test because (1) it recites a mathematical algorithm and (2) the algorithm does not "define" a structural relationship between physical elements and is not "applied" in any manner to physical elements.

The Federal Circuit determined that a read only memory is a "term[] well understood by those skilled in the art," 888 F.2d at 1372, 12 USPQ2d at 1909, and that the claimed read only memory element "is not in means-plus-function form," *id.* at 1373, 12 USPQ2d at 1909, but "is a specific piece of apparatus," *id.* at 1375, 12 USPQ2d at 1912. The Court states that appellants' apparatus claim does not meet the second part of the *Freeman-Walter* test, detailing the relationship between the ROM and the other means in the claim. Therefore, the Court concluded, *id.* at 1375, 12 USPQ2d at 1911:

> The claim as a whole certainly defines apparatus in the form of a combination of interrelated means and we cannot discern any logical reason why it should not be deemed statutory subject matter as either a machine or a manufacture as specified in §101. The fact that the apparatus operates according to an algorithm does not make it nonstatutory.... We therefore hold that the claim is directed to statutory subject matter.

Because the Court determined a ROM to be a specific piece of apparatus for implementing a table look-up function, and not as broad as a means-plus-function recitation, appellants carried their burden of demonstarting that the claim is "truly drawn to specific apparatus distinct from other apparatus capable of performing the identical functions," *Walter*, 618 F.2d at 768, 205 USPQ at 408; as a matter of claim interpretation, the claim cannot be treated as equivalent to a method. The *Walter* test for whether an apparatus claim is equivalent to a method claim is the same as applying the *Freeman-Walter* test to an apparatus claim. *See In re Maucorps*, 609 F.2d 481, 486, 203 USPQ 812, 816 (CCPA 1979) (application of second part of two-part *Freeman* test to appartus claim in "means for" format considers whether the "claimed invention as a whole comprises each and every means for carrying out a [mathematical algorithm]").

Once it is determined that the claim is truley drawn to specific apparatus, it necessarily follows that the apparatus is statutory subject matter under §101. True apparatus does not invoke the mathematical algorithm exception because the mathematical algorithm remains free for use by anyone not employing the specific apparatus, i.e., there is no preemption, in whole or part, of the mathematical algorithm itself. *See In re Bernhart*, 417 F.2d 1395, 1399, 163 USPQ 611, 616 (CCPA 1969) ("a member

of the public would have to do much more than use the equations to infringe any of these [apparatus] claims"); *Freeman*, 573 F.2d at 1247 n.11, 197 USPQ at 472 n.11 ("the calculation method [in dependent claim 10] remained free for use by anyone not employing the enire apparatus of claim 9"). Importantly, as the *Iwahashi* Court notes: [t]he fact that apparatus operates according to an algorithm does not make it nonstatutory," 888 F.2d at 1375, 12 USPQ2d at 1911. *See Freeman*, 573 F.2d at 1247 n.10, 197 USPQ at 472 n.10 (" A claim to a new, useful, and unobvious computer, describing that computer in truly structural terms, would not be rejectable on the ground that the only known use for that computer is the performance of unpatentable methods of calculation.").

The Court's holding that the claim defines apparatus because of ROM is a specific piece of apparatus for implementing the mathematical algorithm is consistent with precedent and PTO policy as set forth at 1106 Off. Gaz. Pat. Office 5-12. Every case, however, must be determined on its facts and, to be consistent with previous decisions, *Iwahashi* does not "hold that the mere presence of apparatus language in a claim will, of itself, save that claim from rejection as nonstatutory," *id.* at 1247 n.11, 197 USPQ at 472 n.11. Under *Walter*, the inquiry with every apparatus claim should be whether the apparatus encompasses any and every means for performing the recited functions and, if this appears to be the case, the burden should be placed on the applicant to show that it does not.

The Court's dicta in footnote 1 (the sole footnote) suggests that §112 ¶6 may require the PTO to construe means-plus-function limitation to the apparatus disclosed in the application and equivalents thereof. Under this suggestion, even a claim which is *entirely* in means-plus-function format could not be treated as indistinguishable from a corresponding method claim for §101 purposes. Such a result would be directly contrary to precedent, including *Freeman, Walter, Abele* and *Meyer*. In the opinion of the PTO, means-plus-function limitations should be not treated differently for §101 purposes than for §102 and §103 purposes for rejections over prior art. Indeed, during prosecution claims should be given their broadest reasonable interpretation. *See In re Zletz*, ___ F.2d ___, ___, 13 USPQ2d 1320, 1321-22 (Fed. Cir. 1989). The issue of claim scope should be treated as a matter of burden of proof: examiners should give "means for" limitations their broadest reasonable interpretation and then it is applicant's burden to show that the functionally-defined disclosed means do not encompass any and every means for performing the recited functions. *See Walter*, 618 F. 2d at 768, 205 USPQ at 408 ("the burden must be placed on the applicant to demonstrate that the claims are truly drawn to specific apparatus"); *Meyer*, 688 F.2d at 796 n.6, 215 USPQ at 199 n.6 and corresponding text; *In re Mulder*, 716 F.2d 1542, 1549, 219 USPQ 189, 196 (Fed. Cir. 1983) (involving a "means for" limitation in a §103 rejection: "Appellants have neither asserted nor shown that [the reference] structure is not the equivalent of the structure disclosed in their specification [for performing the function, as stated by the board]").

Feb. 15, 1990

JAMES E. DENNY
Acting Assistant Commissioner for Patents