IN THE HIGH COURT OF THE REPUBLIC OF SINGAPORE

[2017] SGHC 48

Suit No 228 of 2015

Between

LEE TAT CHENG

… *Plaintiff*

And

MAKA GPS TECHNOLOGIES PTE LTD

… *Defendant*

JUDGMENT

[Patents and Inventions] — [Validity]

[Patents and Inventions] — [Novelty]

[Patents and Inventions] — [Inventive step]

[Patents and Inventions] — [Infringement]

[Patents and Inventions] — [Groundless threat]

TABLE OF CONTENTS

INTRODUCTION **1**

BACKGROUND FACTS **2**

THE CEASE AND DESIST LETTERS 5

THE PLAINTIFF'S PLEADED CASE **7**

THE DEFENCE AND COUNTERCLAIM **9**

INVALIDITY 9

NON-INFRINGEMENT 10

COUNTERCLAIM 11

THE WITNESSES **12**

ISSUES **12**

PRELIMINARY OBSERVATIONS: EXPERT EVIDENCE **13**

THE LEGAL PRINCIPLES 13

IS THE DEFENDANT'S EXPERT A PERSON SKILLED IN THE ART? 17

ARE THE EXPERTS NEUTRAL? 20

PATENT CONSTRUCTION **21**

THE LEGAL PRINCIPLES 21

"IGNITION MONITOR" 25

"SIGNAL" SENT BY THE IGNITION MONITOR 33

VALIDITY OF THE PATENT IN SUIT **35**

NOVELTY 35

The legal principles *35*

Prior art D3 ..... *39*

Claim 1: The system controller, optical recorder, sensor and ignition monitor *40*

The "dependent claims" *46*

Claim 2: The standby power supply and timer switch *48*

Claim 3: The internal memory store *53*

Claim 4: The separate memory store *54*

Claims 5, 6, 7 and 8 ..... *56*

Conclusion on novelty *57*

INVENTIVE STEP 57

The legal principles *57*

Prior art D1 ..... *64*

Prior art D5 ..... *69*

Conclusion on inventive step *71*

CONCLUSION ON VALIDITY OF THE PATENT IN SUIT 71

INFRINGEMENT OF THE PATENT IN SUIT 72

THE MONITORING OF IGNITION VOLTAGE 73

THE MEANS TO SEND A SIGNAL TO THE SYSTEM CONTROLLER ON DETECTION OF AN IGNITION VOLTAGE 76

THE MEANS TO SWITCH OFF AT LEAST ONE OPTICAL RECORDER AFTER A FIXED INTERVAL AFTER RECEIVING THE SENSOR SIGNAL 78

CONCLUSION ON INFRINGEMENT 81

THE DEFENDANT'S COUNTERCLAIM FOR GROUNDLESS THREATS OF PROCEEDINGS 82

THE LEGAL PRINCIPLES 82

THE PARTIES' SUBMISSIONS 87

DECISION 89

CONCLUSION..92

Lee Tat Cheng
v
Maka GPS Technologies Pte Ltd

[2017] SGHC 48

High Court — Suit No 228 of 2015
George Wei J
2–5 August 2016; 30 September 2016

13 March 2017 Judgment reserved.

George Wei J:

Introduction

1 This suit revolves around a patent for an in-vehicle camera that can be used to record events before, during and after an accident. The plaintiff commenced the action claiming that the defendant's offering of three of its devices for sale constitutes an infringement of the plaintiff's patent. The defendant alleges that the plaintiff's patent is invalid, and if valid, is not infringed. It counterclaims for groundless threats of proceedings.

2 The trial of this suit was heard over four days in August 2016, with closing submissions filed on 30 September 2016. I now deliver my judgment.

Background facts

3 The plaintiff, Mr Lee Tat Cheng ("the Plaintiff"), is the proprietor of a patent known as an "automotive accident recordal system" (Patent No 87795) ("the Patent in Suit"). The patent specification states that the invention relates to "a system which may be installed in a vehicle, in particular, an automobile, to record visual data leading up to the event of a dangerous situation requiring sharp braking or an accident".[1]

4 The Patent in Suit was filed on 1 April 1999, published on 16 April 2002 and granted on 31 May 2002.[2] Since then, the Plaintiff has renewed the Patent in Suit on a yearly basis, most recently on 26 January 2015. The Patent in Suit consists of 22 claims, of which only Claims 1 to 8 are in issue in this case. For convenience, these are set out in the table below:

Claim	Description
1	A recording system, for installation in or on a vehicle, comprising a system controller, at least one optical recorder, at least one sensor and an ignition monitor, the ignition monitor providing means to send a signal to the system controller on detection of an ignition voltage, the system controller bring connected to the at least one optical recorder to switch on operation thereof on receiving said ignition monitor signal, wherein the at least one sensor is provided to send a signal to the system controller on detection of a deceleration or impact, the system controller providing means to switch off the at least one optical recorder after a fixed interval after receiving the sensor signal.

1 Agreed Bundle of Documents ("AB") p 115

2 Statement of Claim (Amendment No 2) ("SOC-2") para 2

2	A recording system as claimed in Claim 1 further comprising a standby power supply and a timer switch connected to the at least one sensor, the standby power supply being connectable to the at least one optical recorder on operation of the timer switch.
3	A recording system as claimed in Claim 1 or Claim 2 wherein the at least one optical recorder is provided with an internal memory store.
4	A recording system as claimed in Claim 1 or Claim 2 wherein the at least one optical recorder is connected to a separate memory store.
5	A recording system as claimed in any preceding claim wherein the at least one sensor is an accelerometer.
6	A recording system as claimed in any one of Claims 1 to 4 wherein the at least one sensor is an impact detector.
7	A recording system as claimed in any preceding claim wherein the at least one optical recorder is a digital camera.
8	A recording device as claimed in any of Claims 1 to 6 wherein the at least one optical recorder is a digital camcorder.

5 It is undisputed that Claims 2 to 8 relate back to Claim 1.[3]

6 The mechanics or the working of the invention protected by the Patent in Suit will be expanded on later in the judgment. For now, it suffices to note that the invention essentially relates to an in-vehicle camera which turns on automatically and begins recording images when the driver turns the ignition

[3] Plaintiff's submissions para 31; Defence and Counterclaim (Amendment No 4) ("DCC-4") para 11; Defendant's submissions para 11

key of the vehicle. The camera records in a cyclical fashion. Later pictures override earlier recorded images such that only the most recent images are stored. Upon impact or sudden deceleration, such as in the event of an accident, the main power supply to the camera turns off. The camera instead receives alternative power from a "standby power supply" and will continue recording for a fixed interval of five to ten seconds after the main power supply has been terminated. Thereafter, the standby power supply switches off and the recording of images stops. The most recently recorded images (*ie*, those just before and after the accident) are stored in memory.

7 The defendant, Maka GPS Technologies Pte Ltd ("the Defendant"), is a company incorporated in Singapore having its registered office address at 2 Alexandra Road, #02-03, Singapore 159919. It carries on the business of a wholesaler and retailer of telecommunication equipment and car accessories parts and services. It is the exclusive distributor of the following devices in Singapore:[4]

(a) Marbella MX5 HD Digital Recorder ("MX5");

(b) Marbella MX6 HD Digital Recorder ("MX6"); and

(c) Marbella QB6 HD Digital Recorder ("QB6").

(Collectively, "the Devices")

8 The Devices are marketed under the name "RoadCorder", and are on-board cameras for automobiles which continuously record the road ahead while the vehicle is in motion.[5] It was undisputed that the technical

4 SOC-2 paras 3-4A

specifications and mode of operation of each of the Devices are similar.[6] The differences between the Devices can be summarised as follows: MX5 is the most basic model of the three. MX6 is an improved version of MX5 and produces recordings of a higher resolution and clarity. QB6 is a further improvement on MX6, and is designed to record the view from both the front and rear of the automobile in high-definition resolution.[7] These differences, however, are not relevant for the purposes of the present suit.

9 Mr Huang Shih Chia @ Johnny Huang ("Mr Huang") is the managing director of the Defendant.[8]

The cease and desist letters

10 It is undisputed that prior to the commencement of the present Suit No 228 of 2015 ("the present suit"), the Plaintiff's solicitors sent two cease and desist letters to the Defendant.

11 In the first letter dated 13 February 2014 ("the 13 February 2014 letter"), the Plaintiff claimed that by selling the *MX5 (only)*, the Defendant had infringed the Patent in Suit. The Plaintiff demanded that the Defendant execute a Letter of Undertaking to cease selling the MX5 immediately and to, within seven days of the Letter of Undertaking:[9]

---

5 AB 519

6 Transcript 2 August 2016 15:15-20

7 1st AEIC of Huang Shih Chia @ Johnny Huang dated 11 November 2015 ("HSC 1st AEIC") para 11

8 HSC 1st AEIC para 1

9 HSC 1st AEIC p 27

(a) deliver up all units of the MX5 in its possession;

(b) pay the sum of $50,000 as damages allegedly suffered by the Plaintiff; and

(c) pay the sum of $2,000 for the Plaintiff's legal and investigative costs.

12 Some eight months later, in the second letter dated 28 October 2014 ("the 28 October 2014 letter"), the Plaintiff claimed that *all* the three Devices had infringed the Patent in Suit. The letter stated that the Plaintiff was minded not to enforce its strict legal rights, provided that the Defendant, within seven days of the 28 October 2014 letter:[10]

(a) Signed a Letter of Undertaking, acknowledging that it had infringed the Patent in Suit and agreeing to the terms detailed in (b)–(e) below;

(b) Accounted to the Plaintiff the number of units of each product sold, and paid the sum of $12 per unit sold as a license fee;

(c) Entered into a Licence Agreement for the future sale of the Devices;

(d) Paid costs of $3,750 for the expert opinion obtained to confirm that the Devices infringed the Patent in Suit; and

---

10 HSC 1st AEIC pp 62-64

(e) Paid costs of $7,500 for the investigation fees and professional fees incurred with regards to the infringement of the Patent in Suit by the Devices.

13 It appears that the Defendant did not comply with the Plaintiff's demands in both the 13 February 2014 letter and the 28 October 2014 letter (collectively, "the cease and desist letters").

The Plaintiff's pleaded case

14 On 10 March 2015, the Plaintiff commenced the present suit against the Defendant, alleging that "by offering the [Devices] for sale in Singapore and/or an external memory store for use with the [Devices] without obtaining the Plaintiff's consent, the Defendant has infringed the Plaintiff's Patent" under s 66(1) of the Patents Act (Cap 221, 2005 Rev Ed).[11] The particulars of the alleged infringement are as follows:[12]

Product	**Infringing particulars**
MX5	(a) MX5 comprises all the features of Claim 1 of the Patent in Suit; (b) MX5 comprises all the features of Claims 2, 3, 5, 6, 7 and/or 8 of the Patent in Suit.
MX6	(a) MX6 comprises all the features of Claim 1 of the Patent in Suit; (b) MX6 comprises all the features of Claims 2, 3, 5, 6, 7 and/or 8 of the Patent in Suit.
QB6	(a) QB6 comprises all the features of Claim 1 of the

11 SOC-2 para 6

12 SOC-2 para 5

	Patent in Suit; (b) QB6 comprises all the features of Claims 2, 3, 4, 5, 6, 7 and/or 8 of the Patent in Suit.
MX5, MX6 and/or QB6	Claim 4 of the Patent in Suit is infringed when: (1) an external (and separate) memory store is offered to the customers, for free, at the same time when these customers purchase MX5, MX6 and/or QB6, for use with MX5, MX6 and/or QB6; and/or (2) the Devices' optical recorder is connected to a separate (and external) memory store (in the form of a memory card.

15 The Plaintiff claims the 28 October 2014 letter made known to the Defendant that he was infringing the Plaintiff's patent. The Defendant however continued to offer the Devices for sale, and failed, refused and/or neglected to pay the Plaintiff any license fees.[13]

16 The Plaintiff thus claimed a delivery up of the Devices, an account of profits for the sale of the Devices or damages to be assessed, interest and costs.[14]

The Defence and counterclaim

Invalidity

17 The Defendant's defence is two-fold. First, the Defendant alleges that the Patent in Suit is and has always been invalid.[15] In this respect, the

---

13 SOC-2 para 7—8

14 SOC-2 para 8

15 DCC-4 para 6

Defendant filed particulars of objection against the Patent in Suit pursuant to O 87A r 3(2) of the Rules of Court (Cap 322, R 5, 2014 Rev Ed).

18 The Defendant alleges that the Patent in Suit is not a patentable invention because it is not novel and does not involve an inventive step,[16] citing the following documents as prior art:

Prior Art	**Document**
D1	United States Patent Application No US 4,843,463A (published as 197,673 on 27 June 1989, entitled "Land Vehicle Mounted Audio-Visual Trip Recorder")
D2	International Patent Application No WO 98,331,146 (published as PCT/US97/12129 on 16 July 1998, entitled "Car Cam")
D3	International Publication No WO 96/00957 (published as PCT/IB95/00503 on 11 January 1996, entitled "Method and Device in Particular for Enabling the Causes of an Accident Involving a Vehicle to be Verified by Means of Images of the Environment Within which the Vehicles in a Moving or Stationary State")
D4	International Publication No WO 98/12680 (published as PCT/IT97/00225 on 26 March 1998, entitled "Apparatus for Video-Recording Fortuitous Events Related to Moving Means of Any Nature")
D5	Patent No 5,815,093 (published on 29 September 1998, entitled "Computerised Vehicle Log")

19 The Defendant's position is that Claim 1 is not novel in light of D3, as all the features of Claim 1 of the Patent in Suit have been disclosed by D3.[17] In

---

16 Particulars of Objection against Patent No 87795 (Amendment No 2) para 2

other words, the prior art relied on for the assertion that Claim 1 is anticipated is limited to D3.

20 The Defendant also asserts that the Claims in the Patent in Suit lack an inventive step by reason of various combinations of D1 to D5, as well as common general knowledge.[18]

Non-infringement

21 In the alternative, in the event that the Patent in Suit is held to be valid, the Defendant argues that it is nonetheless not infringed by the Defendant's acts. In this regard, the Defendant's position is that the essential features of Claim 1 of the Patent are not found in the Devices:[19]

Essential Features of Claim 1	**MX5**	**MX6**	**QB6**
An Ignition Monitor	No Ignition Monitor		
Means to send a signal to the system controller on detection of an ignition voltage	No component to detect ignition voltage and consequently, no means to send a signal to the system controller on detection of an ignition voltage		
Means to switch off at least one optical recorder after a fixed interval after receiving the sensor	No software or hardware operating as timer or timer switch		

---

17 Particulars of Objection against Patent No 87795 (Amendment No 2) paras 26-28

18 Particulars of Objection against Patent No 87795 (Amendment No 2) paras 4-19

19 DCC-4 paras 8-10

signal	

22 The Defendant argues that since Claims 2 to 8 are dependent claims (*ie,* claims that relate back to Claim 1), they are consequently also not infringed by any of the Devices.[20]

Counterclaim

23 The Defendant counterclaims that prior to the issuance of the writ of summons and statement of claim on 10 March 2015, the Plaintiff made threats by the cease and desist letters. The cease and desist letters state that the Defendant has infringed the Patent in Suit by selling MX5 and/or the Devices. The Defendant claims that the cease and desist letters are groundless threats of infringement proceedings.[21]

24 The Defendant thus claims a declaration that the Patent in Suit is invalid and an order that the Patent be revoked. Alternatively, if the Patent in Suit is found valid, the Defendant seeks a declaration that there is non-infringement of the Patent in Suit by the Defendant. It also seeks a declaration that the threats in the cease and desist letters are unjustified, an injunction to restrain the Plaintiff from continuing such threats against the Defendant, its officers, servants or agents, as well as damages to be assessed.[22]

---

20 DCC-4 para 11

21 DCC-4 paras 16-18

22 DCC-4 para 20

The witnesses

25 At the trial, the Plaintiff and the Defendant each called one factual witness and one expert witness. The Plaintiff was his own factual witness. The Defendant's factual witness was Mr Huang, who it will be recalled is the managing director of the Defendant. Each party also engaged its own patent agent as an expert witness. The Plaintiff engaged Mr Martin Schweiger ("Mr Schweiger") while the Defendant appointed Dr Freeman Yu Zhenhua ("Dr Yu"). Each expert prepared three reports. I will refer to these reports, where relevant, in the course of my decision.

Issues

26 In light of the above, the main issues before this court are as follows:

(a) Patent construction;

(b) Validity of the Patent in Suit;

(c) Infringement of the Patent in Suit; and

(d) The Defendant's counterclaim for groundless threats of proceedings.

27 Before delving into the main issues, I make a few preliminary observations about the expert witnesses in this trial. This is necessary since the parties' submissions have raised some issues on the reliability of the expert evidence, in particular, the evidence of the Defendant's expert, Dr Yu.

Preliminary observations: expert evidence

The legal principles

28 I begin by summarising the role of experts in legal proceedings involving patent law. In patent invalidity and patent infringement proceedings, experts are almost always called to give evidence to assist the court. This would include evidence on the meaning of technical words and phrases in the patent specification, the scope of the claims in the patent and what exactly is disclosed by the prior art: see David Llewelyn, "The Use of Experts in Legal Proceedings in Singapore Involving Intellectual Property Rights" (2013) 25 SAcLJ 480 ("*Llewelyn*") at para 4. The questions of law that must be answered depend on the legal issue that has arisen. For example, in some cases it may be whether there was sufficient disclosure of the claimed invention in the specifications such that the claimed invention can be performed by the skilled reader. In other cases, it may be whether the claimed invention is novel (*ie*, anticipated by the prior art) or involves an inventive step. Frequently, it will concern the question as to whether the defendant's product or process infringes the plaintiff's patent by reason of it embodying all the essential elements of the claimed invention. No matter what the question of law is, expert evidence can be helpful in explaining technical language, to demonstrate the practical working of the invention and to point out differences between the prior art and the claimed invention as well as differences between the claimed invention and alleged infringement. But when all is said and done, the questions of law are for the Court alone to decide.

29 In short, the expert's role is to assist the court in its task of viewing the patent claims through the eyes of the person skilled in the art at the time the patent was applied for. This person is also known as the "notional skilled

reader". The notional skilled reader has long been recognised as an artificial legal construct. He is not necessarily an individual who is an "expert" in the relevant field. The description of the attributes of the notional skilled reader by Laddie J in *Pfizer Ltd's Patent* [2001] FSR 16 at [62] bears repeating:

> …[The notional skilled reader] is a legal creation… He is deemed to have looked at and read publicly available documents and to know of public uses in the prior art. He understands all languages and dialects. He never misses the obvious nor stumbles on the inventive. He has no private idiosyncratic preferences or dislikes. He never thinks laterally. He differs from all real people in one or more of these characteristics. …

30 In essence, a notional skilled reader should fulfil the following criteria:

(a) possess common general knowledge of the subject matter in question;

(b) have a practical interest in the subject matter of the patent or be likely to act on the directions given in it; and

(c) Whilst unimaginative, be reasonably intelligent and wish to make the directions of the patent work.

See *Mcghan Medical UK Ltd v Nagor Limited* (Case No CH 1999 1720), cited in *A Guide to Patent Law in Singapore* (Alban Kang gen ed) (Sweet & Maxwell, 2nd Ed, 2009) ("*A Guide to Patent Law in Singapore*") at para 7.2.5. It is well-established that it is ultimately for the court to decide who the relevant person skilled in the art is. For example, in *Ng Kok Cheng v Chua Say Tiong* [2001] 2 SLR(R) 326, Judith Prakash J (as she then was) found (at [23]) that the defendant's expert did not possess the skills and attributes of the notional skilled reader to whom the patent specification was addressed.

Because of this finding, Prakash J held that the defendant had failed to adduce any expert evidence on the art.

31 The learned author of *A Guide to Patent Law in Singapore* comments (at para 7.2.9) that "[a]s far as possible, experts should possess the relevant technical knowledge or experience". The author also states that "[p]atent agents… are not deemed to be an expert even though they have the relevant technical qualifications". The question as to whether a patent agent can give expert evidence must depend on the facts and circumstances of each case. This will include the experience of the patent agent in working in the relevant field of art (if any). I also agree with the observation by Jacob LJ in in *SmithKline Beecham plc and others v Apotex Europe Ltd and others* [2004] All ER (D) 431 at [52] that what is important is "not so much the expert's personal view but his reasons for that view". The court must examine the expert's reasons against the standard of "the notional unimaginative skilled man".

32 In *Mühlbauer AG v Manufacturing Integration Technology Ltd* [2010] 2 SLR 724 ("*Mühlbauer*"), Andrew Phang Boon Leong JA underscored (at [48]) the reality that many experts would not themselves fall within the category of the notional skilled reader, as the expert might possess extraordinary knowledge which goes *beyond* what a reasonable person skilled in the art would possess. Indeed, the real-life expert is likely to possess imagination and the ability to think outside of the box. Take for example, Albert Einstein who was an assistant patent examiner at the Swiss Patent Office at the time when his ground-breaking papers on Brownian motion, the photoelectric effect (for which he was awarded the Nobel Prize 1921), special relativity and the relationship between mass and energy were published in

1905. On the other hand, as Laddie J also observed in *Pfizer Ltd's Patent* (at [63]), the genius (real-life expert) can sometimes also miss the obvious.

33 Above all, an expert must realise that he is not an advocate for the position adopted by the party retaining him, and "his advocacy is limited to supporting his independent views and not his client's cause" (*Vita Health Laboratories Pte Ltd v Pang Seng Meng* [2004] SLR(R) 162 ("*Vita Health*") at [83]). He must "remain detached from the fray and should not have any interest in the outcome of the proceedings nor partiality to the facts in issue": *Vita Health* at [80].

34 This is particularly evident from O 40A r 2 and r 3(2)(*h*) of the Rules of Court which make it clear that the expert's duty to the court is *higher* than that to his client:

> **Expert's duty to the Court (O. 40A, r. 2)**
>
> **2.**—(1) It is the *duty* of an expert to *assist the Court* on the matters within his expertise.
>
> (2) This duty *overrides any obligation to the person from whom he has received instructions or by whom he is paid.*
>
> **Requirements of expert's evidence (O. 40A, r. 3)**
>
> …
>
> (2) An expert's report must —
>
> …
>
> (*h*) contain a statement that the expert understands that in giving his report, *his duty is to the Court and that he complies with that duty.*
>
> [emphasis added]

35 Unfortunately, it has been observed that despite the clear legislative provisions, the difficulties generated by the issue of bias with regards to

experts for the respective parties (whether with or without merit) are "perennial in nature" (*Mühlbauer* ([32] *supra*) at [44]), perhaps because of the fact that at the very core, every expert is appointed and remunerated by the party who has engaged his or her services. In cases of such allegations, the relevant test is that of *actual* partiality, rather than merely the *appearance* of partiality: *Mühlbauer* at [47]. Indeed, *Llewelyn* comments at para 26 that the expert need not be independent (he could be an employee in appropriate circumstances), although he usually is in order to avoid accusations of bias.

Is the Defendant's expert a person skilled in the art?

36 I now move on to deal with some preliminary issues relating to the expert witnesses in the trial of the present suit, which the Plaintiff raises. The first relates to the qualifications of the expert witness. This mainly arises from the Plaintiff's submission that Dr Yu, the Defendant's expert witness, "does not have sufficient experience and/or knowledge in the art". According to the Plaintiff, this is ostensibly because Dr Yu has never been directly engaged in the automobile or automobile-related industry. Instead, his work experience mainly involved the maintaining of blast furnaces, automation equipment in the clothing industry, and the designing of irons.[23] The Plaintiff also relies on Dr Yu's own candid admission at trial that he was "a competent person, not a skilled person".[24] By contrast, the Plaintiff says that its own expert, Mr Schweiger, is well-versed in the relevant art as demonstrated by his *curriculum vitae*.[25]

---

23 Plaintiff's submissions paras 13-14

24 Transcript 5 August 2016 21:8-11

25 Plaintiff's submissions para 20; Bundle of Affidavits of Evidence-in-Chief ("BA") 160-167 and 433-434

37 I find the Plaintiff's allegation that Dr Yu does not possess the necessary experience and knowledge to provide expert evidence to be without merit. In my view, Dr Yu, who is a patent agent, qualifies as an expert who is able to assist this court on the meaning of the technical words used in the specifications and claims, the prior art, the workings of the claimed invention and the alleged infringing Devices.

38 In reaching this decision, I am mindful that a qualified patent agent does not become an "expert" simply because of that qualification. Instead, I have reached my conclusion on Dr Yu's suitability to provide expert evidence based on his engineering qualifications and previous work experience. Dr Yu possesses a Graduate Diploma in Metallurgical Machinery from the Shanghai College of Metallurgy (1990), a Bachelor's Degree in Mechatronic Engineering (Robotics) from Shanghai University (1995) and a Doctor of Philosophy in Engineering from the University of Birmingham, UK (2000). Dr Yu is also a Member of the Institution of Mechanical Engineers, UK and the Institution of Engineering and Technology, UK. One of his specialisations, as stated in his *curriculum vitae*, is in machinery and electronics.[26] Indeed, Dr Yu has work experience in the area of computer-aided design and computer-aided manufacturing.[27] The view that I have formed is that his qualifications and his work experience in area of electronics and control systems is consistent with Dr Yu possessing common general knowledge of the subject matter of the Patent in Suit. While Dr Yu has not worked in the specific area of automobile equipment, electronics or optical recording equipment, I am nonetheless

---

[26] BA pp 252 and 254

[27] Transcript 4 August 2016 p 34 lines 13-14

satisfied that Dr Yu is able to act on the directions provided by the Patent in Suit.

39 I am also cognisant of the observation by the Court of Appeal in *Mühlbauer* ([32] *supra*) at [48] that a person skilled in the art need not assume knowledge and expertise that goes beyond what a *reasonable* person skilled in the art would possess, and the person does not need to be someone who possesses *extraordinary* knowledge and expertise. In reaching this conclusion, I find support in the comments by *Llewelyn* at para 26 that the expert need not himself be skilled in the art in question, although he usually is. The important question is whether the chosen "expert" is able to assist the court in viewing the patent claims *through the eyes of the person skilled in the art*. On the whole, I found Dr Yu's analysis to be logical, clear, and of assistance to this court. This is not surprising given his professional qualifications in engineering and his work experience in industry prior to becoming a patent agent. Where appropriate, his opinions have been accepted, as will become clear later in my judgment. The areas where I have preferred the view of the Plaintiff's expert, Mr Schweiger, will also be made clear.

Are the experts neutral?

40 According to the Plaintiff, Dr Yu "has shown actual bias in his evidence" as "amply demonstrated" when he went out of his way to find the existence of an "ignition monitor" (a term used in the Patent in Suit) in D1 and D3. On the other hand, the Plaintiff asserts that Mr Schweiger's evidence was given matter-of-factly.[28]

---

[28] Plaintiff's submissions paras 24-26

41 While the Defendant does not go so far as to expressly state that Mr Schweiger was biased, it also points out that Mr Schweiger's evidence was inconsistent and contradictory at numerous instances, and that he was not objective.[29]

42 An allegation of bias is serious. It requires the demonstration of *actual* partiality rather than merely the *appearance* of partiality (see [35] above). As will become apparent below, although the experts in the present suit each adopted positions that supported his client's case, the positions taken were generally tenable or at least arguable. There is, in my view, no basis for the allegation of *actual* bias on the part of either expert, much less – in the Plaintiff's words – an "ampl[e] demonstrat[ion]" of it.

43 I should, however, again emphasise the importance of experts continuously bearing in mind their overriding duty to the court, over and above their duties to their clients, under O 40A r 2 of the Rules of Court. The court, especially when adjudicating complex technical issues that often arise in patent litigation, will only be assisted by an impartial, clear and objective presentation of the issues by the experts on either side. Even though the expert is retained by his client, it would only serve to jeopardise his client's case if an expert insists on taking indefensible or extreme positions, or appears overly aggressive and uncooperative to the opposing party's counsel during the trial.

44 With that, I now turn to the substantive case.

---

[29] Defendant's submissions para 91

Patent construction

The legal principles

45 The first issue is how the claims in the Patent in Suit are to be construed. Claim construction is vital and arises in connection with a variety of legal issues in a patent suit. These include: (i) whether the specifications set out an adequate disclosure of the invention; (ii) whether the claims are supported by the specifications; (iii) whether the claimed invention is patentable; and (iv) whether the defendant has infringed the patent. The third and fourth issues arise in the present suit.

46 The relevant provision relating to claim construction is s 113(1) of the Patents Act:

> **113.**—(1) For the purposes of this Act, an invention for a patent for which an application has been made or for which a patent has been granted shall, unless the context otherwise requires, be taken to be that specified in a *claim* of the specification of the application or patent, as the case may be, *as interpretated by the description and any drawings contained in that specification,* and the extent of the protection conferred by a patent or application for a patent shall be determined accordingly.
>
> [emphasis added]

47 Section 25(4) of the Patents Act provides that the purpose of a patent specification is to disclose the invention in a manner which is clear and complete for the invention to be performed by a person skilled in the art. Put broadly, this requires disclosure of sufficient information to enable the skilled reader to work the claimed invention.

48 Section 25(5) of the Patents Act goes on to set out the function of patent claims. These are to (a) define the matter for which the applicant seeks

protection; (b) be clear and concise; (c) be supported by the description; and (d) relate to one invention or to a group of inventions which are so linked as to form a single inventive concept.

49 The well-known English case of *Catnic Components Limited and Another v Hill & Smith Limited* [1982] RPC 183 ("*Catnic*") emphasised (at 242) that a patent specification comprises a unilateral statement by the patentee in words of his own choosing, addressed to those likely to have a practical interest in the subject matter of his invention, by which he informs them what he claims to be the essential features of his invention. There is no doubt this is also the approach taken in Singapore. The task before the court is to ascertain what the patentee's words were intended to convey to the notional skilled reader as at the date of the patent application.

50 The general principles as to construction and the relationship between specifications and claims are well-settled. In ascertaining the scope of the patented invention, the claims themselves are the *principal* determinant, while the description and other parts of the specification may *assist* in the construction of the claims: *First Currency Choice Pte Ltd v Main-Line Corporate Holdings Ltd and another appeal* [2008] 1 SLR(R) 335 ("*First Currency Choice*") at [23].

51 In this respect, words used in the claims may be affected or defined by what is said in the body of the patent specification. Claims should not be viewed independently but should instead be construed as part of the whole specification: *First Currency Choice* at [24].

52 It is not, however, permissible under Singapore patent law to put a gloss on the meaning or to expand the claims by relying on statements in the

specification where the meaning of the words used in the claim are clear and unambiguous. By this, what is meant is that if the claims have a plain meaning, reliance ought not be placed on the language used in the body of the specification to make the claim mean something different. Instead, such claims must be read and given their ordinary and natural meaning without incorporating extracts from the body of the specification into them: *First Currency Choice* at [24]. On the same note, it is stated in Ng-Loy Wee Loon, *Law of Intellectual Property of Singapore* (Sweet & Maxwell, 2nd Ed, 2014) ("*Ng-Loy*") at para 33.3.5 that "whilst it is perfectly legitimate to refer to these other parts in the specifications to assist in claim construction, these other parts are ultimately secondary".

53 It is also well-established that where there are ambiguities in the language of the claim, the claims should be purposively interpreted, in that the interpretation should be highly sensitive to the context of, and background to, the particular utterance (see *Kirin-Amgen Inc v Hoechst Marion Roussel Ltd* [2005] RPC 9 at [32]), rather than a literal interpretation derived from "meticulous verbal analysis": *Catnic* at 243, adopted in *FE Global Electronics Pte Ltd and others v Trek Technology (Singapore) Pte Ltd and another appeal* [2006] 1 SLR(R) 874 at [14], and most recently affirmed in *Mühlbauer* ([32] *supra*) at [22].

54 This (purposive) construction is an *objective* one, assessed from the perspective of what the notional skilled person would have understood the patentee to mean by the use of the language of the claims: *Mühlbauer* ([32] *supra*) at [25]. The notional skilled reader interprets the words against the prior art and with common general knowledge. This method of patent construction strikes a balance between the rights of the patentee and those of

third parties: on the one hand, it would give the patentee "the full extent, but no more than the full extent of the monopoly which a reasonable person skilled in the art, reading the claims in context, would think that [the patentee] was intending to claim" (*Mühlbauer* at [24]); on the other hand, it would also allow third parties to know the area within which they will be trespassers.

55 I pause to underscore again the point that the addressee of the patent specifications and claims is the notional skilled reader who is armed with common general knowledge. On this basis, the question is whether the notional skilled reader would find that the words of the claim are clear and unambiguous in and of themselves. It does not matter if the lay person (*ie*, the non-skilled reader) would think that the meaning of a word or phrase in the claim is clear. It appears that this is the reason why Susanna H S Leong, *Intellectual Property Law of Singapore* (Academy Publishing, 2013) ("*Susanna Leong*") comments at para 18.054 that literalism still plays a limited role in Singapore. The problem, however, that was alluded to by Phang JA in *Mühlbauer* at [40]—[43] is that there is always a danger in adopting an overly high level of abstraction when delineating the essential features of a claimed invention. Put in another way, the question of whether a word or term in the claim is ambiguous may depend at least in part on what the notional skilled reader thinks the patentee intends to be the essential elements of the claimed invention.

56 Bearing these principles in mind, I now turn to the construction of the Patent in Suit. There are two main parts or expressions used in Claim 1 that are especially in dispute between the parties: "ignition monitor" and "a signal sent by the ignition monitor."

"Ignition monitor"

57 One of the central disputes between the parties is in relation to the meaning of an "ignition monitor" in Claim 1. According to the Plaintiff, an ignition monitor simply monitors the amplitude of the *direct current ("DC") voltage* in the ignition system, which is electrical in nature. The Plaintiff argues that this is clear from the wording in the specification, which states that when the ignition monitor detects a DC voltage in excess of a threshold value, a signal is sent from the ignition monitor to the system controller to start up the camera.[30] The Plaintiff relies on the point that the threshold value is expressly stated as lying between 10 and 15 volts.[31] The ignition monitor therefore only monitors the ignition *voltage* and *not* the engine or engine ignition activities.[32]

58 I note in passing that the Plaintiff asserts in his submissions that the inventive step in Claim 1 is the use or inclusion of the ignition monitor.[33] The evidence of the Plaintiff was that if a driver forgot to turn off his "communication device" and turned on the car engine, the power surge would cause damage to the communication device.[34] This is because the electrical power required to operate the starter motor and to start the engine is very high, in the region of 2,000 volts. This level of power would or could damage electrical equipment such as a radio communication device that was turned on and connected to the system. The Plaintiff submits that the detection of a

---

30 AB 117 lines 23–27

31 AB 117 lines 27–28 and AB 120 lines 24-31

32 Plaintiff's submissions paras 77 and 84(c)

33 Plaintiff's submissions para 36

34 Transcript 2 August 2016 73:16—19

"stable ignition voltage" that exceeds the threshold value (10-15 volts) was essential to avoid power surges that may damage electronic equipment.[35] The function of the ignition monitor was therefore not to monitor the voltage at the spark plug.[36]

59 Under cross-examination, the Plaintiff's expert witness, Mr Schweiger, explained that the ignition system of a car is divided into two circuits: he primary circuit, which operates at a voltage that is almost equal to the car battery's voltage, and a secondary circuit, which has a step-up transformer to increase the voltage to ignite the spark plugs.[37] In cases where the ignition system of a vehicle is operated by means of a key, the evidence was that a typical ignition switch would have four positions (labelled "0" to "3" for convenience):[38]

(a) In position 0, the vehicle is essentially powered down as the power supply is disconnected.

(b) In position 1, only the vehicle's accessories can be used. In some models of vehicles, the cigarette lighter is also operable in position 1. The source of the power in position 1 is the car battery.

(c) In position 2, the car's ignition circuit is powered and all accessories would draw power from the ignition system.

---

35 Plaintiff's submissions para 38

36 Plaintiff's submissions para 79

37 Transcript 3 August 2016 69:3-70:18; Plaintiff's submissions para 80

38 AB 367—368; Transcript 3 August 2016 92:20-93:4; Plaintiff's submissions para 81.

> (d) When the key is engaged in position 3, power is sent to the starter motor and the engine of the car is turned on. When the key is in position 3, all accessories are switched off. The ignition switch returns automatically to position 2 after the key is released. The accessories are once again powered. When the engine is running and the key is in position 2, the engine also recharges the car battery through an alternator.

60 The Defendant takes a different view. According to the Defendant's expert, Dr Yu, an "ignition monitor" is not a commonly used or accepted word in the relevant technical field.[39] The two words should thus be construed separately. With reference to the *Cambridge English Dictionary*, Dr Yu argues that the word "ignition" refers to the electrical system in an internal combustion engine causing the fuel to burn or explode in order to start the internal combustion engine. The word "monitor" means a machine that regularly tests something. Therefore, collectively, "ignition monitor" would be understood by the skilled person to be a device that regularly, periodically or continuously examines firing activities of an internal combustion engine*,* that is, the ignition system,[40] which in turn, produces the voltage itself.

61 Dr Yu does not give any reasons as to why the words should be construed separately and by reference to standard dictionary definitions. Indeed, I am cognisant that where words used in the claim are ambiguous, there should be a purposive interpretation of the claim, rather than a literal interpretation derived from "meticulous verbal analysis" (see [53] above).

---

39 AB 416

40 AB 493

Given Dr Yu's view that the phrase is not commonly used in the technical field, it must follow that it would be helpful to look to the description and other parts of the patent specification to assist in the construction of this term in the claim. After all, the question is what the notional skilled reader would understand the patentee to mean by the words "ignition monitor".

62 In the context of the core purpose of the claimed invention, I am unable to see why the notional skilled reader would regard the term as meaning something that regularly, periodically or continuously examines *firing activities of an internal combustion engine.* In my assessment, the term "ignition monitor" in Claim 1 does not have a plain and ordinary meaning that can be simply derived from a standard dictionary. I am of the view that the notional skilled reader confronted by the phrase "ignition monitor" would pause and ask the question: what is the *purpose* of the ignition monitor?

63 In my construction of the Patent in Suit, I have found the following parts of the specifications especially helpful:

(a) The ignition monitor is expressly said to provide the means to send a signal to the system controller on detection of an ignition *voltage*.[41] It is also expressly stated in the specifications that the operation of the system is automatic and does not require a skilled operator.[42]

---

41 AB 116 lines 3-5

42 AB 116 lines 31-32

(b) The invention is said to comprise the steps of "monitoring the ignition system of a vehicle" and "providing a signal on detection of a voltage in the ignition system"[43] [emphasis added].

(c) With reference to Figure 1 below, in describing an embodiment of the invention by reference to Figure 1 below, the ignition monitor 2 is said to monitor the "amplitude of the DC voltage" in the ignition system[44], and send a signal to the system control unit 1 when the ignition monitor detects a "DC voltage in excess of a threshold value, i.e. when the vehicle's ignition system is activated to start the vehicle".[45]

(d) With reference to Figure 1 below, the ignition monitor 2 is directly connected to the ignition system of the vehicle via an input 6.[46]

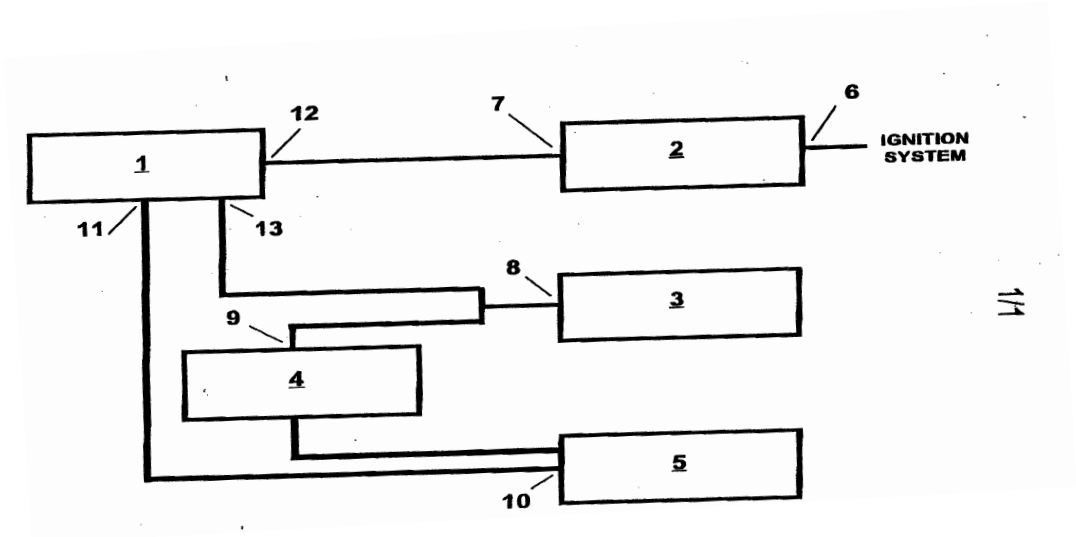
---

43 AB 116 lines 21-24

44 AB 117 lines 22-23

45 AB 117 lines 24-26

46 AB 116, lines 16-17; 117 lines 16-17



(e) Operationally, the voltage produced in the ignition system detected by the ignition monitor is as a result of a driver operating the ignition system to start the engine.[47]

Figure 1: Schematic diagram of an embodiment of the invention in the Patent in Suit

Selected legend:
Unit 1: System controller

---

47 AB 120 lines 24-27

Unit 2: Ignition monitor
Unit 3: Impact sensor
Unit 4: Standby power supply
Unit 5: Optical recorder
Items 6, 10, 12: Input
Items 7, 8, 11: Output

64 Construed as part of the whole specification and bearing in mind the language and purpose, I agree with the Plaintiff's submission that the notional skilled person would have understood the term "ignition monitor" used in Claim 1 to refer to a device that monitors the amplitude of the DC voltage in the ignition system of a vehicle.[48] It is clear that the "ignition" monitor is used to monitor the "ignition" status of the ignition system, in order to turn the in-vehicle camera on and off. Although there are many other ways of detecting the status of the ignition system, the Patent in Suit for this particular invention essentially describes one such technique. The method detects the amplitude of the ignition voltage at about 10-15 volts, and lasting longer than five seconds.[49] The "voltage" that is detected by the ignition monitor is *from or produced by* the ignition system, and not the voltage from any other source, such as from the spark plug in a vehicle.[50] The ignition monitor is not a device that monitors the engagement of the starter motor and spark plugs (2,000 volts) and the operation of the secondary circuit of the ignition system.

65 The Defendant submits that the use of words "ignition monitor" is deliberate because the presence of ignition activity would signify that the internal combustion engine has been started. The use of the term "ignition

---

48 Plaintiff's submissions para 93

49 AB 117 lines 21-33

50 Plaintiff's submissions para 79

monitor", it is argued, must mean that Claim 1 requires actual ignition of an internal combustion engine.[51] Indeed, the Defendant submits that a "purposive approach" using the ordinary meaning of the word "ignition" as used in Claim 1 indicates that there is a requirement for actual ignition of an internal combustion engine.[52] I note that the specifications do refer at various places to the driver of the vehicle operating the ignition system to start the engine.[53]

66 Nevertheless, I disagree with the Defendant's submission. It is common knowledge that the ignition switch of cars (those operated by a key) has several functions, as reflected in the key positions described at [59] above. The ignition system of a car is a complex system that is not only about turning on the starter motor to engage the engine and spark plugs. At intermediate positions, the switch is also used to draw power to operate accessories such as the radio and to engage the cigarette lighter power socket. It is also clearly part of common general knowledge that power surges can cause severe damage to electrical equipment. Indeed, the specifications make clear that what was being detected was the stable (and much lower) DC voltage of between 10 to 15 volts. It was the engagement of the primary circuit and not the secondary circuit that was being monitored. At the end of the journey, when the driver switches off the ignition, there would be a drop in the DC voltage prompting a signal to be sent to the system control unit to turn off power supply to the camera.[54]

---

51 Defendant's submissions paras 22 and 24

52 Defendant's submissions para 28.1

53 AB 120 lines 24-25

54 AB 121 lines 1-6

67 I note that under cross-examination, in answer to the question of what he understood by the word "ignition", Mr Schweiger's evidence was that "in the context, it means an ignition of a vehicle which has an internal combustion engine".[55] But this does not mean that "ignition" refers to the actual firing up of the engine by means of engagement of the starter motor and spark plugs. When it was put to Mr Schweiger that the ignition monitor was monitoring for ignition voltage *of 2,000 volts*, he explained that this was not the position, since what was detected was only a threshold value of *between 10 and 15 volts*. His evidence was that the secondary circuit, which carried 2,000 volts, would never be touched as that could endanger life.[56] Therefore, I accept the Plaintiff's submission that, an ignition monitor referred to in Claim 1 monitors the amplitude of the DC voltage in the ignition system.

"Signal" sent by the ignition monitor

68 The next issue relates to the nature of the "signal" that (referring to Figure 1 at [63] above) the ignition monitor 2 sends to the system controller 1. According to the Plaintiff, the transmission of electrical *power* is sufficient to constitute a "signal".[57]

69 However, according to the Defendant, the plain and ordinary meaning of the word "signal" refers to an indicator that *conveys data or information* about the corresponding behaviour or attribute of some phenomenon, material or physical process, and *not* the physical process itself. Therefore, signal cannot be the transmission of electrical power only.[58]

---

55 Transcript 3 August 2016 66:11-15

56 Transcript 3 August 2016 70:12-13

57 Transcript 3 August 2016 78:12-19

70 In my view, the plain and ordinary meaning of the word "signal", read in the context of the Patent in Suit, entails a conveyance of *information about* the voltage; it is insufficiently captured by the passing of *voltage* (electrical power) *itself*. This construction is supported by the wording of Claim 1, which states that "the ignition monitor provid[es] [a] means to send a *signal* to the system controller on detection of an *ignition voltage*" [emphasis added].[59] In this light, the information that is passed by the "signal" referred to in Claim 1 is that a voltage of between 10 to 15 volts has been detected. Consequently, the camera can be powered up.

71 This construction of the term "signal" is also evident when I take into account another part of the specification, which states (with reference to Figure 1 at [63] above) that upon sudden deceleration exceeding a threshold value, the impact sensor, via output 8, will send a "signal" to the system controller unit 1 and standby power supply 4.[60] This "signal", as used in this part of the specification, is *not* triggered as a result of the detection of voltage or electrical power, but from the *deceleration* of a vehicle. It conveys *information* that an accident (evidenced by sudden braking or deceleration) has occurred, such that the camera can continue recording for a fixed interval and then be switched off. The word "signal" must, in the absence of evidence to the contrary, be presumed to be used consistently across the specification to refer to the conveyance of *information* about certain phenomenon (such as ignition or deceleration), rather than the mere transmission of power.

---

58 AB 495-496; Defendant's submissions paras 30-31

59 AB 123

60 AB 120 lines 1-9

72 That said, I note that the distinction between transmission of power and sending a signal may not always be easy to apply as the two concepts may be closely related. When a light switch is turned on in a dark room, this is nothing more than the sending of electrical *power* to turn the light bulb on for the convenience of the individual. But suppose the purpose of turning on of the particular light bulb was to send a signal to an outside observer that the occupant was in a particular room? The turning on of the light bulb then becomes a *signal* as it involves the transmission of information to the outside observer by means of the light signal.

Validity of the Patent in Suit

73 Having dealt with the way that the Patent in Suit is to be construed, I move on to the next substantive issue of whether the Patent in Suit is valid. For an invention to be valid and patentable, there are three conditions that need to be satisfied under s 13(1) of Patents Act:

(a) the invention is new;

(b) it involves an inventive step; and

(c) it is capable of industrial application.

74 Only (a) and (b) are in contention in the present suit. As highlighted above, the Defendant asserts that the Patent in Suit should be invalidated as it lacks novelty and inventiveness.

Novelty

The legal principles

75 Section 14(1) of the Patents Act states that "[a]n invention shall be taken to be new if it does not form part of the state of the art." Section 14(2) defines the "state of the art" broadly as:

> …compris[ing] all matter (whether a product, a process, information about either, or anything else) which has at any time before the priority date of that invention been made available to the public (whether in Singapore or elsewhere) by written or oral description, by use or in any other way.

76 It has been said that an assessment of novelty involves a two-step process: see *Ng-Loy* ([52] *supra*) at para 30.1.25.

77 First, all the relevant pieces of prior art must be identified. In this case, it is not disputed that D1 to D5 (see [18] above) are prior art. The second step is to ask whether the invention has been anticipated by any of these pieces of prior art. While the two-step approach is broadly correct, embedded within the two-steps is the vital task of interpretation.

78 In *The General Tire & Rubber Company v The Firestone Tyre and Rubber Company Limited and others* [1972] RPC 457 (*"General Tire*"), the English Court of Appeal held (at 483) that the earlier publication (the prior art) must be interpreted as at the date of its publication, having regard to the relevant surrounding circumstances then existing, and without regard to subsequent events. The patent claims must also be interpreted to determine the scope of the matter covered at its relevant date. In both cases, the interpretation is from the perspective of the reader skilled in the art having regard to the state of knowledge at the relevant date.

79 It follows that the quantity of prior art material that may be available in determining novelty is potentially enormous. There are no temporal (going backwards from the priority date) or geographical limits on the material that is available. It comprises all matter made available at any time before the priority date to the public whether in Singapore or elsewhere. It does not matter whether the "making available" is by description or use or in some other manner. The size of the disclosure does not matter. Even if the matter has been made available to one person, if it is free from any obligation of confidentiality, it will generally be regarded as having been made available to the public. Further, the requirement of disclosure to the public is satisfied if it has been made available in the public domain, even if no one has inspected it: see *Ng-Loy* ([52] *supra*) at para 30.1.29, citing *Institut Pasteur and Another v Genelabs Diagnostics Pte Ltd and Another* [2000] SGHC 53 at [188] and *Dien Ghin Electronic (S) Pte Ltd v Khek Tai Ting (trading as Soon Heng Digitax)* [2011] 3 SLR 227 at [29].

80 While a bright line approach has been taken to *when* material or matter enters the prior art, it is clear the claimed invention is only anticipated if the prior art reveals the same thing. The fact that the prior art taught something close or similar is not enough to constitute anticipation. In mountaineering terms, the fact that a previous climber got to within 100 feet of the summit of an unclimbed peak is close but not close enough. The prior art climber must have planted the flag at the very summit in question.

81 An oft-cited test to determine anticipation is the so-called "would it infringe" test. Does the prior art in question infringe the patent claim in question? If it does, there is every reason to conclude the patent claim lacks novelty. To infringe, all the essential elements of the claimed invention

(properly interpreted) must have been usurped. Transposed into the novelty inquiry, the question is whether the prior art matter or material in question already discloses all the essential elements of the claimed invention.

82 I pause to note that the relationship between disclosure and enablement concepts was discussed at some length by Lord Hoffmann in *Synthon BV v SmithKline Beecham Plc's (Paroxetine Methanesulfonate) Patent* [2006] RPC 10 ("*Synthon BV*"). In the case of disclosure, Lord Hoffmann summarised (at [22]) that the prior art must *disclose* a subject matter which, if performed, would necessarily result in an infringement of the patent (see also *Mühlbauer* ([32] *supra*) at [17], citing *General Tire*).

83 Lord Hoffmann continued (at [26]) that enablement, on the other hand, meant that the ordinary skilled person would have been able to perform the invention which satisfies the requirement of disclosure. The key point made was that for the claimed invention to be anticipated by the prior art, the prior art must not only disclose the same subject matter; it must also enable the notional skilled reader to perform (or make) the invention. The case relied on for this proposition was the decision of the House of Lords in *Asahi Kasei Kogyo KK's Application* [1991] RPC 485. In that case, on assumed facts, there had been a prior disclosure of the same invention (a polypeptide) but neither the disclosure nor common general knowledge would have enabled the notional skilled reader to make it. *Susanna Leong* ([55] *supra*) at para 16.141 correctly cites *Synthon BV* as underscoring the point that disclosure and enablement are distinct concepts. Each must be satisfied to conclude that the alleged invention forms part of the state of the art.

84 In Singapore, the leading authority is the Court of Appeal decision in *Mühlbauer* ([32] *supra*). Phang JA noted (at [17]) that the prior publication must not only identify the subject matter of the later patent, but must also set out an *enabling* disclosure. In other words, an invention "would be anticipated by a piece of prior art if the teachings disclosed in this prior art *are sufficiently clear and complete to allow [*ie*, enable] the skilled addressee to make the invention*" [emphasis in original] (see *Ng-Loy* ([52] *supra*) at para 30.1.43). It is clear that the reference to enabling disclosure is consistent with the distinction referred to above between disclosure and enablement.

85 I also note that it is generally *not* permissible, in the context of an assessment of novelty, to assemble all the pieces of prior art together into a "mosaic", and then compare the invention in question against this "mosaic". The invention must instead be compared against each *individual* piece of prior art, and the question repeated each time: has this particular piece of prior art anticipated the invention? (*Mühlbauer* ([32] *supra*) at [68] and *Ng-Loy* ([52] *supra*) at para 30.1.38)

86 In the present case, counsel for the parties have produced a joint table ("Table of Disputes on Invalidity") which analyses the issue of novelty by comparing the elements of each of the claims in the Patent in Suit against each of the prior arts, D1 to D5. However, it is clear from the pleadings, and even at trial, that only D3 is used by the Defendant to invalidate the claims of the Patent in Suit.[61] I will, therefore, focus on D3 in my analysis of the issue of novelty.

---

[61] DCC-4 paras 6, 13-14; Particulars of Objection against Patent No 87795 (Amendment No 2) para 26; Plaintiff's Second Invalidity Opinion AB 412 line 32; Transcript 2 August 2016 94:12-22

Prior art D3

87 D3 is a patent which relates to a camera that can be mounted on a vehicle, and which enables the causes of an accident to be verified by means of photographs of the surroundings. The main claim[62] states that it is:

> A method for enabling the causes of an accident involving a vehicle to be verified, comprising the obtaining..., following vehicle start or after an *enabling signal*..., of images of the environment in which said vehicle is in a stationary or moving state, *memorizing... said images* while the vehicles is moving or until a halt-memorization signal is generated..., said memorizing in any event *ceasing within a predetermined time period* subsequent to a collision undergone by the vehicle while *retaining in memory* the images obtained up to that time, these images being able to be subsequently viewed to verify the causes of said collision.
>
> [emphasis added; references to numbers in diagrams omitted]

88 According to the Defendant, "[a]ll features of the independent Claim 1 of the Patent [in Suit] have been disclosed by D3". This is because D3 discloses a recording system for installation in or on a vehicle. The recording system comprises a system controller, at least one optical recorder, at least one sensor and an ignition monitor. D3 also discloses at least one collision sensor which sends a signal to the system controller on detection of deceleration or impact. The system controller then provides the means to switch off at least one optical recorder after a fixed time interval after receiving the sensor signal.[63]

89 I will now examine some of the key aspects of D3 as compared to various elements of the claims in the Patent in Suit.

---

62 AB 52

63 Particulars of Objection against Patent No 87795 (Amendment No 2) paras 26-29

Claim 1: The system controller, optical recorder, sensor and ignition monitor

90 It will be recalled that Claim 1 of the Patent in Suit relates to:

> A recording system, for installation in or on a vehicle, comprising a *system controller*, at least one *optical recorder*, at least one *sensor* and an *ignition monitor*, the ignition monitor *providing means to send a signal to the system controller on detection of an ignition voltage*, the system controller being connected to the at least one optical recorder to switch on operation thereof on receiving said ignition monitor signal, wherein the at least one sensor is provided to send a signal to the system controller on detection of a deceleration or impact, the system controller providing means to switch off the at least one optical recorder after a fixed interval after receiving the sensor signal.
>
> [emphasis added]

91 The Plaintiff concedes that D3 is a recording system for installation on a vehicle, that D3 consists of a system controller (which is termed the "control unit"), and that D3 has at least one optical recorder (the "telecamera") and at least one sensor (the "collision sensor").[64]

92 The main disagreement between the parties is whether D3 "implicitly discloses" an "ignition monitor",[65] which provides the means to send a signal to the system controller on detection of an ignition voltage.

93 Referring to Figure 2 below, the relevant part of the specification in D3 states:[66]

> …the vehicle ignition key 29 is known to be able to assume *two different positions*, namely a *vehicle rest position (S)* or a *vehicle operation-enabling position (M).* When in this latter

---

64 Plaintiff's submissions para 42; see also Table of Disputes on Invalidity

65 Particulars of Objection (Amendment No 2) para 27

66 AB 44

> position… it *closes a mechanical contact 30* in a first electrical power branch 31 connecting the device of the invention to a usual vehicle battery 32. Parallel to the electrical branch 31 but connected to the same pole of the battery 32 as this latter branch there is another power branch 33 in which there is a mechanical contactor 34, which is open when the key 29 is in the position M. This power branch… 33… is also connected to a timer relay 35 arranged to operate on a mechanical contactor 36… The contactor 36 is normally open… when the key 29 is in the position M. … [T]here is [also] a mechanical contactor 41 controlled by a relay 40 connected to the power branch 31 downstream of the contactor 30. *The contactor 41 is normally closed when the key 29 is in position M.*
>
> *In this manner and following a vehicle start enabling signal originating from the block 28 (key 29 in position M), the contactors 30 and 41 close to power the device. …*
>
> [emphasis added]

94 In his Second Invalidity Opinion, Dr Yu, the Defendant's expert, argues (referring to Figures 2 and 3 below) that the "ignition monitor" of D3 is the ignition switch block 28 ("Block 28") with key 29 in position M. Dr Yu observes that the vehicle ignition key 29 in position M is connected to the vehicle battery 32. An "ignition monitor signal" is sent to the control unit 50 on detection of an ignition voltage of the vehicle battery 32, via relay 35 and contactor 36. For these reasons, the Defendant's position is that D3 implicitly discloses the "ignition monitor" of the Patent in Suit.[67]

---

67 AB 417 lines 10-24

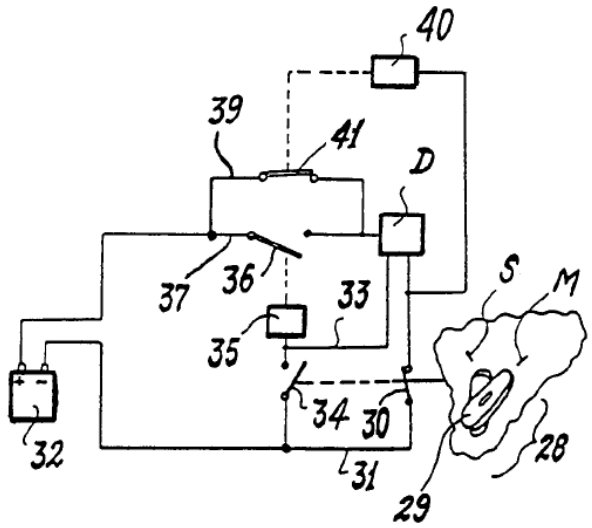


FIG. 9

Figure 2: Fig 9 of D3

Selected legend
Unit 28- Ignition switch block
Unit 29- Ignition key
Unit 30- Mechanical contactor
Unit 31- Power branch
Unit 32- Vehicle battery
Unit 33- Power branch
Unit 35- Timer relay
Unit 36- Mechanical contactor
Unit 40- Relay
Unit 41- Mechanical contactor

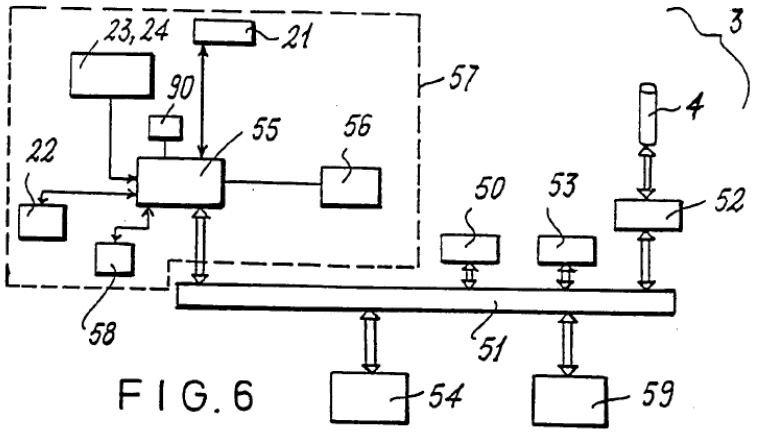


Figure 3: Fig 6 of D3

Selected legend
Unit 50- Control unit
Unit 59- Clock generator

95 The Plaintiff's position is that the Defendant's analysis is flawed for two main reasons:

(a) First, D3 neither explicitly nor implicitly discloses an ignition monitor. Block 28 is only a simplified version of a vehicle ignition block, *ie*, the part of the vehicle where the vehicle key would be inserted in order to turn on the vehicle, as evidenced by Claim 20 of D3.[68] Its function is simply to enable the vehicle to start, after key 29 is turned from position S (vehicle rest position) to position M (vehicle operation-enabling position).[69] Block 28 does not represent a

---

68 Plaintiff's submissions para 45(c) and (d); AB 43 line 32 to AB 44 line 4; AB 54 line 27

69 AB 44 lines 8-9

conventional ignition switch of a car, which typically has four (instead of only two) positions.[70]

(b) Second, Block 28 (with key 29 in position M) does not have the characteristics of the "ignition monitor" of the Patent in Suit. It does not have the ability to "monitor the amplitude of the DC voltage in the ignition system" or to detect a DC voltage in excess of a threshold value. It simply acts as a *switch to close a circuit*.[71] Further, a signal is not sent to the "system controller" 50. Even if a "signal" is sent in the form of the "start enabling signal", this merely results in a mechanical closing of contactors 30 and 41, when the ignition key is brought to the position M, so as to mechanically power the device.[72]

96 Having carefully considered the parties' arguments, I now set out my findings.

97 It will be recalled that the ignition monitor of the Patent in Suit, with reference to Figure 1 above ([63] *supra*), is described as follows:[73]

> An input 6 of the ignition monitor unit 2 is connected to the ignition system of the vehicle, which is connected to the vehicle's battery… An output 7 of the ignition monitor unit 2 is connected to an input 12 of the system control unit 1. *The ignition monitor unit 2 monitors the amplitude of the DC voltage in the ignition system.* When the unit 2 detects a DC voltage in excess of a threshold value [preferably between 10 and 15 volts], i.e. when the vehicle's ignition system is activated to start the vehicle, *a signal is sent from output 7 to the system control unit 1.*

---

70 AB 367-370

71 Plaintiff's submissions para 46(a)

72 Plaintiff's submissions paras 46(b) and (c)

73 AB 117 lines 16-21

[emphasis added]

98 It is clear from the extract of the specification above that there are two functions carried out by the ignition monitor (the "dual functions"). The first function is to monitor or detect ignition voltage, that is, voltage emanating from the ignition system. Once an ignition voltage in excess of the threshold value (between 10 and 15 volts) is detected for a period greater than five seconds, the ignition monitor serves its second function, which is to transmit a signal, conveying the information that the ignition system has been switched on, to the system controller. It is not immediately apparent why the ignition monitor requires five seconds or more of the required voltage value before it sends the signal to the system controller.

99 Viewed in this light, a few observations may be made. First, Block 28 of D3 (with key 29 in the M position) does not "monitor" the voltage originating from the ignition system. I agree with the Plaintiff that Block 28 is simply a vehicle ignition block. Its function is to enable the vehicle to start, when key 29 is turned from position S (vehicle rest position) to position M (vehicle operation-enabling position). When this happens, Block 28 is the very *cause* of the vehicle ignition, and hence the ignition voltage; it does not "detect" the ignition voltage. Second, the "start enabling signal" which is sent by Block 28 simply causes the completion of the electronic circuit 3 by closing contactors 30 and 41; this is a mechanical process. Significantly, when the contactors 30 and 41 close, the camera is powered *directly*.[74] Although contactors 30 and 41 are in the electronic circuit 3, which also contains the control unit 50, it does not appear that any signal is sent from Block 28 *to control unit 50*, before another output is transmitted from the control unit 50 to

[74] AB 44 last paragraph

the telecamera 4 to power it up. This can be contrasted with the second function of the ignition monitor of the Patent in Suit, in which it is expressly stated that the ignition monitor proves a means to send a signal *to the system controller* on detection of an ignition voltage. The system controller is in turn connected to a camera. Upon receiving the said ignition monitor signal, the system control unit is the one that supplies power to the camera via an output.

100 For these reasons, I am of the view that Block 28 (with key 29 in position M) in D3 is *not* the same as, and does not implicitly disclose, the dual-function "ignition monitor" referred to in Claim 1 of the Patent in Suit. I am of the view that Claim 1 is not anticipated by D3.

The "dependent claims"

101 Turning to Claims 2 to 8, I note the Plaintiff's submissions simply assert that these claims are "dependent" on Claim 1. Once it is found that Claim 1 is novel, the Plaintiff submits that it must follow that Claims 2 to 8 are also novel.[75]

102 The Defendant makes the converse argument that since Claims 2 to 8 are dependent claims, if Claim 1 is invalid then Claims 2 to 8 must all be invalid.[76]

103 However, I note that "dependent claim" or "subsidiary claim" does not appear anywhere in the Patents Act or the Patents Rules (Cap 221, R1, 2007 Rev Ed). Neither does the term "independent claim" feature in the legislation.

---

75 Plaintiff's submissions para 48

76 Defendant's submissions para 18

Indeed, these expressions are not even found in the claims and specification of the Patent in Suit. Thus, what is important in this context is to focus on the words used in each claim and ask what the essential elements of the invention as set out in each claim are. The label "dependent claim" should not be used too readily without first considering the actual language of the claims. The learned authors of *Terrell on the Law of Patents* (Colin Birss gen ed) (Sweet & Maxwell, 18th Ed, 2016) at para 9-318 rightly comment that the court will, if possible, construe claims so as to give a different meaning to different claims. The learned authors also recognise that if after properly construing the specifications and claims, little or no difference can be found between two claims, this is not a reason for departing from the reasonable and natural meaning of the language.

104 I accept that it may well be correct for a court, in assessing the validity of the first or what may loosely be called the "independent claim", to obtain guidance from the "dependent claims" or "subsidiary claims" which refer back to the independent claim and incorporates all its features, as an aid to interpreting the proper scope of the independent claim. But it does not follow that the novelty of subsequent claims must *ipso facto* stand or fall on the fate of the independent claim. Much will depend on the scope of the invention as set out in the subsequent claims. The label "dependent claim" or "subsidiary claim" should not distract the court from the enquiry which it is tasked to undertake, which is whether the elements or features in the subsequent claim(s) taken together with the invention as set out in the preceding claim meet the requirements of novelty.

105 A subsequent claim may serve a variety of objectives. For example, the subsequent claim may add a new or extra feature that was not set out in the

previous claim at all. This is permissible provided the claims relate to a single inventive concept. Alternatively, it may be that the subsequent claim simply serves to clarify, limit or restrict the scope of an element referred to in the preceding claim. This may be done to restrict the prior art that is relevant, or simply to add to or improve the clarity of the claims. The subsequent claims may delineate or specifically identify a particular member of a broad class that has been set out in the preceding claim. For example, the first claim may refer to an invention with an element that is made from a "hard and rigid" material. The subsequent claim may relate to the same invention but specifically claim the element made from "tungsten". It may be desirable to tighten the subsequent claim where the preceding claim is drafted in very broad terms.

Claim 2: The standby power supply and timer switch

106 I move on to the first "dependent claim" which concerns the "standby power supply" referred to in Claim 2 of the Patent in Suit. Referring to Figure 1 above, the "standby power supply" of the Patent in Suit is described as follows:

> …if during operation of the vehicle an accident occurs, the impact sensor 3 will be triggered if the deceleration in excess of the sensor's threshold value is experienced. A signal is sent on output 8 to the system control unit 1 and the standby power supply 4. In response, the system control unit 1 switches output 11 to *turn off the main power supply* to the camera 5. At the same time, *the timer switch of the standby power supply 4 is switched on* by the signal from the impact sensor 3. *As a result power is supplied to the camera 5 for an additional 5 to 10 seconds after the termination of the main power supply from the system control unit 1.*[77]
>
> [emphasis added]

---

[77] AB 121 lines 11 - 23

107 In the specification of D3, there is reference to a "buffer battery" which is described, by reference to Figure 4 below, as follows:

> ... Between the branches 101 and 102 there is a branch 100A in which there is a *buffer battery 103... to maintain the device D powered... even after a collision which damages the vehicle electrical installation.*[78]
>
> [emphasis added]

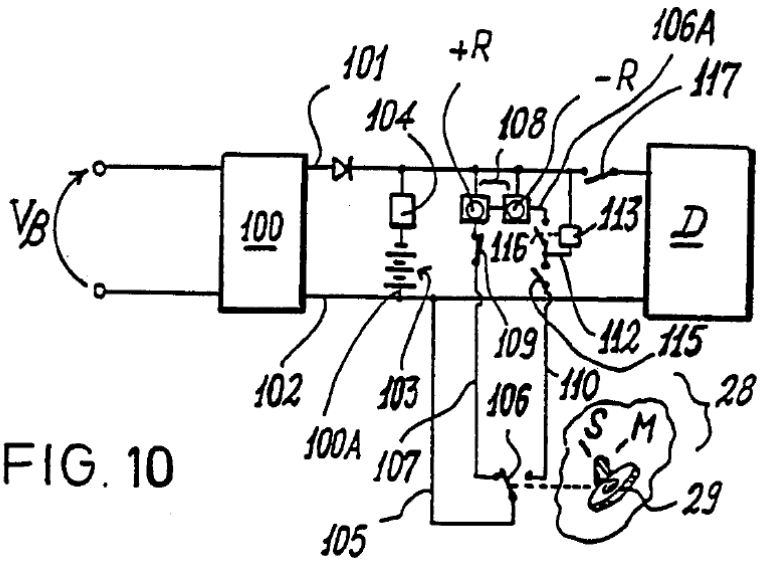


FIG. 10

Figure 4: Fig 10 of D3

Selected legend
Unit 29- Ignition key
Unit 103- Buffer battery

108 The Defendant argues that the buffer battery 103 is clearly the "standby power supply" in the Patent in Suit. Further, referring to Figure 3 at [94] above, the clock generator 59 fulfils the meaning of a timer switch, as it provides timing for the control unit 50.[79]

---

[78] AB 45

[79] AB 418 lines 11-21; Transcript 4 August 2016 102:5-8

109 The Plaintiff, however, takes the position that buffer battery 103 is not a "standby power supply" but a "power supply backup".[80] In this respect, the Plaintiff makes two submissions. First, he argues that the standby power supply of the Patent in Suit is deliberately designed to be *automatically activated* upon the detection of a suitably strong collision or deceleration, as the main power supply would be turned off in such an event. The camera would be immediately powered by the standby power supply for a fixed interval after the accident or deceleration. In contrast, the buffer battery 103 of D3 operates *only if* the connection with the vehicle battery is interrupted following a collision. If there is no disruption to the vehicle battery following an accident, the buffer battery 103 is not envisaged to operate. Second, the Plaintiff points out that unlike the Patent in Suit, there is no timer switch connected to buffer battery 103 of D3, and D3 would technically continue to operate as long as the buffer battery provides sufficient power.[81]

110 Before coming to my findings on this element of the claim, I first note that there is some confusion as to whether the term "buffer battery" used in two different parts of the specification of D3 refer to the same component. The first time the term is used in the specification of D3 has been outlined at [107] above. The second part of the specification which again mentions the term is, referring to Figure 3 at [94] above, as follows:[82]

> A clock generator 59 is also connected to the bus 51 to provide timing for the unit 50. … [I]n other words the generator 59 acts as a clock-calendar and is provided with *its own buffer battery*. It enables the date on which the images were obtained to be exactly defined…

---

80 AB 670

81 Plaintiff's submissions paras 49(b)-(d)

82 AB 48

[emphasis added]

Dr Yu, the Defendant's expert, stated at trial that the two terms refer to the same component.[83]

111 With respect, I disagree with Dr Yu's view that the "buffer battery" highlighted at [107] above is the same as the "buffer battery" outlined at [110], even though the same term is used. From a careful reading of the term in the context of the specification, the former refers to the buffer battery of *D3 itself* and is labelled "103" in Figure 4 (at [107] above). By contrast, the latter refers to the "*clock generator 59['s]… own [separate] buffer battery*". For the purposes of examining this element of Claim 2, I will focus on the term "buffer battery*" of D3*, as used at [107] above.

112 I move on to the parties' substantive arguments. First, although I agree that the "buffer battery" 103 in D3 and the "standby power supply" in the Patent in Suit come into operation differently, I am of the view they nonetheless have the same purpose and perform the same function of providing backup battery supply to the camera in the event of an accident. In my judgment, the buffer battery 103 discloses a "stand-by power supply" within the ambit of Claim 2 as interpreted by the notional skilled reader. I also accept that it provides an enabling disclosure that sufficiently discloses all that is necessary for the skilled reader to make the invention of the "standby power supply" in the Patent in Suit, which directly and immediately supplies power to the camera in the event of an accident.

---

[83] Transcript 4 August 2016 104:14-17

113 Second, I am unable to agree with the Defendant's argument that the "timer switch" referred to in the Patent in Suit is equivalent to the clock generator 59 of D3. In my view, it is clear that clock generator 59 serves a different function from that of the timer switch of the Patent in Suit. Clock generator 59 enables the images or data captured by telecamera 4 to be allotted a date and time, *ie*, it acts as a clock calendar (which has its own buffer battery in the sense described in [110] above). As explained in D3's patent specification, this enables the date on which the images were obtained to be exactly defined together with their exact succession in time, in order to define accident causes and responsibilities.[84] By contrast, the timer switch in the Patent in Suit is used to supply standby power to the camera for a fixed period of about five to ten seconds after termination of the main power supply. The purpose of the timer switch in the Patent in Suit is different: it is to ensure that the recorded pictures cover the period before and immediately after any accident (and will not be overridden). Thus, clock generator 59 does not set out a "disclosure" which unmistakeably instructs the reader to make the timer switch as referred to in the Patent in Suit.

114 Nonetheless, it seems to me that relay 35 in D3 discloses the feature of a timer switch as described in the Patent in Suit, although this was not argued by either party. According to the specification of D3, following vehicle stoppage, for example after an accident, the contactor 34 is closed and relay 35 sets a defined time period in which contactor 36 is closed. Consequently, during the moments following vehicle stoppage, the device is operative, and is able to memorise the images obtained by telecamera 4, until relay 35 opens the contactor 36 after the defined time period to interrupt the connection to the

---

[84] AB 48

battery 32, switching off the camera.[85] Relay 35 therefore sets out, in my view, a "disclosure" which enables the making of the timer switch referred to in the Patent in Suit.

115 For these reasons, I am of the view that the *added elements* of Claim 2 of the Patent in Suit (a standby power supply and a timer switch) are, in and of themselves, not novel. However, I note that Claim 2 and Claim 1 are clearly linked, in that the additional features in Claim 2 relate to the same invention in Claim 1 (in respect of which the ignition monitor is an essential feature). The fact that the prior art discloses the concepts of a standby power supply and a timer does not affect novelty of the invention as set out in Claim 1. In this regard, since Claim 2 comprises the same device as Claim 1 (albeit with added features), the invention set out in Claim 2 is also new as a whole.

Claim 3: The internal memory store

116 In the present case, Claim 3 covers a "recording system as claimed in claim 1 or claim 2 wherein the at least one optical recorder is provided with an *internal memory store*" [emphasis added]. This adds a feature to that outlined in Claim 1. The internal memory store is in itself anticipated by D3, which contains two internal memory stores, 54 and 60 (see Figure 5 at [118] below), and is therefore not novel. However, given my finding that the invention as set out in Claim 1 is novel, it must follow that the invention as set out in Claim 3 is also novel. This is because the invention in Claim 3 is the same invention in Claim 1 together with the specific reference in Claim 3 to the invention in Claim 1 containing an optical recorder with an "internal memory store".

---

[85] AB 44

Claim 4: The separate memory store

117 Claim 4 of the Patent in Suit relates to a recording system as claimed in Claim 1 or Claim 2, wherein at least one optical recorder is connected *to a separate memory store*.[86] The specifications teach that more than one camera may be used. Each camera may have its own internal memory or the cameras may be linked to a single separate memory store.

118 Referring to Figure 5 below, the Defendant argues that telecamera 4 in D3 is connected to memory 60, which is the separate memory store. Further, the specification of D3 also refers "other memory supports external to the device, for example to enable the images to be viewed".[87]

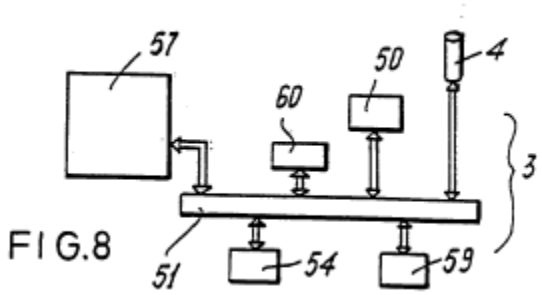


Figure 5: Fig 8 of D3

Selected legend
Unit 54- Memory
Unit 60- Memory

119 The Plaintiff takes a different position. He contends that memory 54 or 60 of D3 are *internal* memory stores, and any reference to a *separate* memory

---

86 AB 123 lines 28-30; AB 119 lines 29-31

87 AB 418; AB 49

store in D3 only refers to the ability for the recordings, which are stored in the internal memory store, to be transferred out of the device D3.[88] I note that the specifications for D3 clearly and explicitly state that the memory store (whether 54 or 60) is to be sufficient to enable the recordings to "be *transferred* onto other memory supports external to the device…"[89] [emphasis added]

120 If "separate memory store" means (from the perspective of the notional skilled reader) an external memory store, as distinct from and additional to the internal memory, the fact that D3 discloses an *internal* memory store does not disclose exactly the same subject matter. The question is whether D3 nonetheless discloses clear directions to make available an external memory store to enable the "memorised" images to be viewed. In my judgment, the presence of an internal memory store in D3, with the possibility of transferring data from the internal to an external storage medium, contains clear and complete directions to enable the Plaintiff to make a device with a separate external memory store altogether. It bears repeating that the notional skilled reader is tasked with interpreting the D3 at the date of its publication: 11 January 1996.[90]

121 Overall, therefore, I am similarly of the view that although the additional feature of Claim 4 (the separate memory store) is not novel in and of itself, the additional feature relates back to the main Claim 1. Because

---

88 Plaintiff's submissions para 50

89 AB 49

90 AB 39

Claim 4 comprises the same device as Claim 1 (albeit with an additional feature), the invention set out in Claim 4 is also new overall.

Claims 5, 6, 7 and 8

122 Claim 5 refers to a recording system as set out in any of the preceding claims wherein at least one sensor is an "accelerometer". Claim 1, while referring to (at least one) "sensor", did not specify what the sensor is. Instead, it described the sensor in terms of its *function*, which was to detect deceleration or impact.[91] All that Claim 5 does is to label the sensor as an "accelerometer". While it may be thought that the specific reference to an "accelerometer" adds nothing to Claim 1, it does at least make expressly clear what was already implicit in Claim 1. The same is true for Claim 6 which refers to at least one sensor being an "impact detector".

123 Claim 7 refers to a recording system as set out in any of the preceding claims wherein at least one optical recorder is a "digital camera". Claim 8 is similar, save that it requires at least one optical recorder to be a "digital camcorder". In the same vein as Claims 5 and 6, Claims 7 and 8 add clarity or specificity to a key element in Claim 1 that the recording system must have at least one optical recorder. Claims 7 and 8 make clear that a "digital camera" and a "digital camcorder" are covered within the framework of the recording system and the claimed invention.

Conclusion on novelty

124 In summary, Claim 1 of the Patent in Suit is novel and not anticipated by D3. The subsequent Claims 2 to 8 are also novel. Although the additional

[91] AB 123 lines 5-13

features set out in Claims 2, 3 and 4 (the standby power supply, the timer switch and the memory stores) are not novel in and of themselves, when analysed in light of the novel Claim 1 to which they relate to and incorporate, these claims are novel as well.

Inventive step

The legal principles

125 The next main issue is whether there is an "inventive step" embodied in the invention of the Patent in Suit. The four-step test in *Windsurfing International Inc v Tabur Marine (Great Britain) Ltd* [1985] RPC 59 was applied and summarised as follows in *Mühlbauer* ([32] *supra*) at [20]:

> (a) Identify the inventive concept embodied in the patent in suit.
>
> (b) The court then assumes the mantle of the normally skilled but unimaginative addressee in the art at the priority date, imputing to him what was, at that date, common general knowledge in the art in question.
>
> (c) Identify what, if any, differences exist between the matter cited as being "known or used" and the alleged invention.
>
> (d) The court then asks itself the question whether, viewed without any knowledge of the alleged invention, those differences constitute steps which would have been obvious to the skilled man or whether they require any degree of invention.

Reference should also be made to s 15 of the Patents Act, which states that "[a]n invention shall be taken to involve an inventive step if it is *not obvious* to a person skilled in the art, having regard to any matter which forms part of the state of the art…" [emphasis added].

126 As VK Rajah JA observed in *First Currency Choice* ([50] *supra*) at [44], the first three steps of this test lay the ground work for the final critical

question of *non-obviousness*: is the alleged invention obvious in the eyes of the notional skill reader? As discussed earlier, while the court is often assisted in the assessment of obviousness by experts, the ultimate decision on non-obviousness is one of fact, impression and judgment which only the court can answer.

127 The answer to the question of what the claimed inventive step is will naturally shape the Court's assessment of whether the invention is obvious. In this regard, the invention being examined is that which is set out in the claim in question.

128 The decision of the UK House of Lords in *Conor Medsystems Incorporated v Angiotech Pharmaceuticals Inc* [2008] UKHL 49 ("*Conor Medsystems*") illustrates the importance of defining the claimed invention by reference to the claims in the assessment of inventive step. The patent concerned a stent coated with taxol for treating or preventing recurrent stenosis. A stent is tubular metal scaffold inserted into a blocked artery to keep the artery open. The prior art revealed a serious problem, namely, the injury caused by the insertion of the stent to the inner walls of the artery. This often resulted in an excessive healing response, resulting in proliferation of new tissue which unfortunately would constrict the arterial channel. This problem was referred to as restenosis. This was apparently a common problem and "no one knew what to do about it" (at [5]). It was said that one group of Dutch scientists even published an article in 1993 entitled: "Pharmacological Approaches to the Prevention of Restenosis Following Angioplasty: The Search for the Holy Grail?"

129 The prior art suggested a number of possible avenues for research. One view was that the proliferation of tissue may be similar to proliferation of cells in a cancer tumour. On this basis, treatment by anti-proliferative drugs was a possible research path. A different view favoured use of antithrombotic agents such as heparin.

130 In 1991, a medical researcher who was studying angiogenesis (the process by which capillary blood vessels grow) came up with the idea that one approach to the undesired cell proliferation was to inhibit angiogenesis. This was because most cell tissues are unable to proliferate without blood supply. The researcher (together with others) decided to try to find an anti-angiogenic agent which could be used to inhibit tissue growth in restenosis. To this end, they used standard assay tests to look for substances with anti-angiogenic properties. In 1993, the team tested a recently discovered substance called taxol. Taxol was, at that time, in the news as a possible cancer treatment because of its anti-proliferative properties. The team discovered that taxol had remarkable anti-angiogenic properties. Stents coated with even minute amounts of taxol were effective against restenosis and were a "great commercial success". The Holy Grail, at least in this context, had been found.

131 The question was whether the invention was obvious. Lord Hoffmann held (at [17]) that it is "the claimed invention which has to involve an inventive step. The invention means *prima facie* that specified in the claim..." Lord Hoffmann also states (at [19]) that the patentee was entitled to have the question of obviousness determined by reference to his claim and not "to some vague paraphrase based upon the extent of his disclosure in the description". The claim was for a stent coated with taxol. The question was therefore whether *that invention as embodied in the claim* involved an inventive step.

The alleged inventiveness lay in the claim that the product would have a particular property, namely, to prevent or treat restenosis. That being so, Lord Hoffmann held (at [17]) that the question of obviousness was whether it was obvious to use a taxol-coated stent for this purpose.

132 In answering this question, Lord Hoffmann stressed (at [17]) the importance of not conflating the obviousness question with questions relating to sufficiency or support. The question was whether it was obvious to make a stent coated with taxol. The question was not whether it was obvious that taxol might have the desired effect or was worth trying. As Lord Hoffmann explained (at [16]), "[i]t was common ground that taxol was, like many other anti-proliferative drugs, worth a try. And that was obvious." With respect to the question of whether it was obvious to make a stent coated with taxol, there was conflicting expert opinion. One expert gave evidence that he would have recommended the researchers to try taxol as it was at the time a highly publicised new drug for cancer. Another expert stated that he would have advised against taxol, on account of its toxic properties (at [14]).

133 In Lord Hoffmann's view, the cited prior art merely taught that the solution may lie in a large and undifferentiated number of drugs which *could* be tried. This was not the point. Bearing in mind the claimed invention, the question was whether the prior art showed that it was obvious that taxol *would* prevent restenosis (at [41]). Lord Hoffman then referred (at [42]) to Diplock LJ's judgment in in *Johns-Manville Corporation's Patent* [1967] RPC 479 that a test for obviousness based on the idea of something being obvious to try was only useful in a case where there was a fair expectation of success. Indeed, Lord Hoffmann concludes that a test for obviousness based on whether it was obvious to try it *without any expectation of success* was "an

oxymoronic concept" which had no precedent in the law of patents. To put it another way, if the prior art teaches many paths one of which might lead to the solution, the obvious thing to do will be to try all those paths. A decision to try a *particular* path, with no (fair) expectation that this path will in fact lead to success, is inventive.

134 In the present case, the claimed invention comprises a product (a recording system for installation in vehicles) with certain defined features. These features include a dual-function ignition monitor which detects an ignition voltage and which also sends a signal to the system controller. While the invention comprises a number of other features, it is apparent from the specifications that the concept of using an ignition monitor is central to the claimed invention. Following *Conor Medsystems*, the question is whether the notional skilled reader would, at the priority date of the Patent in Suit, have found it obvious to make a product with the ignition monitor (as conceptualised and defined in the Patent in Suit), given the stated purpose of recording visual data leading up to and during a dangerous situation involving sharp braking or an accident.

135 Before I turn to consider the prior art, I note that unlike the assessment of novelty, mosaicing is permitted when assessing whether the invention constitutes an inventive step, unless mosaicing itself would not be obvious to the hypothetical skilled person: *Mühlbauer* ([32] *supra*) at [93]. The notional skilled person assesses the obviousness of an invention by reference to the *whole of the state of the art* relevant to the invention. (including common general knowledge). The "mosaic" is one which is "put together by an unimaginative man with no inventive capacity": *Technograph Printed Circuits*

Ltd v Mills & Rockley (Electronics) Ltd [1972] RPC 346 at 355, cited in *Mühlbauer* at [93].

136 In this case, I find that the notional skilled reader who has access to the whole prior art would have regard to the various pieces of prior art cited against the invention in the Patent in Suit. The cited prior art essentially concern systems involving "in vehicle" cameras. In my judgment, the notional skilled person would not find it too far-fetched to mosaic these pieces of prior art to form a considered view of the state of the art (see *Mühlbauer* ([32] *supra*) at [94]). To recap, the pieces of prior art cited may be summarised as follows:

(a) D1, a patent relating to an "audio visual video tape recording system mounted in or on a land vehicle" and which is "automatically activated when the ignition is turned 'ON' to record events forward and rearward simultaneously".[92]

(b) D2, a patent entitled "Car Cam" in which a "typical application [is] the use of the device to document automobile accidents".[93]

(c) D3, a patent has been referred to already in some detail above (see [87] for a fuller description).

(d) D4, a patent entitled "Apparatus for Video-Recording Fortuitous Events Related to Moving Means of Any Nature".[94]

---

92 AB 10

93 AB 15

94 AB 63

(e) D5, a patent which relates to a "vehicle accident recording system employ[ing] a digital camera connected to a controller, a non-volatile memory, and an accident-sensing interrupter".[95]

137 The Defendant does not provide a detailed analysis on the inventive step said to be embodied in the Patent in Suit. It argues that its submissions in respect of novelty in respect of D3 apply with equal force with respect to lack of inventive step of the Patent in Suit. In addition, the Defendant submits that D1 to D5 are in the same technical field and aim to solve similar technical problems as the Patent in Suit, and are readily available to the person skilled in the art to select and combine.[96]

138 In its Particulars of Objection (Amendment No 2), the Defendant argues that the claims in the Patent in Suit are not inventive in light of various combinations (or "mosaics") of the five prior art documents (D1 to D5) and the common general knowledge. In brief, this is because the teachings in one or more of the prior art documents make various elements of the claims obvious.[97] Slightly different combinations of the prior art and common general knowledge are produced in Annex A to the Defendant's closing submissions, but the Defendant does not explain why the "mosaicing" of those particular combinations of prior art mean that the Patent in Suit lacks inventive step.

139 The Plaintiff, on the other hand, in his closing submissions, mainly focuses on the ignition monitor in Claim 1, which he claims is absent in each of the prior art documents. The Plaintiff focuses on what I have termed the

95 AB 83

96 AB 420; Defendant's submissions paras 61-62

97 Particulars of Objection against Patent No 87795 (Amendment No 2) pp 2-8

"dual functions" of the ignition monitor (see [98] above) as set out especially in Claim 1. It is not the Plaintiff's position that the inventive step lies in the ignition monitor being *connected to the vehicle ignition system*. To recap, these two functions are namely, (i) the ability to *monitor/detect* ignition voltage (voltage produced by the ignition system); and (ii) the ability to send a signal to the system controller. The Plaintiff submits that because of the absence of an ignition monitor in each of the prior art, Claims 2 to 8, which are dependent on Claim 1, are inventive and thus valid.[98] The Defendant does not dispute that D2 and D4 do not have ignition monitors but argues that a component equivalent to an ignition monitor exists in each of prior arts D1, D3 and D5.

Prior art D1

140 D1 relates to an audio-visual video tape recording system to be used in or on a land vehicle. The system is automatically activated when the ignition switch is turned on by the operator, after which the forward and rearward cameras will switch on. Both cameras then record all audio and visual events at the front and rear of the vehicle within the scope of their reception simultaneously.[99] I pause to underscore that unlike the Patent in Suit where the ignition monitor waits five seconds after detecting the required voltage before sending the "turn on" signal to the system controller, the camera in D1 is automatically activated and switched on (immediately) when the ignition switch is turned on.

---

98 Plaintiff's submissions paras 58-67

99 AB 13-14

141 Dr Yu, the Defendant's expert, argues that the ignition switch in D1 is in effect an ignition monitor as described in the Patent in Suit.[100] The ignition switch 5 in D1, referring to Figure 6 below, is described as follows in the patent specification:

> ...the operator turns on the ignition switch **5** thereby energizing the forward camera **14** and the central recording unit **4** through the forward signal transmission cable **10F** and the rearward camera through rearward signal transmission cable **10R**...

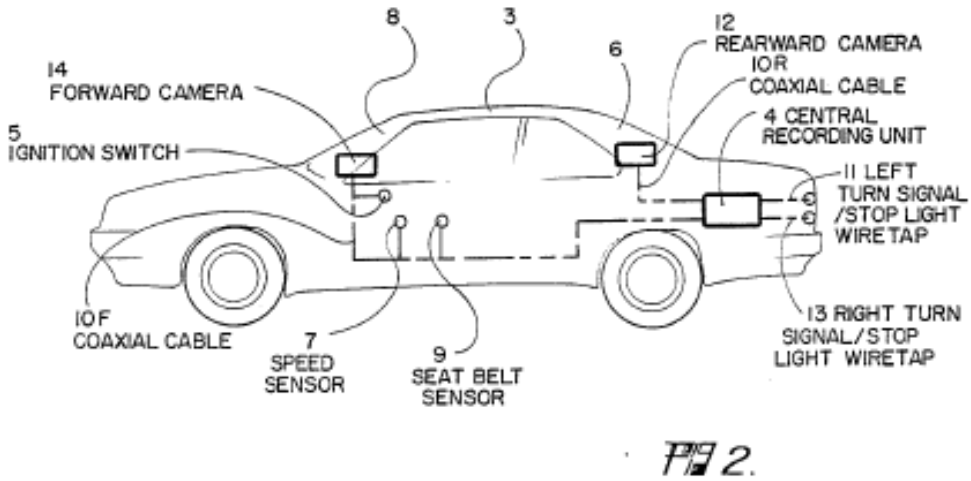


Figure 6: Fig 2 of D1

Dr Yu states that the forward and rearward signal transmission cables 10F and 10R are "coaxial cables" which, to an electrical or electronic engineer, is a "signal wire" or "signal cable".[101]

---

100 Transcript 4 August 2016 76:19-77:7

101 Transcript 4 August 2016 78:1-11; 85:22-86:1

142 The Plaintiff, on the other hand, takes the position that the ignition switch 5 in D1 simply works as a switch to close the circuit along which it is installed. It is unable to detect a DC voltage in excess of a threshold value and does not send a signal to the system control unit. In fact, in his closing submissions, the Plaintiff's position is that there is not even a system control unit in D1 (although he appears elsewise to accept that the central recording unit 4 is the system controller[102]). Instead, he argues that when the ignition switch 5 is turned on, the forward and rearward cameras are directly "energised" by way of an electrical current.[103]

143 I accept Dr Yu's opinion that a coaxial cable can be used to transmit a signal, as his unchallenged evidence is that coaxial cables have traditionally been used to transmit data to a computer.[104] Indeed, I note that the specification in D1 itself uses the words "*signal transmission* cable" [emphasis added] to describe the coaxial cables 10F and 10R in Figure 6 above.

144 Although the focus of the parties is on the dual functions of the ignition monitor, it is in my view more helpful to take a step back and examine the broader question of what the overall function of the ignition monitor (which is claimed to be the inventive step) is meant to be. In my judgment, the overall function of the ignition monitor is to enable power to be drawn directly from the vehicle's ignition system (rather than from any other source), in order to start up the camera. In this regard, the Patent in Suit is directly connected to the primary circuit of the ignition system.[105]

102 Table of Disputes on Invalidity

103 AB 11, 13-14; Plaintiff's submissions para 60

104 Transcript 4 August 2016 86:20-87:5

105 AB 114

145 However, D1 and, indeed, D3 are both connected to the ignition switch, which is part of the primary circuit of the ignition system,[106] such that power from the ignition system is also drawn, in the case of D1, directly to energise the camera, and in the case of D3, to close mechanical switches in order to turn on the camera. Further, I am also of the view that it is common general knowledge that if a device were to be connected to the ignition system, it is only viable to connect the device to the *primary circuit* of the ignition system.

146 It will be recalled that according to the Plaintiff's expert, Mr Schweiger, there are two circuits in the ignition system, a primary circuit and a secondary circuit. As stated earlier, it is dangerous for a person to attempt to interfere with the secondary circuit as it is of a very high voltage (about 2,000 to 3,000 volts).[107] It might be said that the inventiveness of the Patent in Suit is apparent in light of the opinion of Mr Schweiger, at trial, that the ignition system of a vehicle is rarely, if ever, meddled with.[108] Because the Plaintiff's invention is dependent on connecting the ignition monitor to the ignition system directly, and in contradistinction to other methods of detecting ignition (such as engine revolutions per minute ("RPM")), might it be said that he "contributes something new by showing that, contrary to the mistaken prejudice, the idea will work or is practical"? In short, he must have "shown something new" and demonstrated that the "apparent 'lion in the path' is merely a paper tiger". If so, in this way "his contribution is novel and non-obvious and he deserves his patent": *Pozzoli SpA v BDMO SA* [2007] FSR 37

---

106 AB 11, 13 and 59

107 Transcript 3 August 2016 70:12-18

108 Transcript 3 August 2016 30:25-31:22

at [27], cited in *Mühlbauer* ([32] *supra*) at [100]. The difficulty, however, in the present case is that the notional skilled reader will be aware of the dangers of connecting devices to the secondary ignition circuit. Indeed, the prior art already taught that video or image recordings devices could be powered up by connection with the primary circuit of a car ignition system. What is different is the use of the dual-function "ignition monitor" in the claimed invention whose functions have been explained above.

147 The key question is whether the requirement of the *ignition monitor* goes beyond novelty: does it also involve an inventive step? I acknowledge that the *precise mechanism* or process by which the camera is ultimately switched on is different in each of D1, D3 and the Patent in Suit. In the Patent in Suit, the Plaintiff has connected an *ignition monitor* to the primary circuit of the car's ignition system as part of the process to activate the camera. The question is: would the notional skilled reader find it obvious to use an ignition monitor as part of that system? This is a matter of judgment. On the evidence and material before me, I have come to the view that the use of the ignition monitor (bearing in mind its dual functions and the five-second delay) is inventive. While the prior art does teach that electronic devices (accessories) may be connected to the primary circuit, the prior art cited does not suggest a dual ignition monitor with a built in five-second delay before the sending of the "turn on" signal. I do not think the notional skilled reader would have found these particular features "obvious", even if he was aware that the device could be wired into the primary circuit.

Prior art D5

148 For completeness, I shall deal with D5, which is a vehicle accident recording system which employs a digital camera connected to a controller, a

non-volatile memory and an accident-sensing interrupter. The controller accesses images from the digital camera periodically and stores the images. When the storage is full, the newest image overwrites the oldest stored image. In the event of an accident, the interrupter ceases the storage of any more new images (and thus prevents the overriding of older images). The result is that there is a recorded history of images spanning a time period up to the occurrence of the accident.[109] There are also vehicle operation transducers which capture vehicle operation data useful for vehicle accident investigation, such as speed, distance, braking, steering and engine RPM. The recording of the vehicle data operates continuously as long as the vehicle ignition system is on, but sensors of engine RPM stop the recording of the vehicle data when the engine is not operating, which would occur in the event of an accident.[110]

149 With regards to D5, Dr Yu argues that the "sensors of engine RPM" mentioned in the preceding paragraph, or alternatively the "transducers" mentioned in Claim 13 of D5[111] are collectively the "ignition monitor" of D5. Claim 13 of D5 states:

> A computerized vehicle log system as in claim **12** wherein the one or more transducers measure one or more of speed, fuel flow, acceleration and deceleration, engine RPM, and engine temperature.

Dr Yu explained at trial that a "transducer"" is the same as a "sensor".[112]

---

109 AB 83

110 AB 89-91

111 AB 91 Col 7 lines 8-9 and AB 92 Col 9 Claim 13

112 Transcript 4 August 2016 89:12-20; 5 August 2016 28:14-17

150 During cross-examination of Dr Yu, the Plaintiff's counsel pointed out that the "[s]ensors of engine RPM" used in the specification of D5, when read in context, are used to "*stop* the recording of vehicle data when the engine is not operating"[113] [emphasis added]. Dr Yu was thus given an opportunity to address the court on whether and where the specification of D5 states that sensors of engine RPM can also be used to *start* the recording device.[114] On the following day of the trial, Dr Yu proffered the explanation that this feature is disclosed in Claim 13 of D5. He explains that in order for the engine of a vehicle to rotate, there must first be ignition. These engine rotations will be captured by the sensors, also called transducers, which will send out a signal that triggers the operation of the camera.[115]

151 With respect, I am unable to follow the explanation of Dr Yu. It is not clear to me, from the wording of Claim 13 of D5, that the sensors or transducers in D5 are used to "start up" a camera. Instead, it is clear from other parts of the specification that the sensors of engine RPM "are used to", *ie*, they serve only to, *terminate* the recording of vehicle data. This, as the Plaintiff argues, is contrary to the purpose of the ignition monitor in the Patent in Suit, which is used to send a signal to the system controller, to *turn on* or *start* the recording process of the camera.[116]

---

113 AB 91 Col 7 lines 8-9

114 Transcript 4 August 2016 90:17-91:17

115 Transcript 5 August 2016 28:9-29:14

116 Plaintiff's submissions para 61; AB 394

Conclusion on inventive step

152 Looking at the prior art documents as a whole, I am of the view that the "ignition monitor" is not obvious to a notional skilled person, and constitutes an inventive step, in light of the prior art and common general knowledge. The need or desirability for an in-vehicle camera recording system to capture a vehicle's external surroundings in connection with accidents is obvious. Indeed, such devices existed in one form or another in the prior art. The question was whether it was obvious to try the particular solution devised by the inventor. In my judgment, it was not.

Conclusion on validity of the Patent in Suit

153 In the light of my foregoing findings, I am satisfied that the Patent in Suit is valid and the Defendant's objections in its defence fail. Thus, I shall turn to the Defendant's alternative arguments.

Infringement of the Patent in Suit

154 The Defendant's case is that in the event that the Patent in Suit is held to be valid, it is in any event not infringed by any of the Defendant's alleged acts (see [21] above).

155 Section 66(1) of the Patents Act states:

> **66.**—(1) Subject to the provisions of this Act, a person infringes a patent for an invention if, but only if, while the patent is in force, he does any of the following things in Singapore in relation to the invention without the consent of the proprietor of the patent:
>
> (*a*) where the invention is a product, he makes, disposes of, offers to dispose of, uses or imports the product or keeps it whether for disposal or otherwise;

…

156 The Defendant's main defence is that three elements of Claim 1 of the Patent in Suit have not been taken by the Devices, namely, (i) the monitoring of ignition voltage; (ii) the means to send a signal to the system controller on detection of an ignition voltage; and (iii) the means to switch off at least one optical recorder after a fixed interval after receiving the sensor signal. I shall examine each of these elements in turn. It bears repeating that it is established law that to infringe the Patent in Suit, the Defendant must take all the essential elements of the claimed invention. The essential elements are, of course, what claim construction is all about. The remarks of William Cornish, David Llewelyn & Tanya Aplin, *Intellectual Property: Patents, Copyrights, Trade Marks & Allied Rights* (Sweet & Maxwell, 8th Ed, 2013) at para 6-02 bear repeating:

> An article with the attributes called for in the claim remains an infringement, even if further things are added to it and even if those things make it more successful. … But a thing will cease to be within a claim if one or more of the essential elements is omitted or substituted by something different—something which does not fall within the description used in the claim.
>
> …
>
> It was always law … that while an infringer must take each and every one of the essential integers of a claim, "non-essential" integers may be omitted or replaced by mechanical equivalents. …

The monitoring of ignition voltage

157 The Defendant's case is that the Devices are not configured to be connected to any part of a vehicle or the vehicle's engine.[117] Indeed, they do

---

117 AB 523 lines 20-21; 526 lines 1-3

not require the ignition of an internal combustion engine to work. Instead, they will switch on and begin recording whenever they receive an incoming stable and continuous DC electrical power of about 5 volts from any source. In this respect, the Devices have USB ports which can be connected to any power source.[118] This may be the Devices' own internal battery[119], an external charger (provided with the Devices) plugged into the vehicle's cigarette lighter socket, or an external battery supply (such as an external power bank or computer). In this sense, the Devices will work even in an electric vehicle which has no internal combustion engine.[120] Indeed, Mr Schweiger, the Plaintiff's expert, conceded at trial that the Devices will also work when the ignition key of a vehicle is in position 1,[121] *ie*, when the vehicle's accessories, such as the radio, are supplied with power from the vehicle's battery, but there is no ignition of the engine.[122] What this means is that if the driver connects any of the Devices to the cigarette lighter socket and engages the ignition position 1, the Device will still be powered up. For these reasons, the Defendant's argument is that the Devices do not monitor engine ignition activities at all.[123] This is different from the Plaintiff's device, which is wired directly to the primary ignition circuit and which uses an ignition monitor to detect the requisite stable power voltage and to send a signal to the system controller.

158 The Plaintiff's case is, however, that the Defendant's Devices contain "ignition monitors" because the Devices contain the means for detecting

118 AB 523 lines 25-31; 526 lines 14-15

119 AB 528 lines 27-30

120 Defendant's submissions paras 66-67; AB 526 lines 4-5.

121 Transcript 3 August 2016 96:1-21

122 AB 367

123 AB 523 line 22

whether a car's ignition is active or not. This position is based on several of Mr Schweiger's experiments outlined in his expert reports:

(a) In relation to the MX5, Mr Schweiger plugged the external charger of the MX5 into a cigarette lighter socket, connected to a variable voltage source. He first reduced the variable voltage source to about 1 volt, and switched the MX5 off. He then gradually increased the voltage supplied to the MX5 in steps of about 0.1 to 0.3 volts. When the voltage had reached about 6.9 volts, the MX5 switched on and began recording images. In a variation of this experiment, he used an "on-off" voltage switch, in which the voltage of the cigarette lighter was changed from 0 volt to 12 volts (the ignition voltage of a car) instantly, rather than incrementally. He therefore concluded that the MX5 had an ignition monitor which would allow it to be switched on when the car ignition is activated.[124] These experiments were repeated by the Plaintiff and Mr Schweiger in court on the first day of the trial, producing largely the same results (except that in the first experiment, the MX5 only turned on when the voltage was increased to about 8 volts).[125]

(b) In relation to the MX6 and QB6, Mr Schweiger plugged each of their external chargers into a cigarette lighter socket supplied with a 12-volt voltage. The MX6 and QB6 each turned on automatically and began recording images. From this, he concluded that the MX6 and QB6 will also automatically switch on upon engine ignition.[126]

---

124 AB 433

125 Transcript 2 August 2016 7:16-9:3; 12:5-14:17

126 AB 446 and 473

159 The Defendant submits that Mr Schweiger's experiments merely demonstrate that (i) the Devices would power up upon the Devices receiving a certain voltage (6.9 or 8 volts); and (ii) can also switch on when supplied with the voltage of a typical ignition system of a vehicle (12 volts). The Defendant's point appears to be that the experiments do not prove that the Devices cannot be powered by another source *independent* from the vehicle's ignition system. Indeed, it bears repeating that Mr Schweiger accepted that the Defendant's Devices will still switch on when the ignition switch is at position 1, such that the Devices receive only power from the car battery, through the car cigarette lighter socket, without any engine ignition.

160 To be clear, the fact that the Defendant's Devices have a number of different ways of turning on and drawing power (such as by (i) connection to the cigarette lighter socket of the car; or (ii) connection to an external power bank via a USB port) does not in itself mean that they are not infringing. They will still infringe if one method of turning on and drawing power is *by means of connection to the ignition system.*

161 After considering the submissions, I am of the view that the Defendant's Devices, which can draw power by being connected with the car's battery through the car cigarette lighter socket, falls outside the scope of Claim 1. By contrast, as I have earlier explained (at [64] above), an "ignition monitor" detects the requisite voltage *from or produced by* the ignition system. This involves wiring to the primary circuit of the ignition system.

162 While this factor alone is sufficient for a finding of non-infringement, for completeness, I now go on to consider whether the Defendant's devices fall outside of Claim 1 for other reasons.

The means to send a signal to the system controller on detection of an ignition voltage

163 The next issue relates to what I have termed the second function of the ignition monitor of the Patent in Suit. The Defendant's position is that the Devices do not have the means to send an ignition monitor signal to the system controller on detection of an ignition voltage, for the simple reason that there is no ignition monitor. Instead, the Devices will simply switch on when they receive sufficient, stable and continuous electric power. This is no different from any other electrical device. The turning on and off of electric power does not amount to an electric "signal".[127]

164 On the first day of the trial, Dr Yu, the Defendant's expert, gave a short demonstration in this regard using a USB cable which contained multiple wires. He modified the USB cable, cutting off the white and green "signal" wires (used to transmit data), and leaving intact the red and black "power" wires which transmit a DC voltage of 5 volts. He then connected the MX6 to this modified USB cable. The result was that the MX6 likewise turned on and began recording images. By this experiment, Dr Yu concluded that whenever the MX6 (and any of the other Devices) receive a *power supply* of 5 volts, it will begin to record images; no "signal" was required to be transmitted.[128] This can be distinguished from the invention in the Patent in Suit.

165 Given my finding (at [70] above) that the plain and ordinary meaning of the word "signal" is a conveyance of information about the voltage, not just voltage (electrical power) itself, I agree with the Defendant's position.

---

127 Defendant's submissions para 72.

128 Transcript 2 August 2016 19:21-21:23; Defendant's submissions para 73.

Because the Devices can be switched on even when signal cables are cut, this must mean that no "signal" was transmitted to the cameras, but merely power. In any event, there does not appear to be the equivalent of a "system controller" in any of the Devices, to which any signal can be sent. Instead, the cameras in the Devices are powered directly when they receive power through the USB cables. Thus, even if I am wrong in finding that the Defendant's Devices do not infringe on the basis that they do not detect the requisite voltage *from or produced by* the ignition system, the Defendant's devices still fall outside of Claim 1 as they do not have an ignition monitor which *sends a signal to a system controller upon detection of the requisite voltage.*

The means to switch off at least one optical recorder after a fixed interval after receiving the sensor signal

166 The next issue in contention is the part of Claim 1 of the Patent in Suit which deals with whether the optical recorders may be switched off after a fixed interval upon detection of deceleration or impact. According to the Defendant, the Devices will continue to operate as long as they receive steady DC power supply. For example, if the vehicle's electric power supply is terminated, the Devices will continue to operate until the in-built battery is depleted.[129] The Defendant points out that in the experiments described in Mr Schweiger's first expert report, Mr Schweiger had to physically disconnect the Devices from the cigarette lighter socket before they could be switched off. Further, in the second opinion of Mr Samuel Yuen ("Mr Yuen"), an advocate and solicitor from Yuen Law LLC engaged by the Plaintiff, he also concluded that his experiments "do not show evidence of this feature [*ie*, a system

---

[129] Defendant's submissions paras 76-77; AB 524 lines 30-31, 527 lines 16-18, 529 lines 30-31

controller providing means to switch off the optical recorder after a fixed interval after receiving a sensor signal]".[130] I pause to note that Mr Yuen, who was not called as a witness for the trial, was engaged by the Plaintiff to provide opinions prior to the engagement of Mr Schweiger. As will be discussed below, these opinions were rendered in connection with the cease and desist letters. For the avoidance of any doubt, it is evident that Mr Schweiger conducted his own experiments. I add, with respect, that Mr Yuen's qualifications to give expert opinion evidence is in any event rather doubtful. No reliance was placed on the views that he expressed.

167 The Plaintiff's submission appears to be premised on different understandings of the term "optical recorder" and what it means for an optical recorder to be "switched off".

168 The Plaintiff first draws a distinction between an "optical *recorder* device" and an "optical *capture* device". The former, according to the Plaintiff, stores images permanently while the latter merely "observes" images without the means to store them permanently.[131] Thus, the Plaintiff argues, the Defendant's interpretation of an "optical recorder" as a camera, and conclusion that the Devices continue to operate (*ie*, the camera does not switch off) even after an impact, is too simplistic.[132]

169 Instead, the Plaintiff argues that the cameras of the Devices, without any storage media, act purely as an "optical *capture* device" that capture images in front of them. It is only when a storage media (such as a memory

130 Defendant's submissions paras 78-79; AB 337-338

131 Plaintiff's submissions paras 102 and 114

132 Plaintiff's submissions para 98

card) is inserted that the Devices become both an optical *capture* device and an optical *recorder* device (by storing optical images captured through the camera on the storage media). Therefore, it is in fact the *memory card* of the Devices that is the optical *recorder* device described in Claim 1, because it is the repository in which optical images are stored.[133]

170 After the Devices undergo a simulated collision (done by applying a stroke with a screwdriver to the top of the Devices), a "key" symbol appears on the display screen of the camera. This means that the recordings (post-"collision") are "locked" and the data cannot be overridden. When extracted, it results in a "read only" file.[134] In this way, what I understand the Plaintiff to be arguing is that the optical *recorder* device will "switch off" upon detection of collision or impact (in that the storage medium is no longer able to store any more images to override the locked file), even though the *camera* itself (*ie*, the optical *capture* device) does not.

171 With respect, I am unable to agree with the Plaintiff's submission. In my view, the distinction drawn by the Plaintiff between an "optical *recorder* device" and an "optical *capture* device" is not evident in any part of the Patent in Suit. Instead, from a perusal of the claims, it appears that the term "optical recorder" is simply a broad, generic phrase which, as exemplified in later claims, covers a digital camera (Claim 7) and a digital camcorder (Claim 8) (see [123] above). For example, in one embodiment of the invention in the Patent in Suit shown in Figure 1 above ([63] *supra*), item 5 in Figure 1 is referred to as a "digital camera", which is one variant of an optical recorder.

---

133 Plaintiff's submissions paras 106 and 115

134 Transcript 2 August 2016 10:7-11:8

There is no evidence, as the Plaintiff argues, that the *external storage device* (such as a memory card) is the "optical recorder" referred to in Claim 1. Indeed, an "optical recorder" is distinct from a "memory store", as is clear from the drafting of Claims 3 and 4:

> 3. A recording system as claimed in claim 1 or claim 2 wherein the at least one *optical recorder* is provided with an *internal memory store.*
>
> 4. A recording system as claimed in claim 1 or claim 2 wherein the at least one *optical recorder* is connected to *a separate memory store.*
>
> [emphasis added]

172 Since an optical recorder is the camera itself, rather than the storage device, the "switching off" of the optical recorder cannot be taken to mean the termination of storage of images and the creation of the "read-only" file, as the Plaintiff argues. Instead, the plain and ordinary meaning of "switching off" an optical recorder refers to the physical turning off of it. This must also have been what is meant in Claim 1 of the Patent in Suit. According to the specification of the Patent in Suit, when the impact sensor detects sudden deceleration or impact, a signal is sent to the system controller to turn off the main power supply to the camera (one example of an optical recorder) and the standby power supply is turned on to supply power to the camera instead. The camera thus continues to record for a certain amount of time until the standby power supply is switched off.[135] It is in this context that the Patent in Suit elaborates that "system controller provid[es] means to *switch off* the…optical recorder after a fixed interval after receiving the sensor signal" [emphasis added].[136] Without power from either the main or standby power supply, the optical recorder would be physically switched off.

---

135 AB 121

Conclusion on infringement

173 For the above-mentioned reasons, the Defendant's offering of the Devices for sale does not infringe the Patent in Suit. A declaration of non-infringement is granted to the Defendant.

The Defendant's counterclaim for groundless threats of proceedings

174 Finally, I turn to deal with the Defendant's counterclaim for groundless threats of infringement proceedings. This is based on the two cease and desist letters, the contents of which have been set out at [10] to [12] above.

The legal principles

175 Section 77 of the Patents Act states:

> **77.**—(1) Where a person (whether or not the proprietor of, or entitled to any right in, a patent) by circulars, advertisements or otherwise *threatens another person with proceedings for any infringement of a patent*, a person *aggrieved by the threats* (whether or not he is the person to whom the threats are made) may, subject to subsection (4), bring proceedings in the court against the person making the threats, claiming any relief mentioned in subsection (3).
>
> (2) In any such proceedings, the plaintiff shall, if he proves that the threats were so made and satisfies the court that he is a person aggrieved by them, be entitled to the relief claimed unless —
>
> > (*a*) the defendant proves that the acts in respect of which proceedings were threatened constitute or, if done, would *constitute an infringement of a patent*; *and*
> >
> > (*b*) the patent alleged to be infringed is *not shown by the plaintiff to be invalid* in a relevant respect.
>
> (3) The said relief is —

---

136 AB 123

> (*a*) a *declaration* to the effect that the threats are *unjustifiable*;
>
> (b) an *injunction* against the continuance of the threats; and
>
> (*c*) *damages* in respect of any loss which the plaintiff has sustained by the threats.
>
> (4) Proceedings may not be brought under this section for a threat to bring proceedings for an infringement alleged to consist of making or importing a product for disposal or of using a process.
>
> …
>
> [emphasis added]

176 The reference to "plaintiff" in s 77 of the Patents Act includes a plaintiff in a counterclaim, such as the Defendant in the present suit. For convenience, and to avoid confusion, I shall use the names of the parties in discussing the claim under s 77. The plaintiff in the counterclaim is Maka GPS Technologies Pte Ltd ("Maka GPS Technologies") while the person against whom the relief is sought is Mr Lee Tat Cheng ("Mr Lee"), the patentee and defendant in the counterclaim.

177 A "threat" can be determined by looking at the letter (which is said to contain the reported threats) through the eyes of a *reasonable and normal recipient* and thereafter decide whether there could be a reasonable argument that the said letter would be understood as a threat of patent proceedings: *Flexon (Pte) Ltd v Bean Innovations Pte Ltd and another* [2000] 3 SLR(R) 492 at [47]. In the present case, the cease and desist letters clearly amount to a threat of infringement proceedings for the purposes of s 77(1). This is especially because the cease and desist letters demanded fees and damages in lieu of Mr Lee's enforcement of his strict legal rights, which must include infringement proceedings. Maka GPS Technologies, being the recipient of the

cease and desist letters containing the threats, is a "person aggrieved by the threats" referred to in s 77(1). I should add that there is no indication that the "person" who is aggrieved has to be a *natural* person, since s 2 of the Patents Act defines the term "person" used in the Patents Act to include the Government.

178 Under s 77(2) of the Patents Act, the burden is on Maka GPS Technologies to prove that (i) threats of infringement proceedings were made; and (ii) that it is a person aggrieved by the threats. Once Maka GPS Technologies succeeds in establishing these two elements, it is *prima facie* entitled to the relief, unless the threat is justified. Such a threat is justified if (a) Mr Lee proves that the acts in respect of which he had threatened proceedings constitute or would constitute an infringement of his patent; *and* (b) the patent (in respect of which infringement proceedings were threatened) is not shown by Maka GPS Technologies to be invalid in a relevant respect: see *ASM Assembly Automation Ltd v Aurigin Technology Pte Ltd and others* [2010] 1 SLR 1 at [66]. Both conditions must be satisfied in order for Mr Lee's threats to be justified.

179 In this case, the threat is not justified because one of the two cumulative conditions has not been satisfied. Even though the Patent in Suit is valid (*ie*, condition (b) is satisfied), I found earlier that Maka GPS Technologies' acts *do not* constitute an infringement of the Patent in Suit. Therefore, relief under this section may be available.

180 I turn then to the question of discretion and the grant of relief. In the recent case of *Singsung Pte Ltd v LG 26 Electronics Pte Ltd (trading as L S Electrical Trading)* [2016] 4 SLR 86 ("*Singsung*"), the Court of Appeal

analysed the groundless threat provisions, albeit in the context of copyright law. Whilst the Court of Appeal was concerned solely with the equivalent provision in s 200 of the Copyright Act (Cap 63, 2006 Rev Ed), the views expressed on the underlying policy behind the statutory action for groundless threats may be relevant to other areas of intellectual property law, including patent law.

181 The Court of Appeal held (at [133]) that the purpose of a claim of groundless threats is to provide a statutory remedy for aggrieved parties whose business or reputation might be affected by threats emanating from another party, without the need to prove bad faith on the part of the threatening party.

182 The Court of Appeal also opined (at [129) that the rationale underlying the groundless threat provisions is to establish a balance between the protection of existing intellectual property rights and the prevention of "bullying" tactics in which right-holders use the threat of legal proceedings directed at their competitors or customers to chill their legitimate activities.

183 In this regard, the possible high costs associated with defending an action for infringement of an intellectual property right may have the effect of frightening away competitors, even those whose activities are not in fact infringing, but who are nonetheless unprepared to face the costs and time involved in establishing their innocence: *Singsung* at [129]. On the other hand, overly broad groundless threats provisions may instead have a "chilling" effect on the proprietors of intellectual property rights, because the fear of exposure to liability for groundless threats may mean that those with fewer resources will hesitate to enforce, or perhaps even forgo the legitimate enforcement of, their rights in the first place: *Singsung* at [138].

184 The Court of Appeal opined (at [148]) that the task of the court is to consider whether, in all the circumstances, there is any reason for it to grant relief upon a claim of a groundless threat that is founded on a failed allegation of infringement. In this regard, the Court of Appeal stated that it does not follow that where an allegation of infringement has failed, this must necessarily result in any relief being granted; instead, the grant of relief by the court is *discretionary*. In each case, the question of whether relief ought to be granted will be a fact-sensitive inquiry as to whether the action was warranted and whether any relief is required at all. The cost consequences flowing from a failed claim would also be a relevant consideration.

185 Although the above policy considerations are broadly relevant to patent law, I note that the Copyright Act cloaks the relief available under s 200 in discretionary language. Section 200(1) of the Copyright Act provides that where a person threatens another person with proceedings for copyright infringement, a person who is aggrieved may bring an action and "may" obtain a declaration that the threats are unjustified and an injunction, and "may" recover damages, unless the acts in respect of which proceedings were threatened constituted or would constitute an infringement of copyright.

186 Section 77(2) of the Patents Act, on the other hand, employs language which, at least at first sight, is far more proscriptive in nature. It states that the plaintiff shall, if he proves that the threats were so made and satisfies the court that he is a person aggrieved by them, be *entitled* to the relief claimed, *unless* the threats were justified (on which, see [178] above). The reliefs available are set out in s 77(3) (quoted in full at [175] above).

187 Whilst there are similarities between s 200 of the Copyright Act and s 77 of the Patents Act, the language and structure of the provisions is not the same.

188 In my view, the stronger language of s 77(3) of the Patents Act should be taken into account. The provisions in s 77 represent a careful balancing of the interests of the plaintiff and the defendant. This is evident from the careful and detailed allocation of burdens of proof and the various elements required to be established by s 77 of the Patents Act. Accordingly, the Court does not appear to have discretion as to whether to award relief under s 77. Once the plaintiff has established all the requisite elements – namely that he is *prima facie* entitled to relief (*ie*, threats were made and he is an aggrieved person) *and* the threats are not shown to be justified – the plaintiff is *entitled* to be granted a form of relief.

189 I turn now to the type of relief that may be applied for. The nature of the relief is, of course, a relevant consideration. The grant of an injunction, on general principles, is a discretionary remedy. Under s 77(3) of the Patents Act, the injunction is limited to an order against the continuance of the threats. It may be that there will be cases where there is no likelihood that the threats will be repeated. In such a case, I am of the view that the court is not bound to grant the injunction. Nevertheless, if it is found that the threats are unjustified within the terms of s 77, and taking into account the language and structure of the provisions, the plaintiff would still be entitled to damages for any loss which it has sustained by the threats. The burden, of course, is on the plaintiff to show a loss that was caused by the threats. If he is unable to establish any loss, it must follow that there is no basis for any award (save possibly of a

notional sum). Finally, there is the question as to whether declaratory relief (*ie*, a declaration that the threat is unjustified) should be granted.

The parties' submissions

190 According to Maka GPS Technologies, there are a few reasons why the cease and desist letters constitute groundless threats of infringement proceedings.[137] First, it argues that there was no reasonable basis for the cease and desist letters. Prior to the sending of the cease and desist letters, Mr Lee did not seek the advice of a qualified registered patent agent, but only engaged Mr Yuen, an advocate and solicitor, to provide three infringement opinions. These opinions were not grounded on a technical analysis undertaken by a patent agent or someone skilled in the art. Further, Mr Yuen had opined that the experiments he had carried out on the MX6 *did not* disclose one of the essential elements of the Patent in Suit, namely, the system controller providing means to switch off the optical recorder after a fixed interval after receiving a sensor signal.

191 Second, Mr Lee's demand for damages in the cease and desist letters were not justified. It appears that the 13 February 2014 letter, which demanded damages amounting to $50,000, was based on the Plaintiff's "market study" that essentially comprised walking around a car park in Singapore and counting the number of cars with car cameras, rather than any analytical study. The Plaintiff was also unable to explain how he came up with the figures (demanded in the 28 October 2014 letter) of a licence fee of $12 per unit of the Devices sold, $3,750 for the expert opinion and $7,500 for investigation fees and professional fees.[138]

---

137 Defendant's submissions paras 100-114

192 Third, the point is made by Maka GPS Technologies that the writ of summons for the present suit was issued belatedly on 10 March 2015, more than a year after the 13 February 2014 letter.

193 Mr Lee's argument was simply that, based on his submissions, there was no groundless threat because the Patent in Suit was valid and subsisting, and the Devices have been shown to infringe the Patent in Suit.[139] Unfortunately, I am unable to accept this argument because I have earlier found that the Devices did not infringe the Patent in Suit.

Decision

194 In the circumstances, I have already found that the cease and desist letters constitute threats and that Maka GPS Technologies is entitled to relief because Mr Lee has failed to establish one of the two cumulative factors for a threat to be justified (see [177] and [179] above). I shall, however, make a few comments about the parties' submissions. First, I am of the view that the first point raised by Maka GPS Technologies (*ie*, that there was no reasonable basis for the cease and desist letters) is not a relevant consideration in determining whether there is a right to claim relief. The question is simply whether the threat of proceedings for patent infringement was made. The action set out in s 77 is not limited to cases where the person making the threat acted unreasonably.

195 I am also of the view that the second complaint raised (*ie*, unjustified sums of damages and license fees claimed in respect of the alleged

---

138 Transcript 2 August 2016 50:23-52:22; 58:16-59:23

139 Plaintiff's submissions para 129

infringement) is also irrelevant to the question of whether the threat of proceedings was made. However, I accept that the actions of the person making the threat and the severity or quantum of the "requests" or "demands" made against the alleged infringer can be relevant to the loss suffered by the alleged infringer. It will be recalled that in *Singsung* ([180] *supra*), the Court of Appeal held that the purpose of groundless threat proceedings is to provide a statutory remedy for aggrieved parties *whose business or reputation might be affected by threats* emanating from another party (see [181] above). It follows that it is incumbent on Maka GPS Technologies to show loss in the sense that its business or reputation was affected. I will return to this point shortly.

196 Finally, I deal with the third point raised by Maka GPS Technologies, which is the one-year delay in issuing the writ of summons for the present suit. In my view, the timing of the subsequent commencement of proceedings – or indeed whether proceedings are commenced at all – is and should be irrelevant to the issue of groundless threats.

197 First, it would be noted from the wording of s 77 of the Patents Act that it is the *threat* of proceedings, rather than the *actual commencement* of it, which is actionable. Indeed, the action created by s 77 of the Patents Act is entitled "Remedy for groundless *threats* of infringement proceedings" [emphasis added]. The justifiability of the threat depends solely on the two cumulative factors in s 77(2) of the Patents Act, as set out at [178] above, and not on whether and when legal proceedings are in fact commenced thereafter.

198 Second, if the timing of the subsequent commencement of proceedings (after the threat) was a relevant consideration, there would be an "anomaly" in

that not only would the commencement of suits *per se* be encouraged (a concern in *Singsung* ([180] *supra*) at [134]), but there would also be a perverse incentive for the *speedy* commencement of proceedings. It is not unimaginable that in such a case, holders of intellectual property rights would hastily commence legal actions in a bid to avoid liability for groundless threats, without even giving the opposing party time to consider its next course of action. This would clearly be against the general policy of encouraging out-of-court settlement of disputes, but would instead proliferate the "sue first, talk later" approach that has perturbed legal practitioners and the judiciary (see *Singsung* at [135]).

199 In the light of my comments, it is evident that the parties' submissions do not alter my earlier finding that Maka GPS Technologies is entitled to relief. I now turn to the appropriate form of relief to be granted to Maka GPS Technologies. In this regard, the learned authors of *CIPA Guide to the Patents Acts* (Paul G Cole ed) (Sweet & Maxwell, 7th Ed, 2011) ("*The CIPA Guide*") state (at para 70.06) that "[t]o obtain an award of damages, the claimant must prove a financial loss arising from the threat". An example provided is *Carflow Products (UK) Ltd v Linwood Securities (Birmingham) Ltd and Others* [1998] FSR 691, where Laddie J declined to award damages because the retailer had only withdrawn the products from its catalogue *after* a writ was served against it. The loss suffered by the retailer in withdrawing those items was held not to be caused by the threat, but by its own decision to withdraw its products.

200 I note that *The CIPA Guide* also states (at para 70.06) that a successful claimant is entitled to an inquiry into damages even when the court has deep

suspicions that he would recover very little indeed. To this end, the issues of liability and quantum should be heard together.

201 However, in the evidence before me, the only "damage" that Maka GPS Technologies suffered was its alleged difficulty in obtaining financing, which arose *after* the *commencement of legal proceedings*.[140] There is no evidence at all as to what the impact was (if any) on their business or reputation. Indeed, there is no evidence that Maka GPS Technologies had acceded to any of the demands by Mr Lee. Thus, Maka GPS Technologies has failed to show that any conceivable damage has arisen from the demands being made in the cease and desist letters, which cannot now be compensated by a costs order against Mr Lee for having issued an unwarranted threat. Consequently, I decline to make any award of damages to Maka GPS Technologies.

202 While Maka GPS Technologies is *prima facie* entitled to a declaration that the threats made were unjustifiable, I am of the view (like the Court of Appeal in *Singsung* ([180] *supra*)) that this relief is unnecessary because I have already found that Mr Lee's claim for infringement fails and I have ordered that a declaration of non-infringement be granted to Maka GPS Technologies.

203 While there is nothing to suggest that Mr Lee will make further threats, I am of the view that this is an appropriate case to grant an injunction against the continuance of the threats.

---

140 HSC AEIC para 27 and Exhibit HSC-6.

Conclusion

204 In sum, although the claims of the Patent in Suit are novel and inventive, and therefore valid, the Defendant's offering of the Devices for sale does not infringe the Patent in Suit and the Plaintiff's claims fail. A declaration of non-infringement is granted to the Defendant. The Defendant succeeds in its counterclaim for groundless threats of infringement proceedings. An injunction is granted to the Defendant against the continuance of the threats by the Plaintiff.

205 Costs for the claim and counterclaim are to be paid by the Plaintiff to the Defendant, to be agreed or taxed.

George Wei
Judge

Ismail bin Atan and Koh Kai Ling Angeline (Salem Ibrahim LLC) for the plaintiff;
Bryan Manaf Ghows and Khadijah binte Yasin (Via Law Corporation) for the defendant.