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BUSINESS AND ECONOMIC IMPLICATIONS OF PROGRAMME PATENT PROTECTION IN CANADA

*by Gaylen A. Duncan**

TABLE OF CONTENTS

INTRODUCTION 106
I. TERMINOLOGY 108
A. *Hardware and Software* 108
B. *Hardware and Software Industries* 110
II. INTELLECTUAL AND INDUSTRIAL PROPERTY PROTECTION 111
A. *Patent Statutes of Canada, the United States and Great Britain* 111
B. *Legislative and Conceptual History of Patent Law* 112
1. General 112
2. Legislative History 113
a. Great Britain 114
b. United States 119
c. Canada 122
3. Conceptual History 124
a. Role of Discovery 124
b. Concept of Tangible and Intangible Property 128
III. PATENTABLE ASPECTS OF COMPUTER PROGRAMMES 131
A. *Patentability of Bundled Systems* 131
1. Machine Claim 132
2. Process Claim 134
3. Means-Plus-Function Claim 135
B. *Patentability of Unbundled Systems* 136
1. Machine Claim 136
2. Process Claim 137
a. Mental Steps 138
b. Vendible Product 140
c. Unsuspected Advantage 140
d. Nonobviousness and Combination of Known Matter 141
e. Summary 141
IV. PATENTABILITY OF COMPUTER PROGRAMMES 142
A. *Recognition of the Problem: 1964-1967* 143
B. *Birth of a Surprise: 1968* 146
C. *International Turmoil: 1969-March, 1971* 149

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D. Reversal of Positions: May, 1971-November, 1972 157
E. Summary 162
V. SOME IMPLICATIONS OF THE PATENT SYSTEM 162
A. Model I: The Beneficiaries of the Patent System 164
B. Implications of Model I 173
C. Model II: Preliminary Analysis of Patent Litigation Costs 174
D. Implications of Model II 183
VI. CONCLUSION 184

INTRODUCTION

> Canada's economic hopes and aspirations have never been easy to achieve. Indeed, one of the primary reasons for the establishment of the nation nearly 100 years ago was to provide the means for forging a co-ordinated economic development on a continental scale.
>
> Today new problems are emerging and new forces are at work. We are in the midst of a great scientific, technological and educational revolution which holds the promise of exciting new accomplishments and improvements in our standards of life. But at the same time, there is an urgent need to adjust to the implications which rising levels of skills and growing specialization and inter-dependence have for our economic life, both at home and in our trade with other countries. The changes of the second half of the twentieth century are both creating and destroying occupations and industries with rising speed and great unevenness. These are bringing significant new possibilities for progress in some industries and in some areas and declining opportunities for others.
>
> More than ever before, we must be prepared to look ahead, to try to anticipate developments which are likely to take place, and to arrange our affairs so that we shall be able to take advantage of the opportunities which the future will offer.[1]

The computer industry, perhaps more than any other, epitomizes the scientific, technological and educational revolution occurring today. The future of this industry in Canada is of particular importance for the continued economic and industrial growth of the nation.[2] In

1. J.J. Deutsch, *cited in* A. Wilson, SCIENCE, TECHNOLOGY AND INNOVATION, SPECIAL STUDY NO. 8 (1968).

2. This article, and in particular the recommendations and solutions, is directed to the Canadian milieu. Canada was chosen for four reasons:

1. The Government of Canada is in the process of developing a policy on this issue;
2. Canadian jurisprudence has traditionally been affected by developments in American courts and the current government review presents Americans with an opportunity to benefit from Canadian experiences;
3. With the federally-oriented constitutional structure in Canada, proposed amendments to the system are more likely to be enacted than in the United States;
4. "The Canadian appears to find it natural to marry intellectual with political considerations; in the United States [one shies] away from

1970, the Canadian government provided substantial assistance to Control Data Canada, Ltd., in its establishment of a large domestic research and development centre. This support was prompted by statistics which disclosed that in 1967 "the trade imbalance in computer hardware and software amounted to $85 million. This deficit was expected to reach $450 million by 1975 if Canada did not develop industrial capacity in this field."[3]

This article will evaluate the extent to which patent protection would foster a healthy national climate for the growth of a Canadian software industry, both in terms of national production and international trade. Grand scale federal regulation, subsidies and tax benefits, and perhaps, the establishment of Crown corporations[4] might be proposed to stimulate the industry. Such intervention, however, suffers from the ripple or tar-baby effect: the more modifications that are made, the less predictable the effects become. Consequently, changes in the law and in government regulation are recommended only where there exists an unquestionable need, and where the foreseeable effects of such changes may be minimized or kept within predictable limits.

The following issues will be addressed:

1. Should the courts protect computer programmes by the application of traditional concepts found in existing proprietary laws?
2. Should the courts protect computer programmes by modernizing traditional concepts found in existing proprietary laws?
3. What benefits and costs are involved in granting or refusing protection of existing proprietary laws to programme writers?
4. What changes in existing policies are necessary to approach a stipulated set of goals?

Section I defines terminology and presents a survey of the traditional methods of protection for proprietary interests in computer software. Section II traces the history of patent concepts, while Section III presents a theoretical application of patent laws to computer programmes. Section IV discusses computer programme patent cases in

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overt consideration of such a marriage." Bock, *The Place of Competition Among National Goals*, 8 CONF. BOARD REC. 6, 13 (Nov. 1971).

Thus, the Canadian milieu provides an ideal environment for an interdisciplinary study such as this.

3. O. FIRESTONE, ECONOMIC IMPLICATIONS OF PATENTS 286 n.80 (1971). Since the basic product of software firms is information formatted to solve a specific problem or class of problems, such as industry does not suffer in a market which depends on exports for profit. With growth potential in excess of 40 percent per year and a sales base in 1969 of $50 million (Financial Post, Aug. 22, 1970, at 1-2), the future of this industry is of great importance to Canadian business and economy.

4. Control Data Corporation and the Department of Regional Economic Expansion are currently proposing a massive joint venture to develop software and information-management systems.

Canada, Britain and the United States, while section V analyzes the costs and effects of granting patent protection to computer programmes. The recommendations of the final section (Section VI) represent an attempt to improve the Canadian position in the field of software production, while not causing adverse effects in other fields.

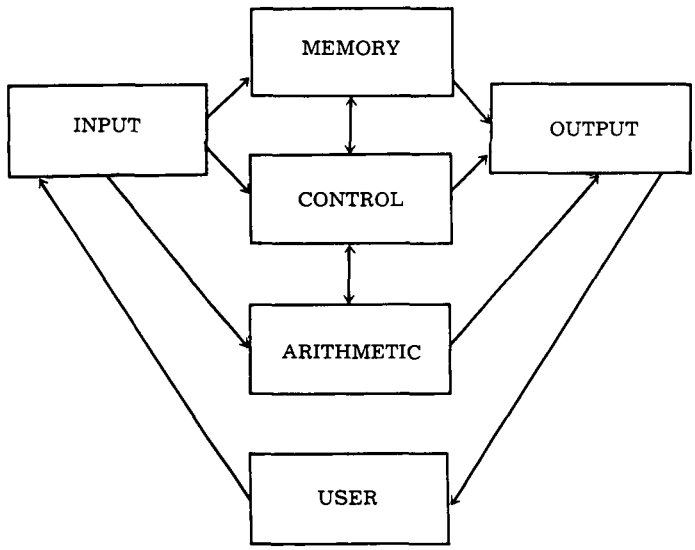
I. TERMINOLOGY

A. Hardware and Software

A computer is an "arrangement of electrical switching devices to perform basic arithmetic functions and magnetic cores to serve as memory storage devices."[5] There are five basic units in every computer.[6] These include an input unit, which imparts the necessary information to the arithmetic and memory units; a control unit which scrutinizes operations; and an output unit which transmits information to the user.[7] These units, which may or may not have separate physical identities, have led to two distinct conceptualizations of a computer. The first, the "Physical Definition," considers the combination of these basic units merely a "warehouse of unrelated parts."[8] Such a definition

5. Comment, *Process Patents for Computer Programs*, 56 CALIF. L. REV. 466, 468 (1968), *reprinted in* 1 PAT. L. REV. 555, 557 (1969). While this definition remains basically true today, advances in computer technology make it more likely that one will find integrated circuits on silicon chips in today's computers, rather than mechanical relays as switching devices and "magnetic cores" as storage devices.

6.



7. *Id.*

8. UNITED STATES PATENT OFFICE, GUIDELINES TO EXAMINATION OF PROGRAMS, 829 Off. Gaz. Pat. Office 865, 866 (Aug. 16, 1966), *reprinted in* the Appendix in this issue [hereinafter cited as PROPOSED GUIDELINES].

implies that any reorganization of the components constitutes a new machine. This definition has been vigorously attacked by those who prefer the "Conceptual Definition"[9]—that *any* use of a computer is a use for which it was specifically designed, hence, a restructuring of the internal units does not create a new machine.[10]

The components or units of a computer are regulated by *programmes*, which are commands written in a specific machine-intelligible format. Programmes, like computer hardware, have been defined in many ways, two of which are of significance to this presentation. The first classifies programs according to their purposes and physical properties—the "Physical Definition." Accordingly, programmes are either compilers, executives or applications.[11] The second definition ignores the purpose and properties of the programme, and concentrates instead on the mathematical and intellectual concepts present. This "Conceptual Definition" of software has two versions. However, a comparison of the versions reveals that the differences between them are basically etymological. According to the first:

> A program may vary according to the type of information it contains and the methods by which the machine is to utilize that information. The factors which account for these variances are the "intellectual components" of the computer program, and may be classified as follows: (1) The mathematical or logical rule or rules which serve as the basis for the program; (2) the "correlation scheme"—the method or system by which rules are used to accomplish the desired result; and (3) the means by which such ideas and information are communicated to the machine, so as to control its operation.[12]

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9. The suggestion that the computer, as a combination of these basic units, is merely "a 'warehouse' of unrelated parts," indicates a surprising misunderstanding of the device. The computer is a complex and intricately designed system of electronic circuitry. Construction of the individual units is accomplished with specific purposes in mind. The interrelation of the basic units likewise reflects the attempt to implement the general purpose of the overall system. Thus the computer, whether of the general or special purpose variety, is specifically designed and constructed to perform various tasks.

Comment, *supra* note 5, at 468, *reprinted in* 1 PAT. L. REV. at 558 (footnotes omitted).

10. Accepting one definition over the other seriously affects the analysis of the software patentability issue and leads to an entirely different conclusion.

11. A *compiler* translates the user's commands into a language which can be utilized efficiently by the computer. An *executive* programme controls the sequence and timing of the hardware and software functions requested by the user. *Application* programmes are the set of commands actually given by the user, which are structured to solve a particular problem or class of problems. *See generally*, AMERICAN NAT'L STANDARDS INST., AMERICAN NATIONAL STANDARD VOCABULARY OF INFORMATION PROCESSING (1970), *reprinted in* 1 R. BIGELOW, COMPUTER L. SERV. § 1.3., art. 1, at 19, 33 & 70 [hereinafter cited as ANSI].

12. Comment, *supra* note 5, at 470, *reprinted in* 1 PAT. L. REV. at 559-60. *See also*, text accompanying note 157 *infra*.

The second classifies the stages through which a programme passes. Though the terms differ, the stages correspond to the "intellectual components" of the prior description:

1. *The Idea*—may be expressed in a basic equation, logic or system;
2. *The Technique*—expression of *The Idea* in a generalized form—to borrow some terms—the expression of the idea, in problem-oriented form, free of language and machine limitations; and
3. *The Expression*—translation of *The Technique* into flowcharts, detailed algorithms, etc., so that *The Technique* can be input to a computer with a minimum of human intervention. This interpretation points to a difference between *The Technique* expressed in ALGOL and in COBOL.[13]

B. Hardware and Software Industries

While it is virtually impossible to pinpoint the starting date of the computer hardware industry, the significant starting date of the software industry is June 23, 1969. On that day, IBM, the world's largest computer manufacturer, instituted a policy whereby hardware and certain software would thereafter be priced separately. Known as *unbundling*, the impact of this act can best be understood by considering the computer industry both before and after the pronouncement.

Before 1969, when selling or leasing a computer, most manufacturers supplied, without charge, all general purpose programmes, and some applications programmes, required to operate the machine. Since the manufacturer's primary goal was to increase machine usage, it had no incentive to provide efficient programmes. Consequently, individuals and companies outside the hardware industry developed programmes to facilitate more efficient computer operations. When a hardware user, however, had already received a programme from the manufacturer at no charge, it was difficult for him to justify paying for a new programme from a third party which performed basically the same function. The computer user would be willing to pay for such a programme only if the savings in operating costs as a result of increased efficiency exceeded the acquisition costs of the programme; or, if the only alternative to purchasing the programme was procuring new or additional hardware to meet increased system demands.

Under pressure from government, users and small independent groups of programmers, IBM announced, in the fall of 1968, that as of June, 1969, it would sell its computers at an unbundled price (*i.e.*, without the general purpose programmes) and that the purchaser could

13. ALGOL (Algorithmic Language) and COBOL (Common Business Oriented Language) are high level programming languages. *See generally* MCGRAW-HILL DICTIONARY OF SCIENTIFIC AND TECHNICAL TERMS (1974).

buy the programmes from either IBM or someone else. It was at this point that the software industry first gained prominence.[14]

The creation of programmes is an expensive process. Thus, the software industry has, and will continue to have, a great desire to protect its financial investment in these programmes. This protection may take the form of any one of three policies recognized by common law or statute—patent, copyright or trade secret.[15] This article will address the issue of program protection by patent.

II. INTELLECTUAL AND INDUSTRIAL PROPERTY PROTECTION

A. Patent Statutes of Canada, the United States and Great Britain

The Canadian Patent Act[16] states that the inventor of "any new and useful art, process, machine, manufacture or composition of matter, or any new and useful improvement . . ."[17] thereon, may apply to "obtain

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14. CANADIAN COMPUTER/COMMUNICATIONS TASK FORCE, BACKGROUND PAPERS (Dept. of Communications, Ottawa, Canada); H. SACKMAN, COMPUTERS, SYSTEM SCIENCE AND EVOLVING SOCIETY: THE CHALLENGE OF MAN-MACHINE DIGITAL SYSTEMS 31 (1967):

> Programming systems have advanced from . . . the relatively machine-independent, procedure-oriented languages of the late 1950's and the early 1960's (such as FORTRAN, ALGOL, and COBOL), to problem-oriented languages tending toward stylized natural language in the mid-1960's, and to a concerted effort to establish a universal procedure-oriented language in the late 1960's (PL/1).

For the purposes of this article, manufacturers of computers are referred to generally as the "hardware industry" (although most such manufacturers also provide software support for their equipment), while those who develop programmes will be classified as the "software industry" (although many of these firms also sell time on the equipment they own).

15. Patents and copyrights "are part of a class of policy tools used to improve society's 'total information system' in sectors in which the production and distribution of knowledge might otherwise be inadequate." ECONOMIC COUNCIL OF CANADA, REPORT ON INTELLECTUAL AND INDUSTRIAL PROPERTY 31 (1971) [hereinafter COUNCIL REPORT]. Each of these tools gives its owner an exclusive right to use the item, or at least a right to control its use by others, for a set period of time. These rights are predicated upon a variety of concepts ranging from an incentive device to the inalienable right to the fruits of one's labour.

The courts have added to these legislatively-created tools the doctrine of trade secrets. This concept provides that a developer ". . . has the right to keep the work which it has done, or paid for doing, to itself. The fact that others might do similar work, if they might, does not authorize them to steal" (Board of Trade v. Christie Grain & Stock Co., 198 U.S. 236, 250 (1905)) the ideas from the developer. "[T]he most basic reason for allowing trade secret protection lies in the fundamental notion of 'fairness' or equity, which runs as a tough fiber through Anglo-American jurisprudence." D. Bender, *Trade Secret Protection of Software* 9 (unpublished and undated).

16. CAN. REV. STAT. c.203 (1952). For an analysis of the history of this act and amendments, *see* notes 72-84 *infra* and accompanying text.

17. *Id.* at § 2(d).

a patent granting to him an exclusive property in such invention,"[18] provided he satisfies certain requirements set forth in the statute.

In the United States, the Patent Act states that "[w]hoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefore, subject to the conditions and requirements . . ."[19] set out in the act.

The English Patent Act[20] defines a patentable invention as "any manner of new manufacture the subject of letters patent and grant of privilege within section six of the Statute of Monopolies and any new method or process of testing applicable to the improvement or control of manufacture, and includes an alleged invention."[21]

B. Legislative and Conceptual History of Patent Law

1. General

Perhaps more than any other field of law, Canadian patent law and practice are the synergetic progeny of Anglo-American jurisprudence. After combining English common law with American statutory law, the courts have progressed to a point at which Canadian law now resembles neither but is influenced by both.[22] If such unique breeding were not enough, this offspring of Anglo-American parents has yet to mature to where it can develop in an independent manner. The Canadian courts thus have been placed in a unique position of potential conflict in reconciling the case law of the United States and England. On this point, the courts have concluded that "the jurisprudence established by the Courts of the United Kingdom is authoritative in Canada"[23] and "that United States decisions are accepted only on very particular points where the relevant statutes make similar provision."[24]

This reliance on foreign jurisprudence is a major reason for including the history of English and American patent law in any analysis of Canadian programme patent protection. There is, however, another reason for detailing the social and economic history of these three countries. A major issue currently faced by the courts is whether patent law, which has existed in one form or another for almost 500 years, is

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18. *Id.* at § 28(1).
19. 35 U.S.C. § 101 (1970).
20. 12, 13, and 14 Geo. VI, c.87, as amended.
21. *Id.* at § 101(1).
22. "[T]herefore, the patent law of Canada is a direct inheritance from the common law of England, and, although it bears upon its face the impress of its borrowings from the United States patent statutes, this is only a minor influence."

H. FOX, THE CANADIAN LAW AND PRACTICE RELATING TO LETTERS PATENT FOR INVENTIONS 6 (4th ed. 1969).

23. Lawson v. Commissioner of Patents, 62 Can. Pat. Rep. 101, 111 (1970).
24. Fox, *supra* note 22, at 6.

still an appropriate means for protecting the far-reaching technological innovations of today. English and American case laws, as well as Canadian judicial decisions, are pertinent on this issue.

History has shown that the prevailing social, economic and political conditions in a country play an important role in the legislation that is enacted and the manner in which that legislation is interpreted by the courts. Thus, a basic knowledge of the background of patent legislation in these countries is imperative to an understanding of its complexities.[25] In tracing the history of patent legislation, one must distinguish between the basic economic and political rationales behind the legislation, and the conceptual changes that legislation has undergone in adapting to new technologies. To maintain this separation, the patent history of each nation is discussed under two headings: Legislative History and Conceptual History. The first traces the expansion of the patent concept into England, the United States, and Canada, and summarizes relevant sections of the patent statutes of each country. The second deals with certain concepts and illustrates the role the legislature and the courts have played in modernizing the patent acts.

2. Legislative History

The patent system, essentially as it exists today, may be traced to a statute of the Republic of Venice adopted on March 19, 1474.[26] This enactment granted a limited monopoly to the individual who first introduced into the jurisdiction, or invented a perfected device which had not previously been manufactured there. The rationale expressed in the Venetian statute for granting such a monopoly was to protect the "inventor's honor." This reason forms the basis of one of the two traditional grounds for government-sanctioned monopoly rights, such as patents

25. This knowledge is particularly relevant when one realizes that claims for patent protection for computer programmes hinge on the definition of the term "invention" as found in the Canadian Patent Act, CAN. REV. STAT. c.203 (1952), *as amended*, while "Section 2(d) of the Patent Act closely resembles Section 101 of the United States Code, Title 35, Patents." Waldbaum, 3 CLSR 164, 171 (1971).

26. We have among us men of great genius, apt to invent and discover ingenious devices; and in view of the grandeur and virtue of our City, more such men come to us every day from diverse parts. Now, if provision were made for the works and devices discovered by such persons, so that others who may see them could not build them and take the inventor's honor away, more men would then apply their genius, would discover, and would build devices of great utility and benefit to our commonwealth. Therefore; Be it enacted that, by the authority of this Council, every person who shall build any new and ingenious device in this City, not previously made in our Commonwealth, shall give notice of it to the office of our General Welfare Board when it has been reduced to perfection so that it can be used and operated. It being forbidden to every other person in our territories and towns to make any further device conforming with and similar to said one, without the consent and license of the author, for the term of 10 years. And if anybody build it in violation hereof, the aforesaid author and inventor shall be entitled to have him summoned before any magistrate of this City,

and copyrights.[27] The other major ground is the natural or moral right that an author or inventor has to the fruits of his labour.[28] The Venetian concept of an individual's "monopoly right" followed the intellectual and commercial trade routes through France and Germany. By the time it reached the English commercial community, the rationale of rewarding an inventor for his work had been superseded by the idea of raising revenue for the Monarch's coffers.[29]

a. Great Britain

By the middle of the fifteenth century, several important concepts had been established. First, it was within the prerogative of the Crown to grant a monopoly to an individual, a city, or an association. No recipient of such a monopoly claimed it as a right, but rather as a privilege; and, since it was a matter of royal prerogative, no one could question its validity. Second, the monopoly conferred a franchise, vesting in the recipient the exclusive privilege of practicing a certain art or

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by which magistrate the said infringer shall be constrained to pay him a hundred ducats; and the device shall be destroyed at once. It being, however, within the power and discretion of the Government, in its activities, to take and use any such device and instrument, with this condition however that no one but the author shall operate it.

Quoted in Falk & Popper, *Computer Programs and Nonstatutory Subject Matter in Canada*, 4 R. BIGELOW, COMPUTER L. SERV. § 9-4, art. 2, at 5 [hereinafter cited as Falk & Popper].

27. The theory upon which the patent system is based is that the opportunity of acquiring exclusive rights in an invention stimulates technical progress mainly in four ways: first, that it encourages research and invention; second, that it induces an inventor to disclose his discoveries, instead of keeping them as a trade secret; third, that it offers a reward for the expense of developing inventions to the state at which they are commercially practicable; and fourth, that it provides an inducement to invest capital in new lines of production which might not appear profitable if many competing producers embarked on them simultaneously.

PATENTS AND DESIGN ACT, SECOND INTERIM REPORT TO THE DEPARTMENT COMMITTEE 3, *presented by* the President of the Board of Trade to Parliament, April 1946 (the "Swan Report"). *See also*, COUNCIL REPORT, *supra* note 15, at 46-50; O. FIRESTONE, ECONOMIC IMPLICATIONS OF PATENTS, *Social Science Series No. 1*, at 193-239 (1971); H. FOX, MONOPOLIES AND PATENTS: A STUDY OF THE HISTORY AND FUTURE OF THE PATENT MONOPOLY 206-07 (1947).

28. It is not the purpose of this study to analyze the validity of these claims, for such has been done elsewhere. *See, e.g.*, B. HINDLEY, THE ECONOMIC THEORY OF PATENTS, COPYRIGHTS AND REGISTERED INDUSTRIAL DESIGNS (1971). However, a personal bias on this issue, that will become obvious, should be clearly stated: The economic rationale for patent protection can neither be supported nor attacked with statistical justification:

No economist, on the basis of present knowledge, could possibly state with certainty that the patent system, as it now operates, confers a net benefit or a net loss upon society.

F. MACHLUP, REPORT OF THE SUBCOMMITTEE ON PATENTS, TRADE MARKS AND COPYRIGHTS OF THE SENATE JUDICIARY COMMITTEE (1958). Further, the natural rights concept has little, if any, basis in historical fact, especially in the Canadian context.

29. 1 W. ROBINSON, PATENTS 3-4 (1890).

trade which, but for the grant, all others would be at liberty to practice. Third, the reasons advanced for granting the monopoly included rewarding an inventor, encouraging trade, and paying for services rendered. The limitless grant protected inventions, trade routes, and articles of trade.

In 1476, Caxton brought the Gutenberg press to Westminister. Within a few years, the Crown had taken a keen interest in this new and potentially explosive art, and had asserted prerogative rights over it. The result of the Crown's control was the creation of a new rationale for granting monopolies; one in direct opposition to the economic reward and moral right claims found in traditional patent analysis. The resulting conflicts led to the rise in prominence of the Stationer's Guild and a series of Printing and Licensing Acts, the last of which expired in the late 1600's due to the "general disgust at the variable stupidity of the censors."[30] By 1561, the English concept of monopoly rights for individuals had spread beyond so-called copyright protection and had entered the field of letters patent in industry.[31]

From the meager evidence that still survives, it appears that the litigious nature of patents existed from the very beginning. A patent was granted to Burchart Cranick (Cranyce) in 1556 under the auspices of Philip and Mary "to search for metals within the realm and to work

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30. *Id.* at 6. The reference to "censors" should, in and of itself, hint at the rationale behind these acts. It was not a "natural rights" claim that motivated Parliament to pass these acts; rather, it was the desire of the church and Crown to control what they considered heresy and sedition through censorship of literature.

31. "The word 'patent,' although adjectival in origin, is now by statute defined as meaning 'letters patent for an invention,' and has been accepted by usage as having such signification. The term owes its origin both to the Latin, LITTERAE PATENTE, and to the Law French, LETTRES PATENTES, used from the fourteenth century onwards to denote those letters that were written upon open sheets of parchment, with the Great Seal pendent at the bottom. For this reason, they were in contrast to the LITTERAE CLAUSAE or letters close, which, being of a more private nature, and addressed to one or two individuals only, were closed or folded up and sealed on the outside."

Fox, *supra* note 22, at 1 (footnotes omitted).

> It was the genius of William Cecil, Lord Burghley, that foresaw the great benefits that might ensue by the active encouragement by the Crown of the introducers of new manufactures into the realm by the grant of patent privileges. By the dint of much repetition it has become widely accepted that the initial suggestion of the propriety and desirability of establishing a system of patent grants to inventors came to William Cecil from a petition submitted to the Crown, it is alleged, in 1559. For a variety of reasons, . . . it is highly doubtful whether this particular petition, one Jacobus Acontius, a native of Trent, can claim this distinction; but it can be accepted that the system of granting monopoly patents to inventors was established as a system in England in 1561.

Davies, *Further Light on The Case of Monopolies*, 48 LAW. Q. REV. 394, 396-97 (1932). This is in direct conflict with the usual claim that the concept of patents was first expressly recognized in England as a system in 1623. *Cf.* Falk & Popper, *supra* note 26, at 5.

them without let or hinderance."[32] Nine years later, Cranick was a defendant in what appears to be the first patent case in England.[33] The practice of granting patents, and the concommitant grave abuses, flourished during the forty-three year reign of Queen Elizabeth I. In 1576, the "card manufacturing" patent was granted to Ralph Bowes and Thomas Bedingfield, both royal pensioners. Between 1576 and 1602, the holders of this patent, first Bowes and Bedingfield, and then Thomas Darcy, faced almost continuous litigation to enforce their monopoly.[34] The escalating protest against this, and many other patents, during the ensuing years, resulted in the issuance of a Royal proclamation on November 28, 1601, which rendered null and void many patents and made it possible to challenge the validity of any patent grant.

The *Case of Monopolies* or *Darcy v. Allen*[35] began in the Easter Term of 1602, and judgment was rendered a year later. Among other things, the Court ruled that:

i. All trades, as well mechanical as others, which prevent idleness (the bane of the commonwealth) and exercise men and youth in labour, for the maintenance of themselves and their families, and for the increase of their substance, to serve the Queen when occasion shall require, are profitable for the commonwealth, and therefore the grant to the plaintiff to have the sole making of them [cards] is against the common law, and the benefit and liberty of the subject . . .;[36]

ii. The sole trade of any mechanical artifice, or any other monopoly, is not only a damage and prejudice to those who exercise the same trade, but also to all other subjects, for the end of all these monopolies is for the private gain of the patentees; and although provisions and cautions are added to moderate them, yet . . . it is mere folly to think that there is any measure in mischief or wickedness: and, therefore, there are three inseparable incidents to every monopoly against the commonwealth, 1. That the price of the same commodity will be raised, for he who has the sole selling of any commodity, may and will make the price as he pleases . . . . The 2d incident to a monopoly is, that after the monopoly granted, the commodity is not so good and merchantable as it was before: for the patentee having the sole trade, regards only his private benefit, and not the commonwealth. 3. It tends to the impoverishment of divers artificers and others, who be-

32. Davies, *supra* note 31, at 396.

33. *Id.* at 396 nn.13 & 14.

34. *Id.* at 398-99. Perhaps more than any other, either before or since, the history of this patent illustrates the agonizing sociological and commercial upheaval which finally led to the restructuring of the entire British patent system and the enactment of the first specific patent statutes.

35. 11 Coke. 84b, 77 Eng. Rep. 1260 (also reported as Darvy v. Allen and Dary v. Allein).

36. *Id.* at 86a, 77 Eng. Rep. at 1262-63.

> fore, by the labour of their hands in their art or trade, had maintained themselves and their families, who now will of necessity be constrained to live in idleness and beggary . . . . The Queen was deceived in her grant; for the Queen . . . intended it to be for the weal public, and it will be employed for the private gain of the patentee, and for the prejudice of the weal public; moreover the Queen meant that the abuse (of playing cards) should be taken away, which shall never be by this patent, but (rather) the abuse will be increased for the private benefit of the patentee . . . .[37]

Even if the historical, economic-monopoly relevance of this case is ignored, it is clear that the only "natural right" associated with these patents was a man's natural right to engage in any trade that he desired, including that of the patent-holder. This conclusion is a long way from the claim that a man has a natural right to monopolize his own output to the exclusion of others.

By the early 1600's, a state of rebellion existed against the unjust grants of monopoly patent rights as a form of Royal pension or repayment for services rendered. Parliament, the judiciary, and the newly emerged industrial class all were hostile to the granting of virtually any exclusive privilege. This did not mean, however, that all monopolies were regarded as anathema either by the judiciary or by Parliament. On the contrary, it was recognized that if the grant concerned a new trade or item of manufacture, it would benefit the realm and should not be considered a monopoly. In spite of this potential benefit, however, "[t]he inventor was looked upon as a monopolist, dependent for his exclusive rights upon the royal bounty; and his privileges were rigidly confined within the literal meaning of the words by which they were described in his patent."[38]

The general discontent over patent grants and the decision in *The Case of Monopolies* prompted publication in 1610 of the King's Book of Bounty, which listed "the grants of royal favour that [the King] was prepared to make, and those to which he was opposed."[39] Even the King's Book of Bounty, however, did not dispel the discontent of the King's subjects over the patent system. That took an act of Parliament.

In 1624, Parliament passed the *Statute of Monopolies*,[40] which declared that all monopolies and letters patent of any kind were null and void under common law except

> letters, patents and grants of privilege for the term of fourteen years or under, hereafter to be made, of the sole working or making of any manner of new manufactures within this realm, to the true and first inventor and inventors of such manufactures,

37. *Id.* at 86b, 77 Eng. Rep. at 1263.
38. Robinson, *supra* note 29, at 21.
39. Fox, *supra* note 22, at 3.
40. 21 Jac. I, c. 3 (1623-24).

> which others at the time of making such letters, patents and grants shall not use, so as also they be not contrary to the law, nor mischievious to the state by raising prices of commodities at home, or hurt of trade or generally inconvenient.[41]

The *Statute of Monopolies*, as a codification of common law, preserved the Royal prerogative to grant letters patent, which continued until 1883 when the first Patent Office was established.[42] Henceforth, letters patent "were sealed with the seal of the Patent Office instead of with the Great Seal."[43] Even before 1883, however, a liberalized attitude toward inventors[44] led to the relaxation of some of the more rigid patent requirements established by the courts in the early 1600's.[45]

The Statute of 1835 conferred upon the Crown the right to extend a patent for seven years beyond the fourteen-year limit established in the *Statute of Monopolies*.[46] In 1844, this additional period was increased to fourteen years.[47] The patent rules were codified in 1852;[48] a separate Patent Office was established in 1883;[49] the patent statute was thoroughly revised in 1907;[50] and again in 1949.[51] Between these two revi-

41. *Id.* § 6.

42. Patents, Designs, and Trade Marks Act, 1883, 46-47 Vict., c. 57.

43. Fox, *supra* note 22, at 4.

44. The atmosphere of hostility toward monopolists and the distrust of patents lasted from the early 1600's until the middle 1700's. Gradually, the generations which had suffered under the harsh restrictions of the monopolists passed away. As memories and attitudes grew dim, England's industrial community began to rise again. Yielding to industrial pressures, the populous ". . . began to recognize inventors as public benefactors, whose personal services and sacrifices merited the privileges which they received, and demanded for them a liberal consideration from the courts." Robinson, *supra* note 29, at 23.

45. For example, prior to 1835, if an applicant mistakenly included within his claims anything that was not new, or attributed to his invention a broader sphere of usefulness than actual experience would justify, the entire patent was invalidated. However, in 1835 Parliament bestowed upon inventors the right to amend the claims and descriptions in their patents, subject only to the limitation that no such amendment should extend the exclusive rights already granted. 5 & 6 Will. IV, c. 83, § 1 (1835).

A second example of this liberalization concerned the definition of the first and true inventor under the *Statute of Monopolies*. Again, prior to 1835 the courts had held that any use of an invention in such a way that knowledge of its use might be communicated to another would be sufficient to defeat a claim to patent protection of the invention. In 1835, however, Parliament amended the law so that a claimant, though not the first inventor, and even though the actual invention had been used by others before he discovered it, might still obtain a patent upon proof that at the date of filing of his patent application, he believed himself to be the first inventor and believed the thing invented had not been publicly and generally used before. *Id.* § 2.

46. *Id.* § 4.

47. 7 & 8 Vict., c. 69 (1844).

48. The Patent Law Amendment Act, 15 & 16 Vict., c. 83 (1852).

49. *See* note 42 *supra* and accompanying text.

50. Patents and Design Act, 1907, 7 Edw. VII, c. 29.

51. 12, 13 & 14 Geo. VI, c. 87.

sions, Parliament codified the rights, duties and responsibilities of patent-holders as developed by the courts.[52] The 1949 act, as amended in 1957,[53] constitutes the current statutory law of patents in England.

b. United States

In the United States, patent protection is secured by the Constitution, article I, section 8: "The Congress shall have power . . . to promote the progress of Science and useful Arts, by securing, for limited Times, to Authors and Inventors the exclusive Right to their respective Writings and Discoveries."[54] Prior to this constitutional mandate, many States had granted patents.[55] Since such grants were limited to the territory of the granting State, the protection afforded an inventor by a State grant was relatively worthless. In 1790, Congress conferred upon the Secretary of State, the Secretary of War, and the Attorney General the duty to grant any inventor a patent for a period not to exceed fourteen years.[56] Exclusive privileges were thereby secured for the entire country by applying to a single office.

In 1793, the duty of issuing patents was transferred to the Secretary of State, subject to the approval of the Attorney General[57]—a policy which continued until 1836 when Congress established a separate Patent Office to accommodate the increased number of applications.[58] The principal features of the present United States patent system originated

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52. Patents and Design Act, 1919, 9 & 10 Geo. V, c. 80.

53. 5 & 6 Eliz. II, c. 13 (1957).

54. U.S. CONST. art. I, § 8.

55. Among the most notable examples of these State grants is the one out of which grew the case of Livingston and Fulton v. Van Ingen, (1812), 9 Johns. 507. On Mar. 19, 1787, the legislature of the State of New York granted to one John Fitch the sole and exclusive right and privilege of making and using boats, propelled by fire or steam, within the waters of that State for the period of fourteen years. Fitch failed to exercise this right, and on Mar. 27, 1798, his patent was repealed, and the same privileges were conferred on Robert R. Livingston for the ensuing twenty years. Livingston's efforts were also fruitless, but Robert Fulton having at last succeeded in constructing a boat that could be moved by steam, the Livingston patent was extended on April 5, 1803, to embrace Fulton also, and its duration fixed conditionally at twenty years from the date of the extending act. While the steamboats of these patentees were in operation, James Van Ingen and others engaged in a similar enterprise, and against these a bill for an injunction was filed by Livingston and Fulton in 1811 .*** Kent, C.J. delivering his opinion in reference to the power of individual States to grant such patents says: (581) ". . . I see nothing to hinder the State from granting [a patent]."

Robinson, *supra* note 29, § 45, at 68-69 n.1.

56. 1 Stat. 109, § 1 (1790). This duty, however, was to be exercised only if the grantors were honestly convinced that the discovery in question was sufficiently useful and important. *Id.*, *especially* § 6.

57. Robinson, *supra* note 29, § 48, at 80.

58. Act of 1836, 5 Stat. 117 (1836).

with the Act of 1836.[59] That statute, however, did far more than merely establish a Patent Office. In addition to registration, the new Patent Office functioned as a tribunal with both executive and judicial powers to investigate applications and to issue only those patents not likely to be defeated by subsequent litigation.[60]

Since 1790, congressional enactments under Article I of the Constitution have been of two types: those bestowing upon individual inventors new or more extensive privileges than those normally granted,[61] and those granting a patent monopoly to any person qualified to receive it.[62] The important point to be culled from the American legislation is the fundamental differences between the patent environment in England and that in the United States. The negative attitudes prevalent in England toward industrial concerns had only a minor impact in the United States.[63] The colonists were concerned with freeing themselves from an inferior economic position *vis-a-vis* England, not with local monopolists or inventors.[64] It is significant to note how the United

59. Between 1793 and 1836, six acts were passed by Congress that dealt with patents. *See*, Robinson, *supra* note 29, at 76-80.

60. A patent thus granted could, of course, be reasonably trusted . . . . The meritorious inventor was no longer condemned to interminable waiting and unrewarded self-sacrifice. The discoverer of anything pronounced by the Patent Office to be new and useful acquired thereby a property which had market value, and to which he could give a title as reliable as that to any other form of personal estate.

Id. at 82. Prior to this act, the United States, as did England, granted a patent simply upon application of the inventor without any investigation of the claims for novelty or usefulness. *See* The Patent Law Amendment Act, 15 & 16 Vict., c. 83 (1852). As a result, each patentee bore the risk of subsequent defeat "by the proof of any use or knowledge of the invention prior to his own, and yet having no method of ascertaining whether such use existed, except the tedious, expensive, and uncertain one of private inquiry." Robinson, *supra* note 29, at 81.

61. *Id.* at 73.

62. *Id.* at 74-76.

63. It was in this overall atmosphere of commercial and industrial activity that Congress passed the first patent act of 1790. The conflicts which had occurred in England did not cause similar problems in America. Confrontation with the Crown led to the establishment of a country, not simply a limitation on royal prerogatives. As a result of this evolution, neither the jurisprudence nor the statutes in America were affected by the severe distrust and hostility toward monopolies that had ravaged England.

64. In America every corporation, whether or not it had an express monopoly, was considered monopolistic simply because it was a corporation. This was partly because all corporations before the end of the eighteenth century, and most of them before the Civil War, were chartered by special legislation. Each was authorized by a special act that prescribed its distinctive organization and defined the rights and duties peculiar to it. No group of men could form a corporation unless the state legislature passed a special act in their favor, and those who succeeded were regarded as privileged above their fellows. The mere existence of a corporation was therefore proof that it was a monopoly.* * *

Also, every corporation had additional privileges, the real advantages

States benefited from the English experience, since the first Canadian patent act[65] was modeled upon the then-existing United States Act of 1836.[66]

The philosophy underlying United States patent law was summarized by William Robinson:[67]

> (1) That a patent creates a *contract between the inventor and the public*, and that each party is bound to exercise good faith toward the other; (2) That a patent is not granted to the inventor as favor, but is a matter of right on his compliance with the conditions prescribed by law; (3) That being intended for his benefit, both the patent and the law are to be construed in favor of the patentee.[68]

The contractual concept is basic to an understanding of the major events which have occurred in the United States and which have played an important role in Canadian patent legislation. A patent may be viewed as a privilege and a derogation of public rights (monopoly); or it can be seen as a justifiable benefit conferred on an individual because of the valuable contribution his disclosure makes to society (reward). The latter view is based upon the natural law concept—that a man has a right to control the fruits of his own labour. In selecting as the basis for a patent grant either the monopoly or reward theory, or a combination of both, the courts have been faced with conflicts in interpreting the grant in favor of either the public at large or the patentee.

The monopolistic overtones of a patent grant are accentuated by the historical attitude that the very nature of a patent has characteristics of a true monopoly. It is not considered totally odious only because it deals with new, and not existing, rights and subject matter. The inventor is granted, by the arbitrary interposition of the law, an exclusive right to that to which he is not naturally entitled. Furthermore, a patent grant restricts the natural rights of simultaneous inventors and of the public to improve upon or use existing inventions. The conflict between public and private rights can be resolved, however, if the rights granted

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> that made men want to incorporate, such as long life, limited liability, and in some cases, public subsidies. All of these aggravated the complaint that corporations were privileged, monopolistic bodies. * * *
>
> The policy finally accepted was to reduce the privilege of incorporation, not by taking it from the few, but by opening it to the many: general incorporation laws authorized state officials to issue charters to all qualified applicants. * * * By the time of the Civil War incorporation under general laws had become so easy and frequent that the old complaint against "monopolistic corporations" could no longer be sustained.

Letwin, *Congress and the Sherman Antitrust Law: 1887-1890*, 23 U. CHI. L. REV. 221, 229-32 (1956).

65. 32-33 Vict., c. 11 (1869) (Can.).

66. Fox, *supra* note 22, at 5.

67. Robinson, *supra* note 29, § 20, at 31.

68. *Id., citing* Whitney v. Emmett, 29 F. Cas. 1074 (1831) (No. 17,585) (emphasis added).

by a patent are viewed as a contract. Under contract law, both the public and the inventor acquire certain rights and assume certain responsibilities. The inventor has the right to secrecy and is under no compulsion to reveal his invention. If he chooses this course, however, he has no power to prevent others from independently developing the same invention.[69]

Under the patent theory, full and immediate disclosure of an invention is required in exchange for the inventor's right to restrict the use of his invention by others for a limited time period and to recover damages from those who impinge upon that right. In practice, and according to traditional contract law, the courts liberally construe patent provisions in favor of the party being benefited. Those provisions which deal with disclosure are construed in favor of the public; those provisions which deal with protection are construed in favor of the inventor. Deviations from such an approach should be the result of an express policy decision by the legislature. Where the courts stray from this contractual concept, the legislature must assert its mandate and dampen judicial deviation.[70]

c. Canada

There are no records of patent activity in Canada during the French regime. It took over half a century after Canada became a British colony in 1767 before the appearance of a distinctly Canadian patent system. During this interval, however, there is evidence that English patents applied in Canada.[71] Under the British, the conditions of life in the Canadian territory, and the British attitude toward colonies in general, militated against the development of a domestic patent system by the restrictions placed on commercial development. The colonies existed to supply England with needed raw materials and to consume the products of her industry, not to develop rival industries of their own. When representative and responsible government emerged in the provinces, however, this situation changed. Even prior to the enactment of provincial patent acts, individual patents were granted by the Governor in Council.[72] Commencing with the Act of 1824 in Lower Canada, various

69. *Id.* at 1077.

70. Since the history of English patent law has shown that the rights of the patentee and those of the public are determined by prevailing social attitudes, it is essential that an overall approach to patent protection be explicitly adopted by the legislature to guide the courts in applying the patent law as generations pass and as new technologies emerge.

71. Asher, *The Development of the Patent System in Canada Since 1767*, 43 Can. Pat. Rep. 56, 56 (1965).

72. The first such patent was issued in lower Canada by an Act of 1791, c. 7, 31 George III (Can.), entitled, "An Act or Ordinance to Reward Samuel Hopkins and Angus Macdonald and others for their invention for two new and improved methods for making Pot and Pearl Ashes."
Asher, *Legislative History of the Canadian Patent Act*, 33 Can. Pat. Rep. 64, 65 (1960).

provincial legislatures enacted patent statutes.[73] The passage of these acts negated British patents in Canada[74] and began the shift from the English patent laws toward American-type legislation.

Prior to Confederation of the Provinces of Canada, New Brunswick, and Nova Scotia, there were three different patent acts in force.[75] Following unification as the Dominion of Canada by the British North American Act of 1867,[76] Parliament passed Canada's first federal patent act in 1869.[77] This legislation closely followed the United States enactments, the operative granting section "being in almost identical terms and providing that an inventor, upon certain conditions, 'may obtain a patent' for his invention."[78]

The Act was amended several times over the years[79] and new concepts, such as compulsory licensing in 1903,[80] were added. In 1923, a code of rights, duties and responsibilities for patent holders was in-

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73. *Id.* at 65-67. The purpose of the Act of 1824 was ". . . for the encouragement of Genius and of acts in this province by securing an exclusive right to the Inventor of any new and useful Art, Machine, Manufacture or Composition of Matter." Act of 1824, 4 Geo. IV, c. 25 (Can.).

74. The New Brunswick Patent Act of 1853 particularly specified that British Patents granted after 1853 were to have no effect in that Province unless certified before the Provincial Secretary. Similar provisions occur in the Newfoundland Act of 1856. Asher, *supra* note 72, at 65.

75. Province of Canada, Act of 1849, 12 Vict., c. 24 (Can.); Province of Nova Scotia, Act of 1833, 3 Wm. IV, c. 45 (Can.); Province of New Brunswick, Act of 1834, 4 Wm. IV, c. 27 (Can.).

76. 30 Vict., c. 3, § 91, head 22, "Patents of Invention and Discovery" was assigned to the exclusive jurisdiction of the Parliament of Canada.

77. Subsequently, in 1869, the first parliament passed a new patent act applicable to the whole country. This act appears to have been modeled on the previous act of the Province of Canada but it was expanded extensively.

> There were 54 sections. The Patent Office was to be a branch of the Department of Agriculture, and the Minister of Agriculture was to be Commissioner of Patents. Provision was made for a deputy Commissioner, and a Patent Office staff. The Governor in Council was authorized to make rules and regulations. Only residents of Canada could patent inventions. The term of patents was five years, but this could be renewed for two additional five year terms—a total of 15 years. All patents were to be examined by the Minister of Justice. Compulsory working of the invention was required. The invention had to be made available at a reasonable price, and importation was forbidden. Patents could be impeached for non-working. The Provision for caveats which had existed earlier in New Brunswick appeared in this new legislation. The Government reserved the right to use patent inventions, paying such compensations as the Commissioner decided. All applications except caveats were open to public inspection. The Commissioner was authorized to refuse patents, subject to appeal to the Governor in Council . . . . Models were to be supplied.

Asher, *supra* note 71, at 65-66.

78. Fox, *supra* note 22, at 5.

79. Asher, *supra* note 71, at 66-71.

80. Amendment of 1903, 3 Edw. VII, c. 46 (Can.).

troduced.[81] This Act, as amended, forms the basis for current Canadian legislation. The relevant points of Canadian patent law are:[82]

(1) the granting of a patent is not a Royal prerogative, but is a right to be enjoyed by all qualified applicants;
(2) an examination, and not a registration, system is used, thereby giving reasonable protection to the patentee;
(3) a concept of rights, duties and responsibilities for patentees was established in 1923, patterned after the United States common law and the British Act of 1919;
(4) as a result of the common law concept of prior knowledge,[83] under the current statute only *public* knowledge will defeat a Canadian patent application;[84] and,
(5) though the philosophical basis for granting a patent in Canada and the United States differs from that in Britain, Canadian legislation has its roots in the *Statute of Monopolies*, and English common law jurisprudence is accepted as authority in interpreting Canadian patent law, except where pertinent sections are irreconcilably divergent.

3. Conceptual History

This section analyzes certain fundamental patent concepts and the changes that each has undergone, by considering the role of discovery and the concept of tangible and intangible property.

a. Role of Discovery

Under the Venetian Act of 1474, the inventor was required to "build [the] new and ingenious device"[85] before protection would be granted. This requirement was not being stringently applied, however, by the time patent grants reached their peak in England.[86] By 1600, in three of four classes of patent monopolies, discovery or invention played a role. Only in the first class, however, is that role significant to modern patent law, in that it dealt with introduction into the commonwealth of any beneficial item.[87] A patent in this class required that the inventor discover, either through mental steps or through actual exploration, a new product or process of manufacture.

The second group of patents took the form of licenses granted to

81. 13-14 Geo. V, c. 23 (Can.).
82. Although changes in the law have been introduced to give effect to international conventions, the basic concepts have continued from these early statutes.
83. Rice v. Christiani, [1931] A.C. 770, 48 Pat. Cas. 511 (1931).
84. The Patent Act, CAN. REV. STAT. c. P-4, § 63 (1970).
85. Falk & Popper, *supra* note 26, at 4-5.
86. There does not appear to have been a requirement that a model be filed with the application.
87. Davies, *supra* note 31, at 397.

individuals, which relaxed or removed certain general restrictions.[88] These were granted, ideally, to foster trade with other nations, though abuses were often encountered. No matter how beneficial they might have been for the nation as a whole, these licenses were inconsistent with the modern concept of invention, since there was no requirement of innovation. The third classification bestowed the power of supervision over an entire, established industry or trade,[89] such as retailing wines or keeping taverns, or one that was newly discovered, such as tobacco. Unfortunately, the person who discovered the new industry was not necessarily the one to whom the powers of supervision were granted.[90]

The final class, often deemed the most odious, consisted of those patents which granted control of new or established industries or trade-routes to an individual.[91] Just as in the previous classification, control granted over an established trade, was openly and obviously a form of payment to a loyal subject, and control over an item new to the realm was not necessarily granted to the discoverer.

In her "Golden Speech" on November 30, 1601, Queen Elizabeth declared many of these patents null and void and left the remainder to be tested in the courts.[92] The *Statute of Monopolies* in 1623 held all patents and monopolies "utterly void and of no effect, and in no wise to be put in use or execution,"[93] with the exception of letters patent granted to the "true and first inventor"[94] of any manner of new manufacture within the realm. The judiciary construed this exception to protect only those inventors who discovered a new principle and put that new principle into practice.[95] Mere discovery of a principle, without disclosure of a practical means of obtaining the result, was held not patentable. This concept was continued in the Patents Act of 1907,[96]

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88. *Id.*

89. *Id.*

90. There seems to be little doubt that this group of patents was used by the Crown as a means of repaying loyal subjects for services rendered without expending actual sums of money from the Royal coffers.

91. *Id.*

92. *Id.* at 409.

93. Statute of Monopolies, 21 Jac. 1, c. 3, § 1 (1623-24).

94. *Id.* at § 6.

95. I am of the opinion that a court of law cannot pronounce Betts patent void, simply on the comparison of the two specifications, without evidence that Dobb's specification disclosed a practicable mode of producing the result, or some part of the result, described in Betts' patent.

Betts v. Menzies, 31 L.J.Q.B. 233, 241 (1862). In this case Betts obtained a patent, but his specifications never showed how the entire principle was to be put into effect. Dobbs' patent, which did show a practical application, would be upheld and Betts' patent declared void if the jury ruled that such was the case.

96. The Patents and Design Act, 7 Edw. VII, c. 29,§1 (1907). ("An application for a patent may be made by any person who claims to be the true and first inventor of an invention . . . .")

and carried over into United States patent law.[97]

The first Canadian statute passed after confederation, however, did not adopt this approach. Instead, a patent was to be granted to "any person having been a resident of Canada for at least one year next before his application, and having invented *or discovered* any new and useful art, machine, manufacture, or composition of matter. . . ."[98] In 1872, with the elimination of the residency requirement and the words "or discovered,"[99] the grant of a patent for only those things invented by the applicant was affirmed, bringing Canadian law into conformity with United States and British jurisprudence.

By 1890, the basis of United States patent law was summarized in terms of the means, and not the end, as being patentable.[100] The idea of a means is composed of three elements: a force, an object, and a mode of application. Whenever one discovers a method of uniting these elements in a practical way, a patentable item is invented.[101] Further, as noted in *Potts v. Coe*,[102] there can be no invention without inventive genius. This opinion also implies that there must be a stricter application of the tests of novelty, foreseeability and prior art to inventions emanating from the laboratories of corporate giants, as compared to those of "back-yard" inventors.[103] Although the "corporate test" has not been adopted by other American courts, and the "flash of genius" portion of the opinion[104] has been purportedly disclaimed by the Patent Revision Act of 1952,[105] current Canadian law requires the court to test for novelty based upon anticipation in a prior document, and to test for nonobviousness based upon the cumulative effect of prior art.[106]

The doctrine enunciated in *Potts*[107] was a natural extension of the evolution of the novelty requirement. In England prior to 1623, there was no need for the invention to be novel; established industries were

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97. Robinson, *supra* note 29, at 132-56.

98. An Act Respecting Patents of Invention, 32-33 Vict., c. 11, § 6 (1869) (Can.) (emphasis added).

99. 35 Vict., c. 26 (1872) (Can.).

100. Two ideas were present in the mind of the inventor during his performance of the inventive act: (1) The idea of an end to be accomplished; (2) The idea of a means by which that end can be attained. The same ideas are manifest in the invention when reduced to practice and engaged in the production of its appropriate result.

Robinson, *supra* note 29, at 132.

101. *Id.* at 138.

102. In order to evaluate the contribution of the inventor the court must reconstruct the conditions under which he worked, with emphasis on the contribution of others.

140 F.2d 470, 474 (D.C. Cir. 1944).

103. *Id.*

104. *Id.*

105. The Patent Act, CAN. REV. STAT. c. 203, § 28 (1952).

106. Fox, *supra* note 22, at 71-73.

107. *See* notes 102-04 *supra* and accompanying text.

given to patent holders.[108] The *Statute of Monopolies*, however, required that valid patents could only apply to "any manner of new manufactures within this realm."[109] Over time, the territorial restrictions were extended and time limitations were imposed. By 1923, Canadian law required that for an item to be patentable, it must be

> . . . not known or used by others before his invention thereof and not patented or described in any printed publication in this or any foreign country more than two years prior to his application and not in public use or on sale in this country for more than two years prior to his application.[110]

The nonobviousness test has become increasingly common: in England it is now a statutory requirement;[111] in Canada it stems from the common law method of testing for the exercise of the inventive faculty;[112] in the United States, the test now apparently subsumes the old "flash of genius" requirement.[113] Thus, it seems natural for the court to analyze the environment in which the invention evolved and apply the test of novelty with strict precision in those cases in which the inventor is surrounded by others of his kind.[114] Though Canadian courts have, thus far, declined to adopt the *Potts* doctrine, it does not mean that such a situation will not occur in the future.

In summary, several important factors must be emphasized in applying traditional Canadian patent law concepts to emerging industries such as the computer software industry:

(1) The discovery of a new principle is a necessary, but not a sufficient, basis for granting a patent.[115]
(2) The subject matter of a patent must have been neither used nor anticipated by anyone else in the world.[116]
(3) "It is easy for one not skilled in the art to see invention in a device which to the skilled mind is obvious. It is also easy after a discovery to say that the device is and always has been obvious."[117] For this reason, the test is always

108. *See* Davies, *supra* note 31, at 397-98.
109. Statute of Monopolies, 21 Jac. I, c. 3, § 6 (1623-24).
110. The Patent Act, 13-14 Geo. V, c. 23, § 7 (1923) (Can.). The current Canadian statutes contain similar wording. *See* The Patent Act, CAN. REV. STAT. c. P-4, § 28(1)(a), (b), (c) (1970).
111. The statute provides that a patent may be revoked on the ground that "the invention . . . is obvious and does not involve any inventive step having regard to what was known or used before the priority date of the claim." The Patent Act, 1949, 12, 13 & 14 Geo. VI, c. 87 § 32(1)(f).
112. Fox, *supra* note 22, at 70.
113. *Id.* at 62-66.
114. *Id.* at 66-68.
115. *Id.* at 103.
116. *Id.*
117. Electric & Musical Indus., Ltd. v. Lissen, Ltd., 56 Pat. Cas. 23, 63 (1939).

whether the invention would have been obvious to one skilled in the art at the time of the invention, and not to the reasonable man at the time the invention is finally evaluated by the Patent Office or the courts.[118] The use of a person skilled in the art seems to be a preliminary step towards the *Potts* doctrine.[119]

(4) This value judgment must be applied to subject matter that otherwise meets the statutory requirements.

b. Concept of Tangible and Intangible Property

Many attempts have been made, both by the courts and by the commentators, to devise subordinate classes of patentable subject matter. Historically, statutes have created several broad categories. The *Statute of Monopolies*, for example, refers solely to "any manner of new manufactures . . . so as . . . they be not contrary to the law nor mischievious to the state . . . or generally inconvenient."[120] Nearly 300 years later, English law provided that a patent would be granted only for an "invention"[121] defined as "any manner of new manufacture the subject of letters patent and grant of privilege within section six of the Statute of Monopolies . . ., and includes an alleged invention."[122] Though, it would appear from this definition that a process would not be considered patentable subject matter in England, the courts have declared that a "manner of new manufacture" should be defined to include both the product and the process involved therein.[123] Canadian legislation, patterned after United States statutes, specifically defines an invention to include "any new and useful art, process, machine, manufacture or composition of matter. . . ."[124]

Obviously, the attitudes of the legislatures at the time each statute was enacted had an impact on the limits of patentable subject matter. What was attained at the outset by statute in North America required judicial interpretation in England. When the evils of monopolies were attacked in England, the *Statute of Monopolies* was intentionally drafted as restrictively as possible.[125] On the other hand, faced with a rising mercantile class and a need to develop industry, North American legislation was broad and flexible, almost to the point of redundancy.

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118. Fox, *supra* note 22, at 72.

119. *Id.*

120. 21 Jac. I, c. 3, § 6 (1623-24). *See also,* text accompanying note 41 *supra.*

121. Act of 1907, 7 Edw. 7, c. 28 § 1.

122. *Id.* at § 93. "Utility in patent law does not mean either abstract utility or comparative utility, or commercial utility. An invention is useful if it provides a thing better in some respects though worse in others than what is already known." Welsbach Incandescent Gaslight Co. v. New Incandescent (Sunlight Patent) Gas Lighting Co., 2 Ch. 1, 69 L.J. Ch. 546 (1900).

123. The term "manner of manufacture" was held to include both process and product of manufacture. R. v. Wheeler, 2 B. & Ald. 345, 349 (1819).

124. The Patent Act, CAN. REV. STAT. c. P-4, § 2 (1970).

125. 21 Jac. I, c. 3 (1623-24).

Given the political and economic history of England, with its heavy reliance on real property and the feudal system, it is understandable that both before and after 1624, the law concentrated on tangible items, such as products and trades, to the exclusion of intangibles such as processes. One example illustrates the ease with which tangibles were held patentable, while intangibles were found to be patentable only after significant historical development. In interpreting the *Statute of Monopolies*, Chief Justice Eyre, in *Boulton v. Bull*[126] discussed the following definition of the word "manufacture:"

> It was admitted in the argument at the bar, that the word "manufacture" in the statute was of extensive signification, that it applied not only to things made, but to the practice of making, to principles carried into practice in a new manner, to new results of principles carried into practice . . . . Under things made we may class in the first place, new compositions of things, such as manufactures in the most ordinary sense of the word; secondly, all mechanical inventions, . . . for a new piece of mechanism is certainly a thing made. Under the practice of making we may class all new artificial manners of operating with the hand, or with instruments in common use, new processes in any art, producing effects useful to the public.[127]

This definition of "manufacture" evidently included "art," "machine," "manufacture," and "composition of matter;" but the concept of a patentable process was not yet acceptable to the courts.

While these developments took place in England, the courts in Canada and the United States were struggling to define the limits of a patentable process. The results of a long line of cases in both countries are particularly relevant today as the concept of patentable subject matter is stretched to cover the technological innovations of the twentieth century. In the United States, the Supreme Court in *Cochrane v. Deener*[128] defined "process" in the following terms:

> A process is a mode of treatment of certain materials to produce a given result. It is an act, or a series of acts, performed upon the subject-matter to be transformed and reduced to a different state or thing.*** The machinery pointed out as suitable to perform the process may or may not be new or patentable; whilst the process itself may be altogether new, and produce an entirely new result. The process requires that certain things should be done with certain substances, and in a certain order; but the tools to be used in doing this may be of secondary consequence.[129]

In Canada, the court concluded:

> That processes are good subject-matter of Letters-Patent was

126. 126 Eng. Rep. 651 (1795).
127. *Id.* at 666.
128. 94 U.S. 780 (1876).
129. *Id.* at 788.

> finally decided in 1842 in the case of *Crane v. Price* (1 Webst. P.C. 393). It was there held that if the result of a new process is a new article, or a better article, or a cheaper article than that produced by old methods the process was patentable, provided of course that it required an exercise of the inventive faculty to arrive at it. It has since been held that a new and alternative method of arriving at the same result irrespective of whether that which results is better or cheaper, may be patentable. But a process to be patentable must be a process which leads to some result and the result arrived at must be useful, although it need not be an article at all; for example, a new process for chemically treating material, of which no result at all could be predicted would not be patentable.[130]

The American passage first cited has often been misconstrued as a rule or definition

> . . . requiring that all processes, to be patentable, must operate physically upon substances . . . . To deduce such a rule from the statement would be contrary to its intendment which was *not to limit process patentability but to point out that a process is not limited to the means used in performing it*.[131]

Prior to 1952, a patentable process only included the attainment of a new result by a process which used a novel or known machine, and

> . . . the discoverer of a new use for an old material was fairly well stymied, for unless he could incorporate such material into a machine, composition or article of manufacture, and claim the resultant machine, composition, or article as being new, it was impossible to protect his invention.[132]

Since 1952, however, though the new use of a known process is statutory subject matter,[133] a claimant may still be required to disclose a machine to implement the process.[134]

In Canada,

> . . . a method or process is a manner of new manufacture if it (a) results in the production of some vendible product, or (b) improves or restores to its former condition a vendible product, or (c) has the effect of preserving from deterioration some vendible product to which it is applied.[135]

Since the term "vendible product" has been defined to include a process,[136] Canadian common law would seem to be identical to the

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130. *In re* Alsop's Patent, 24 Pat. Cas. 733, 752 (1907).

131. *In re Prater*, 415 F.2d 1378, 1387-88, 159 U.S.P.Q. 583, 592, 2 CLSR 8, 22 (1968).

132. A. SEIDEL, WHAT THE GENERAL PRACTITIONER SHOULD KNOW ABOUT PATENT LAW AND PRACTICE 14 (1956).

133. 35 U.S.C. § 100(b) (1970), *reprinted in* the Appendix in this issue.

134. *See generally*, A. DELLER, PATENT CLAIMS §§ 548-60 (2d ed. 1971).

135. Fox, *supra* note 22, at 33-34 (footnotes omitted).

136. *In re* G.E.C.'s Application, 60 Pat. Cas. 1, 3 (1942) (a method or process is a

United States statutory definition, although this may not have been true prior to 1952. In the United States, since 1952, and in Canada and England traditionally, a patent will issue for a new use of an old process only if "there be some novelty or invention in the adaptation of the old process to the new use, or the overcoming of some difficulty which lay in the way of such application."[137] Thus, while Canadian legislation, patterned after that in the United States, was broadly drafted, Canadian jurisprudence, bound by the precedents of England, was more restrictive in scope. Before attempting to apply United States case law and interpretations to the Canadian scene, care must be taken to ensure that the United States decisions are not only relevant, but that they are also consonant with Anglo-Canadian precedents.

III. Patentable Aspects of Computer Programmes

While the electronic digital computer has allowed man to solve problems at greater speeds and with greater accuracy than ever before, it also has given man the problem of controlling the machine. From the earliest time, great resources have been expended to solve this problem. The first steps in this effort consisted of delineating the basic operations for the machine to perform, including such functions as addition, subtraction, storage, erasure, reading, writing and moving data from one location to another. Since these basic instructions constituted the totality of what the machine could comprehend, these orders were called the "machine language."

There is no doubt concerning the patentability of the hardware units themselves as machines. The real issue is whether a computer, complete with programmes, is eligible for patent protection under Canadian patent law, and if so, by what rationale. This section considers programmes in terms of the Physical Definition and Conceptual Definition of software,[138] analyzing the patentability of bundled systems, and the patentability of independently developed programmes.

A. Patentability of Bundled Systems

A "bundled" system is one where both the hardware and software are sold or leased to the customer as a unit.[139] There are three possible claim forms for patent applications directed to bundled systems—as a machine, as a process, or as a means-plus-function.

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manner of manufacture, if it results in the production of some vendible product); Ciba, Ltd. v. Commissioner of Patents, 17 Fox Pat. Cas. 3, 10-15 (Ex. 1957), *aff'd*, 19 Fox Pat. Cas. 18 (Can. S. Ct. 1959).

137. Acetylene Illuminating Co. v. United Alkalai Co., 22 Pat. Cas. 145, 155 (1905).

138. *See* notes 8-13 *supra* and accompanying text.

139. *See* note 14 *supra* and accompanying text.

1. Machine Claim

The bundled computer may be patented as "the embodiment in mechanism of any function or mode of operation designed to accomplish a particular effect."[140] At this point, the programme itself is considered an element of the overall machine.[141] If the computer and its constituent programmes are to be patented as a machine, there are two issues to be resolved: the requirements for obtaining such a patent, and the delineation of protection such a patent might afford.

A patent protects a machine in its entirety, but not necessarily each component of the machine.[142] In fact, some of the components may be subject to individual patents themselves,[143] or may be unpatentable.[144] The rationale for granting a machine patent for a bundled computer was broadly outlined by Judge Baldwin in *In re Prater I*:[145]

> In one sense, a general purpose digital computer may be regarded as a storeroom of parts and electrical components. But once a program has been introduced, the general purpose digital computer becomes a special purpose digital computer (i.e. a specific electrical circuit with or without electro-mechanical components) which along with the process by which it operates, may be patented matter, subject, of course, to the requirements of novelty, utility and nonobviousness.[146]

This decision appears to resolve the first requirement for patentability if the Physical Definition of a computer[147] is accepted, especially since the Conceptual Definition has been rejected by Canadian courts.[148]

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140. Fox, *supra* note 22, at 17.

141. The concept of a programme being, in and of itself, a machine is discussed *infra* at notes 167-71 and accompanying text.

142. "The term 'machine' includes every mechanical device or combination of mechanical powers and devices that perform some function and produce a new result." Fox, *supra* note 22, at 17.

143. *Id.* at 51 & 81.

144. *Id.*

145. 415 F.2d 1378, 159 U.S.P.Q. 583, 2 CLSR 8 (C.C.P.A. 1968), *superseded by*, 415 F.2d 1393, 162 U.S.P.Q. 541, 2 CLSR 32 (C.C.P.A. 1969) [hereinafter cited as *Prater I* and *Prater II*, respectively].

146. *Id.* at 1403 n.29, 162 U.S.P.Q. at 549-50 n.29, 2 CLSR at 47 n.29. The same basic conclusion was reached by the Canadian Patent Appeal Board when it held that "a computer that is programmed in one way must be deemed to be a machine which is different from the same computer when programmed in another way or unprogrammed." Waldbaum, 3 CLSR 164, 172 (Can. Pat. App. Bd. 1971).

147. *See* note 7 *supra* and accompanying text.

148. The computer itself is a totally designed mechanism. The computer manufacturer has constructed the device with painstaking care, so as to relate properly the individual units and elements with one another. Engineers have specifically designed the operations of each unit into the device. Finally, the manufacturer has built into the computer the capacity to respond to a control program. This being so, it is impossible to produce new or different combination functions merely by changing the instructions of the programs. The most that such changes could do would be to

There are two ways of considering the programme contained in a bundled computer: as a method for operating the machine, which may be patentable as a process; or, as a physical part of the machine, protected by the overall machine patent. An extreme interpretation of the latter policy would include a patent covering a computer and a specific programme and would prohibit use of that programme on any other machine. The error inherent in this interpretation is that the courts will only protect future uses of the programme if *it alone* is patentable. If the court prohibits the use of an unpatented programme in another machine, it then, in effect, is granting patent protection to an item that may or may not be patentable subject matter and is not, as yet, patented. Courts have traditionally refused to grant patent protection without first deciding the patentability of the subject matter. At best, a patent for a bundled computer would prohibit others from manufacturing or using the identical hardware *and* software configuration.

The solution to this restriction is to apply for patents on all possible configurations of hardware upon which a particular programme could operate. Unfortunately, such a series of applications would be rejected on the traditional concepts of lack of inventive ingenuity, lack of novelty, and lack of new or improved results.[149] Thus, a machine patent for a bundled computer will, at best, protect the *particular* hardware configuration plus the *particular* programme. Such protection cannot extend to other computers either directly (by multiple patents) or indirectly (by the equivalence doctrine).[150]

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vary the steps involved in the series of internal computer operations. The basic machine functions would remain the same, as they must if the machine is to operate properly.[49]

[fn. 49 This discussion applies solely to instances where a programed computer alone is claimed as a combination. Where the programed computer is merely an element of a combination it may well fall under patent protection. This is true because the elements of any combination need not be patentable in themselves. Thus a program, developed specifically to control a computer which is an element of a combination, may be effectively protected, since the program presumably would be useless unless used in the patented combination. Note however, that neither the program nor the programed computer have been patented; they are merely protected by the overall combination patent.]

Comment, *supra* note 5, at 475 & n.49, *reprinted in* 1 PAT. L. REV., at 565 & n.49. However, since the Conceptual Definition has been disputed, if not totally rejected, by Canadian courts, the second issue must be considered, *viz.*, the protection such a machine patent offers to the programme apart from its bundled hardware.

149. D. HUMPHRIS-NORMAN, THE CANADIAN PATENT ACT 10-11 (1960).

> In order that a new use of a known device may constitute the subject-matter of an invention, it is necessary that the new use be quite distinct from the old one and involve practical difficulties which the patentee has by inventive ingenuity succeeded in overcoming; if the new use does not require any ingenuity, but is in manner and purpose analogous to the old use, although not exactly the same, there is no invention; . . . .

Sommerville Paper Boxes, Ltd. v. Cormier, [1941] Can. Exch. 49, *aff'd*, 1 D.L.R. 367 (Can. 1941).

150. *See* notes 163-65 *infra* and accompanying text.

2. Process Claim

There are two possible theories of process claims[151] typically asserted for computer programmes: the first, that a programme, in and of itself, is a process; and the second, that the combination of programme and computer constitutes a process. In Canada,[152] a process "must of necessity consist of two elements, namely a method or a procedure and the material or materials to which it is applied."[153] A bundled computer would appear to have all the requisite elements necessary to qualify for a process patent. In determining the applicability of process claims, it is necessary to consider the three elements of the Conceptual Definition of a programme: the mathematical or logical rule; the correlation scheme; and the means by which such a rule is communicated.[154] A process claim cannot be based on the first element, since mathematical laws have traditionally been held nonstatutory subject matter.[155] The third element fails the tests of novelty and inventive ingenuity.[156] Thus, any claim for a programme, to be statutory subject matter under this definition, must be based on the correlation scheme and its interaction with a computer. The broad classification of a programme's elements can be illustrated by a practical example: the television networks' use of computers to predict the outcome of elections.

> The program used to implement such a scheme on a computer would be composed of the three . . . intellectual components. The first component is the mathematical or logical basis of the program—in this case, the principles of probability and statistical analysis.
>
> The second component, the correlation scheme, is the method by which the machine uses the principles of the first component to produce particular results. . . . Part of the scheme

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151. A process is defined as a

> mode, method or operation, by which a result or effect is produced by chemical action, by the operation or application of some element or power of nature, or of one substance to another. Shortly stated a process is the use of a method or the performance of an operation to produce a result.

Fox, *supra* note 22, at 17.

152. In the United States, the Court of Customs and Patent Appeals (C.C.P.A.) in *Prater I, supra*, reviewed the decisions in Cochrane v. Deener, 94 U.S. 780 (1876), and held that in light of such subsequent decisions as The Telephone Cases, 126 U.S. 1 (1887), "a process could be as much the subject of a patent as a manufacture" (415 F.2d at 1388, 159 U.S.P.Q. at 592, 2 CLSR at 23) and that there was no rule "in *Cochrane* that process claims are required to act on physical substances." *Id.* Although this may be a proper analysis of American law, the Canadian courts have not yet adopted this position.

153. HUMPHRIS-NORMAN, *supra* note 149, at 12-13.

154. *See* notes 12-13 *supra* and accompanying text.

155. *See, e.g.*, Gottschalk v. Benson, 409 U.S. 63, 67, 175 U.S.P.Q. 673, 675, 3 CLSR 256, 259 (1972).

156. 35 U.S.C. § 101 (1970).

> encompasses choosing relevant data and the methods by which the program will correlate this data with the election returns.
>
> Finally, the third component is the means for translating the correlation scheme into a form the computer can read—for example, a Fortran writeup.[157]

The issue then is whether a programmed computer is the reduction to practice of a new process, or only a new instrument for the performance of an old process. Assuming that the programme itself is not susceptible of patent protection,[158] then only hardware can be patented[159] and the patent will not extend protection to the programme contained within that hardware. If an algorithm is not patentable, but the programmed computer is, then the patent would wholly preempt use of the algorithm by others and, in effect, would be a patent on the programme implementing that algorithm, since the programme would have no practical application except in connection with the computer.[160] As such, a bundled computer could qualify for patent protection only if the programme constituted statutory subject matter. Any other conclusion would necessitate a modification of existing Canadian patent law.[161]

3. Means-Plus-Function Claim

While the final concept, that of "means-plus-function,"[162] has not yet been accepted by Canadian courts, analysis of this type of claim is important because of the close association between Canadian and American legislation, and Canadian recognition of the "doctrine of equivalence," which is basic to this claim type.[163]

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157. Comment, *supra*, note 5, at 470-71, *reprinted in* 1 PAT. L. REV., at 560. *See also*, text accompanying note 12 *supra*.

158. The question of the patentability of programmes *per se* is discussed *infra* at notes 201-348 and accompanying text.

159. *Cf.* Hosiers, Ltd. v. Penmans, Ltd., [1925] Can. Exch. 93, 100-01; *but see*, Bergeon v. De Kernor Elec. Heating Co., [1927] Can. Exch. 181, 187-89.

160. *See, e.g.*, Gottschalk v. Benson, 409 U.S. 63, 71, 175 U.S.P.Q. 673, 676, 3 CLSR 256, 262 (1972).

161. A new proposal, however, was presented in Falk, *Mental Steps and the Patent Law—A Rumination*, 8 PAT. L. ANN. 203 (1970), where he claimed that the application of novel mathematics to a known apparatus can create a statutory invention:

> It is not that the application of the mathematics, once it is known, is inventive or that the machine, apart from the mathematics, is inventive. It is, instead, that the machine establishes that the mathematics is useful. The mathematics may equate to "art" but so far our law has needed the machine to equate to "useful." The machine puts the clothing of "useful" on the naked principle.

Id. at 218 (footnotes omitted). To allow such a claim in Canada, however, would necessitate a change in existing policy to provide an extension of patent protection to mathematical principles. It is doubtful that this will occur.

162. 35 U.S.C. § 112 (1970), *reprinted in* the Appendix in this issue.

163. Fox, *supra* note 22, at 370-81.

The strategy for use of the "doctrine of equivalence" is as follows: the inventor designs a set of fixed wire circuits which perform the same functions as the programmes in question; the specification and claims of the application are then drafted in terms of the fixed wire circuits ("hardware"), thereby avoiding rejection on the ground that programmes *per se* are not patentable; then, if a patent is granted on the hardware configuration, in a later infringement action

> the patentee can argue that a computer, programmed to function in the same manner as his patented fixed wire circuit, is an equivalent device. Therefore, no one may use the program, which the patentee originally sought to protect, without infinging the patent on the fixed wire circuit.[164]

The fallacy in this strategy is that "equivalency" only extends to "substantially similar" means of reaching the same result.[165] Hardwired circuits and programmes operate in substantially *different* ways. If "[t]he tests of equivalency are identity of function and substantial identity of ways of performing that function,"[166] it is unlikely that a hardware patent would be considered "equivalent" to a programme.

Thus, despite three possible methods of protecting programmes by patenting bundled systems, the same conclusion is reached in each instance. If a programme is not patentable itself, it cannot be protected in combination with hardware. The only exception is where the original configuration of hardware and software is patented as a unit. This protection, however, does not prevent use of the programme in another machine.

B. Patentability of Unbundled Systems

1. Machine Claim

It has been suggested that the physical device containing the programme—the card deck, disk-pack or reel of tape—could be claimed as the object of patent protection. "The rationale of such a claim is that the program acts as an actual control device, functioning to control the computer physically."[167] The concept of a machine patent, however, would tend to limit the potential protection available, for if a machine is "the embodiment in mechanism of any function or mode of operation designed to accomplish a particular effect,"[168] then the only patentable subject matter would be the programme device itself. However, "[t]he novelty is not in the contents of the program device,"[169] but solely in the

164. Comment, *supra* note 5, at 477, *reprinted in* 1 PAT. L. REV., at 568.
165. *Id.*
166. Fox, *supra* note 22, at 380.
167. Comment, *supra* note 5, at 474, *reprinted in* 1 PAT. L. REV., at 564.
168. Fox, *supra* note 22, at 17.
169. Comment, *supra* note 5, at 474, *reprinted in* 1 PAT. L. REV., at 564.

concept of using that device. Thus, a patent obtained by this strategy would not have the desired effect of protecting the *content* of the programmed device, *i.e.* the programme.

In the United States, the *Printed Matter* cases[170] stated that "[o]nly by showing a physical relationship between the printed matter and the material structure which effects a new and physical result does a claimant show patentability."[171] This doctrine, if applied in Canada, would also prevent use of the machine patent form to protect programmes.

In effect, Canadian law would only protect the programme device, while American law would only protect the bundled system. Neither approach gives any protection to the claimant who bases his invention solely on the programme.

2. Process Claim

A process is a manner of manufacture apart from the machine, or the article or result produced by the process.[172] It qualifies as patentable subject matter under both the *Statute of Monopolies* and the Canadian Patent Act's definition of an "invention."[173]

The difficulties in creating a universally acceptable definition of the elements of a programme necessitate two assumptions. First, it must be assumed that the "correlation" portion of a programme is itself a mathematical principle. The second assumption requires acceptance of the definition of an algorithm as set out by the International Organization for Standardization Technical Committee 97/Subcommittee 1: "A prescribed set of well-defined rules or *processes* for the solution of a problem in a finite number of steps, e.g., a full statement of an arithmetic procedure for evaluating sin x to a stated *precision.*"[174]

If the courts were to hold that an algorithm itself is an expression of

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170. *See, e.g., Ex parte* des Granges, 142 U.S.P.Q. 41 (Pat. Off. Bd. App. 1962) (decompression time computer unpatentable where sole novelty resided in the special meaning given printed scales); *Ex parte* Stange, 124 U.S.P.Q. 238 (Pat. Off. Bd. App. 1958) (dice game unpatentable where sole novelty resided in the meanings ascribed to the indices on the dice); *Ex parte* Read, 123 U.S.P.Q. 446 (Pat. Off. Bd. App. 1943) (aircraft rate of speed indicator not patentable where novelty lies solely in the indicator scales and their meaning); Boggs v. Robertson, 13 U.S.P.Q. 214 (D.C. Supreme Ct. 1931) (the use of geometric curves on a map to indicate particular ideas unpatentable, being merely the reduction of an idea to writing). *But see*, Note, *The Patentability of Printed Matter: Critique and Proposal*, 18 GEO. WASH. L. REV. 475 (1950).

171. Comment, *supra* note 5, at 474, *reprinted in* 1 PAT. L. REV., at 564.

172. Riddell v. Patrick Harrison & Co., 17 Fox Pat. Cas. 83, 121 (Ex. 1957).

173. CAN. REV. STAT. c. 203, § 2(d) (1952); *see also* Refrigerating Equip., Ltd. v. Drummon, [1930] Can. Exch. 154.

174. ANSI, *supra* note 11, at 3 (emphasis in original). A *process* is further defined as a "systematic *sequence* of *operations* to produce a specified result." *Id.* at 69 (emphasis in original).

a mathematical principle, then it would appear under Canadian law, that a programme could not be patentable subject matter. As noted in *Boulton v. Bull*:[175] "The very statement of what a principle is, proves it not to be a ground for a patent. It is the first ground and rule for arts and sciences, or in other words the elements and rudiments of them."[176] It might be argued that the next sentence in this 1795 decision gives some comfort to a claimant. Mr. Justice Buller went on to conclude that "[a] patent must be for some new production from those elements, and not for the elements themselves."[177] The weakness in attempting to apply this thesis in the programming context stems from the fact that a programme is, under the first assumption, simply a specific structuring and ordering of mathematical concepts. It is only by using the programme in a machine and associating it with the appropriate data that a solution or "new product" is achieved. The question then becomes whether it is possible for an algorithm, as officially defined, to qualify as patentable process? Resolving this issue requires a finding that an algorithm is a process and that such a process is patentable.

To qualify as a process under Canadian patent law, three elements are necessary: a method or procedure, the material to which it is to be applied, and production of a useful result.[178] Technically an algorithm is defined as a method or procedure. The computer itself can be described as the "material" to which the procedure is applied, or it may also be claimed that the raw data and unsolved equations input to the computer are the "material" to which the procedure is applied. In either case, it would appear that a programme fits the conceptual definition of a process. It must still be determined, whether this "process" fits the technical requirements of a *patentable* process. To do so, the "process" must also satisfy the doctrines of mental steps, vendible product, unsuspected advantage, nonobviousness and combination of known matter.

a. Mental Steps

In a long series of decisions dealing with the patentability of programmes, the United States Supreme Court and the C.C.P.A. have analyzed the "mental steps" doctrine.[179] The issue in each of these cases was the contention by the Patent Office that one cannot obtain a patent on a series of steps which is or could be performed mentally. Though

175. 126 Eng. Rep. 651 (1795).

176. *Id.* at 662 (Buller, J.).

177. *Id.* Such a claim is similar to the contention of Falk already discussed. *See* note 161 *supra* and accompanying text. Falk equated mathematics and art but concluded that "so far our law has needed the machine to equate to 'useful.'" *Id.* at 218.

178. *See generally*, Fox, *supra* note 22, at 32-41.

179. Discussed *infra* at notes 249-71, 281-93, 296-300, 311-15, 321-25 & 336-48 and accompanying text.

Canadian and American jurisprudence are not identical on this point, the United States experience with this doctrine may have predictive value for Canadian programme patent protection, and an analysis of cases on this point is therefore useful.

The case of *Cochrane v. Deener*[180] established the "rule" that a process, to be patentable, must operate on physical substances.[181] By 1880, a process was defined as including "a conception of the mind, seen only by its effects when being executed or performed."[182] In 1887, the court ignored the "rule" of *Cochrane* and allowed a patent on a process that acted on energy rather than physical matter.[183] In 1951, the C.C.P.A., in dicta, appeared to adopt three rules dealing with mental steps.[184] Shortly thereafter, the same court held that "purely mental steps do not form a process which falls within the scope of patentability."[185] In 1952, the Patent Act was amended and new sections 100 and 101 clearly established the statutory category of "process."[186] In 1969, the C.C.P.A. allowed one claim for a programme based on a reasonable interpretation of the effect of that programme on a computer[187] and, allowed another programme claim, stating that "a member of the public would have to do much more than use the equations to infringe any of these claims."[188]

The "reasonable interpretation" test was expanded when the same court held in 1970 that "[it] would be absurd to say that the claims reasonably read on a mentally implemented process. We are aware of no

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180. 94 U.S. 780 (1876).

181. *Id.* at 788. *See* text accompanying note 146 *supra*.

182. Tilghman v. Proctor, 102 U.S. 707, 728 (1880).

183. The Telephone Cases, 126 U.S. 1 (1887).

184. 1. If all the steps of a method claim are purely mental in character, the subject matter thereof is not patentable within the meaning of the patent statutes.

2. If a method claim embodies both positive and physical steps as well as so-called mental steps, yet the alleged novelty or advance over the art resides in one or more of the so-called mental steps, then the claim is considered unpatentable for the same reason that it would be if all the steps were purely mental in character.

3. If a method claim embodies both positive and physical steps as well as so-called mental steps, yet the novelty or advance over the art resides in one or more of the positive and physical steps and the so-called mental step or steps are incidental parts of the process which are essential to define, qualify or limit its scope, then the claim is patentable and not subject to the objection contained in 1 and 2 above.

In re Abrams, 188 F.2d 165, 166, 89 U.S.P.Q. 266, 267-68, 4 CLSR 607, 609-10 (C.C.P.A. 1951).

185. *In re* Shao Wen Yuan, 188 F.2d 377, 380, 89 U.S.P.Q. 324, 327 (C.C.P.A. 1951) (footnote omitted).

186. These sections are reprinted in the Appendix in this issue.

187. *Prater I, supra*, 415 F.2d 1378, 160 U.S.P.Q. 230, 2 CLSR 8 (C.C.P.A. 1968).

188. *In re* Bernhart, 417 F.2d 1395, 1399, 163 U.S.P.Q. 611, 616, 2 CLSR 359, 365 (C.C.P.A. 1969).

way in which the human mind can operate on"[189] electrical pulses. This concept was extended later in 1970 when the C.C.P.A. held that "all that is necessary . . . to make a sequence of operational steps a statutory 'process' . . . is that it be in the technological arts . . . ."[190] The C.C.P.A., however, added that "a step requiring the exercise of subjective judgment without restriction might be objectionable as rendering a claim *indefinite* . . . ."[191]

In light of these holdings, it appears that the mental steps doctrine had been nullified as a ground for rejection of a claim, being replaced by an "indefiniteness" test. A more recent decision, however, may have revived this doctrine. The United States Supreme Court in *Gottschalk v. Benson*[192] held that one may not patent an idea; that a mathematical formula was an idea; and that since the algorithm in question had "no practical application except in connection with a digital computer, . . . the patent would wholly pre-empt the mathematical formula . . . ."[193] From the American point of view, it would appear that an algorithm constitutes a process, but that the entire patent claim may fail for indefiniteness—a test which includes whatever remnants of the mental steps doctrine still exist. A similar conclusion has been reached in Canadian jurisprudence without the intervening series of cases.

b. Vendible Product

For a Canadian court to hold that an algorithm is a process, they must first find a "vendible product."[194] In most cases, the "output" of a programme is data, specially formatted to facilitate human understanding. This output has consistently been held to be intellectual information and, as such, does not "fall within the meaning of the word 'product.'"[195] This does not militate against the patentability of all programmes, since some algorithms are used to operate machines which themselves operate chemical, electrical, or physical improvements in a process. At least this type of programmes should qualify as a process within the scope of the Canadian Patent Act.

c. Unsuspected Advantage

All process claimants must also satisfy the doctrine of "unsuspect-

189. *In re* Mahony, 421 F.2d 742, 746, 164 U.S.P.Q. 572, 576, 2 CLSR 587, 593 (C.C.P.A. 1970).

190. *In re* Musgrave, 431 F.2d 882, 893, 167 U.S.P.Q. 280, 289, 2 CLSR 920, 938 (C.C.P.A. 1970).

191. *Id.* at 893, 167 U.S.P.Q. 290, 2 CLSR at 938 (emphasis added).

192. 409 U.S. 63, 175 U.S.P.Q. 673, 3 CLSR 256 (1972).

193. *Id.* at 71-72, 175 U.S.P.Q. at 676, 3 CLSR at 262.

194. Fox, *supra* note 22, at 33.

195. *Id.* at 35. *See also*, Stahl & Larsson's Application, [1965] Pat. Cas. 596; Slee & Harris' Application, [1966] Pat. Cas. 194, 3 CLSR 1 (1965).

ed advantage,"[196] which states that:

> The mere production of advantages hitherto unknown are insufficient in themselves in the absence of invention, and *a fortiori* if these were not suspected by the alleged inventor. No protection, therefore, can be claimed for discovering the fact that a process of working already known produces unsuspected changes in any given material. But an inventive step is accomplished where there is utilized an unsuspected property of a known material so as to secure specified advantages.[197]

Thus, even if a programme produces a vendible product, it may still be unpatentability if it simply constitutes an unsuspected advantage or result of the known capabilities of a computer.

d. Nonobviousness and Combination of Known Matter

It has generally been held that where there is a problem awaiting solution, an answer to that problem is likely to be accepted as one involving invention.[198] Although many variants of the doctrine of obviousness have been developed by the courts, the most commonly accepted version was outlined by Lord Justice Diplock in 1966, when he stated that the solution to a problem would be obvious if it were "one which would have occurred to everyone of ordinary intelligence and acquaintance with the subject-matter of the patent who gave his mind to the problem."[199] This test cannot be stated quantitively. There is no way of predicting in advance how a court will rule, or how much and what kinds of evidence will sway the court one way or the other. There are very few "new" programming techniques being developed, and in most cases, the programme is a "new combination" of old techniques to achieve a given result. The issue to be faced by the courts is whether anyone had ever before thought of combining those particular techniques.[200]

e. Summary

A claimant for programme patent protection faces many seemingly

196. *See* text accompanying note 197 *infra*. Returning to the Conceptual Definition of a computer (*see* note 9 *supra* and accompanying text), since the machine is "specifically designed and constructed to perform various tasks" (Comment, *supra* note 5, at 468, *reprinted in* 1 PAT. L. REV., at 558), an algorithm simply employs the known capabilities of the computer to achieve a result.

197. Fox, *supra* note 22, at 69 (footnotes omitted).

198. American Arch Co. v. Canuck Supply Co., [1924] 3 D.L.R. 567, 572; Fuso Elec. Works v. Canadian Gen. Elec. Co., [1939] 1 D.L.R. 412, 417; The King v. American Optical Co., 11 Fox Pat. Cas. 62, 89 (Ex. 1950); Durkee-Atwood Co. v. Richardson, 23 Fox Pat. Cas. 30, 43 (Ex. 1962); Benmax v. Austin Motor Co., 70 Pat. Cas. 284, 291 (1953), *appeal dismissed*, 72 Pat. Cas. 39 (1955).

199. Parks-Cramer Co. v. G.W. Thornton & Sons Ltd., [1966] Pat. Cas. 407, 418.

200. Jamb Sets Ltd. v. Carlton, 25 Fox Pat. Cas. 109, 126-27 (Ex. 1963), *aff'd*, 30 Fox Pat. Cas. 166 (Can. 1965).

impassable obstacles under Canadian patent law. He may claim that the programme and computer constitute a machine or process, or he may approach the problem by attempting to protect the programme alone. The most fertile area appears to be in process patents, but even that is complex and of questionable applicability. Without amending the Canadian Patent Act or altering the traditional concepts of process claims, machine claims and obviousness, it would appear that a programme cannot qualify for patent protection. Such a conclusion does not mean that algorithms *should not* be patented, or, for that matter, that they *are not* patented under other guises.

IV. PATENTABILITY OF COMPUTER PROGRAMMES

A chronological analysis of patent law and practice as it relates to computer software is presented here through a compilation of case law and governmental policy pronouncements from 1964 to 1972. Relevant cases[201] in Canada, the United Kingdom, and the United States, divided into four major periods: 1964-1967; 1968; 1969-March 18, 1971; and May 6, 1971-November 1972, are considered. Before analyzing the cases, it is important to understand basic patent law procedures and the court structures in each country. Of particular significance is the need to distinguish between administrative decisions and judicial ones. Although decisions of a Patent Office itself may be based on governmental policy, court decisions are binding on the Patent Office and, therefore, must be considered in greater detail.

In Canada, an inventor files his patent application with the Patent Office and, after examination, the Commissioner of Patents either grants a patent or rules that the invention is ineligible for patent protection. All appeals from a ruling by the Commissioner are subject to "the *Exchequer Court Act* and the rules and practice of that Court."[202] Appeals from decisions of the Exchequer Court are decided by the Supreme Court of Canada.[203] The Exchequer Court also has original jurisdiction in all cases of conflicting applications for a patent,[204] in all cases in which it is sought to impeach or annul a patent,[205] and "in all other cases in which a remedy is sought under the authority

201. Only those cases which deal directly with software are analyzed, although extensive references are made to the process and apparatus concepts outlined previously. The purpose here is to present the law as it has actually been applied.

202. Canadian Patent Act, CAN. REV. STAT. c. P-4, § 17 (1970) (emphasis in original). *See also*, Exchequer Court Act, CAN. REV. STAT. c. E-11, § 22 (1970). New legislation has been enacted which replaces the Exchequer Court with the Federal Court. 19 Eliz. II, c. 1, § 3 (1970) (Can.).

203. *Id.* at § 23(2).

204. *Id.* at § 21(a).

205. *Id.* at § 21(b).

of any Act of the Parliament of Canada or at common law or in equity, respecting any patent of invention . . . ."[206]

In the United States, an inventor sends his application to the Patent Office and, as in Canada, awaits a ruling by the Commissioner of Patents. Appeals from a decision by the Commissioner are decided by the Patent Office Board of Appeals[207]—an administrative tribunal—and then, if appealed again, by the Court of Customs and Patent Appeals (C.C.P.A.).[208] Decisions of this court may be reviewed by the United States Supreme Court.[209]

In the United Kingdom, an inventor files his application with the Patent Office and awaits a decision of the Comptroller-General of Patents.[210] Subject to special provisions for Scotland, Northern Ireland, and the Isle of Man,[211] appeals from the Comptroller's decision are decided by a judge of the High Court appointed specially by the Lord Chancellor,[212] or by an Appeal Tribunal,[213] depending on the claims involved. Appeals from the Appeal Tribunal are decided by the Court of Appeal.[214] The Appeal Tribunal is considered an administrative tribunal for patent purposes.[215]

A. Recognition of the Problem: 1964-1967

On September 10, 1964, the United States Patent Office Board of Appeal released its decision concerning the patentability of processing data expressed in Polish Notation.[216] The Patent Office held that an "apparatus operating on particular stored data through a particular stored program [was] patentably no different than a computer, absent such data and program."[217] In effect, the Patent Office held that a

206. *Id.* at § 21(c).

207. 35 U.S.C. § 134 (1970), *reprinted in* the Appendix in this issue.

208. 35 U.S.C. § 141 (1970). An alternative method of review available to an applicant dissatisfied with the decision of the Board of Appeals is to file a civil action against the Commissioner of Patents and Trademarks in the United States District Court for the District of Columbia. 35 U.S.C. § 145 (1970). However, as of this date, all rejections of program-related patent applications have been appealed to the C.C.P.A. Both of these sections are reprinted in the Appendix in this issue.

209. 28 U.S.C. § 1254 (1948).

210. Patents Act, 12-14 Geo. VI, c. 87 (1949).

211. *Id.* at §§ 103-05.

212. *Id.* at § 84.

213. *Id.* at § 85.

214. *Id.* at § 87.

215. *Id.* at § 85(10).

216. *In re* King & Barton, 146 U.S.P.Q. 590, 1 CLSR 302 (Pat. Off. Bd. App. 1964). "Polish Notation" is a system for denoting mathematical expressions free of parenthetical groupings. For example, the algebraic equation "C=A + B" would appear as "Let C be B, A +" in Polish Notation. This system of expression is well known to mathematicians.

217. *Id.* at 591, 1 CLSR at 304.

computer, by its very design, made all possible configurations of its circuits caused by a programme a part of the prior art. The Board agreed in concept, but disagreed in its application to the instant case. This was the first case in which data processed by a computer was presented, and this fact weighed heavily in the Board's decision:

> Since most general purpose computers have the recognized capability of simulating operations of many other computers or machines by suitable programming, this fact should afford no basis for a denial of a patent on all *future novel* computer configurations which the art does not make obvious.[218]

In the end, however, the Board agreed with the result of the Patent Office decision, though not with the reasoning. In effect, the Board replaced the Patent Office's Conceptual Definition of hardware with the Physical Definition.[219] The claims were rejected not because they were obvious, but because of their format. The claims were "not directed to the novel configuration of a computer which can process data in Polish Notation but . . . merely operating on data in Polish Notation."[220] As such, the claim failed as apparatus.[221]

On November 25, 1965, the British Patent Office released its decision on a series of claims which included both apparatus and process claims for a revision of the SIMPLEX algorithm.[222] The Examiner agreed with the C.C.P.A.'s position on apparatus claims when he referred to the fourth claim which was

> directed to a machine which has been set into such a condition that it can proceed to solve a particular program by undertaking a series of specified steps. It may be regarded as a machine which has been temporarily modified.[223]

The examiner was faced with a second apparatus claim based upon the "means" for controlling a computer, *i.e.*, a punched tape or card. Rather than simply deciding the issue on the ground that the means were "no more than a printed sheet,"[224] and therefore unpatentable, thereby avoiding the Physical Conceptual definition issue, the examiner compared the means "to a cam, shaped according to certain formulae so that, when fixed into a machine, it controls the latter in a certain way."[225] No decision was reached on this claim; it was remanded for further investigation. From the analogy with a cam, however, the examiner obviously believed a computer with one programme in it to be different from one with a different programme.

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218. *Id.* at 591, 1 CLSR at 304-05 (emphasis is original).
219. *See* notes 8-10 *supra* and accompanying text.
220. *In re* King & Barton, 146 U.S.P.Q. at 591, 1 CLSR at 305.
221. There was no attempt made to claim a process.
222. Slee & Harris' Application, [1966] Pat. Cas. 194, 3 CLSR 1 (1965).
223. *Id.* at 198, 3 CLSR at 6.
224. *Id.* at 198, 3 CLSR at 7.
225. *Id.*

The process or method claims were all denied because they failed to produce a proper result or product as required by British law. Intellectual information was held not within the definition of a "vendible product."[226] The examiner reached this conclusion despite the fact that the claims were based on the management of a chemical process, since he found the particular use cited not "essential or inherent in the method claimed."[227]

In August 1966, a "tentative theoretical analysis of applicable statutory law," prepared by a broad interagency working committee, was released by the United States Patent Office in the form of "Proposed Guidelines."[228] These proposals were divided into process and apparatus claims. Programmes were to be denied process patents in four instances and allowed in one:

1. A mathematical process is not a treatment of materials or substances and so is not patentable.[229]

2. A formula is neither a process, machine, manufacture, composition of matter, nor useful improvement thereof, and thus is not patentable.[230]

3. A means of doing business or evaluating data is characterized by an algorithm and thus is not patentable.[231]

4. A series of steps "for performing a specified function without recital of structure, material or act in support thereof" is grounds for patent, but not if the claim is to the result of such steps.[232]

In dealing with potential apparatus claims, the Patent Office outlined three guidelines:

1. A programme device would be patentable unless the sole novelty lay in the "meaning of intelligence conveyed by the symbology of the physical representations"[233] on the device.

2. "A prior art machine can have its parts interrelated by a program device in a new way to carry out machine functions of a specialized character"[234] and "may well result in a new patentable combination, unless there is a prior art teaching that would make the interrelations and results thereof obvious.[235]

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226. *Id.*
227. *Id.* at 197, 3 CLSR at 4.
228. PROPOSED GUIDELINES, *supra* note 7.
229. *Id.*
230. *Id.*
231. *Id.*
232. *Id.* at 866.
233. *Id.*
234. *Id.*
235. *Id.*

3. The final apparatus guideline dealt with the "means-plus-function" claims.[236]

A little over three months after the Proposed Guidelines were published, the Report of the President's Commission on the Patent System[237] was released. The Report contained a terse analysis of the then-current situation, and recommended that programmes be held not patentable.[238]

Thus, although there was little litigation prior to 1968, administrative tribunals in both the United States and the United Kingdom had at least one opportunity to rule on some issues of the debate. Furthermore, in the United States, two policy statements were released which aided industry in its attempts to identify the problem. Though the two statements were not legally binding on the courts, they were illustrative of current thinking within the Patent Office and the Administration.

The Boards in the United States and United Kingdom seemed amenable to granting apparatus patents for programme devices, provided the novelty did not lie in the content of the device. Both countries appeared to lean toward acceptance of the Physical Definition of hardware, whereby a patent would issue for a "programmed computer" whose components had been altered, in an unobvious fashion, from other programmed computers. The American tribunal went further and seemed prepared to grant a patent on a "means-plus-function" claim, provided the "means" was not simply the result attained by the operation of a programmed computer. Additionally, the Patent Offices of both countries appeared to agree that a pure algorithm was not patentable, either because it did not produce a vendible product as required by English law, or because it did not essentially or inherently operate on a material substance as required by American law.

B. Birth of a Surprise: 1968

In early 1968, the United Kingdom Patent Office refused to grant a patent to Badger Company for a method of operating a computer to produce design data to be plotted automatically.[239] In rejecting the claims, the examiner seemed to apply concepts developed during the

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236. *Id.*

237. REPORT OF THE PRESIDENT'S COMMISSION ON THE PATENT SYSTEM, TO PROMOTE THE PROGRESS OF . . . USEFUL ARTS (1966), *reprinted in* the Appendix in this issue.

238. Direct attempts to patent programs have been rejected on the ground of non-statutory subject matter. Indirect attempts to obtain patents and avoid the rejection, by drafting claims as a process, or a machine or components thereof programmed in a given manner, rather than as a program itself, have confused the issue further and should not be permitted.

Id. at 14.

239. *In re* Badger Co., [1970] Pat. Cas. 36, 3 CLSR 7 (U.K. Pat. Off. 1968).

previous few years, holding that the product of the system was data or intellectual information which, being a nonvendible product, did not qualify as an invention.[240] On appeal, it was held that the claim, as drawn, was not patentable, but that an alternate form of claim, based on the conditioning of a computer, might be allowed.[241]

About the same time, a process patent was granted in the United States for a method of performing an oscillating sort using four tape drives which read in the forward direction only.[242] Although at first glance this appeared to be the first patent granted for a programme, such was not the attitude of the Patent Office. The Office's solicitor said that "he noticed the movement of the tapes described in one portion of the patent, and [said] he [felt] this could easily be interpreted as being a 'process' and as such patentable without any problems."[243]

This statement was consistent with the Final Guidelines promulgated less than six months later by the United States Patent Office.[244] Though vastly shortened from the Proposed Guidelines,[245] this version was also divided into process and apparatus claims. Under the Final Guidelines, a process claim would fail if it produced only numerical, statistical, or intellectual information as a result, but might succeed if it produced some appreciable change in the character or condition of a physical material or if it formed part of a valid combination claim.[246] An apparatus claim would fail either "if the actual invention resided in a series of steps which could be performed mentally"[247] or if the invention was simply a method of automating that which was previously done by hand, but might succeed if it was "part of a patentable combination if unobviously combined with other elements to produce a physical result . . . ."[248]

In this calm, almost predictable atmosphere, Prater and Wei

240. *Id.* at 38, 3 CLSR at 10.

241. *Id.* at 40, 3 CLSR at 12. It would appear from this decision that the Physical Definition of hardware (*see* note 7 *supra* and accompanying text), was nearing acceptance in the United Kingdom.

242. M. Goetz, Pat. No. 3,380,029, granted April 23, 1968.

243. *First Patent on Software, Awarded to Applied Data Research*, E.D.P. INDUSTRY REPORT, July 11, 1968, at 3.

244. UNITED STATES PATENT OFFICE, GUIDELINES TO EXAMINATION OF APPLICATIONS FOR PATENTS ON COMPUTER PROGRAMS, 855 Off. Gaz. Pat. Office 829 (Oct. 22, 1968), *rescinded*, 868 Off. Gaz. Pat. Office 349 (Nov. 11, 1969), *reprinted in* the Appendix in this issue [hereinafter cited as FINAL GUIDELINES].

245. *See* notes 228-36 *supra* and accompanying text.

246. FINAL GUIDELINES, *supra* note 244, at 829-30.

247. *Id.* at 830.

248. *Id.* It should be noted that the distinction between algorithm and utility processes was dropped in this version, but that other points were maintained. These points included the "mental steps" doctrine, the "materials or substances" requirements for a process, the distinction between process and result, and the potential validity of claims for restructuring or combination.

awaited a decision by C.C.P.A. on their claims to both a method and apparatus for producing accurate data (obtained by spectrographic analysis) on the relative proportions of various known constitutent gases in a mixture of gases. In its decision, the C.C.P.A. reversed rejections by the Patent Office Board of Appeals and, in so doing, attacked some of the basic concepts that had been developed by the Patent Office.[249]

Finding *Don Lee, Inc. v. Walker*[250] to be the origin of the "mental steps" doctrine, Judge Smith stated that the doctrine was "not only unsupported by any citation of precedent but in its inception was directed to subject matter that was not even novel."[251] Having weakened the foundation of the "mental steps" doctrine, the court then turned to the "Rules" of the *Abrams* case.[252] While the court spent considerable time analyzing the internal inconsistencies of these "Rules," its conclusion relied more on precedent than validity.[253]

The court then traced the evolution of process claims from the *Cochrane* decision in 1876 to the *Shao Wen Yuan* decision in 1951.[254] After doing so, the court rejected the traditional *Cochrane* interpretation that a process, to be patentable, must result in a material change.[255] The court then established what appeared to be a new rule applicable to process claims:

> that patent protection for a process disclosed as being a sequence or combination of steps, capable of performance without human intervention and directed to an industrial technology—a "useful art" within the intendment of the Constitution—is not precluded by the mere fact that the process could alternatively be carried out by mental steps.[256]

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249. *Prater I, supra*, 415 F.2d 1378, 159 U.S.P.Q. 583, 2 CLSR 8 (C.C.P.A. 1968).

250. 61 F.2d 58, 14 U.S.P.Q. 272 (9th Cir. 1932).

251. *Prater I, supra*, 415 F.2d at 1387, 159 U.S.P.Q. at 591, 2 CLSR at 21.

252. *In re* Abrams, 188 F.2d 165, 166, 89 U.S.P.Q. 266, 267-68 (C.C.P.A. 1951).

253. The "Rules" of Abrams, so essential to the [Board's] rejection of the present claims, were not given the status of judicial acceptance by the court in Abrams and remain no more than parts of the argument put forward by Abrams' counsel. Further we note that even if "Rule 2" had been so adopted, the rule when traced to its origin in *Don Lee* rests on an uncertain basis as precedent.

Prater I, supra, 415 F.2d at 1387, 160 U.S.P.Q. at 591, 2 CLSR at 21-22.

254. Cochrane v. Deener, 94 U.S. 780 (1876); Tilghman v. Proctor, 102 U.S. 707 (1880); The Telephone Cases, 126 U.S. 1 (1887); Smith v. Snow, 295 U.S. 1 (1935); Waxham v. Smith, 294 U.S. 20 (1935); *In re* Shao Wen Yuan, 188 F.2d 377 (1951).

255. To deduce such a role from the statement [in the *Cochrane* case] would be contrary to its intendment which was not to *limit* process patentability *but to point out that a process is not limited to the means used in performing it*.

Prater I, supra, 415 F.2d at 1388, 159 U.S.P.Q. at 592, 2 CLSR at 22-23 (emphasis in original).

256. *Id.* at 1389, 159 U.S.P.Q. at 593, 2 CLSR at 25. The British "essential and inherent" test was clearly not gaining acceptance in the United States.

Furthermore, the premise of the Final Guidelines, which invalidated claims for a "series of steps which *can* be performed mentally,"[257] was rejected by the court.[258] Judge Smith concluded the opinion with two findings directed to the apparatus claims rejected by the Patent Office Board of Appeals. First, he held that if a process is patentable, so also is the apparatus counterpart.[259] Second, he found that even if a process is not patentable, apparatus claims should not be rejected without reference to prior art, obviousness and novelty as traditionally applied.[260] A petition for rehearing was granted over the strenuous objections of Judges Almond and Rich.[261]

Though the granting of the petition for rehearing cast doubt on the validity of Judge Smith's opinion, no one doubted that 1968 had ended in a way far different from the manner in which it had begun.

C. *International Turmoil: 1969-March, 1971*

Judge Baldwin began his decision on the rehearing of the *Prater* case (*Prater II*) by stating that "[t]his supersedes the decision and opinion of November 20, 1968, although various portions of the latter are repeated herein without specific reference thereto."[262] Analyzing the invention, claims, and briefs of the parties, the court concluded that the appellants

> are *not* seeking patent coverage of any purely mental process or any mental process coupled only with pencil and paper markings, but they *are* seeking coverage of the operation of a properly programmed general-purpose digital computer performing their

257. FINAL GUIDELINES, *supra* note 244, at 830.

258. *Prater I, supra*, 415 F.2d at 1389, 159 U.S.P.Q. at 593, 2 CLSR at 25.

259. *Id.*

260. *Id.*

261. In his dissent to the Court's granting of a rehearing, Judge Rich expressed the situation aptly:

> It has been suggested that the case is one of the most complicated, technically and legally, with which we have ever had to deal. This is not so. While the technology is perhaps mathematically awesome, the economic impact of our decision tremendous, and the administrative problems of the Patent Office horrendous if it is obliged to abide by our decision, the case really boils down to a simple question or two of law. The technology is not as bad as many of our cases. Some have approached this case as though we were obliged to decide a momentous question of public policy: *should* computer programs be patentable? This is the problem the Patent Office presented to Congress, where the question belongs, submitting a bill implementing the recommendations of the President's Patent Commission that they be declared to be not patentable. But we are not at all concerned with what ought to be. We are not a policy-making body but a court of law. The simple question which has been before us is whether appellants' claimed process and apparatus are patentable *under the existing statutes.*

Id. at 1392-93, 160 U.S.P.Q. 230, at 232-33, 2 CLSR at 30-31 (emphasis in original).

262. *Prater II, supra*, 415 F.2d 1393, 1395, 162 U.S.P.Q. 541, 543, 2 CLSR 32, 33 (C.C.P.A. 1969).

process, as well as that of an analog device of the type disclosed.[263]

The same reasoning was used in analyzing the process claims. There was no dispute as between the principal parties that appellant had disclosed a patentable process. The issue was the breadth of the claims. The court carefully differentiated between a failure to disclose a patentable process, and an attempt to claim as patentable more than is necessary or allowable:

> In our view, appellants would really like us to read a limitation of the specification into the claims, not merely interpret the claims in the light of the specification. When read in the light of the specification, claim 9 *does* read on a mental process augmented by pencil and paper markings. We find no express limitation in claim 9 which, even when interpreted in the light of the specification, would support the conclusion that the claim is limited to a "machine process" or "machine-implemented process." This is particularly important in this case since the board noted that, in their brief before the board, appellants acknowledged that "[t]hough not practical for most of the needed applications, their method, theoretically, can be practiced by hand."
>
> Inasmuch as claim 9, thus interpreted, reads on subject matter for which appellants do not seek coverage, and therefore tacitly admit to be beyond that which "applicant regards as his invention," we feel that the claim fails to comply with 35 USC § 112 which requires that "[t]he specification shall conclude with one or more claims particularly pointing out and distinctly claiming the *subject matter which the applicant regards as his invention*. This is true notwithstanding appellants' *disclosure* of a *machine-implemented* process."[264]

The court concluded that the process claims failed to particularly point out and distinctly claim the specific subject matter which applicants regarded as their invention, as required by statute.[265] In short, the court found their claims to be too broad.

A comparison of the decisions in *Prater I* and *Prater II* reveals:

1. That the mental steps doctrine, if still valid, could be avoided by disclosing an "apparatus for performing the process wholly without human intervention";[266]
2. That Judge Smith's analysis of the *Cochrane* decision and the requirements of a valid process claim had been correct; and,
3. That Judge Smith's attempt to establish a "new rule" had been refined in *Prater II*: A sequence of steps, directed to

263. *Id.* at 1403, 162 U.S.P.Q. at 549-50, 2 CLSR at 47 (emphasis in original).
264. *Id.* at 1404, 162 U.S.P.Q. at 550, 2 CLSR at 48 (emphasis in original).
265. *Id.* at 1405, 162 U.S.P.Q. at 551, 2 CLSR at 49-50.
266. *Id.* at 1403, 162 U.S.P.Q. at 549, 2 CLSR at 46.

> an industrial technology, that could alternatively be carried out by mental steps might be patentable if, and only if, the claims were drafted so as to make no attempt to cover the mental process and disclosed an apparatus.

The need for carefully drafting and distinctly claiming the invention sought was subsequently emphasized in the *Wheeling* case.[267] The invention there related to a program to optimize the operation of a chemical plant, a refinery, or the like.[268] The examiner and Patent Office Board of Appeals rejected the claims for various obscure reasons, but basically because there was "no novelty other than in mental steps."[269] The C.C.P.A. analyzed the "utilitarian functions performed by the apparatus"[270] and remanded the case for classification and further proceedings.

In October, the Final Guidelines were rescinded by the Patent Office because of the turmoil created by the rehearing in *Prater*.[271]

The extent of confusion over the application of traditional concepts to patents for programmes was not confined to the United States. In late 1968, a British Patent Office examiner refused to grant a patent for a programme to translate words into word marks, sort them into specified lists, and print them.[272] The rejections followed one of the concepts established in the earlier *Slee and Harris* case[273] and reversed the other concept, even though the same examiner rendered both decisions. The claim for a modified computer (by introduction of a "word" program) was refused as not a manner of new manufacture, since all operations were within the known, inherent capacity of the mechanism.[274] The previous ruling, finding unpatentable a program device whose novelty consisted of words on cards, was reapplied.

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267. *In re* Wheeling, 413 F.2d 1187, 162 U.S.P.Q. 588, 2 CLSR 297 (C.C.P.A. 1969).

268. As *disclosed*, the method may be performed by an analog apparatus, by hand, or by a digital computer and may be employed in such diverse systems as the processing of seismic signals and a catalytic cracking process.

Id. at 1189, 162 U.S.P.Q. at 589, 2 CLSR at 299 (emphasis in original).

269. *Id.* at 1190, 162 U.S.P.Q. at 590, 2 CLSR at 300.

270. *Id.* at 1192, 162 U.S.P.Q. at 592, 2 CLSR at 304. This would appear to be a "throwback" to the PROPOSED GUIDELINES, *supra* note 7, at 865-66.

271. UNITED STATES PATENT OFFICE, COMPUTER PROGRAMS—NOTICE OF RESCISSION OF GUIDELINES, 868 Off. Gaz. Pat. Office 349 (Nov. 11, 1969).

272. Gevers' Application, [1970] Pat. Cas. 91, 3 CLSR 24 (1968).

273. *See* notes 222-27 *supra* and accompanying text.

274. *Gevers, supra*, [1970] Pat. Cas. at 93-94, 3 CLSR at 32-34. This decision reversed the examiner's previous ruling in *Slee & Harris* (notes 222-27 *supra* and accompanying text) and the Court's previous ruling in the *Badger* case (notes 239-41 *supra* and accompanying text). In effect, the examiner adopted the Conceptual Definition of hardware and rejected the Physical Definition. *See* notes 8-10 *supra* and accompanying text.

On appeal, the decision continued to muddy the waters. First, the court seemed to confuse the algorithmic aspects of a programme with the programme device.[275] Second, the court's interpreted the claims as not a scheme or plan (*i.e.*, algorithm) but rather a machine constrained by cards to operate in a given way to produce a desired result.[276] Rather than classifying such a claim as a machine or an apparatus, the judge referred to it as a manner of manufacture.[277] The British court seemed to be approximating some of the attitudes expressed in *Prater II*.

The next four decisions of the C.C.P.A.[278] began to refine and rationalize the *Prater* case through a series of reversals of Board decisions. In the midst of these decisions, the Canadian Patent Office announced its proposed and final guidelines.[279] Appropriately, these guidelines came in the wake of the recission of the United States' guidelines.[280]

In the United States, the examiner, Board of Appeals, and C.C.P.A. applied three different rationales in dealing with Bernhart and Fetter's claims to an algorithm using a series of equations to display parts of a three-dimensional objects in a two-dimensional field.[281] The examiner ruled that the invention had been insufficiently disclosed since the "applicants had merely set forth equations and asserted that the equations could be readily programmed by programmers of ordinary skill . . ."[282] In failing to disclose a machine, the examiner held the claims predicated on mental steps and therefore not patentable.[283] The Board

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275. The court stated that in its

> judgment it would not be right to class the information or directions which are contained in the punched cards which are inserted into the applicant's machine as being purely intellectual, literary or artistic. The object of the cards is amongst other things to ensure that the old machine functions in a particular way which it is alleged is new.
>
> * * *
>
> To my mind such a card is no different from the "means" in *Slee & Harris' Application* . . . or from the cam therein referred to . . . .
>
> * * *
>
> If the card was in fact shaped so that it could be used in place of metal cam its contour being followed by some sensing device, it seems there could be little argument. How can it make any difference that the card is punched instead of being contoured? . . . [I]t seems to me to differ from a card which is merely printed and which is intended to be "ancillary" to some machine being specially shaped or constructed for that purpose.

Gevers, supra, [1970] Pat. Cas. at 97-98, 3 CLSR at 32-34.

276. Thus, the court appeared to accept the concept that a computer is modified by the insertion of a programme.

277. *See* note 275 *supra*.

278. *See* notes 281-93, 296-300 & 304-08 *infra* and accompanying text.

279. *See* note 294 *infra* and accompanying text.

280. *See* note 271 *supra*.

281. *In re* Bernhart, 417 F.2d 1395, 163 U.S.P.Q. 611, 2 CLSR 359 (C.C.P.A. 1969).

282. *Id.* at 1398, 163 U.S.P.Q. at 615, 2 CLSR at 363.

283. *Id.* at 1396-98, 163 U.S.P.Q. at 613-15, 2 CLSR at 360-63.

disagreed with the first part of the examiner's ruling and held that the claimants had sufficiently disclosed their invention to permit persons trained in the field to put it to use. The Board, however, rejected the claims, without referring directly to the examiner's statements of mental steps, by citing the *Printed Matter* cases, and concluding that

> [t]he rationale of these cases appears to be that the law does not favor the granting of a patent for non-statutory subject matter by indirection, and this should be applicable to a mathematical formula or an algorithm as well as to printed text, when the real substance of the contribution by its originator clearly is unpatentable in its own right.[284]

The Board also held that the claims did not define a new use of an old machine but simply a new result based on "the old use of solving equations and plotting the results."[285]

The C.C.P.A. referring to *Prater* and distinguishing the *Printed Matter* cases, held that in this instance only a machine could understand and use the data and mental steps could not and would not infringe the patent.[286] The court agreed that no patent could be granted for a claim to all uses of a set of equations, but that in the instant case the claim was specifically directed to a specific use in a computer.[287] Disagreeing with both the examiner and the Board, both of which had held that new signals stored in a computer did not make it a new machine since it was structurally the same, the C.C.P.A. held that not only would the machine be structurally different, but that such a change would constitute a new and useful improvement over the unprogrammed machine and, thus, the process doubly qualified as patentable subject matter.[288] The court also questioned the statement that one who improves one element in a combination, but does not change the result, cannot claim either the combination or the new element.[289] In effect, the court ruled that a programmed computer qualified for patent protection even though the sole novelty was a result of the programme.

In the next pertinent United States decision, *In re Mahony*,[290] both the examiner and the Board rejected claims to circuits and methods in a communications system, which automatically synchronized a receiver of digital information with the transmitter, since the method could be performed by a human.[291] The C.C.P.A. reversed the rejection, holding

284. *Id.* at 1398, 163 U.S.P.Q. at 615, 2 CLSR at 363-64.

285. *Id.* at 1399, 163 U.S.P.Q. at 615, 2 CLSR at 364. This statement seems to coincide with the earlier concept that a programme simply utilized the known components of a computer and, as such, could never be patented. *See* note 9 *supra*.

286. *Id.* at 1399-1400, 163 U.S.P.Q. at 615-16, 2 CLSR at 364-66.

287. *Id.* at 1399-1400, 163 U.S.P.Q. at 616, 2 CLSR 365-66.

288. *Id.* at 1400, 163 U.S.P.Q. at 616, 2 CLSR at 366.

289. *Id.* at 1402-03, 163 U.S.P.Q. at 618, 2 CLSR at 369-70.

290. 421 F.2d 742, 164 U.S.P.Q. 572, 2 CLSR 587 (C.C.P.A. 1970).

291. *Id.* at 744, 164 U.S.P.Q. at 574, 2 CLSR at 589-90.

that a reasonable reading of the claims showed that human infringement was impossible, since the method referred to a string of electrical pulses.[292] The *Mahony* claims were distinguished from those in *Prater II*, where a "reasonable reading" of the claims led to a finding of potential infringement by human thought.[293]

On October 1, 1970, the Canadian Patent Office issued its draft version of new guidelines which stated simply that "a program, algorithm, or set of instructions to cover the operation or use of a computer or any other device, rules for games and the like, or a method of its establishment, is unpatentable."[294] This statement was more than an analysis of applicable law; it was an attempt to reach administratively a point that had not been judicially or legislatively attained.[295]

The next United States decision, *In re Musgrave*,[296] began to clarify the issues. Musgrave applied for a patent on a new technique for identifying errors in seismograms by applying a series of hyperbolic functions to a family of seismograms.[297] Rejections by the Patent Office and the Board of Appeal, based on the *Abrams* "rules," were rendered prior to *Prater I*. The Board held that the process, since it operated on information or data, was not patentable.[298] The C.C.P.A. reversed, restating its earlier conclusion that a process need not operate on physical matter as long as it is within the "technological arts."[299] Further, the court held that objective, as distinguished from subjective or interpretive, mental steps do not defeat a process claim.[300]

Prior to the issuance of the final guidelines by the Canadian Patent Office, the Economic Council of Canada released its report on intellectual and industrial property.[301] Based more on policy than law, this report enumerated several reasons why patent protection should not be

292. *Id.* at 746, 164 U.S.P.Q. at 575-76, 2 CLSR at 593.

293. *Id.*

294. CANADIAN PATENT OFFICE, NOTICE ON "NON-STATUTORY SUBJECT MATTER," Guideline 3(i) (Oct. 1, 1970).

295. This effort was particularly noteworthy when one considers the then-current state of British case law on this issue (*see* notes 216-93 *supra* and accompanying text), since "jurisprudence established by the courts of the United Kingdom is authoritative in Canada." Lawson v. Commissioner of Patents, 62 Can. Pat. Rep. 101, 111 (Ex. 1970).

296. 431 F.2d 882, 167 U.S.P.Q. 280, 2 CLSR 920 (C.C.P.A. 1970).

297. *Id.* at 885-86, 167 U.S.P.Q. at 283-84, 2 CLSR at 925-27.

298. *Id.* at 886-88, 167 U.S.P.Q. at 284-85, 2 CLSR at 927-29.

299. *Id.* at 893, 167 U.S.P.Q. at 289-90, 2 CLSR at 938.

300. *Id.* at 893, 167 U.S.P.Q. at 290, 2 CLSR at 938. Judge Baldwin, concurring in the result but dissenting from the rationale, preferred the "reasonable interpretation of the claims" test to an objectivity test. He also rejected the "technological art" concept, holding that either a process operates on physical matter or an apparatus for carrying out the process must be disclosed (*Abrams* rules). *Id.* at 894-95, 167 U.S.P.Q. at 290-91, 2 CLSR at 940-42 (Baldwin, J., concurring).

301. COUNCIL REPORT, *supra* note 15.

extended to computer programmes:[302]

1. Since patent protection is directed to increasing disclosure and avoiding duplication of effort on the part of inventors, granting patents for programmes would be costly to Canadian industry since the impetus of patent protection is not directed toward increased production.
2. The granting of patents for programmes would not significantly increase the protection available in view of such alternatives as leasing, contracting, special programming techniques, and trade secrets.
3. The onus on the parties and the Patent Office to establish novelty in each application would be considerable and would, in effect, weaken the validity of patents in general since there would be more challenges and a higher percentage of patents would be held void by the courts.
4. Because a programme is analogous to a process used to produce a product which could also be produced using other processes, and because it is not possible to tell from the final product which process was used, the policing of such patents would be extremely difficult.
5. Since the goal of patents is widespread disclosure of inventions, a simpler solution would be to have the government publish a catalogue of available programmes and let users bargain directly with developers.

The final guidelines of the Canadian Patent Office adopted the policy recommendation of the Economic Council and, despite United States and British jurisprudence, declared programmes to be unpatentable in language similar to, but more extensive than, the original notice.[303]

The differences between Canadian patent policy and United States patent practice is most easily illustrated by the case of *In re Foster*,[304] decided one month after publication of the Canadian guidelines. The Board of Appeals rejected Foster's claim for a method of smoothing

302. *Id.* at 101-05.

303. It [a patent] must not be for a computer program, an algorithm, or a set of instructions to operate a computer. Similarly it may not be for a known or general purpose computer programmed in a particular way to produce a particular result. Under this criteria software such as punched cards or tapes carrying programmes and some hardware would be excluded. It is considered that the development of computer programmes falls within the expected skill of competent programmers and as such lacks the requirements of nonobviousness. Furthermore, programmes in whatever form they may be presented, are essentially mathematical information developed from an algorithm and set forth in the form of a set of instructions. As such they are not allowable under Section 2(d).

CANADIAN PATENT OFFICE, GUIDELINES (Feb. 18, 1971).

304. 438 F.2d 1011, 169 U.S.P.Q. 99, 2 CLSR 994 (C.C.P.A. 1971).

seismographic curves by generating and using a set of coefficients on the ground that such a claim fell within the "mental steps" doctrine. Judge Almond reversed a portion of the Board's decision and affirmed the remainder.[305] In reaching this decision, he clarified three major points: (1) the "mental steps" doctrine was not relevant if the process in question was within the "technological arts;"[306] (2) a properly drafted "means-plus-function" claim for computer operations would not, by definition, allow for human intervention;[307] and (3) a programme improves or changes a computer and the resulting new machine is valid, patentable subject matter if the programmed machine is claimed as apparatus.[308]

As of March 1971, each nation's position on program patentability was as follows:

In Canada, a programme was simply not patentable subject matter either as a process, an apparatus, a manner of manufacture, or under any other guise. A programme device was similarly not patentable subject matter. Furthermore, even if someone were able to discover a means of having a programme declared valid subject matter, the programme would fail the tests of obviousness and novelty since it would be within the expected skills of competent programmers. Finally, the Conceptual Definition of a computer[309] was accepted, thereby destroying any potential apparatus claim to a "programmed computer."

A programme was patentable subject matter in Britain for two reasons. The concept that a programme was simply an intellectual, literary, or artistic writing had been rejected. A programme had been compared to a machine cam and had been held a new manner of manufacture. A programme device was found patentable subject matter since punching a card, like contouring a cam, was different from writing on that card. A programmed computer could also succeed on an apparatus claim as being an improved manner of manufacture over an unprogrammed computer.[310]

In the United States, a programme was patentable as a process within the technological arts, whether or not it operated on physical

305. *Id.* at 1016, 169 U.S.P.Q. at 102, 2 CLSR at 1002.

306. *Id.* at 1014-15, 169 U.S.P.Q. at 101, 2 CLSR at 998-99.

307. *Id.* at 1015-16, 169 U.S.P.Q. at 101-02, 2 CLSR at 1000-01. It was within this area that the specific findings of fact led to the rejection of several claims. Any claim which referred to processing an "electrical signal" was allowed, whereas those claims which referred simply to a "signal" were rejected.

308. *Id.* at 1016, 169 U.S.P.Q. at 102, 2 CLSR at 1001-02. In doing so, Judge Almond approved the previous *Prater II* and *Bernhart* holdings. *See* notes 262-66 & 281-89 *supra* and accompanying text.

309. *See* notes 9-10 *supra* and accompanying text.

310. Britain had accepted the Physical Definition of hardware. *See* note 8 *supra* and accompanying text.

matter and whether or not an apparatus was disclosed. A programme device was patentable only if the novelty did not lie in the configuration of the punched holes, *i.e.*, in the data or messages contained on the cards. Furthermore, a programmed machine was an improvement over an unprogrammed machine and thus was appropriate subject matter for an apparatus claim.

D. Reversal of Positions: May, 1971 - November, 1972

In May 1971, the C.C.P.A. continued its practice of reversing Board of Appeals rejections in its decision on a case "directed solely to the art of data-processing itself . . .," unlike most earlier cases in which "some subsidiary or additional art was involved."[311] The claims in this case were for a method of converting binary coded decimal numbers (BCD) to pure binary numbers by a series of add and shift operations. Both the examiner and the Board based their rejections on the fact that the disclosed algorithm could be executed by a human with pencil and paper.[312] Finding the claims patentable, the C.C.P.A. refined its earlier doctrines. In so doing, however, the court cast doubt on at least one of those doctrines. Judge Rich, pointing out the decline and fall of the "mental steps" doctrine, stated that there was "a 'standard of reasonableness' in the interpretation of claims which is that they should be given the meaning they would have 'to one of ordinary skill in the pertinent art when read in light of and consistently with the specification.'"[313] Ruling that a reasonable interpretation of the claims did not cover the process implemented by the human mind, the court stressed that the process was utilized on a specific piece of apparatus.[314] This appears to be a weakening of earlier judicial statements that a process did not have to operate on physical matter or disclose an apparatus.

Dealing with another claim, the court stated that:

> [r]ealistically, the process . . . has no practical use other than the more effective operation and utilization of a *machine* known as a digital computer. It seems beyond question that the machines—the computers—are in the technological field, are a part of one of our best-known technologies, and are in the "useful arts" rather than the "liberal arts" . . . . How can it be said that a process having no practical value other than enhancing the internal operation of those machines is not likewise in the technological or useful arts?[315]

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311. *In re* Benson, 441 F.2d 682, 686, 169 U.S.P.Q. 548, 551, 2 CLSR 1030, 1037 (C.C.P.A. 1971).

312. *Id.* at 685, 169 U.S.P.Q. at 551, 2 CLSR at 1036.

313. *Id.* at 687, 169 U.S.P.Q. at 552, 2 CLSR at 1038.

314. *Id.* at 687, 169 U.S.P.Q. at 552, 2 CLSR at 1038-39.

315. *Id.* at 688, 169 U.S.P.Q. at 553, 2 CLSR at 1041 (emphasis in original). The

In May, 1971, the C.C.P.A. was faced with an appeal concerning a programme which allowed noninterfering portions of sequential programme steps to overlap for faster computer operation.[316] The examiner had rejected the claims "on the grounds that the method claimed amounts to the inherent function of the apparatus. This rejection and the board's decision sustaining it, were made prior to . . . [the] decision in *In re Tarczy-Hornoch* . . . . That decision . . . overruled the line of *previous* decisions sanctioning that theory of rejection."[317] The C.C.P.A. reversed the Board's "inherent function" rejection and its findings dealing with prior art. The court, however, affirmed the Board's rejection on the ground of insufficient disclosure.[318] The court stated that

> [a]t the outset, one point needs particular discussion. In their arguments appellants seem to imply that, because the claims on appeal are method claims, it is not material whether there is an adequate disclosure of the apparatus. This is clearly not so. Appellants do not deny that the application must be adequate to teach how to practice the claimed method. If such practice requires particular apparatus, and we think it plainly does, it is axiomatic that the application must therefore provide a sufficient disclosure of that apparatus . . . .[319]

The drawings in the application were in the form of block diagrams, representing the elements of a computer by functionally labelled blocks interconnected by lines. By ruling as he did, Judge Baldwin cast doubt on previous decisions concerning the patentability of a process within the technological arts.[320] Not only did the court require identification of particular apparatus, but it ruled that claims had to be drawn to fully disclose the operation of the computer. The test of "ordinary skill in the pertinent art" was not mentioned.

One week later, in *In re McIlroy*,[321] Judge Lane seemed to dispute the *Ghiron* decision when he reversed the Board's rejections of a method of retrieving symbolic data in a computer system. Citing *Musgrave*,[322] he stated that "machine implementation versus mental implementation is not a determinative dichotomy in deciding whether a

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patentability of Benson's claim apparently rested on the "technological arts" doctrine and not on the adequacy of disclosure of the apparatus.

316. *In re* Ghiron, 442 F.2d 985, 169 U.S.P.Q. 723, 3 CLSR 70 (C.C.P.A. 1971).

317. *Id.* at 987-88, 169 U.S.P.Q. at 724, 3 CLSR at 73 (emphasis in original).

318. The Board's position "was that definite apparatus is required to practice the claimed method; that an adequate disclosure of how to practice the method requires a disclosure, or reference to a disclosure, of suitable apparatus; and that the present application lacks such a disclosure." *Id.* at 991, 169 U.S.P.Q. at 727, 3 CLSR at 78.

319. *Id.*

320. *Id.* at 991-92, 169 U.S.P.Q. at 727-28, 3 CLSR at 79-81.

321. 442 F.2d 1397, 170 U.S.P.Q. 31, 3 CLSR 81 (C.C.P.A. 1971).

322. 431 F.2d 882, 167 U.S.P.Q. 280, 2 CLSR 920 (C.C.P.A. 1970).

method is statutory . . . ."[323] Referring to *Benson*,[324] Judge Lane reaffirmed the doctrine "that 'a process having no practical value other than enhancing the internal operation of [digital computers]' was in the technological or useful arts and hence was statutory"[325] subject matter.

The Ninth Circuit was faced shortly thereafter with a claim for pretesting an analog computer.[326] Machine claims defined an apparatus as being

> composed of certain defined elements in combination. Carried to its logical conclusion, the argument . . . [by the Patent Office] would result in a rule to the effect that A&P [*Great Atlantic and Pacific Tea Co. v. Supermarket Equipment Corp.*, 340 U.S. 147 (1950)] precludes the patenting of virtually every new mechanical or electrical device since the vast majority, if not all, involve the construction of some new device (or machine or combination) from old elements. The A&P rule does not require that a combination patent be held invalid merely because all of the elements in the combination are old. It supports patentability where the combination produces "unusual or surprising consequences."[327]

This conclusion would imply that a programmed computer could qualify as valid subject matter as long as the result of the process satisfied the test of "ordinary skill in the pertinent art," or the Canadian test of being "within the expected skills of competent persons in the field."

Waldbaum, the first Canadian ruling, was decided on December 8, 1971.[328] The claim was for a method and an apparatus that counted the number of busy trunk lines on a k-register in a communications system.[329] The Chairman, with the approval of the Commissioner of Patents, arrived at several conclusions which did not precisely coincide with the Canadian Patent Office Guidelines.

First, the Chairman ruled that a machine programmed to operate in a nonobvious manner is patentable as being different from a machine with another programme or unprogrammed.[330] While stating that a computer programme is not patentable *per se*,[331] the Chairman stated that "it is proper to equate a method for controlling the operation of a machine with a method of operating a machine and since the Canadian Patent Office regularly permits claims to methods of operation,"[332] a

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323. 442 F.2d at 1398, 170 U.S.P.Q. at 31, 3 CLSR at 83.

324. *In re* Benson, 441 F.2d 682, 169 U.S.P.Q. 548, 2 CLSR 1030 (C.C.P.A. 1971).

325. 442 F.2d at 1398, 170 U.S.P.Q. at 31, 3 CLSR at 83.

326. Reeves Instrument Corp. v. Beckman Instruments, Inc., 444 F.2d 263, 170 U.S.P.Q. 74, 3 CLSR 693 (9th Cir. 1971).

327. *Id.* at 270, 170 U.S.P.Q. at 80, 3 CLSR at 704-05.

328. Waldbaum's Case, 3 CLSR 164 (Can. Pat. App. Bd. 1971).

329. The same claim was filed in the United States. *See* notes 336-37 *infra* and accompanying text.

330. 3 CLSR at 170-72.

331. *Id.* at 168.

332. *Id.* at 171.

rejection based on such a claim should not be upheld. This statement relied on several British decisions disallowing such claims "because the result of the method would be intellectual information and therefore not a manner of new manufacture.[333] The Chairman concluded that the new use of a known apparatus is not patentable, but that the method of using it is valid subject matter.[334] Thus, the method and apparatus claims were allowed, but the new use of the address register was rejected.[335]

The C.C.P.A. also allowed the basic claims, set forth by Waldbaum in his United States application, though for different reasons.[336] The court held that the mental steps doctrine was not a valid ground for rejection. "[The test of] whether appellant's process is a 'statutory' invention depends on whether it is within the 'technological arts' . . . [which] is synonymous with the phrase 'useful arts' as it appears in . . . the Constitution."[337] The court also pointed out that there was no requirement to disclose a special apparatus, or the old process, under United States patent law.[338] A process patent would not require total disclosure of an apparatus, as long as a skilled programmer could adopt the invention for his own use. It would seem that in *Waldbaum*, Judge Baldwin was retreating from his stance in *Ghiron*.

On November 20, 1972, the first programme patent case was decided by the United States Supreme Court—*Gottschalk v. Benson*.[339] The Benson application referred to an invention which was related "to the processing of data by program and more particularly to the programmed conversion of numerical information in general purpose digital computers."[340] The Court specifically noted that the "claims were not limited to any particular art or technology, to any particular apparatus or machinery, or to any particular end use."[341]

The rejection of Benson's claims was accomplished in a circuitous manner involving five separate steps. First, the Court defined the invention as an algorithm.[342] Second, the Court set forth a rule on the

333. *Id.*
334. *Id.* at 172.
335. *Id.*
336. *In re* Waldbaum, 457 F.2d 997, 173 U.S.P.Q. 430, 3 CLSR 173 (C.C.P.A. 1972).
337. *Id.* at 1003, 173 U.S.P.Q. at 434, 3 CLSR at 181.
338. 35 U.S.C. § 112 (1970), *reprinted in* the Appendix in this issue.
339. 409 U.S. 63, 175 U.S.P.Q. 673, 3 CLSR 256 (1972).
340. *Id.* at 64, 175 U.S.P.Q. at 674, 3 CLSR at 256.
341. *Id.*
342. The patent sought is on a method of programming a general-purpose digital computer to convert signals from binary coded decimal form into pure binary form. A procedure for solving a given type of mathematical problem is known as an "algorithm." The procedures set forth in the present claims are of that kind; that is to say, they are a generalized formulation for programs to solve mathematical problems of converting

patentability of processes, holding that "[t]ransformation and reduction of an *article* 'to a different state or *thing*' is the clue to the patentability of a process claim that does not include particular machines."[343] Under this rule, while an algorithm is a process, for it to be patentable, the claims must be drafted either to disclose a computer or to show how the algorithm would alter the physical components of a computer.

In Step Three, however, the Court stated:

> It is argued that a process patent must either be tied to a particular machine or apparatus or must operate to change articles or materials to a "different state of thing." We *do not hold that no process patent could ever qualify* if it did not meet the requirements of our prior precedents.[344]

This statement is subject to two possible interpretations. The Court might have been stating that this *particular* programme did not qualify for patent protection, possible because it was obvious, but that other programmes might. In the alternative, this statement could be interpreted as holding that algorithms *per se* would not qualify as processes but that the patentability of other claims or other forms of art could not be predicated and, therefore, the boundaries of the rule were purposely being left vague.

In the next step, the Court referred to the algorithm as a "formula" or "mathematical formula."[345] It might be argued that all programmes are not formulae and that the Court was ruling only on this specific algorithm. That is the only interpretation which would lend support to those who believe that the *Benson* decision can be restricted.[346]

The last step was the enunciation of a "substantial practical application" test:

> The mathematical formula involved here has no substantial practical application except in connection with a digital computer, which means that if the judgment below is affirmed, the patent would wholly pre-empt the mathematical formula and *in practical effect would be a patent on the algorithm itself*.[347]

In effect, as long as a programme is classified as a mathematical formula, a patent will not issue.

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one form of numerical representation to another. From the generic formulation, programs may be developed as specific applications.

Id. at 65, 175 U.S.P.Q. at 674, 3 CLSR at 257.

343. *Id.* at 70, 175 U.S.P.Q. at 676, 3 CLSR at 261 (emphasis added).

344. *Id.* at 71, 175 U.S.P.Q. at 676, 3 CLSR at 262 (emphasis added).

345. *Id.* at 65, 175 U.S.P.Q. at 674, 3 CLSR at 257.

346. *See, e.g.*, Titus, *Supreme Court Ruling Fails to Settle Issue of Patenting Computer Programs*, 16 COM. ACM 63 (1973); Goetz, *A Different Viewpoint on the Benson-Tabbott Decision*, 16 COM. ACM 334 (1973).

347. 409 U.S. 63, 71-72, 175 U.S.P.Q. 673, 676, 3 CLSR 256, 262 (1972) (emphasis added).

The Court also noted that the breadth of the claims precluded patentability. This was not a necessary step for the Court to take, since it had already ruled that the algorithm was not patentable, however, it does serve as a warning to future claimants not to claim both known and unknown uses of an invention.[348]

E. Summary

The *Benson* decision has created an atmosphere of uncertainty in the Patent Offices of Canada and the United States. In Canada, according to the Patent Office examiners, a computer programme *per se* is not patentable, but a method of controlling the operation of a machine is. Furthermore, a programmed machine is an apparatus separate and apart from an unprogrammed machine. According to the Patent Office Guidelines, a computer programme is not patentable either by itself (as a process) or combined with a computer (as an apparatus, machine, or combination). Further, the development of computer programmes falls within the expected skills of competent experts in the field and, as such, lacks the requirements of novelty and nonobviousness. Finally, the components of a computer are considered to be specifically designed so that a reordering of its known capabilities will not qualify for a machine or apparatus claim.[349]

American law can be considered relatively unsettled in certain aspects. The following assertions, however, appear to be valid: (1) if an algorithm is interpretable as a mathematical formula, it is not patentable; (2) if the claims do not disclose an apparatus or explain how the process operates to change the physical state of a computer, it is probably not patentable; and, (3) if the claims are carefully drawn to protect a known use of a nonmathematical application programme (as opposed to a mathematical algorithm) and apparatus is disclosed, a patent *may* be granted as long as it meets the tests of novelty, nonobviousness, and utility.

The conclusion to be drawn is that programmes fail to comply with the traditional concepts of patent law and that the courts in the United States and the Patent Office in Canada are not yet prepared to extend traditional patent concepts to include programmes.

V. Some Implications of the Patent System

Although the entire situation is in a state of flux, certain conclusions about Canadian patent law can be made. This section, divided into two parts, will analyze some of the potential costs and effects of patents on computer programmes. First, a model is developed to analyze the value of patents to Canadian inventors. Second, the litigious

348. *Id.* at 68, 175 U.S.P.Q. at 675, 3 CLSR at 259.

349. It would appear that the Canadian Patent Office has adopted the Conceptu-

nature of the patent system is analyzed and a second model is developed to estimate the potential, direct legal costs of patent protection.

Data on patent costs, presented in a classical, statistical format, has apparently never been used in any effort to model the Canadian patent system. In preparing an effort in that direction, the first step is to develop the data to be used; the second step is to present the model itself.

In 1967, the Economic Council of Canada commissioned several studies to analyze the long-term economic objectives of patent law. One of these studies, by O.J. Firestone, resulted in publication of the first comprehensive statistical study and industrial survey of the Canadian patent system.[350] Firestone conducted two surveys. The first, a statistical sample, surveyed all patents granted to Canadians in 1957, 1960 and 1963, and a random sample of five percent of all patents granted to foreign inventors.[351] The second survey consisted of in-depth interviews with fifteen firms (five Canadian-controlled and ten foreign-controlled), which owned or used a total of 30,000 Canadian patents in 1968 (approximately ten percent of all patents legally in force in Canada).[352] This study was

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al Definition of hardware. *See* notes 9-10 *supra*.

350. FIRESTONE, *supra* note 3.

351. As with any statistical survey, there are positive and negative factors to be considered when interpreting the data. In this survey, Canadian inventors represented approximately five percent of the total patents granted during the three years in question; yet the sample size consisted of almost the entire universe. The United States and other foreign inventors accounted for ninety-five percent of the universe, yet only five percent were sampled. To allow for the discrepancies Firestone employed a weighting method. *Id.* at 380, app. B, Survey Notes.

Firestone listed four basic limitations which applied to the statistical survey (*Id.* at 381-82):

1. The proportion of Canadian-owned patents to the total number might be slightly understated since it was impossible to contact every Canadian patent holder.
2. Weighting coefficients were applied to the sector data and the sum of the weighted sector data differed from the actual totals by approximately 0.5 percent. Differences in totals were listed as "not stated."
3. There was a fifty percent response ratio to the survey questionnaire. This ratio might improperly state the case for patent holders who did not utilize their patents. *Id.* at 382.
4. The survey covers the years 1957, 1960 and 1963 only. It ignores any changes in the structure of the invention industry which may occur when using such data to project into the future.

352. In 1967, these 15 firms produced a total of $4.7 billion in sales (approximately twelve percent of the estimated total gross value of all manufacturing output in Canada), and employed a total of 129,630 persons (approximately 13.5% of total employment in manufacturing). Firestone listed five limitations to this survey (*Id.* at 384-85):

1. Since large firms were sampled, the sixty percent of Canadian manufacturing firms which employ less than 500 persons was not represented.

> the first in-depth economic inquiry into the working of the Canadian patent system—its effect on individual inventiveness and corporate initiative, research and development work, innovational activity, industrial diversification, international commercial relations, standard and quality of living, and economic growth.[353]

The following models represent an extension of Firestone's economic inquiry and an attempt to predict the impact of extending patent protection to computer programmes.

A. Model I: The Beneficiaries of the Patent System

Model I illustrates the probability of a Canadian being able to benefit from the patent system by putting his invention into use. The importance of this model is the fact that if a significant number of the inventions in use were owned by Canadians, one could conclude that the patent system was of some benefit to Canadian industry. To determine the significance of this number, two specific sub-models have been developed. The first analyzes the inventions which are worked in Canada. The second examines the inventions which are patented in Canada, but are worked elsewhere. When a patent is put to use inside *and* outside Canada, it appears in both models.

Both models begin at the application state. Once an application is filed, one of three steps occurs: the application is abandoned; the Patent Office grants the patent; or the Patent Office refuses it.[354]

The procedures under the Canadian Patent Act and the work load on the examiners in the Canadian Patent Office tend to create a greater percentage of patents being granted than in the United States. Correspondingly, the abandonment ratio in Canada for 1968-69 was 9.5%

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2. The survey ignored the views of small, independent inventors and concentrated on large firms.
3. The firms interviewed produce a wide variety of products, but did not represent a complete mix of the Canadian industrial structure.
4. Since large firms have traditionally been viewed as the true beneficiaries of a patent system, it could be argued that they represented only the vested-interest point of view.
5. "Some of the data supplied were approximate estimates, and thus were not based on a detailed examination of company records." *Id.*

353. *Id.*

354. It is difficult to obtain reliable statistics on the success rate of applications, because a patent which was granted in 1968-69 may have been the subject of an application filed in the period 1967-68, 1966-67 or earlier. As of 1969, it was estimated that the time involved in obtaining a patent was between twenty-four and thirty-six months. *Id.* at 33. In 1958-59, there were 22,912 filings in the Canadian Patent Office and 18,293 grants for a "success ratio" of 79.84%. In 1968-69, there were 31,091 filings and 27,703 grants for a "success ratio" of 89.10%. The "success ratios" in the United States for the same years were 67.05% and 64.31%, respectively, based on 77,978 and 96,342 filings.

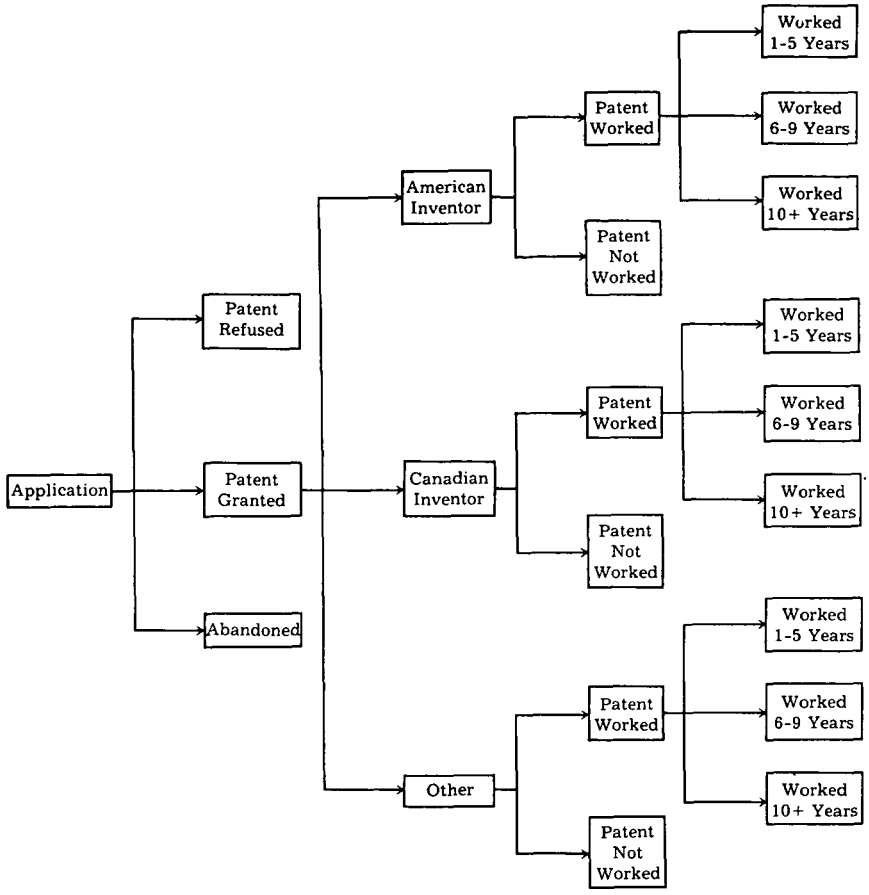

Figure I Model I. PATENT OWNERSHIP AND USE

compared to approximately thirty-two percent in the United States for the same year.[355] These percentages are not as significant as they seem, however, since the United States is the real testing ground for many

355. The Canadian abandonment ratio is lower than the corresponding American ratio for a number of reasons: (1) the bulk of Canadian patent filings originates abroad and foreigners are less likely to file unpatentable ideas because of greater experience and cost consideration; (2) more patent applications from abroad are filed by corporations rather than by individuals and they are likely to be better prepared, researched and cleared against prior references than is likely to be the case for Canadian applications; and (3) the examination of patents filed in the U.S. is claimed to be stricter than is the practice in Canada.

Id. at 259 (footnotes omitted). For the purposes of these models, an abandonment ratio of 9.5% and a success ratio of 89.1% are used. Both ratios are the exact figures for 1968-69. The remaining 1.4% (89.1+9.5=98.6) constitutes the "failure ratio."

potential applications before the Canadian Office; and, arguably, the quality of a Canadian patent is less than that of an American patent, due to the abilities of the respective Patent Offices to examine the state of the prior art.[356]

Three basic categories of patent ownership are considered: Canadian, American and Other.[357] Firestone's statistical sample showed that the percentage of patents granted by country of residence for 1957, 1960 and 1963 were as follows: Canada, 5.4%; United States, 70.0%; and Other, 24.6%.[358] These figures correspond very closely with those in the Annual Report for the Department of Consumer and Corporate Affairs for 1968-69 shown in Table V-1.[359] It appears that non-Canadian inventors use the Canadian patent system more than Canadian inventors; but the available information does not enable one to conclude that non-Canadians gain more benefit from that use or that they benefit at the expense of Canadian inventors. For the purposes of the model, the actual data from 1968-69 are used rather than the survey approximations.

TABLE V-1

RESIDENCE OF PATENT OWNER (1968-69)

Residence of Inventor	Patents Granted	Percent
Canada	1,433	5.2
United Kingdom	2,013	7.3
Commonwealth Countries	135	0.5
United States	18,542	66.9
Europe	4,897	17.6
Other Countries	683	2.5
TOTAL	27,703	100.0

SOURCE: DEPARTMENT OF CONSUMER AND CORPORATE AFFAIRS, ANNUAL REPORT FOR THE FISCAL YEAR ENDED MARCH 31, 1969 (1970).

356. Firestone questions the validity of this claim (*id.* at 256-61), but does make recommendations for improving the quality of the Canadian's grant.

357. A Canadian-owned invention was defined, in the case of an individual, as one taken out by an inventor resident in Canada. In the case of a company, a Canadian-owned invention was defined as one obtained by a firm which was not foreign-owned or controlled. The latter group of firms was taken to be all companies so designated under the Corporations and Labour Unions Returns Act (COLURA). Also treated as foreign-owned were patents obtained by individuals residing abroad.

Id. at 379-80 (footnotes omitted).

358. *Id* at 66.

359. The close correspondence between the survey and this Report arguably adds credibility to the other statistics in the survey.

TABLE V-2

SAMPLE SURVEY OF PATENTS GRANTED IN CANADA, 1957, 1960, and 1963 COMBINED

	Number of Patents	Percent
Canada		
Individual	206	20.9
Corporate	642	65.0
Government	139	14.1
Total	987	100.0
United States		
Individual	678	5.4
Corporate	11,687	93.1
Government	192	1.5
Total	12,557	100.0
Other Number		
Individual	418	9.4
Corporate	3,943	88.8
Government	80	1.8
Total	4,441	100.0
Total Number		
Individual	1,302	7.2
Corporate	16,272	90.5
Government	411	2.3
Total	17,985	100.0

SOURCE: O. FIRESTONE, ECONOMIC IMPLICATIONS OF PATENTS 125 (1971).

An analysis of the data presented in Table V-2 shows that a large percentage of Canadian patent holders are individual inventors.[360] Of significance are the high number of Canadian *individual* patentees as compared with United States and foreign *corporations*. It is inevitable that this would be a major factor leading to licensing agreements between Canadian patent holders and foreign firms,[361] since individuals and small corporations "do not have the facilities, capital and experience, to develop their inventions, and they are content to sell their inventions either outright or to make them available to others on a license basis."[362] This is confirmed in Table V-3.

360. In Table V-2, the term "individual" includes independent inventors; the term "corporate" includes employees of the company holding the patent as well as employees of the original patentee.

361. *Id.* at 129.

362. *Id.* at 71.

TABLE V-3

LICENSING AGREEMENTS BY COUNTRY OF OWNERSHIP

Number of Licenses Per Patents	Canada		United States		Other Countries	
	Number	Percent	Number	Percent	Number	Percent
1	114	76.5	1,487	88.8	219	84.6
2	18	12.1	157	9.2	20	7.7
3 and over	17	11.4	34	2.0	20	7.7
TOTAL	144	100.0	1,678	100.0	259	100.0

SOURCE: O. FIRESTONE, ECONOMIC IMPLICATIONS OF PATENTS 71 (1971).

From the point of view of developing a Canadian software industry, it is probable that only corporate patentees, whether direct holders or licensees, could withstand United States competition. If so, the large number of individual Canadian patentees would indicate that patent protection for programmes would not be beneficial to the establishment of a domestic software industry, since United States firms would dominate individual Canadian inventors. Table V-4 shows that licensing agreements between Canadian-owned firms are less frequent than between United States parents and their Canadian subsidiaries or be-

TABLE V-4

NUMBER OF VOLUNTARY LICENSING AGREEMENTS ENTERED WITH CANADIAN FIRMS FOR INVENTIONS FOR WHICH PATENTS WERE GRANTED IN CANADA BY COUNTRY OF OWNERSHIP, THREE YEAR TOTAL, 1957, 1960 AND 1963

Number of Licensing Agreements	Canada		United States		Other Countries	
	Number	Percent	Number	Percent	Number	Percent
0	832	84.3	10,739	85.5	4,182	94.1
1	114	11.6	1,487	11.9	219	4.9
2	18	1.8	157	1.3	20	0.5
3	8	0.8	0	0.0	20	0.5
4	6	0.6	0	0.0	0	0.0
5	1	0.1	17	0.1	0	0.0
6	1	0.1	0	0.0	0	0.0
7	0	0.0	0	0.0	0	0.0
8	0	0.0	0	0.0	0	0.0
9	1	0.1	17	0.1	0	0.0
Not stated	6	0.6	140	1.1	0	0.0
TOTAL	987	100.0	12,557	100.0	4,441	100.0

SOURCE: O. FIRESTONE, ECONOMIC IMPLICATIONS OF PATENTS 369 (1971).

tween Canadian inventors and foreign firms. Based on these statistics, the proportion of patents resulting in license agreements to the total number of patents granted by country of ownership was as follows: Canada, 15%; United States, 13%; and other countries, 6%.

Tables V-3 and V-4 show that Canadian inventors were more likely to grant multiple licenses (23%) than were United States patentees (11%) or other foreign patent holders (15%).[363] When combined with the fact that more Canadian-owned patents were licensed, the only conclusion available is that the Canadian Patent Act is not conducive to the growth of small Canadian-owned firms. It appears that only large, established Canadian firms can take advantage of patent protection. The question of whether or not to extend patent protection to computer programmes, if the goal is to develop and protect small Canadian software firms, should be answered in the negative.

Unfortunately, even if a patent is granted by the Canadian Patent Office it may not be put to use. Furthermore, even if it is worked, it may not be worked in Canada. Table V-5 and V-6 show that 83.7% of the patents granted in Canada during the survey years were never worked in Canada (Table V-5) and 49.0% were never worked outside Canada (Table V-6).[364]

TABLE V-5

NUMBER OF YEARS INVENTION WAS WORKED IN CANADA FOR WHICH PATENTS WERE GRANTED IN CANADA, 1957, 1960 AND 1963

Number of Years	1957		1960		1963		3 Year Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
0	3,464	83.4	6,166	83.6	5,415	83.9	15,045	83.7
1	38	0.9	75	1.0	72	1.1	185	1.0
2	41	1.0	28	0.4	45	0.7	114	0.6
3	37	0.9	49	0.7	38	0.6	124	0.7
4	26	0.6	52	0.7	41	0.6	119	0.7
5	38	0.9	35	0.5	224	3.5	297	1.7
6	1	0.0	82	1.1	132	2.0	215	1.2
7	1	0.0	69	0.9	102	1.6	172	0.9
8	44	1.1	196	2.7	128	2.0	368	2.0
9	22	0.8	100	1.3	23	0.4	155	0.9
10 and over	362	8.7	481	6.5	113	1.8	956	5.3
Not stated	71	1.7	46	0.6	118	1.8	235	1.3
TOTAL	4,155	100.0	7,379	100.0	6,541	100.0	17,985	100.0

SOURCE: O. FIRESTONE, ECONOMIC IMPLICATIONS OF PATENTS 346 (1971).

363. *Id.* at 71.

364. *Id.* at 346 (Table 4) & 345 (Table 3), respectively.

TABLE V-6
NUMBER OF YEARS INVENTION WAS WORKED OUTSIDE CANADA FOR WHICH PATENTS WERE GRANTED IN CANADA, 1957, 1960, and 1963

Number of Years	1957		1960		1963		3 Year Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
0	2,148	51.7	3,417	46.3	3,246	50.3	8,811	49.0
1	105	2.5	189	2.6	117	1.8	411	2.3
2	106	2.5	148	2.0	102	1.6	356	2.0
3	99	2.4	194	2.6	101	1.6	394	2.2
4	65	1.7	121	1.6	139	2.1	325	1.8
5	66	1.7	167	2.3	262	4.1	495	2.8
6	43	1.0	218	3.0	253	2.9	514	2.9
7	53	1.2	62	0.8	270	4.2	385	2.4
8	18	0.4	277	3.8	620	9.6	915	5.1
9	124	3.0	191	2.6	571	8.9	886	4.9
10 and over	1,174	28.2	2,150	29.1	588	9.1	3,912	21.7
Not stated	154	3.7	245	3.3	182	2.8	581	3.2
TOTAL	4,155	100.0	7,379	100.0	6,451	100.0	17,985	100.0

SOURCE: O. FIRESTONE, ECONOMIC IMPLICATIONS OF PATENTS 345 (1971).

Three explanations for the tendency to work patents outside Canada, rather than inside the country, are offered:

1. Economics of scale in many instances make production abroad and importation into Canada preferable to the establishment of production facilities in Canada.
2. Levels of Canadian tariff protection are in many instances sufficiently low to favor the importation of goods over the establishment of branch plant operations or to encourage domestic producers to manufacture such items under licensing arrangements.
3. Compulsory licensing has been used very little in Canada; reasons given include the cumbersome nature of administrative procedures, and basic economic consideration such as the size of the market and lack of entreprenurial personnel.[365]

If patent protection were extended to computer programmes, while the current trend in licensing continued, the Canadian patent system would harm, rather than help, the development of a domestic software industry, both in terms of national, Canadian-owned firms and of a potential export industry. To achieve a different result, other changes would have to be made, such as a revision of tariff agreements, tax incentives to help develop Canadian-owned firms, and subsidies to assist in the development of individual programmes and their exportation to other markets.

365. *Id.* at 92-93 (footnotes omitted).

TABLE V-7

NUMBER OF YEARS INVENTION WAS WORKED IN CANADA, FOR WHICH PATENTS WERE GRANTED IN CANADA, BY COUNTRY OF OWNERSHIP, THREE YEAR TOTAL 1957, 1960 AND 1963

Number of Years	Canada		United States		Other Countries	
	Number	Percent	Number	Percent	Number	Percent
0	473	48.0	10,493	83.5	4,181	93.9
1	65	6.6	105	0.8	20	0.5
2	49	5.0	70	0.6	0	0.0
3	20	2.0	105	0.8	0	0.0
4	27	2.7	70	0.6	20	0.5
5	58	5.9	245	2.0	20	0.5
6	26	2.6	175	1.4	20	0.5
7	29	2.9	105	0.8	40	0.9
8	56	5.7	262	2.1	40	0.9
9	27	2.7	122	1.0	0	0.0
10 and over	151	15.3	700	5.6	80	1.8
Not stated	6	0.6	105	0.8	20	0.5
TOTAL	987	100.0	12,557	100.0	4,441	100.0

SOURCE: O. FIRESTONE, ECONOMIC IMPLICATIONS OF PATENTS 364 (1971).

TABLE V-8

NUMBER OF YEARS INVENTION WAS WORKED OUTSIDE CANADA, FOR WHICH PATENTS WERE GRANTED IN CANADA, BY COUNTRY OF OWNERSHIP, THREE YEAR TOTAL, 1957, 1960 AND 1963

Number of Years	Canada		United States		Other Countries	
	Number	Percent	Number	Percent	Number	Percent
0	842	85.4	5,702	45.4	2,369	53.3
1	13	1.3	332	2.6	60	1.4
2	13	1.3	245	2.0	100	2.3
3	10	1.0	315	2.5	60	1.4
4	12	1.2	280	2.2	40	0.9
5	14	1.4	420	3.3	80	1.8
6	5	0.5	332	2.6	179	4.0
7	5	0.5	297	2.4	119	2.7
8	13	1.3	735	5.9	219	4.9
9	9	0.9	717	5.8	219	4.9
10 and over	31	3.2	2,797	22.2	936	21.0
Not stated	20	2.0	385	3.1	60	1.4
TOTAL	987	100.0	12,557	100.0	4,441	100.0

SOURCE: O. FIRESTONE, ECONOMIC IMPLICATIONS OF PATENTS 363 (1971).

Tables V-7 and V-8 indicate, by country of ownership, the percentage of patents which were worked as compared with those which were not worked.[366] Combined with the data from Tables V-5 and V-6, one can obtain a breakdown of the number of years a patent was actually used. The only statistics available are found in Firestone's study, but their format fails to show how many patents were actually worked both inside and outside Canada. Therefore, two separate sets of data must be presented, and the model run twice. The first, Model I-A, shows the operation of the patent system in general, with specific statistics on patents worked inside Canada. The second, Model I-B, duplicates Model I-A for the first part, but also presents statistics on patents worked outside Canada.

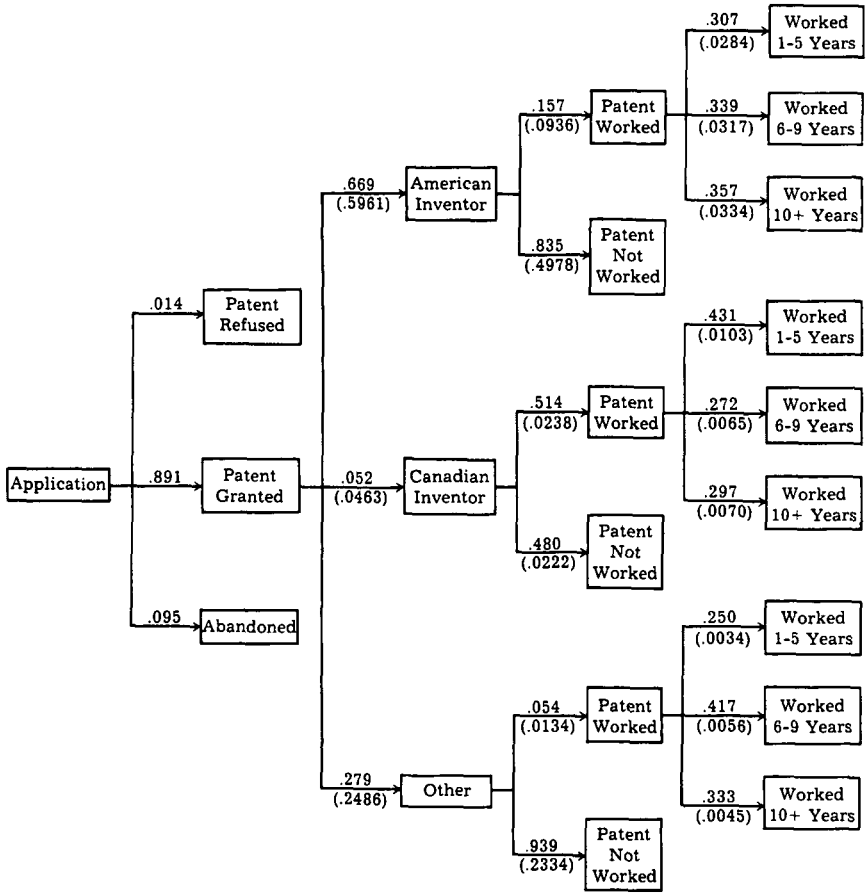

Figure II Model I-A.

PATENT OWNERSHIP AND USE PATENTS WORKED INSIDE CANADA

366. *Id.* at 364 (Table 28) & 363 (Table 27).

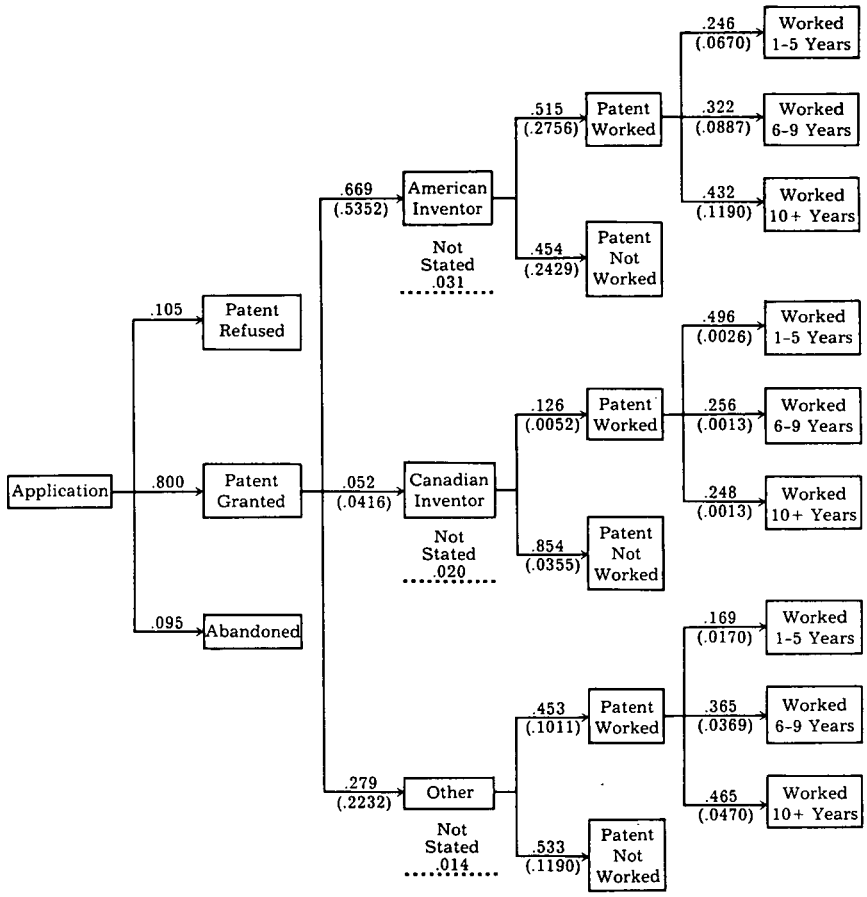

Figure III Model I-B.

PATENT OWNERSHIP AND USE PATENTS WORKED OUTSIDE CANADA

B. Implications of Model I

Analyzing Model I, the following conclusions emerge:

1. Firestone's analysis indicates that foreign firms and individuals held more patents in Canada than did domestic firms and individuals. Furthermore, Canadians tended to work a greater percentage of their patents in Canada than did Americans and other inventors. Model I-A dramatically illustrates, however, that the tendency of Canadians to use their patents fails to offset American dominance of the patent system. The conclusion is inevitable that Americans have successfully used the Canadian patent system to foster production to a far greater degree than either Canadian or "other" inventors (9.36%, United States; 2.38%, Canadian; and 1.34%, Other (in Canada); and 27.5%, United States; .52%, Canadian; and 10.1%, Other (outside Canada)).

2. Model I-A shows that American-owned inventions are worked longer than either Canadian or "Other"-owned ones. Thus, American firms, operating in Canada and using the Canadian patent system, have a greater probability of recovering research and development costs than do Canadian firms. These increased returns allow American firms to undersell Canadian competitors and still have profits to reinvest in further research.

3. Without comparing Model I-A with Model I-B, it would appear that: (i) Model I-A is unable to prove or disprove the claim that patent protection fosters industrial growth in Canada; (ii) Model I-A does show that whatever growth does occur in Canada as a result of the patent system is more likely to benefit Americans than Canadians; and thus, (iii) Model I-A establishes that patent protection for computer programmes is not likely to foster the development of a Canadian-owned software industry.

4. Model I-B reinforces the implication that American firms tend to obtain Canadian patents but produce their product outside Canada. Such actions prevent, rather than foster, the growth of Canadian firms because of the need to invent around American patents (a costly procedure) or obtain licenses from American firms (a costly step which is seldom taken).

5. Model I-B shows that even "Other" inventors take advantage of the Canadian patent system more than Canadian firms.

6. From the two models, it appears that extending patent protection to computer programmes would tend to foster first, American production facilities outside Canada; second, American production facilities inside Canada; third, "Other" production facilities outside Canada; and lastly, Canadian production facilities inside Canada.

If the objective is to establish and foster the growth of Canadian-owned software firms, with possible export potential, patent protection appears to be a costly and ineffective tool.

C. Model II: Preliminary Analysis of Patent Litigation Costs

The development of a model to estimate the cost of protecting patent rights in Canada presents a new challenge—one never before considered. Though there have been general references to the litigious nature of the patent system, there has never been an attempt to model the history of Canadian patent litigation on even a preliminary basis. Model II attempts to trace the judicial life of all patent infringement cases decided by the Supreme Court of Canada since 1929.

Unfortunately, there are few statistics on the probability that a patent will be challenged in the courts; or, if challenged, that the patent will be upheld.[367] If a court holds that infringement has not occurred,

367. In Canada, studies have been done by H.C. Fox for the twenty-five years

this does not necessarily mean that the patent is valid. A study dealing with United States decisions during the seven-year period 1948-54, shows the breakdown found in Table V-9.[368] The only comparable English study did not classify the decisions by court, but simply gave a set of totals for the period 1919-49 (Table V-10).[369] Until recently in Canada, four distinct sets of data were available: all decisions between 1940 and 1959;[370] Supreme Court decisions from 1940 to 1960 (Table V-11);[371] and two sets of Supreme Court decisions from 1923 to 1948 and 1948 to 1958 (Table V-12).[372]

TABLE V-9

PUBLISHED DECISIONS, 1948-1958 UNITED STATES PATENT CASES

Court	Number of Patents	Percent
U.S. District Court		
Valid and Infringed	201	30.3
Invalid	335	53.3
Not Infringed	108	16.2
Total	663	100.0
U.S. Court of Appeals		
Valid and Infringed	77	18.0
Invalid	269	62.7
Not Infringed	83	19.3
Total	429	100.0
Supreme Court of the United States		
Valid and Infringed	2	28.6
Invalid	5	71.4
Not Infringed	0	0.0
Total	7	100.0

SOURCE: Federico, *Adjudicated Patents, 1948-1954*, 36 J. PAT. OFF. SOC'Y 233 (1956).

prior to 1948 (Fox, *The Law of Industrial and Intellectual Property: 1923-1947*, 26 CAN. BAR REV. 227 (1948)) and for the years from 1948-58 (Fox, *The Law of Patents*, 36 CAN. BAR REV. 201 (1958)). In the United States, P.J. Federico reported to the O'Mahoney Subcommittee on the years 1948-54. Federico, *Adjudicated Patents, 1948-54*, 38 J. PAT. OFF. SOC'Y 233 (1956). In England, P. Meinhardt reported on decisions from 1919-43. P. MEINHARDT, INVENTIONS, PATENTS AND TRADEMARKS 177 (2d ed. 1950).

368. Federico, *supra* note 367.

369. MEINHARDT, *supra* note 367.

370. ROYAL COMMISSION ON PATENTS, COPYRIGHTS & INDUS. DESIGNS, REPORT ON PATENTS ON INVENTION 8 (1960) [hereinafter cited as ROYAL COMMISSION].

371. *Id.*

372. *Id.* at 8-10.

TABLE V-10

ENGLISH CASES AS REPORTED IN THE REPORT OF PATENT CASES (1919-1949)

	Number of Cases	Percent
Valid and Infringed	51	28.0
Invalid	105	56.0
Not Infringed	28	16.0
Total	184	100.0

SOURCE: P. MEINHARDT, INVENTIONS, PATENTS AND TRADEMARKS 177 (2d ed. 1950).

TABLE V-11

CANADIAN REPORTED DECISIONS ON PATENTS (1940-1960)

Court	Number of Patents	Percent
All Reported Decisions (1940-1959)		
Valid and Infringed	13	43.3
Invalid	13	43.3
Not Infringed	4	13.3
Total	30	100.0
Supreme Court of Canada (1940-1960)		
Valid and Infringed	2	14.3
Invalid	10	71.4
Not Infringed	2	14.3
Total	14	100.0

SOURCE: ROYAL COMMISSION ON PATENTS, COPYRIGHTS AND INDUSTRIAL DESIGNS, REPORT ON PATENTS OF INVENTION 8 (1960).

TABLE V-12

SUPREME COURT OF CANADA

Dates	Number of Patents	Percent
1923-1948		
Valid and Infringed	10	23.8
Invalid	32	76.2
Not Infringed	n.a.	
Total	42	100.0
1948-1958		
Valid and Infringed	7	77.7
Invalid	2	22.2
Not Infringed	n.a.	
Total	9	100.0
1923-1958		
Valid and Infringed	17	33.3
Invalid	34	66.6
Not Infringed	n.a.	
Total	51	100.0

SOURCE: ROYAL COMMISSION ON PATENTS, COPYRIGHT & INDUS. DESIGN, REPORT ON PATENTS OF INVENTION 8-10 (1960); Fox, *The Law of Industrial and Intellectual Property: 1923-1947*, 26 CAN. BAR REV. 277 (1948); Fox, *The Law of Patents: 1948-1958*, 36 CAN. BAR REV. 201 (1958).

Though evidence is scanty, patent case statistics raise several issues. First, statistics on patent cases are relatively meaningless unless the actual number of patents involved in the litigation is known. Second, since studies have shown that the cost of litigation varies between the trial and appellate levels,[373] a simple summation of these statistics is inappropriate. Finally, since not all disputes reach the trial state, it is necessary to estimate the cost of reaching settlement. Each of these issues must be considered in constructing a model.

In the United States, it is estimated that litigated patents represent less than two percent of all unexpired patents,[374] whereas in Canada, the proportion is reportedly less than one percent.[375] Although this ratio appears to be small enough to be of only minor value, that is not necessarily so. Studies in the United States, have shown that only those patents which are being "worked" are litigated.[376] If one assumes that one percent of all patents issued will be litigated and that only those

373. FIRESTONE, *supra* note 3, at 50.

374. Sanders, *Counter-Comments on the Significance of Use-Rates of Potential Inventions*, 10 PAT., T.M., & COPYRIGHT J. RES. & EDUCATION 337 (1966).

375. FIRESTONE, *supra* note 3, at 51 (based on data presented to the Royal Commission on Patents, Copyrights & Industrial Designs and on a series of interviews conducted by Firestone).

376. Unpublished studies on patent costs by the Patent, Trademark & Copyright Institute.

being worked are involved, the ratio takes on new significance. According to 1968-69 Canadian data, one percent of all issued patents is 277 cases. Using the data from Model I, if an item is patented and used in Canada, the probability that it will be tested in court is .06814.[377] If it is assumed that only one-half of one percent of all patents are litigated, this ratio drops to .0341.[378] For the purpose of this model, a conservative estimate, that .73 percent of the patents will be litigated, is used, resulting in a ratio of .05. The challenge ratios for patents worked outside of Canada are .0209 if one percent are challenged and .0105 if one-half of one percent are challenged.[379] Since the interest here is in the impact and costs of patents on *Canadian* industry, the ratio applying to patents worked in Canada will be used. The second ratio would be important in analyzing the "export" costs of such an industry.

To construct the model, certain data, though unavailable, was required. In particular, once a patent is challenged in court, the probability of an appeal and the likelihood of success must be calculated before a cost table can be established. To obtain this information, two separate studies were conducted. The first analyzed all Canadian Supreme Court decisions published in FOX PATENT CASE REPORTER from 1949 to 1969 to determine the number of cases in which the trial decision was appealed and, whether upheld or reversed. The summary of these decisions appears in Table V-13.

TABLE V-13

PATENT DECISIONS OF THE SUPREME COURT OF CANADA (1940-1969)

Year	Number of Patents	Valid	Invalid	Not Infringed
1940-59	14	4	10	0
1960	1	1	0	0
1961-62	—	—	—	—
1963	2	0	2	0
1964	—	—	—	—
1965	11	1	10	0
1966	1	0	1	0
1967	3	1	1	1
1968	2	0	2	0
Total	34	7	26	1
Percent	100	20.6	76.5	2.9

377. Challenge ratio $= \dfrac{\text{Total Patents Granted x Probability of a Test}}{\text{Total Patents Granted x Probability that it will be worked in Canada}}$

$$= \frac{27{,}703 \times .01}{27{,}703 \times .147} = \frac{277.03}{4067.548} = .06814$$

378. (138.515/4067.548) = .0341.

379. 0.1 percent of all patents becomes .068 of all patents being worked and .005 becomes .034.

The second study omitted all conflict proceedings dealing with applications since that statistic properly related to the cost and proba-

TABLE V-14

CANADIAN PATENT INFRINGEMENT AND IMPEACHMENT ACTIONS 1948-1969

Case Number	Number of Patents	Trial Court	Other	Exchequer Court	Supreme Court	Privy Council	Notes
1	1			I	V		Plaintiff lost
2	3		V(BCSC)				Plaintiff lost
3	1			V			Plaintiff lost
4	1		V(Que. S.C.)				Plaintiff lost
5	1	V	V(Ont. C.A.)		V		Plaintiff lost
6	1			V			Plaintiff lost
7	1			I	I		Plaintiff lost
8	1	I	V(Que. Q.B.)		I		Plaintiff lost
9	2			I,I	I,V		Plaintiff won on appeal
10	1		V(Que. S.C.)				Plaintiff won
11	1			I			Plaintiff lost
12	1			I			Plaintiff lost
13	1			I	I		Plaintiff won
14	1			V			Plaintiff lost (see #17)
15	10			I	I		Plaintiff lost
16	2		V(Que. S.C.)				Plaintiff lost
17	1						Plaintiff lost (see #14)
18	1			I			Plaintiff lost
19	1			I	V		Plaintiff won but patentee lost
20	2			V			Plaintiff lost
21	1			V	V		Plaintiff won
22	1			I			Plaintiff lost
23	1			I			Plaintiff lost
24	2			V			Plaintiff won
25	1			V			Plaintiff lost
26	1			V			Plaintiff won
27	1			V			Plaintiff won
28	2			V			Plaintiff lost
29	1			V			Plaintiff won
30	1			I	I		Plaintiff lost
31	1		V(S.C. Alta.)				Plaintiff won
32	1			V			Plaintiff won
33	2			I,V			Split decision
34	3			V			Plaintiff won
35	1			I			Plaintiff lost
36	1			V	V		Plaintiff won
37	1	I	V(Que.Ct. of Q.B.)				Plaintiff won
38	1			V			Plaintiff won
39	1			V			Plaintiff won
40	1		V(Que. S.C.)				Plaintiff won
41	1			V			Plaintiff won
42	1			V			Plaintiff lost
43	1			V			Plaintiff won
44	1		V(Que. S.C.)				Plaintiff won
45	1		V(Que. S.C.)				Plaintiff won
46	1			V			Plaintiff won
47	1			I			Plaintiff lost
48	1			V			Plaintiff lost
49	1			I	I	I	Plaintiff lost
50	1						Plaintiff lost
51	1			I			Plaintiff won
52	1			V			Plaintiff lost
53	1			V			Plaintiff lost
54	1			I			Plaintiff lost
TOTAL	73						
Valid	1 (33%)	14 (100%)	31 (43%)	8 (33%)	0 (0%)		Plaintiff lost 44
Invalid	2 (66%)	0 (0%)	28 (47%)	16 (66%)	1 (100%)		Plaintiff won 29

bility of obtaining a patent grant. That information has been included in the "average total cost" discussed below. This study also omitted all cases in which the court ruled that no infringement had taken place, unless the ruling affected the validity of the patent. The results of this study are summarized in Table V-14. The case numbers and notes set forth in Table V-15[380] refer to the correspondingly numbered cases in Table V-14.

Model II is an attempt to show the probable life history of any given patent suit. The basic model is relatively simple. The starting point presumes that the patent was granted and is being worked. Facing the patent holder is the major question of whether he is likely to end up in court and, if he does, whether he will be successful. The model has been constructed from the foregoing tables.

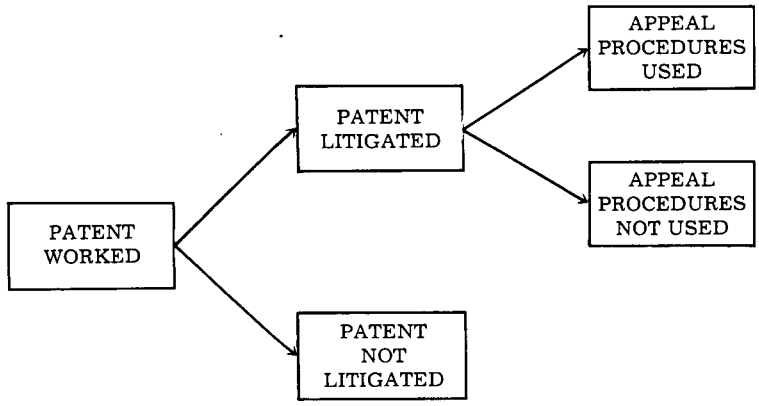

Figure IV Model II Patent Litigation

The basic model has also been converted into two sub-models, each designed to present a particular aspect of the problem. Model II-A, using the data from Table V-15, presents the decisions of trial and appellate courts which have ruled on the validity of patents. This model does not show whether the plaintiff or the defendant prevailed, but simply whether the patents involved were held valid or invalid.

380. Table V-15 appears at the end of this article.

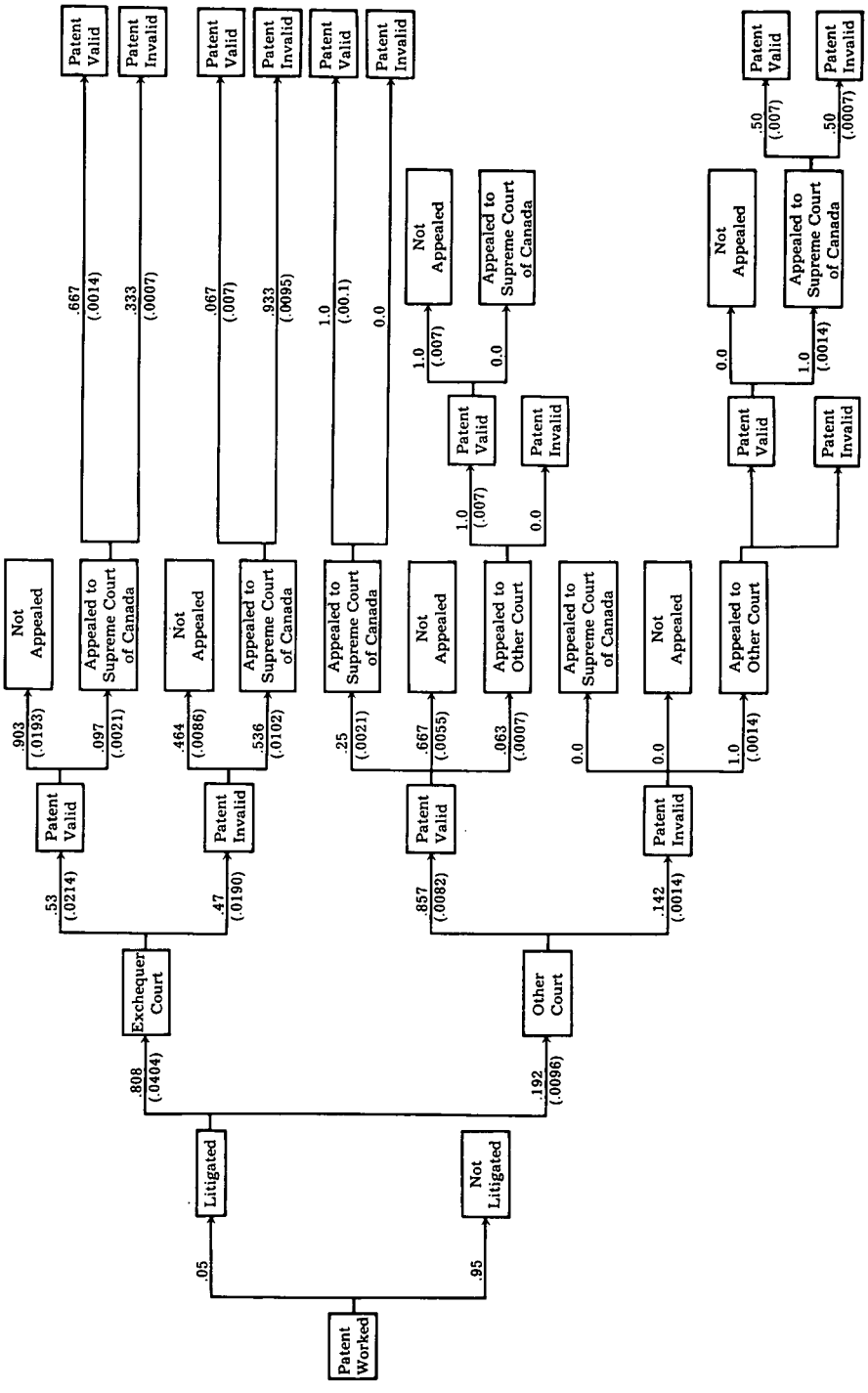

Figure V Model II-A. PATENT LITIGATION VALIDITY AND INVALIDITY

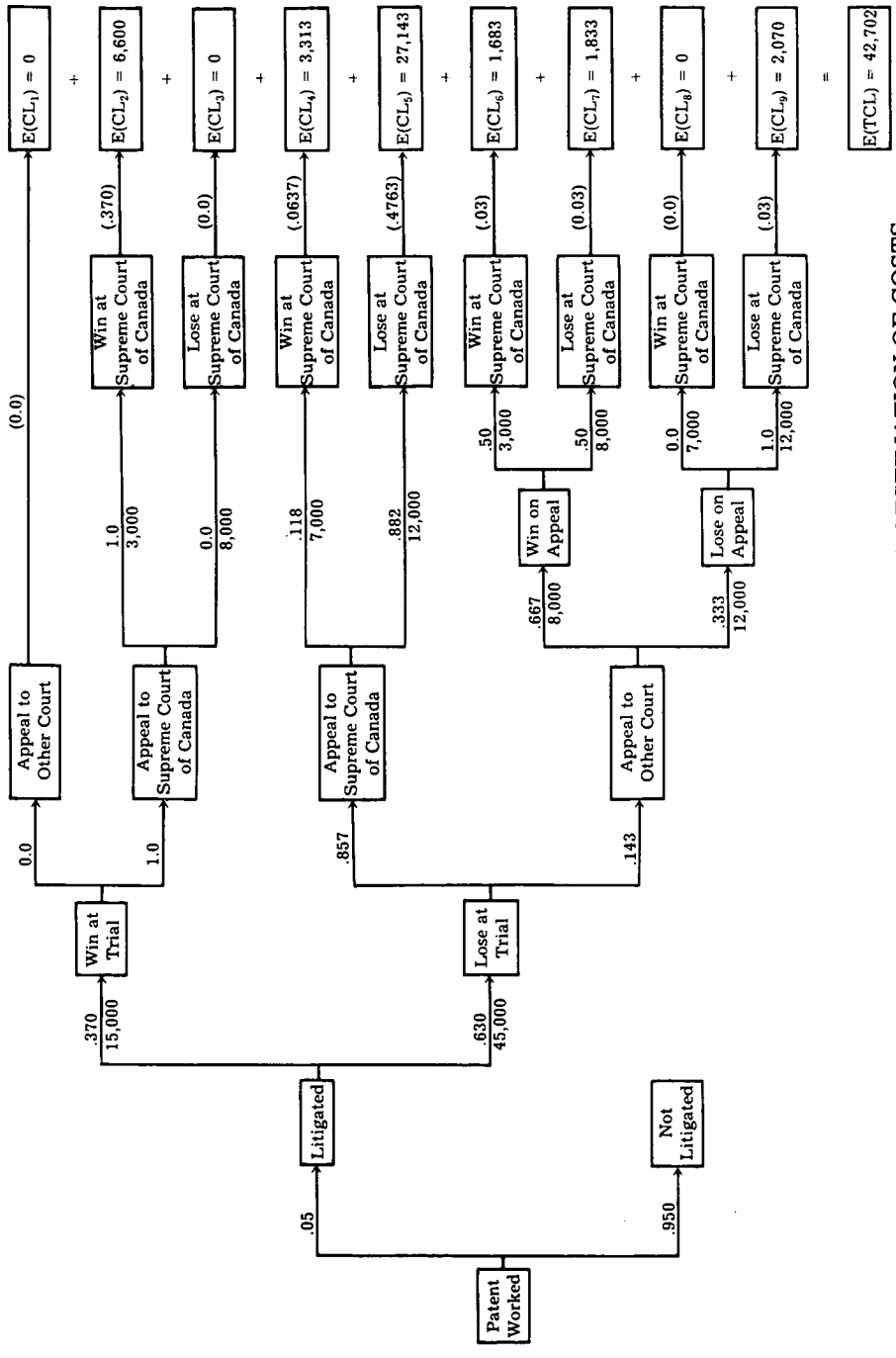

Figure VI Model II-B. PATENT LITIGATION: AN ESTIMATION OF COSTS

Model II-B utilizes the same basic data, but ignores the question of whether the patents were valid. It concentrates instead on whether the plaintiff won or lost. This model also uses the conservative figures to present the costs which a litigant might expect to incur given the life history of the patent suits under consideration. Additionally, the model shows the various paths that might be taken if a patent is worked and litigated, and the probability of reaching each terminal mode. The model indicates that the expected total cost of litigation [E(TCL)] is $47,702, and the expected costs of litigation for a patent holder who puts his patent to work [E(CPW)] is $2,135. These costs are only the direct legal costs, but should be considered as further fixed costs facing any inventor who intends to use the Canadian patent system. Furthermore, even after these expenditures are made, there is a forty percent chance that the patent will be held to be invalid.

D. Implications of Model II

An analysis of the two versions of Model II indicates that considerably more research must be done on the economic and societal impact of the patent system. It does not appear that Canadian inventors are benefiting from the system. While there is currently insufficient data to conclude that the Patent Office should be closed, certain implications and conclusions can be made:

1. If validity of a patent is challenged in the Supreme Court of Canada, and if the ratios from 1929 to 1969 continue, it is unlikely that the patent will be upheld. While the percentage of patents held valid has varied over the years, except for the period from 1948 to 1958 when few patents were upheld, the percentage has never risen above 33.3%. Model II-A shows that 31% of the patents were held valid by the Supreme Court and 69% invalid between 1928 and 1969.

2. Of all patents involved in litigation between 1928 and 1969, 60.7% ultimately were held valid, while 39.3% were held invalid. When compared with implication 1. above, it is obvious that the lower courts tend to uphold patents while the Supreme Court tends to reject them. Several explanations for this pattern are offered, though satisfactory evidence is unavailable to justify any one of the reasons: (1) the "reputation" of the Supreme Court acts as an inducement to settle most cases; (2) only those where the patent holder is desperate reach the Court; (3) the high cost of litigation acts as an inducement to settle all but the most complex cases; or, (4) the time involved in getting the decisions from the lower courts to the Supreme Court is so great that the patent is no longer worth the costs and efforts of appeal. This latter rationale is of considerable importance for an industry, such as computer software, where the expected economic life of the product may be only three to seven years.

3. Model II-B develops some minimum, direct legal costs expected for patents involved in litigation. Because of these costs, it would appear realistic for patent holders to establish reserve accounts for future litigation expenses. The money invested in these accounts could be treated as a further cost of obtaining a patent. If a company owns few patents, as is likely in the fledgling Canadian software industry, it may be necessary to establish large reserves to avoid financially disastrous legal expenses in defending a patent suit. The need for significant financial reserves is reinforced by the fact that enforcement of patent rights will likely involve suits against large hardware manufacturers and computer users, which are generally far more able to fund extended litigation than a software house. Finally, there will be other costs associated with such litigation, *e.g.*, damages, loss of manufactured items, which must also be considered in establishing a reserve account.

VI. CONCLUSION

The following conclusion appears valid: ***Small Canadian firms and individual inventors are least likely to benefit from a patent grant and are most likely to be unable to protect the patent once obtained.*** Canadian's work patents for shorter periods of time and thus must amortize related costs over a shorter period. Logically, Canadian firms would have to make a smaller profit to maintain competitive prices. The statistics indicate that Canadians have a tendency to offset this difficulty by licensing others to develop and market their patents. Since many licensees are Americans, who use Canadian patents to protect United States-based operations, the patent approach is not appropriate to the establishment of an indigenous, Canadian software industry. Whatever other avenues are open, steps must be taken to assure that neither the Patent Office nor the courts extend patent protection to computer programmes.

TABLE V-15

Case 1. *Lacal Indus. Ltd. v. Slater Steel Indus. Ltd.*, 41 Fox Pat. Cas. 1 (Ex. 1969).

Court held patent invalid for obviousness.

Case 2. *International Pediatric Prods. Ltd. v. Lambert*, 40 Fox Pat. Cas. 5 (B.C. Ct. App. 1968).

This action was originally dismissed (34 Fox Pat. Cas. 16 (B.C. Supreme Ct. 1965)) and appeals to the Court of Appeal (34 Fox Pat. Cas. 58 (B.C. Ct. App. 1966)) and Supreme Court of Canada (35 Fox Pat. Cas. 111 (Can. 1967)) were also dismissed. No infringement was found.

Case 3. *Printed Motors, Inc. v. Tri-Tech, Inc.*, 39 Fox Pat. Cas. 74 (Ex. 1968).

Plaintiff attacked validity of certain claims of patent as well as attacking an application then pending. Defendant's patent was held valid. The attack on the application was ignored.

Case 4. *Saul v. Canadian Marconi Co.*, 38 Fox Pat. Cas. 10 (Que. Superior Ct. 1968).

Plaintiff's claim of infringement was dismissed.

Case 5. *Formea Chems. Ltd. v. Polymer Corp.*, 38 Fox Pat. Cas. 116 (Can. 1968).

The trial court (28 Fox Pat. Cas. 145 (Ont. Supreme Ct. 1964)), appellate court (35 Fox Pat. Cas. 21 (Ont. Ct. App. 1967)) and Canada Supreme Court all dismissed the action on the ground that (1) there was no infringement, and (2) since the defendant was a Crown corporation it could not be held for infringement.

Case 6. *Slater Steel Indus. Ltd. v. R. Payer Co.*, 38 Fox Pat. Cas. 139 (Ex. 1968).

No infringement was found.

Case 7. *Societe Des Usines Chemiques Rhone-Poulenc & Ciba S.A. v. Jules R. Gilbert Ltd.*, 38 Fox Pat. Cas. 203 (Can. 1968).

On appeal from the Exchequer Court (35 Fox Pat. Cas. 174 (Ex. 1967)). Both courts found plaintiff's patent invalid.

Case 8. *Parke, Davis & Co. v. Laboratoire Pentagone Ltd.*, 37 Fox Pat. Cas. 12 (Que. Ct. Q.B.—App. 1967).

The trial court found the patent invalid (29 Fox Pat. Cas. 67 (Que. Superior Ct. 1965)). The appellate court held it valid. The Canadian Supreme Court (37 Fox Pat. Cas. 186 (Can. 1968)), held the patent invalid.

Case 9. *Curl-Master Mfg. Co. v. Atlas Brush Ltd.*, 36 Fox Pat. Cas. 84 (Can. 1967)).

The trial court held the first patent and the reissued patent invalid (31 Fox Pat. Cas. 1 (Ex. 1965)). On appeal, the court found that althought the original patent was defective, the reissued patent was valid and infringed.

Case 10. *Rodi & Wienenberger A.G. v. Jacques Kreisler (Can.) Ltd.*, 36 Fox Pat. Cas. 126 (Que. Superior Ct. 1966).

Plaintiff's patent had previously been held valid by the Supreme Court of Canada (21 Fox Pat. Cas. 95 (Can. 1960)). The court held that defendant had infringed one of plaintiff's three patents.

Case 11. *Houle v. Moncton Publishing Co.*, 36 Fox Pat. Cas. 174 (Ex. 1967).

Plaintiff's patent was held invalid.

Case 12. *Gibney v. Ford Motor Co. (Can.) Ltd.*, 35 Fox Pat. Cas. 143 (Ex. 1967).

Plaintiff's patent was held invalid.

Case 13. *S. & S. Indus., Inc. v. Rowell*, 33 Fox Pat. Cas. 56 (Can. 1966).

On appeal from 28 Fox Pat. Cas. 79 (Ex. 1964). Plaintiff's patent was held invalid.

Case 14. *Union Carbide (Can.) Ltd. v. Trans-Canadian Feeds Ltd.*, 32 Fox Pat. Cas. 17 (Ex. 1965).

Validity of plaintiff's patent was left to be decided by the court if infringement was found. Infringement was shown, but the infringing act had occurred prior to the time the patent was assigned to plaintiff. Therefore, the action could not be maintained.

Case 15. *Hoechst Pharm. (Can.) Ltd. v. Gilbert & Co.*, 32 Fox Pat. Cas. 56 (Can. 1965).

On appeal from 28 Fox Pat. Cas. 120 (Ex. 1964). All patents were held invalid.

Case 16. *Kusters v. Beloit Sorel Ltd.*, 32 Fox Pat. Cas. 113 (Que. Superior Ct. 1966).

Application for an injunction against infringement was denied, but patent validity was upheld.

Case 17. *Union Carbide (Can.) Ltd. v. Trans-Canadian Feeds Ltd.*, 32 Fox Pat. Cas. 145 (Ex. 1966).

Plaintiff's claim for infringement (*see* Case 14 *supra*) led to the conclusion, on rehearing, that the patent was invalid.

Case 18. *Burns & Russell (Can.) Ltd. v. Day & Campbell Ltd.*, 31 Fox Pat. Cas. 36 (Ex. 1965).

Plaintiff's patent was held invalid.

Case 19. *Carlton v. Jamb Sets Ltd.*, 30 Fox Pat. Cas. 166 (Can. 1965).

Plaintiff asked for declaration that its actions did not infringe defendant's patent. The declaration was granted by the Exchequer Court (25 Fox Pat. Cas. 109 (Ex. 1963)) and upheld on appeal.

Case 20. *American Cyanamid Co. v. Continental Pharma (Can.) Ltd.*, 30 Fox Pat. Cas. 171 (Ex. 1965).

Plaintiff's patent was held valid but not infringed.

Case 21. *Dominion Auto Accessories Ltd. v. De Frees*, 30 Fox Pat. Cas. 104 (Can. 1965).

On appeal from 25 Fox Pat. Cas. 58 (Ex. 1963). Plaintiff's patent was found valid and infringed.

Case 22. *United Merch. & Mfrs., Inc. v. A.J. Freinan Ltd.*, 30 Fox Pat. Cas. 206 (Ex. 1965).

The relevant claims of plaintiff's patent were held invalid.

Case 23. *Barton v. Radiator Specialty Co.*, 29 Fox Pat. Cas. 89 (Ex. 1965).

Plaintiff's patent was held invalid.

Case 24. *American Cyanamid Co. v. Charles E. Frosst & Co.*, 29 Fox Pat. Cas. 153 (Ex. 1965).

Plaintiff's patents were held valid and infringed.

Case 25. *Dominion Rubber Co. v. Propas Chems. & Equip. Co.*, 28 Fox Pat. Cas. 56 (Ex. 1963).

Application for interlocutory restraining order against infringement was denied since the claimed infringement had been occurring for seven years. Defendant ordered to keep an account pending trial.

Case 26. *Omark Indus. (1960) Ltd. v. Gouger Saw Chain Co.*, 27 Fox Pat. Cas. 1 (Ex. 1964).

Plaintiff's patent was held valid and infringed.

Case 27. *Canadian Marconi Co. v. Vera Prinzen Ent. Ltd.*, 27 Fox Pat. Cas. 105 (Ex. 1964).

Plaintiff's patent was held valid and infringed.

Case 28. *Clark v. R.J. McDermott Co.*, 26 Fox Pat. Cas. 158 (Ex. 1964).
Plaintiff's patent was held valid and infringed.

Case 29. *Ernest Scragg & Sons Ltd. v. Leesona Corp.*, 26 Fox Pat. Cas. 1 (Ex. 1964).
Declaratory relief action. Defendant's patents held valid and infringed.

Case 30. *C.H. Boehringer Sohn v. Bell-Craig Ltd.*, 25 Fox Pat. Cas. 36 (Can. 1963).
The appeal from the Exchequer Court (22 Fox Pat. Cas. 190 (1962)), which held plaintiff's patent invalid, was dismissed by the Supreme Court.

Case 31. *Hoffman-La Roche Ltd. v. Pan Chems. Ltd.*, 25 Fox Pat. Cas. 43 (Alta. 1963).
Plaintiff's patent was held valid as defendant failed to rebut the presumption of validity.

Case 32. *Alloy Steel & Metals Co. v. A-1 Steel & Iron Foundry Ltd.*, 25 Fox Pat. Cas. 157 (Ex. 1964).
Plaintiff's patent was held valid and infringed.

Case 33. *Durkee-Atwood Co. v. Richardson*, 23 Fox Pat. Cas. 30 (Ex. 1962).
In an action for infringement of two patents, one was held invalid due to prior use, but the second was held valid and infringed.

Case 34. *Lovell Mfg. Co. v. Beatty Bros. Ltd.*, 23 Fox Pat. Cas. 112 (Ex. 1962).
Plaintiff's three patents were held valid and infringed.

Case 35. *New Process Screw Corp. v. P.L. Robertson Mfg. Co.*, 22 Fox Pat. Cas. 71 (Ex. 1961).
The court did not find infringement of plaintiff's three patents. In its discussion, it held one of the patents invalid. [For this reason only one patent will be used in the accompanying statistics.]

Case 36. *The McPhar Eng. Co. v. Sharpe Instr. Ltd.*, 21 Fox Pat. Cas. 1 (Ex. 1960).
Plaintiff's patent was held valid and infringed.

Case 37. *Metalliflex Ltd. v. Rodi & Wienenberger A.G.*, 21 Fox Pat. Cas. 95 (Can. 1960).
On appeal from the Quebec Court of Queen's Bench (19 Fox Pat. Cas. 49 (1959)). The trial judge held claims 1 and 2 invalid for lack of utility and claim 3 valid, but not infringed. The Court of Queen's Bench held claims 1 and 2 valid and infringed (claim 3 was abandoned). The Supreme Court dismissed the appeal.

Case 38. *Unipak Cartons Ltd. v. Crown Zellerbach (Can.) Ltd.*, 20 Fox Pat. Cas. 1 (Ex. 1960).
Plaintiff's patent was held valid and infringed.

Case 39. *Clover Leaf Bedding Co. v. Ideal Upholstering Co.*, 19 Fox Pat. Cas. 191 (Ex. 1960).
Plaintiff's patent was held valid and infringed.

Case 40. *Rodi & Wienenberger A.G. v. Watchstraps Inc.*, 18 Fox Pat. Cas. 75 (Que. Superior Ct. 1958).
Although plaintiff's first two claims were held invalid, his third and most vital claim was held valid and infringed.

Case 41. *Visirecord (Can.) Ltd. v. Malton*, 17 Fox Pat. Cas. 157 (Ex. 1958).
Plaintiff's patent was held valid and infringed.

Case 42. *Reliable Plastics Ltd. v. Louis Marx & Co.*, 17 Fox Pat. Cas. 184 (Ex. 1958).
Defendant's patent was held valid in an action for impeachment, and was also held infringed.

Case 43. *Riddell v. Patrick Harrison & Co.*, 17 Fox Pat. Cas. 83 (Ex. 1957).
Plaintiff's patent of a combination of unpatentable parts was held valid and infringed.

Case 44. *American Paper Box Ltd. v. Kabbish*, 16 Fox Pat. Cas. 59 (Que. Superior Ct. 1956).
Plaintiff's patent was held valid and infringed.

Case 45. *American Paper Box Co. v. Mendell*, 16 Fox Pat. Cas. 170 (Que. Superior Ct. 1957).
Plaintiff's patent was held valid and infringed.

Case 46. *O'Cedar (Can.) Ltd. v. Mallory Hardware Prods. Ltd.*, 15 Fox Pat. Cas. 134 (Ex. 1955).
Plaintiff's patent was held valid and infringed.

Case 47. *Scully Signal Co. v. The New York Machine Co.*, 14 Fox Pat. Cas. 27 (Ex. 1954).
Plaintiff's patent was held valid, but not infringed.

Case 48. *Campbell Mfg. Co. v. Thornhill Indus. Ltd.*, 13 Fox Pat. Cas. 198 (Ex. 1953).
Plaintiff's patent was held invalid because it lacked the essential requirement of invention.

Case 49. *Minerals Separation North American Corp. v. Noranda Mines, Ltd.*, 12 Fox Pat. Cas. (Jud. Comm. P.C. 1952).
The Privy Council affirmed the Supreme Court's reversal (9 Fox Pat. Cas. 165 (Can. 1949)) of the Exchequer Court's finding (6 Fox Pat. Cas. (Ex. 1947)) of the validity of the patent.

Case 50. *Ralph Di Fiore v. Gabriel Tardi*, 12 Fox Pat. Cas. 138 (Ex. 1952).
Plaintiff's patent was held invalid.

Case 51. *Insulation Prods. Ltd. v. Marcel Gallai-Hatchard*, 11 Fox Pat. Cas. 99 (Ex. 1951).
Plaintiff successfully impeached the validity of defendant's patent.

Case 52. *The King v. American Optical Co.*, 11 Fox Pat. Cas. 62 (Ex. 1950).
The plaintiff failed to impeach defendant's patent.

Case 53. *The King v. Uhlemann Optical Co.*, 10 Fox Pat. Cas. 24 (Ex. 1949).
The plaintiff failed to impeach defendant's patent.

Case 54. *International Vehicular Parking, Ltd. v. Mi-Co Meter (Can.), Ltd.*, 8 Fox Pat. Cas. 138 (Ex. 1948).
Plaintiff's patent was held invalid.

APPENDIX

TABLE OF CONTENTS

I. UNITED STATES CODE, TITLE 35—PATENTS (EXCERPTS) 189
Section 100. Definitions 189
Section 101. Inventions patentable 190
Section 102. Conditions for patentability; novelty and loss of right to patent 190
Section 103. Conditions for patentability; non-obvious subject matter 191
Section 111. Application for patent 191
Section 112. Specification 192
Section 131. Examination of application 192
Section 141. Appeal to Court of Customs and Patent Appeals 192
Section 144. Decision on appeal 192
Section 145. Civil action to obtain patent 192
Section 154. Contents and term of patent 192
II. UNITED STATES PATENT OFFICE, GUIDELINES TO EXAMINATION OF PROGRAMS, 829 Off. Gaz. Pat. Office 865 (Aug. 16, 1966).* 193
III. REPORT OF THE PRESIDENT'S COMMISSION ON THE PATENT SYSTEM, TO PROMOTE THE PROGRESS OF . . . USEFUL ARTS (1966).* 200
IV. THE PATENT REFORM ACT OF 1967, S. 1042, 90TH CONGRESS, 1ST SESSION (FEB. 21, 1967). 201
V. UNITED STATES PATENT OFFICE, GUIDELINES TO EXAMINATION OF APPLICATIONS FOR PATENTS ON COMPUTER PROGRAMS, 855 Off. Gaz. Pat. Off. 829 (Oct. 22, 1968), *rescinded*, 868 Off. Gaz. Pat. Office 349 (Nov. 11, 1969).* 202

I. UNITED STATES CODE, TITLE 35—PATENTS (EXCERPTS)

Section 100. Definitions

When used in this title unless the context otherwise indicates—

(a) The term "invention" means invention or discovery.

(b) The term "process" means process, art or method, and includes a new use of a known process, machine, manufacture, composition of matter, or material.

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* These materals have the original pagination indicated in the margin.

(c) The terms "United States" and "this country" mean the United States of America, its territories and possessions.

(d) The word "patentee" includes not only the patentee to whom the patent was issued but also the successors in title to the patentee.

Section 101. Inventions patentable

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Section 102. Conditions for patentability; novelty and loss of right to patent

A person shall be entitled to a patent unless—

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent, or

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States, or

(c) he has abandoned the invention, or

(d) the invention was first patented or caused to be patented, or was the subject of an inventor's certificate, by the applicant or his legal representatives or assigns in a foreign country prior to the date of the application for patent in this country on an application for patent or inventor's certificate filed more than twelve months before the filing of the application in the United States, or

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent, or

(f) he did not himself invent the subject matter sought to be patented, or

(g) before the applicant's invention thereof the invention was made in this country by another who had not abandoned, suppressed, or concealed it. In determining priority of invention there shall be considered not only the respective dates of conception and reduction to practice of the invention, but also the reasonable diligence of one who was first to conceive and last to reduce to practice, from a time prior to conception by the other.

Section 103. Conditions for patentability; non-obvious subject matter

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Section 111. Application for patent

Application for patent shall be made by the inventor except as otherwise provided in this title, in writing to the Commissioner. Such application shall include: (1) a specification as prescribed by section 112 of this title; (2) a drawing as prescribed by section 113 of this title; and (3) an oath by the applicant as prescribed by section 115 of this title. The application must be signed by the applicant and accompanied by the fee required by law.

Section 112. Specification

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

A claim may be written in independent or, if the nature of the case admits, in dependent or multiple dependent form.

Subject to the following paragraph, a claim in dependent form shall contain a reference to a claim previously set forth and then specify a further limitation of the subject matter claimed. A claim in dependent form shall be construed to incorporate by reference all the limitations of the claim to which it refers.

A claim in multiple dependent form shall contain a reference, in the alternative only, to more than one claim previously set forth and then specify a further limitation of the subject matter claimed. A multiple dependent claim shall not serve as a basis for any other multiple dependent claim. A multiple dependent claim shall be construed to incorporate by reference all the limitations of the particular claim in relation to which it is being considered.

An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

Section 131. Examination of application

The Commissioner shall cause an examination to be made of the application and the alleged new invention; and if on such examination it appears that the applicant is entitled to a patent under the law, the Commissioner shall issue a patent therefor.

Section 141. Appeal to Court of Customs and Patent Appeals

An applicant dissatisfied with the decision of the Board of Appeals may appeal to the United States Court of Customs and Patent Appeals, thereby waiving his right to proceed under section 145 of this title.
* * *

Section 144. Decision on appeal

The United States Court of Customs and Patent Appeals, on petition, shall hear and determine such appeal on the evidence produced before the Patent and Trademark Office, and the decision shall be confined to the points set forth in the reasons of appeal. Upon its determination the court shall return to the Commissioner a certificate of its proceedings and decision, which shall be entered of record in the Patent and Trademark Office and govern the further proceedings in the case.

Section 145. Civil action to obtain patent

An applicant dissatisfied with the decision of the Board of Appeals may unless appeal has been taken to the United States Court of Customs and Patent Appeals, have remedy by civil action against the Commissioner in the United States District Court for the District of Columbia if commenced within such time after such decision, not less than sixty days, as the Commissioner appoints. The court may adjudge that such applicant is entitled to receive a patent for his invention, as specified in any of his claims involved in the decision of the Board of Appeals, as the facts in the case may appear and such adjudication shall authorize the Commissioner to issue such patent on compliance with the requirements of law. All the expenses of the proceedings shall be paid by the applicant.

Section 154. Contents and term of patent

Every patent shall contain a short title of the invention and a grant to the patentee, his heirs or assigns, for the term of seventeen years,

subject to the payment of issue fees as provided for in this title, of the right to exclude others from making, using, or selling the invention throughout the United States, referring to the specification for the particulars thereof. A copy of the specification and drawings shall be annexed to the patent and be a part thereof.

II. UNITED STATES PATENT OFFICE,
GUIDELINES TO EXAMINATION OF PROGRAMS,
829 Off. Gaz. Pat. Office 865 (Aug. 16, 1966).

The following are guidelines which the Patent Office proposes to adopt for the examination of applications for patent on programming methods and apparatus. Comments as to these guidelines will be considered if received on or before October 4, 1966, on which date a public hearing on the matter will be held at 10:00 a.m. in Room 3886B of the Department of Commerce Building. All persons wishing to be heard orally at that time are requested to notify the Commissioner of Patents of their intended appearance.

EDWARD J. BRENNER,
Commissioner of Patents.
July 6, 1966.

In considering these guidelines, it should be understood that, since it is not an analysis of judicial holdings, they must be considered as a tentative, theoretical analysis of applicable statutory law. It may well be that, when particular applications are considered, modification in some instances may become necessary.

The term "program" has been loosely applied by authors discussing the patentability of processes and apparatus under our statutes.

For the purposes of this paper it is unnecessary to arrive at formal or precise definition of this term or of related terms such as "computer" or "data processor" since these are merely adaptations of the concept of "automatic control" which the Patent Office heretofore has been treating as within the classes of invention called for in 35 U.S.C. 101 as either apparatus or processes.

For example, the Jacquard looms of Class 139, Textiles, Weaving, subclass 59 and indented subclasses have presented for many years the concept of processes and apparatus that include a program. It is of no moment whether a "program device" is termed a Jacquard card belt, a player piano roll, a plug board or a magnetic tape and the corresponding "program" is termed a weaving design, a musical composition, a switching scheme or a document listing a series of instructions which a machine will execute, for its patentability is based on the presence or lack of statutory subject matter and this must be determined on the basis or a particular disclosure of subject matter.

It is not intended to indicate that there are no special, unresolved

problems in the field of "programs" for electronic computers, such as where a program is a printed document, yet is acceptable directly by a computer having devices which can sense the printed characters on the program document.

PROCESS

Special problems of patentability arise in the computer, data processing and automatic control field that revolve around mathematical processes and equations. These problems may be more generically stated as the broad field of algorithms which are conclusions based upon a precise or mathematical premise and line of reasoning.

For example the prediction as to the winner in a presidential election made by a programmed "general purpose" computer is based on an algorithm, not generally publicized, which has been evolved from a line of reasoning based on known factors and is analogous to a mathematical formula. Similarly, business practices or methods may be reduced to an algorithm.

Mathematical process discoveries and mathematical formulas used therein may not be patented although they may be of enormous importance (e.g., $e=mc^2$)). The mathematical process fails as a statutory process as defined by the Supreme Court in *Cochrane v. Deener*, 94 U.S. 780, 1877 C.D. 242, since it is not a treatment of "materials or substances." Processes in the electrical field were considered in the Telephone Cases 126 U.S. 1 (1887) and the electric telegraph case *O'Reilly v. Morse*, 15 How. (56 U.S.) 62 (1853).

Mathematical formulas are not included within 35 U.S.C. 101 since they are not a process, a machine, a manufacture, a composition of matter, or useful improvements thereof.

Other decisions treating similar non-statutory processes as "mental processes" are:

> *In re Abrams*, 38 CCPA 945, 1951 C.D. 264, 648 O.G. 633, 188 F.2d 165, 89 USPQ 266. *In re Shao Wen Yuan*, 38 CCPA 967, 1951 C.D. 286, 648 O.G. 967, 188 F.2d 377, 89 USPQ 324.

These processes were for, or were characterized by, an algorithm.

Processes of doing business and of evaluating data likewise are characterized by an algorithm.

Thus certain useful and important processes are non-statutory as being merely expressions of an algorithm while other useful processes are statutory since they deal with tangible things and substances. For convenience they may be distinguished as "algorithm" and "utility" processes, respectively.

To distinguish between algorithm and utility processes becomes difficult in the case of a programmed general purpose computer unless the distinction between a *result* of method or apparatus operation and

the *function* of the method steps or apparatus components is maintained.

The *result* of a programmed operation of a computer may be the mathematical transformation of data according to an algorithm but the
*866 *functioning* of the computer is the change * in state of certain electrical or mechanical devices within the computer according to the algorithm, as distinguished from the individual or total computational result of the components thereof.

Thus a process, defined as a series of steps for the manipulation or evaluation of data, even though it is required to be carried out by a programmed computer, would be an algorithm process. A process defined as a series of steps for causing a sequence of changes in state of components of the computer, even though the sequence is dictated by an algorithm, would be a utility process.

Since the general purpose computer usually is programmed solely in terms of an algorithm and but infrequently in terms of the machine functioning of its components, it would be possible to define the process solely in algorithm terms and thus not be within the statute and not in utility function terms so as to be within the statute.

Where a process is a combination of algorithm and utility steps, its patentability is measured by viewing the process as a whole against the background of the prior art, as evidenced by references, including that which can be judicially noticed, to determine whether the process is characterized solely by the algorithm. Mere inclusion of algorithm steps *per se* does not render a process non-statutory since the algorithm may illuminate or exemplify the utility steps.

35 U.S.C. 112, third paragraph, authorizes a claim, when expressed as a "step for performing a special function without the recital of structure, material or act in support thereof," but this does not sanction the claiming of a result only, since this has been construed repeatedly by the courts as not such that would promote the progress of science and useful arts. "Function" here must be construed as a utility function, as a means to an end, not the end or result itself.

However, a process, which includes utility steps that may or may not be old *per se*, recited in proper interrelation and illuminated by the inclusion of steps which set forth an algorithm to be solved as a result of the utility operations, may yield some new and unobvious *utility* and thus may be patentable over the prior art that does not teach this utility and how to obtain it. For example, a known programmed computer may be combined with and monitor and control a known chemical reactor in a manner to carry out a new and unobvious algorithm by a procedure applied to a material and thus be possibly patentable as where a new, unobvious compound results.

In summary, a process carried out by a programmed apparatus is (a) non-statutory where the process as claimed merely states the algorithm and is (b) unpatentable over the prior art where the prior art shows (i.e., makes obvious) all the statutory subject matter although not applied to the same algorithm. However, where the algorithm expressed in the process results in a new utility function for the statutory subject matter of the claim and this utility function is not presented by the prior art, the algorithm is illuminating and may be limiting in the process. But in no case would the fact of inclusion of the algorithm vitiate the statutory subject matter of the process.

APPARATUS

Apparatus within the field of programmed devices is always some form of machine or other manufacture under 35 U.S.C. 101.

In the case of a programmed computer or other machine, evaluation of patentability of the combination claimed follows by analogy that set forth above for processes. The program itself (if this is considered to be the algorithm) and the physical embodiment for effectuating that program (as a structural device) require no further treatment.

Apparatus may be defined in many instances in terms of a paraphrase of a process definition, i.e., in terms of "means for" carrying out the "function" of each step of that process. If the "function" is a *machine function* such a means encompasses statutory subject matter, but where the "means" is modified only by a statement of the *result* to be effected (such as the analysis of intellectual information in accordance with an algorithm), definition is non-statutory.

35 U.S.C. 112, third paragraph, specifically relates "function" to the structure or material in support of the function and not to a result which the structure or material cannot give. A claim to a series of means for carrying out the successive steps of a mathematical algorithm tells nothing of the structure of a machine capable of so operating as to result in solving the algorithm, but merely claims, in effect, the non-statutory algorithm.

Similarly to the case of the process, a claim which includes both statutory apparatus features and non-statutory features may be patentable on the basis of the new utility of the statutory apparatus features, but only if properly claimed so as to be restricted to apparatus significantly different from the prior art.

A programable machine, such as a general purpose computer, with its various parts not interconnected to perform any useful combined operation is merely a "warehouse" of unrelated parts. It may well be that the same machine, with a program device correctly related thereto may yield a novel and useful machine combination due to the new interrelation of parts. In other words, the fact that such a prior art

machine can have its parts interrelated by a program device in a new way to carry out machine functions of a specialized character may well result in a new patentable combination, unless there is a prior art teaching that would make the interrelations and results thereof obvious.

A machine which has as a part thereof a program device to cause the entire combination to carry out machine functions is embraced within the patent statute the same as any other special purpose machine and the fact that portions of the complete machine may take the form of a replaceable program device is of no moment.

Claims to apparatus frequently are directed to less than the total apparatus disclosure and the aforegoing considerations are applicable to any such subcombination.

However, when the subcombination is that portion of a programmed machine which is interchangeably related to the machine and is determinative of the choice of algorithm to be carried out by the total machine, special considerations may arise because of the various usage of the terms "program" or "computer program."

The term "program" has been applied indiscriminately both (a) to the algorithm which the machine is intended to solve as a result of its functioning and (b) to the physical device which is associatable with the machine and becomes a part of that machine so as to cause the total combination to be capable of yielding the result.

A "program," when this term designates an algorithm, has no physical connotations, but is an intellectual concept and is not *per se* statutory subject matter.

A "program" may be a physical device which may take many different forms, such as printing on a piece of paper, electric or magnetic discontinuities on a recording media or cam-like protuberances or recesses, which is capable in proper relation to other physical devices of yielding a combination functioning to solve algorithms as a result.

The physical modification of a program *device* may express the algorithmic meaning by a printed word, letter or symbol easily interpreted by the human mind according to the prearranged convention of language by a coded arrangement of physical discontinuities which similarly may be interpreted, but with greater difficulty, by the human mind. These same physical modifications can be sensed by the machine to control the kind or sequence of the operations of various portions of the machine so that its function is in accordance with the algorithm. (Note that some machines optically sense print and are controlled in accordance with the printing, but not its *meaning*.)

Since these program devices include symbols which can be interpreted in an intellectual sense the numerous cases on "printed matter" may apply such as the following Board decisions:

Ex parte Gwinn, 716 O.G. 15, 1957 C.D. 18, 112 USPA 439, *Ex parte Ehnes*, 107 USPQ 282, *Ex parte Dere*, 118 USPQ 541, *Ex parte Stange*, 124 USPQ 238, *Ex parte des Granges*, 1964 C.D. 265, 803 O.G. 899, 142 USPQ 41,

and the court decisions to which reference is made therein.

Thus a program device which has in combination novel structure apart from the symbols or a novel relationship of the symbols to structure so that the combination functions to give a useful result, may qualify as a statutory machine or article of manufacture. Where the program device, as to all features and interrelations, is made obvious by prior art, the meaning or intelligence conveyed by the symbology of the physical representations thereon being the sole novelty, such * being nonstatutory subject matter, may not impart patentability to that which is old. *86

It is of extreme importance to an inventor who has devised an overall combination of a programmed machine that is patentable to be able to obtain a patent on the program device as a subcombination of that machine. This is particularly the case where the subcombination is to be sold separately from the machine, being evolved for interchangeable use with other correlative subcombinations.

Where the subcombination is defined in terms of its own novel structure and resultant utility, no problems in determining patentability exist.

Where the subcombination is defined in terms of the old structure of a known subcombination and thus is unpatentable for this reason, the fact that the claim also includes language indicating merely a sought for result or an intended use in an unclaimed combination cannot cause that which is old to be patentable.

The following is presented as a summary and as such must be construed in the context of the preceding discussion.

(1) The examination of process claims entails:

(A) A determination whether or not there is a disclosure of a statutory process under 35 U.S.C. 100(b) and 101. Mere disclosure of an algorithm process in the absence of a utility process is insufficient under 35 U.S.C. 112, first paragraph.

(B) A determination of whether or not the claims are in whole or in part to a utility process.

(a) Patentability of a utility process or of the utility steps of a process which have both utility and algorithm steps must be on the basis of prior art which is cited or is indicated to have been judicially noted (as under 35 U.S.C. 103).

(b) Patentability cannot be predicated on an algorithm process alone. Where a process has both utility and algorithm steps, patentability cannot be predicated on the algorithm

but the algorithm steps do not vitiate the claim.

(C) A search for, and an application of, the prior art to the statutory subject matter set out by the claims. The prior art is constituted by any known machine, any known process, any known algorithm or any other pertinent known information available in the prior art to render obvious the claimed process under 35 U.S.C. 101, 102, 103.

(2) The examination of apparatus claims entails:

(A) A determination of whether or not there is a clear disclosure of apparatus coming under the statutes, particularly 35 U.S.C. 101 and 112, first paragraph.

(B) A determination of whether or not the claims are in whole or in part to apparatus coming under the patent statutes.

(a) The claims may set forth structure or a means for carrying out an apparatus function.

(i) Where this function is that which an apparatus is capable of carrying out, it is a statutory definition of that apparatus or its equivalents under 35 U.S.C. 112, third paragraph.

(ii) Where this function is not one which apparatus can carry out but is merely a designation of the result of, or the meaning to be accorded to, the operation of the apparatus, only a non-statutory algorithm is claimed thereby.

(b) The presence in the claim of a statement of the algorithm practiced by the apparatus does not vitiate the statutory apparatus set forth therein but may illuminate a novel apparatus function of that apparatus.

(c) The claim may set forth less than the total disclosed apparatus. The program device, apart from the programable machine with which it is to function, may be a proper subcombination, if the claim defines that which provides an apparatus function; but such device is not a subcombination where its sole characteristic is the meaning, algorithm or result ascribed to a physical feature of the program device.

(C) A search for, and application of, the prior art to the statutory apparatus set out in the claim. The prior art is constituted by any known process, any known apparatus, any known algorithm, or any other pertinent known information available in the prior art to render obvious the claimed apparatus under 35 U.S.C. 101, 102, and 103.

(a) The fact that known programable machine components could be programmed by appropriate interconnections to carry out the machine functions set out in a claim does not in and of itself anticipate or make obvious the invention claimed. However, additional prior art may make obvious the necessary interconnection.

(b) A program device for a programable machine is unpatentable which differs from the prior art only by reason

of the meaning or algorithm ascribed to the symbology represented on the program device and the analogy to printed matter law to which there has been reference should be followed.

(c) A program device which is a proper subcombination of a disclosed combination may be patentable *per se* by reason of its novel structure and functions.

III. REPORT OF THE PRESIDENT'S COMMISSION ON THE PATENT SYSTEM, TO PROMOTE THE PROGRESS OF . . . USEFUL ARTS (1966).

* * *

* IV. *12

The classes of patentable subject matter shall continue as at present, except: * * *

3. A series of instructions which control or condition the operation of a data processing machine, generally referred to as a "program," shall not be considered patentable regardless of whether the program is claimed as: (a) an article, (b) a process described in terms of the operations performed by a machine pursuant to a program, or (c) one or more machine configurations established by a program.

This recommendation would end the practice of granting patents on designs and plants. It also would eliminate whatever possibility exists under the present statute, if any, for directly or indirectly obtaining a patent covering a program or a patent covering the operation of a data processing machine pursuant to a program.

The Commission believes strongly that all inventions should meet the statutory provisions for novelty, utility and unobviousness and that the above subject matter cannot readily be examined for adherence to these criteria.

1. Designs: [omitted] * *13

2. Plants: [omitted]

3. Programs: Uncertainty now exists as to whether the statute permits a valid patent to be granted on programs. Direct attempts to patent programs have been rejected on the ground of nonstatutory subject matter. Indirect attempts to obtain patents and avoid the rejection, by drafting claims as a process, or a machine or components thereof programmed in a given manner, rather than as a program itself, have confused the issue further and should not be permitted.

The Patent Office now cannot examine applications for programs because of the lack of a classification technique and the requisite search files. Even if these were available, reliable searches would not be feasible or economic because of the tremendous volume of prior art being

generated. Without this search, the patenting of programs would be tantamount to mere registration and the presumption of validity would be all but nonexistent.

It is noted that the creation of programs has undergone substantial and satisfactory growth in the absence of patent protection and that copyright protection for programs is presently available.

IV. THE PATENT REFORM ACT OF 1967, S. 1042, 90TH CONGRESS, 1ST SESSION (FEB. 21, 1967).

* * *

Section 106. Computer Programs Not Patentable

A plan of action or set of operating instructions, in whatever form presented, to cause a controllable data processor or computer to perform selected operations shall not be patentable.

This section is new and is added to implement the Commission's Recommendation IV, paragraph 3, that programs for data processing machines shall not be considered patentable regardless of how they are claimed or presented to the Patent Office. Uncertainty now exists as to the extent the statute permits a valid patent to be granted on programs.

Because the term "program" is inherently indefinite and susceptible to various interpretations, the term is avoided. Instead, "programs" are described in more generic terms as "a plan of action or set of operating instructions to cause a controllable data processor or computer to perform selected operations."

By providing that such a "plan of action or set of operating instructions" shall not be patentable, it is intended also that they shall not lend patentability to a more comprehensive system in which a general purpose data processor programmed in a certain manner is the novel subcomponent.

Thus, under the added paragraph, novelty in the "plan of action or set of operating instructions" shall not, in any way, supply patentability to:

(a) a program claimed as such, that is a plan of action, or set of operating instructions, in whatever form presented, to cause a controllable data processor or system incorporating a controllable data processor or similar system to perform selected operations, or

(b) a program claimed as a manufacture or machine, that is, a controllable data processor, or as a more comprehensive system incorporating a controllable data processor or similar controllable system, caused to perform selected operations under a plan of action or set of operating instructions, or

(c) a program claimed as a process involving a plan of action, or set of operating instructions, for the processing of physical data manifestations or information-bearing signals.

V. UNITED STATES PATENT OFFICE, GUIDELINES TO EXAMINATION OF APPLICATIONS FOR PATENTS ON COMPUTER PROGRAMS, 855 Off. Gaz. Pat. Office 829 (Oct. 22, 1968), *rescinded*, 868 Off. Gaz. Pat. Office 349 (Nov. 11, 1969).

Pursuant to the Notice of July 6, 1966, published in the OFFICIAL GAZETTE of August 16, 1966; S29 O.G. 865, and to the hearing held on October 4, 1966, and upon consideration of the statements made at the said hearing, as well as the written comments filed in response to the notice, the following guidelines to examination of computer programs are adopted, effective immediately.

EDWARD J. BRENNER
Commissioner of Patents.

In considering these guidelines, it should be understood that they must be considered in a tentative analysis of applicable statutory law and judicial precedents and hence subject to modification on the basis of later decisions.

While there may be some question as to exactly what is meant by a computer program, it is believed that the essential meaning of that term is generally understood and that no specific definition is necessary here.

Process

Special problems of patentability arise in the computer and data processing fields revolving around logical processes and mathematical equations. Mental processes may not be patented although they may be of enormous importance; *In re Abrams,* 1951 C.D. 264, 38 C.C.P.A. 945, 89 U.S.P.Q. 266. A process or method is directed to patentable subject matter only if it is performed on physical materials and produces some appreciable change in their character or condition; *In re Shao Wen Yuan,* 1951 C.D. 286, 38 C.C.P.A. 967, 89 U.S.P.Q. 324; *Cochrane v.*
*830 *Deener,* 94 U.S. 780, 1877 C.D. 242. Accordingly, * a computer programming process which produces no more than a numerical, statistical or other informational result is not directed to patentable subject matter. Such a process may, however, form a part of a patentable invention if it is combined in an unobvious manner with physical steps of the character above referred to as, for example, in the knitting of a pattern or the shaping of metal.

Apparatus

In accordance with 35 U.S.C. 112, the claims of an application must point out the invention. If the actual invention resides in a series of steps which can be performed mentally, or which are otherwise not directed to subject matter which is patentable under the statutes, a patent cannot properly be obtained merely by reciting broadly a means

for performing each of those steps. To permit this would be tantamount to granting a patent on the unpatentable process, since the process could not be performed unless some means are provided for carrying out each of the steps.

Further, it is well settled that a patent cannot be granted merely on the broad basis of doing automatically what has previously been done by hand; *In re Hamilton*, 17 U.S.P.Q. 245, and cases there cited, and for similar reasons, it would not be proper to patent apparatus, broadly, for doing what it is not patentable to do mentally.

Moreover, if, given the process to which an application relates, it would be obvious to a skilled programmer what tape or other apparatus was necessary to carry out the process, then the invention, if any, resides in the process and not in the apparatus; *Nestle-Lemur Co. v. Eugene, Ltd.*, 12 U.S.P.Q. 335, 54 F.(2d) 854; *Whitman v. Andrus et al.*, 92 U.S.P.Q. 291. As was said in the former case:

> Where one discovers a new and useful process for accomplishing a given result, is the obvious mechanical or electrical device, obvious to anyone to whom the proposed method is disclosed patentable apart from the process? We are constrained to the opinion that it is not.

However, as in the case of a corresponding process, a programmed computer may be part of a patentable combination if unobviously combined with other elements to produce a physical result of the character referred to above.

The basic principle set forth in the foregoing guidelines is that computer programming per se, whether defined in the form of process or apparatus, shall not be patentable.