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## DEFINING THE DESIGN DEFECT IN AIRCRAFT PRODUCTS LIABILITY CASES

ALBERT R. ABRAMSON\*

PRODUCTS LIABILITY is currently one of the fastest developing areas of tort law. Although seventeen years have elapsed since the decision in *Greenman v. Yuba Power Products, Inc.*,<sup>1</sup> which adopted strict liability in California and was the precursor of similar decisions in other states, most of the case authority is of more recent vintage. Each month new decisions widen the scope of products liability and define new actionable areas as the courts make products liability litigation an effective means of consumer protection. A large verdict, or the threat of one, has caused some manufacturers to improve their products and to warn of inherent dangers.<sup>2</sup> As a consequence, in some cases the law has become more effective than governmental regulatory agencies in enforcing product safety standards.

Aircraft and component manufacturers, along with sellers and lessors, are liable in tort when their product contains a design defect which causes injury.<sup>3</sup> Courts have developed three theories imposing responsibility for damages: negligence, breach of war-

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<sup>1</sup> 59 Cal. 2d 57, 377 P.2d 897, 27 Cal. Rptr. 697 (1962).

<sup>2</sup> Wade, *On the Nature of Strict Tort Liability for Products*, 44 Miss. L.J. 825, 826 (1973).

<sup>3</sup> L. KREINDLER, *AVIATION ACCIDENT LAW*, ch. 7 (1978) [hereinafter cited as KREINDLER]; Murray, *Aircraft Manufacturers' and Overhauleders' Liability*, 13 U. MIAMI L. REV. 189 (1958); Comment, *Tort Liability of Manufacturers and Vendors of Aviation Products*, 1953 WIS. L. REV. 109; Note, *Aircraft Manufacturer's Liability for Defects in Construction and Design*, 23 J. AIR L. & COM. 108 (1956); Note, *Manufacturer's Liability in Aircraft Accidents*, 16 J. AIR L. & COM. 240 (1949).

ranty, and strict product liability.<sup>4</sup>

Design defect liability first appeared in actions based on negligence. Simply stated, "A manufacturer . . . is subject to liability to others whom he should expect to use the chattel . . . for physical harm caused by his failure to exercise reasonable care in the adoption of a safe plan or design."<sup>5</sup> Many courts have applied this principle to aircraft and components. Negligent designs has been a basis of liability in cases involving seat fittings in a Grumman Navy airplane,<sup>6</sup> wing joints in a Martin 202,<sup>7</sup> an alternator drive shaft in a Boeing B-52 jet bomber,<sup>8</sup> aileron hinge brackets in a Piper aircraft,<sup>9</sup> fire suppression equipment in a Douglas DC-6 airliner,<sup>10</sup> a propeller governor system manufactured by United Aircraft Corporation<sup>11</sup> and the thrust reversers of a Boeing 707 jet transport.<sup>12</sup>

One of the earliest reported decisions involving negligent design of an airplane, *Maynard v. Stinson Airplane Corp.*,<sup>13</sup> is a good illustration of the nature and scope of this type of liability. Plaintiff's aircraft was destroyed by an in-flight fire which he claimed was caused by two design defects. The exhaust stacks were allegedly too short and were likely to emit high temperature gases or flames so close to the skin of the fuselage that any fuel or vapor lurking free in the ship would be ignited.<sup>14</sup> Additionally, plaintiff alleged that the carburetor drain opening was too close to the exhaust

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<sup>4</sup> FRUMER & FRIEDMAN, PRODUCTS LIABILITY §§ 7.01-7.03 (1961); HURSH & BAILEY, AMERICAN LAW OF PRODUCTS LIABILITY 2D (1974) [hereinafter cited as HURSH & BAILEY]; KREINDLER, *supra* note 3; W. PROSSER, LAW OF TORTS, §§ 96-98 (4th ed. 1971).

<sup>5</sup> RESTATEMENT (SECOND) OF TORTS § 398 (1965).

<sup>6</sup> Gladstone v. Grumman Aircraft Eng'r Corp., 254 A.D. 871, 5 N.Y.S.2d 252 (1938).

<sup>7</sup> Northwest Airlines, Inc. v. Glenn L. Martin Co., 224 F.2d 120 (6th Cir. 1955), *cert. denied*, 350 U.S. 937 (1956).

<sup>8</sup> Boeing Airplane Co. v. Brown, 291 F.2d 310 (9th Cir. 1961).

<sup>9</sup> Smith v. Piper Aircraft Corp., 18 F.R.D. 169 (M.D. Pa. 1955).

<sup>10</sup> De Vito v. United Airlines, Inc., 98 F. Supp. 88 (E.D.N.Y. 1951).

<sup>11</sup> Pan American World Airways, Inc. v. United Aircraft Corp., 192 A.2d 913 (Del. Super. Ct. 1963), *aff'd*, 157 Del. 322, 199 A.2d 758 (1964).

<sup>12</sup> Manos v. Trans World Airlines, Inc., 324 F. Supp. 470 (N.D. Ill. 1971). For a more complete list of aircraft cases involving negligent design, see 6 HURSH & BAILEY, *supra* note 4 at §§ 35:4-35:6.

<sup>13</sup> 1 Av. Cas. 698 (County Cir. Ct. Mich. 1937).

<sup>14</sup> *Id.* at 699.

stacks, presenting a fire hazard.<sup>15</sup> The court held that the manufacturer was liable for negligent design if the aircraft contained defects caused by the failure to exercise ordinary care, *i.e.*, that care used by persons ordinarily skilled in designing airplanes and engines.<sup>16</sup> Testimony that the design of the airplane conformed with industry standards was evidence of due care, but was not conclusive; common practice in the industry may not meet the "ordinary" or "due" test of care.<sup>17</sup> Plaintiff was successful in proving that the design created an unnecessary fire hazard, thus, the manufacturer was negligent.<sup>18</sup>

Even in this era of strict products liability, negligent design is, and will continue to be, an important part of aircraft products liability actions. According to some writers there is little real difference between negligence and strict products liability in the area of defective design in jurisdictions where the product must be "unreasonably dangerous" in order to hold the manufacturer strictly liable. One commentator has observed:

In the case of the improper design which makes the product dangerous, whatever is enough to show that it is so dangerous that strict liability should apply . . . will also be enough to show negligence on the part of the manufacturer. Even if the manufacturer is not aware of the danger created by the bad design, he is negligent in not learning of it. . . . The proof necessary to establish strict liability will certainly be sufficient to establish negligence liability as well.<sup>19</sup>

It has also been said that in actions against manufacturers, there is not one case in one hundred in which strict liability would result in recovery where negligence would not.<sup>20</sup>

Despite these and similar comments, there are important differences between negligent design and strict products liability for defective design. A vitally important one is that contributory negligence is unavailable as a defense in strict liability actions in

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<sup>15</sup> *Id.* at 700.

<sup>16</sup> *Id.* at 699.

<sup>17</sup> *Id.* at 702.

<sup>18</sup> *Id.* at 699.

<sup>19</sup> Wade, *supra* note 2, at 836-37.

<sup>20</sup> Prosser, *The Assault Upon the Citadel*, 69 YALE L.J. 1099, 1114 (1960).

many jurisdictions.<sup>21</sup> A second difference is that intermediate suppliers of a product are often simply not negligent when it comes to design.<sup>22</sup> If the negligent manufacturer who designed the product is beyond the court's jurisdiction, or if he is insolvent or uninsured, the injured plaintiff will be left without a remedy if his only case is one against a seller based on negligent design. Additionally, evidence may be admissible under one theory and not the other. In a negligence action evidence of prior failures of a product or warnings to the manufacturer as to its dangerous nature would be admissible to prove notice, but may not be relevant in a strict liability case. Likewise, subsequent remedial design changes may be admissible in some jurisdictions on the theory that exclusion would not serve to affect the conduct of mass producers anyway.<sup>23</sup> A careful plaintiff's attorney will allege both negligence and strict liability in design cases.

Breach of warranty can still be an important part of products liability actions despite occasional statements that it has been absorbed by strict liability. There may be a recovery for breach of an express warranty even though the product is not defective. An express warranty is an affirmation of fact or a promise concerning the goods made by the seller and relied upon by the buyer forming part of the basis of the bargain between the parties.<sup>24</sup> An express warranty may also be created by a description of the goods sold which is made a part of the bargain.<sup>25</sup> An aircraft manufacturer's advertising material or owner's manual may contain express warranties as to performance, reliability, range, or useful load, among others.<sup>26</sup>

An implied warranty is not unlike strict products liability, and some courts appear to have used the terms interchangeably.<sup>27</sup> On

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<sup>21</sup> Montgomery & Owen, *Reflections on the Theory and Administration of Strict Tort Liability for Defective Products*, 27 S.C. L. REV. 803, 829 (1976).

<sup>22</sup> Wade, *supra* note 2 at 836-37; Prosser, *supra* note 20 at 1117.

<sup>23</sup> Ault v. International Harvester Co., 13 Cal. 3d 113, 528 P.2d 1148, 117 Cal. Rptr. 812 (1974).

<sup>24</sup> W. PROSSER, LAW OF TORTS § 97 (4th ed. 1971); U.C.C. § 2-313.

<sup>25</sup> U.C.C. § 2-313(1)(b).

<sup>26</sup> See generally Grinnell v. Charles Pfizer & Co., 274 Cal. App. 2d 465, 79 Cal. Rptr. 369 (1969) (involving express warranties as to drugs); Toole v. Richardson-Merrell Inc., 251 Cal. App. 2d 689, 60 Cal. Rptr. 398 (1967).

<sup>27</sup> Goldberg v. Kollsman Instrument Corp., 12 N.Y.2d 432, 191 N.E.2d 81, 240 N.Y.S.2d 592 (1963).

sale of a product an implied warranty arises that the goods will be merchantable<sup>28</sup> and reasonably fit for the general purpose for which they are manufactured or sold.<sup>29</sup> These implied warranties may still have utility in cases where strict products liability does not. Some jurisdictions do not permit recovery for purely economic losses under the doctrine of strict liability.<sup>30</sup> In these, warranty liability, along with negligence would be the consumer's only remedy.

Although negligence and breach of warranty actions are still widely pleaded, the great majority of cases involving design defects in aircraft are based on strict products liability.<sup>31</sup> Now, fifteen years after Justice Traynor's opinion in *Greenman v. Yuba Power Products, Inc.*,<sup>32</sup> virtually every state adheres to the doctrine of strict products liability in one form or another.<sup>33</sup> Briefly stated, the manufacturer and seller of a defective product which causes physical harm are liable for damages, regardless of the exercise of due care in the design, manufacture, or marketing of the product.<sup>34</sup> One of the first courts to adopt the *Greenman*

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<sup>28</sup> U.C.C. § 2-314.

<sup>29</sup> U.C.C. § 2-315. See also *Henningsen v. Bloomfield Motors, Inc.*, 32 N.J. 358, 161 A.2d 69 (1960).

<sup>30</sup> See, e.g., *Hawkins Constr. Co. v. Matthews Co.*, 190 Neb. 546, 209 N.W.2d 643 (1973).

<sup>31</sup> The clear majority of the jurisdictions which have faced the issue of whether defective design cases are cognizable under strict liability have answered affirmatively. See *Mather v. Caterpillar Tractor Co.*, 23 Ariz. App. 409, 533 P.2d 717 (1975); *Cronin v. J.B.E. Olson Corp.*, 8 Cal. 3d 121, 501 P.2d 1153, 104 Cal. Rptr. 433 (1972); *Bradford v. Bendix Westinghouse Automotive Air Brake Co.*, 33 Colo. App. 99, 517 P.2d 406 (1973); *Rindlisbaker v. Wilson*, 95 Idaho 752, 519 P.2d 421 (1974); *Allen v. Kewanee Mach. and Conveyor Co.*, 23 Ill. App. 3d 158, 318 N.E.2d 696 (1974); *Phipps v. General Motors Corp.*, 363 A.2d 955 (Md. App. 1976); *Blevins v. Cushman Motors*, 551 S.W.2d 602 (Mo. 1977); *Brandenberger v. Toyota Motor Sales, U.S.A., Inc.*, 162 Mont. 506, 513 P.2d 268 (1973); *Bexiga v. Havir Mfg. Corp.*, 60 N.J. 402, 290 A.2d 281 (1972); *Deem v. Woodbine Mfg. Co.*, 89 N.M. 50, 546 P.2d 1207 (Ct. App. 1976); *Siebel v. Symons*, 221 N.W.2d 50 (N.D. 1974); *Phillips v. Kimwood Machine Co.*, 269 Or. 485, 525 P.2d 1033 (1974); *Engberg v. Ford Motor Co.*, 205 N.W.2d 104 (S.D. 1973); *Pizza Inn, Inc. v. Tiffany*, 454 S.W.2d 420 (Tex. Civ. App.—Waco 1970, no writ); *Seattle-First Nat'l Bank v. Tabert*, 86 Wash. 2d 145, 542 P.2d 774 (1975); *Arbet v. Gussarson*, 66 Wis. 2d 551, 225 N.W.2d 431 (1975). See also Annot., 76 A.L.R.2d 91 (1961).

<sup>32</sup> 59 Cal. 2d 57, 377 P.2d 897, 27 Cal. Rptr. 697 (1963).

<sup>33</sup> For a comprehensive list of the states which have adopted the doctrine of strict products liability see 1 PROD. LIAB. REP. (CCH) ¶ 4060 and 1 HURSH & BAILEY, *supra* note 4, at § 4:41.

<sup>34</sup> *Greenman v. Yuba Power Prods., Inc.*, 59 Cal. 2d 57, 377 P.2d 897, 27 Cal. Rptr. 697 (1963); RESTATEMENT (SECOND) OF TORTS § 402A (1965);

rationale applied it to a defective altimeter. In *Goldberg v. Kollsman Instrument Corp.*,<sup>35</sup> the Court of Appeals in New York, although basing its decision largely upon principles of implied warranty clearly expressed its approval of the *Greenman* decision and extended a cause of action for liability without fault to passengers aboard a Lockheed airplane which crashed because of a defective altimeter. Since the *Goldberg* decision, the principles of strict products liability have been regularly applied to the design of aircraft and their components.<sup>36</sup>

The presence of a defect is essential to the doctrine of strict liability; proof that the product caused an injury is not enough to establish the cause of action. Strict liability is not absolute liability, and the manufacturer is not the insurer of its product.<sup>37</sup> Therefore, the initial inquiry must always be whether the product was defective.<sup>38</sup> It is that question, more than any other, which has troubled the courts.<sup>39</sup> Generally, a product can be defective in at least three ways: (1) it may have been fabricated improperly, in the sense that at the time of sale it was not in the condition its maker intended it to be; (2) it may have been improperly designed; or (3) instructions or warnings may have been inadequate to provide for the safety of those using or affected by the use of the product.<sup>40</sup> Because of the many ways in which a product can be

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Traynor, *The Ways and Meanings of Defective Products and Strict Liability*, 32 TENN. L. REV. 363 (1965).

<sup>35</sup> 12 N.Y.2d 432, 191 N.E.2d 81, 240 N.Y.S.2d 592 (1963).

<sup>36</sup> See, e.g., *Rigby v. Beech Aircraft Corp.*, 548 F.2d 288 (10th Cir. 1977) (defective design of auxiliary fuel tanks); *Bruce v. Martin-Marietta Corp.*, 544 F.2d 442 (10th Cir. 1976) (defective design of aircraft seats); *Kritser v. Beech Aircraft Corp.*, 479 F.2d 1089 (5th Cir. 1973) (defective design of fuel system); *Manos v. World Airlines*, 324 F. Supp. 470 (N.D. Ill. 1971) (defective design of thrust reversers); *Brachner v. Pearson*, 479 P.2d 319 (Alaska 1970) (defective design of exhaust system); *McGee v. Cessna Aircraft Co.*, 82 Cal. App. 3d 1005, 147 Cal. Rptr. 694 (1978) (defective design of fuel system); *Myers v. Cessna Aircraft Corp.*, 275 Or. 501, 553 P.2d 355 (1976) (defective design of pilot tube). For other cases applying strict products liability to aircraft and their components see 6 HURSH & BAILEY, *supra* note 4, at §§ 35:4-35:6.

<sup>37</sup> Wade, *Strict Tort Liability of Manufacturers*, 19 Sw. L.J. 5, 13 (1965).

<sup>38</sup> Calabresi & Hirschoff, *Toward a Test for Strict Liability in Torts*, 81 YALE L.J. 1055, 1061 (1972).

<sup>39</sup> *Id.* at 1055.

<sup>40</sup> Keeton, *Product Liability and the Meaning of Defect*, 5 ST. MARY'S L.J. 30, 33-34 (1974); Phillips, *The Standard for Determining Defectiveness in Products Liability*, 46 U. CIN. L. REV. 101, 102 (1977).

defective, no single definition applicable to all cases has proved adequate.<sup>41</sup> A product's potentially harmful condition may be created either intentionally or unintentionally and at one or more stages of its development, during design, manufacture, testing, packaging, sale (with or without instructions and warnings), or foreseeable or unforeseeable use.

In most cases, defects occur during either design or manufacture, and it is not always possible to distinguish between them. If all of the products contain a common flaw, then the defect might well be characterized as one of design,<sup>42</sup> while, if only an occasional flaw occurs, the defect can be assigned to the manufacturing process. At these extremes the difference between manufacturing and design defects has meaning. There is, nevertheless, a grey area in which the distinction becomes blurred.<sup>43</sup> Because product design affects quality control, which in turn affects manufacturing flaws, a change in design could reduce manufacturing defects.<sup>44</sup> If a change in design reduces or eliminates manufacturing defects, cannot the manufacturing defect be treated as a design defect? Due to the inherent difficulty in distinguishing between manufacturing and design defects, the practitioner should allege both in his pleading. For example, in a case the author recently settled, a twin-engine general aviation airplane crashed, killing the pilot and his passenger, when the propeller of one engine would not feather. The National Transportation Safety Board investigation revealed that a set screw in the collar of a propeller governor pilot valve plunger backed out causing the oil passage holes in the plunger to align in such a way that the governor was set in the low pitch, high rpm position and became uncontrollable. The design of the assembly called for the set screw to be epoxied in the collar, but a visual examination revealed no signs of glue in the set screw threads. It was likely that when the propeller

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<sup>41</sup> Traynor, *supra* note 34, at 373.

<sup>42</sup> Comment, *Automobile Design Liability: Larsen v. General Motors and its Aftermath*, 118 U. PA. L. REV. 299 n. 4 (1969). But cf., Comment, *Strict Liability in Tort Based on Defective Design*, 45 WASH. U.L.Q. 359 n. 1 (1970): "Conceptually, however, a defect could be 'common to' an entire given model and still be attributable to the manufacturing process, . . ."

<sup>43</sup> Weinstein, Twerski, Piehler & Donaher, *Products Liability, An Interaction of Law and Technology*, 12 DUQ. L. REV. 425, 432 n. 38 (1974).

<sup>44</sup> Holford, *The Limits of Strict Liability for Product Design and Manufacture*, 52 TEX. L. REV. 81, 84-85 (1973).



governor was assembled at the factory, someone simply forgot to apply epoxy. By any definition, it was a manufacturing defect. The assembled governor did not conform to the manufacturer's own specifications, and it "deviated from the norm" of like products. Arguably, it was also a design defect because the unnecessarily complicated nature of assembling the governor probably caused the omission of epoxy. The design of the pilot valve plunger-collar assembly could have called for machining the part out of a single piece of metal; alternatively, it could have called for another type of retention device such as a collar and through pin assembly. Either design would have prevented the manufacturing defect.

The nature of a pure design defect also varies. It may be the result of inadvertent design error or a conscious choice.<sup>45</sup> The appropriate definition of a design defect contained in a jury instruction may depend upon whether the design was intentional. The courts, however, have been slow to recognize this distinction.<sup>46</sup>

Despite the difficulties inherent in establishing a definition of a defect, it must be done if we are to develop a coherent principle of strict products liability. If consumers are to be protected, and if the law of strict products liability is to be one of the vehicles to achieve that protection, then a definition which comports with the policy considerations on which strict products liability is based and which affords recognition of the manufacturer's legitimate interests must be formulated.<sup>47</sup>

Parenthetically, it should be noted that not all courts are interested in defining a design defect in the context of strict liability. For example, in Maryland and Nebraska, motor vehicle design

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<sup>45</sup> Henderson, *Judicial Review of Manufacturer's Conscious Design Choices: the Limits of Adjudication*, 73 COLUM. L. REV. 1531, 1543-44 (1973). Professor Henderson believes that courts are inherently unsuited to the task of establishing product safety standards, particularly those by which to measure manufacturers' conscious design choices, because of the polycentric nature of the problem of establishing product safety standards. For a rebuttal of Henderson's thesis see Twerski, Weinstein, Donaher, & Piehler, *The Use and Abuse of Warnings in Products Liability—Design Defect Litigation Comes of Age*, 61 CORNELL L. REV. 495 (1976). For Professor Henderson's response, see Henderson, *Design Defect Litigation Revisited*, 61 CORNELL L. REV. 541 (1976).

<sup>46</sup> Henderson, *Judicial Review of Manufacturer's Conscious Design Choices: the Limits of Adjudication*, *supra* note 45.

<sup>47</sup> Dickerson, *Products Liability: How Good Does a Product Have To Be?*, 42 IND. L.J. 301, 302 (1967).

"crashworthiness" cases are handled as negligence cases regardless of plaintiff's theory of liability.<sup>48</sup> This position has its support among the commentators;<sup>49</sup> however, it has proved to be unsatisfactory. One of the prime reasons for a strict liability approach to products liability is that often it is impossible to prove negligence on the part of the manufacturer or the supplier.<sup>50</sup> Second, carving out a design defect exception to strict products liability creates the problem in that intermediate suppliers are often simply not negligent when it comes to design.<sup>51</sup> If liability were left to negligence principles, the risk-spreading and enterprise liability underpinnings of strict products liability would be frustrated. Negligence is best suited for cases where there is some parity of risk-avoiding ability between actor and victim and where risk avoidance is shared between them. When the victim can do nothing to protect himself, strict liability is called for. Given the technological complexities of products like aircraft, it is apparent that in the area of design there is a lack of parity of risk-avoiding ability between the manufacturer, with its staff of engineers, and the relatively unsophisticated purchaser and user of general aviation aircraft. It has been held, however, that such parity exists when an airline purchases a jet transport.<sup>52</sup>

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<sup>48</sup> Volkswagen of America, Inc. v. Young, 272 Md. 201, 216, 321 A.2d 737, 746 (1974); Friedrich v. Anderson, 191 Neb. 724, 733, 217 N.W.2d 831, 836-37 (1974).

<sup>49</sup> Hoenig, *Product Designs and Strict Liability: Is There a Better Approach?* 8 Sw. U. L. REV. 109 (1976). Hoenig calls for a negligence approach to all design liability cases saying that unless one is prepared to accept a no-fault approach to products liability, there must be a reconsideration of the fundamental premises of products liability in order to achieve a sense of order, certainty, and predictability. *Id.* at 111. The current state of confusion in the law of products liability, he says, results from vagueness surrounding the issue of defect, particularly design defect. His solution is to establish a test of defective design which permits the trier of fact to consider all relevant factors in determining whether a design is defective. The test he proposes is traditional negligence analysis. *Id.* at 123-24. See also Herrington, *Products Liability: Model Proposals for Legislative Reforms*, 43 J. AIR L. & COM. 221 (1977).

<sup>50</sup> Wade, *supra* note 2, at 826.

<sup>51</sup> *Id.* at 836-37; Prosser, *supra* note 20, at 1117.

<sup>52</sup> Kalven, *Torts: The Quest for Appropriate Standards*, 53 CALIF. L. REV. 189, 206 (1965). It has been held that the doctrine of strict products liability does not apply as between parties who deal in a commercial setting from positions of relatively equal economic strength. *Kaiser Steel Corp. v. Westinghouse Elec. Corp.*, 55 Cal. App. 3d 737, 127 Cal. Rptr. 838 (1976); *cf.*, *Delta Air Lines, Inc. v. Douglas Aircraft Corp.*, 238 Cal. App. 2d 95, 47 Cal. Rptr. 518

In contrast to the approach taken in states such as Maryland<sup>53</sup> and Nebraska,<sup>54</sup> other courts handle design defect "crashworthiness" cases under the theory of strict products liability as well as negligence. In *McGee v. Cessna Aircraft Co.*,<sup>55</sup> the California Court of Appeal rejected the argument that crashworthiness cases should be judged by negligence principles. The Court said, "California does not require a crashworthiness suit to be brought under 'general negligence' doctrines."<sup>56</sup> California has not only imposed responsibility on a manufacturer for a defective or defectively designed part causing injury in a secondary accident matrix, but has done so under strict tort liability rules.<sup>57</sup>

If we are to retain strict products liability without absolute liability, the definition of design defect ultimately adopted must be consistent with the reasons for imposing strict liability for products. Four reasons have generally been given.<sup>58</sup> First, strict products liability distributes the risk of injury. Its cost may be an overwhelming misfortune to the person injured, and a needless one, because the risk can be insured by the manufacturer and distributed among the public in the price of the product.<sup>59</sup> Second, strict liability has a deterrent effect. "Experience seems to demonstrate that if a manufacturer knows he will be liable for injuries inflicted by his product, that product will be safer than if he understands that he can avoid liability by demonstrating the exer-

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(1965), which upheld a contractual disclaimer in a products liability action based on express and implied warranties and on negligence. Had the parties to the contract and the subsequent lawsuit been of unequal bargaining power, the result probably would have been different. *Accord*, *Delta Air Lines, Inc. v. McDonnell Douglas Corp.*, 503 F.2d 239 (5th Cir. 1974), *cert. denied*, 421 U.S. 965 (1975) and *Keystone Aeronautics Corp. v. R. J. Enstrom Corp.*, 499 F.2d 146 (3d Cir. 1974).

<sup>53</sup> See note 48 *supra*.

<sup>54</sup> *Id.*

<sup>55</sup> 82 Cal. App. 3d 1005, 147 Cal. Rptr. 694 (1978).

<sup>56</sup> 82 Cal. App. 3d at 1017, 147 Cal. Rptr. at 701.

<sup>57</sup> *Id.*, but *cf.*, *Williams v. Cessna Aircraft Corp.*, 376 F. Supp. 603 (N.D. Miss. 1974), holding that there is no manufacturer's liability in "second accident" or "crashworthiness" cases.

<sup>58</sup> Keeton, *Manufacturer's Liability: The Meaning of 'Defect' in the Manufacture and Design of Products*, 20 SYRACUSE L. REV. 559, 560-61 (1969); Prosser, *supra* note 20, at 1122-24; Wade, *supra* note 2, at 826.

<sup>59</sup> *Escola v. Coca-Cola Bottling Co.*, 24 Cal. 2d 453, 462, 150 P.2d 436, 441 (1944).

cise of due care."<sup>60</sup> Third, it is often difficult to prove negligence on the part of the manufacturer.<sup>61</sup> Seldom, if ever, does the plaintiff have any evidence of what transpired in the manufacturer's plant.<sup>62</sup> Fourth, the consumer is entitled to assume that the product is what it is represented to be, and, if harm results from an unexpected defect he should be able to recover under the "representational rationale."<sup>63</sup>

During the development of products liability law, courts have struggled to define the type of defect that will give rise to strict liability in tort.<sup>64</sup> Although there are several variations on the theme, two basic definitions emerge in design cases: (1) A product is defective if it fails to meet consumer expectations<sup>65</sup> or (2) if the risk of harm it creates outweighs its utility.<sup>66</sup>

One of the most widely adopted tests is that of consumer expectation set out in the Restatement (Second) of Torts, Section 402A. Strict liability applies when a product is "... in a defective condition unreasonably dangerous to the user or consumer."<sup>67</sup> The Comments to Section 402A define it as "... a condition not contemplated by the ultimate consumer, which will be unreasonably

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<sup>60</sup> Wade, *supra* note 2, at 826.

<sup>61</sup> *Id.* See also, Montgomery & Owen, *supra* note 21, at 809.

<sup>62</sup> Prosser, *supra* note 20, at 1114.

<sup>63</sup> Keeton, *supra* note 58.

<sup>64</sup> See Traynor, *supra* note 34. Perhaps one reason that courts have had such difficulty in formulating definitions, particularly in design cases, is that in such cases the nature and use of the products involved vary extensively from one case to the next. Precedent may, therefore, be of little value. Note, *Products Liability-Defectiveness Standard of Section 402A of Restatement (Second) of Torts Questioned*, 80 DICK. L. REV. 633, 639 (1975). But see *Barker v. Lull Eng'r Co.*, 20 Cal. 3d 413, 428-29, 573 P.2d 443, 453, 143 Cal. Rptr. 225, 235 (1978):

By observing that the problem in defining defect might be alleviated by reference to the cluster of 'useful precedents,' we intended to suggest that in drafting and evaluating instructions on this issue in a particular case, trial and appellate courts would be well advised to consider prior authorities involving similar defective product claims.

*Barker* is discussed at length in the text accompanying notes 99-107 *infra*.

<sup>65</sup> RESTATEMENT (SECOND) OF TORTS § 402A comments f, h, and i (1965); *Manos v. Trans World Airlines, Inc.*, 324 F. Supp. 470 (N.D. Ill. 1971); *Dickenson, The ABC's of Products Liability—With a Close Look at Section 402A and the Code*, 36 TENN. L. REV. 439 (1969).

<sup>66</sup> *Horn v. General Motors Corp.*, 17 Cal. 3d 359, 551 P.2d 398, 131 Cal. Rptr. 78 (1976); *Calabresi & Hirschhoff, supra* note 38; Wade, *supra* note 2.

<sup>67</sup> RESTATEMENT (SECOND) OF TORTS § 402A (1965).

dangerous to him.”<sup>68</sup> “A product is not in a defective condition when it is safe for normal handling and consumption.”<sup>69</sup> “Unreasonably dangerous” means that “[t]he article sold must be dangerous to an extent beyond that which would be contemplated by the ordinary consumer who purchased it, with the ordinary knowledge common to the community as to its characteristics.”<sup>70</sup>

Despite its popularity, the Restatement test has been the subject of much criticism. In *Cronin v. J.B.E. Olson Corp.*,<sup>71</sup> the California Supreme Court rejected the requirement that the defect make the product unreasonably dangerous to the user or consumer.<sup>72</sup> The court stated that it smacks of negligence<sup>73</sup> and contravenes the purpose of strict product liability, which is to relieve plaintiffs of the problems of proof inherent in negligence cases.<sup>74</sup> Furthermore, the dual requirement of proving that a product is both defective and unreasonably dangerous places on plaintiffs a significantly increased burden and represents a step backward.<sup>75</sup>

The consumer expectation standard of the Restatement suffers from other difficulties. First, it is phrased in terms of a condition not contemplated by the ultimate consumer. In other words, if the defect is obvious or patent, there is no recovery. “Requiring the defect to be latent would severely limit the cases in which the financial burden would be shifted to the manufacturer. . . . the

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<sup>68</sup> *Id.* at comment g.

<sup>69</sup> *Id.* at comment h.

<sup>70</sup> *Id.* at comment i.

<sup>71</sup> 8 Cal. 3d 121, 501 P.2d 1153, 104 Cal. Rptr. 433 (1972).

<sup>72</sup> 8 Cal. 3d at 134-35, 501 P.2d at 1163, 104 Cal. Rptr. at 443. The “unreasonably dangerous” test was also rejected in *Anderson v. Fairchild-Hiller Corp.* 358 F. Supp. 976 (D. Alas. 1973), in *Glass v. Ford Motor Co.*, 123 N.J. Super. 599, 304 A.2d 562 (1973) and in *Berkebile v. Brantley Helicopter Corp.*, 462 Pa. 83, 337 A.2d 893 (1975). Whether *Berkebile* retains any meaning on this point is questionable: “The *Berkebile* plurality opinion . . . was signed by only two justices. Two other justices filed concurring opinions on limited grounds. The remaining three justices concurred *only* in the result. Thus five of seven Pennsylvania Supreme Court Justices refused to join in the opinion. Pennsylvania law provides that such an opinion . . . has no precedential value.” Hoenig, *supra* note 49, at 116 n. 29. Subsequent Pennsylvania opinions have adhered to the “unreasonably dangerous” requirement. *See, e.g.,* *Beron v. Kramer-Trenton Co.*, 402 F. Supp. 1268, 1274 (E.D. Pa. 1975).

<sup>73</sup> *Cronin v. J.B.E. Olson Corp.*, 8 Cal. 3d 121, 132, 501 P.2d 1153, 1162, 104 Cal. Rptr. 433, 440 (1972).

<sup>74</sup> *Id.*

<sup>75</sup> *Id.*

result would be to immunize from strict liability manufacturers who callously ignore patent dangers in their products while subjecting to liability those who innocently market products with latent defects.<sup>76</sup> If liability is so limited, the manufacturer has no incentive to improve the safety of his more obviously defective products, thus weakening the deterrent effect of strict liability. Second, there are situations in which consumer attitudes have not developed sufficiently to define an expected standard of performance.<sup>77</sup> This problem is particularly critical in the area of newly developed products. Also, what of injured persons who are neither users nor consumers? A passenger injured in an airplane crash is a good example. Whereas pilots and purchasers may have sufficient familiarity with aircraft to have developed reasonable expectations, passengers do not. A third and somewhat related problem is that consumer expectations may be too low or too high. Federal regulations establish minimum standards for certain products, among them aircraft.<sup>78</sup> In some instances, these regulations might be above the expectations of ordinary consumers. A violation of them would be negligence per se,<sup>79</sup> but strict adherence to the consumer expectation test would require a finding that the product was not defective. On the other hand, consumer expectations may not always coincide with what manufacturers can achieve because the average person will not have the same information as experts in the field.<sup>80</sup> The newer and less familiar the product is, the greater the consumer expectation as to safety tends to be,<sup>81</sup> while it is common knowledge that some newly designed machinery, including aircraft are initially less safe. With them, unanticipated deficiencies are revealed only after a period of service history. The weakness of the consumer expectation test is that if applied alone it does

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<sup>76</sup> *Luque v. McLean*, 8 Cal. 3d 136, 145, 501 P.2d 1163, 1169, 104 Cal. Rptr. 443, 449 (1972); Donaher, Piehler, Twerski, & Weinstein, *The Technological Expert in Products Liability Litigation*, 52 TEX. L. REV. 1303, 1304 (1974); Jackson, Cronin and Luque: *The Search For A Standard in Strict Liability in Tort*, 10 U. S.F. L. REV. 725 (1975-76).

<sup>77</sup> *Dickenson*, *supra* note 65, at 455.

<sup>78</sup> 14 C.F.R. §§ 21, 23, 25, 27, 29, 31, 33, 35 and 37 (1978).

<sup>79</sup> *Keeton*, *supra* note 58, at 569.

<sup>80</sup> *Fischer, Products Liability—The Meaning of Defect*, 39 MO. L. REV. 339, 349-50 (1974).

<sup>81</sup> *Rheingold, What Are the Consumer's Reasonable Expectations?*, 22 BUS. LAW. 589, 595 (1967).

not adequately serve the underlying social purposes of strict products liability.

The risk-utility analysis as a test of product defectiveness developed by Deans Wade and Keeton has also gained wide acceptance.<sup>82</sup> This strict liability standard is basically no different from that of negligence, except that the manufacturer is presumed to have knowledge of the actual condition of the product when it leaves his hands.<sup>83</sup> Thus, the element of *scienter* is provided. Once the assumption is made that the manufacturer knew of the dangerous condition when he marketed the product, the inquiry is whether his decision to do so was a reasonable one. Seven factors are offered for consideration in testing the reasonableness of the marketing decision:

(1) The usefulness and desirability of the product—its utility to the user and to the public as a whole.

(2) The safety aspect of the product—the likelihood that it will cause injury, and the probable seriousness of the injury.

(3) The availability of a substitute product which would meet the same need and not be as unsafe.

(4) The manufacturer's ability to eliminate the unsafe character of the product without impairing its usefulness or making it too expensive to maintain its utility.

(5) The user's ability to avoid danger by the exercise of care in the use of the product.

(6) The user's anticipated awareness of the dangers inherent in the product and their avoidability, because of general public knowledge of the obvious condition of the product, or of the existence of suitable warnings or instructions.

(7) The feasibility, on the part of the manufacturer, of spreading the loss by setting the price of the product or carrying liability insurance.<sup>84</sup>

When a manufacturer is involved, the difference between negligence and strict liability is slight under the risk-utility analysis.<sup>85</sup> There is a great difference, however, when liability is sought to

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<sup>82</sup> Wade, *supra* note 37, at 15; Wade, *supra* note 2, at 836-38; Keeton, *supra* note 40, at 38.

<sup>83</sup> Wade, *supra* note 37, at 15.

<sup>84</sup> Wade, *supra* note 2, at 837-38.

<sup>85</sup> Phillips, *supra* note 40, at 103.

be imposed on wholesalers, retailers, or others in the chain of product distribution.<sup>86</sup> Under the majority rule, the retailer has no duty to inspect or to test the products he markets.<sup>87</sup> The reasonableness of his decision, therefore, cannot be tested adequately, and as to him the risk-utility analysis breaks down because it fails to distribute the risk of loss to everyone in the chain of product distribution.

A second difficulty with the risk-utility analysis is that the first part of the test, which views the marketing decision from the perspective of the reasonable manufacturer,<sup>88</sup> shifts the focus to the vantage point of the person whose evaluation of risk versus utility may be skewed to his own perspective.<sup>89</sup>

A third difficulty with risk-utility analysis is the problem of proof. One of the prime reasons for adopting strict products liability was to relieve unknowledgeable injured plaintiffs of the burden of proving negligence.<sup>90</sup> Under the risk-utility test of defect, his burden will be as great as it was in negligence actions. He will have to prove facts that are in most part unavailable to him.<sup>91</sup> For example, manufacturers of technologically complex products, such as aircraft, usually are in a better position to identify risks inherent in their product's design. Furthermore, they probably have greater knowledge of feasible alternatives and clearly are better able to measure the cost of feasible alternatives.

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<sup>86</sup> *Id.*

<sup>87</sup> *Id.*

<sup>88</sup> This portion of the test originated in Keeton, *Manufacturer's Liability: The Meaning of 'Defect' in the Manufacture and Design of Products*, 20 SYRACUSE L. REV. 559 (1969); cf. *Welch v. Outboard Marine Corp.*, 481 F.2d 252 (5th Cir. 1973), which held that a product is "defective" and "unreasonably dangerous" when a reasonable seller would not sell the product if he knew of the risks involved.

<sup>89</sup> Donaher, Piehler, Twerski, & Weinstein, *The Technological Expert in Products Liability Litigation*, 52 TEX. L. REV. 1303, 1306-07 (1974). "There are indications that automobile engineers proposing safer designs are apt to be thrust aside in favor of salesmen and stylists," Noel, *Manufacturer's Negligence of Design or Directions for Use of a Product*, 71 YALE L.J. 816, 853 n. 154 (1962). "Dependence on industry financing and technical experts who are paid by industry as regular employees, consultants, or contractors tends to subordinate national interests to private ends", Henderson, *Judicial Review of Manufacturer's Conscious Design Choices: The Limits of Adjudication*, *supra* note 45, at 1556-57 n. 108, citing THE REPORT OF THE NATIONAL COMMISSION ON PRODUCT SAFETY 62 (1970).

<sup>90</sup> Wade, *supra* note 2, at 826; Montgomery & Owen, *supra* note 21, at 809.

<sup>91</sup> Wade, *supra* note 2, at 826; Montgomery & Owen, *supra* note 21, at 809.



Two other problems with the risk-utility test are that "by relieving manufacturers of liability in such a broad area, it may undesirably reduce the manufacturer's incentive to improve his product. . . ."<sup>92</sup> It also allows too large an area for consumer economic choice concerning technologically complex products in which an "ever expanding range of design features lies outside of general consumer knowledge."<sup>93</sup>

In *Barker v. Lull Engineering Co., Inc.*<sup>94</sup> the California Supreme Court established a dual test for design defect cases that incorporates both the consumer expectation test and the risk-utility analysis. In deference to courts in Oregon and Texas, it should be noted that California is not the first jurisdiction to adopt such an amalgam.<sup>95</sup> Oregon, according to one commentator, uses the Wade-Keeton test and the consumer expectation test in the conjunctive. It requires a plaintiff to satisfy a double burden and unnecessarily limits manufacturers' liability.<sup>96</sup> Courts in Texas have adopted the two tests in the disjunctive.<sup>97</sup> This is arguably an expansion of liability.<sup>98</sup> The principal difference between the California and Texas approach is that California also shifts the burden of proof of risk versus utility to the manufacturer, where it properly should be once plaintiff proves he was injured by the product's design.

In *Barker*, a plaintiff equipment operator was injured during the roll over of a high lift loader manufactured by defendant Lull. He brought an action claiming that the loader was defective in design because (1) it was unstable due to its narrow wheel base, (2) it was not equipped with "outriggers", (3) it was not equipped with a roll bar or seat belts, (4) its leveling mechanism was inadequate, and (5) its transmission was unsuitable.<sup>99</sup> The trial court instructed the jury "that strict liability for a defect in design

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<sup>92</sup> Holford, *supra* note 44, at 93.

<sup>93</sup> *Id.* at 93-94.

<sup>94</sup> 20 Cal. 3d 413, 573 P.2d 443, 143 Cal. Rptr. 225 (1978).

<sup>95</sup> Note, *Torts—Products Liability—Strict Liability for Defect in Design*, 43 Mo. L. REV. 601, 609 (1978).

<sup>96</sup> *Id.*

<sup>97</sup> *Id.* See *General Motors Corp. v. Hopkins*, 548 S.W.2d 344 n. 1 (Tex. 1977).

<sup>98</sup> Note, *Torts—Products Liability—Strict Liability for Defect in Design*, 43 Mo. L. REV. 601, 609 (1978).

<sup>99</sup> 20 Cal. 3d 413, 419-20, 573 P.2d 443, 447-48, 143 Cal. Rptr. 225, 229-30 (1978).

of a product is based on a finding that the product was unreasonably dangerous for its intended use. . . ."<sup>100</sup> A verdict was returned for defendants and the Supreme Court reversed, holding that "a product is defective in design (1) if the plaintiff demonstrates that the product failed to perform as safely as an ordinary consumer would expect when used in an intended or reasonably foreseeable manner, or (2) if the plaintiff proves that the product's design proximately caused his injury and the defendant failed to prove, in the light of the relevant factors discussed above, that on balance the benefits of the challenged design outweigh the risk of danger inherent in such design."<sup>101</sup> Some of the relevant factors are the gravity of the danger posed by the challenged design, the likelihood that such danger would occur, the mechanical feasibility of a safer alternative design, the financial cost of an improved design, and the adverse consequences to the product and to the consumer that would result from an alternative design.<sup>102</sup>

The significance of the *Barker* tests is two-fold. First, the tests are in the disjunctive. The plaintiff has the option of selecting the approach which best suits his case.<sup>103</sup> Second, and perhaps of greater significance, the burden of proof concerning the reasonableness of the decision to market the product *shifts* to the manufacturer once plaintiff proves that the design of the product proximately caused his injuries.<sup>104</sup> By establishing a disjunctive dual

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<sup>100</sup> 20 Cal. 3d at 422, 573 P.2d at 449, 143 Cal. Rptr. at 231.

<sup>101</sup> 20 Cal. 3d at 435, 573 P.2d at 457-58, 143 Cal. Rptr. at 239-40.

<sup>102</sup> 20 Cal. 3d at 431, 573 P.2d at 455, 143 Cal. Rptr. at 237. The court recognized that there might be other relevant factors but chose not to elaborate. Obviously, the factors which are relevant in a given case may vary.

<sup>103</sup> Presumably the plaintiff could elect to use both tests. A question arises, however, concerning situations in which the plaintiff chooses to use only the consumer expectation test. Does that prevent the defendant manufacturer from producing evidence of utility versus risk? It probably does prevent such production of evidence. Evidence of a product's utility is not relevant to a determination of whether the product performed as safely as an ordinary consumer would expect. Furthermore, had the court intended that evidence of risk versus utility would be admissible in consumer expectation test situations, it would not have been necessary to formulate the tests in the alternative.

<sup>104</sup> A curious difference exists in the court's formulation of the two parts of the test. The consumer expectation test allows recovery only as long as the use of the product was intended or reasonably foreseeable. 20 Cal. 3d at 435, 573 P.2d at 457-58, 143 Cal. Rptr. at 239-40. The risk-utility test makes no mention of intended or reasonably foreseeable uses. *Id.* This was perhaps an oversight because a subsequent opinion of the court makes it clear that "the manufacturer is not deemed responsible when injury results from an unforeseeable

test of defective design in which the burden of proving its reasonableness is shifted to the manufacturer, the California Supreme Court minimized most of the objections to the consumer expectation and the risk-utility tests. The Court recognized the weaknesses of each test used alone, commenting that the consumer expectation cannot be the exclusive test for evaluating design defectiveness because in many situations consumer expectations are inadequate.<sup>105</sup> It also saw that the risk-utility test creates problems for plaintiffs, primarily because most of the evidentiary requirements relevant to a determination of risk versus utility are similar to issues typically presented in a negligent design case and involve technical matters peculiarly within the knowledge of the manufacturer.<sup>106</sup>

The *Barker* decision goes a long way toward defining a defect in terms of the policy considerations underlying the imposition of strict liability. The court's rationale was that the:

[D]ual standard for design defects assures an injured plaintiff protection from products that either fall below ordinary consumer expectations as to safety, or that, on balance, are not as safely designed as they should be. At the same time the standard permits a manufacturer who has marketed a product which satisfies ordinary consumer expectations to demonstrate the relative complexity of design decisions and the trade-offs that are frequently required in the adoption of alternative designs. Finally, this test reflects [the California courts'] continued adherence to the principle that, in a *product* liability action, the trier of fact must focus on the product, not on the manufacturer's conduct, and that the plaintiff need not prove that the manufacturer acted unreasonably or negligently in order to prevail in such an action.<sup>107</sup>

Potentially, the most disastrous consequences of a defectively designed product exist in an aircraft. One need consider only the example of the DC-10 Paris air crash on March 3, 1974. A defect in the airplane's cargo door allowed it to open in flight. The resulting decompression caused the floor to collapse and to sever the hydraulic lines to the flight controls, thus causing the crash

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use of its product." *Daly v. General Motors Corp.*, 20 Cal. 3d 725, 733, 575 P.2d 1162, 1166, 144 Cal. Rptr. 380, 384 (1978).

<sup>105</sup> *Barker v. Lull Eng'r Co.*, 20 Cal. 3d 413, 430, 573 P.2d 443, 454, 143 Cal. Rptr. 225, 236 (1978).

<sup>106</sup> 20 Cal. 3d at 431, 573 P.2d at 455, 143 Cal. Rptr. at 237.

<sup>107</sup> 20 Cal. 3d at 418, 573 P.2d at 446-47, 143 Cal. Rptr. at 228-29.

that killed everyone on board.<sup>108</sup> The airline and its crew, as ordinary consumers, certainly must have expected better safety performance from the airplane. Although liability was admitted in the subsequent litigation, under the consumer expectation test, plaintiffs would undoubtedly have been entitled to a directed verdict upon proof of the above facts.

Considering the gravity of the danger when an aircraft malfunctions, in those states where the risk-utility analysis is used, aircraft manufacturers may well have a difficult time convincing jurors that even though there was a feasible, safer alternative, the benefits of the challenged design outweigh the risks of danger inherent in the design. Jurors may not readily accept a trade-off of safety for a few dollars saved and additional load carrying capacity. In future aircraft product liability litigation in states which adopt the dual disjunctive *Barker* test, once it is shown that a design defect caused the crash, manufacturers will have a heavy burden to overcome if they are to prevail.

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<sup>108</sup> In *Re Paris Air Crash*, 399 F. Supp. 732 (D.C. Cal. 1975).

