

IN THE COURT OF APPEAL OF THE REPUBLIC OF SINGAPORE

[1996] SGCA 71

CA 181/1995

Between

Creative Technology Ltd

... Appellant

And

Aztech Systems Pte Ltd

... Respondent

GROUND OF DECISION

Copyright — Defence; Copyright — Infringement; Copyright —
Infringement; Copyright — Infringement; Words and Phrases

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Creative Technology Ltd v Aztech Systems Pte Ltd

[1996] SGCA 71

CA 181/1995

Karthigesu JA; Lai Kew Chai J; L P Thean JA

12 November 1996

1 (delivering the judgment of the court):

2 This is an appeal from the judgment of the learned judicial commissioner Lim Teong Qwee sitting in the High Court, dated 24 October 1994. In those proceedings, the appellants (Creative) counterclaimed, inter alia, that the respondents (Aztech) had disassembled and copied a substantial portion of the firmware which is housed in the microprocessor of the Creative Sound Blaster Card; and that their copyright in TEST.SBC (a program ancillary to and supplied with the sound blaster package) was infringed when it was unlawfully copied for the purpose of effecting assembly through the running of the DEBUG program. Aztech in turn denied disassembling the firmware and argued that such copying of the TEST.SBC program was a fair dealing for the purpose of research or private study under s 35(1) of the Singapore Copyright Act (Cap 63, 1988 Ed) (SCA). Furthermore it was argued by Aztech that being the lawful owners of TEST.SBC they were entitled to use it for any reasonable purpose, including the purpose of investigating how it interacted with the Sound Blaster card, relying principally on the 1871 decision of *Betts v Willmott* .

3 It was held by the learned judicial commissioner that, in relation to the firmware, Aztech had not been shown to have had access to the firmware program which is usually secured by way of a fuse, and that they had successfully explained away apparent similarities in both programs. He further held that the copying of TEST.SBC by Aztech constituted fair dealing for the purpose of private study under s 35 SCA, and that such use for experimentation was one of the rights of ownership implied in the software licence.

4 ***Facts***

5 The salient facts have to be set out. This judgment has been edited to preserve the proprietary rights of Creative. Creative manufacture and sell `Sound Blaster` sound cards. The sound card is an `add-on` product, a circuit board that can be inserted into a personal computer (PC). The sound card generates sounds through a speaker system by means of a digital signal processor (DSP) and a digital-to-analog converter (DAC). When an application program runs on a PC and requires sound, it sends commands to a software program in a driver for conversion into low-level commands. These commands are sent to the DSP, and subsequently on to the DAC where the data is converted into sound through the speaker system. For the DSP, Creative used an Intel 8051 chip. The firmware program was burnt into the ROM of this chip. The other program of significance is TEST.SBC, which formed part of the ancillary executable software that was supplied with every purchase of the Sound Blaster sound card.

6 Aztech, who are also commercial developers of sound cards, developed a sound card, `Sound Galaxy` (in 3 versions, `Sound Galaxy BX`, `Sound Galaxy NX` and `Sound Galaxy NX PRO`), which was compatible or interoperable with the application programs that have been developed to operate

with Sound Blaster. Sound Galaxy is thus a competing product, providing the same functionality as Creative's Sound Blaster card, with additional capabilities. Like the Sound Blaster sound card, Sound Galaxy sound cards also make use of the Intel 8051 chip, a DAC and a FM synthesizer. It also has its own firmware burned into the ROM by the manufacturer of the chip.

7 Creative developed two versions for their Sound Blaster sound card; and this was matched by Aztech. Version 1 ('Sound Galaxy BX' and 'Sound Galaxy NX') of Aztech's card was available by March 1992. This version implemented the publicly described functions in Creative's card and two of the test and verification functions at issue: the E2 command and the F8 command. It should be pointed out at the very outset that Aztech did not implement these two commands in a manner similar to Creative. Their E2 command used a complicated table-look up method to calculate its response; and their F8 command did not perform any testing but simply returned the value that indicated it was functioning properly. Indeed no allegation has been made that Aztech's version 1 copied any of Creative's firmware.

8 Creative launched the second version of their firmware on or about March 1992. Aztech released their second version by August 1992. To this version Aztech added two more test commands - the F0 command and the F4 command. The instructions for the E2 and F8 commands were also changed from version 1. There are thus two notable phases in the development of Aztech's sound card and firmware. The first version of the card and firmware was produced in phase 1, between October and March 1992, at the end of which the first Sound Galaxy cards were marketed. Creative asserted that it was during this phase that Aztech made illegitimate use of their software (ie TEST.SBC). The second version of Aztech's firmware and card were produced in phase 2, between March and August 1992, at the end of which new versions were

marketed, as stated above. At the end of phase 2 Aztech's card was capable of responding in a sophisticated way to a full range of Creative's undocumented commands. Creative further asserted that it was during this phase that Aztech most likely had access to and disassembled its Sound Blaster firmware.

9 In broad terms Creative's claim is grounded on three central allegations of facts, viz: (a) that Aztech reverse engineered (through disassembly) version 1 of the Sound Blaster firmware; (b) that Aztech copied portions of version 2 of the Sound Blaster firmware, particularly in four undocumented commands, E2, F0, F4 and F8; and (c) by loading TEST.SBC into the PC's RAM and disassembling it, by means of running the DEBUG program, Aztech infringed Creative's copyright in TEST.SBC.

10 ***Issues raised in this appeal***

11 In his submissions, Mr Garnett, counsel for Creative identified the following issues for consideration by this court:

(1) Was the learned judicial commissioner correct to accept that Aztech's firmware had been developed independently and without having had access to and copied Creative's firmware or software? (a) Did Creative establish a prima facie case of disassembly, so that the burden of disproving that fact was shifted to Aztech, by showing that: (i) Aztech had potential access to Creative's firmware and disassembled the source code; and (ii) There were sufficient fingerprints of such disassembly in Aztech's source code. (b) If so, did the fact that the learned judicial commissioner regarded the burden of proving disassembly as being on Creative vitiate his decision? (c) Alternatively, even if the burden of proof was, for some reason correctly left with Creative, did Creative's cumulative evidence (of the opportunity for access by Aztech to the Creative firmware and of the significant number of otherwise improbable fingerprints in Aztech's code) nevertheless establish disassembly on the balance of probabilities? (d) Did the judicial commissioner make errors in the consideration of evidence (eg by mis-stating certain facts, ignoring others and not

considering the cumulative improbability of the many instances of coincidence in Aztech's code) which could vitiate his evaluation of it? (2) Putting aside the evidence of Aztech's disassembly, are the portions of Aztech code that are essentially identical to Creative's code an independent form of infringement? (3) Did the judicial commissioner err as a matter of law in accepting that Aztech's admitted copying of one of Creative's software programs was nevertheless not an infringement because it constituted 'fair use' or alternatively a use identical to the right of ownership of the physical copy of the program?

12 The first issue broadly relates to the alleged disassembly of the Sound Blaster sound card; and is decidedly a question of fact, quite apart from the determination of whether the burden of proof does shift when Creative alludes to sufficient access and similarities between both works, which is always a question of law. The second issue asks the question whether such similarities lead to the finding of an independent form of direct copyright infringement. It is also decidedly a question of fact. The third issue raises a pure question of law: whether Aztech are able to rely on copyright defences to excuse their act of admitted copying, in relation to the TEST.SBC program.

13 ***Did Creative establish a prima facie case of disassembly?***

14 It is Creative's contention that most of the evidence of disassembly occurred in the six months, during which Aztech significantly modified their sound card firmware and moved from partial to full Sound Blaster compatibility and which was the period described as 'phase 2' above. It was submitted that in this phase, the 'fingerprints' of disassembly could clearly be seen. The attention of the court was specifically directed at five undocumented commands (instructions which are sent to operate the micro-controller) that were fully implemented for the first time in phase 2; viz. E2, F0, F4, F8 and F1. Quite apart from functionality, features from each of these commands exist in the Sound Galaxy card.

15 We set out below the key characteristics of the various commands and similarities between both parties' firmware, which Creative rely upon to argue that the learned judicial commissioner erred in finding that such similarities arose through independent creation, rather than disassembly of the sound blaster firmware.

16 (a) E2 Command

17 E2 is an undocumented command. A series of signals passes between an application program in the PC and the sound card. If the sound card does not return the correct response, the external software will not continue running. Creative argued that E2 provides proof of Aztech's disassembly.

18 Aztech used the same secret algorithm as Creative. Second, Aztech coded the algorithm in a manner identical to that used by Creative, when better alternatives existed. It is further alleged that Aztech duplicated the secret fixed values used by Creative in the E2 algorithm.

19 In relation to the algorithm, Creative pointed out that it was indeed difficult for Aztech's programmer and key witness, Mr Loh, to have coded the algorithm in subsequent versions of Sound Galaxy, other than through the means of disassembly. The learned judicial commissioner was prepared to accept Mr Loh's explanation that the algorithm could have been deduced through the mere observation of the relationship borne by the return codes to the input data values. He said:

Mr Loh did not immediately deduce the algorithm and as pointed out above it was not implemented in the first version of the compatible sound cards (which used a look up table) and it was only in subsequent versions that the algorithm was coded and employed ... Mr Loh said he deduced it and from his evidence it

would have taken him much longer and I see no reason not to accept that he did it without copying Creative's code.

20 On the other hand, it was the view of Creative's expert witness, Dr Swensen, that:

... it requires an unreasonable suspension of disbelief to accept that he suddenly observed, with no further substantial effort, the nature of the algorithm defining the entire behaviour of the E2 instruction.

21 Dr Swensen apparently deduced the algorithm, but with some difficulty, after 250 hours of effort and 400 hours of computing time.

22 [The court discussed aspects of the algorithm, and the evidence of Mr Loh given at trial.]

23 Creative also pointed out that the actual coding of the E2 command was written by Aztech in a way which is almost identical in code. They went on to demonstrate that with a mere substitution of actual memory addresses, the two codes would have been identical. Evidence (inter alia, through Dr Swensen's own writing of the E2 algorithm) was also presented to demonstrate how a better, more efficient method of coding was available. The judicial commissioner, having compared two codes, said:

The coding of the algorithm in the circumstances is as different as they can be between Creative and Aztech. While there are alternative ways of coding it has not been demonstrated that there are simpler or more obvious instructions to achieve any of the five steps. There are no simple or obvious instructions other than those which have been used. There is no evidence that any programmer writing a program for this without having had access to Creative's code is more likely to have written it any other way.

24 Mr Prescott in his arguments disputed whether Dr Swensen's method of coding was indeed an alternative method, because in his view it contains a

design flaw. He also argued that this alternative was not arrived at in a `clean room`. Moreover the relevant lines of code referred to by Creative only came up to 8 lines of instructions, thus greatly exaggerating the similarity in the coding.

25 (b) F0 Command

26 The first observation to be made about this command is that it is not an essential feature, but merely included into Sound Blaster firmware by Creative as a testing feature in the manufacturing process. It is an unnecessary feature, and Creative were quick to argue that it is not required for compatibility.

27 [The court discussed the nature of command, similarities in the implementation and execution in Aztech`s and Creative`s respective sound cards, and the evidence of Mr Loh given at trial and the judicial commissioner`s findings.]

28 (c) F4 Command

29 The function of this command is to perform a test. When an F4 command is sent to the micro-controller on the Sound Blaster sound card by an outside test, the card will return a 2 byte value which represents the result of the test. In addition to the 2 byte return value, there is another curious feature. There is a programming error.

30 [The court discussed the points of similarity between Aztech`s F4 command and Creative`s F4 command raised by Creative and Aztech`s arguments that such similarities were coincidental and/or likely.]

31 It was also argued on behalf of Creative that Mr Loh went on to code F4 in a virtually identical away. Creative furnished expert evidence, on how a clean room construction showed that Creative's code had many 'branches' and 'loops' which could have been avoided, but Aztech chose to use substantially similar, if inefficient coding. However the judicial commissioner said of Mr Loh's method:

There is no evidence that this method [of saving code] should come to mind more readily or would have been more likely to have been implemented than what was actually done. The code is really quite simple and consists of instructions in about 20 lines of a source code with instructions in some 2,300 lines in the case of Aztech. The algorithm appears quite logical and there is no reason why Mr Loh could not have implemented the checksum test the way he has done it ... It is only for a manufacturing test ... I do not consider that in the circumstances of this case the want of elegance in the code or the extravagance of two extra bytes points to copying.

32 It was argued on behalf of Creative, based on the above finding, that the judicial commissioner erred in not attaching any weight to the coincidence of similarity in coding. In response, Mr Prescott reproduced a comparison of the appellant's source code lines [num]741-759 against Aztech's source code lines [num]788-807 to illustrate the use of different registers, different types of jumps and different instructions in two of the reproduced lines. He argued that if these 'differences' were made to disguise copying, why were other changes not made to the F4 coding, since the test is 'trivial and easy to devise'?

33 Significantly, Aztech's firmware had also replicated the programming error contained in the Sound Blaster F4 command, which was an error achieved through convoluted coding. [The court set out the judicial commissioner's findings in the court below.]

34 [The court set out Aztech`s argument that the programming error was not material and made no difference to the result of the test.]

35 (d) F8 Command

36 [The court explained the nature of the F8 command.]

37 Creative pointed to some aspects of the undocumented F8 command which provided fingerprints of disassembly by Aztech. First, an F8 command sent to Aztech`s firmware also implements the same test. Second, Aztech`s version of the F8 command also implements the test in the same way as the Sound Blaster firmware. Third, the Sound Galaxy firmware`s F8 command also possesses the same design flaw as Creative`s sound card. Fourth, on registering a test failure, Aztech`s F8 command also reports the failure in the same way. Finally, Creative further pointed out that the coding for both F8 commands is extremely similar, save for the addition of one refinement by Aztech.

38 [The court set out part of Mr Loh`s evidence given in the court below.]

39 Creative have questioned how it was possible to conclude that because F4 was a particular test, F8 must necessarily be another particular test, stressing that Mr Loh in fact had no information about F8 other than it returned a particular value, as run by TEST-SBC. Creative`s expert, Dr Swensen, investigated the F8 command in a clean room, and although he guessed that F0 command was a testing command and that F4 initiated a particular test, unlike Mr Loh he did not jump to the conclusion that the F8 command was another particular test. The learned judicial commissioner however concluded that:

I see no reason for not accepting (Mr Loh`s) explanation for using this command for a (particular) test.

40 Creative also argued that Mr Loh made use of the same coding choices, when alternatives were clearly available, eg different ways of coding the test. The judicial commissioner made the following finding in respect of coding:

There are differences in the two codes. There are also similarities. These similarities in this case do not prove that Aztech has copied Creative's coding of the F8H test and I find accordingly.

41 (e) F1 Command

42 [The court explained the function of the F1 command, set out Creative's argument that Mr Loh's comments on Aztech's source code suggested that he knew what function the command performed despite its non-implementation in Aztech's firmware, and set out Aztech's arguments against Creative's contentions.]

43 **Our evaluation of the evidence**

44 We have considered all the evidence adduced in the court below, and form the view, after consultation with the appointed assessor, Dr AJ Nichols of Probitas Corporation, that the similarities between Creative's and Aztech's firmwares are such that the chance of independent development is low. We have accordingly come to the conclusion that it was highly probable that disassembly had taken place. Aztech did infringe the copyright of Creative. The most influential reasons for reaching this view may be summarised as follows:

45 E2 Command

46 Aztech derived the same algorithm even when this algorithm was not intuitively apparent. The same sequence of instructions were used to generate values.

47 F0 Command

48 We form the view that the similarities which exist in this command are highly probative of disassembly.

49 [The court set out the various similarities that it felt were noteworthy and whose presence were indicative of disassembly by Aztech.]

50 F4 Command

51 Whilst it is not apparently obvious that the F4 command is a particular test, Aztech successfully determined this function. This would have been clearly observable through the disassembly process. The same sequence of instructions was broadly used, but most importantly, Aztech's firmware has the same programming error as Creative's.

52 F8 Command

53 As with F4, Aztech claimed that they are correctly guessed that this command performed another particular test. Further, Aztech also chose, like Creative did, to effect the test in the same way. Dr Nichols is of the view that a much more efficient test method was available.

54 The design flaw apparent in Creative's firmware is also curiously replicated in Sound Galaxy firmware, forming yet another 'fingerprint'.

55 F1 Command

56 Not much should be made of Mr Loh's comments which were found present in his coding. The relevant lines do not describe what the code actually

does. At most the comments suggested that Mr Loh had a partial understanding of Creative's coding, and this was reflected in his programming. We cannot determine for sure whether through this evidence Mr Loh acquired actual knowledge of the function of the command through the means of disassembly.

57 ***Access***

58 It is our view that Aztech had the means and sufficient time to extract the relevant program from the Sound Blaster card, to disassemble raw data, and to analyse the commands of interest. They had at least four months to perform the acts of extraction and disassembly.

59 (a) Firmware Extraction

60 The Sound Blaster card uses both Intel and Matra microprocessors which contain the necessary firmware. Protection mechanisms lie in each, with varying potency.

61 Intel Microprocessor

62 The protection mechanism is substantial. To observe the program stored in the ROM, one would need to strip and stain a chip - a very costly and laborious exercise, and according to Dr Nichols, not likely to have been completed in the period of four months.

63 Matra Microprocessor

64 The incorporation of the firmware and its protection involves two separate operations. After the firmware is incorporated into the ROM, protection is achieved through a technical procedure.

65 If some Sound Blaster cards contained Matra parts without the technical procedure having been properly carried out, and Aztech had obtained one of these cards, it could have extracted the ROM contents in a matter of minutes. Otherwise this protection mechanism could also have been overcome by electronic means. This task requires special technique and equipment, but according to Dr Nichols, can be done in a few weeks at most. Once the protection mechanism is overcome, the firmware can be easily read electronically.

66 (b) Time for disassembly/analysis

67 With disassembly, raw numbers from the firmware will be converted into text, which reveals the instructions specified by the numbers. It should be noted that disassembly does not present a copy-perfect source code complete with names and helpful comments. Even with disassembly the functionality of the program in question is not immediately clear. The numbers are primarily converted into commands, which then have to be analysed by a programmer to understand what the program does. Much of this depends on the size and complexity of the program.

68 The evidence suggests that the computer program underlying the Sound Blaster card is not complex, but is highly structured in that there is a separate set of instructions for each command which the card can perform.

69 Contrary to evidence produced by Aztech that it is necessary to analyse the entire program to obtain useful information, Dr Nichols has expressed the view that the four primary commands at issue in these proceedings (E2, F0, F4, F8) are independent of each other and any other routine in the program. They can be analysed independently; and this exercise would, according to Dr

Nichols take the average programmer less than a week for all four commands. In his opinion, if Aztech had obtained a Sound Blaster board with a Matra part, they could have extracted the code and analysed the commands of interest in about one month. If they obtained a Matra part without the internal fuse blown, the process of extraction and analysis would not have taken much more than a week.

70 In his judgment the learned judicial commissioner thought it improbable that Aztech went through the entire code of Creative's firmware and painstakingly interpreted each line so that they could decide which parts to incorporate into their own firmware. This is not strictly correct, for much of the labour that is associated with the cumbrous process described above can be spared through locating the 'command dispatcher'. This is a feature commonly found in command-driven software, and comprises a set of instructions called the 'main loop', and code which determines what commands have been requested. When a command is received, the command dispatcher will direct that to the appropriate bit of code in the firmware. Through locating the command dispatcher, a programmer would be able to discern which parts of coding were to be of interest to him. The command dispatcher in Creative's firmware is to be found in lines 631-639 and 642-644 of its source code. The main loop itself consists of 12 instructions which watch for commands to arrive. The first character of any incoming program determines its ultimate destination. More specifically, by way of example, the codes that begin with E, eg E2, will be transferred to 'SECURITY' at line 690; and the codes that start with F, including FO, F4 and F8, will go to 'SELF TEST' at line 678. According to Dr Nichols Creative's relatively small, command dispatcher would take an average programmer no more than a few days to locate.

71 From the above we conclude that, on a balance of probabilities, Aztech had the means, motive and opportunity to disassemble Creative's firmware. Next, we turn to the literal similarities which exist (including the programming errors) between the respective firmware of the parties, when viewed in toto, raise the irresistible inference that the chances of independent development on the part of Aztech were low. Despite Mr Prescott's efforts we find that Aztech have failed to provide a reasonable explanation, one that is consistent with the absence of any copying through disassembly. In our view the learned judicial commissioner failed to address the question of the cumulative weight and significance of all the similarities in reaching his decision, including similarities in non-essentials and errors. In respect of the evidential effect of resemblances in inessentials, it is instructive to refer to Hoffmann J (as he then was) in the case of **Billhofer Maschinenfabrik GmbH v TH Dixon & Co** [1990] FSR 105 at p 123:

It is the resemblances in inessentials, the small, redundant, even mistaken elements of the copyright work which carry the greatest weight. This is because they are least likely to have been the result of independent design.

72

Do the identical similarities in coding support a finding of independent infringement?

73 It is a trite copyright principle that reproductions must be made of the whole or a substantial part of a work: see ss 10(1)(b) and 26 of the SCA. Only 4% or less (comprising, for example, seven lines of identical code in the E2 command, and 12 lines of identical code from the F8 command) of Aztech's

code is actually identical to Creative's code. In terms of literal copyright infringement, it is our view that this does not amount to a substantial taking.

74 This, however, in no way prejudices our finding of disassembly, which involves a degree of reproduction and adaptation having a greater impact in terms of revealing the ideas and interfaces of a copyright holder's program, insights which would not otherwise have been obtained by independent development or empirical observation within a given time frame. Although a trial judge's findings of fact should be respected by an appellate court, they are not sacrosanct. We may reverse the findings of the learned judicial commissioner, in exercising our appellate jurisdiction, to correct findings of fact that were reached on the wrong basis, or under a plain misdirection: see *Coghlan v Cumberland* [1898] 1 Ch 704; *Chung Hwa Ying v Phang Mun Mooi & Anor* [1987] 2 MLJ 693; *Choo Kok Hoe & Ors v Choo Kok Beng* [1983] 1 MLJ 53; [1982-1983] SLR 95. In our view the learned judicial commissioner, while having considered the evidence as a whole, failed to address the cumulative weight of all the similarities as a whole, and the 'fingerprints' in particular.

75 ***Burden of proof and the tenets of copyright - does the burden ever shift?***

76 One of the other grounds of appeal is against the decision of the learned judicial commissioner who held that the burden of proving disassembly, on a balance of probabilities, remained with the party that asserts it. The burden of proof does remain with the plaintiff in an infringement claim, to prove copying and access to his work, and, where there is sufficient resemblance shown between the two works, he will invite the court to draw an inference of copying. The defendant then has the opportunity to rebut the inference; to give an

alternative explanation of the similarities where this is possible; and at this point, in our view, the burden shifts.

77 The copyright owner must essentially show that `causal connection` is the explanation of the similarity between the work and infringement - but there are other possibilities which may be pleaded by way of defence; that the plaintiff copied from the defendant, that they both copied from a common source, or that they arrived at their respective results independently: see *Corelli v Gray* (1913) 30 TLR 116. We find Jacob J's judgment in *IBCOS Computers Ltd & Anor v Barclays Mercantile Highland Finance Ltd* [1994] FSR 275, at pp 296-297, to be of considerable assistance. The relevant question in our case is this: whether the inference of copying could be displaced by evidence from Aztech how in fact they had arrived at their design and that they had not done so by copying? This question is derived from *LB (Plastics) v Swish Products Ltd* [1979] RPC 611 at p 621; a proposition described by Jacob J in *IBCOS* as not so much one of law as of `plain rational thought`.

78 The above statement must not be read to mean that the copyright plaintiff is awarded a lower standard of proof. He must still run his case in the most thorough and best way he can, to show the existence of probative similarities leading to the inference of copying, whereupon the opportunity then arises for the defendant to explain those difficulties away. From an analysis of the transcripts of the proceedings, we do not see anything to suggest that the learned judicial commissioner acted outside the principles stated above.

79 At the trial, Aztech were given ample opportunity to account for the apparent similarities after Creative had produced evidence to support a prima facie case of disassembly. Whilst the principle in *IBCOS* was not expressly

articulated, the net effect of the proceedings is that it was implemented in substance. Accordingly, this ground of appeal fails.

80 ***The admitted copying of TEST.SBC***

81 We now turn to the substantial issues of law in this appeal. Creative alleged that, when investigating the E2 command, Aztech copied the whole of the TEST.SBC program, through running it with the DEBUG program, for the purpose, they claim, of `understanding functionality in order to make a non-infringing, compatible product.` This was admitted by Aztech at trial. The learned judicial commissioner said:

To run a program it has to be downloaded to the PC ie. copied to its memory. There can be no doubt that the software program in TEST.SBC has been copied by running it with DEBUG when investigating the E2H command and I so find.

82 Such copying was found to be lawful by the learned judicial commissioner, on two grounds; (a) fair dealing for the purposes of research and private study under s 35(1) SCA; and (b) use of copyrighted software for a reasonable purpose as implied by licence: ***Betts v Willmott*** (1871) 6 LR Ch App 239. A third defence was argued by Aztech at the trial - non-derogation from grant based on ***British Leyland Motor Corp Ltd v Armstrong Patents Co Ltd*** [1986] AC 577, but this was rejected by the learned judicial commissioner. In this appeal this argument re-surfaces as part of (b). The broad question before this court is whether any of the above copyright defences excuse what otherwise would be an actionable infringement?

83 ***(a) Fair dealing for the purposes of research and private study***

84 It is useful to set out an overview of software copyright protection in Singapore. Computer programs are protectable under the SCA as a type of `literary work`. Section 7(1) defines a computer program as:

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 or both of the following:
(a) conversion to another language, code or notation; (b) reproduction in a different material form, to cause a device having information processing capabilities to perform a particular function.

85 The above definition, which is in pari materia with the definition found in the Australian Copyright Act 1968 (as amended), removes any doubt that might remain as to whether the source code and object code of a computer program are both protected by copyright in Singapore. Under s 26 SCA, generally the exclusive rights granted to the software copyright owner include, inter alia, the right to reproduce the computer program in a material form. By s 17 SCA, a reproduction of a computer program includes storage thereof in a computer, and the right to make an adaptation thereof. By s 7(1) SCA, an `adaptation` means a version of the computer program, not being a reproduction thereof, whether or not in the language, code or notation in which the computer program was originally expressed.

86 The scope of software copyright protection is limited by certain defences contained in the SCA, two of which are tailored specifically for computer programs. First there is the right to make back-up copies of computer programs, which is provided in s 39(1), (2) and (4) of the SCA. Secondly, there is s 39(3), which provides that it is not an infringement for the owner of a computer program to make or authorise the making of another copy or adaptation of that computer program provided that such a new copy or adaptation is created as an essential step in the utilization of the program in conjunction with a machine;

this will be further discussed below. The other important defence, for the purposes of this appeal is the defence of `fair dealing for the purpose of research or private study`, under s 35 SCA. It is this issue to which we now turn.

87 The learned judicial commissioner accepted that although the running of TEST.SBC involved copying, such an act did not constitute copyright infringement under s 35 SCA, which provides so far as it is relevant as follows:

35(1) A fair dealing with a literary work ... for the purpose of research or private study shall not constitute an infringement of copyright. (2) For the purposes of this Act, the matters to which regard shall be had, in determining whether a dealing with a literary ... work ... constitutes a fair dealing with the work ... for the purpose of research or private study shall include - (a) the purpose and character of the dealing, including whether such dealing is of a commercial nature or is for non-profit educational purposes; (b) the nature of the work or adaptation; (c) the amount and substantiality of the part copied taken in relation to the whole work or adaptation; and (d) the effect of the dealing upon the potential market for, or value of, the work ... (5) In this section, `research` shall not include commercial research, research carried out by bodies corporate (not being bodies corporate owned or controlled by the Government), companies, associations or bodies of persons carrying on a business.

88 We agree with the learned judicial commissioner that this section involves two separate questions. First, was the use for the purpose of research or private study? Second, was the use fair?

89 **Research or private study**

90 Despite the statutory exclusion of `commercial research` in s 35(5) SCA the judicial commissioner held that the copying of TEST.SBC could be brought under the wording of s35(1) SCA, since some private study for commercial purposes may yet count as a defence to a claim for infringement. Moreover

`research` and `study` are qualified differently; the two qualifications being that `research` should exclude that undertaken by companies and bodies corporate; and `study` should be private. The learned judicial commissioner said:

Mr Loh and his colleagues in the R & D department might have been engaged in research but that does not rule out the possibility that the purpose might also have been `study`.

91 The learned judicial commissioner was influenced by the argument that since the court is required, when deciding whether the research or private study was `fair` to have regard, inter alia, to whether the dealing was `of a commercial nature or was for non-profit educational purposes`: s 35(2)(a) SCA.

92 Much of the tenability of this construction, for the purposes of this appeal, turns on the interpretation of `private study`.

93 Having considered all the arguments, including parliamentary debates, which provide limited assistance on this point, we take the view that s 35(1) excludes commercial research, as well as private study for commercial purposes. The exception is, of course, any research undertaken by `bodies corporate owned or controlled by the Government.`

94 The word `study` has been qualified by the word `private`, so as to prevent private educational institutions and libraries from relying on this defence. Their recourse lies in provisions like ss 40, 51, 52 of the SCA. `Private study` should be construed to refer only to individuals actually performing a study. In order to come within the `private study` exception, the dealing (usually copying) must be undertaken by the student himself: ***University of London Press Ltd v University Tutorial Press Ltd*** [1916] 2 Ch 601 and ***Sillitoe & Ors v McGraw-Hill Book Co (UK) Ltd*** [1983] FSR 545.

95 If one were to adopt a broader construction of `private study` to extend to `private study for commercial purposes`, this interpretation would render otiose the specific exclusion of commercial research under s 35(5), in that all commercial research will almost inevitably be private study as well. It could not have been the intention of Parliament to propagate this non-distinction.

96 Aztech, however, submitted that such an interpretation would not be consistent with one of the guidelines in s 35(2) SCA, which, as they contend, contemplates that there may be fair dealing for the purposes of private study where the purpose is commercial. We do not regard this argument as tenable, since a proper reading of s 35(2)(a) would suggest that where dealing is of a commercial nature, it is a factor operating against a finding of fair dealing. Moreover the sub-section contemplates that the commercial nature of the dealing, or otherwise, is one of many aspects to be considered, when determining the overall `purpose and character` of the dealing. Let us take, for example, the difference between a university researcher undertaking private study for a project commissioned by an external commercial enterprise on the one hand and a person who undertakes private study in the pursuit of academic edification. The latter dealing, which falls under the rubric of `research and private study`, arguably has a better prospect in arguing that such dealing is `fair` under s35(2).

97 For the reasons stated above, it is our view that Aztech`s admitted copying of TEST.SBC does not even qualify as `research or private study`, and it follows that they may not avail themselves of the copyright defence offered by s 35(1). This is the result of a construction based on the plain, ordinary meaning of the words contained in s 35. Having answered the first question in the negative, it is therefore unnecessary to consider the second question on

whether the dealing was `fair`. There is no need to consider the guidelines in s 35(2) SCA.

98 **(b) Implied licence; Betts v Willmott**

99 Under this branch of their case, Aztech argued that when they purchased TEST.SBC, they became its lawful owners with the right to use it in the way they did, provided such use was for a reasonable purpose (inserted by Aztech), in the absence of clear and explicit agreement to the contrary. The copy of TEST.SBC that was made in the process of running DEBUG, to ascertain functionality with the object of building a non-infringing compatible product was argued to be a `reasonable purpose.` The learned judicial commissioner made no finding on whether such use was indeed reasonable, but was persuaded that Aztech merely exercised what was inherent right of ownership conferred by the purchase of TEST.SBC.

100 The proposition which Aztech sought to adapt and extend to software copyright cases was advanced by Lord Hatherley LC in **Betts v Willmott** at p 245:

When a man has purchased an article he expects to have control of it, and there must be some clear and explicit agreement to the contrary to justify the vendor in saying that he has not given the purchaser his licence to sell the article, or to use it wherever he pleases as against himself.

101

Betts

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Willmott

is a patent case, in which the plaintiff owned a patent for metallic capsules, which he sold to the defendant in France. The patentee had a factory in France as well as in England. He later sued, unsuccessfully, to restrain the sale of the article in the England, having failed to prove as part of his case that the article

was not in fact a product of his French factory. The case proceeded on the basis that where the owner of a patent manufactures and sells the patented article in a foreign country as well as in England, the sale of the article in one country implies a licence to use it in the other, but if he has assigned his patent in either country, the article cannot be sold so as to defeat the rights of the assignee. Lord Hatherley's proposition, in broad terms, should be considered in this context. We must admit to having intellectual difficulty in extending this well founded proposition in patent law to copyright.

102 The exclusive rights that are granted to the patent owner can differ materially from those accorded to the copyright owner. The essential difference is this: exclusive rights which are granted to the holder of copyright do not include the rights to use and sell the protected work. Under s 66(1) Singapore Patents Act 1994 the exclusive rights granted to the patentee include 'use' or 'disposal'. By contrast s 26(a) SCA grants to the copyright owner of a literary work the exclusive rights to reproduce, publish, perform, broadcast, cable-cast, make an adaptation, and to do all the said acts in relation to an adaptation of the work. It was for this primary reason that the High Court of Australia restricted the Betts principle only to patent cases. It was so stated in *Time-Life International (Nederlands) BV & Anor v Interstate Parcel Express Co Pty Ltd* [1978] FSR 251 at p 272:

*...there is another important difference between the law of patent and the law of copyright. By the grant of a patent in traditional form, a patentee is granted exclusive power to 'make, use exercise and vend' the invention. The sale of a patented article, by the patentee, would be quite futile, from the point of view of the buyer, if the buyer was not entitled either to use or to re-sell the article which he had bought. It therefore seems necessary, in order to give business efficacy to such a sale, to imply a term that the patentee consents to the use of the patented article by the buyer and those claiming under him. The law accordingly does ordinarily imply the consent of the patentee 'to an undisturbed and unrestricted' use of the patented article: **National***

Phonograph Company of Australia Limited v Menck...*To make such an implication, for the purpose only of avoiding the restrictions upon the use of the article that would otherwise be imposed by the patent, seems to be perfectly consistent with the ordinary rules governing the implication of terms in contracts. However no similar necessity exists to imply a term of this kind upon the sale of a book the subject of copyright. The owner of copyright has not the exclusive right to use and sell the work in which copyright subsists...The buyer of a book in which copyright subsists does not need the consent of the owner of the copyright to read, or speaking generally to re-sell, the book. The necessity to imply a term in the contract which exists when a patented article is sold does not arise on the sale of a book the subject of copyright. It was not, and could not be, suggested that the sale of a copy of a book is a licence to do the acts comprised in the copyright...(emphasis added).*

103 From the above passage, it is quite clear that the importation of the type of implied term advanced by ***Betts v Willmott***, one which advances `unfettered use`, does not sit comfortably on copyright principles; hence Aztech`s reference to `use for any reasonable purpose` in their pleadings: see para 35A(4) of the defence to counterclaim. This was correctly submitted by Mr Garnett to go further than the principle in *Betts*. Mr Prescott argued that the pleading was intended to mean that the right to use does not extend to some unreasonable purpose, and that this was inherent in ***Betts v Willmott*** itself. However in the copyright context, Aztech tried to put forth the argument that copying TEST.SBC for the purpose of running the DEBUG program was a reasonable purpose; albeit one which Creative would have objected to. In copyright law, rights only exist in so far as they are provided for by the Copyright Act. Mr Prescott suggested by way of example that the purchaser of a computer program does not acquire the right to use it to multiply and sell infringing copies. To this argument we have to say that there are no rights to acquire in the first place, since these are infringing acts under the SCA, unless performed with the permission of the copyright owner.

104 Mr Garnett was right to point out that when a patented article is sold to an ordinary purchaser, the patentee has no legitimate expectation or interest in controlling the further use of the article by the purchaser. Effectively there is nothing left of the patentee's rights. On the other hand, a copyright owner who sells his work still retains the economic and moral rights of authorship; described by Mr Garnett as 'valuable incorporeal rights'. It is in this spirit that we form the view that the following proposition in the Canadian case of **North American Systemshops Ltd v King et al** (1992) 27 CPR (3rd) 367, referred to by Mr Prescott, is far too broad in stating:

...the sale by the plaintiff of its product over-the-counter constitutes the implied granting by the plaintiff of an implied permission to the purchaser to do whatever the purchaser wished with the product (at 376f).

105 We therefore disagree with the learned judicial commissioner, and hold that the proposition in **Betts v Willmott** is inapplicable in the Singapore copyright context. Any terms which should be implied must be those which lend business efficacy to a contract, and we agree with Creative that this does not extend to implied consent to the copying of TEST.SBC to effect the process of discovering its functionality, with the ultimate objective of making a competing product. It is the opinion of this court that to uphold such an implied licence would be tantamount to making a mockery of the provisions of the SCA.

106 Aztech under this part of their case also relied on the principle of non-derogation of grant (allowing competing manufacturers to develop spare parts) in the case of *British Leyland v Armstrong*, in further support of the **Betts v Willmott** defence. In our view these are two distinct common law principles of different parentage. In *British Leyland* it was held that the owner of the copyright subsisting in an article cannot, after the sale assert his copyright to prevent the article from being repaired, where such repair involved the

commission of infringing acts, such as manufacturing spare parts, in breach of the original design copyright. It was stated by Lord Templeman:

that a grantor will not be allowed to derogate from his grant by using property retained by him in such a way as to render property granted by him unfit or materially unfit for the purpose for which the grant was made.

107 In the present case, the creation of a compatible and competing sound card is materially distinguishable from a situation of repair. It also should be doubted whether the right of repair stated in *British Leyland* is indeed based on an implied licence: see the obiter view expressed by Lord Templeman at p 643.

108 ***(c) Possible defence under s 39(3) SCA***

109 Section 39(3) SCA states:

...it is not an infringement for the owner of a copy of a computer program to make or authorise the making of another copy or adaptation of that computer program provided that such a new copy or adaptation is created as an essential step in the utilisation of the computer program in conjunction with a machine and that it is used in no other manner.

110 During the hearing of this appeal, this court drew the attention of counsel to s 39(3) SCA, and the American case of ***Vault Corp v Quaid Software Ltd*** 847 F 2d 255 (5th Cir, 1988) to determine whether the essential steps in using a computer program (TEST.SBC) could include running it in a PC, ie copying it into the RAM of the PC for its intended purpose, which may be interpreted to include a study of the underlying ideas and functional concepts of the program. Aztech responded and adopted it as part of their case. In *Vault*, the plaintiff produced a PROLOK program which was essentially a copy protection program designed to prevent purchasers of programs recorded on a PROLOK diskette from making unauthorised copies of the recorded program. The defendant bought a copy of PROLOK, and after running it in a computer in order to study

how the program functioned, developed a means to circumvent the PROLOK protection system. The defendant developed a RAMKEY program that allowed users to make and use an archival (or backup) copy of the software. It was held that defendant's use of the program fell within s 117(1) US Copyright Act 1976, as the loading of the program into the computer memory was an 'essential step in the utilisation' of the program. Creative were given a further opportunity to tender supplementary submissions on this point.

111 Section 39(3) appears to have been derived from s 117 US Copyright Act 17 USC 107, which states (in the relevant parts):

Notwithstanding the provisions of section 106, it is not an infringement for the owner of a copy of a computer program to make or authorize the making of another copy or adaptation of that computer program provided: (1) that such a new copy or adaptation is created as an essential step in the utilisation of the computer program in conjunction with a machine and it is used in no other manner; or (2) that such a new copy or adaptation is for archival purposes only and that all archival copies are destroyed in the event that continued possession of the computer program should cease to be rightful.

112 Creative made two primary submissions which we consider to be persuasive. First, that s 117 US Copyright Act was enacted to accomplish a limited purpose, to permit the rightful owner of the program to input and use it in his computer: **Micro-Sparc Inc v Amtype Corp** 592 F Supp 33, 34-35; **Apple Computer Inc v Formula International Inc** 594 F Supp 617, 621 (CD Cal 1984); **Allen-Myland v International Business Machines Corp** 746 F Supp 520, 536 (ED Pa 1990). In our view, they correctly argued that Aztech's copy of TEST.SBC was not made as an essential step in the utilisation of the program in conjunction with the machine. On the contrary copies was made as part of the running of the DEBUG program, and not as part of an essential step in the utilisation of the TEST.SBC program. Aztech's conduct thus excludes any protection which s 39(3) might otherwise afford.

113 Secondly, the decision of ***Vault v Quaid*** does not take the debate much further. It largely concerned s 117(2), since the defendant's RAMKEY program allowed users to make and use a backup copy of otherwise PROLOK protected software. As such the broad language contained in the case relating to s 117(1) is unusually broad, but should be read with s 117(2). Other federal courts have not supported the broad proposition asserted by the defendant in *Vault*, that software purchasers may make copies of copyrighted software for purposes not intended by the copyright owner: eg. ***ProCD Inc v Zeidenberg*** 908 F Supp 640 at p 649 (a decision which has since been reversed by the 7th Circuit on different grounds).

114 More significantly, the influential 9th Circuit decision of ***Sega Enterprises Ltd v Accolade Inc*** 977 F2d 1510 (9th Cir, 1992) has held that s 117 does not protect a user who 'disassembles object code, converts it from assembly into source code, and makes printouts and photocopies of the refined source code version' (at 1520n6). In his reply to Mr Garnett's supplementary submissions, Mr Prescott cited several Federal district court decisions supporting the *Vault* interpretation of s 117 US Copyright Act: ***Foresight Resources Corp v Larry Pfortmiller*** 719 F Supp 1006; ***RAV Communications Inc v Philipp Brothers*** US Dist LEXIS 3048 (1988); ***Data Products Inc v William C Reppart Jr*** 1990 US Dist LEXIS 16330; ***Clifford Scott Aymes v Jonathan J Bonelli*** 47 F 3d 23. However we prefer the directly relevant guidance offered by the 9th Circuit in ***Sega v Accolade***.

115 Mr Prescott was right to point out that under s39(3) SCA the lawful owner of the copy is not merely allowed to make a copy, but he may also make an adaptation. If this was the case, he argued that one must be allowed to understand how the original program works, which was what Aztech did. But we reiterate the proviso within s 39(3), that such copy or adaptation must be

`created as an essential step in the utilisation of the program` in the machine, and not for any other purpose such as the creation of a compatible product.

116 In our view the admitted copying of the TEST.SBC for the purpose of performing analysis and disassembly through the use of DEBUG, was not an infringing act which could be excused by s 39(3).

117 For these reasons, the appeal should be allowed with costs here and below. The judgment below is set aside. Creative succeed in their counterclaim for copyright infringement which was the only issue dealt with by the learned judicial commissioner. The terms of the judgment of this court are to be settled and agreed, if possible, between the parties within three weeks, failing which they are to submit their drafts and any submissions relating thereto for our consideration. We will thereafter make such other orders as are necessary. Before we part with this judgment, we wish to thank Dr Nichols for his technical advice given to us before, during and after the hearing.

118 **Outcome:**

119 Appeal allowed.

Karthigesu JA
Lai Kew Chai J
L P Thean JA

Kevin Garnett QC, Morris John and Lim Yee Ming (Drew & Napier)
for the appellants

Peter Prescott QC and Ng Soon Kai (Ng Chong & Hue) for the
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