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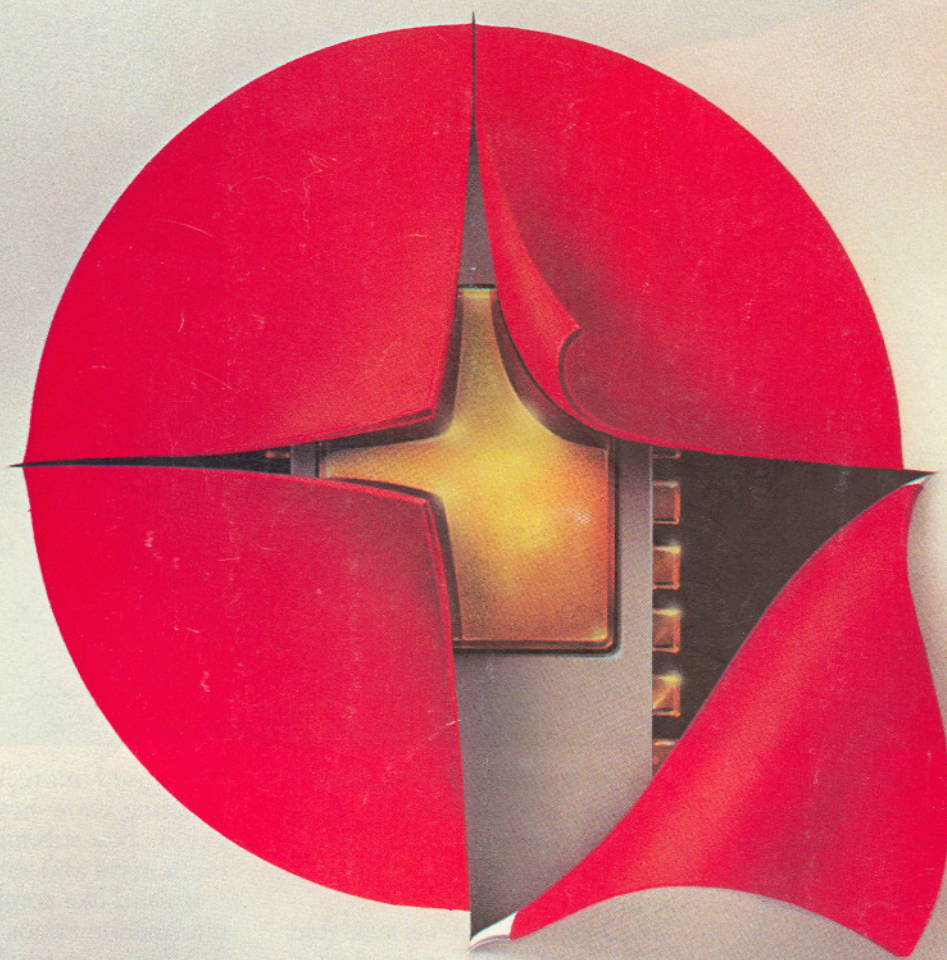
INSIDE JAPAN'S NEW MICRO DESIGNS



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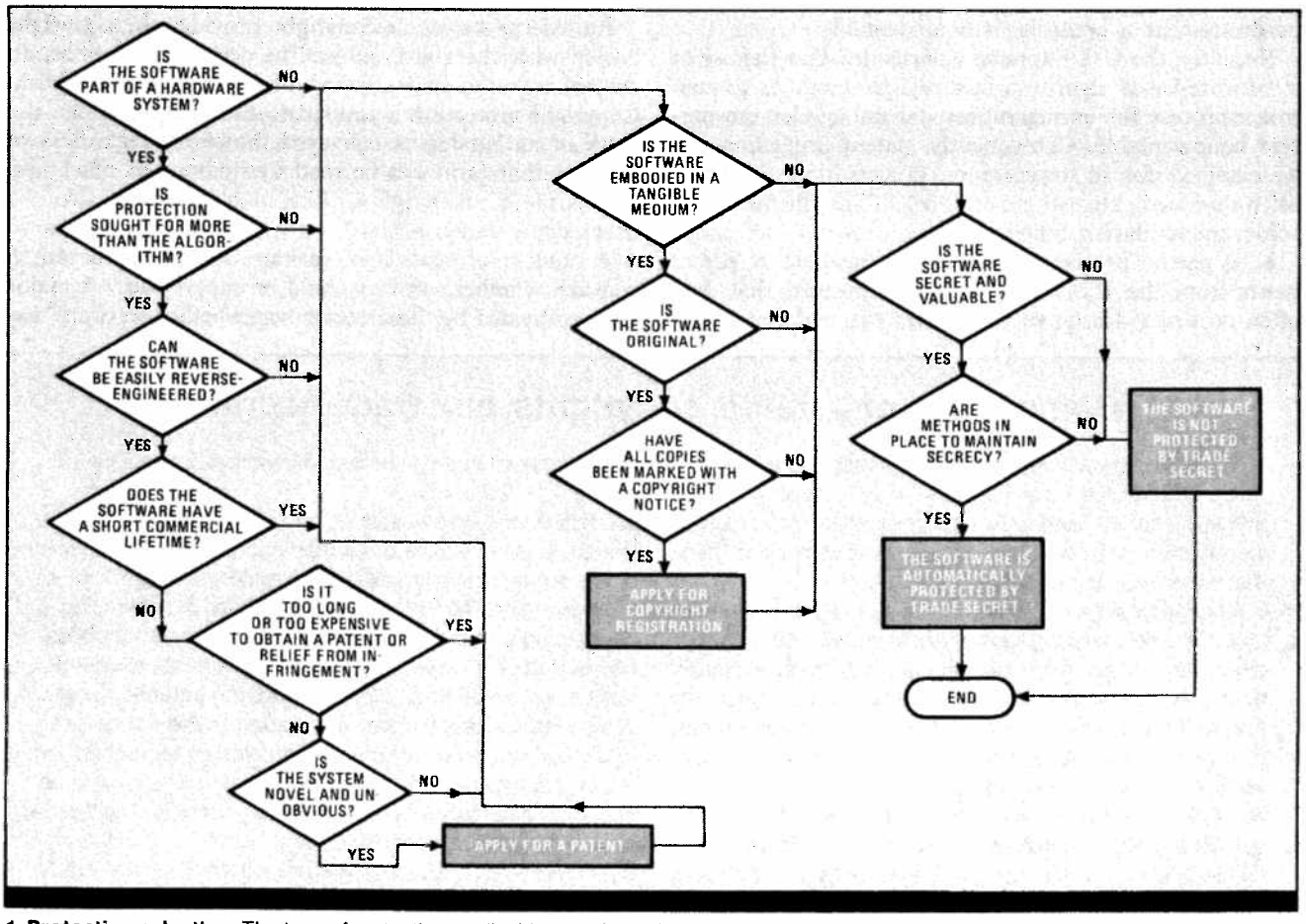
LEGAL DEFENSES AGAINST PIRACY

Software protection in the U.S. is a forest of facts, fantasies, methods, and results ☐ *by Peter L. Michaelson and Michael B. Einschlag*

Incidents of software theft and piracy have reached epidemic proportions in the U.S., resulting in significant lost revenues. For every legitimate copy of a commercially successful program currently on the market, there exist at least four—some estimates are as high as 10 or more—pirated copies. Furthermore, as the success of a program increases, so does the number of pirated copies. Surprisingly, both large and small organizations copy illegally, sometimes secretly and sometimes openly.

Under current law, software can be protected against unauthorized and illegal use in the U.S. in one of three ways: by obtaining a patent, by claiming copyright, or by treating the software as a trade secret (see "Comparison of patents, copyrights, and trade secrets," p. 54). Each of these three avenues affords certain specific forms of protection; each also has its particular limitations. The ex-



1. Protection selection. The type of protection applicable to a given piece of software is determined by a variety of factors. By following the steps in the flowchart, it is possible to determine which of the three types of protection available will serve the user best.

tent and limitations of each type of protection, the methods generally adopted by U.S. industry to protect software, and recent judicial and legislative developments aimed at strengthening the protection for hardware and software are all factors to be considered when deciding which route to take to provide protection (Fig. 1).

Patent protection

By itself, software is not patentable. In combination with hardware, it is. Whether patent protection is worthwhile depends on the situation. But often, it is not.

Patents provide very strong protection for intellectual property. As provided by federal statute, anyone who invents or discovers any new and useful process, machine, manufactured article, or composition of matter or any new and useful improvement thereof may file for and obtain a patent.

The essence of software, however, does not lie in a process, machine, manufactured article, or composition of matter but rather in its underlying algorithm—a sequence of steps which, when followed, perform a useful and intended result. Although an algorithm is meant to be implemented on high-speed processors, humans, in theory and given enough time, can also perform the algorithm to yield the same result.

With this in mind, U.S. courts have held an algorithm to be nothing more than a sequence of mental steps that does not fall within the statutory classes of patentable subject matter. Hence, these courts have concluded that software, by itself and devoid of any relationship to the hardware that it controls, is nonpatentable.

Recently, the U.S. Supreme Court ruled that the use of a software-based algorithm in a digital computer to control a process for curing rubber did not render the process nonpatentable. Consequently, patent protection can be obtained for a structure or process that utilizes a software-based algorithm as one of its elements to achieve a utilitarian function.

U.S. patent protection begins on the date a patent issues from the U.S. Patent Office. However, that date often occurs at least two years after the underlying patent application has been filed in the patent office. Because most software generally has a short product life, most of the useful product life of the software has ended before patent protection on the software and its attendant hardware has begun. Nonetheless, where product life is longer and patent protection is secured, a patent owner obtains strong exclusive rights, which he can exercise during the 17-year term of a patent. In addition, a patent owner can license his patent to others. Through licensing, the patent owner receives something of value, typically royalties, from his licensee.

Even if meaningful patent protection is obtained, enforcement against infringers is difficult. Full-scale patent litigation is complex and often stretches over many years.

Therefore, several factors militate against using U.S. patent protection for software in most situations: the uncertainty surrounding the patentability of software, the short product life of most software, and the protracted period of time required to obtain both patent protection and effective relief from infringement.

Copyrighting software

Software can be copyrighted, however, and copyright protection is definitely worthwhile. Copyrights, in contrast to patents, provide immediate protection. This protection begins as soon as an original work of authorship (such as a program) is fixed in a tangible medium (such as being printed on paper or stored in a read-only memory chip, in floppy disks, or on magnetic tape) and lasts for at least 50 years.

By federal statute, a copyright provides the copyright owner with the right, subject to certain exceptions, to control unauthorized copying of his copyrighted work. Copyright protection is limited to the form in which the work of authorship is conveyed, however, regardless of whether that form can be read by humans or machines. Furthermore, copyrights, like patents, can also be licensed.

A number of years ago, various U.S. courts began to consider whether software could be copyrighted. A major issue addressed by these courts was whether software was

Comparison of patents, copyrights, and trade secrets

Although patents, copyrights, and trade secrets all provide protection for the owner, they apply to specific areas.

- A utility patent applies to a process, machine, article of manufacture, composition, or any improvement of these that is both novel and nonobvious.
- A copyright is for original works of authorship fixed in any tangible medium of expression, now known or later developed, from which these works can be perceived, reproduced, or otherwise communicated either directly or with the aid of a machine. There is no protection for an idea, procedure, process, system, method of operation, concept, principle, or discovery, regardless of the form in which it is described, explained, illustrated, or embodied.
- A trade secret constitutes information that is not widely known and conveys a competitive advantage to the party or parties who possess it.

Each one of these means of protection is effective for a different period of time.

- *Utility patent.* Protection begins only when a patent is issued. This now takes more than two years from the time a patent application is filed. However, "Patent pending" or the like can be affixed to the article or used in advertising in connection with the article as soon as the patent application is filed. The patent application is carefully examined. Patent protection ends 17 years after the patent issues.
- *Copyright.* Protection begins as soon as the work is fixed in a tangible medium of expression; that is, registration is not a prerequisite to obtaining copyright protection. A copyright application is only cursorily examined, and protection lasts for at least 50 years.
- *Trade secret.* Protection begins as soon as the trade secret is created. This protection lasts indefinitely, provid-

purely functional. Early on, U.S. courts have held that items that are purely utilitarian—that is, designed to perform a given function rather than being artistic or expressive in nature—were not copyrightable, and that if protection is to be had for these items, that protection must come from a U.S. patent.

At first, various U.S. courts perceived software as merely an element that controlled the operation of a computer to produce a desired result. Therefore, the courts held software to be purely functional and hence noncopyrightable. Over the past few years, a number of influential U.S. courts, in well-reasoned opinions, have realized that because software both contains significant amounts of original authorship that is independent of the function performed by the software (a program can be written in many different ways to perform the same function) and is fixed in a tangible medium, it qualifies as copyrightable subject matter, even when stored in ROM.

Furthermore, the Copyright Act was amended in 1980 to permit limited copying of a computer program (for archiving, for example). In effect, the act now recognizes that software is copyrightable. Hence, current U.S. law is such that software, including both source code and object code, fixed (stored) in ROM or other tangible media, is now universally recognized by all concerned as being eligible for copyright protection.

The rights provided by U.S. copyrights are far narrower than those provided by patents. Copyright law provides no relief against one who distills the underlying algorithm from a copyrighted program and, using the algorithm, writes a non-infringing program. However, this restriction is not as limiting as it first appears, inasmuch as most software misappropriation in practice involves the type of slavish copying that is actionable under the copyright statute. Such slavish copying is generally the rule where short-lived consumer goods (particularly video games and software for home or personal computers) are involved and a competitor is seeking to minimize his product-development time.

Copyright-infringement actions are generally far simpler than patent-infringement actions and often provide a fast and effective remedy against copying. To sue for copyright infringement under the present U.S. Copyright Act and to take advantage of all the remedies provided by that act, a copyright registration must first be made. This entails depositing a complete copy of the software (or a specified portion thereof) in the U.S. Copyright Office (which forms part of the Library of Congress).

Currently, all copyright deposits (with some minor exceptions, such as secure tests) are publicly accessible. Although the Copyright Office is considering proposed rules to eliminate public access to software deposits, these rules have not yet been adopted. Therefore, anyone who now deposits software in the Copyright Office runs a risk, albeit a minimal one, that a third party will examine the deposited software, discern its underlying algorithm, and produce a noninfringing version.

As noted, copyright protection begins when software is fixed in a tangible medium and notice of the copyright is communicated to others by an appropriate copyright notice. Consequently, a proper copyright notice should be applied to all software as soon as possible during its development to notify others of its copyrighted nature. Notwithstanding the limited nature of copyright protection, copyrights have proven to be an effective practical weapon against software misappropriation.

Trade secrets

Software can also be protected as a trade secret. However, this type of protection also depends on certain conditions in order to be worthwhile.

Trade secrets cover a broader range of subject matter than do patents and copyrights. In general, any item of intellectual property can be the subject of a trade secret, as long as that item is not generally known by others, conveys a competitive advantage to one who possesses it, and is kept secret. For example, business information (such as customer lists and financial information), designs, and software can all qualify as trade secrets.

Unlike patent and copyright protection, which are provided by federal statute, trade-secret protection emanates from state law and hence varies from state to state. This

ed the information remains secret and adequate steps are taken to protect its secrecy.

The rights and remedies available to the owner vary with each type of protection.

- *Utility patent.* During the term of any patent, its owner has the right to exclude others from making, using, or selling the claimed invention anywhere in the U.S. The owner can sue infringers and obtain remedies such as actual damages, injunctions against infringement, prejudgment interest, and court costs. If the infringement is found to be willful, treble damages and attorneys' fees can be awarded. Furthermore, in certain instances, exclusion orders can be obtained to bar imports that infringe upon the patent from entering the U.S.
- *Copyright.* The owner of a copyright has the right to control copying and distribution of copies of the copyrighted work, to control preparation of derivative works based upon the copyrighted work, and, for certain works, to control public display and performance of the copyrighted work. The owner can sue infringers and obtain such remedies as actual damages, infringer's profits attributable to infringement, injunctions against infringement, statutory damages, prejudgment interest, court costs, and seizure and forfeiture of infringing articles. If the infringement is found to be willful, attorneys' fees can be awarded. Furthermore, in certain instances, exclusion orders can be obtained to bar infringing imports from entry into the U.S., and criminal penalties are available in some cases.
- *Trade secret.* The owner of a trade secret can sue infringers and obtain such remedies as actual damages, injunctions against use, disclosure to others of the trade secret, and court costs.

Congressional action

Congress recently recognized that the protection accorded by U.S. intellectual-property laws, particularly patents and copyrights, is insufficient and thus often ineffective to counter the substantial ongoing misappropriation of computer technology. As a result, Congress is now taking active steps to remedy these defects.

First, regarding computer hardware, Congress recognized that designs embodied in the three-dimensional layered structure of an integrated circuit were generally unprotected under current law. This, in turn, allowed many incidents of chip piracy to occur unchecked. To counter this piracy, Congress outlawed unauthorized duplication and distribution of chips by passing the Semiconductor Chip Protection Act of 1984. This act establishes a new form of intellectual property for mask works, which are defined as a series of related images that represent 3-d patterns in the layers composing a semiconductor chip.

If certain prerequisites are met, the owner of protected mask works is granted for 10 years the exclusive rights to reproduce the mask works by any means, to import or distribute a semiconductor chip product embodying the mask works, or knowingly to cause or induce another to do any of these acts. Furthermore, initial protection under the act is obtained either through registration of the mask work or through proper commercial exploitation of a semiconductor chip product embodying these mask works. Nonetheless, the act grants a limited right to third parties to reverse-engineer any semiconductor product containing protected mask works in order to extract the underlying teachings of the protected mask works, and embody these teachings in noninfringing mask works.

Second, Congress recognized and is now attempting to eliminate another form of software piracy. This piracy involves third parties who rent the software from purchasers and then make illegal copies. Through this practice, those who develop and sell software are losing significant numbers of sales. To counter this piracy, Sen. Charles Mathias (R., Md.) recently introduced a measure (S. 3074), which, if enacted, would outlaw this rental practice.

U.S. law now provides significant protection for software and computer technology, including both computer hardware and software. As the U.S. depends increasingly on software and computer technology, however, new forms of piracy will inevitably evolve.

protection arises out of a confidential relationship between the owner of the trade secret and another party. Trade secrets can last indefinitely—that is, as long as the subject matter of the trade secret remains secret and adequate steps are taken to ensure its continued secrecy.

Although U.S. patent or copyright protection protects its owner against any third-party infringers, trade-secret protection does not. Anyone who successfully discovers a trade secret through legal means, such as reverse engineering, can use the trade secret without any interference from its owner. Because trade-secret protection is based on a confidential relationship, anyone who obtains trade-secret information as a result of a breach of such a confidential relationship and who has actual or constructive knowledge of the existence of that relationship can be restrained from using the trade secret.

Like patents and copyrights, trade secrets can be licensed by what are often referred to as know-how licenses. When such licenses cover trade secrets embodied in software, they should include various restraints.

The vast majority of software in the U.S. is protected through trade secrets. However, since trade secrets provide no protection against third-party reverse-engineering, trade-secret protection is wholly inadequate to protect software destined for commercial public distribution. Hence, trade-secret protection by itself should only be relied on in those instances where access to the software can be tightly controlled.

Because the public should rarely, and preferably never, be given access to the source code, the current practice is not to register the source code unless and until the Copyright Office permits secret deposits or unless actual copyright litigation involving the source code is contemplated. Nonetheless, both the object-code and source-code versions of any software should bear prominent copyright notices, preferably in the comment sections at the beginning, middle, and end of the software.

Because trade-secret protection cannot protect against reverse-engineering, a number of technical methods have been devised to thwart reverse-engineering and detect unauthorized copying.

Recent developments

Over the past few years, U.S. computer manufacturers have become increasingly litigious and have taken advantage of U.S. intellectual-property laws to counter, at least temporarily, the increasing onslaught of misappropriation. Congress has also looked at this situation with a view to increasing the protection available to software owners (see "Congressional action," above).

Apple Computer Inc. obtained an exclusion order from the U.S. International Trade Commission that barred the importation into the U.S. of personal computers and various subassemblies used therein, which were manufactured primarily by establishments based in Hong Kong and Taiwan and which infringed on various U.S. patents and copyrights that Apple held on its personal computer hardware and software, respectively.

In other recent cases involving Apple and Midway Manufacturing Co. (makers of the Pac-Man video game), U.S. courts have upheld that programs are copyrightable, particularly those stored as object code in ROM, and have generally granted relief against unauthorized duplication of the ROM code. □

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