

IN THE HIGH COURT OF THE REPUBLIC OF SINGAPORE

[1996] SGHC 127

Unknown

Between

GROUNDS OF DECISION

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Aztech Systems Pte Ltd v Creative Technology Ltd

[1996] SGHC 127

Unknown
Lim Teong Qwee JC
26 June 1996

1 Creative developed the `Sound Blaster` family of sound cards and has marketed these very successfully. It is today the world market leader for sound cards. The Creative sound card is an `add on` circuit board that can be easily plugged onto the motherboard of an IBM compatible personal computer (PC) such as may be found in many offices and homes in Singapore and elsewhere. It generates sound through a speaker system by means of a digital signal processor (DSP) and a digital-to-analog converter (DAC) which converts data from the DSP which is in a digital representation to an analog representation. For the DSP Creative uses a chip made by or under licence from Intel Corp known as the Intel 80C51. The Intel 80C51 is a chip in the Intel 8051 series and since it has been referred to as the Intel 8051 in these proceedings I shall refer to it as such in this judgment. Sound is also generated by means of a frequency modulation (FM) synthesizer which is not concerned in these proceedings. All these devices are built into the circuit board. When an application such as a game program running in the PC requires sound it sends commands to a software program in a driver which acts as an interface. The driver converts the commands into low level commands which it sends to the DSP. The DSP interprets the commands and sends data to the DAC. The DAC converts the data

into sound through the speaker system. Creative bundles its sound card with some amount of software including TEST-SBC and the driver which is called CT-VOICE.DRV. The driver can also be embedded in the application thus doing away with the need for an external driver.

2 The Intel 8051 is an 8-bit chip with 128 bytes of random-access memory (RAM) and 4 kilobytes (4096 bytes) of read-only memory (ROM). It has an arithmetic and logic unit that performs the operations for which it is designed and a number of registers or temporary storage areas for data. One of these registers is identified as `A` and it is in this register that the arithmetic operations are performed. It communicates with the external circuitry via four ports numbered 0 to 3. The ROM stores the permanent instructions for the Intel 8051's operations and other data according to the factory design or the customer's requirements. Creative has written a source code for a program which has been permanently written or burned into the ROM at the factory. This program has been referred to as the firmware or firmware program in these proceedings and I will be referring to it as such in this judgment. The firmware program responds to the low level commands from the driver or application including that which has embedded in it the program in CT-VOICE.DRV.

3 Aztech developed the `Sound Galaxy` family of sound cards and although it is about two years behind Creative it has also marketed its sound cards successfully. It introduced its first sound card the `Adplus Sound Booster` at the Comdex Fall 1991 show in Las Vegas. Its representatives at the show were often asked if its sound card was Sound Blaster compatible and that led to a decision to make Sound Blaster compatible sound cards. Mr Loh who is or was until recently a director of Aztech and the head of its research and development (R&D) department said that there were then four sound standards including that associated with Creative's Sound Blaster sound card and Aztech

wanted to produce a sound card which was compatible with all four standards. He said that `compatibility` in the trade meant that Aztech`s sound card had to be able to accept commands in all four sound standards and produce the desired output effect as if the commands were fed into the sound card associated with each sound standard. The advantage so his argument goes is that a user who has purchased one of Aztech`s sound cards can use it in conjunction with application programs that use the other sound standards. More specifically the Aztech sound card must be able to correctly interpret and execute the commands from the PC in the same manner that Creative`s sound card would. I think it is more accurate to say that the Aztech sound card must be compatible with application programs developed to operate with Sound Blaster (and other) sound cards and perhaps `interoperability` better expresses the idea but I will for the sake of convenience use the word `compatible` in the sense used by Mr Loh. `Sound Galaxy BX` and `Sound Galaxy NX` were developed in about March 1992 in time for the Cebit trade show in Hanover that month. These were the first version of what Aztech considered to be Sound Blaster compatible sound cards. In about August 1992 Aztech developed its second version of Sound Blaster compatible sound cards which it named `Sound Galaxy NX PRO` and in September 1992 these cards were marketed worldwide. Sound Galaxy sound cards also employ the Intel 8051 chip, a DAC and an FM synthesizer. Aztech also has its own firmware burned into the ROM by the manufacturer of the chip at its factory. Mr Johnson-Laird an expert testifying for Aztech said that the Intel 8051 was designed for this situation and was therefore a sensible choice for both parties and there has been no suggestion that there were other options open to Aztech.

4 Creative alleges that for the development of Sound Galaxy NX, Sound Galaxy BX and Sound Galaxy NX PRO Aztech infringed its copyright in the

programs in the firmware in Ver 2.00 and other versions of the Sound Blaster sound card and the software called CT-VOICE.DRV, TEST-SBC and others by copying:

(1) The whole of Creative's firmware. (2) Parts of Creative's firmware being: (a) the coding for the E2 **H** algorithm; (b) the coding for the implementation of the F4 **H** command; (c) the coding for the implementation of the F8 **H** command; and (d) the 'look up table' of values for the F0 **H** command. (3) The whole of Creative's software programs in TEST-SBC and others.

5 In regard to the alleged infringement of the software programs the copying is said to have been done by disassembly and also by running them with a program called DEBUG when investigating the E2 **H** command. Aztech denies infringement and says that its program was developed independently and without access to the source code of Creative's program. Alternatively it says that if for the development of its sound cards there was any reproduction of a substantial part of any copyright work the exclusive rights in which belong to Creative then the reproduction for such development amounted to a fair dealing with such work for the purpose of private study. Aztech also relies on the principle in *British Leyland Motor Corp Ltd & Anor v Armstrong Patents Co Ltd & Anor* [1986] AC 577. Finally Aztech relies on the principle in *Betts v Willmott* (1871) 6 Ch App 239 and says that by the sale to it of a Sound Blaster sound card together with the program TEST-SBC it became the lawful owner of the chattels with the presumed and implied right of quiet enjoyment and possession including the right to use them for any reasonable purpose and the use of the program in conjunction with the program DEBUG to study its mode of operation in order to understand the E2 **H** command with a view to designing a non-infringing Sound Blaster compatible sound card was a use for a reasonable purpose. There were other claims and counterclaims but the parties have agreed that only these infringement claims be tried.

6 ***Access to Creative`s source code***

7 Creative obtained its Intel 8051 from two sources - Intel Corp and Matra MHS. Between March 1991 and April 1992 it purchased about 1.57 million pieces of the chip for the Sound Blaster and Sound Blaster Pro range of sound cards. Of these a little over 0.5 million pieces were supplied by Matra.

8 Creative`s principal engineer Mr Tan said that he wrote the source code for the first version of the firmware and subsequent versions although there were others in the company who either came up with the ideas or wrote part of the code in a higher programming language but it is not in dispute that he and the others were all qualified persons for the purpose of the Copyright Act being either citizens or residents of Singapore. He was responsible for passing the source code to Intel Corp and Matra. He explained:

I have the code, I generate in Intel hex format. Then I send it to them, they will come back with another format, also it`s under Intel hex. So I`ll do the comparison and do the verification with my original code. If nothing is wrong, then I will just approve it. We don`t need a sample for verification.

9 I think what he meant was he wrote the source code in assembly language and ran an assembler program with it to output a listing in hexadecimal notation. The source code in this notation was sent to the chip manufacturer which sent back a listing also in hexadecimal notation. When he had approved it the program in source code was sent back to the chip manufacturer for the program to be burned into the ROM of the chip. The reference to `Intel hex` is I think a reference to the listing in hexadecimal notation. This has to be `translated` into machine or object code which is in binary notation to program the Intel 8051 so that it can execute the required functions. To ensure confidentiality the ROM is protected by security arrangements put in place by the chip manufacturer.

10 Mr Cable an expert testifying for Creative said there were three ways by which the firmware could be `dumped` from the chip, ie extracted or printed out. The first is what he called the visual optical method. This is an elaborate method requiring specialist skills in removing the packaging and protective materials under controlled conditions to ensure the integrity of the circuitry and specialist skills in interpreting the circuitry. The second and third are electronic methods using a PROM (programmable read-only memory) or an EPROM (erasable PROM) or E2PROM or EEPROM (electrically erasable PROM) programmer which is a tool with the capability of writing a program in the ROM or in the reverse order printing it out from the ROM. In one the chip is set up in the programmer and the firmware program is printed out but this is possible only if the ROM is not protected. In the other the chip is opened up and a probe is inserted to act as a fuse before setting up the chip in the programmer to print out the firmware program. This is possible if the ROM is protected by a method employing a fuse which has been `burned`.

11 Mr Cable said he dumped a total of seven Aztech chips and two Creative chips. He prepared a report on his work with the Aztech chips but for some unknown reason he was asked so he said by the solicitors not to include his work on the Creative chips in his report. The report also included work done on other chips as well as chips not proved to be from either Aztech or Creative sound cards. His report is part of the Chatham Report [report annexed to the affidavit of Jerry Alan Klein filed on 12 November 1994 and marked `JAK-2`]. Of the two Creative chips he said one was provided to him by Creative Labs Inc (an American subsidiary of Creative) and as there was no evidence about this chip other than what he had done with it I do not consider that what he had to say about his work on it is either reliable or relevant. The other came from a sound card which he said he purchased from a retail store in California on 26 March

1994. This was the one which he said he dumped by simply setting it up in a programmer and printing out the firmware program. It was not protected. He said he also bought other Sound Blaster sound cards from another store but his evidence as to this is quite confused and unreliable. According to the report he used the visual optical method on three of the Aztech chips. He employed an outside laboratory to remove the packaging and protective materials and an outside photographer to highlight the parts by staining and to photograph the parts to a magnification of about 1500 times. The entire chip, packaging and all, may be as small as 15mm x 15mm and less than 5mm thick. Sixteen photographs were required to piece together the ROM core of one chip. It took him a few months to dump an Aztech chip this way. He himself worked 100 to 120 hours doing this. I doubt if `dump` is an accurate description of what he did using this method. He arranged the photographs and examined them to study the circuitry to determine the polarity of each of the bits. This would give him data in binary notation and he converted the data into hexadecimal notation. The data so extracted were in physical sequence as he would actually see them and he ran the data in a computer with a specially written program to rearrange them in address or memory location sequence. With a 4 kilobyte ROM he would be looking at up to 32768 bits (ie 4096 x 8 since the Intel 8051 is an 8-bit chip) in the ROM core. I have if anything oversimplified the process which is described in some detail in the Chatham Report. Inserting a probe to `repair` the fuse in the electronic method also requires the removal of the packaging and protective materials to expose the burned fuse. This method was said to have been used on some of the other chips.

12 Mr Cable said the first time he dumped a chip electronically by repairing the fuse with a probe was on 1 May 1994. He said it was an Aztech chip. He referred to p 17 of App C of the Chatham Report which is a chronology of code

extraction and verification. The entry for that date does not even mention any Aztech chips. The chronology does not show that he dumped any code from any chip by any method at all after 1 May 1994. The Creative chip which he said had the unprotected ROM was acquired only about two months before. The three Aztech chips which he said he dumped by the visual optical method exhibited as D-17, D-18 and D-19 were provided to him by Creative Labs Inc. Some of the chips he worked with were produced in court but there were no indications of any appropriate security arrangements or any arrangements to ensure the reliable identification of the chips. He had a large box with him in court and there were occasions when he was not sure if he had produced all the exhibits from the box and identified them correctly or if the chips had fallen out of the unsealed envelopes. It was altogether quite amazing. There is no evidence of the work done by the outside laboratory or the controls to ensure the integrity of the circuitry or any evidence of the work of the outside photographer. As stated at p 6 of Section II of the Chatham Report he had to become intimately familiar with Creative's code for the purpose of his assignment. That would have meant that he knew what he was looking for or knew what to expect in a Sound Blaster chip. However I would accept that the firmware program can be extracted from the ROM of the Intel 8051 by the three methods mentioned by him and under those conditions. The question is whether it was and if it was whether Aztech had access to it.

13 There is no evidence that the technology and skills required for the visual optical method were available in 1991 or 1992 or if Aztech had availed itself of them or attempted to do so. The one Creative chip that Mr Cable said he was able to dump from was made by Matra. It could be one of the 0.5 million Matra chips bought by Creative down to April 1992. Creative did not raise the matter of the unprotected chip with Matra and has not protested at all or at any

time about any unprotected chips. If there was such a chip it does not appear to have disturbed anyone in its establishment sufficiently to take any action. Mr Cable with his experience of reverse engineering (though not of dumping specifically) had never heard or known that Matra made chips with such a total failure of security arrangements. There is no evidence that any such chip (other than the one Mr Cable said he found) was ever in the market at any time at all. The chips made by Intel Corp were protected by a different method not employing a fuse and so cannot be dumped by repairing it. There is no evidence that Aztech had a PROM (or EPROM or E2PROM) programmer in 1991 or 1992 or ever used one. If the firmware is dumped by the visual optical method what is dumped out is not the source code but only data in binary notation. The data extracted in this way are in physical sequence and have to be rearranged in memory location sequence and converted into hexadecimal notation. In the electronic method the printout or dump will consist of 256 lines of 16 columns of numbers since the ROM is 4 kilobytes. As with the data obtained from the visual optical method there will be no comments or explanations. These numbers will have to be disassembled by running them with a disassembler program to give a source code in assembly language and even then there will still be no comments or explanations for anyone to be sure he has really understood what the program is going to execute. Mr Johnson-Laird said in para 107 of Johnson-Laird (3) [affidavit of Andrew Johnson-Laird filed on 18 November 1994]:

*In summary, because absolutely all of the **high level of abstraction** information has been deleted from the machine code, reverse engineering machine code to understand what a program is doing, is extremely tedious, time consuming and expensive. Furthermore, as reverse engineering **never** permits one to get the original source code with all the symbolic variable names and explanatory comments, it is impossible to be sure whether one has really understood what the program is doing.*

14 I agree. By the autumn of 1991 Aztech had already developed a sound card. It developed its first version of Sound Blaster compatible sound cards by about March 1992. One way to achieve compatibility might be to derive a source code from object code by disassembly as alleged by Creative. Aztech would then have had to dump the firmware program from a Creative chip first. Having obtained the source code without comments or explanations it would then deliberately leave out some features as were in fact not implemented in either the first or the second versions or in both. This is apparent by placing the source codes side by side. Aztech would have to know what to leave out and to do so without the benefit of any comments or explanations. It would then rewrite the whole of the source code as its own code.

15 There was another way of achieving compatibility as Aztech understood it without having to gain access to the machine code or the source code. What its sound card had to do was to correctly interpret and execute the commands from the PC in the same manner as Creative`s. The solution that immediately suggests itself is to set up one of Creative`s sound cards in a PC, run a number of programs such as TEST-SBC to issue the commands to it and observe the activities. A PC to run such programs, a logic analyzer, an oscilloscope and a PC to run a program called DEBUG which comes as a standard utility with the DOS operating system and not much else would be needed. Mr Loh said that was what he and his colleagues in the R&D department did. He wanted to come up with a product that Aztech considered compatible. He was not making an exact copy. He did not need it. It had to be compatible with the other major sound standards as well. It was a commercial project. It seems to me that it would have to be cost effective and the product had to be on the market in good time. He had less than six months to get the first version out and Creative is not

complaining about that version. He did not take much longer to have the second version on the market.

16 I find it highly improbable that Aztech gained access to the object code or the source code of the firmware in the ROM of the DSP in any of Creative's sound cards by dumping it by the visual optical method or by repairing the fuse in the way described by Mr Cable. I further find it equally improbable that Aztech gained access by dumping it from an unprotected chip. It is more likely that the firmware program was developed without access to the source code of Creative's program. If it did not have access to the firmware in Creative's sound card or the source code then it could not and it did not copy Creative's firmware program. Much has been said about Mr Loh's evidence and the similarities in the coding and I will go on to consider them.

17 ***Evidence of Mr Loh***

18 (1) Testing the commands

19 It should be pointed out at the outset that Mr Loh is of Chinese origin and English is not his first language. His affidavits were written for him by Mr HP Mun in English. They spoke to each other in Mandarin. Mr Mun is a director of Aztech but he is not a lawyer or a person trained or skilled in computers or software engineering.

20 Mr Loh said in para 27 of Loh (3) [affidavit of Loh Ngiang Guan filed on 12 November 1994]:

I tested each of the 256 commands and identified most of the features available on each of the sound cards by running a large variety of computer programs which activated the different features in a variety of sequences while the CPU and the micro-controller are being monitored by the logic analyzer.

21 In the user's guide or manual of the software developer kit (`SDK` or `SDK Ver 1` and `SDK Ver 2` for the first and second versions of the SDK) issued by Creative there is a summary of the DSP commands or commands sent to the DSP by the application or the external driver or the driver embedded in the application. These commands are in the range from 00 **H** to FF **H** so that there may be up to a maximum of 256 (ie 16 x 16) possible commands. Referring to this part of Mr Loh's evidence Mr Garnett said this could not have been the case or he would have discovered such commands as F0 **H** and F4 **H** and encountered other problems. He referred to Loh (0) [affidavit of Loh Ngiang Guan filed on 11 February 1993] also.

22 In court Mr Loh said that the statement `I tested each of the 256 commands` was partially true and partially not true. He was cross-examined at length on this and I questioned him also to try to understand what he was saying. He explained:

I have tested the commands 256, certain things you don't see anything.

23 The evidence was recorded verbatim and I think it should have been recorded as:

I have tested the commands. 256 - certain things you don't see anything.

24 He continued:

The status bit doesn't indicate it needs data or the status bit doesn't indicate there is a data returned from the sound card. And, therefore, some are not further investigated. It's those commands that you output, you immediately got, immediately be able to see from the code or immediately by checking the status [bit] there is data to be returned. Then you take in back the data. You know what I mean?

25 The status bit would show if an operation is being performed or has been completed or is recognized by the CPU. He said after he completed the development of the first version of the Sound Blaster compatible sound cards he went to work on the second version and in his own words `then I'm a little bit relaxed to be able to work on more of the commands. So I start to use DEBUG to output command by command`. He now had available to him Creative's SDK Ver 2 and as he said `we started to probe into more of the commands`. Running DEBUG from the beginning would have taken him too long. The Hanover show was in March 1992. I think by `tested each of the 256 commands` he meant he used the logic analyzer to capture the activity ***if there was any observed by him*** over a period of time in the course of which the first version of compatible cards was developed and some six months later the second version and if there was no observed activity the logic analyzer was not triggered. He ran DEBUG after completing the first version `to work on ***more*** of the commands`. Mr Garnett suggested that Mr Loh had changed his evidence in court but while I think para 27 of Loh (3) might have been better written the explanation is reasonable and I see no reason for not accepting it.

26 (2) ADPCM

27 Mr Garnett also referred to Mr Loh's evidence in respect of adaptive differential (or delta as was often referred to in the evidence) pulse code modulation (ADPCM) which is a feature common to both the Creative and Aztech sound cards. PCM allows sound to be represented and stored in binary (digital) form as a time-stepped series of numerical data instead of a continuous wave (analog) form. As Mr Loh puts it `the analog signal is `chopped` into a finite number of segments per time interval`. The shorter the time interval the closer the stored sound is to the original but correspondingly the larger the volume of data to be stored will be but the ear is not uncompromising and near

perfection is unnecessary for good quality sound. The data are stored in what is usually called a PCM file. The greater the amplitude the larger the numerical values and an 8-bit device for example can only represent integral values from 0 to 255 but sound can be `compressed` by DPCM by storing not the absolute values but only the differences (usually represented by the Greek letter `Δ`) between adjacent values. Typically four bits are used to represent the differences but four bits will give only 16 discrete values from 0 to 15 (0000 to 1111 in binary notation). As a general rule loud sounds tend to change by larger amounts from one value to the next and so the sound to be stored can be further compressed by scaling the differences (the 16 values becoming, say, 0, 2, 4 ... 30) and still further by using variable scales by adaptive DPCM or ADPCM. When sound has been compressed and stored or encoded in a file called an ADPCM file the DSP of the sound card must be able to decompress it so as to send the `corrected` or decoded data to the DAC to generate the intended sound. Creative's SDK says that the compression schemes used are 4-bit ADPCM, 2.6-bit ADPCM and 2-bit ADPCM. The software developer's toolkit available to a developer writing an application includes software for converting a PCM file into an ADPCM file. The software developer will then be able to build ADPCM files which the Sound Blaster sound card will play back. Aztech's sound cards must be able to decode these ADPCM files if they are to be compatible.

28 Mr Street an expert testifying for Aztech said that he started the process of deriving the ADPCM algorithm in Creative's sound card late afternoon on 14 January 1994 (a Friday) and by the end of the day on Sunday (two days later) he had virtually completed the analysis of the data he had obtained and derived all the specific multipliers and developed scaling tables that emulated the Sound Blaster ADPCM output. He did that without disassembling any Creative source code or object code. He was subjected to very lengthy cross-examination as to

his experience and technical competence but at the end I was left in no doubt as to his expertise. His company of which he is the chief technical officer developed the ADPCM functionality for a chip set used by certain sound card manufacturers. Interestingly these manufacturers had earlier been taken to court by Creative in another jurisdiction for having described their product as `100% Sound Blaster compatible` when it did not have the ADPCM feature and as he said `on the basis of that lawsuit being filed, we decided, well, it might make sense to add the ADPCM capability`.

29 Mr Loh said that to create an implementation of ADPCM compression and decompression compatible with Creative`s he had to determine the `trigger points` at which Creative`s ADPCM changes the scale factor upwards or downwards and how many scale levels there were in all. He did that by comparing the ADPCM file created by compressing a PCM file using the program VOXKIT.EXE provided by Creative with its Sound Blaster sound card. The PCM file he used was DOG.VOC also provided by Creative. He called the ADPCM file DOG4.VOC. He printed out the two files and analysed the data. He said that careful analysis of the data over a period of about one month in January to early February 1992 enabled him to design an algorithm compatible with the ADPCM algorithm used in Creative`s sound cards. In para 17 of Loh (4) [affidavit of Loh Ngiang Guan filed on 6 February 1995] he said:

... it is not essential for Aztech`s algorithm to reproduce the original PCM file data exactly or to reproduce it in exactly the same manner as Creative`s algorithm would, since the human ear is unable to distinguish minor differences. As long as the result is close enough, our purpose is achieved. The portion of the firmware that handled the ADPCM decompression was thus incrementally improved over the one month period to reach the present form.

30 It is not alleged by Creative directly that Aztech copied Creative`s ADPCM coding but the case is that `Mr Loh, with no previous experience and

only a book or books to help him, looking at non-systematic data` could not have deduced the ADPCM algorithm.

31 Dr Hughes-Hartogs an expert testifying for Creative said there are five methods which will yield code which is able to work in place of that developed by Creative. These are:

- (1) Copy the code directly and identically from the ROM.
- (2) Develop the technology independently and choose the same method by chance.
- (3) Read and disassemble the ADPCM code, develop a flow chart for the ADPCM algorithm and recode the algorithm using this flow chart.
- (4) Operate the ADPCM code on selected inputs and by reading the outputs determine the algorithm function which can then be coded.
- (5) Some other methods which he would not rule out.

32 He said he had had an opportunity to review both the Creative and Aztech ADPCM codes. He found that the arithmetic operations and code sets are not identical and significant portions do not overlap. Surprisingly he also said he found that the algorithms are the same. He then concluded that the first of the five methods listed by him was not employed and the second method seemed unlikely because of the extensive parameter set necessary to define the complete algorithm. On the evidence before me I agree with his conclusions on the first and second methods. Dr Hughes-Hartogs also noted these variations between the Creative and the Aztech codes:

- (1) The styles of programming are not similar.
- (2) The order of the algorithms is different although he said this is not a major point. Creative`s order is 2-4-3 bits but Aztech`s is 4-3-2 bits and within the algorithms the order of calculating the current delta or difference and the subsequent step size is reversed.
- (3) There is no overlap of specific coding sequences.

33 He also said:

One was given the impression, although it could not be formally documented, that the Aztech Systems code was written after the Creative Technology code and by someone who wrote tighter code but was less of a signal processing expert.

34 He then reached the `overwhelming inference that the Aztech Systems ADPCM code was generated by the disassembly of the Creative Technology Developer`s Kit, or by the disassembly of the Creative Technology board firmware, or by some combination`. He came to this conclusion because some material `has not been forthcoming under formal court inquiry`. The material he referred to consists of working notes, lab books, computer programs and `other tangible evidence` of a `clean room` approach. His conclusion is that the third method rather than the fourth method was used. I think it bears repeating that it is Creative that has to prove that Aztech infringed its copyright by copying the whole of Creative`s firmware program of which the ADPCM code is part and there are significant differences between the two codes. The `clean room` material is a matter for discovery.

35 Mr Johnson-Laird compared the ADPCM codes of Creative and Aztech and noted these other differences. In the 2.5-bit (or 2.67-bit) compression a single byte (eight binary digits) is viewed as three adjacent sound samples, 3-bit, 3-bit and 2-bit. Creative`s 2-bit sample is `split` into a mathematical sign bit (+ or -) and a value bit (0 or 1) but Aztech treats the two bits as the higher order two bits of a 3-bit sample. The result is that the Aztech sound card will decode a Creative encoded ADPCM file incorrectly. If Mr Loh had disassembled the code he would have known that he was writing this part of the code to produce an incorrect result. No reason of any kind was ever suggested as to why after having taken the time and the trouble to disassemble Creative`s code he should have taken more time and trouble to write that part wrongly. Secondly there is an error in Creative`s code. In Ver 1.05 at line 1667 there is an instruction:

MOV A,OFF H

36 which causes the Intel 8051 to copy to the register A the value at **location** OFF **H** whatever that value may be. Given that the value to be copied to register A is OFF **H** (the highest value without causing an `overflow`) the instruction should have been:

MOV A,#OFF H.

37 When Mr Tan wrote the code for Ver 2.00 he copied this part of the code from Ver 1.05 and in the process he copied the same mistake which is now at line 1233. He only realized the mistake when his attention was drawn to it at the trial. He thought it was a very common programming error. There is no such mistake in Aztech's coding of the ADPCM functionality. If Mr Loh had disassembled Creative's code the incorrect instruction would have been printed out. Although it is a `common programming error` I am to find that `with no previous experience and only a book or books to help him, looking at non-systematic data` and being `less of a signal processing expert` and without the aid of any comments or explanations in what he was supposed to be looking at he nevertheless spotted the mistake and corrected it. I cannot come by such a finding without some explanation and there was none.

38 I see no reason to find that Mr Loh could not have deduced the algorithm for the ADPCM functionality without disassembling the firmware program or the software program VOXKIT.EXE or any other program. I see no justification for the `overwhelming inference` drawn by Dr Hughes-Hartogs. I would have thought that given the significant differences the only proper inference that can be drawn is that Mr Loh used the fourth method, ie operated the ADPCM code on selected inputs and by reading the outputs determined the algorithm function

which could then be coded, which is a convenient way of describing what Mr Loh said he did and I find accordingly.

39 (3) Connection of the logic analyzer

40 I will refer to Mr Loh`s evidence further when considering the alleged similarities in particular areas but before I leave this matter I should discuss two other aspects of his evidence. Both have to do with where the logic analyzer was connected to. In para 19 of Loh (3) (which is the para immediately before para 27 there being no paras 20 to 26) he said:

As the micro-controller has a total 32 lines which can be used for the input and output of signals, I simply used the Logic Analyzer to capture the input and output signals sent to and from the sound card via all 32 lines and the CPU.

41 The micro-controller is the DSP.

42 Mr Korody was the logic analyzer specialist in the team of experts advising Creative. He was instructed to create a Sound Blaster equivalent sound card without disassembly of any Creative software or firmware under conditions prevailing in mid-1991. He too like Mr Loh used a logic analyzer and he set it up by connecting it to the DSP of a Creative sound card. He wrote that part of the Supplementary Chatham Report [report annexed to the affidavit of Jerry Alan Klein filed on 24 March 1995 and marked `JAK-3`] under the heading `Loh`s claim to using a logic analyzer to observe events stated in his affidavit is false`. In para 16 he said:

Loh states the signals which he monitored with the logic analyzer. If the logic analyzer is hooked up as Loh has claimed ([Loh (3)], para 19), Loh could not have observed the events which are recorded in `TEST-SBC V1.51 (SB1) I/O PROCEDURE` ([Loh (3)], in exh LNG-2). Although there is no explanation of the purpose of this document or how it was created, or when it was

created, it is clear that this is not an accurate transcription of the events recorded with a logic analyzer.

43 He thought Mr Loh had connected the logic analyzer as he himself had done, ie connected it to the DSP of the sound card and not to the CPU of the PC. Loh (3) was available to him after he had completed his assignment but before the Supplementary Chatham Report was written. In para 18 of Loh (3) Mr Loh said:

*I was able to study these signals and data with the aid of an instrument called a logic analyzer. The logic analyzer is a high speed computer designed to track the electrical signals **entering or leaving the CPU of another computer** while the second computer is executing a computer program. [Emphasis added.]*

44 I am surprised that Mr Korody with his claim to expertise with logic analyzers did not understand this as a clear statement that the logic analyzer was connected to the CPU and not the DSP or at least a clear signal of what Mr Loh set out to do. He said he relied on the statement in para 19 but at best that statement is consistent with connecting the logic analyzer to the CPU or to the DSP. In para 19 of Loh (3) Mr Loh continued:

The logic analyzer was used in this manner to measure and ascertain the effect of activating each feature available in the sound cards manufactured by the four major sound card manufacturers, ie Adlib, Disney, Convex and [Creative].

45 Mr Korody did not investigate the sound cards of the other manufacturers. If he did he might have found out if they had a DSP to be connected to. Even if Mr Korody had thought that Mr Loh had connected the logic analyzer as he himself had done then he ought to have considered the possibility of connecting it the other way, ie to the CPU of the PC. He should have run TEST-SBC V1.51 with a Sound Blaster sound card with the logic analyzer so connected to test Mr Loh's findings before writing his report.

46 The logic analyzer that Mr Loh used was set up in court and he said it was set up in the same way. It was connected to the CPU of the PC. With the logic analyzer connected in this way he could and would have observed the events as recorded. Also he would not have observed what he said he did not. He did not at any time say the logic analyzer was connected to the DSP of the sound card. I am satisfied that he connected the logic analyzer to the CPU of the PC as he said he had done. There was no basis for the conclusions in para 16 and also para 18 of the Supplementary Chatham Report.

47 In para 19 of the Supplementary Chatham Report Mr Korody said:

*In addition, certain transactions which are shown in the seven-page document are simply fabricated. For instance, it is known from the Sound Blaster Software Developer Kit that port address 22A (Hex) is defined as a `read only` port (only has meaning if **read** from), yet the second entry on the first page in the document `TEST-SBC V1.51 (SB1) I/O PROCEDURE` (part of exh LNG-2 of [Loh (3)]) records TEST-SBC.EXE as **writing** to this port. TEST-SBC does not write to this port, therefore this data cannot be accurate. In addition port 226 is defined as a `write only` port, yet an entry in this document (p 5 ll 20-23) records TEST-SBC.EXE as reading from this port. TEST-SBC does not read from this port.*

48 It is true that SDK Ver 1 and SDK Ver 2 both show the I/O port at 22A **H** as a `read only` port and at 226 **H** as a `write only` port. Mr Loh was cross-examined at some length on the entries in the documents he said he had generated and he was given an opportunity to verify those entries during the recess. P-33 is a printout of his effort and it clearly shows that the I/O port at 22A **H** is **both** a `read` and `write` port. This was accepted by Creative. Mr Loh did not check the port at 226 **H** but it was also accepted by Creative that the I/O port at 226 **H** is also both a `read` and `write` port. When Mr Korody wrote his report did he know that Mr Loh was right? Did he know that SDK Ver 1 and SDK Ver 2 were wrong? Did he test Mr Loh's findings after having read

his affidavit? Did he make any findings himself? The conclusions in para 19 of the Supplementary Chatham Report are founded on false premises and I reject them. No reason has been suggested for Mr Loh to fabricate entries which can be easily verified by reference to Creative's published documents admittedly consulted by him. Why would he present entries in his documents which conflict with those in the published documents and how would he know that the entries are correct? I observed him over his entire testimony and this part of it in particular among others. He did not fabricate the entries in those pages of the documents in LNG-2. He used the logic analyzer as he said he did and Creative has failed to prove that he would have found out about certain features of the Sound Blaster sound cards that he said he did not or would not have found out what he said he did. I find his evidence generally acceptable and reliable.

49 ***Firmware program***

50 I now refer to alleged similarities in respect of the specific parts of the firmware which are alleged to have been copied and I begin with some general observations. The claim is about copying of the firmware program in the ROM of the DSP and the software program in certain applications such as TEST-SBC. It is about a computer program in each case. The firmware program is in machine language which is in binary notation. The program as a literary work in respect of which copyright is claimed and of which Mr Tan an employee of Creative is the author is the source code which is in assembly language and the firmware program is an adaptation. The copying alleged against Aztech is the reproduction of the adaptation by dumping it and also the making of an adaptation of it by disassembling it into a source code. There is no direct evidence of dumping and I am asked to compare the source codes. I have before me Creative's source code Ver 1.05 dated 22 September 1989 and Ver 2.00 dated 14 July 1990 and Aztech's source code Ver 1.01 dated 19 February 1992

and Ver 2.10 dated 12 August 1992. The claim is not about making a Sound Blaster compatible sound card. It is not about the effect of the execution of the instructions in the programs. It is not Creative`s case that it was wrongful for Aztech`s sound cards to produce the same effect as Creative`s.

51 (1) F0H Command

52 (2) F4H Command

53 (3) F8H Command

54 (4) E2H Command

55 [**Editorial note** : This part of the judgment was not included in the transcript released for reporting; it is contained in the appendix to the judgment, and made available only to the parties to the litigation.]

56 I have considered the evidence as a whole and I have also discussed some of the technical aspects with Dr Wedig and I find that in so far as the firmware program is concerned Aztech has not infringed Creative`s copyright whether by copying it or by copying any of those parts of it relating to the coding of the E2 **H** algorithm or the coding for the implementation of the F4 **H** and F8 **H** commands or the `look up table` of values for the F0 **H** command.

57 **TEST-SBC**

58 Aztech is also alleged to have copied the whole of the software programs in TEST-SBC and others by disassembly and by running them with a program called DEBUG when investigating the E2 **H** command. No evidence has been given of disassembly of any software program when investigating the E2 **H**

command or otherwise. When he explained how he came upon the password feature Mr Loh said he ran TEST-SBC with his emulator before implementing this feature and the system failed. He then instructed Ms Shi to investigate running the application with DEBUG. He could not be sure if the application was TEST-SBC as at that time they were running so many programs. Ms Shi was unable to assist but she must have run an application that issued the E2 **H** command and in all probability it was TEST-SBC. 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 E2 **H** command and I so find. There was no or no sufficient evidence to find that CT-VOICE.DRV or any other software program was copied by disassembly or by running it with DEBUG when investigating the E2 **H** command as alleged.

59 ***Fair dealing for the purpose of private study***

60 Section 35(1) of the Copyright Act provides:

A fair dealing with a literary ... work ... for the purpose of research or private study shall not constitute an infringement of the copyright in the work.

61 `Literary work` includes a computer program such as the software program in TEST-SBC. `Research` does not include industrial research or research carried out by certain persons such as companies, associations or bodies of persons carrying on any business. See s 35(5).

62 Section 35(2) provides:

For the purposes of this Act, the matters to which regard shall be had, in determining whether a dealing with a literary ... work ... being a dealing by way of copying the whole or a part of the work

... constitutes a fair dealing with the work ... for the purpose of ... 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 ...; (c) the amount and substantiality of the part copied taken in relation to the whole work ...; and (d) the effect of the dealing upon the potential market for, or value of, the work`

63 Aztech has to satisfy the court that its dealing by way of copying the whole or part of the program in TEST-SBC was for the purpose of `private study` and that such dealing was `fair`.

64 ***Private study***

65 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`. I have been referred to the ***Oxford English Dictionary*** and this is one of the definitions of the word `study` which I think is appropriate: `the devotion of time and attention to acquiring information or knowledge`. If `study` is not to extend to study by companies or persons carrying on any business as in the case of `research` there is no reason why s 35(5) which excludes such research cannot be made to apply to `study` as well but instead the legislature has chosen to qualify `study` by `private`. When the Copyright Bill was read a second time in Parliament and committed to select committee the word `private` was not there. Section 35(5) was not there either. `Private` was added when the Bill was read a third time and passed as was s 35(5) but I can derive little assistance from the Parliamentary materials for the meaning of `private` or `private study` except that the word was added to address a concern expressed at select committee stage and `research` and `study` have been qualified differently. Mr Prescott invited my attention to two aids, one from within s 35 itself and the other from s 39. Section 39 provides that the

making of a reproduction of a computer program is not an infringement if it is made by the owner of an original copy and the reproduction is made for the purpose only of being used by or on behalf of the owner of the original copy in the event that it is lost, destroyed or rendered unusable. The reproduction may be said to be for a non-commercial purpose. Once the conditions are fulfilled there is no infringement without regard to any consideration of fairness. I do not think this is particularly helpful. There is a distinction between the making of a back-up copy to use in place of the original and a dealing with the copyright work for the purpose of study. In a sense the making of a back-up is a **fair dealing** if the purpose is as set out in s 39 but it is not right to attempt to read too much into a statutory provision and I think this would be one instance of doing so. I go on to consider the other aid. As pointed out earlier fair dealing for the purpose of **research** also does not constitute infringement and under s 35(5) `research` does not include research carried out by companies, associations or bodies of persons carrying on any business. Under s 35(2) one of the matters to which regard shall be had in determining whether a dealing is fair dealing for the purpose of research or private study is whether such dealing is of a commercial nature. Mr Prescott's submission is that **some** private study for commercial purposes may yet count as a defence to a claim for infringement. I think there is some force in this argument.

66 Among the definitions of `private` given by the **Oxford English Dictionary** is `kept or removed from public knowledge or observation`. I think that `private` has been used in this sense. Copying for use by educational institutions is provided for by s 40 as is copying for libraries in Division 5 of Part III of the Act. These are examples of **public** studies or **public** purposes. There are other examples of public purposes in the Act. It seems to me that a study is **private** if the study and the information and knowledge acquired

through it are kept or removed from public knowledge or observation and this is so even if the purpose may be of a commercial nature. The commercial nature of the purpose is a matter to be taken into consideration along with others to determine if the copying in a particular case constitutes fair dealing for the purpose of private study and it does not follow that the defence is excluded in every case where the purpose of the copying may be categorised as being of a commercial nature. I think that in the case before me the study which was the purpose of the dealing with the copyright work and the information and knowledge acquired were sufficiently kept from public knowledge and observation. I think the dealing was for the purpose of private study.

67 ***The purpose and character of the dealing***

68 The copying of the program in TEST-SBC was carried out by downloading it to the PC. It was copied to the memory of the computer. That is the ordinary way of running the program and it was undoubtedly the way Creative intended it to be run. It was not copied in any other way nor in any other form. It was not disassembled or printed out. No copies of it in any form were made for distribution or which could be distributed. I think this weighs in favour of fairness.

69 Aztech's purpose in running the program TEST-SBC with the program DEBUG was to observe the DMA activity between the PC and Creative's sound card. The ultimate purpose was to develop a sound card that was compatible with that of Creative's in the sense that it can correctly interpret and execute the commands from the PC in the same manner that a Sound Blaster sound card would. The Sound Blaster compatible sound cards would then be marketed worldwide in direct competition with Creative. I cannot see that Aztech's purpose when dealing with the program was other than of a commercial nature.

Its success in its investigation of the E2 **H** command led to the development and marketing of its range of Sound Blaster compatible sound cards. I think it has to be borne in mind though that the product that was developed and marketed by Aztech was the **sound card**. It was not a **software program** that emulated TEST-SBC or the instructions in it.

70 I think that the commercial nature of the purpose is an important factor against a dealing for that purpose being considered fair. If the software program is copied for sale that is direct commercial exploitation of the copyright owner's rights. There is no authorship of the work in the copy other than that attributed immediately to the copyright owner. I think it is another thing altogether to run the program to study it to know what it is doing with a Sound Blaster sound card in order to develop a compatible sound card. No part of the program is copied in the sound card. I think that in this case the effect of the commercial nature of the purpose has been substantially mitigated.

71 ***The nature of the work, the amount and substantiality of the part copied***

72 I think both these matters can be considered together. The work is a computer program which has to be copied in the way it was done in order to run it. It was copied in its entirety although it was only that part in relation to the E2 **H** command which was studied and which forms the subject matter of this part of Creative's case. I am inclined towards accepting these as factors which are not against the dealing being considered fair.

73 ***The effect upon the potential market or value of the work***

74 TEST-SBC comes bundled together with Creative`s sound card and is not sold separately although there is no reason why it cannot be if there is any need for it. Its market if any and its value to Creative or Aztech or to any persons including users of sound cards sold by either of them as opposed to the sound cards themselves are not likely to be adversely affected to any great extent. There may conceivably even be a favourable effect since the software is likely to be compatible with Aztech`s Sound Blaster compatible sound card and may have a larger market if sold separately. However I do not consider this to be a significant factor in this case.

75 ***Public interest***

76 The factors mentioned in s 35(2) are not intended to be exhaustive. The expression used is `the matters ... shall ***include*** `. I think there is the matter of public interest to be considered and it is in consonance with the purpose of the Act. Aztech copied the program in TEST-SBC in order to develop and market a Sound Blaster compatible sound card. This may open the market to more than just Creative and those licensed by it. It may also place more sound cards on the market and to that extent Creative`s immediate profitability may be affected but there is no evidence that the market is so limited that it cannot support the potential increase in the supply. Competition is not necessarily a bad thing and there may be longer term benefits even for Creative. The very popular game application X-Wing may be run on more than just a Sound Blaster sound card. There may be other such applications as well. Software developers will be freed from the restrictions inherent in the want of compatibility in sound cards. With compatible sound cards in the market an application written to run with a Sound Blaster sound card may be run with others which are compatible. This is likely to be good for the industry. The end user will have a choice of sound cards. There is a benefit to the industry in the development and marketing of sound

cards and of applications software. There is a benefit to the large and growing number of end users. I think that on balance the public interest is served by the copying complained of.

77 I have had regard to the matters referred to in s 35(2) and I have also considered the public interest and I have weighed them carefully. In my judgment Aztech's dealing with the program TEST-SBC constituted fair dealing for the purpose of private study within the meaning of s 35. It was not an infringement of Creative's copyright in it and this defence succeeds.

78 I have been referred to two American cases which considered a point not altogether very different. Section 107 of the Copyright Act 17 USC 107 (1988) provides:

Limitation of exclusive rights: Fair Use

... the fair use of a copyrighted work ... for purposes such as ... scholarship, or research is not an infringement of copyright. In determining whether the use made of a work in any particular case is a fair use the factors to be considered shall include:

(1) the purpose and character of the use, including whether such use is of a commercial nature or is for nonprofit educational purposes; (2) the nature of copyrighted work; (3) the amount and substantiality of the portion used in relation to the copyrighted work as a whole; and (4) the effect of the use upon the potential market for or value of the copyrighted work.

79 These provisions are in many respects similar to those of s 35 of the Singapore Act. The notable differences are the absence of any reference to 'study' or 'private study' and of the equivalent of s 35(5) in the US legislation.

80 In ***Sega Enterprises Ltd v Accolade Inc*** F 2d 1510 (9th Cir 1992) Accolade contended that disassembly of object code in a game application in order to gain an understanding of the ideas and functional concepts embodied in the code is a fair use that is privileged by s 107 of the Copyright Act. Sega a

Japanese corporation and its American subsidiary develop and market video entertainment systems including the 'Genesis' console and video game cartridges. Accolade develops and markets computer entertainment software including video game cartridges. Sega licenses independent developers of computer game software to develop and sell Genesis compatible video game cartridges and they do so in competition with Sega. Accolade is not and has never been so licensed but it developed and marketed Genesis compatible video game cartridges. It achieved compatibility by a two-step process. First it reverse engineered Sega's video game programs to discover the requirements for compatibility. It did this by disassembly of the object code in commercially available copies of Sega's video game cartridges. The disassembled code was then loaded into a computer and experimented with to discover the interface specifications for the Genesis console. By this means Accolade developed a manual containing the functional descriptions of the interface requirements. It did not include any of Sega's code. Secondly Accolade developed its own video game cartridges. It did not copy Sega's programs in this stage of the development but relied only on the information concerning the interface requirements for the Genesis console contained in the manual. Reinhardt Circuit J delivering the opinion of the US Court of Appeals for the Ninth Circuit said at p 12533:

Although the question is fairly debatable, we conclude based on the policies underlying the Copyright Act that disassembly of copyrighted object code is, as a matter of law, a fair use of the copyrighted work if such disassembly provides the only means of access to those elements of the code that are not protected by copyright and the copier has a legitimate reason for seeking such access. [The passage cited is from the copy printed for the Administrative Office - US Courts, by Barclays Law Publishers.]

81 The unprotected elements are the ideas and functional concepts embodied in the code as opposed to the code itself. The copying by disassembly

was characterized as an `intermediate use` and not a direct commercial exploitation of the copyright work. See the other American case of ***American Geophysical Union v Texaco Inc*** 29 IPR 381.

82 In that other case Newman CJ delivering the opinions of the US Court of Appeals for the Second Circuit said at p 395:

Conversely, courts are more willing to find a secondary use fair when it produces a value that benefits the broader public interest.

83

Sega Enterprises Ltd v Accolade Inc

was applied. While I am conscious of the need to approach the American authorities with caution in view of the development in that jurisdiction of the distinction between ***ideas and functional concepts*** which are not protected by copyright and the ***expression*** of those unprotected elements which is protected it is at least comforting to know that the broader public interest is a factor to be taken into consideration albeit in respect of the `purpose and character` of the use although I would prefer to treat it as a separate matter to which regard is to be had.

84 I have reached a conclusion in favour of Aztech but there are two other defences raised and I ought to refer to them even if briefly.

85 ***British Leyland Motor Corp Ltd & Anor v Armstrong Patents Co Ltd & Anor***

86 In ***British Leyland Motor Corp*** the plaintiffs were designers and manufacturers of motor cars and they also produced some of the spare parts for their cars. In addition they licensed other manufacturers to copy and sell spare

parts in consideration of a royalty payment. The defendants declined to obtain a licence from the plaintiffs but produced replacement exhaust pipes for the plaintiffs' cars by copying the shape and dimensions of the original. The plaintiffs sued for infringement of their copyright in the drawings of the exhaust pipes. In the House of Lords Lord Templeman said at p 641:

I see no reason why the principle 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 should not apply to the sale of a car.

87 Applying the principle to that case he said at pp 641, 642:

BL own the car and the copyright in a drawing of an exhaust pipe fitted to the car. BL sell the car and retain the copyright. The exercise by BL of their copyright in the drawing will render the car unfit for the purpose for which the car is held. BL cannot exercise their copyright so as to prevent the car being repaired by replacement of the exhaust pipe.

88 Aztech says that Creative has granted to software developers (who write applications to run with the sound cards) a right to develop software for what was supposed to be going to be an industry standard, ie the sound standard associated with Sound Blaster sound cards. This is said to have been done by its conduct in representing that its sound standard was or was going to be an industry standard and by selling its SDK to them without warning as to the dangers of embedding the driver CT-VOICE.DRV in the software. It will be recalled that in SDK Ver 1 there is a statement which Aztech says encourages software developers to do so and the driver has been embedded in the case of the very popular game X-Wing. It is then said that by attacking for copyright infringement those who claim the right if need be to disassemble the firmware program in the DSP of the sound card (and by the same reasoning the software program in TEST-SBC) in order to develop and market a Sound Blaster compatible sound card Creative will render the right to develop software granted

to software developers `unfit` or `materially unfit` for the purpose for which the grant was made.

89 I find this argument difficult to accept. The property granted was the right to develop software. Even if it can be said that the grantee, ie the software developer is encouraged to have the driver embedded in the application he is not obliged in any way to do so and in SDK Ver 2 no such statement whether encouraging or not appears. It cannot be said that the right granted is a right to develop **only** software with the embedded driver. It is very different from selling a car with an exhaust pipe which is bound to fail during the life of the car. The exhaust pipe comes with the car. The car does not come with an optional exhaust pipe. Embedding CT-VOICE.DRV is an option and the grantee is free to exercise the option or not as he pleases. If he does he must know that the application will be compatible with a Sound Blaster sound card but may not be with some other sound card. The same would be true in regard to any ADPCM sound files in the application. I am unable to see that his position can be compared with a buyer of a British Leyland car which Lord Templeman thought would be rendered unfit by the exercise of British Leyland's rights. There is a further difficulty in the way of this defence. By exercising its copyright Creative is not preventing anything granted by it from being **repaired**. See at p 626 per Lord Bridge of Harwich. The submission in that case was that a vendor cannot deprive a purchaser of the right to repair. See at p 639 per Lord Templeman. I do not think this defence is available to Aztech on the facts of this case.

90 ***Betts v Willmott***

91 ***Betts v Willmott*** was a patent case decided in 1871. The plaintiff held a patent and manufactured in England and also in France metallic capsules for

covering the corks and necks of bottles. He sued to restrain the sale of the article in England. He proved that the article was not made by him in England but could not prove that it was not made by him in France. Lord Hatherley LC said at p 245:

When a man has purchased an article he expects to have the 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 license to sell the article, or to use it wherever he pleases as against himself.

92 Aztech purchased a Sound Blaster sound card which came together with TEST-SBC. At no time up to the point of the purchase was its attention drawn to any limitations as to the use of the software and such limitations as there were are contained in the manual would only have come to its knowledge **after** the purchase. I do not see that there is really any dispute as to these facts. On the evidence it is clear that this is the case. Aztech says that having purchased the software it became the lawful owner with the right to use it in the way it did. There was no clear and explicit agreement to the contrary.

93 Mr Prescott referred to ***National Phonograph Co of Australia Ltd v Walter T Menck*** [1911] AC 336. That too was a patent case. In that case the appellants held patents for improvements in phonographs, sound records or blanks and were entitled by way of monopoly `to make, use, exercise and vend the invention ... in such manner as to [them] seems meet`. The respondent was a dealer in the patented articles under certain contracts and was entered in the appellants` dealers` list. He undertook that if he was withdrawn from the list he would in no way `handle, sell, or deal in or use, either directly or indirectly` the patented articles unless authorized to do so by the appellants. The action was commenced to restrain the respondent who had been withdrawn from the dealers` list first from acting in breach of contract and secondly from infringing

the appellants' patent rights. After reviewing the authorities beginning with **Betts v Willmott** Lord Shaw of Dunfermline in the Privy Council said at p 353:

In their Lordships' opinion, it is thus demonstrated by a clear course of authority, first, that it is open to a licensee, by virtue of his statutory monopoly, to make a sale sub modo, or accompanied by restrictive conditions which would not apply in the case of ordinary chattels; secondly, that the imposition of these conditions in the case of a sale is not presumed, but, on the contrary, a sale having occurred, the presumption is that the full right of ownership was meant to be vested in the purchaser; while, thirdly, the owner's rights in a patented chattel will be limited if there is brought home to him the knowledge of conditions imposed, by the patentee or those representing the patentee, upon him at the time of sale ... Whether that restriction affects the purchaser is in most cases assumed in the negative from the fact of sale, but depends upon whether it entered the conditions upon which the owner acquired the goods.

94 If the full right of ownership in TEST-SBC vested in Aztech without any restriction as to its use the argument taken to its logical conclusion may be likely to produce a startling result. No doubt with that in mind Aztech's case has been put a little lower at a right to use it for a **reasonable** purpose.

95 If the written note of his submissions is anything to go by Mr Garnett's only answer was that there were restrictions. He said that the terms of purchase limited the use of the software to normal use and the making of back-up copies. On the evidence I have found that the restrictions contained in the manual would only have come to Aztech's notice **after** the purchase and there is no evidence that it had notice of any restrictions at all at the time of purchase of the particular copy of the software. So this is no answer to Aztech's case on this point but Creative was not without any answer. I was referred to **Ager v Peninsular & Oriental Steam Navigation Co** (1884) 26 Ch D 637. The plaintiff published a book of words selected from eight languages for use in telegraphic transmissions of messages and it was accompanied by figure cyphers for reference or private interpretation. The book was registered under the Copyright

Act then in force. The defendants bought a copy of the book and with its aid compiled for their own use a new and independent work as alleged which was their own private code and they distributed copies among their agents at home and abroad. The plaintiff sued for infringement of his copyright. The defendants' main argument was that in making use of the plaintiff's book they were doing no more than the plaintiff intended they should do and to that Kay J said at p 642 that he had no difficulty in believing that the plaintiff never intended anything of the kind. I do not think this case is of much assistance. The ***Betts v Willmott*** point was not taken although the question of intended use was dealt with.

96 In ***Waterlow Directories Ltd v Reed Information Services Ltd*** [1992] FSR 409 the plaintiff and the defendant were publishers of legal directories containing lists of names and addresses of firms of solicitors and barristers. To update its directory the defendant compared the plaintiff's directory with its directory and highlighted those names and addresses in the plaintiff's directory which were not in its own. The highlighted names and addresses were copied onto a word processor which was used to produce letters inviting the solicitors and barristers to appear in the new edition of the defendant's directory. In addition in order to create a section listing solicitors and barristers in public authorities and industry which the plaintiff's directory had but the defendant's had not the defendant compiled from the plaintiff's directory an alphabetical list of organizations. This list together with lists obtained from other sources was used to identify organizations to be mailed to see if they wished to have an entry in the defendant's directory. The plaintiff sued for infringement of its copyright and applied for an interlocutory injunction. Aldous J said at p 417:

The defendant also submitted that the plaintiff authorized the use of its directory and therefore cannot now derogate from its grant. I cannot accept that submission. The defendant must have

known that the plaintiff did not and would not have given it any permission to infringe copyright. It must have known that considerable work went into producing the lists in the plaintiff's directory and that the copyright in the directory was valuable and was exploited by selling the directory and the lists. Nobody could have believed that such a directory could be used other than for the purpose for which it was sold, namely, to be consulted to obtain the information in it. It is not a necessary implication that persons that purchased the plaintiff's directory have the right to reproduce a substantial part to produce a rival directory. This defence is very unlikely to succeed.

97 I think both the **British Leyland Motor Corp** and **Betts v Willmott** points seem to have been taken together but there is a suggestion that a right to do that which would otherwise be an infringement may be implied although it is not clear whether the right is contractual in nature or may be an incident of the sale.

98 **Roberts v Candiware Ltd** [1980] FSR 352 was also a case of an application for an interlocutory injunction. The plaintiff carried on the business of a designer of original handmade knitted garments. She manufactured and sold garments from her patterns. She also published pattern books by which people could make up the garments from the patterns included in the books. The books sold for only 75 pence a copy (or 95 pence previously) but of course the garments sold for considerably more. The defendant purchased one of these books and commercially manufactured garments from a pattern that came with the book and sold these garments in competition with the plaintiff and for less. Vinelott J said at p 354:

It is argued that the plaintiff having sold these patterns without any reservation such as appears in knitting posters, which are also sold by her, which contain a statement that the garment may not be knitted for resale without the prior permission of the publisher/ designer, having sold these knitting patterns without that express reservation, any purchaser is entitled for the 95 pence or 75 pence laid out to use the pattern and to manufacture from it as many garments as the purchaser wishes, whether for his or her own or his or her family's use or for resale it matters not. I cannot accept that submission.

99 All that the court had to decide at that stage was whether there was a serious issue to be tried and as to that his Lordship said at the same page:

I am satisfied that there is a triable issue, a serious issue, whether it is not implicit in the transaction whereby these patterns are offered for sale in newsagents, knitting shops and the like, that the purchaser will not use the patterns for, in broad terms, commercial purposes, that is as a means of reproducing large number of garments which will then be sold as made-up garments. It seems to me that there must be a strong possibility that the judge at the trial will be satisfied that some such limitation must be imposed to give commercial sense to the transaction.

100 I come now to the last of the line of cases I was referred to. In ***Time-Life International (Nederlands) BV & Anor v Interstate Parcel Express Co Pty Ltd*** [1978] FSR 251 the second plaintiff Time owned the copyright in certain books. The first plaintiff Time-Life was given an exclusive right of publication and sale of the books in Australia and elsewhere other than the US and Canada. The defendant carried on business in Australia as a book seller. It had difficulty in obtaining a supply of these books from the Australian distributor of Time-Life and accordingly imported them from a major wholesaler in the US who in turn bought them from Time's distributors in the US. The defendant received the imported books and sold them in Australia. The action was brought for a declaration and injunction for infringement of copyright. Sections 37 and 38 of the Copyright Act 1968 (Commonwealth of Australia) provide:

37 The copyright in a literary ... work is infringed by a person who, without the licence of the owner of the copyright, imports an article into Australia for the purpose of - (a) selling ... the article ...

where, to his knowledge, the making of the article would, if the article had been made in Australia by the importer, have constituted an infringement of the copyright.(38) (1) The copyright in a literary ... work is infringed by a person who, in Australia, and without the licence of the owner of the copyright - (a) sells ... an article ...

where, to his knowledge, the making of the article constituted an infringement of the copyright or, in the case of an imported article, would, if the article had been made in Australia by the importer, have constituted such an infringement.

101 It was conceded by the defendant that the only issue under these sections was whether when it imported the books into Australia for the purpose of selling them or when it sold them in Australia it did so `without the licence of the owner of the copyright`.

102 [The approximate equivalent provisions of the Singapore Copyright Act are ss 32 and 33(1) where the concluding words are:

32 ... where he knows, or ought reasonably to know, that the making of the article was carried out without the consent of the owner of the copyright.(33) (1) ... where he knows, or ought reasonably to know, that the making of the article constituted an infringement of the copyright or, in the case of an imported article, the making of the article was carried out without the consent of the owner of the copyright.

103 Parallel imports and sales without the licence of the copyright owner are not infringements unless the conditions in these concluding words are also satisfied. See **Television Broadcasts Ltd & Ors v Golden Line Video & Marketing Pte Ltd** [1989] 1 MLJ 201 . See also **PP v Teoh Ai Nee & Anor** [1994] 1 SLR 452 but see s 25(3) of the Copyright Act which came into force subsequently.]

104 The defendant`s submission was that Time had impliedly consented to the import and sale of the books. The implied consent was said to have been given when Time by itself or by its distributors first sold the books in the ordinary course of trade without imposing any restriction upon their resale anywhere in the world and this sale impliedly gave to the buyer of the books and to any person claiming title through him Time`s consent `to use the books

however and wherever he pleased` and therefore to import them into Australia and to sell them there. Gibbs J in the High Court distinguished the patent cases and said at p 272:

*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**, at p 349. 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 or sell the work in which copyright subsists.*

105 Stephen J (with whom Barwick CJ agreed) also distinguished the patent cases. He said at p 278:

[The patent cases] should, I think, be seen as confined to the quite special case of the sale by a patentee of patented goods and as turning upon the unique ability which the law confers upon patentees of imposing restrictions upon what use may after sale be made of those goods. If the patentee, having this ability, chooses not to exercise it and sells without imposing any such restrictions, the purchaser and any successors in title may then do as they will with goods, for they are then in no different position from any purchaser of unpatented goods.

106 Jacobs and Murphy JJ also distinguished the patent cases and the decision of the court below to grant the relief was unanimously affirmed.

107 The submission for Creative is that the **Betts v Willmott** principle is not applicable to copyright law and in any case the sale to Aztech of a Sound Blaster

sound card with TEST-SBC did not confer on it any implied right or licence to do the things complained of.

108 Upon the completion of the sale of an article all the rights (and liabilities) of an owner are conferred on the buyer. As an owner he is free to use the article or to sell it. A patent, at any rate a patent such as was granted to the plaintiff at the time ***Betts v Willmott*** was decided, is a grant to the patentee of a special licence, full power and sole privilege and authority to the exclusion of all others among other things to **use** and to **vend** the invention. A buyer of a patented article would be unable to use it or to sell it without infringing the patentee's right. It would be quite futile from his point of view as Gibbs J said. See ***Time-Life*** at p 272. The patentee has the exclusive licence. He can sell subject to restrictions or confer a limited licence on the buyer but as Lord Hatherley LC said in ***Betts v Willmott*** there must be some clear and explicit agreement to the contrary to justify the seller in saying that he has not given the buyer the licence that was exclusively his to use and to vend the invention. It is open to the seller to sell under restrictive conditions by virtue of his monopoly. Where the patentee is the seller the principle is really not different from that which was applied in ***British Leyland Motor Corp.*** The sale confers the rights of ownership. The seller will not be allowed to derogate from his grant by using the patent rights retained by him in such a way as to render the article sold by him unfit or materially unfit for the purpose for which the grant was made. There are difficulties when there is an intermediate seller and one approach that has been suggested is by way of estoppel. See ***Badische Anilin Und Soda Fabrik v Isler*** [1906] 1 Ch 605 at p 611. Notwithstanding the views expressed in ***Time-Life***

109 I think that the principle in ***Betts v Willmott*** is of general application and not limited only to patent cases. It is applicable to copyright cases and

indeed to any case that is concerned with the sale of a chattel. The actual decision in that case is an application of the general principle to a sale of a patented chattel. When a man buys a Sound Blaster sound card and with it comes TEST-SBC he expects to have and to exercise his rights of ownership over it. He can use it. That is one of the rights of ownership. He can run the software in his PC. That is what it is for. To run it the program has to be copied to the PC's memory. He can run the program in as many PCs and as often as he pleases. He can study it to see what it is doing and he can experiment with it. That is exercising his right as an owner to use it. But he cannot make and distribute copies of it. That is not using it. That is not using the software he has bought. That is making copies of it and using or dealing with the copies and he has bought neither the copies nor the right to make copies for that purpose. Creative's copyright is the exclusive right to reproduce or to copy the program and it has not sold or granted any licence in respect of this right. Although he came to a different conclusion I think Stephen J in *Time-Life* put it quite succinctly when he said at p 278:

The buyer of a book in which copyright exists is just such a buyer; the book, once bought by him, is not thereafter subject to any monopoly rights of the copyright owner but may be dealt with by the buyer entirely as he chooses. The copyright in the literary work of course remains with the copyright owner; the buyer has bought no part of it and remains as he was before his purchase, unable lawfully to enjoy any of those exclusive rights, reproduction, adaptation or the like, which ownership of the copyright preserves exclusively for the copyright owner.

110 I think that in the case before me Aztech having purchased a Sound Blaster sound card together with TEST-SBC was entitled in the exercise of its rights of ownership over it to use it by running it with the program DEBUG to study its mode of operation to understand the E2 **H** command with a view to designing a Sound Blaster compatible sound card. It was so entitled not because such use was reasonable (which it may have been) but because such use was a

right of ownership conferred on it by virtue of its purchase and there was nothing to suggest that the seller had not the power to confer this right.

111 There will be judgment accordingly and I will see counsel as to the other claims and the terms of the order to be made.

112 ***Defendants` claim dismissed.***

Lim Teong Qwee JC
