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COPYRIGHT IN THE "FUNCTIONALITY" OF AN ELECTRICAL CIRCUIT

• *by Brendan Welsh*

The Australian *Copyright Act* was amended in 1984 to clarify the issue of copyright in computer programs. These amendments were recently considered for the first time in *Autodesk Inc & Anor v Martin Peter Dyason & Ors* by Northrop J who reached the significant conclusion that copyright subsists in the functionality of an electrical circuit.

Facts

Autodesk Inc ("Autodesk") owns copyright in a sophisticated shrink-wrap PC computer program known as "AutoCAD" which assists in the drafting of architectural and engineering designs. In comparison with other shrink-wrap computer PC programs AutoCAD is expensive and retails in Australia for about $5,000.

Autodesk sought to limit the use of AutoCAD to one computer at any one time with a device known as the "AutoCAD lock". The AutoCAD lock attaches to a serial port of a computer. When AutoCAD is running it regularly "challenges" the serial port with information and then verifies the response from the AutoCAD lock. If a response is not received AutoCAD immediately terminates.

The AutoCAD lock is a basic electronic circuit made up of data input and output lines, a digital clock, a shift register and an XOR (exclusive OR) gate. Each time AutoCAD is run it initialises the AutoCAD lock by loading into the shift register the binary representation of a number between 0 and 127. During operation AutoCAD challenges the AutoCAD lock in the form of a transition in the electrical signal from the computer to the AutoCAD lock. The transition is a signal to alter the contents of the shift register. Following each transition AutoCAD immediately polls the AutoCAD lock for the new value of the 6th bit of the shift register and verifies this against what AutoCAD expects. If its value is different to what AutoCAD expects it stops running. Apart from initialisation, the only relevant input to the AutoCAD lock is a transition in the electrical

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signal and the only relevant output is the value of the 6th bit of the register immediately following a transition.

The 3rd Respondent, Kelly, obtained the AutoCAD program and the AutoCAD lock. He was interested to discover how the lock worked. With use of an oscilloscope he noticed that the sequence of responses from the AutoCAD lock were repeated after 128 challenges. He converted the responses into a look up table and discovered that the binary number loaded into the AutoCAD lock upon initialisation indicated which of the 128 responses was the correct response to the first challenge. Thereafter the next response was the next value in the look up table wrapping around after the 128th value. He broke the code without ever looking inside the AutoCAD lock.

Kelly then made a device comprising data input and output lines, a digital counter and an EPROM into which was loaded the contents of the look up table. This device was an infallible substitute for the AutoCAD lock. He called the device the "Auto–Key Hardware Lock" and with the aid of the 1st and 2nd Respondents, Mr & Mrs Dyason, he manufactured and marketed the device at a retail price of $499.

Autodesk sought an injunction to restrain the Respondents from infringing its copyright in the computer program embodied in the AutoCAD lock.

The Respondent's denied any infringement. They denied that the AutoCAD lock contains any part of AutoCAD. They denied that the AutoCAD lock is a computer program and they denied that the Auto–Key lock is a reproduction in material form or adaption of AutoCAD or any part of it. Furthermore, they contended that if the Auto-Key lock contains a reproduction in material form of the computer program within the AutoCAD lock, it was produced independently.

The respondents did not contest the proposition that if the AutoCAD lock did contain a computer program, copyright in that program was owned by Autodesk.

Held

1. The AutoCAD and Auto–Key Locks both contain "computer programs" as defined by the 1984 amendments to the Australian *Copyright Act*.
2. The Auto–Key. Lock infringed the computer program in the AutoCAD lock by reproducing the functionality of that program in a material form.

Comment

The result is somewhat surprising. It challenges the ordinary understanding of what constitutes a computer program and it imports "function" into the criteria for infringement. It is inconceivable that such an outcome was envisaged when the 1984 amendments were introduced.

The Definition of "Computer Program"

Accordng to the 1984 amendments:

"'Computer Program' means an expression, in any language, code or notation of a set of instructions (whether with or without related information) intended, either directly or after either of the following:

- conversion to another language, code or notation;
- reproduction in a different material form,

to cause a device having digital information processing capabilities to perform a particular function."

Northrop J felt obliged to widely interpret the construction of the definition and found that:

- each of the locks are devices having digital information processing capabilities;
- each of the locks is devised to perform a particular function;
- the encoding on the shift register in the AutoCAD lock and the encoding of the EPROM on the Auto-Key lock constitutes an expression in a "language, code or notation"; and
- the information encoded in the locks constitutes a set of instructions.

It is difficult to understand how the AutoCAD lock and the Auto-Key lock could be regarded as containing a computer program. The AutoCAD lock consists merely of electrical circuits and the Auto-Key lock consists of a hard wired counter addressing a look up table (merely data) embedded in an EPROM.

The Respondents persuasively argued that in order to satisfy the definition of "computer program", it is necessary to have an "expression ... of a set of instructions" which is separate and distinct from the "device having ... information processing capabilities". The instructions must be the "cause" of the device performing a particular function.

It is a fundamental concept of computers that hardware and software are completely interchangeable. The line between software and hardware is completely arbitrary and is defined by the designers of the particular computer in question and is based solely on a cost benefit analysis. One computer's hardware is another computer's software.

As a question of fact it is possible to distinguish between hardware and software for any particular computer. The hardware being the electrical circuits and the software being the input instructing the hardware in the manner in which it is to perform.

The software input could be a single electrical impulse in the form of a transition into a simple circuit, as in the AutoCAD lock, or it could be a series of impulses into a sophisticated mathematical processor performing complex floating point arithmetic. The crucial distinction is that the input, or instructions, in the form of electrical impulses representing the "software" is quite different from the electrical device processing these inputs.

Nonetheless, Northrop J found that the "instructions" in the circuitry of the lock and the "device" of the lock itself are essentially one and the same. The instructions are the cause of their own function.

It is respectfully submitted that Northrop J confused the so called instructions in the circuitry with the instructions passing between the AutoCAD lock and AutoCAD. If one accepts that hardware and software are interchangeable and that the software instructs the hardware it is not logically sound to say that hardware instructs itself.

Northrop seems to imply, with a traffic light analogy, that the AutoCAD lock "instructs" because it directs the flow of electrical impulses within the lock. Apart from widely interpreting the word "instruction", this conclusion can only be true if and when the electrical impulses are present. The AutoCAD lock is incapable of instructing or causing itself to perform a particular function without the presence of the electrical impulses.

Reproduction in a Material Form

Having decided that the AutoCAD lock constituted a computer program, Northrop J then went on to

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Wednesday 15 November 1989

The Insurance Hall, London

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find that the Auto-Key lock is a reproduction in a material form of the AutoCAD lock.

He started with the proposition stated by Gibbs CJ in the *Apple Computer* case that the notion of reproduction involves two elements – that the infringing work was produced by use of copyright work (clearly, on the facts, this element was satisfied) and that there be a sufficient resemblance or a sufficient degree of objective similarity between the two works.

The concept of "reproduction" was not changed by the 1984 amendments. The High Court in the *Apple* case held that objective similarity required a "physical resemblance" between the works. While the material forms in which they are embodied need not be the same, if they are too different there will not be the necessary physical resemblance. A building may resemble and therefore reproduce a drawing but it is hard to imagine it resembling a piece of writing. It might give effect to directions in the writing, it might embody the idea contained in the writing, but it would not resemble or reproduce it.

Northrop J took a different line. He said that regard must be had to the function of the computer program in determining resemblance, and the concept of physical appearance is immaterial. He held that the Auto–Key lock is a reproduction in a material form of the AutoCAD lock because they both perform the same function.

Northrop J's stress on function rather than physical resemblance comes from the definition of computer program. Northrop J does not adequately reason through this radical logic. He merely notes that the 1984 amendments are intended to protect object code, which is invisible. Although he does not expressly mention this in his judgment, it may be he could also find some support in the new definition of "material form", which now includes "any form (whether visible or not) of storage from which the work ... or a substantial part of the work ... can be reproduced". It is difficult to apply the High Court's requirement of physical resemblance to an essentially invisible work stored in invisible form.

This is a radical departure from previous notions of copyright. For the very first time, if Northrop J is correct, copyright protects function rather than expression and the floodgates may well have opened to actions for software infringement. If two software programs perform the same function, regardless of the underlying code, there will be potential for an infringement action to be brought under the *Copyright Act.* If a programmer produces software which performs the same function as an older program, but with vastly improved speed and efficiency, there will be potential for an infringement action. The question that needs to be asked is will this also apply to computer programs that are original, but are obvious or simple?

Conclusion

This is far and away the most important Australian case on copyright protection for computer programs since *Apple v Computer Edge.* By importing "function" into the criteria for infringement, Northrop J has extended copyright far beyond where it was thought to be in the light of the approach taken by the High Court in relation to "reproduction" in the *Apple* case.

It may be that the High Court would not uphold such radical departure from traditional notions of copyright, and would take a more conservative approach in applying terms such as "expression" and "reproduction" in the context of a hardware device.

The understanding within legal circles is that the Respondents will seek to appeal against Northop J's decision.

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