In the Matter of

CERTAIN DOUBLE-SIDED FLOPPY DISK DRIVES AND COMPONENTS THEREOF (TEO)

Investigation No. 337-TA-215

USITC PUBLICATION 1859

MAY 1986

United States International Trade Commission / Washington, DC 20436

UNITED STATES INTERNATIONAL TRADE COMMISSION

COMMISSIONERS

Paula Stern, Chairwoman
Susan W. Liebeler, Vice Chairman
Alfred E. Eckes
Seeley G. Lodwick
David B. Rohr
Anne E. Brunsdale

Address all communications to
Kenneth R. Mason, Secretary to the Commission
United States International Trade Commission
Washington, DC 20436

PUBLIC VERSION

United States International Trade Commission
Washington, D.C. 20436

In the Matter of	
CERTAIN DOUBLE-SIDED FLOPPY DISK DRIVES AND COMPONENTS THEREOF	Investigation No. 337-TA-215

COMMISSION MEMORANDUM OPINION

On May 30, 1985, the administrative law judge (ALJ) recommended in an initial determination (ID) that temporary relief be awarded under section 337(e) of the Tariff Act of 1930. 1/

On July 2, 1985, the Commission determined to review certain issues presented by the ID. 2/ Based upon the record of the temporary relief phase of this investigation, including the written submissions of the parties on review, the Commission determined on September 3, 1985, that a limited temporary exclusion should be awarded. The following opinion reflects the Commission's determination awarding temporary relief.

PROCEDURAL HISTORY

On December 6, 1984, Tendon Corporation (Tendon) filed a complaint and a motion (Motion No. 215-1) for temporary relief under section 337. On January 22, 1985, the Commission instituted an investigation to determine whether there is a violation of section 337 in the unlawful importation of certain double-sided floppy disk drives into the United States or in their sale, by reason of alleged infringement of the claims of U.S. Letters Patent

1/ The following abbreviations are used in this opinion: ALJ -- Administrative Law Judge; ID -- ALJ's Initial Determination; FF -- Finding of Fact; TR -- Transcript of evidentiary hearing on temporary relief before ALJ; CI -- complainant's exhibit, IRK -- respondent TEAC's exhibit.

2/ 50 Fed. Reg. 28,294 (1985).

4,151,573 (the '573 patent), the effect or tendency of which is to destroy or substantially injure an industry, efficiently and economically operated, in the United States. 3/ The Commission did not institute on Tandon's allegations concerning prevention of the establishment of a domestic industry.

The respondents are: (1) Mitsubishi Electric Corporation, (2) Mitsubishi Electronics America, Inc. (hereinafter collectively referred to as "Mitsubishi"), (3) TEAC Corporation, (4) TEAC Corporation of America (hereinafter collectively referred to as "TEAC"), (5) Sony Corporation, and (6) Sony Corporation of America (hereinafter collectively referred to as Sony).

On May 30, 1985, the ALJ granted complainant's motion for temporary relief after a hearing. Respondents and the Office of Unfair Import Investigations petitioned the Commission for review of the ID. On July 2, 1985, the Commission determined to review the ID on all the issues except (1) patent validity under 35 U.S.C. S 102(g), 35 U.S.C. S 103, and misjoinder of inventors, (2) efficient and economic operation, and (3) importation and sale. Notice of the Commission's decision to review the ID was published in the Federal Register. 4/

On July 8, 1985, complainant Tandon and respondents Sony filed a joint motion (Motion No. 215-32) to terminate this investigation as to the Sony respondents on the basis of a joint settlement agreement and license agreement. On July 19, 1985, the ALJ issued an ID (Order No. 20) terminating the Sony respondents. On August 15, 1985, the Commission approved a settlement and licensing agreement between the Sony respondents and Tandon. A

3/ 50 Fed. Reg. 4,276 (1985).
4/ 50 Fed. Reg. 28,294 (1985).

Federal Register notice terminating the Sony respondents was issued on August 20, 1985. 5/

As a result of that review, the Commission has determined to affirm the ALJ's initial determination and award temporary relief in the form of a limited temporary exclusion order.

STANDARD FOR GRANT OF TEMPORARY RELIEF

Section 337(e) governs the issuance of temporary relief. It provides that if, during the course of a section 337 investigation, the Commission determines that there is "reason to believe that there is a violation" of section 337, "it may direct that the articles concerned . . . be excluded from entry" unless after consideration of certain enumerated public interest factors, it finds that the articles should not be excluded (emphasis added). 6/

In exercising its authority under this provision, the Commission has traditionally undertaken a two part analysis. First, it determines whether the complainant has established "a reason to believe that there is a violation of section 337." The complainant must establish this "reason to believe" as to each element of a section 337 violation. Once the Commission has determined that there is a "reason to believe" that section 337 has been

---

5/ TEAC and Tendon filed a proposed settlement agreement and a motion (Motion No. 215-54) to terminate the investigation as to TEAC on Aug. 19, 1985. The Ala has not issued an ID terminating TEAC as of September 3, 1985. Thus, TEAC is a respondent in the investigation.

6/ By way of comparison, section 337(d), which governs permanent exclusion orders, provides that when the Commission determines that a violation of section 337 does exist, "it shall direct that the articles concerned . . . be excluded from entry . . . " subject to the same public interest factors as specified in section 337(e) [emphasis added). See October 5, 1984, Commission Opinion in Certain Fluidized Supporting Apparatus and Components Thereof ("Burn Beds"), Inv. No. 337-TA-182/188, at 3-5; S. Rep. No. 1298, 93d Cong., 2d Sess. 197-198 (1974). 19 U.S.C. S 1337(f).

violated, the Commission must then determine, as the second part of its anallsis, whether it is appropriate to exercise its discretion to award temporary relief. The Commission balances the following four criteria:

1. Complainant's probability of success on the merits;

2. Immediate and substantial harm to the domestic industry in the absence of the requested temporary relief;

3. Harm, if any, to the respondents if the requested temporary relief is granted; and

4. The effect, if any, that the issuance of the requested temporary relief would have on the public interest. 7/

These criteria are similar to, and derived from those governing the grant of preliminary injunctions in Federal district courts. 8/

THE PRODUCT, TECHNOLOGY AND THE '573 PATENT

The articles under investigation are double-sided floppy disk drives. Disks store information for use in computers. Floppy disks drives use floppy disks which are circular and made of pliant plastic. 9/ In the computer, a disk drive'reads information electrically from a magnetic coating on the disk by rotating (driving) the disk past a main component of the drive called the "read/write" head, transducer, or head assembly. Current floppy disk drives

---

7/ 19 C.F.R. S 210.24(e).

8/ See Certain Apparatus for the Continuous Production of Copper Rod ("Copper Rod II"), Inv. No. 337 -TA -89, USITC Pub. No. 1132 (April 1981), citing Washington Metropolitan Area Transit Commission v. Holiday Tours, Inc. 559 F.2d 841 (D.C. Cir. 1977) ("WMATA") and Virginia Petroleum Jobbers Assoc. v. FPC, 259 F.2d 921 (D.C. Cir. 1958) ("VPJ"). These two cases actually involved, not the grant of preliminary injunctions, but the stay of permanent injunctions pending appeal (WMATA) or the stay of administrative orders (VPJ). WMATA, 559 F.2d at 842, n.l.

9/ The other major type of disk drive is the rigid "Winchester" disk drive. We are not concerned with it in the investigation.

are available in 8-inch, 5-1/4 inch and 3-1/2 inch, corresponding to the sizes of the disks. Complainant Tendon manufactures 8-inch, 5-1/4 inch and 3-1/2 inch 10/ double-sided floppy disk drives. Respondents TEAC and Mitsubishi manufacture and export to the United• States double-sided floppy disk drives in several sizes and models.

U.S. Patent No. 4,151,573 was issued on April 24, 1979, to Sirjang I. Tandon, Alfred Hackney and A. Applequist. The '573 patent is currently assigned to complainant. The claimed invention is a double-sided floppy disk drive which utilizes a head assembly having one transducer Which acts as a• positional reference for the disk and a second transducer which is gimballed.

One of the prior art references before the examiner during the prosecution of the '573 patent was an IBM Technical Disclosure Bulletin (CX-609) which disclosed a double-sided floppy disk drive head assembly having two gimballed transducers. In the IBM device the disk controlled the transducers and the system was symmetrical. The development of double-sided floppy disk drives is described in detail in the ID.

REASON TO BELIEVE A VIOLATION EXISTS 11/

A. Unfair Practices - Patent Infringement

1. Validity of the '573 patent

Under 35 U.S.C. S 282, a patent is presumed valid. The presumption can be overcome by clear and convincing evidence. Validity of the '573 patent was challenged on grounds of: anticipation under 35 U.S.C. S 102(a) and 35 U.S.C.

10/ Tendon is developing its 3-1/2 inch drive. FF 475-492.

11/ A determination of whether there is reason to believe a violation of section 337 exists differs from a determination of whether a violation of section 337 exists. The two determinations are independent of each other and a finding of one does not require or even indicate a finding of the other or vice versa.

S 102(g), obviousness, 12/ misjoinder of inventors, 13/ and inequitable conduct. 14/ The ALJ rejected all of these defenses. The Commission is reviewing only the issues of anticipation under section 102(a) and inequitable conduct.

a. Anticipation under section 102(a)

We agree with the ALJ's conclusions that the claimed device of the '573 patent is not anticipated under section 102(a) and that the '573 patent is not unenforceable due to inequitable conduct during the prosecution of the '573 patent. The ALJ did not separately analyze anticipation and inequitable conduct. Anticipation and inequitable conduct are separate defenses, and we treat them accordingly in our review.

Anticipation requires looking at a reference, and comparing the disclosure of the reference with the claims of the patent in suit. A claimed device is anticipated if a single prior art reference discloses all the elements of the claimed invention as arranged in the claim. Jamesbury Corp. v. Litton Industrial Products, 756 F.2d 1556, 1560, 225 U.S.P.Q. 253, 256 (Fed. Cir. 1985).

Respondents TEAC allege that the '573 patent is invalid under section 102 because British patent No. 1,162,463, TRI-9B, to Parken (U.S. Patent No. 3,514,770, CX-642) discloses the invention claimed in the '573 patent. We agree with the ALJ that the Parken reference does not anticipate the claimed '573 device. Parken discloses a magnetic read/write head assembly having a pair of opposed magnetic transducers for reading a thin, stiffly flexible

---

12/ 35 U.S.C. S 103.
13/ 35 U.S.C. S 116.
14/ Respondents argue in their briefs on review that the '573 patent is invalid under 35 U.S.C. S 112.

magnetic strip. The teachings of Parken are fully discussed in the ID at pages 23-26.

An important distinction between Parken and the claimed device is that Parken is designed for a stiff media whereas the '573 patent expressly claims a device for use with a "nonrigid planar magnetic recording media" CE-601, col. 6, lines 49-50, or a "pliant magnetic disk." Id., col. 8, line 19. Parken does not disclose such a device. Additionally, in the claimed device one of the transducers provides a positional reference for the disk. Id., col. 6, lines 63-68. Parken does not disclose this feature. Thus, Parken does not anticipate the claimed invention. Other important distinctions between Parken and the claimed device include the fact that the Parken heads are relatively massive; 15/ Parken is designed for low recording densities whereas the Tandon floppy disk drives have recording densities almost seven times as great; 16/ and, the recording tracks of the Parken meg card are linear, not circular as in a disk. 17/ It is clear from these differences that Parken does not teach every element of the claimed invention and that Parken does not anticipate the device claimed in the '573 patent.

b. Unenforceability and Inequitable Conduct

The TEAC respondents argue that the '573 patent is unenforceable because Tendon's patent attorney failed to cite Parken to the PTO during the prosecution of the '573 patent. The. ALJ apparently concluded that the fiilure to cite Parken did not result in the '573 patent being unenforceable because the Parken reference did not anticipate, i.e., was not material to the

15/ FF 120.
16/ FF 121.
17/ FF 122.

invention claimed in the '573 patent, and patent counsel for Tandon lacked the requisite intent to establish unenforceability. 18/

The basis for his conclusion regarding materiality was intertwined with his conclusion regarding anticipation. Apparently he concluded that the Parken reference discloses a head assembly for reading a stiff magnetic card, as previously discussed, and the '573 patent claims a head assembly for reading a "pliant" floppy disk. The ALJ also found that the transducers disclosed in Parken do not provide a positional reference for the card whereas the transducers claimed in the '573 patent provide a positional reference for the disk.

With respect to the patent attorney's intent not to disclose the Parken patent to the PTO, the ALJ determined that because Tandon's patent counsel was experienced and had a mechanical engineering degree, he was entitled to give the Parken patent "brief consideration, and in 'good faith' come to the conclusion that it was not 'germane.'" ID at 23.

We affirm the ALJ's conclusion. His analysis with regard to unenforceability, however, is intertwined with his anticipation analysis. As previously stated, inequitable conduct is a separate defense from a defense of anticipation. In our review, we have analyzed inequitable conduct apart from anticipation.

Conduct before the PTO which may render a patent unenforceable requires: (1) failure to disclose material information or submission of false material information, i.e., materiality, (2) with an intent to mislead. Inequitable conduct requires proof by clear and convincing evidence of a threshold degree of materiality and proof of a threshold intent. J.P. Stevens & Co. v. Lex Tex

18/ ID at 22-26.

Ltd., 747 F.2d 1553, 223 U.S.P.Q. 1089 (Fed. Cir. 1984) and Argus Chemical Corp. v. Fibre Glass-Evercoat Co., 759 F.2d 10, 225 U.S.P.Q. 1100, (Fed. Cir. 1985). If the thresholds of materiality and intent are established then they must be balanced, and a determination must be made as to whether inequitable conduct occurred. American Hoist & Derrick Co. v. Sowa & Sons, 725 F.2d 1350, 220 U.S.P.Q. 763 (Fed. Cir. 1984).

Materiality is defined as:

> "Inequitable conduct" requires proof by clear and convincing evidence of a threshold degree of materiality of the nondisclosed or false information. It has been indicated that the threshold can be established by any of four tests: (1) objective "but for"; (2) subjective "but for"; (3) "but it may have been"; and (4) PTO rule 1.56(a), i.e., whether there is a substantial likelihood that a reasonable examiner would have considered the omitted reference or false information important in deciding whether to allow the application to issue as a patent.

J. P. Stevens, 223 U.S.P.Q. at 1092, 747 F.2d at 1559.

Parken, the undisclosed reference, discloses a "mag card" drive system. 19/ Although the device disclosed by Parken relates to read/write drive technology, Parken does not relate to floppy disk drives and the media for the Parken device differs significantly from the pliant floppy disk used in the '573 patent. Different engineering problems are associated with obtaining accurate data transfer between a stiff "meg" card and a drive than obtaining data transfer between a pliant, floppy disk and a floppy disk drive. Moreover, as the ALJ found, the heads of the Parken device do not provide a positional reference for the media. Rather, the media provides a reference for the heads. TRX 9B at 1, lines 75-80, CX-642, col. 4, lines

---

19/ A mag card is a magnetic card shaped like a file card.

1-10. Therefore, although Parken discloses a read/write device, such device markedly differs from the claimed double-sided floppy disk drive which utilizes one gimballed transducer and one transducer which acts as a positional reference for the floppy disk.

The IBM Disclosure Bulletin, the primary reference cited by the examiner in the '573 patent, and the claimed invention relate to double-sided floppy disk drives. However, unlike the claimed invention, the IBM drive utilizes two fully gimballed transducers. CX-609. Parken, in contrast, does not disclose transducers for use with floppy disk drives, and thus, is considerably less relevant than the IBM Disclosure Bulletin which was before the PTO. Based on these facts and using the broadest materiality test set forth above, PTO rule 1.56 (37 C.F.R. S 1.56), we conclude that Parken is only slightly material.

Since we have concluded that Parken is material, albeit only slightly, it is necessary to determine the second element of inequitable conduct--whether Tandon intended to mislead the PTO. As previously stated, if both a threshold intent and materiality are established then the two must be balanced. If the subject information has only a slight degree of materiality, then a stronger showing on intent is necessary to establish inequitable conduct.

The federal circuit has characterized proof of a threshold intent as "gross negligence." Gross negligence is defined as "when the actor, judged as a reasonable person in his position, should have known of the materiality of a withheld reference." J. P. Stevens, 223 U.S.P.Q. at 1092. Simple negligence, oversight, or an erroneous judgment made in good faith is insufficient.

Id. 20/ A patent applicant is not required to disclose all known prior art to the PTO. American Hoist.

There is evidence at this phase of the investigation that Tandon's patent counsel reviewed the Parken reference, as well as the other references cited by the British patent office in the British counterpart of the '573 patent. Based on this review, he concluded that Parken was not material to the claims of the '573 patent. TR 2991-2993, 3008-3010. The evidence concerning intent to mislead is insufficient when combined with the low degree of materiality of Parken to render the '573 patent unenforceable. We, therefore, conclude that for purposes of temporary relief the '573 patent is not unenforceable.

2. Literal Infringement

The ALJ concluded that for purposes of temporary relief the drives of Mitsubishi and TEAC literally infringe claim 5. 21/ In arriving at this conclusion he used various legal standards and his interpretation of the scope of the claims of the '573 patent is unclear. 22/ The correct standard is found in section 337(e), which provides that if the Commission determines that there is "reason to believe" that there is a violation of section 337, it may

---

20/ The ALJ's statement that "there is no objective evidence to show that patent counsel's conclusion of no materiality" is not in good faith is insufficient by itself to conclude that the requisite intent is lacking. ID at 26. Subjective good faith of counsel does not negate inequitable conduct. Argus.

21/ Tendon has admitted that some of the drives manufactured by Mitsubishi do not infringe the '573 patent. Tendon's Post-Hearing Brief at 62.

22/ In one part of the ID, the ALJ concluded that there was "reason to believe" that the drives of respondents TEAC and Mitsubishi literally infringe claim 5. ID at 3-40. In another section, the ALJ noted that the burden of proof to support a finding of patent infringement need not rise to the level of preponderance of the evidence, citing Copper Rod II, 214 U.S.P.Q. 892, 894. ID at 9. The ALJ apparently used yet another standard when he stated that complainant had "raised a serious question whether the TEAC and Mitsubishi disk drives literally infringe claim 5 of the '573 patent, which is fair grounds for litigation with respect to the request for permanent relief." ID at 42.

temporarily exclude such articles. 23/ In our review, we have analyzed each eleRent of a section 337 violation according to the "reason to believe" standard.

Analysis of patent infringement is a two step process. First, the patented invention as indicated by the language of the claim is defined. This is a question of law. Envirotech Coro. v. Al George. Inc., 730 F.2d 753, (Fed. Cir. 1984) and SSIH Equipment. S.A. v. U.S. International Trade Commission, 718 F.2d 365, 376, 218 U.S.P.Q. 678 (Fed. Cir. 1983). The second step in the analysis is whether the accused device falls within the scope of the claims. This is a question of fact. With regard to the first step, we have ascertained the scope of the patented invention by reviewing the claims, the patent specification, the patent prosecution history, and the experts' testimony.

The relevant portions of claim 5, the only claim found by the ALJ to be literally infringed, 24/ are:

> 5. A device for maintaining a pair of magnetic transducers in operative relation with opposite sides of a non-rigid magnetic recording media comprising: . . .
>
> a first non-gimballed transducer mounted on a first side of the media and having a relatively fixed position relative to the plane of the media in which the first transducer is in operative relationship with the first side of the media; . . .
>
> a secoond [sic) transducer coupled by gimbal means to the support arm in opposition to the first transducer and being moveable relative to the plane of the media and to the first transducer: . . . [emphasis added)

CX-601, col. 7, lines 21-36.

23/ See, S. Rep. No. 1298, 93d Cong., 2d Sess. 197-198 (1974).

24/ We affirm the ALJ's conclusion that for purposes of temporary relief complainant has not established that respondents TEAC and Mitsubishi literally infringe any other claims of the '573 patent.

The differences in complainant's and respondents' interpretations of claim 5 involves the phrases "first non-gimballed transducer" and "relatively fixed position." Complainant argues that the first non-gimballed transducer acts as a positional reference for the disk and that the claim requires that the first transducer be more fixed than the second transducer. In contrast, respondents argue that claim 5 requires that the lower transducer is fixed and does not move at all.

Patent claims are interpreted relative to each other and it is presumed that each claim is of a differing scope. The scope of claim 5 differs from that of the two other independent claims. Claims 1 and 12 are specific as to the fixedness of the lower (first) transducer. Claim 1 states that the first transducer is in a "fixed position in a direction normal (perpendicular) to the plane of the media . • • " According to claim 1, the lower transducer does not move in a direction perpendicular to the disk. Claim 12 defines the lower (first) transducer as being in an invariant position. According to claim 12, the lower transducer does not move at all.

Considering claim 5 in relation to claims 1 and 12, we interpret claim 5 as covering a first transducer that is non-gimballed. The term non-gimballed does not preclude all movement. Based on the words of claims 1, 5, and 12, we conclude that there is reason to believe that claim 5 requires that the lower transducer be fixed in one direction.

The patent specification supports this interpretation. The specification of the '573 patent broadly describes the claimed invention as being an "faJsymmetrical system . . . in which the record element is deflected by the fixed transducer but confined against the fixed transducer, despite perturbations in its movement, by the moveable transducer." CX-601, col. 2,

lines 47-52. The specification describes the second (upper) transducer as having a "two axis gimbal spring." Id., col. 4, lines 63-65. There is no definition of the term "non-gimballed" in the specification.

The Court of Appeals for the Federal Circuit has repeatedly stated that the prosecution history of an issued patent is relevant in interpreting claim language. The ALJ should have considered the prosecution history of the '573 patent in his analysis. Lemelson v. United States, 752 F.2d 1538, 1550, 224 U.S.P.Q. 523 (Fed. Cir. 1984); McGill. Inc. v. John Zink Co., 736 F.2d 666, 221 U.S.P.Q. 944 (Fed. Cir. 1984). Analysis of the '573 file history is illustrative. Claim 5 as originally filed, i.e., prior to any amendments, claimed:

> A first transducer mounted on a first side of the media and having a fixed position relative to the plane of the media . . .

CX-611. After the first Office Action, claim 5 was not amended, but Tendon argued before the PTO that the proper definition of gimbal was the dictionary definition, namely, "a contrivance that permits a body to incline freely in any direction." CX-611. Additionally, Tandon argued that all of the claims of the application claimed a "first transducer in a fixed position relative to the plane of the media." CX-611 at 28. We interpret these statements as requiring that the lower transducer be more fixed than the upper transducer.

In their second response to the PTO, Tendon amended claim 5:

> a first non-Rimballed transducer . . . in a relatively fixed position relative to the plane of the media . . .
> (underlined material is the added material)

CX-611 at 51. At this time Tandon argued that the claims were amended to clarify any ambiguity.

The ALJ found and we affirm that the lower transducers of neither the TEAC nor the Mitsubishi drives are fully gimballed. The lower transducer of both of these respondents' drives appear at first blush to have a gimbal spring. However, closer inspection shows a fixed back-up member underneath each of respondent's lower transducers and that the construction and movement of the lower gimbal spring differs from the upper gimbal spring. CI -693.

Some of the experts stated that the '573 patent claimed an asymmetrical head assembly, where the lower (first) transducer was more fixed than the second (upper) transducer. TEAC's expert stated that the lower transducer•of the TEAC device was more fixed than the upper transducer and acts as a positional reference. TR at 1595, 2523, 2592.

We find that the TEAC and Mitsubishi head assemblies are asymmetrical. Based on the claims of the '573 patent, the file history, the specification, and the experts' testimony, we conclude that for purposes of temporary relief there is reason to believe that the respondents' drives literally infringe claim 5.

3. Infringement under the doctrine of equivalents

The starting point for analysis of infringement under the doctrine of equivalents is whether the accused device performs substantially the same function in substantially the same way to yield substantially the same result. Graver Tank & Mfg. Co. v. Linde Air Products, 339 U.S. 605 (1950). If equivalence is found, the second step is whether an expansion of the claim is precluded by any file history estoppels. Atlas Powder Co. v. E.I. DuPont de Nemours & Co., 750 F.2d 1569, 224 U.S.P.Q. 409 (Fed. Cir. 1984).

We affirm the ALJ's determination that under the doctrine of equivalents the TEAC and Mitsubishi drives perform the same function in substantially the

same way to achieve the same result as the devices claimed in the '573 patent 25/ and we adopt the ID. Although the ALJ considered the doctrine of prosecution history estoppel as it applied to claim amendments, he did not consider the prosecution history in relation to the arguments presented to the PTO which is required under Coleco Industries v. U.S. International Trade Commission. 573 F.2d 1247, 197 U.S.P.Q. 472 (C.C.P.A. 1978). We have, therefore, considered such arguments in our review.

With regard to any estoppels, both the arguments and claim amendments which occurred during the prosecution of the '573 patent were discussed in the preceding section. The arguments presented to the PTO during prosecution distinguished the claimed invention from the drives disclosed in the IBM Technical Disclosure Bulletin, CX-609. In the IBM device both transducers were fully gimballed and the transducers followed the movements of the disk. The IBM device was a symmetrical system.

In contrast, in the claimed drives the media is made to conform to the disk. The head assembly is asymmetrical. The amendments and arguments that were presented to the PTO were directed toward this fundamental distinction between the IBM prior art and the claimed invention. For example, in the amendment under 37 C.F.R. S 1.116, Tandon argued that a significant feature of the claimed invention was a fixed head that serves as a positional reference for the disk, CX-611. Tandon argued that the IBM device contained two gimballed transducers. Thus, under the doctrine of equivalents claims 1, 5 and 12 cover a device having one gimballed transducer and a transducer which acts as a positional reference.

25/ ID at 42.

The Mitsubishi and TEAC drives both include a lower transducer which is more fixed than the upper transducer. Although we recognize that there may be some ambiguity in the arguments presented to the PTO, we conclude that these arguments do not estop the application of the doctrine of equivalents. We, therefore, conclude that there is reason to believe that the devices of Mitsubishi and TEAC infringe claims 1, 5 and 12 under the doctrine of equivalents.

B. Domestic Industry

The ALJ divided his domestic industry analysis into two parts: the definition of the domestic industry and the domestic activities of complainant and its licensees which should be included in the domestic industry.

1. Definition of the Domestic Industry

The ALJ defined the domestic industry as the domestic operations of the patent owner and its domestic licensees devoted to the exploitation of the patent. He noted that domestic industry is not determined by a rigid formula, but by an examination of the facts in each investigation, the article of commerce, and realities of the marketplace. See Schaper Manufacturing Co. v. U.S. International Trade Commission, 219 U.S.P.Q. 665 (Fed. Cir. 1983). Using this test, the ALJ defined the domestic industry as the domestic operations devoted to the manufacture of double-sided floppy disk drives, rather than head assemblies of drives, even though he found the '573 patent is directed to head assemblies.

The ALJ's decision was based, inter alia, on the Commission's decision in Certain Personal Computers and Components Thereof, Inv. No. 337-TA-140, USITC

Pub. Mo. 1504, 224 U.S.P.Q. 270 (1984). We agree with the ALI and note that the following facts support his conclusion that there is reason to believe that the domestic industry should be defined as domestic production of double-sided floppy disk drives, rather than head assemblies. Respondents import and/or sell disk drives, not head assemblies; drives are the article of commerce; complainant sold ( ) drives in 1984 and sold (head assemblies in 1984; 26/ a head assembly is used every time a disk drive is used and a drive is useless without a head assembly. We affirm the ALI and adopt this portion of the ID. 27/

We note that respondents argue that the domestic industry should be defined as as the domestic manufacturing activities involving head assemblies because the claims of the '573 patent cover head assemblies. Respondents urge that because all head assemblies are manufactured offshore, there is no domestic industry.

At this phase of the investigation there is little evidence of record concerning the procedure of manufacturing completed drives and the various components of a completed drive. Such evidence may be significant in a final definition of domestic industry and is relevant in evaluating complainant's probability of success on the merits.

2. Scope of the Domestic Industry

The AL/ determined that there is reason to believe that the domestic industry includes the domestic operations of Tandon and its licensees devoted to the "manufacture, distribution, research and development, and sale of double-sided floppy disk drives." 28/ At the time the complaint was filed,

---

26/ These drives incorporated head assemblies produced under the '573 patent.
27/ ID at 51-57.
28/ ID at 61-62, FF 576.

Tandon and its domestic licensees, Texas Peripherals, Control Data Corporation and Shugart Associates were manufacturing patented double-sided floppy disk drives in the United States.

The relevant disk drives were and are manufactured in three sizes: 8-inch, 5-1/4 inch and 3-1/2 inch. The ALJ found, and we affirm, that all floppy disk drives perform essentially the same function and thus are potential substitutes for one another. Although the disks for the different size drives are not interchangeable in the same equipment, there is evidence that at the early design stages of computers, there is competition between the various size drives. 29/ The ALJ concluded that for the purposes of temporary relief the domestic industry includes all double-sided floppy disk drives which incorporates the claims of the '573 patent. 30/

We affirm and adopt the ID on the scope of the domestic industry pertaining to the domestic operations of Tandon's domestic licensees. 31/ We also agree that for purposes of temporary relief 8-inch, 5-1/4 inch, and 3-1/2 inch drives are substitutable. 32/ We also affirm the ALJ's determination that the date for determining the scope of the domestic industry is the filing date of the complaint. Bally-Midway Manufacturing Co. v. U.S. International Trade Commission, 714 F.2d 1117, 219 U.S.P.Q. 97 (Fed. Cir. 1983).

The ALJ concluded and we affirm that the domestic industry includes the domestic activities of Tendon and the domestic activities of its licensees. 33/ We note that Tandon manufacturers its 8-inch drives in

---

29/ ID at 61-62.
30/ ID at 65.
31/ ID at 66-76.
32/ In any determination on permanent relief further information on the nature of the competition between various size drives will aid in our understanding of the domestic industry or industries.
33/ ID at 72.

Chatsworth, California, FF 400, and that Tandon manufactures the majority of its 5-1/4 inch drives offshore. The evidence presented by Tandon concerning value added is incomplete and includes activities not in accordance with Commission precedent. If evidence produced during the permanent relief phase of the investigation results in a different definition of domestic industry, Tandon's domestic activities could be excluded from the domestic industry. 34/

C. Substantial Injury and Tendency to Substantially Injure

The ALJ determined that there was reason to believe that the domestic industry has been substantially injured by the alleged unfair acts of TEAC and Mitsubishi. Briefly, the ALJ based his determination, in part, on the significant price decreases that have occurred in the floppy disk drive market, decreases in sales, layoffs in the domestic industry and sales lost to the named respondents. 35/ The ALJ also determined that there is reason to believe the imports of the TEAC and Mitsubishi respondents have a tendency to substantially injure the domestic industry. We affirm the ALJ's determination on these issues and adopt the ID.

D. Conclusion - Reason to Believe that a Violation Exists

The Commission finds, as the ALJ did, that complainant has established that there is reason to believe that each element of a section 337 violation exists. Having determined that there is reason to believe that a violation of section 337 exists, the Commission must determine whether to exercise its discretion and award temporary relief.

34/ Vice Chairman Liebeler does not join in the last two sentences of this section. She determines that Tendon has established that there is "reason to believe" that its domestic activities are clearly part of the domestic industry.

35/ ID at 92-103.

FACTORS BEARING ON APPROPRIATENESS OF TEMPORARY RELIEF

A. Probability Of Success On The Merits

With respect to the first criteria, complainant's probability of success on the merits, we conclude that complainant has made a sufficient showing. Complainant has barely exceeded the reason to believe threshold on the issue of patent infringement, but has established that there is reason to believe that the drives of Mitsubishi and TEAC infringe the '573 patent. With respect to the issue of domestic industry, there are significant questions as to which of Tendon's activities should be included in the domestic industry. 36/

Under Commission precedent, Burn Beds, and VPJ and WMATA, it is not necessary for complainant to establish that it is more likely than not to succeed on the merits. For example, a weak showing on probability of success may be offset by the severity of the immediate and substantial harm that will occur in the absence of temporary relief. Probability of success is one of the four criteria the Commission balances in deciding whether to exercise its discretion.

B. Immediate and Substantial Harm

We affirm the ALJ's decision on this issue and adopt the ID. Immediate and substantial harm is the second of the four criteria which the Commission balances in considering the appropriateness of temporary relief. 37/ Temporary relief cannot be awarded absent a strong and persuasive showing on this issue.

36/ Vice Chairman Liebeler does not join in this sentence of this section. See her footnote 34.

37/ The legislative history of the 1974 Trade Act states that the Commission's determination concerning temporary relief should be based in part on whether there would be immediate and substantial harm to the domestic industry in the absence of temporary relief. H.R. Rep. No. 571, 93d Cong., 1st *Sess.* 78-79 (1973).

With respect to the immediacy element, the ALJ did not consider immediacy. There is significant evidence that substantial harm will occur to the domestic industry in the near future. (

3

Such evidence establishes the immediacy element of the immediate and substantial harm requirement. TR 689-90. We conclude that the domestic industry is faced with harm that is both immediate and substantial.

We do not agree with the ALJ•s statement that temporary relief is warranted unless it is certain to be futile. ID at 142. This is neither standard for nor the purpose of temporary relief. The purpose of temporary relief is to preserve the statusla pending final disposition of the investigation.

C. Harm to Respondents

The ALJ determined that the harm to respondents if temporary relief is awarded must be balanced directly against the immediate and substantial harm to the domestic industry. He recognized that respondents may lose customers if temporary relief is awarded. He, however, determined that the balance of hardship tipped in favor of the domestic industry because the immediate and substantial harm was so great. 21/

We affirm the ALJ on this issue and adopt the ID.

D. Public Interest Factors

In evaluating the public interest the ALJ considered the effect of temporary relief on the public health and welfare, competitive conditions in the United States economy, the production of like or directly competitive

38/ ID at 136-137.

articles in the United States, and United States consumers. 39/ He concluded that there was no evidence that the public health and welfare would be adversely affected, competitive conditions in the U.S. would be benefitted in the long term, importation could continue under bond, and the impact on consumers would not be substantial. Although there is some testimony that OEMs might incur additional costs if temporary relief is awarded, there is also testimony that when OEMs are in the early stages of qualifying drives they can readily interchange drives from different manufacturers.

We affirm the ALJ on this issue and adopt the ID.

E. Appropriateness of Temporary Relief - Conclusion

We have considered the four criteria in determining the appropriateness of temporary relief. Based on our evaluation of these criteria, we agree with the ALJ that temporary relief is appropriate. In this investigation, complainant has established that the domestic industry will be immediately and substantially harmed in the absence of temporary relief.

Complainant has established sufficient probability of success on the merits. Complainant need not establish probability of success on the merits on a mathematical basis. See VPJ and WMATA. Further, there is no public interest factor or harm to the respondents that persuades us that temporary relief should not be awarded. Therefore, having determined that the complainant has established that there is a reason to believe that section-337 has been violated and having balanced the complainant's probability of success, harm to the domestic industry and respondents and the public interest, we believe that temporary relief is warranted in this investigation.

39/ ID at 137-141.

REMEDY, BONDING AND THE PUBLIC INTEREST

A. Remedy

We have determined to issue a limited temporary exclusion order (TEO) directed to double-sided floppy disk drives manufactured by or on behalf of the Mitsubishi and TEAC respondents which infringe the claims of the '573 patent.

The TEO does not extend to computer systems and other equipment which incorporate allegedly infringing drives. There is no evidence of record concerning the importation of equipment incorporating allegedly infringing. disk drives. Rather, the evidence of record indicates that respondents import double-sided floppy disk drives. Moreover, as the Commission investigative attorney noted, a TEO which covers computers which include allegedly infringing drives, would cause considerable hardship to computer manufacturers that now manufacture computers abroad for sale in the United States because such firms may have long term contracts for the purchase of such drives. Complainant did not respond to this argument. 40/ The Commission would like further information from the parties regarding the advantages and disadvantages of various possible forms of permanent relief.

B. Public Interest

The Commission may issue temporary relief only after "considering the effect of exclusion upon the public health and welfare, competitive

---

40/ Complainant merely argued that "the requested remedies [sh)ould be comprehensive enough yet narrow enough to avoid problems in the administration of the order." Tandon's Brief to the Commission at 102. Complainant neglected to submit a draft order as requested in the Commission's Notice of Review of the ID. 50 Fed. Reg. 28,294. Their failure to submit a draft order and respond to these arguments made it difficult for the Commission to understand their position.

conditions in the United States economy, the production of like or directly competitive articles in the United States, and United States consumers." 19 U.S.C. S 1337(e). We determine that a limited TEO will not have an adverse impact on the public interest factors for several reasons. There are numerous floppy disk drive manufacturers, besides respondents, which are importing licensed drives, as well as domestic manufacturers. Consumers, therefore, would not be affected. There is no evidence indicating that the public health and welfare would be affected by temporary relief.

TEAC and Mitsubishi argue that competition would be adversely affected because drives which have not been proven to be clearly infringing the '573 patent would be excluded. We disagree. The award of temporary relief is premised on the fact that complainant has established that there is reason to believe that respondents' drives infringe the '573 patent.

C. Bondin&

In determining the amount of bond, the Commission generally establishes an amount sufficient to "offset any competitive advantages resulting from the unfair method of competition or unfair act enjoyed by persons benefitting from the importation." S. Rep. No. 1298, 93d Cong., 2d Sess. 198 (1974). We have determined that a bond of twenty-five (25) percent of the entered value of the articles in question be imposed.

The determination of a bond for temporary relief involves different considerations from those involving the determination of a bond during the 60-day presidential review period in the permanent relief phase of an investigation. A 60-day bond is imposed only after there has been a determination that there is a violation of section 337. For purposes of temporary relief, there is a determination that there is "reason to believe"

that a violation of section 337 exists. Additionally, the bond at the permanent phase of an investigation will run for a period of 60 days. In contrast, the bond for temporary relief will run approximately five months. We have taken these considerations into account in determining the amount of bond for temporary relief.

Our determination of the bond is based on the prices of the respondents' floppy disk drives and the prices of the floppy disk drives manufactured by the domestic industry. The evidence on pricing in this investigation is confusing. However, we have considered the price data pertaining to respondents' drives and compared that data with the price data for the drives produced by the domestic industry. The data shows that the prices for the respondents' drives is generally lower. There is also significant evidence of substantial price declines in the disk drive industry over the period of investigation. We also note that there is evidence that complainant is offering drives at prices competitive with those of the respondents and we have factored that consideration into our determination. Finally, we have considered the reasonable royalty rate in the industry in making our determination.

CERTIFICATE OF SERVICE

I, Kenneth R. Mason, hereby certify that the attached Commission Memorandum Opinion was served upon Victoria L. Partner, Esq., and Robert D. Litowitz, Esq., and upon the following parties via first class mail, and air mail where necessary, on October 15, 1985.

ea.0-0-44.
Kenneth R. Mason, Secre
U.S. International Trade Commission
701 E Street, N.W.
Washington, D.C. 20423

FOR CCMPLAINANT TANDIal CORPORATION:

R.V. Lupo, Esq.; Jack 0. Lever, Jr., Esq.;
Steven E. Lipman, Esq.
LEVINE, LUPO, LIPMAN & LEVER
1025 Connecticut Ave., N.W. Suite 712
Washington, D.C. 20036

James A. Hamilton, Esq.; Thanas K. Bourke, Esq.;
Steven C. Kenninger, Esq.
RIORDAN, CAPS, CARBONE & MCKINZIE
523 West Sixth Street, Suite 1234
Los Angeles, CA 90014

Raymond A. Bogucki, Esq.; Louis *A. Mbk,* Esq.;
FRASER & BOGUCKI
3345 Wilshire Boulevard, Suite 704
Los Angeles, CA 90010-1868

Norman H. Kirshman, Esq.; Michael S. Harris, Esq.;
RICHARDS, WATSON, DREYFUSS, GERSHON, P.C.
333 S. Hope Street, 38th Floor
Los Angeles, CA 90071

RESPONDENTS

FOR MITSUBISHI ELECTRONIC CORPORATION: MITSUBISHI ELECTRIC AMERICA, INC.:

Thanas P. Ondeck, Esq.; Kevin M. O'Brien, Esq.;
Gary Anderson, Esq.; Bradford E. Kile, Esq.;
Thanas J. Egan, Esq.; and Arthur L. George, Esq.;
BAKER & MCKENZIE
815 Connecticut Ave., N.W.
Washington, D.C. 20006

CERTIFICATE OF SERVICE - Cont.

FOR MITSUBISHI ELECTRIC CORPORATION: MITSUBISHI ELECTRONICS AMERICA, INC.: (Continued)

Robert M. Taylor, Jr., Esq., Samuel B. Stone, Esq.;
David B. Murphy, Esq.
LYON & LYON
34th Floor
611 West Sixth Street
Los Angeles, CA 90017

FOR TEAC CORPORATION OF AMERICA:

Brian G. Brunvold, Esq.; Stephen L. Peterson, Esq.;
Stephen J. Rosenman, Esq,
FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER
1775 K Street, N.W. Suite 600
Washington, D.C. 20006

Lawrence W. Dam, Esq.; David L. Hayutin, Esq.;
Forrest W. Cogswell, Esq.
LTT.T.TCK, MCHOSE & CHARLES
707 Wilshire Boulevard
Los Angeles, CA 90017

David D. Schulman, Esq.; Richard B. Silverman, Esq.;
SCHULMAN, SILVERMAN & KREITER, LTD.
19 So. LaSalle Street
4th Floor
Chicago, IL 60603

FOR SONY CORPORATION OF AMERICA: SONY CORPORATION:

Ronald H. Brown, Esq.; Andrew S. Newman, Esq.;
PATTON, BOGGS & BLOW
2250 M Street, N.W.
Washington, D.C. 20037

Dean C. Dunlavey, Esq.; Michael T. Williams, Esq.;
GIBSON, DUNN & CRUTCHER
333 South Grand Avenue
Los Angeles, CA 90071

Lewis H. Eslinger, Esq.; Alvin Sinderbrand, Esq.;
ESLINGER & PELTON, P.C.
522 Fifth Avenue
New York, NY 10036

MAILING LIST

FOR SONY CORPORATICN OF AMERICA:

Frank M. Lesher, General Counsel;
Otho B. Ross, III, Esq.
SONY CORPORATION OF AMERICA
Sony Drive
Park Ridge, NJ 07656

GOVERNMENT AGENCIES:

Mr. Charles S. Stark
Antitrust Div./U.S.Dept of Justice
Room 7115, Main Justice
Pennsylvania Avenue & Tenth Street, N.W.
Washington, D.C. 20530

Edward F. Glynn, Jr., Esq.
Asst **Dir for IntlAntitrust**
Federal Trade Commission
Room 502-4, Logan Building
Washington, D.C. 20580

Darrel J. Grinstead, Esq.
Dept of Health and Human Svcs.
Room 5362, North Building
330 Independence Avenue, S.W.
Washington, D. C. 20201

Richard Abbey, Esq.
Chief Counsel
U.S. Customs Service
1301 Constitution Avenue, N. **W.**
Washington, D.C. 20229

In the Matter of CERTAIN DOUBLE-SIDED FLOPPY DISK DRIVES AND COMPONENTS THEREOF	Investigation No. 337-TA-215

COMMISSION ACTION AND ORDER

Background

On December 6, 1984, Tandon Corporation (Tandon) filed a complaint and a motion for temporary relief under section 337. On January 22, 1985, the Commission instituted an investigation to determine whether there is a violation of. section 337 in the unlawful importation of certain double-sided floppy disk drives into the United States or in their sale, by reason of alleged infringement of the claims of U.S. Letters Patent No. 4,151,573 (the '573 patent), the effect or tendency of which is to destroy or substantially injure an industry, efficiently and economically operated, in the United States (50 F.R. 4276 (Jan. 30, 1985)).

The respondents are: (1) Mitsubishi Electric Corporation, (2) Mitsubishi Electronics America, Inc. (hereinafter collectively referred to as "Mitsubishi"), (3) TEAC Corporation,_(4) TEAC Corporation of America (hereinafter collectively referred to as "TEAC"), (5) Sony Corporation, and (6) Sony Corporation of America (hereinafter collectively referred to as "Sony"). On August 15, 1985, the Commission approved a settlement and licensing agreement between the Sony respondents and Tandon. A Federal Register notice terminating the Sony respondents was issued on August 20, 1985.

On May 30, 1985, the presiding administrative law judge (ALJ) (Judge Harris) issued an initial determination (ID) in the above-captioned investigation granting complainant's motion for temporary relief under subsections 337(e) and (f). All respondents and the Office of Unfair Import Investigations filed petitions for review on numerous issues. No Government agency comments were received.

On July 2, 1985, the Commission determined to review the ID on the issues of patent validity under 35 U.S.0 § 102, inequitable conduct, patent infringement, and domestic industry as these issues relate to the issue of whether there is reason to believe a violation of section 337 exists. The Commission also determined to review the complainant's probability of success on the merits of the case, immediate and substantial harm to the domestic industry in the absence of temporary relief, harm to the respondents if temporary relief is awarded, and the public interest.

The parties were requested to file briefs on the issues under review and on remedy, public interest, and bonding. Notice of the Commission's decision to review the ID was published in the Federal Register, 50 F.R. 28294. All parties, except the Sony respondents, have submitted briefs on all issues under review. The U.S. Customs Service has filed a submission on the issue of remedy. No other submissions were received.

Action

Having considered the briefs of the parties, and the record in this investigation, the Commission has determined to affirm the ALJ's initial determination recommending temporary relief.

Having determined that the issues of remedy, the public interest, and bonding are properly before the Commission, and having reviewed the written submissions filed on remedy, the public interest, and bonding and those portions of the record relating to those issues, the Commission has determined in investigation No. 337-TA-215 to issue a limited temporary exclusion order prohibiting entry into the United States, except under license, of double-sided floppy disk drives manufactured by or on behalf of the Mitsubishi Electric Corporation, Mitsubishi Electronics America, Inc., TEAC Corporation, and TEAC Corporation of America that infringe claims 1, 5, or 12 of U.S. Letters Patent No. 4,151,573.

The Commission has also determined that the public interest factors enumerated in section 337(d), 19 U.S.C. § 1337(d), do not preclude issuance of the aforementioned limited temporary exclusion order and that the bond during the pendency of the tnvestigation should be in the amount of 25 (twenty-five) percent of the entered value of the articles concerned.

Order

Accordingly, it is hereby ORDERED THAT--

1. The ALJ's ID recommending temporary relief is affirmed;

2. Double-sided floppy disk drives and components thereof that are manufactured by or on behalf of respondents Mitsubishi Electric Corporation or Mitsubishi Electronics America, Inc. or TEAC Corporation or TEAC Corporation of America, including any successor, assign, affiliated persons or companies, parents, subsidiaries, or other related business entities of the above-named respondents that infringe claims 1, 5, or 12 of U.S. Letters Patent No. 4,151,573, and that are not otherwise authorized for importation are temporarily excluded from entry into the United States, except under bond as provided in paragraph 3 below, during the pendency of the investigation;

3. The articles covered by this order are entitled to entry into the United States under bond in the amount of twenty-five percent of the entered value of such articles, as provided by section 337(e);

4. Notice of this order be published in the Federal Register and this order and the opinion in support thereof be served upon each party of record to this investigation and upon the Department of Health and Human Services, the U.S. Department of Justice, the Federal Trade Commission, and the Secretary of the Treasury; and

5. The Commission may amend this Order in accordance with the procedure described in section 211.57 of the Commission's Rules of Practice and Procedure, 19 CFR § 211.57.

By order of the Commission.

Kenneth R. Mason
Secretary

Issued: September 4, 1985

and CO::.POYE:':TS Tn:REOF

Certificate of Service

1:enneth a. ason, hereby certify that the attached :OTICE Or C0:71ISS10. ECISION ON.ItEVIEW OF INITIAL DETE2nIATI0':; A::D ISSUANCE OF LI!aTED "=?QRAaY :CLUSIOY. a:Ina, was served upon Victoria L. Partner, Esq. , and aobert O. Litowitz, Esq., and upon the folloing parties vic first class nail, and air mail where necessary, on September 4, 1985.

IP

e neth R. nason, Secretary
U.'. International Trade Commission
701 E Street,
•:ashington, D.C. 20436

FOR COMPLAINANT TANDON CORPORATION:

R. V. Lupo, Esq.; Jack O. Lever, Jr., Esq.;
Steven E. Lipman, Esq.
LEVINE, LUPO, LIPMAN & LEVER
1025 Connecticut Avenue, N.W., Suite 712
Washington, D.C. 20036

James A. Hamilton, Esq.; Thomas K. Bourke, Esq.;
Steven C. Kenninger, Esq.
RIORDAN, CAPS, CARBONE & MCKINZIE
523 West Sixth Street, Suite 1234
Los Angeles, California 90014

Raymond A. Bogucki, Esq.; Louis A. Mok, Esq.
FRASER & BOGUCKI
3345 Wilshire Boulevard, Suite 704
Los Angeles, California 90010-1868

Norman H. Kirshman, Esq.; Michael S. Harris, Esq.
RICHARDS, WATSON, DREYFUSS & GERSHON, P.C.
333 S. Hope Street, 38th Floor
Los Angeles, California 90071

RESPONDENTS

FOR MITSUBISHI ELECTRIC CORPORATION; MITSUBISHI ELECTRONICS AMERICA, INC.:

Thomas P. Ondeck, Esq.; Kevin M. O'Brien, Esq.;
Gary Anderson, Esq.; Bradford E. Kile, Esq.;
Thomas J. Egan, Esq.; and Arthur L. George, Esq.
BAKER & McKENZIE
815 Connecticut Avenue, N.W.
Washington, D.C. 20006

(Cont'd.)

CERTIFICATE-OF SERVICE - Page 2

FOR MITSUBISHI ELECTRIC CORPORATION; MITSUBISHI ELECTRONICS AMERICA, INC.: (continued)

Robert M. Taylor, Jr., Esq.; Samuel B. Stone, Esq.,
David B. Murphy, Esq.
LYON & LYON
34th Floor
611 West Sixth Street
Los Angeles, California 90017

FOR TEAC CORPORATION; TEAC CORPORATION OF AMERICA:

Brian G. Brunsvold, Esq.; Stephen L. Peterson, ESQ.;
Stephen J. Rosenman, Esq.
FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER
1775 K Street, N.W., 4600
Washington, D.C. 20006

Lawrence W. Dam, Esq.; David L. Hayutin, Esq.;
Forrest W. Cogswell, Esq.
LILLICK, McHOSE & CHARLES
707 Wilshire Boulevard
Los Angeles, California 90017

David B. Schulman, Esq.: Richard B. Silverman, Esq.
SCHULMAN, SILVERMAN & KREITER, LTD.
19 So. LaSalle Street
4th Floor
Chicago, Illinois 60603

FOR SONY CORPORATION OF AMERICA; SONY CORPORATION:

Ronald H. Brown, Esq.; Andrew S. Newman, Esq.
PATTON, BOGGS & BLOW
2550 M Street, N.W.
Washington, D.C. 20037

Dean C. Dunlavey, Esq.; Michael T. Williams, Esq.
GIBSON, DUNN & CRUTCHER
333 South Grand Avenue
Los Angeles, California 90071

Lewis H. Eslinger, Esq.; Alvin Sinderbrand, Esq.
ESLINGER & PELTON, P.C.
522 Fifth Avenue
New York, New York 10036

Mailing List

FOR SONY CORPORATION OF AMERICA:

Frank M. Lesher, General Counsel;
Otho B. Ross, III, Esq.
SONY CORPORATION OF AMERICA
Sony Drive
Park Ridge, New Jersey 07656

GOVERNMENT AGENCISE:

Mr. Charles S. Stark
Antitrust Div/U.S. Dept of Justiie
Room 7115, Main Justice
Pennsylvania Avenue & Tenth Street, N.W.
Washington, D.C. 20530

Edward F. Glynn, Jr., Esq.
Asst Dir for Intl Antitrust
Federal Trade Commission
Room 502-4, Logan Building
Washington, D.C. 20580

Darrel J. Grinstead, Esq.
Dept of Health and Human Svcs.
Room 5362, North Building
330 Independence Avenue, S.W.
Washington, D.C. 20201

Richard Abbey, Esq.
Chief Counsel
U.S. Customs Service
1301 Constitution Avenue, N.W.
Washington, D.C. 20229

In the Matter of

CERTAIN DOUBLE-SIDED FLOPPY DISK DRIVES AND COMPONENTS THEREOF

Investigation No. 337-TA-215

NOTICE OF COMMISSION DECISION ON REVIEW OF INITIAL DETERMINATION AND ISSUANCE OF LIMITED TEMPORARY EXCLUSION ORDER

AGENCY: U.S. International Trade Commission.

ACTION: The Commission has determined to affirm the presiding officer's initial determination recommending temporary relief and to issue a limited temporary exclusion order in investigation NO. 337-TA-215.

SUMMARY: The Commission has determined on review to affirm the presiding officer's initial determination recommending temporary relief in the above-captioned investigation. Having determined that the issues of remedy, the public interest, and bonding are properly before the Commission, and having reviewed the written submissions filed on remedy, the public interest, and bonding and those portions of the record relating to those issues, the Commission has determined in investigation No. 337-TA-215 to issue a limited temporary exclusion order prohibiting entry into the United States, except under license, of double-sided floppy disk drives manufactured by or on behalf of the Mitsubishi Electric Corporation, Mitsubishi Electronics America, Inc., TEAC Corporation, and TEAC Corporation of America that infringe claims 1, 5, or 12 of U.S. Letters Patent No. 4,151,573.

The Commission further determined that the public- interest factors enumerated in section 337(d), 19 U.S.C. § 1337(d), do not preclude issuance of the aforementioned limited temporary exclusion order and that the bond during the pendency of the investigation should be in the amount of 25 (twenty-five) percent of the entered value of the articles concerned.

FOR FURTHER INFORMATION CONTACT: Marcia H. Sundeen, Esq., Office of the General Counsel, U.S. International Trade Commission, telephone 202-523-0480.

6/00/

SUPPLEMENTARY INFORMATION: On December 6, 1984, Tandon Corporation (Tandon) filed a complaint and a motion for temporary relief under section 337. On January 22, 1985, the Commission instituted an investigation to determine whether there is a violation of section 337 in the unlawful importation of certain double-sided floppy disk drives into the United States or in their sale, by reason of alleged infringement of the claims of U.S. Letters Patent No. 4,151,573 (the '573 patent), the effect or tendency of which is to destroy or substantially injure an industry, efficiently and economically operated, in the United States.

On May 30, 1985, the administrative law judge (Judge Harris) issued his initial determination in the above-referenced investigation granting complainant's motion for temporary relief under subsections 337(e) and (f). All respondents and the Office of Unfair Import Investigations filed petitions for review on numerous. issues. No Government agency comments were received.

On July 2, 1985, the Commission determined to review the initail determination on the issues of patent validity under 35 U.S.C. 3 102, inequitable conduct, patent infringement, and domestic industry as these issues relate to the issue of whether there is reason to believe a violation of section 337 exists. The Commission also determined to review complainant's probability of success on the merits, and immediate and substantial harm to the domestic industry in the absence of temporary relief, harm to respondents if temporary relief is awarded, and the public interest.

The parties were requested to file briefs on the issues under review and on remedy, public interest, and bonding. Notice of the Commission's decision to review the initial determination was published in the Federal Register, 50 F.R. 28294. All parties have submitted briefs on all issues under review. The U.S. Customs Service has filed a submission on the issue of remedy. No other submissions were received.

Copies of the Commission's Action and Order, the Commission opinion in support therof, and all other nonconfidential documents filed in connection with this investigation are available for inspection during official business hours (8:45 a.m. to 5:15 p.m.) in the Office of the Secretary, U.S. International Trade Commission, 701 E Street NW, Washington, D.C. 20436, telephone 202-523-0161.

By order of the Commission.

1:enneth R. Mason
Secretary

Issued: September 4, 1985

//-

PUBLIC INSPECTION

UNITED STATES INTERNATrOAD TRADE COMMISSION
WasLington, D.C.

In the Matter

CERTAIN DOUBLE-SIDED FLOPPY DRIVES AND COMPONENTS THEREFORE

Investigation Na. 337-TA-215

INITIAL DETERMINATION

APPEARANCES

For Tandon Corporation:

R.V. Lupo, Esq.;
Jack Q. Lever, Jr., Esq.;
Steven E. Lipman, Esq.
LEVINE, LUPO, LIPMAN & LEVER

Raymond A. Bogucki, Esq.;
Louis A. Mok, Esq.;
FRASER & BOGUCKI

James A. Hamilton, Esq.;
Thomas. K. Bourke, Esq.
RIORDAN, CAPS, CARBONE & McKINZIE

Norman H. Kirshman, Esq.;
Michael S. Harris, Esq.
RICHARDS, WATSON, DREYFUSS & GERSHON, P.C.

For Mitsubishi Electric Corporation and Mitsubishi Electronics America, Inc.:

Thomas P. Ondeck, Esq.;
Kevin M. O'Brien, Esq.
BAKER & McKENZIE

Robert M. Taylor, Jr. Esq.;
Samuel B. Stone, Esq.
LYON & LYON

For TEAC Corporation and TEAC Corporation of America:

Brian G. Brunsvold, Esq.;
Stephen J. Rosenman, Esq.
FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER

Lawrence W. Dam, Esq.;
David L. Hayutin, Esq.
LILLICK, McHOSE & CHARLES

David B. Schulman, Esq.; Richard B. Silverman, Esq.
SCHULMAN, SILVERMAN & KREITER, LTD.

For Sony Corporation of America and Sony Corporation:

Ronald H. Brown, Esq.;
Andrew S. Newman, Esq.
PATTON, BOGGS & BLOW

Dean C. Dunlavey, Esq.;
Michael T. Williams, Esq.
GIBSON, DUNN & CRUTCHER

Lewis H. Eslinger, Esq.; Alvin Sinderbrand, Esq.
ESLINGER & PELTON, P.C.

For United States International Trade Commission:

Victoria L. Partner, Esq.

TABLE OF CONTENTS

ii

iv

MIITZ0 ST/t.TES rNTrnrAnonAt TRAO: C07!!!ISETOI
'1ashington, n.c.

Tr the ratt•r of

cErrAIr DOUSLE-SnED FLOPPY D,UVES .7c:p CO1PON:NTS r:ITRsor), invrotigation 337-TA-11'3

INITIAL tsrmnirArrom

Sidnty Ha:ris, Administr,Itivt Law Judge-

On Dtctmbtr 6, 1184, complainant Tandon Corporation fi1t.1 a motion for ttaporarY rtlit! under 19 C.F.R. 5 210.24(r) in th'' ;latter of. Certain Doublt-Siltd Floppy Disk Drives and Components Th•rtof. Docktt 21S-1. This motion w3s for'larit": by the Commission to t:.. alministr: ivt law !adgt for an initial dtttrmination pursuant to 11 C.F.R. 5 210.53(b). 50 Ftd, Rtg. 4,175 (Jan. 30, 1985).

Tht a2mini3trativt lay judgt htr•by d.ttrmints that th•rt is rranon to btli•ve. that a violation of 5 337 of the Tariff Act of 1'1 30, as amtnet.1, t•lsts ir. the importation of certain dou:At-sitd floppy disk drivta and co.aontnts"thtitof, or in 1 h•ir Lela, oy tason or inrrin tmtnt of Ltt,trsPattnt No.' 4,151,373, tht tfftct or he. fit. of which !a P. totrof or in 1t:rt an influstry, tfficitntly tconomically tht Unittd 2totto. Tht administrativt lad judgt Citls that complainant's motion for t-mporary rtli•f snow.•: bt grant•d ba3-J upon a cons!...:traticm tt, stt Earth in 19 C.7.rl. 5 2:1.24(fl.

OPINION

PROCtDURAL HISTORY

On December 6, 1984,, Tandon Corporation' Chataworth$_i$ California filed a complaint and a motion for temporary relief under section 337 [1]6f;the Tariff Act of 1930 (19 U.S.C. S 1337). Supplements to the complaint were filed on December 21 and 27, 1°14, and January 7, 1985; The complaint, is supplemented, alleges unfair methods of competition and unfair acts in iht. importation of certain double-Sided floppy disk drives and components thereof into the United States Cr In their sale' by reason of alleged direct, induced, and contributory infOngement of the claims of U.S. tt.iters Patent No. 4,151,573. The complaint further alleges that the effect or tendency of the unfair methods of competition and unfaii acts is to destroy or substantially injure an efficiently and economically operated domestic industry and to prevent the establishment of a nascent sub-industry In the United States.

On January 22, 1985, the Commission ordered pursuant to 19 U.S.C. 5 1337(b) that an investigation be instituted to deterMine whether there is a violation of 19 U.S.C. S 1337(a) with respect to the subject articles by reason of Illeged direct, induced, and contributory infringement of the claims of U.S. Letters Patent No. 4,151,573 (the '573 patent), the effect or tendency of which is to destroy or substantially injure an industry, efficiently and economically operated, in the United States. Notice of Investigation, 50 Fed. Reg. 4,276 (Jan. 30, 1985). The Commission pursuant to 19 C.F.R. 5 210.24(e) also Corwardod to the Office of the Administrative Law Judges complainant's

CORRECTED PAGE 2

motion for temporary relief under 19 U.S.C. SS 1337(e) and (f) for an initial determination under 19 C.F.R. S 210.53(b). Id. The notice of investigation and complaint were served on parties, interested Government agencies, and certain interested persons either by Eirst-class mail or air mail on January 29,1985.

The following persons were named as respondents in this investigation:

Mitsubishi Electric Corporation
2-3, Marunouchi 2-chome
Chiyoda-ku, Tokyo 100
Japan

TEAC Corporation
3-7-3, Naka-cho
Masashino, Tokyo 180
Japan

Sony Corporation
6-7-35, Kita-Shinagawa
Shinagawa-Ku, Tokyo 141
Japan

Mitsubishi Electronics America, Inc.
991 Knox Street
Torrance, California 90502

TEAC Corporation of America
7733 Telegraph Road
Montebello, California 90640

Sony Corporation of America
700 W. Artesia Boulevard
Compton, California 90220

The following entities, which were not named as respondents in this investigation, were also served with a copy of the notice of investigation, thy complaint, and section 210.26 of the Commission's Rules of Practice and Procedure:

Alps Electric Co., Ltd.
1-7, Yukigawa Ohtsuka-cho
Ohta-ku, Tokyo 145
Japan

Fujitsu Ltd.
Furukawa Sogo Building
6-1, Marunouchi 2-chome
Chiyoda-ku, Tokyo 100
Japan

Matsushita Communication Industrial Co., Ltd.
4-3-1 Tsunashima-Higashi
Kohoku-ku, Yokohama 223
Japan

Matsushita Electric Industrial Co., Ltd.
1006, Kadoma
Kadoma City, Osaka 571
Japan

NEC Corporation
33-1 Shiba Gochome
Minato-ku, Tokyo 108
Japan

Ricoh Co., Ltd.
1-3-6 Naka-Magome
Ohta-ku, Tokyo 143
Japan

Tokyo Electric Co., Ltd.
14-10 1-chome Uchikanda
Chiyoda-ku, Tokyo 101
Japan

Toshiba Corporation
1-6, Uchisaiwaicho 1-chome
Chiyoda-ku, Tokyo 100
Japan

Victoria L. Partner, Esq., and Robert D. Litowitz, Esq., Unfair Import Investigations Division, were designated the Commission investigative attorneys. 50 Fed. Reg. 4,276 (Jan. 30, 1985). The Commission investigative attorney is a separate and independent party to this proceeding. 19 C.F.R. S 210.4(b).

Chief Administrative Law Judge Janet D. Saxon designated Administrative Law Judge Sidney Harris to preside over this investigation.

On February 21, 1985, the Mitsubishi respondents filed a motion for summary determination under 19 C.F.R. S 210.50. Motion Docket No. 215-2. The Mitsubishi respondents asserted that they had not at any time been involved in the manufacture, importation, distribution, or sale of any products which infringe tht '573 patent and have not violated S 337. Responses to Motion 215-2 were due on March 6, 1985, and the Mitsubishi respondents rebuttal was due on March 11, 1985. Prelim. Conf. Tr. 12-13, 48-51. A decision on the motion for summary determination was postponed by the administrative law judge until after the hearing on temporary relief. Preh. Conf. Tr. 7.

A Preliminary Conference was held in this investigation on February 22, 1985. Appearances were made on behalf of complainant Tandon, all respondents, and the Commission investigative attorney. The prehearing and hearing schedule for the temporary relief phase of this investigation was set at this time.- Order No. 3 (Feb. 25, 1985).

On March 14, 1985, the Sony respondents filed a7moiion for partial summary determination in this investigation. MotionDocket:ab. 215-6. Rule 210.50(a) states that motions for summary determination by any party "must be-filed at least thirly (30) days before the date fixed for any hearing provided for in section 210.41." The hearing on complainant's motion for temporary relief was scheduled to begin on April 8, 1985. Respondent's motion for summary determination, therefore, was filed less than 30 days before this hearing. The administrative law judge invoked the 30-day provision in order to avoid undbe hardship to, and conserve the resources of, the parties and the Commission in this investigation and did not consider Sony's motion. Order No. 6 (Mar. 15, 1985).

A Prehearing Conference on complainant's motion for temporary relief was held on April 8, 1985. Appearances were noted for the record by complainant Tandon, respondents Mitsubishi Electric Corporation (MELCO), Mitsubishi Electronics America (MELA),' TEAC Corporation (TEAC Japan), TEAC Corporation of America (TCA), Sony Corporation (Sony),•and Sony Corporation of America (SONAM), and the' Commission investigative attorney. The Hearing in the matter of Certain Double-Sided Floppy Disk Drives and Components Thereof commenced immediately after the preh•aring conference. The hearing concluded on April 19, 1985.

On April 29, 1985, the administrative law judge sua sponte reconsidered the TEAC respondents application to subpoena Mr. Bogucki to testify at th'e hearing on temporary relief and his order granting the motion to quash this subpoena. The administrative law judge under 19 C.F.R. S 210.53(g) decided to reopen the record to take the testimony 'of Mr. Bogucki on matters listed in the original subpoena signed by the judge on April 3, 1985. Order No. 14 (Apr. 29, 1985). The testimony of Mr. Bogucki was fiken on May 3, 1985.

Closing arguments on complainant's motion for temporary relief were held on May 6, 1985.

This Initial Determination is based on the entire record of this proceeding. Proposed findings not herein adopted, either in form or in substance, are either specifically dealt with in this Initial Determination or are rejected as not being supported by the evidence or as involving immaterial matters.

The findings of fact include references to supporting evidentiary items in record. Such references are intended to serve as guides to the xnitions, exhibits, and testimony supporting the findings of fact; they do necessarily represent complete summaries of the evidence supporting each :ding.

The following abbreviations are used in this Initial Determination:

CX Complainant's Exhibit (followed by its number and the referenced page(s)).
CPX - Complainant's Physical Exhibit
TRX - TEAC Respondent Exhibit
TRPX - TEAC Respondent Physical Exhibit
SRX - Sony Respondent Exhibit
SRPX - Sony Respondent Physical Exhibit
MRX - Mitsubishi Respondent Exhibit
MRPX - Mitsubishi Respondent Physical Exhibit
SX - Staff Counsel Exhibit
SPX - Staff Counsel Physical Exhibit
FF - Finding of Fact
Tr. - Transcript

7

II. STANDARDS FOR GRANTING TCMPORARY RELIEF

The icsuance of temporary relief AS governed by sections 337(e) and (f) of the Tariff Act of 1930, as amended. Section 337(e) provides:

> If, during the course of an investigation under this section, the Commission determines that there is reason to believe that there'is a violation of this section, it may direct that the articles concerned, imported by any person with respect to whom there is reason to believe that such person is violating this section, be excluded from entry into the United States, unless, after considering the effect of such exclusion upon the public health and welfare, competitive conditions in the United States economy, the production of like or directly competitive articles in the United States, and United States consumers, it finds that such articles should not be excluded from entry.

The standards for review of a complainant's motion for temporary relief as adopted by the Commission pursuant to S 337(e) are set forth in 19 C.F.R. 4 210.24(e) and include: (1) complainant's probability of success on the merits; (2) immediate and substantial harm to the d6Mestic industry in the absence of the requested temporary relief; (3) harm: if any, to the proposed-respondents if the requested temporary relief is granted; and (4) the effect, if any, that the issuance of the requested temporary relief would have on the public interest. See Certain Apparatus for the Continuous Production of Copper Rod, Inv. No. 337-TA-89, 214 U.S.P.Q. 892, 893-94 (Oct. 29, 1980), citing Washington Metropolitan Area Transit Comm'n v. Holiday Tours, 559 F.2d 841, 843 (D.C. Cir. 1977). Each of the factors are to be first analyzed individually, then balanced against each other. Certain Coin-Operated Audiovisual Games, Inv. No. 337-TA-105, 216 U.S.P.Q. 1106, 1109 (Jan. 4, 1982).

Before a finding is made as to whether a balancing of these,factors indicate that temporary relief should or should not issue, the Commission must initially find whether there is a reason to believe that a violation of

S 337 exists. Certain Fluidized Supporting Apparatus and Component= Thereof, Inv. No. 337-TA-132/188, Comm'n Memorandum Op. 4-5 (Sept. 17, 1994). The evidence to support a finding that there is reason to believe a violation exists need not rise to the level of a preponderance of the evidence. Copper Rod, 214 U.S.P.Q. at 893-94. Evaluation of the first factor, probability of success on the merits, is closely related to the "reason to believe" determination. "The distinction is that the substantive determination (reason to believe) is a determination that a threshold has been met, while evaluation of the first factor is a measure of the extent to which that threshold has been exceeded." Fluidized Apparatus, Comm'n Memorandum Op. 5.

Immediate and substantial harm in the absence of temporary relief and harm to other parties are required to be considered by the rules of the Commission in order to recognize the issue of equity as regards complainant's entitlement to temporary relief. Copper Rod, 214 U.S.P.Q. at 893-94.

In order to determine whether there is "reason to believe" a violation of 5 337 exists, each of the substantive elements-of the complaint must be considered.

III. PATENT INFRINGEMENT

The unfair practice alleged in this investigation is patent infringement. Two elements must be present to demonstrate that respondents have engaged in patent infringement: (a) validity of patent; and (b) infringement by respondents.

A. Patent- Validity.

1. Background of the '573 Patent.

U.S. Letters Patent 4,151,573 (referred to as the '573 patent or the "Tandon" patent), entitled "Magnetic Recording Device For Double Sided Media," was issued on April 24, 1979, and is assigned to complainant. CX 601. Three inventors are named: Mr. Sirjang I. Tandon, the President of Tandon; Mr. Alfred Hackney; and Mr. A. Applequist. CX 601. The '573 patent dezcribes a claimed improvement over what was considered as •tiv most pertinent prior art. This was represented to be an IBM Technical Disclosure Bulletin (CX 609) issued in December 1975.

The IBM bulletin. was a signal to the industry that IBM was advancing from a single-sided floppy disk drive to a double-sided drive, instantly doubling the capacity of the data storage devices used with computers. IBM at the time• was the acknowledged leader in the computer industry. Many firms simply followed IBM, and they were galvanized into action by the Technical Disclosure Bulletin and the later shipment of double-sided floppy disk drives to develop their own double-sided disk drives to replace the existing single-sided drives. CX 609; FF 23-27. At that time IBM did not sell' floppy disk drives

10

to other computer manufacturers, but merely manufactured the drives to incorporate them in its own computer systems. Other computer companies purchased floppy disk drives from independent drive manufacturers to be incorporated into compUter systems in order to be compatible and competitive with IBM systems. Sales to such companies were known as OEM sales. FF 92, 302, 312.

It is useful at this point to describe some of the technical aspects that are involved in the patent validity and infringement questions. The head assembly constitutes the most sensitive part of a floppy disk drive. It contains the magnetic read/write cores and supporting springs, arms and mountings that enable the read/write cores to maintain proper contact with the floppy disk on which the information is stored or accessed. FF 18-19. The contact (or head compliance) between the read/write heads and the disk must be incredibly close and stable. Comstock, Tr. 1451; Nathanson, Tr. 1548. In the Mitsubishi drives, for example, a gap of greater then 0.32 microns (between 12 and 13 millionths of an inch or microinches) betweerrthe read/write cores and the disk produces unacceptable error in the storage or accessing of information from the disk. Hayashi, Tr. 2847. Stability of contact refers to proper alignment of the cores with each concentric track of the disk which ensures that information is deposited or read onto or from the proper location. 1/

1/ The disk has a series of concentric tracks, which distinguishes it from the single continuous track of an ordinary phonograph record, and is encased in a paper envelope or jacket, from which it is not meant to be removed. The envelope has an opening at the center so that the disk can fit on a center spindle and hub. In addition, there is a radial slot in the envelop on

(Footnote continued on next page)

The dick JOC•5 not revolve in a perfect plan.•. It is a floppy disk made of very pliant, limp, droopy material which undulates in rotation. "Wrinklts" also occur as a result of being clamped by th• hub mechanism. FF 35, 164. The envelope gives it a certain amount of stiffness so that th• disk can be handled. The disk is also subject to variations in its width as a result of manufacturing imperfections and of being clamped together by the heads upon loading of the heads against the disk (startup) and during read/write operations. These imperfections or deviations from the perfect place of the disk are significant enough to cause error in the read/write operations if not compensated for in the design of the head assembly; yet, the range of motions involved is "unimaginably small." Comstock, Tr. 1548. The design must also prevent excessive wear on the disks by contact of the heads as this can cause the stored data to be erased. FF 36-37.

Respondents challenge the validity Of the '573 patent on the grounds that it was anticipated, obvious, and omits with deceptive intent some of the inventors.

2. Anticipation -- 35 U.S.C. S 102(g).

The Sony respondents allege that the '573 patent is invalid under 35 U.S.C. S 102(g) because the invention had already been made and used in the United States before the priority date of the suit patent by IB!1. Sony Post-Hearing Brief at 3-5.

(Foo•note continued from previous page)
opposing sides to permit the heads to come into contact with each of the concentric tracks as the disk rotates. The read/write heads can be positioned to access any location on any track of the disk during rotation (or operation) through a mechanism which moves the head assembly along the radial track defined by the envelope slot.

Under 35 U.S.C. S 102(g), a person shall be entitled to a patent unless

* * *

> (g) before the applicant's invention thereof the invention was made in this country'by another who had not abandoned, suppressed or concealed it. In determining priority of invention there shall be considered not only'the respective dates of conception and reduction to practice of the invention, but also the reasonable diligence of the one who was first to conceive and last to reduce to practice, from a time prior to conception by the others.

Tandon disputes Sony's interpretation of the relevant facts and contends that IBM's activities do not anticipate the '573 patent because IBM abandoned, suppressed or concealed their allegedly anticipatory activities. Tandon Reply Brief at 19-21.

Unlike S 102(a), under which prior knowledge and use must be public when the patented invention is made, prior invention under S 102(g) "requires only that the invention be complete, that is,'conceived and reduced to practice, and not abandoned, suppressed or concealed." International Glass Co., Inc. v. United States, 159 U.S.P.Q. 434, 440 (Ct. Cl. 1968) :(citations omitted): Although S 102(g) usually arises in priority disputes in PTO interference proceedings, it may also be an appropriate defense to patent validity in infringement litigation where a patent application was never filed by the prior inventor." Id.

In the present case, the Sony respondents allege that the invention claimed in the '573 patent was conceived and reduced to practice by IBK well before the time of filing the application which matured into the '573 patent. For purposes of this discussion, the date of Tandon's invention is deemed to

be the date of filing the patent application, June 13, 1977. FF 16. Cosden Oil & Chemical Co. v. American Hoechst Corp., 214 U.S.P.Q. 244 (D. Del. 1982). The record is clear that IBM's early work on double-sided floppy disk drives occurred during 1973:4974. FF 51, 57. At that time, IBM tested three different types of head configuration in its disk drives. In the first type of drive, both heads were fixed. In the course of testing, IBM was unable to obtain satisfactory results and decided not to pursue this design for commercial production. FF 58-60. However, a patent was obtained on this configuration. FF 60.

Another design tested by IBM utilized one fixed head and one gimballed head. FF 61. Testing on a prototype of this drive occurred in late 1973. IBM was not satisfied with the performance of this second configuration in stress testing, and in January 1974 terminated further development of this design. *FF* 62-63. This design was never embodied in a commercially available product, its existence was known only within IBM, "and no patent application was ever filed on this concept. FF 64, 66. .,Later,-at the earliest in 1975 or 1976, IBM developed a precision writer strictly for in-house use which utilized a head configuration in which one head was fixed and the other gimballed. FF 67-68.

In the third approach developed by IBM, both heads were gimballed. FF 71-72. Based on successful testing of this configuration, further development work was done, the design was utilized in IBM's 43 FD drives, which were commercially produced, and a patent was applied for and obtained. FF 69-72.

The foregoing facts suggest that IBM actually conceived and tested a double-sided disk drive which embodied the same invention as that disclosed in the '573 patent. There is no dispute that IBM's activities occurted well before Tandon's.

In order for IBM's work on its type 2 head configuration to constitute an anticipating prior invention for purposes of S 102(g), it must be found that IBM reduced it to practice and did not abandon, conceal or suppress the invention. There has not been a sufficient showing that IBM reduced this concept to practice. The evidence indicates that IBM tested the concept for about four weeks, far less time than it spent on developing its type 3 design. FF 62, 70. The IBM type 2 design appears to be more like preliminary experimentation, rather than reduction to practice. For purposes of considering abandonment, concealment or suppression, however, a reduction to practice will be assumed.

Abandonment is irrelevant to this section unless it occurred before the time of the applicant's invention. Allen v. JI.H. Brady Co., 184 U.S.P.Q. 385, 386 (7th Cir. 1974); Leesona Corp. v. Varta Batteries, Inc., 213 U.S. P.Q. 222, 250 (S.D.N.Y. 1981). In addition, "the concept of abandonment contemplates a voluntary decision by the original inventor to terminate any effort to practice his conception." Allen v. W.H. Brady Co., 184 U.S P 0 at 386. Similarly, concealment or suppression must be intentional. Cosden Oil & Chemical Co. v. American Hoechst Corp., 214 U.S.P.Q. at 257.

.Irrespective of a reduction to practice and an arguably successful use of an invention, it may be found to have been abandoned, suppressed or concealed in the absence of further steps taken within a reasonable time after the

invention to make it publicly known. "Thus, failure to file a patent application . . .; to describe the invention in a publicly disseminated document . . .; or to use the invention publicly . . ., have been held to constitute abandonment; suppiession or concealment." International Glass Co., Inc. v. United States, 159 U.S.P.Q. at' 441 (citations'omitted). The measure of whether there has been abandonment, suppression or concealment by the first inventor is whether the public has gained any knowledge of his iuvention.

> The true ground of the doctrine . . . lies in the policy and spirit of the patent laws and in the nature of the equity that arises in favor of him who gives the public the benefit of the knowledge of his invention, who expends his time, labor and money in discovering, perfecting, and patenting, in perfect good faith, that which he and all others have been led to believe has never been discovered, by reason of the indifference, supineness, or willful act of one who may, in fact, have discovered it long before.

Mason v. Hepburn, 13 App. D.C. 86 (D.C. Cir. 1898); see also Palmer and Taylor v. Dudzik, 178 U.S.P.Q. 608, 615 (C.C.P.A. 1973).

The facts relating to IBM's activities compel the conclusion that IBM voluntarily abandoned, suppressed and.concealed its invention before the time of the same invention by Tendon. At the time of its development work on double-sided floppy disk drives, IBM was pursuing three different design concepts. Problems were encountered with two of these designs, whereas the third showed promise. FF 58, 60-63, 69. As a result, IBM stopped development work on the first two designs, including the design that is claimed to anticipate the '573 patent, and did not disclose the latter concept to the public. FF 60, 62, 64. When an article was published in 1981 which described IBM's work on floppy disk drives, the basic head design of its second approach was briefly discussed, together with an indication of the problems

•ncounterd.- FF 63. To the extent that thi3 nay be considered a disclosurr to the public, it occurred Weit,eitter;:rne dati of thOnvention of the '$71, patent.

It in noteworthy thata tb4;:thitt,:designs developed by IBM; the onr design that is allegrd to $ntiolphte the only one for which IBM did not seek patmlt prot'ctiont ,FF 66. There is nothing!oh' this tecord to suggest that /BM beliovi'd.that ' ts type 2 design was a patentable invention, or that it had priority ovet Tandon's claim: IBM's only use of this particular configuration occurred entirely in-housri and was clearly.not publicly disclosed before June 1977. rt. 64-68. 'the tact that IBM subsequently took ik license tram Tandon under the '573 patent (CX 62/1 further supports the concluSion hat ISi1 vOluntarili abandoned, suppressed and concealed this

For the foregoing tiiasons, 010' record shows no reason to brlirvr that IBM's dmr^lopmf.nf work be ore 1977 anticipated the invention of the '573 patent.

3. Invrntorship of ibr '573 Patent -- 35 U.S.C. S 116.

The Sony respondents allege that the invention of the '573 patent was first conceived at CalComp and that Tandon only participated in reducing it to practice. Thus, it is Sony's position that the suit patent is in error in failing to name Malcolm Smithi of CalComp, as an inventor: In addition, Sony claims that Tandon misrepresented the covrrage of the patent claims to CalComp and named only Tandon employees as inventors with the deceptive intent to deprive CalComp of any ownership rights. Sony Post-Hearing Brief at 5. See' 35 U.S.C. SS 115, 256.

Non-joindfq of a joint inventor may render a patent unenforceable. 1 D. ChiLum, Patents SS 2.02, 2.03 (1934). When a mistake is made in the joinder of inventors without deceptive intent, the mistake may be corrected under the remedial provisions of 35 U.S.C. S 256. Iowa State University Research Foundation, Inc. v. Sperry Rand Corp.; 170 U.S.P.Q. 374 (4th Cir. 1971). However, the defense of improper joinder of inventors is a technical, and thus disfavored, defense. The party asserting such a defense bears the burden of proving such improper joinder by clear and convincing evidence. Certain Steel Rod Treating Apparatus and Components Thereof, Inv. No. 337-TA-97, 215 U.S.P.Q. 237, 255 (1981) (Steel Rod); see also Certain. Fluidized Supporting Apparatus and Components Thereof, Inv. No. 337-TA-182/188, ID at 105-07, CD at 8 (1984).

The Sony respondents' allegations with respect to this issue concern Tandon's relations with California Compdter Products, Inc. (CalComp), during 1976 and 1977. At that time, CalComp was an OEM suliplier of single-sided disk drives. FF 91. When IBM announced its double-sided "floppy disk drives" in 1976, CalComp sought to enter the double-sided disk drive market as quickly as possible so that its OEM customers could remain competitive with IBM. FF 92. Since CalComp did not have the technical capability to develop a double-sided floppy disk drive, it entered into a contract with Tandon Magnetics (predecessor of Tandon) to design the double-sided heads. FF 93-94.

Initially, it was felt both at Tandon and at CalComp, that IBM's preeminent position in the market would require CalComp to develop an IBM compatible disk drive. As a result, Tandon's original proposal to CalComp was to reverse engineer the IBM double-sided disk drive. FF 95. Preliminary work on the reverse engineered IBM drive revealed that the head assembly would not fit in CalComp's existing single-sided drive carriage. Therefore, for a 18

variety of reasons, CalComp preferred to develop a double-sided disk drive that could be adapted to its single-sided drive. FF 96-97. Although Tandon was initially resistent to this approach it agreed to develop the reverse engineered IBM drive and the modified CalComp drive in parallel. FF 98-100.

The essential controversy relating to CalComp's relations with Tendon concerns the participation of Mr. Malcolm Smith in the double-sided drj.ve project. Mr. Smith was the mechanical engineer at CalComp's Small Disk Operations and served as the liaison between Tandon and CalComp on this project and monitored and tested the prototype developed at Tandon. FF 94. When Tandon delayed the development of the modified CalComp drive in favor of the reverse engineered IBM approach, Mr. Smith made a crude model of the • modified CalComprive, us ng a single-sided drive, and discussed his model with Tandon. In Mr. Smith s view, this model was not really acceptable, although it showed some ability to read and write because it destroyed the medium. FF 97, 99. However, after Mr. Smith prepared the model, Tandon produced a prototype of this modified CalComp4leirigrr, and preliminary testing gave very encouraging results. FF 100. Subsequent work at Tandon apparently concentrated on this.modified CalComp design with Mr. Smith in frequent attendance, with the objective of having the new double-sided drive ready for the NCC show in June 1977. This double-sided drive was incorporated in CalCOmp's product and was shown at the NCC show. According to Mr. Smith, this double-sided drive worked better than IBM's drive. FF 94, 101.

'It was not until about September 1977 that Mr. Meyer, director of CalComp's Small Disk Operations, discovered that Tandon had filed a patent application on the double-sided floppy disk drive that had been developed as

19

result of the CalComp/Tandon development project. Mr. •oyor felt that Mr. Smith should be named as an inventor and that CalComp's name should be associated with the patent. His concerns apparently were- satisfied by Mr. Tandon's roprosontation that the patent would only cover the head and the suspension flexure. FF 94, 102-104, 106.

The Sony respondents' contention that Tandon improperly omitted Mr. SMith as a named inventor with deceptive intent places heavy reliance on fir. Meyer's interpretation of the events surrounding the CalComp/Tandon relationship. In Mr. Meyer's view, the agreements between Tandon and CalComp divided the ownership of different components of the double-sided disk drive between Tandon and CalComp, and Tandon patented more than it owned.?/ FF 102-106: Mr. Meyer's testimony sharply contrasts with the testimony of Mr. Smith .-3/

2/ Mr. Meyer sought the advice of CalComp's patent committeeand was told that the concept was unpatentable. FF- 107.

3/ At the hearing on temporary relief, both Mr.. Moyer and Mr. Smith testified about the CalComp/Tandon double-sided floppy disk drive project which ultimately produced the double-sided drive that is the subject of the '573 patent. During the course of Mr. Meyer's testimony, particularly on cross-examination, it became clear that although he had very definite opinions about the nature of CalComp/Tandon relations, his memory of the timing and sequence of events was unclear. In addition, Mr. Meyer frequently disclaimed a clear memory of certain events on the basis that he was not directly involved. Thus, Mr. Meyer's testimony must be contrasted with Mr. Smith's, who was intimately involved in the CalComp/Tandon project and had a clear recollection of the progress of the development project. On balance, I have found Mr. Smith's testimony to be more probative and reliable than Mr. Meyer's, and have attributed greater credibility to Mr. Smith's testimony.

Mr. Smith's testimony indicates that in developing the- modified CalComp double-sidd head, Tandon prepared many of the technical drawings, particularly those related to the head assembly. The only drawings provided by CalComp covered the carriage and the upper arm. FF 102, 105. In Figure 1 of the '573 patent, the only part of that drawing "derived" from CalComp are the "bosses" or protuberances on the carriage, which is not a critical part of or central to the invention. FF 105. Mr. Smith also testified that he had prepared a crude model of the modified CalComp design. Although this model appears to have prompted Tandon to proceed along similar lines, Mr. Smith made quite clear that his crude model did not work. FF 99.

Although Mr. Meyer felt that Mr. Smith should have been named as an inventor, there is no indication that Mr. Smith shared this opinion. In fact, far from challenging the inventorship of the '573 patent, Mr. Smith filed a declaration with the PTO supporting Tandon's patent application. FF 108. As the chief mechanical engineer and liaison between CalComp and Tandon, -Mr. Smith was in a better position than Mr. Meyer. toicnow about the development of the double-sided disk drive that matured into the '573 patent. The word of the inventors is normally accepted as to who are the actual inventors. Brader, Cavitt, and Gipson v. Schaeffer, 193 U.S.P.Q. 627, 631 (PTO BPI 1976). In view of Mr. Smith's close connection with this project, his view of inv•ntorship is more reliable than Mr. Meyer's and is found to be more credible on this issue.

.On the basis of the foregoing, I find that there is little likelihood that the Sony respondents will meet their burden of proof on the issue of improper joinder of inventors.

21

4. The Parken Patent: Anticipation -- Inequitable Conduct.

Respondents argue that claim 1 of the '573 patent is invalid as anticipated by the Parken patent and unenforceable because of inequitable conduct before the patent office. Anticipation under 35 U.S.C. S 102(a) refers to whether the Parken patent readi on claim 1 of the Tandon patent. Inequitable conduct refers to intentional non-disclosure of material prior art. The questions of whether the Parken patent is material prior art and whether it reads on the Tandon patent are closely similar.

The claim of unenforceability stems from the fact that when the British counterpart of the '573 patent was pending before the British patent office, the examiner initially refused to grant a patent, and cited, among other prior art references, was the Parken patent. The British version of the '573 patent issued with claim language identical to the claim language in the '573 patent. Bogucki, Tr. **2996**; **FF** 243.. Thus, if there is any basis to hold the '573 patent unenforceable, the Parken patent must bc: material. The Patent and Trademark Office (PTO) Rule 1.56(a) defines materiality as'information With - respect to which (1) there is a substantial likelihood that (2) a reasonable examiner +3) would consider it important (4) in deciding whether to allow the application to issue as a patent without any substantial change. American Hoist & Derrick Co. v. Sowa & Sons, Inc., 220 U.S.P.Q. 763, 773 (1984).

Unenforceability requires both materiality and culpability, that is, there must be some degree of intentional non-disclosure. Questions of materiality and culpability are intertwined so that the less culpability, the greater the required showing of materiality, and vice versa. Id. Complainant's patent attorney, when informed of the Parken reference while the

'573 patent was pending before the patent office, gave it brief consideration, but did not consider it germane. CX 753; Bogucki, Tr. 3082-84; FF 115-16, 236. Patent counsel involved was experienced as a patent law practitioner and had a mechanical engineering degree and experience in prosecuting patents on mechanical devices and related hard dis4ctechnology. 'FF 231-34. On the basis of his background, he could give the Parken patent brief consideration, and in "good faith" come to the conclusion that it was not "germane."

Materiality does not mean that the information is merely relevant or pertinent. There is no duty of a patent applicant to disclose all pertinent prior art or to conduct a patent search. American Hoist, 220 U.S.P.Q. at 773. Moreover, "where it is demonstrated that a reasonable examiner would merely have considered particular information to be important, but not crucial to his decision not to reject, a showing of facts which would indicate- something more than gross negligence or 'recklessness may be required, and good faith or honest mistake might well be a sufficient defense." Id.

There is no objective evidence to show thaw patent counsel's concldsion Of no materiality **is** not in good faith. The British patent office granted a patent without **a** change in claim language. The Parken patent is assigned to **IBM. IBM** has taken a license under the **'573** patent and during negotiations apparently did not assert the Parken patent. FF 255. While the license to IBM does not require money payments to Tandon, it does grant paid-up cross-licenses to valuable IBM patents. CX 621.

'Furthermore, there are important differences between the Parken teachings and claim 1 of the '573 patent. The most important is that the head assembly in the Tandon patent is for use in a floppy disk drive system (CX 601, claim 12, col. 3, lines **49-63)**, whereas the Parken patent relates to older card

reader rechn.ilogy. TRX 9B; FF 109. Cliilas 1 and 5 of the Tandon patent rflat' to a device for utilizing magnetic heads or transducers in operative relationship with "non-rigid magnetic recording media."[4/] Claim 12 :r.scribPs the media as a "pliant magnetic disc." CX 601, col. 8, line 19. Tip! term "non-rigid" media is described in the patent indicating a degree of plasticity or suppleness approaching that of a tape used in earlier digital data storage systems. Comstock, Tr. 1583; Brown, Tr. 2522-23.

The patent describes the "wrapping of the pliant disk about the surface of the fixed transducer" similar to a tape wrapping around a penetrating magnetic head to provide a positional reference, and the "curvature of the disc" as a result of the penetration of the fixed transducer. CX 601, col. 5, lines 24-25, 43-44. The magnetic media is further referred to as a thin "pliant disk elem•nt," and "pliant." CX 601, col. 1, line 17; id., col. 2, line 45. The disk is in several places referred to as "flexible" (CX 601, col. 1, line 44; id., col. 3, line 33; id., col. 4, line 30), but never as "stiff." Whereas the media in the Parken patent is r•fe rred to "as a stiffly flexible magnetic record sheet or chip." TRX 9B, at 1, lines 47-48. In fact the media in the Pal Wen specification is frequently referred to as a "chip," suggesting a rather stiff media. TRX 9B, at 1, lines 70, 79, at 2, lines 8, 34, 36, 38, 42, 74, 81. A "stiffly flexible" magnetic media could_ not be used in a floppy disk drive because it is not limp enough to permit a positional reference. The floppy disk wraps itself around the lower head, and thereby creates the stable platform for the upper head. Brown, Tr. 2522 - 23.

4/ Claim 1 describes it as "non-rigid planar recording media."

24

A supple "pliant" ele;iient could not be used in the device defined in the Parke!' patent. In the Parken patent, magnetic heads which ar' massive compared to the heads described in the Tandon patent slide over the surfaces of the "chip." TRX 9B; at 2; lines 54-64; FF 119-20, 122, 138. The floppy disk materiA would not operate in the= Parken device: Bogucki, Tr. 3095.

The. stiffness of the chip as the essential element of the Parken system is also a';parent from the patent.[5/] The chip separates the tranadoc.-rs, and they rotate for slight misalignment of the chip. TRX 9B,. at 2, lines 2-7.

Thus, based on the evidence in the record, the stiffly flexible chip of the Parken potent is not within the "non-rigid" or "pliant" terminology described in the Tandon patent claims. FF 117-18, 237-39.

There are additional reasons why Parken is not material or anticipatory. The heads in Parken do not provide a positional reference for the media as in claim 1 of the Tandon patent, but rather the stiff "chip" provides a reference for the heads which "accommodates misalignment of the chip." TRX 913, at 1, lines 75-80. This is only in the sense that ylif' Parken heads maintain "contact pressure" on the surfaces of the chip. TRX 9e, at 2, line i 80-84. There is no mention of or apparent need for a positional reference in the- Parker. device since it does not utilize the penetrating contact head of the- tape storage devices, or the air bearing head of the rigid disk devices.

5/ It ha:i not been established that TRPX 2 is the media used with the Parken device. Although this media is much stiffer then the floppy disk, the only evidence concerning the nature of the media used with the Parken device is the language of the Parken patent itself. FF 123.

25

Parken merely mentions use of adjustment to a fixed position in substitution for free rolling heads.[5/] Such an adjUstment reduces "the ability of the system to record and read Thda, Park'ri doei not teach a one fixed and one gimballed 6ad jliyhi6 as in the Tandori patent. FF 121722, 124-27, 240-50.

For the reasons given aboVei Parke41 paten• doeS not deicribe clOim of the Tandon patent. Thus, it does not anticipati' the Tandori patent under 35 U.S.C. 5 102(a). There is no reason to believe that the Tandon Patent is unenforceable because of the Parken patent. The Parken patent is not mate r ial to the '573 patent, and there is reason to believe counsel's view that it was not germane Is in good faith.

5. Obviousness -- 35 U.S.C. 5 103.

Respondents claim that the Tandon patent is invalid as obvious in light of the prior existing single-Sided floppy disk drives. Respondents argue it was obvious to modify the pressure pad arm to carry the second head.

Under 35 U.S.C. 5 103, a patent may not be obtained if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time kis' invention was made to a person having ordinary skill in the art to which the subject matter pertains. The test for obviousness, established by the Supreme Court in Graham v. John Deere & Co., 383 U.S. 1, 148 U.S.P.Q. 95-99 (19G5),

---

6/ The adjustment suggested does not mention adjusting one or both heads.

involves a determination of: (1) the scope and content of the prior art; (2) the differences between the prior art and the claims at issue; and (3) the level of ordinary skill in the art.

The patent in suit and the prior art applied to its claims by the Patent and Trademark Office (PTO) offers a convenient starting point for ascertaining the scope and content of the prior art. See Orthopedic Equipment Co., Inc. v. United States, 702 F.2d 1005, 217 U.S.P.Q. 193, 196 (C.A.F.C. 1983). As the Court of Appeals for the Federal Circuit (CAFC) has noted; the question of non-obviousness is a simple one to ask but difficult ,to answer. CAFC precedent instructs that the proper analysis of the non-obviousness question begins with the prestimption that the person of ordinary skill in the art at the time of the patentee's invention is presumed to have before him all of the relevant prior art. The next inquiry is whether, armed with this information, it would have been non-obvious to this person of ordinary skill in the art to coordinate the teachings of the prior art elements in the same manner as the claims in suit. Id., at 199. The CAFC has cAutioneathatthe strong temptation to rely on hindsight in evaluating obviousness must be resisted:

> is wrong to use the patent in suit as a guide through the maze of prior art references in the right way so as to achieve the result of the claims in suit. Monday morning quarterbacking is quite improper when resolving the question of non-obviousness in a court of law.

Id.

Respondents argue that the structure of the '573 patent is obvious as shown by the experimentation of IBM, the Parken patent, the work of Shugart, and the development of the CalComp/Tandon double-sided drive. The evidence adduced in the temporary phase of this investigation which has been discussed above, leads to a contrary conclusion.

It wan obvious to I3M to experiment with or investigate adding a second head on a gimbal spring and tortaih,th iiSed head contained in ihe single-headed drive, as 11 i';a448.MiVAPiek U.CaiCoMO: was nor obvious, however, that of the IcI system was one that6061d be reduced to practice. ihiSWid!otiVibui'neithert-o ISM: Shugart: CalCOMP: or Tandon. Indeed **IBM aftei:to4fikpetiMentatiOri** thoUghi sd iililp. of.'the asymmetrical configuration ihii.h8 CiM.1 was colleCted and no 'patent application was filed. /8M did appii tor and ioCeive a patent on its "clamshell," symmetrical free floating head deirIce, as wall a its symMeirical two fixed-headed deltic . Further, CalComp s Suggestion that Tandon investigate whether a doUble-heicied drive could be Made so it couldutilize: its inventory and tooling for the single-headed drive, does not bUggedi ihii the '573 patent is invalid for obvioUsness. Mr. Smith, they CalComp as shown in his affidavit, did not believe that the deVice embodied in the '573 patent was obvious, and he does not claim to have reduced it to Practice. In fact he described in his affidavit several benefits of thP patented device over the prior art. CX 611. Tandon was initially resistent to the non-/BM approach and Shugart, after much effort in working on the one fixed-hend/one-gimballed-head approach, failed and obtained a license from Tandon.

Thus, although the level of **skill** in the art was high, many of the leaders in the field could not redUce the '573 patent to practice. What is obvious is that at the time of the '573 application the structure embodied in the '573 patent was not the way any of the leading manufacturers in the industry would or could construct a functioning double-headed floppy disk drive. The /8M approach was the only successful implementation of a double-sided drive in the industry, and the industry considered the IBM approach the only practical system. Comstock, Tr. 1511.

IC M:)nday morning quarte-rbacking is to b• avoided and the situation is vi'.' u.1 as it was after IBM izau•d its Technical Disclosure• Bulletin at th• •nd of 1975, it is cleat that th• asymmutrical Tandon system wad non-obvious.

Sucond:ary.considurationa may also b• asst-ssr-d in evaluating non-c)t'viousnucs und•r 5 103. These c6h's1i•rations include; (1) com•ercial 5..ICCaE. of prodacts producud under th• patent; (2) long felt but unruaolvud n•f-a fur the- pat•nt•d invention; (3) failure- of others to arrive- at a solution to the- problem solved by th• patcntcd invuntionvand (4) industry acquif•scunc• in th• validity of th• patent. Graham, 383 U.S. at 17-18.

All of the aucondary considerations point in th• direction of non-obviousnc-ss, and hardly need e-xtunsiv• discussion, in that the patunt (1) covers an inv•ntion that succ••sdf-d where contmporan•ous inventive activities by others in th• industry were- abandoned after a lack of success, (2) has been accorded industry-wick- acquiuscunce' in th• form of multiple licenses with induatry lf•ad•rs, and (3) is support•d bye.vidf-ncf- of tc-chnical validity. Sc-f, •.g., cx 616-21. 'e' Smith Inc. v. Bugh•s Tool- Co., 219 U.S.P.Q. 686, 690 (C.A.r.c. 1983).

Tnua, thuru is reason to bf•livt- the. '573 pate-nt is valid.

29

B. Patent Infringement.

The '573 patent contains 16 claims, three of which are independent (claims 1, 5, and 12). CX 601. The '573 patent as described by TEAC's expert witness, Mr. Brown, represents a mixture of two technologies used in earlier data storage devices; namely, the pen etrating head of' the tape drive and the air bearing head of the hard or rigid disk drive. Brown, Tr. 2522.

Tape, a very pliant or limp material, forms a flat stable surface when the data transfer head slightly penetrates the plane of the tape, such that the contact between head and tape is sufficiently close and stable to enable accurate data transfer. The head of a rigid disk drive floats on a microscopically thin cushion of air so it will not abrade the disk, damage the disk material, or erase the stored data. The rigid disk drive head is suspended on a gimbal spring so that it can move up or down, or pitch or roll in accordance with the tiny imperfections of the disk, and permit the disk and head to always maintain the same relationship for data transfer. In the '573 patent, the lower head maintains the same or similar ¯telationship with the pliant, limp, floppy disk as the tape head did with the tape, serving as a positional reference and creating a flat stable surface for the upper head to slide against. The gimbal mounted upper head relates to the floppy disk as it does with the rigid disk. Brown, Tr. 2522-23.

The question of infringement in this investigation involves interpretation of several terms found in the '573 patent. The disputed portions are as follows: Claim 1 specifies that the first (or lower) transducer has "a fixed position in a direction normal to the plane of the media," and that the first transducer serves "as a fixed positional reference despite tendencies of the media to deviate in position from its nominal plane." Claim 5 specifies

"a first non-giMballed transducer . . . having a relatively fixed position relative to the plane of the media." (Emphasis added.) Claim 12 relates to a lower transducer "fixedly coupled . . . in an invariant position in a direction normal to the plane of the disc." [2]/

In both the accused TEAC and Mitsubishi drives, the lower heads are gimbal mounted, and have "fixed," "fixedly coupled," or "non-gimballed" backup members which restrict the movement of the lower gimbal springs. FF 140, 143, 211-12. The TEAC device has a massive structural element underneath the lower head gimbal spring which can be seen when shroud material is cut away. CX 763, photos 16, 17; Comstock, Tr. 1961-63. The photos indicate that the finger-like protuberance backing up the TEAC lower head will limit the travel of the gimbal spring in the Z-axis direction. [8]/ The lower gimbal spring of the TEAC device also has only one axis of movement in the pitch direction, which" is different from its upper head spring (CX 763, photo 14). The Mitsubishi fixed lower head backup member can be seen at CX 763, photos 21 and 22. This member appears to limit the Z-axis.travel and pitch movement of the Mitsubishi lower head. The various Mitsubishi models are the same or similar for our purposes (FF 135-38, 140, 142-43), except one does not have the fixed

---

7/ TEAC also disputes an additional portion of the language of claim 5, which provides for "a pivotable support arm having a pivot axis in fixed spatial relation to the first transducer. . . ." TEAC Post Hearing Brief, at 25.

8/ Z-axis direction movement refers to movement of the head towards and away from the disk. It is also referred to as translational movement.

backup member but has a heavier more restrictive spring on.the lower head than on the upper head (FF 144), and some have two springs on the lower head and one on the upper. Comstock, Tr. 1835-36. [21]

The accused TEAC and Mit'silbishi drives seem to be part way in between the IBM and Tandon systems. The lower heids'are not absolutely "fixed," ".fixedly coupled," or "non-gimballed." Although the backup devices restrict the movement of the lower heads, Mitsubishi claims that the lower heads of its devices move substantially and that its system is like the symmetrical IBM system. Hayashi, Tr. 2843. TEAC also claims that its lower head moves significantly and therefore its device is non-infringing.

Tandon, TEAC, and Mitsubishi have all conducted tests purporting to measure head movement. FF 146-59, 174-80. The significance of the various test results is the subject of substantial dispute between the parties. TEAC arguet that the proper comparison is the lower head movement of the Tendon device which embodies the patent and the lower head movement of the TEAC device. If this is done, according to TEAC,It will be shown that the TEAC head moves much more than the Tendon head. Mitsubishi argues that its lower head exhibits much greater movement than the critical angles and distance, thus establishing that its lower head is not 'fixed,' 'fixedly coupled,' or "non-gimballed."

9/ Some Mitsubishi models are admittedly not infringing. Tandon Postsilearing Br. at 62.

7%e i.atent speaks in tors of "tenlencies of the meliu to deviatn in from itc nominal plane." Ca C01, col. 6, lines C7-63 to col. 7, lin- 1.[13] The nominal plane of the floppy disk is the "mythical perfect p:ane" of the disk if the heads were not there and if there were no disk cerfectians or undulations caused by the clamping of the dish by the hu'Id. L•ais, Tr. 2990; Comstock, Tr. 1516. The patent thus makes it clear, and all partie: are in agreement, that the head design of a floppy disk drive mast 4. zuccessrolly with the movements of the disk away from its perfect plane, or head to disk compliance will not be satisfactory, resulting in unacceptable errors in data transfer. Thus, in interpreting the patent claims tic- disk movements should be taken as a reference point to determine the significance of the movements of the lower head. The only test which purported to meacure movement was done by complainant. FF 175,. 173.

Mr. Nathanson tested disk drives of the respondents as well as the drive:. of Tandon and the old IBM double-sided drive, which exemplified the most recent prior art cited by the examiner and upon which the '573 patent purports to be an improvement. The data or measurements yielded in the Nathanson tests apppear iin-four tables. FF 181-84. The technical experts called to testify by complainant and respondents have praised the test setup, instrumentation, :Accuracy and reliability of the test results. FF 200-01.[11]

he criticism of the meaningfulness of the Nathanson test results rests principally on the (Jet that because the tests were conducted while the lower head 4as in the outermost track position and the measurements were made at

---

10! The same- or closely similar language is in each of the independent claims.

111 The one apparent exception is Mitsubishi's claim that there was error in tn'- measurement of the pitch angle in operation of the lower head of its Mark I model. Mitsubishi Post-Hearing Br. at 25-26.

33

arProXIAal!iy the mid-radius of the disk, the amount of Z-axis movement of the Alsk shown represents an increase above the movement which the heads would encounter in actual operatiorii. The Cliii is that the Nathanson measurements do not have any "relevance" beciibie.if,the disk motiones't s wore conducted with th, lower head at mid-radii:2 ihka lesi media to support and therefir• less undulation and other types of imperfeciioni or.iinwanted disk motion. Lewis, Tr. 2888-91. Another criticism is that the Nathanson measurements are centerline or mici_poini values, which are said not to be meanin40.11 at the point wher; the heads sandwich the.disk.[11] (Drown, Tr. 2115-36. Mr. Drown, TEAC's iechnicA expert, would instead compare lowPr head movm•nts of th..' 'MAC and Tandon drives.[12] If ”r. Lewis is correct• then the Nathanson method of measuring disk motion may have exaggerated the amount of such motion in a floppy disk drive.il[13]

Ther - is general agreement among all the technical experts that there are two of disk movementa away fiom the nominal plane of the disk, and that these movements exert "substantial" forces on the heads; large scale waviness,

---

12/ The centerline value seems to represent a reasonable approximation of the conditions present at the point where the disk passes through the heads.

13/ Nathanson's data does permit comparisons of lower head movements1 however, the comparisons are meaningful when made to the reference point of disk movement, because although the lower heads of the respondents' drives may_ be' less fixed then complainant's lower head, they may still be fixed enough to come within the patent claim language. Comstock, Tr. 1595.

14/ It should be noted that if there were no contact bPtween the disk and the lower head, the disk movement could have been greater than shown by Nathanson. Brown, Tr. 2622.

sL.merines referred to aS undulations and small scale movements such as manufacturing imperfections and reductions in the thickness of the media when it passes through the two heads pressing against the disk while in*operation. Lrown, Tr. 2628, 2630;Alayaihi, Tr. 2848-49; Lewis, Tr. 2892. In each of the systems, the two heads and the disk make' up a sandwiCh, and each head plays an important part in providing close and stable head to disk compliance. Comztock, Tr. 1552; Lewis, Tr. 2887; Brown, Tr. 2523.

The Lin double-sided drive did not include a positional reference for thf-disk. Brown, Tr. 2522. In that drive the heads reacted to and were moved by the disk movements. The loading force of the heads against the disk in that drive was only eight grams (CX 601, col. 1, lines 48-53), and thus the disk movements would be relatively unrestrained by the heads pressing against Ir.[15/] The measurement of lower head movement in the IBM drive as shown in 'rabic- I shows relatively large movements, vis-a-vis the disk movement, of a much greater proportion than the head to disk movements of the other drives tested. Thus, the proportionally larger head movements in'the IBM drive is a further indication that disk movement forces are significant (Comstock, Tr. 1881-82), and that in the other drives the heads restrain such disk movement. After head loading and during operation, both heads clamp the disk, each of which contributes to some extent to restraining disk movement. It is, however, difficult to separate out the proportionate contribution of-each element in the sandwich. Lewis, Tr. 2910-11; Comstock, Tr. 1815-16. Thus, it is important to measure disk movement as a reference point in order to assess the r.elative contribution made by each head to restraining the disk.

15/ The respondents' and complainant's drives have a loading force of from 16 to 24 grams. Comstock, Tr. 1529.

35

An [1]•..,mination of tht• NJthanson tc-sta shows that f•vt•n if a corrf-cation is -JA- to subatantially ri•Jucf- dick mow•m•nt mrausru:v.nts,.tht. ddta is highly relevant at 1••ast Cur purposus of the- he-aring on temporary rf•lic f. diff!re nt types of mow-me.nt of the low•r hr-ads of the various drivf•s muasure-d during re-ad/writ.• opuraFion, namely Z-axis displ cumuar, (movrmiunts toward and away from th• lowc-r surface. of the• disk), pitch (up and Jo.::: tilting motion), and rc:11 (sick- to sidf• tilting motion). By rf•ducin•j the diskmotion measure-mf•nts in Tables I ant III (the only Tabl-s m••asuring disk motion) by 50 percent (the- largest amount that could be. considf.rud a substantial amount), Mr. Luais' objc-ction that disk move-r•nt should be- ruducA substantially is fully rakun into account. Whe'n.this rd-duction is mad•, rhu ovurall rf•otionships butwcun th• various disk drivus measure-d by Jathanson do not change. in any significant re,sp•ct. This is be.-cause- the- de-gre-e• of motion cxhiCitf-d by the- lower heads in complainant's and re-spondf•nts' disk drivs is small in relationship to the- amount of disk motion, and the- deireq- of motion in the- Ian drivc- lower head is large' in rc-lati•an to disk motion. Thu- data, f-vc-n after tht- adjustment, presf-nts a picture• of two difff-re-nt floppy dick drivc- systt-ms; one' a. Err-f--floating head system re.-presented by the. IBM drivt• and the• othf-r represented by all other drivc-s. Th•y apps-ar to involve• two typf-s of head assembly configurations; one that contains a positional - ruCure•nce- and one• that does not. Fr 186-87, 192, 197-99.

Thus, if A, which re•prw-nts Z-axis disk move-mc•nt, is re-duce-a by hall, thA the- purce-ntage.s I (for invariance•, meaning the• df•rt-e• to which the• lower he ad does not follow disk move•nf•nts) in Table- I would to- as follows:

36

Mitsubishi 95.4 percent; TEAC 92.3 perc•nt; Sony 99.05 percent; Tandon 5-1/4, 98.52 percent; Tandon 8, 95.2 percent; and IBM, -21.15 percent.[16] The SO percent reduction in measured disk movement reduces Nathanson's percentages of the invariance or fixedneas ror the TEAC and Mitsubishi drives by about two percent. A similar picture- would be presented in Table III if a 50 percent rejuction in measured disk pitch movement was made: Mitsubishi's percentage invariance would be reduced to 98.5 percent and TEAC's, to 88.2 percent.

The Nathanson data merely confirm what appears obvibus from physical inspection of the- drives tested. The- IBM drive did not contain heads that provided a positional reference for the disk. Brown, Tr. 2522. The TEAC drive- does contain a' positional reference; however, it is described as "resilient" rather then fixed. Brown, Tr. 2523, 2592. The- Mitsubishi drives also provide a positional reference for the disk. However, it is claims-.1 that each of the- two Mitsubishi he-ads provide equal positional references for the disk. Lewis, Tr. 2887.

TEAC and Mitsubishi appear to ignore the fixed backup members which are under the- lower h.-ad gimbals, and any role- they may play in restraining disk movement; Nathanson has taken spring rate measurements of the upper and lower heads of the drives tested and the disk, which gives a picture of the relative contribution of each head to the- restraint of disk movement. Comstock, Tr. 1529. Nathanson's spring rate data is contained in Tables II and IV.

16/ The negative percentage for IBM can simply be taken to mean that the- IBM lower head moves a great deal more then the lower heads of the other drives in response to disk movements.

with respect to motion along the Z-axis, Table II of the Nathanson data shows tear thf• lower head of the TEAC device is approximately one thousand times more inflexible then the TEAC upper head. The same is true for the Mitsubishi d•vice,[17/] and is probably due to the backup member, since in these devices (with one eUc•ption) Mitsubishi uses the same gimbal spring to support' the *upper* and lower heads. FF 138-39. This data confirms that the TEAC and Mitsubishi head assembly systems are asymmetric systems, like the Tandon system, and unlike the symmetric system of IBM. This evidence further tends to show that the necessary positional reference in the TEAC and Mitsubishi devices is caused by the lower head being substantially more fixed than the upper heads in those drives.

With this background in mind we should now consider the questions of infringement literally and under the doctrine of equivalents.

1. Literal Infringement.

The lower head of the Sony device is "fixed" in the same sense as the preferred embodiment in the '573 patent and as provided in claim 1. FF 133. All of thlv-other elements of claim 1 are also present. FF 208. Obviously,

---

17/ The TEAC test as shown in a videotape tends to confirm the accuracy of Nathanson's spring rate measurement of the TEAC lower head. _Comstock, Tr. 1557-58. The Nathanson *data* **portrayed the** TEAC lower head as more resilient then it actually is. Brown, Tr. 2611. The spring rate measurement of the Mitsubishi lower head measured by Nathanson is about right according to •itsubishi's technical expert, and there is no TEAC **or** Mitsubishi *data* on disk stiffness, or TEAC *data* on Z-axis displacement. Lewis, Tr. 2910, 2913; Brown, Tr. 2622; Comstock, Tr. 1594.

evec material 4toves to aome degree when forces arc applied to it. The loder. Sony heal, like the lower Tsndon head, was not designed to move with respect to the forces it would encounter in operation in a disk drive. It is not mounted on any gimbal or spring which would permit it to deflect when forces of the disk. contact its upper surface, but rather it is mounted on a fixed metal strap. The data collected in the Nathanson tests shows that the Sony lower head plays the major role in the sandwich by ironing out the un1ularions and imperfections in the disk by serving as a fixed positional referenc• for the upper head. FF 134. The data yielded from testing the Sony device in Nathanson Tables I to IV is about the same as from the tested Tandon device, which exemplifies the patent claims.

For the above reasons, the Sony device infringes claim 1. The Sony device is also "fixedly coupled" as provided in claim 12, and it therefore clearly infri nges claiLa 12. Finally, for these same reasons, the Sony device is "non-gimballed" and literally infringes claim 5.

It is much more difficult to find that the—TEAC and Mitsubishi drives literally infringe the independent claims. The term "fixed" in claim 1 and "fixedly coupled" in claim 12, based on the way the terms are used in the patent and in light of the testimony of the meaning of such terms in the industry, indicate that these terms mean the lower head was not designed to move in response to the forces it would likely encounter in a floppy disk drive. Lewis, Tr. 2919. The Tandon and Sony heads meet this test, but the TEAC and Mitsubishi heads do nOt. They do move to some extent in response to disk inovem•nts on loading and in operation* Thus the TEAC and Mitsubishi drives do not literally infringe claims 1 and 12 of the '573 patent.

39

Ti.er• LI a serious question as to whether the TEAC and Mitsubishi drivys literally infringe claim [18/] Neither is fully gimballed in that they, rely 0.' rigil or fixed backup members to restrict the gimbal movement, thus to some extent preventing deflections and translational movement of the lower head gimbal in respons• to the forces of ttie disk. Furthei, of the independent claims, claim 5 is the only one that provides that the "non-gimballed" lower head has "a relatively fixed position relative to movements of the plane of the media." (Emphasis added.) Thus, the term "non-gimballed" in claim 5 includes a head mounting that permits the head to move relative to the plane of the media. The term "relatively fixed" in claim 5 means "somewhat fixed." Lewis, Tr. 2921-22. The TEAC and Mitsubishi lower heads are "non-gimballed" apparently because of the fixed backup members and the role they play in restricting movement which would be expected from a gimbal. TEAC's lower head may m:ave significantly upon. loading, and TEAC's and Mitsubishi's lower heads may move somewhat in operation, as shown in the testing of all parties; however, these movements move the lower head .closer to and'in alignment with the disk. The movements do not take these drives outside the claiwlanguage, "relativef fixed position relative to the plane of the media." CX 601, claim 5.[12/]

18/ Complainant's technical expert, Mr. Comstock, states that the term "non-gimballed" in claim 5 relates to angular deviations and claims 1 and 12 relate to translational movement. Comstock, Tr. 1514. This, however, is not supported in the patent claim language. CX 601. The various claims are just different ways of describing the mounting of the lower head (Bogucki, Tr. 2984), and measurements of all types of movement may be used to interpret the scope of all the claims.

19/ TEAC makes the additional argument that claim 5 also provides for a

(FoOtnote continued on next page)

in almost all of the Mitsubishi drives the gimbals on the upper and lower h•aJa are (as in the case of the /ivl drives) identical, lo.:er gimbal of t!',• tested drive, and others in the same group, are supported by a sheet metal fixed prutub•ranCe which restricts the gimballing action in the Z-axis direction to about the same amount of motion as is exhibited by tie fixed Tandon onJ Sony lower heads. See Table I. This protuberance may also limit the Mitsubishi gimballing action in the pitch direction. 1.3(4- Table- III.[20/]

The TEAC lower head exhibits more movement then the Mitsubishi or Tandon lower heads in the Z-axis direction, but because of the fixed backup member, much less movement then the IBM drive. FF 181. Claim 5 contemplates a lower head that moves in relation to disk movement, so the fact that TEAC's lower head moves somewhat more than Tandon's or Mitsubishi's does not•exclude it from the language of claim 5. Like them, it is "relatively fixed" in rc-larionship to the media. Also,.because the spring on which the lower head of the TEAC drive is mounted has only one axis of ireedom, the TEAC lower head has about the same freedom to move in the ro)‹l_direciion as the Tandon drive.

(Footnote continued from previous page)
pivotable support arm having a pivot axis in "fixed spatial relation to the first transducer." The pivotal axis and support arm is fixed in the TEAC and all the other devices. TEAC argues that the "pivot axis" cannot be in fixed spatial relations because the TEAC lower head moves. However, as shown above, the claim language describing the first transducer provides for movement- The pivot axis of the upper arm is fixed, and in this sense has a fixed spatfal relationship to the first transducer.

20/ Mitsubishi claims the pitch measurement was an error or a "fluke" measurement, and its tests show greater pitch movement. Nevertheless, the backup element appears to provide' restraint in the pitch direction.

41

rT 188. Also, Table IV of the Nathanson data shows that the lower head•of the TEAC device is much more inflexible then its upper head in pitch and roll movements, about 18 times more inflexible in the pitch direction and over 500 times more inflexible in the roll direction. FF 189.

Complainant thus has raised a serious question whether.the TEAC and :iitsubishi disk drives literally infringe claim 5 of the '573 patent, which is fair grounds for litigation with respect to the request for permanent [21/]

2. Doctrine- of Equivalents.

If the TEAC and Mitsubishi devices perform substantially the same function in substantially the same way to obtain the same result, then they are equivalent to the device defined in the '573 patent. See Graver Tank Si Mfg. Co. Linde Air Products, 339 U.S. 605; 608, 85 U.S.P.Q. 328 (1950); Perkin-Elmer Corp. v. Computervision Corp., 732 F.2d 888, 900, 221 U.S.P.. 669, 679 (C.A.F.C. 1984). The result and function is to provide accurate and effective data transfer, which all of the drives provide. TEAC and Mitsubishi argue, however, that their devices do not perform this function in the sa.4• way. Mitsubishi in effect argues that its disk drives behave like the IBM drives, but that the three piece sandwich is put together in a way that provides a positional reference, whereas in the earlier IBM device a

21/ Mitsubishi makes several models of disk drives and only one model was tested by Nathanson. However, all except two admittedly non-infringing models would be expected to exhibit the same characteristics as the tested model. FF 217-25.

42

i•.)zitional reference was not provided. Mr. Lewis did not quite say that and lower heads contribute equally to the creation of the positional ref.•rence. tie said it was a "reasonable approximation" of what happens. Lewis, Tr. 2007. It is true that in the roll and pitch directions Mitsubishi's upper and lower heads exhibit the same degree of springiness. FF 19. But this is not true, as shown above, for Z-axis translati.mal movements towards and away from the disk. FF 184. Table 1 of the Nathanson data shows only 29 microinches of Z-axis movement in operation 22/ Mr. Hayashi, in claiming that the two heads move "synchronously," referred only to the small scale (pitching and rolling) movements of the disk. Hayashi, Tr. 2863-64. Yet, he, along with all the other experts, admitted that there are two kinds of movements which must be dealt with in a floppy disk head assembly, the large scale -undulations or waviness and the small szalr: movements. Hayashi. Tr. 2849-50.

:tr. Lewis appears to suggest that upon loading of the headt, the disk becomes more rigid and that only the small scale movements are left, to which the Mitsubishi heads react like the heads in the old IBM drive. Lewis, Tr. 289144, 2907-08. This view was disputed by Mr. Comstock who cited the data collected on the IBM drives that there would be little or no increase in disk tension when the heads were loaded on the disk. Comstock, Tr. 1879-81. Mr. Lewis admits that during loading, the disk has a propensity to undulate and

22/ Mitsubishi has not informed us of the actual distance between the backup member and the lower gimbal spring.

43

deviate from the nominal plane. Lewis, Tr. 2905-06. If the undulations are pr•s•nt during loading they would also be present during operation (Lewis, Tr. 2911) , but for the backup member which apparently makes the litsubishi lower head substantially fixed. Thus, the fixed backup member below th4 bier gimbal functions so that the lower head contributes more to the positional reference then does the upper head in the Mitsubishi devices.[22/]

;CAC does not contend that its upper and lower heads equally, contribute to the positional reference. , The TEAC system is clearly asymmetric as shown, above. TEAC- argues that the positional reference for the disk is "resilient," and its lower head moves. significantly on loading much more than the Tandon *lower* head moves in Operation. This resilient system, as shown by the evidence discussed above, depends' substantially on the fixed backup member.

Therefore, the positional reference in the TEAC and Mitsubishi drives with respect to translational Z-axis motion is created by the substantially "fixed" and substantially "fixedly coupled" lower heads. The_TEAC and Mitsubishi lower heads may not be as fixed as the Tandon-lower head, but they are fixed enough to serve as a *fixed* positional reference. Comstock, Tr. 1595. Thus, with r•sit•c.t to the doctrine of equivalents concerning claims 1 and 12, there is reason to believe that the lower heads of the TEAC and Mitsubishi drives are substantially "fixed" and "fixedly coupled." They function substantially like the lower head in the device defined by the '573 patent in substantially

---

23/ Mr. Comstock, Tandon's technical expert, does not know if there is any space between the backup member and Mitsubishi's lower spring. Comstock, Tr. 1830.

44

way to achieve the same result as the device defined in the '573 atent.

IC there is no reason to believe that the Mitsubishi and TEAC driVes literally infringe claim 5 of the '573 patent, then there is reason to believe thiv do so .under the doctrine of equivalents. For the reasons set forth above- in the discussion of literal infringement of claim 5, the lower heads of the TCAC and nitsubishi drives are substantially "non-gimballed."

3. Patent history Estoppel.

Respondents TEAC and Mitsubishi claim that to find infringement by applying the doctrine of equivalents would permit complainant to recapture subject matter intentionally given up during the patent application proceedings. Whenever the doctrine of file history estoppel is evoked, a close examination must be made as to not only what was surrendered by the patentee, but also the reason for such a surrender•. Bayer Aktieng•llschaft v. D4phar Intl Research, 222 U.S.P.Q. 649, 653..(.C.A.F.E. 1984); Ziegler V. Phillips Petroleum Co., 177 U.S.P.Q. 481, 489 (5th Cir. 1973), c•rt. denied, 414 u.5. 1179 (1973). Close examination of the prosecution history of the '573 patent determines "not only what was surrendered, but also the reason for such a surrender" (Bayer, 177 U.S.P.Q. at 653), and reveals clearly that the patentees amended their claims to clarify the direction of the "fixed" nature of the lower transducer.

The patent office history shows that the patentees sought to distinguish the subject matter of their application from the prior IBM Technical Disclosure of a double-sided floppy disk drive. CX 611. The applicants

the claims, but the 4w-rid:T•-tit-L. did not relinquish any subject .;;att•r. In claim 1, applicants did attempt an elaboration of the definition of "fixed," ("a direction normal to the plane of the media" and "the first transducer serving 3s a fixed position reference (for the media)"), but this a:Tlendinq languag• added only directioil'and function'io the meaning of.the word "fixed,". which was present in the original application. CX 611, at 52-53.

•Similarly in claim 12, the language "in an invariant position in a Direction normal to the plane of the disk" merely clarified the direction of the "fixed coupled" lower head. CX 611, at 54. No relevant subject matter was surrendered. •

The amendment to' claim 5 significantly departed from the original clear meaning of "fixed" as not designed to move in responsv'to the forces expected in the system. The amendment expanded the claim so that the first transducer can be "relatively" but not completely "fixed" in relation to the perfect plane of the lick by the addition of the following language relating to the first transducer: "having a relatively fixed position r•l'ative to the plane of the media." CX 611, at 53.

There is reason to believe that the applicants are not estopp•d by the patent office history from asserting the doctrine of equivalents.

4. Conclusion as to Infringement.

There is reason to believe that thy double-sided Sony 3-1/2 inch floppy dist drives literally infringe claims 1, 5, and 12 of the '573 patent. There is also reason to believe that the double-sided disk drives of TEAC and

46

Mitzubishi (•xc•pt for curtain admittudly non-infringing modulo) litf•1.11y inrcingf. claim 5 of the- '573 patent. There: is furth•r rf•ason to b••ii•vo that th• double•-4id•d disk drivus importud *by* TE›C and by Mitsubishi (•xcf.0 for th• admittedly non-infringing models) infringe- claims 1, 5, and 1: of the. '573 pat•nt by (•ason of th• doctrine- of equivalents.

am.

47

IV. UIPORTATT077 Arn SALE

[1]..rV,OAethe subject matter jurisdiction of the Commission ane; to sul:port a filiiT; tIpt a violation of 5 337 exists, complainant must establish that there 13 a reason to believe that the accused product has been imported and/or sold in the United States.

TEAC Japan sells floppy disk drives to the United States both directly from Japan, primarily to large 0E1 customers, a d through TEAC America, a sul:sidiary located in the United States. FF 255-57. From October 1182 C.* September 1333, the- TEAC respondents sold doable-sided disk drives in the United States. 'F? 259. From Cctober 1982 to September 19E1, tae TaNg C respondents sold double-sided :Hs% drives in the United States. ?T 260. In October-December 1994, the TEAC respondents sold C.ouble-sided disk drives in the. United States. FF 251. TEAC respondents c:o not import into or sell in the United States 3-inch f7outle-sided fl3ppy disk ,drives. F? 712.

MELCO is 3 Japanese corporation which manufactures and sells double-sided floppy disk drives in the United States through its U.S. subsidiary, 71F.LA. FF 238-55. :12',LCO manufactures and sells into the United States 3-1/2 inch and 5-1/4 inch double-sided floppy disk drives alleged tc infringe the '573 patent. FF [1]72-73. •LA performs vality assurance, service 7;n3 repair - functio:1;:, ard application engineering support in the United States on lisk rive. 41iC'n it di3tribjt". Fr [1]00-91. From October 1192 to S•pteiber responc7ents shipped double-siel :lak drives to the C ':nite' States, of d.ich about percent were 3-1/1 inch lis% drives. Ab:;ut

***C = Confidential.**

of thsss disk drives 3-inch crives -shich do not infrinjs th• '573 patent. FF 270. From October 1983 to S•ptsmbsr 1984, th !litsuhiAhi rsspond•nts shippsd dou:.1••-sid•d floppy disk drivssto th Unitsd States. Of this total, about w•rs doubls-silse 3-1/2 inch disk driv•c, about wsrs 5-1/4 inch disk drives, ane .rout wsrs 8-inch disk drivss. F7 271. From Octob•r 1934 to Dst•mbsr 1034, the !1itsubishi rSspondsnts shipp•d double-sidsd floppy lick drives to ths Unit's• States. Of this total, about wsrs doubls-sidsd 3-1/2 inch els% drives, :sere 5-1/4 inch disk drives, and ws.rs S-inch disk erivs . FF 272. Thy 8-inch driV•s shipped to ths United Statss from October 1933 to December 1984 do not infrings the '573 patsnt. FF 272.

The- Sony rsspondsnts import and sell in th• United Statss•doubls-sLlsd floppy disk drivss allsgsd to infrings the '573 patsnt. FF 2a5. Sony or solAn has marketed in ths United States on• doubl•-sidsd lisk drive modsl, the. 0A-032W. IT 237. Sony shippsd 0 total of doubls-sids4 full-hsight floppy disk drivss to th• United Stat•s bstwssn ths fourth quarter of 1981 any': ths first quarter of 1985. Of this total, units wsrs sold to

IF 235.. The- Sony rsspondsnts also have begun to off•r a doutl•.•.sif:•3 disk drive' in ths United Statss in the third quarter of 1184, and in th• first quarter of 1985 sold drives to and drivsa to . FF 238-84. SONA!!, as the. U.S. salsa rsprsssntativ far Cony, has th!' re-s?onsibility of promoting Sony as a rslia')Is 77 331, 3ONA:1's major functions inc lids making th• initial contact sit:. ths

unite'? Statc-o customr-r, s-7.31uation unitc, making follow-up vioits,

st•rvicin.; Sony's largf' U.S. accounts, such 35

FF 292.

r-vidc-ncr. of rr•corl r-stablishess that thr•rr- is reason to bc-liev tat

thr- TZAC, anl Sony rr-spondsnts have import into or Si in thr

Unitt.1 Statc-s double—sidt•E1o2py disk 3rivf's.

V. DOMESTIC INDUSTRY

The Commission has customarily defined the domestic industry in. patent-based investigations as the domestic operations of the patent owner and its licensees devoted to the exploitation of the patent. Certain Methods for Extruding Plastic Tubing, Inv. No. 337-TA-110, 218 U.S.P.Q. 348 (1982); Certain Slide Fastener Stringers and Machines and Components Thereof, Inv. No. 337-TA-85, 216 U.S.P.Q. 907 (1981); see H.R. Rep. No..93-571, 93 Cong., 1st Sess. 78 (1973). The domestic industry is not limited to manufacturing per se but encompasses distribution, research and development, and sales. Certain Personal Computers, Inv. No. 337-TA-140, 224 U.S.P.Q. 270 (1984); Plastic Tubing, supra. The Commission does not adhere to any rigid formula in determining the scope of the domestic industry as it is not precisely defined in the statute, but will examine each case in light of the realities of the marketplace. Slide Fastener Stringers, supra; Certain Apparatus for the Continuous Production of Copper Rod, Inv. No. j37-TA-52, 206 U.S.P.Q. 238 (1979).

A. Definition of the Domestic Industry: Double-Sided Floppy Disk Drives.

Tandon was incorporated in California in February 1976. FF 366. Tandon developed and filed a patent application for its double-sided head assembly in 1977. FF 368. During its first year of operations, Tandon established itself as'a leading manufacturer of flexible disk drive recording heads (including its patented double-sided head) and captured approximately 80 percent of the total floppy disk drive market for head assemblies. FF 367. Tandon in 1979

51

introducmd its 5-1/• inch doubl•-sid'•1 floppy dick product line., :1:17 1.22 had be-come- the- larol•st mailufacturc•r of flop'py sold to =Is. Fr 395. For fiscal year 1.c34, complainant's ne-t sale's of h-ad totaled units; its rvt sale-s of disk driv--s totale-J units. FF 371.

Re'sponde-nts asst-rt that the- domestic: industry in a pat•nt-bas•d invmstigation is limit•d to th• article' cove•r•d 'ay the' claims of the- pats-n*. Re-spondmnts conclude' that the- claims of the- '573 pat.'nt.cove'r h^-ad not floppy disk drivms, and that the- allmcrd 1:;mmstic industry should .'- strictly Imfin-• by those' domestic activitims of the pate•ntme- and its lice.nse-ms de•votmd tC thm production and sale- of he'a2 asse-mblims. Sony 2rie-f, at 20-21 (Apr. 30, 1935); TE:AC Brimf, at 30-33 (Apr. 29, 1983); nitsUMshi 3rimf, at 28-30 (Apr. 29, 1905).

Complainant asserts that the' sp•cifications and claims of of the '573 patent 31:f' dirmct•d to a double'-side?: floppy disk drivs• or maGnmtic rf-corrling system. Tandon Sri•f, at 31-33, 46-48 (Apr. 29, 1933). Base':' on this pre•mism, complainant concludes that Tandon and its lice-nse-.'s constitute- a dommstic industry. Id., at 34-46; Tandon Rmply Brim f, at 7-11 Clay 3, 192:),

Thm Commission invl•stigative• attorney has not taken a position on w:l -thr.r thf' '573 patmnt covers disk drive's or head assmmblims. The staff attorney subsiits that thm pre-cism covmragm of the patmnt is not a controllincj f,..ctnr in this cusm; that the- rmle-vant hmad assmmbly is us.'1 mve-ry time- thm disk drie.' is us--d and tat the' disk hive' cannot he- usmd withcut a he-ad asse.nhly. Th- staff attorn--y conclude•s that marke-t rmalitims ne-c-•ssarily d.*•fine• the- (!o.:1''3t..- iniustry lz do.Me--zi:c.1 floppy disk drive's. Staff at 11-13 22, 1523).

The claims of the '573 'patent are directed to head assemblies. Opn., at 13-47. The domestic industry in this investigation, however, is defined by t: domestic activities of the patentee and its licensees devoted to the 7.anuf.ictur•, distribution, r;'search and development, and sale of double-sided floppy disk drives.

Respondents rely on the Court of Appeals decision in Schaper Manufacturing v. U.S. Int'l Trade Commin, 219 U.S.P.Q 665 (C.A.F.C. 1963), and the cases cited therein, to assert that "the relevant domestic 'industry' (in a S 337 investigation) extends only Co articles which come within the claims of the patent relied. on." See 219 U.S:P.Q. at 667. Respondents make no attempt to reconcile Schaper with the Commission's decisions in Certain Apparatus fo, Production of Copper Rod, 206 U.S.P.Q. 13.9 (1979), and Certain Slide Fastener Stringers and Machines, 216 U.S.P.Q. 907 (1981), which hold that the Commission is not bound by any rigid formula in defining a domestic industry, but will evaluate each case in light of the realities of the marketplace. 206 U.S.P.Q. at 161; 216 U.S.P.Q. at 916. A full:: analysis of Schaper demonstrates that the court's decision is consistent with Copper Rod and Slide Fastener Stringers and doc-s not create, as suggested by respondents, a rigid industry formula for patent-based investigations.

Schaper Manufacturing Co. was engaged in the developing, manufacturing, and marketing of toy products. Complainant had been granted an exclusive license to manufacture, use, and sell toy vehicles under U.S. Letters Patent No..4,306,375. Complainant arranged for the manufacture of these vehicles in Hong Kong. 219 U.S.P.Q. at 666-67. The court agreed with the Commission's decision that a portion of complainant's business activities relating to

53

production of accessories for the toy vehicles, all of which occurred in the United States, could not be considered part of any domestic toy vehicle industry as that term is defined under 5 337. The court held that it was a well-settled, longstanding rule that, "(i)n cases under 5337 involving United States article patents, the relevant domestic industryNextends only to articles which come within the claims of the patent relied on." 219 U.S.P.Q., at 667. The court then applied the facts of the case to this rule:

> Appellants' complaint alleged infringement of the '375 patent, which covers only the Stomper toy vehicles. The fact that the existence of the accessories derives from the toy vehicles does not make their domestic production by Schaper . . . a part of a toy vehicles industry in this action under section 337. The accessories are not a necessary part of the vehicles, nor are they integral to them. Most of the appellants' vehicles are sold without the accessories; the latter do not come within the claims of the '375 patent; nor do they have the claimed product configuration of the Stomper toy vehicle. The Commission could rightly conclude from these facts that "the Stomper accessories cannot be part of any domestic industry in this investigation." (Footnotes deleted.)

219 U.S.P.Q., at 667-68.

The court in Schaper did not rely simply upon an industry definition derived from the claims of the '375 patent to hold that complainant did not constitute an industry in the United States within the meaning of S 337. It found that it was the nature and extent of complainant's domestic activities in the United States that were insufficient to constitute a domestic industry. 219 U.S.P.Q. at 669. While the court agreed with the Commission's decisions in Certain Airtight Cast Iron Stoves, 215 U.S.P.Q. 963 (1981), and Certain Airless Paint Spray Pumps, 216 U.S.P.Q. 465 (1981), that the servicing and installation activities of a complainant within the United States may meet the domestic industry requirement under S 337, it distinguished these cases from its holding in Schaper because the Commission did not err in its finding

that "Schapet's activities in the United States are too minimul to Le considered an 'industry' under section 337." (Emphasis add-J.) 219 U.S.P.Q. at 669. The court recognized that the domestic industry in patent-based investigations may encompass'a broader definition than the article cow•rf•0 by the claims of a patent, which is consistent with the Commission's decision in Copper Rod and Slide Fastener Stringers.

iresur• in Schaper centered on whether the- toy vehicle accessories were necessary part of the patented article- or integral to.it such that they should be considered part of the domestic industry. A similar question is posed in this investigation: Does the nature and extent of the domestic activities of complainant and its licensees constitute- a domestic industry given the [act that the patented article, the head assembly, is a necessary part of the floppy disk dr-ive?

A head assembly can be- sold as a separate article of commerce. Tandon was originally established as a manufacturer of flexible disk drive recording he-ads and did not introduce- its 5-1/4 inch double-sided fl6ppy **disk driiit-product line- until 1979**. Fr 365-66, 396. A **small portion** of Tandon's tales in fiscal year 1984 still involves the Sale of recording heads directly to customers. FF 371. At the- same time, the head assembly is a necessary and integral part of the floppy disk drive. A floppy disk drive functions, to store-, and transfer data, and it is the heads within the head assembly of the disk drive that perform the read/write function.

The Commission in Certain Personal Computers and Component's Thereof USITC Pub. No. 1504, 224 U.S.P.Q. 270 (1984), held that if the intellectual property right involved in the investigation is an essential component of an article, the industry should be defined in terms of the complete article and not just

rte. intellectual property right. USITC Pub. No. 1504, at 41. The Commission :oar-2 that **one** copyright at issue, a computer program known .:As the Autogtart mn, w,:.4 used every time the personal computer was used. The Commission did not stakf• **similar findings with respect to the other intellectual property rigLts at issue. The Commission alsd' Made no finding as to whether the** ccpyrighted software or the patented technology were **articles of commerce separate** from the personal computer, **but held that the actual article of com.nerc• involved in the investigation was the complete personal computer and defined the domestic industry as those portions of complainant devoted to certain personal computers. USITC Pub. No. 1504, at 41-42.**

Respondents assert that the Commission's decision in Certain Modular Structural Systems**, Inv. No. 337-TA-164, USITC Pub. 1668 (1984), considers** Personal **Computers as a mere exception and that the definition of a domestic industry is limited to complainant's intellectual property right. TUAC Reply Brief, at 12-15 Play 3, 1985); Sony Reply Brief, at 14 (May 3, 1985); Mitsubishi Reply Brief, at 14 n.14 (May 3, 19.45). This view is incorrect.**

Afte-r **determining that the investigation in the matter of Modulr** Structural Systems **should b4′ terminated for mootness, the Commission reiterated its longstanding practice of defining the domestic industry by** the exploitation **of the intellectual property right at issue. USITC Pub. 1668, at 8, 12. The Commission underscored that a domestic industry was not to be defined according to a rigid formula; "In certain circumstances, the realities of the marketplace require a modification of that principle." USITC Pub. 1668at 12. The Commission gave as an example an instance in which a**

patented article is not itself an actual article of co=erce tut is ph:yoically incorporated in an article of commerce and Personal Comriters as em authority from which such a proposition night follow. USITC Pub. 155 '5, at 12 n. 40. The Commission held that the industry in th' investigation shoull be defined in terms of the patented article, FSD's # GOO connector, because the record clearly showed that the connector was not only a separate- article of co:nncrce, but the actual article of commerce at issue. USITC Pub. 1652, at S.12, 12-15. Therefore, Personal Computers cannot be read simply as a uni'lAe exception of as an aberration.

The patented article in this investigation may be in and of itcelf an article of commerce, but, like the articles at issue in Personl Computers Modular Structural Systems, it is not the actual article of commerce involved in this investigation. The actual article involved is double--:Aded floppy disk drives: First, it is the importation and sale of respondents' ouble-sided floppy disk drives which, based upon t'ae xealities of the marketplace, compete directly with the :7omestic activities of the patentee 3..1 its licensees. FF 256-37, 2C8-69, 223. Second, complainant's net sales of disk drives for fiscal year 1333 totaled • units, while its net sales of head assemblies equaled only a small fraction of its sales of drives, or units. FF 371. Finally, the head assembly is used every time the is drive is used and the disk drive cannot be used without_a head assembly. Therefore, th- domestic industry in this investig:rtion is by th.e domestic activities of the patentee and its licensees devote) to t.;1 manufacture, distribution, research ane development, and sale of dout.1 :-: flo:71:7 disk drives.

57

2. 'Mr Advftsf•y Afff•crf.J po:nestic Op'rations..

'...neon currently manufactures the following patented doubl•-sided floppy Ji.:k drives; (1) th' TM 100, a 5-1/4 inch full-height floppy disk: drive; (2) the TM 65, a direct drive 5-1/4 inch half-height floppy disk drive; (3) the• Tn (143, J direct drive 8-inch half-height floppy disk drive; (4) the TM ;3, a b-lt-Jriven 5-1/4 inch half-height floppy disk drive; and (5) the TM 101, a modification of the TM 100. FF 398. The patented double-sided floppy disk drives manufactured by Tandon licensees at the time the complaint was filed in this investigation include: (1) Texas Peripherals TM 65-2, a direct drive 5-1/4 inch halt-height floppy disk drive; (2) Control Data Model No. 9409, a 5-1/4 inch full-height floppy disk drive; (3) Control Data Modf•1 No. 9428 and Mo. 9429, 5-1/4 inch half-height floppy disk. drives; (4) Shugart Model No. SA-850, an 8-inch floppy disk drive; and (5) Shugart Model No. SA-450, a 5-1/4 inch floppy disk drive. See FF 505-06, 512. Tandon is currently developing the floppy disk drive TM 300 "series, a 3-1/2 inch, half-height, patented double-sided floppy dis.k driveTat its Microtck subsidiary. FF 475. Complainant asserts that all of the double-tided floppy disk driVes. of Tandon and its licensees which incorporate the claims of the '573 patent comprise the domestic industry in this investigation.

Though a complainant may incorporate the patented technology in a numbe-r of products, all of the products may not necessarily be included in domestic industry for purposes of S 337. The industry consists of those-domestic operations which are adversely affected by the alleged unfair mf•hods of coup'tirion or unfair acts. Certain Heavy-Duty Staple Gun Tackers, Inv. No. 337-TA-137, Initial Determination, at 66-68 (1983), adopted la Commission,

49 Fed. Reg. 668 (Jan. 5, 1984); Certain Drill Point Screws fOr Drywall Constructinn, Inv. No. 337-TA-116, USITC Pub. 1365, at 11-15 (1933); Certain Headboxes and Papermaking machine, Inv. No. 337-TA-82, USITC Pub. 1138, at 27-29 (1981).

All floppy disk drives perform essentially the same storage and retrieval functions; therefore, from both a technical and a broad economic perspective, all floppy disk drives are potential substitutes for-one another. FF 543. The economic concept of floppy disk drive substitutes incorporates, but at the same time goes beyond, technical possibilities of substitution. Not only must it be technically possible to substitute one floppy disk drive product for another, but the marketplace must perceive the products as substitutes. FF 544. Competition for the principal floppy disk drive configurations has come from newer floppy disk drives (3M:ring increased capacity, smaller size, or lower price. FF 545.

In 1976, the state of the art for floppy disk drives was the 8-inch drive. FF 548. Sales of 8-inch double-sided.disk drives in the United States continued to outnumber sales of 5-1/4 inch double-sided disk drives both in 1980 and 1981. FF 552. In 1982, a customer asked Tandon for a quote on both the 5-1/4 inch and 8-inch disk drives. Tandon has received a number of similar requests for quotes since that time. FF 553. Tandon currently offers its full repertoire of disk drives, including the 8-inch drive to, customers who are designing new computer systems, but there is no evidence of any new computer systems that use the 8-inch disk drive. FF 554-59.

The market for 8-inch disk drives is flat, but sales opportunities exist for customers who still use an 8-inch disk drive in their system. FF 555. Tandon estimates the 8-inch disk drive market at several hundred thousand

59

drive3 per year, and expects to compete with Mitsubishi and one or two other Japanese companies for this business. FF 554. Over the long term & however, the 8-inch disk drive is not expected to be an important factor in the marketplace. FF 555-56. The decline in the 8-inch drive market is attributed to a general industry trend toward the use of smaller, less expensive components, the use by IBM and Apple of 5-1/4 inch and 3-1/2 inch formats, and the wealth of software available for 5-1/4 inch and 3-1/2 inch disk drives. *FF* 555-57.

A prototype of the 5-1/4 inch disk drive was unofficially shown by Shugart to certain companies about April 1976. Shugart later introduced the 5-1/4 inch drive at a trade show in May 1976. FF 305. At first, sales of the 5-1/4 inch single-sided floppy disk drive were slow due to an induitry reaction of disbelief because IBM was-using 8-inch drives and the product was not IBM compatible. FF 307. The initial market expansion for 5-1/4 inch disk drive was also hindered by a software shortage. FE 56•. The 5-1/4 inch floppy disk drive began to sell in 1977-1978•w4th the growth of the personal computer market (FF 307) and became a critical factor in the marketplace in 1978-1979-when IBM began its initial use of the 5-1/4 inch drive (FF 560). The first year in which double-sided 5-1/4 inch floppy disk drives outsold double-sided 8-inch disk drives was 1982. FF 547. The 5-1/4 inch double-sided disk drive is expected to dominate the floppy disk drive market 4t least through 1987. FF 547.

The first 3-1/2 inch single-sided floppy disk drive (microfloppy) was introduced in June 1981 at a computer trade show. FF 562. At first there was no standard size for the microfloppy disk drive, and diameters for the product

60

•anged from 3.4 inches to 3.9 inchei. FF 565. An industry standards committee was formed in May 1982, and a standard microfloppy disk size of 3-1/2 inch"s was agreed to approximately a year later. FF 566. The first U.S. shipment of microfloppy disk drives took place in 1982 when 9,000 units were sold. . In 1983, 269,000 units were sold. Estimated sales for 1984 are 1,064,000 units. FF 563. Most of these drives have been single-sided. rr 563. Shugart introduced a single-sided 3-1/2 inch disk drive in April 1933 and a 3-1/2 inch double-sided floppy disk drive in October 1983. FF 567. In 1983, Shugart sold evaluation units of the double-sided 3-1/2 inch disk drive to approximately 15 to 20 accounts. FF 568.

The most intense competition between different diameter disk drives odours at the early design or product planning stage of the personal computer. FF 546. A "marketing window" is created as the OEM, in the process of designing a new computer system, considers vendors and evaluates and tests disk drives. FF 604.

In terms of media (disk) interchangeabiltt-y, a 3-1/2 inch double-sided disk drive cannot be made compatible with a 5-1/4 inch double-sided disk drive. FF-573. The.electrical interfacing between 3-1/2 inch and 5-1/4 inch disk drives is the same, however, for those devices quoted as being compatible. FF 576. Some Japanese 3-1/2 inch disk drive manufacturers advertise their product as being compatible with 5-1/4 inch disk drives. FF 577. Given the industry trend toward the use of smaller and less expensive components, the possibility exists at the design stage for the substitution of 3-1/2 inch double-sided disk drives for 5-1/4 inch disk drives. With respect

61

to new computer systems, Compaq has switched its computer from a 5-1/4 inch drive to a 3-1/2 inch drive, and IBM may have a 3-1/2 inch drive in its new generation PC, FF 596A.

To date 3-1/2 inch double-sided drives have made little progress in the double-sided drive market. The effect of IBM not having introduced a 3-1/2 inch disk drive computer has been to limit the market for this drive, f.specially among the OEMs considered to be "IBM followers." FF 599-600. In additicm, software availability has limited the market for 3-1/2 inch computers and disk drives; there are currently 170-175 software programs available on 3-1/2 inch diskettes compared to approximately 10,000 software programs available on 5-1/4 inch diskettes. FF 597. If IBM enters the market with a 3-1/2 inch computer, it is likely that other OEM's would follow with their own 3-1/2 computers. FF 600. Thus, the future market for 3-1/2 inch disk drives, and their viability as a substitute at the design stage for 5-1/4 inch disk drives, is largely dependent on IBM's decision with respect to the introduction of a 3-1/2 inch disk drive computor and the speed at which IBM and the industry develop 3-1/2 inch software.

Once 113e design stage of the computer is completed, competition tends to be limited to disk drives having the same diameters and dimensions. FF 546. The most critical factors affecting the compatibility of technically different floppy disk drives include: (1) media interchangeability; (2) physical interchangeability; (3) use of the same set of signals; and (4) use of the same set of connectors with the same output. FF 570-71. Less critical factors of compatibility include interchangeability of spate parts, timing of input signals, and power usage differentials. FF 570.

For example, with regard to media interchangeability, a 5-1/4 inch floppy disk cannot be placed in an 8-inch disk drive (FF 572); a 3-1/2 inch, double-sided floppy disk drive cannot be made compatible with a 5-1/4 inch double-sided disk drive (FF.573). If data stored on a 5-1/4 inch drive is to ᴰ^ transferred to a 3-1/2 inch drive, the data would have to be regenerated; a laborious process. *FF* 575. The change from a 5-1/4 inch drive to a 3-1/2 inch drive in an existing system would also be difficult because it would involve substantial design changes, including size" wiring, and plugs. FF 587. Therefore, to switch an existing computer system from the incumbent floppy disk drive supplier to a new supplier, or from one disk drive diameter to another diameter, may involve substantial costs.

Some Japanese 3-1/2 inch floppy disk drive manufacturers, however, advertise their product as being compatible with 5-1/4 inch drives. FF 577. Also,˙ an OEM could potentially substitute a 3-1/2 inch drive in the space formerly occupied by a 5-1/4 inch drive the same way the OEMs replaced full-height 5-1/4 inch drives with half-height-5-1/4 inch drives (i.e., by keeping the larger bezel). FF 583. The probability of substituting 3-1/2 inch drives-for 5-1/4 inch drives in an existing product is less than the substitution of half-height for full-height drives because the 3-1/2 inch drive differs from the 5-114 inch drive in its basic physical configuration. Still, if the 3-1/2 inch disk drive is priced lower than the 5-1/4 inch disk drive, substitution may be made. FF 584. The computer systems sold by OEMs are'evolving rapidly. To remain competitive, an OEM producer must bring dnto the market a new system with the latest advances as soon as possible or risk falling behind. FF 610. If the market moves toward a smaller 3-1/2 disk

cputer as a result of IBM's future introduction of a 3-1/2 inch cb7i;ute:, the cost of not introducing a 3-1/2 inch disk drive computer may outweign any conversion costs.

Anb:her industry trend is thee move from full-height to half-height disk drives. In the spring 1982 !ICC shownly Shugart shOwed a half-height prsduct; however, in the fall 1982 Comdex show, half-height disk drives were sto.4n by Tandon, Shugart, and CDC, as well as by 12 to 15 Japanese suppliers. FF 591-5:. In many cases, customers because of lower price switched from full-height disk drives to half-height drives while keeping the full-height bezel. FF 589. The half-height disk drive allowed miniaturization and took advantage of the availability of 5-1/4 inch software. FF 595. In January. 1933, IBM discontinued its purchase of full-height disk drives from Tandon, but aireed to purchase newer products such as fast-access Winchester disk drives and half-height 5-1/4 inch flexible disk drives. FF 593. There exists a wide and broad-based industry trend toward higher capacity, half-height 5-1/4 inch flexible disk drives. FF 594.

All floppy disk drives are technical substitutes in the sense that they perform file- same function. The degree of economic substitutability between disk drives of different sizes or from different suppliers differs depending on factors such as the planning stage of the computer's development and the relative costs to switch. The costs of switching from an incumbent supplier and/or a particular disk drive size are clearly greater once the OEM is past the initial planning stage. The costs of not switching may include the lower price of a substitute disk drive or the loss of market share if a substitute disk drive is widely accepted in the market.

••ji•• of substitutability between the different size disk drives is relarivtly high at the design stage for a new computer. This conclusion is qualified, hoqev•r, by the fact that the market has effectively determined that the 8-inch floppy .iisk drive is a relic and that many large OEMs have already paszed the design stage for 5-1/4 inch floppy disk drive computers and selected vendors for their products. The degree of substitutability between different size disk drives after the computer design stag• is relatively limited. However, the constant competitive demand on Cans to upgrade their systems has increased the pressure for OEMs to reevaluate different diameter disk drives and different suppliers, thereby increasing the possibility of substitution in the Post-design stage period. Evidence of this is especially evident in the pressure to switch from full-height to half-height disk drives and in the uncertainty involved in the future market for 3-1/2 inch floppy disk drive computers.

Various respondents import into or sell in the United States 5-1/4 inch and 3-1/2 inch floppy disk drive products (Importation Si Sale, Opn., at 48-50) that directly compete with specific disk drives of complainant and its licenseei.....Tandon's.TR 848 is also in competition with Mitsubishi (and one or two other Japanese companies) for Shugart's 8-inch disk drive accounts. FF 554. These facts, together with the substitutability of the products discUasf•d about., lead to the conclusion that the domestic_industry in_this investigation include=s 611 of the double-sided floppy disk drives of Tandon and'its licensees which incorporate the claims of the '573 patent.

65

C. Complainant and Its Licensees.

The proper date for determining whether the domestic activities of complainant constitute an industry entitled to protection under S 337 is the date on which the complaint was filed. Bally/Midway Mfg. Co. v. U.S. Int'l Trade Comm'n, 219 U.S.P.Q. 97, 100 (C,A.F.C. 1983). -Tandon filed the complaint in this matter on December 6, 1984. 50 Fed. Reg. 4276 (Jan. 30, 1985). Therefore, the domestic industry will be defined as of that date. Deterioration of the domestic industry during Commission. proceedings does not undermine the conclusion that the business constituted an industry at the time the complaint was filed. Bally/Midway, 219 U.S.P.Q., at 101-02.

1. Tandon.

Since its formation, Tendon has contracted with offshore manufacturing facilities in India for high volume production of labor intensive components and various completed products. FF 372, 456. The companies located in India include Tandon Magnetics (India) Pvt.: Ltd. (TMI), which assembles recording heads and certain labor intensive disk drive sub-assemblies; Tandon.Motors Pvt., Ltd. (m), which manufactures precision stepper motors used in Tandon's flexible and rigid disk drives; Barnala Electronics, which manufactures harness assemblies for use in Tandons' disk drives; Tancom Electronics, which manufactures rigid disk drive record heads; and Eastern Peripherals Pvt., Ltd., which manufactures completed half-height 48 TPI 5-1/4 inch floppy disk drives. FF 457.

The manufacture of head assemblies was the first component moved overseas by complainant because of the relatively large amount of labor involved in the manufacture of this component. FF 374. Tandon first contracted with Tandon Magnetics (India) Pvt., Ltd. (TMI), in June 1978 for the assembly and testing of certain ferrite recording head and disk drive products. FF 375. On

66

Tandon and TMI •ntsrs1 into a contract in which conditions wsrs sstablishsd to govsrn TMI's ass'mbly and tssting in Bohay, India, of thsss products. Th' contract is Aus to sxpirs on . FF 376.

Ths specific ssrvicss to bs psrformsd by TMI, and thy- datss of thy psrformancs, is to b• dstsrminsl according to th• purchas• ordsrs issued Tandon during th• tsrm of the contract. Each purchase order specifics th• dates upon which the asssmbly is to b• complstsd and shipped to Tandon and the price-. F? 377. For each purchas• ordsr issusd, Tandon pays TMI

C

C

FF 378. Tandon providss TMI with al.1 f.quipmc-nt matsrial, and know-ho•; TMI providss reasonably sufficir.nt

C structural facilities and a skillsd labor forcs. FF 380.

FF 381. Tandon pays

C . FF 382.

Th‣ transactions bstwssn Tandon and the compani-s locats0 in India are coordinated and sffsctsd through Tandon Associatss, Inc., which acts on behalf of ths various Indian companiss and invoices Tandon for the products and ssrvicss psrformsd 'oy•thsss companiss. Fr 450. Tandon Associatss is a ssparats company from complainant. FF 337.

Tandon Singapore Ltd., a wholly-ownsd subsidiary of Tandon locat•.A in Singapor•, manufacturssc the TM 100, tts TM 101, and csrtain ·.:inchsntsr

rr 465. Tandon Singapors curr•ntly producss approximately 151,00r" units of the T 100 a month. Fr 467. Approximatsly 149,030 of ths TM 100c

C ar• ,D1151s-sids1 floppy disk drivss, of which unit: shi.:ps(f'

67

T3n3on's facility at Chatsworth, California. rr 457, 1r,9. Approximate•1y 12?,001 of th" Tn loos are- quality-te-ste-A in Singapor--, th'n drop-shipp liv-ctly to I2M. FF 471.

11'-ad ass"mblie-s for the' following Tanlon dOUble-side-d floppy disk driv-s are asse-mble-J offshore- and. subj'r-ct to quality control in India: TM 30, • TM 65-2, TM 65-4, TM 100-2, TM 100-4, TM 101-4, and Tn 843. F7 385735. Tardon do's not curre,ntly manufacture.' commrcial q'uantitie's of hr•3') in the- Unit'•L1 States. FF. 393. Any production of he-ad asse-mblie-s in the' Urite-3 State's by Tandon is limited to e-njihring and de-ve'lopme•nt programs and small initial production runs of less than 100 units. FF 390. T--xac Pe-riphe-rats procure-s all of its double-3ide'1 he-ad asse-mblie-s from TMI through Tanlon. FF 392. lagne-tic Peripherals, Inc., a partially-owntd subsidiary of Control Data Corporation, obtains some-, if not all, of its double-sided as2"m1,111's from La f-, a supplie-r of head locate-d in Taiwan or Korea. FF 393. Shugart as of 1934 obtained ..0 pe-rce-nt of its he•a1 asee-nh'ie-s from Me-xico. F7 394.

Tandon's offshore- and dome-stir manufacture- of floppy disk drivf-s by mode•1 numoFr as of fiscal ye-ar 1984 (Octobe'r 1, 1933, through Scpte,mbe-r 31, 1704) is as follow:::

Mode,1	Offshore- Units	Dome•stic Units	Tot al
TM 50			
•1 55/53D			
T!:			
T 100			
Tt 101.			
T• 343			

The above figures reflect production of both single-sided and double-sided floppy disk drives. FF 401. Complainant's records for floppy disk drives, witl the exception of the. TM 100, are not separated into single-sided and double-sided drives (FF 406); however, in fiscal year 1984, approximately 95 percent of Tendon's total floppy disk drive business involved double-sided drives (FF 399).

As of the first quarter of fiscal year 1985 (October 1, 1931, through C December 31, 1934), Tandon produced units of the TM 103 in Singapore, C units of the TM 50 and units of the TM 65 in India, and units of the TM 848 in the United States. FF 402. The head assemblies for C the TM 848 units were assembled in India. FF 383.

The existence of a domestic industry must be determined according to an assessment of the nature and silnificance of the activities carried out in the United States in connection with the product. Certain Miniature, Battery-Operated, All-Terrain Wheeled Vehicles, Inv. No. 337-TA-122 (1982), aff'd sub nom. Schaper, 219 U.S.P.Q. 665. One method to assess the •nature and significance of domestic activities is to determine the -value added to the product by domestic activities as a percentage of the product's total value. Certain Cube Puzzles, Inv. No. 337-TA-112, 219 U.S.P.Q. 322, 314 ’15 (1982). An important purposeof this type of evaluation is to determine whether complainant's domestic activities differ in kind from the activities that - would normally be performed by an importer.' Schaper, 219 U.S.P.Q. at- 5-12.

Tandon manufactures all of its TM 848, 8-inch half-height floppy disk drives in the United States at Chatsworth, California. Tandoh'snr't sal^s in fiscal year 1934 of TM 843's was $ FF 400.

A value--adler! analysis for Ttl 50 ani TM 65 floppy drives prolice•,I by T•no• follow:). This analysis is tase•d on April-June. 1934 aata -11:' is repre-sentative- of curre•nt activity and costs. FF 405.

	TI 50 $/unit	nr•rce-nt	TM 55 $/unit	pr•rcr•nt
• Labor Value—Aldrd				FF •15
• natc.rial Variance′				FF 417
• !!ate-rial Support				FF 419
• Labor Support				FF 421
• Corporate				FF 423
• Divisional				FF 423
:`ark'-ting:				
• Corporate-				rr 432
Ge-nr-ral & Admin:				
• Corporate-				FF 435
• Divisional				FF 435
• Customs:				
Torr-ign Value--Addeul:				
C Sinjaporr-				
• India				
• TOTAL COST:				

FF 407.

Cost :lata for the- TM 50 only refers to singl.•-side-d liak drive.s. FF 411. This information is relevant to a value•added analysis for doubly--side.d r^:7 50 •rive-a, howe-vi-r, t.f•ca~use• thr- 3rivr-s are similar in structure ant:: liffr only - as t′) ter he-a3 asst!′m'aly. Cost data for th TM G5 re-pre-sr-nts only louble--sile-:: :is;: lrivrs. rF 412.

70

A valu•-added analysis for TM 100 and Tat 101 floppy disk drives produce': by Tandon follows. This analysis is based on April-June 1984 data and is representative of current activity and costs. F: 405.

		71 100		TI 101		
		Vunit	percent	$/unit	percent	
C	Le,or va1J--AV&I					rr 415
C	laterial Variance					rF 417
•	laterial Support					FF 413
•	Labor Support					Fr 421
	Engineering:					
•	Corporate					FF 423
•	Divisional					rr 423
	lart:etinc:					
•	Corporate					F? 432
	General 5.					
C	Corporate					FF 435
C	Divisional					rF 435
•	custom.s:					
	Foreign Value-Added:					
	Singapore					
C	India					
C	TOTAL COST:					

Fr 403.

Cost data for the Tn 100 represents both single-sided and double-side1 disk drives. FF 412. Cost data for the Tn 101 repre...ents only do4:11e-side.:! dis% drives. FF 412.

71

Complainant arts thlt the- above- c•nrts indicate' that the' value--ac7de-1 in the- Unite'd 3tatt•s for the' pro:I...lotion cost of the TEA. 30 is pr.rcr.nt ; the' Tl 5E, pv.rce-nt; the' TM 100, percent; and the T1 101, gr•rce-^t. Fr 409. These• ps-rce.'ntag.-n include- a numb.•r of activities which normally arc. pr-r'ormr•d by an importer, including customs and certain components of mackt•ting and administration. S-C, Sony PFF 39)-416. Complainant, in order to se'corQ permanr-rit re-lief, will rie'el to be-ttr•r dr-fine• the r-le•m-•nts of its value addr-d analysin in accordance- witn Commission prr-cd'de-nt. For thr- tr'mporary phasr• of this investigation, the- value- addr-d in the' United State-s incorporates activities not normally pr-rforme-d by an importe-r includes complainant's material and components of its mare'ting activities _____ technical or Engine e ring support), and componl,nts of its general and administrative· opr'rational manag•er-nt). Th1•rr-fore, the-rs is a re-anon to br-lir-ve• that the• value--added for the production cost of rel••vant floppy die!: drive's, though it can only he' approximated, is somewhe-re br-twr-sn pe'rce•nt for the- TM 50; 171.7't'ir-e•n pt'rcs.nt for the 55; be'twesc-n prcf-rit for th, ri 100; and pr-ro."•nt for the TI 101.[24/]

24/ The Commission has never de-i'e-mini-a the exact pr'rcr-ntage' of domr-stic valur—addr.d rc-quirr•d to constitute- a domf'stic inlustry un&'r 5 237. r. t C ., Cr-rtain Cubr. Puzzles, Inv: Na. 337-TA-112, 219 U.S.P.2. 322 (1982)(Aom-stic basr•d on SO% •alue a.idr-•); Crtain 7apr.rmakir:,' nachinr-*Fc.rling. Sr-stions, Inv. 337-7A-147 (19:;-1) (domestic industry 13a-3'•J on 30% vala The' in..iustry issue' in this inv 'stigation, however, addrr-ss-s hotl: camplainant's and its licr•nsr•r's']onr•stic the- 2-rcr.ntagf' dome-stic vale- aldrA by complainant For the' 71 30, 171 35, 132, 771 101, anl 343, is aTh1-1 cumulatively to His'. domc.'stic activities of complainant's licr•nsr-r's and any othe r activity pr-rformf-d by Tandon In C.•• Unitr•a States that might br. conaire-d part of the- domestic industry, to 'i=-tr-rmin•whether thr.rf• is a Masan tc b.r•lif-w- that an industry r-xists in th Statr-s for purposes of 5 337.

Tandon in fiscal year 1984 leased 515,000 square feet of building space for its principal executive offices and domestic manufacturing operations at Chatsworth, Simi Valley, Thousand Oaks, San Jose, and Santa Clara, California. FF 438. Tandon's facility at Simi Valley is not involved in the assembly of floppy disk drives, but its operations do include the assembly of printed circuit boards which are used in floppy disk drive production. FF 440. The Santa Clara facility also is not involved in the production of floppy disk drives, but its research and development may have assisted rlicrotek with regard to the 3-1/2 inch floppy disk drive product. FF 441-42. The Thousand Oaks facility houses the Voyager Division of Tandon which makes computer systems and subsystems. FF 443.

The Chatsworth facility occupies square feet of building space. Approximately individuals are employed by Tandon at Chatsworth in activities relating to the manufacture, marketing, administration, and research and development of floppy disk drives. FF 444. Specifically, the TM 848, which is manufactured at Chatsworth, occupies squats feet of production spacs and smploys individuals in production activities. FF 445.

All research and development concerning Tandon floppy disk drives, with the exception of the 3-1/2 inch disk drive, is done in the United States ut the Chatsworth facility. The research and development facility ocdupie3.

73

C square feet of building space and employs engineers, tecbnicians,

C. document control individuals, and drafting in FF 447. Expenses associated with research and development accounted for five- perc-nt of net sales Eor fiscal year 1933 and four percent for fiscal year 1934. FF 443.

The research an3 development associated with, and the engineering prototype units and pilot production for, the Ti 50, Tn 55, 7.! 100, and TM 101, had been completed prior to December 1934. Fr 430. The dev•lopm'•nt of the•Tn 348 double-sided floppy disk drive also took place prior to December 1934. FF 452. Problems that may be associated with the continuous production of floppy disk drives, however, require technical evaluation by manufacturing engineers or sustaining engineering. Virtually all sustaining engineering activities are performed in the United States. There are also ongoing Efforts to improve the- production process by both enhancing the quality of th product and reducing costs. FF 453.

Tandon is currently developing the TM 300 series of 3-1/2 inch double-side-1 floppy disk drives (TM 304, TM 305, and TI 303) at its Microtek subsidiary located in San Jose, California. FF 475. Microte,k occupies square feet of manufacturing space and employs approximate-1y individuals in the design and development of the TM 300 series. FF 477. Tandon has completed the fliginf'f'ring prototypf• activitif-s on thf- TM 306, and the pre-production of SC to 100 units of the TM 304 and Tn 306 has lyAun for th_.• purpose- of providing zamplc-s to Tan:lon's marketing organization. FF 17. licrote'k also has sold alustion snits of thf. TM 304 and Tn 306 to customf-rs. Fr 431.

74

Microtek has acquired tooling for the manufacture of the TM 300 series disk drive and-intends to commence production at its San Jose facility as soon as an order for commercial production has been received. FF 477-78. To commence production, however, Microtek would have to order parts, hire and train workers in the assembly of the disk drive, and set up quality control procedures. FF 482. It would take from 90 to 120 days for Microtek to achieve production of 10,000 units per month of the TM 300 series floppy disk drive. FF 483. The Microtek facility has the capacity to produce 20,000 to 30,000 drives per month. FF 485. Once Microtek achieved production of 10,000 units per month, its facilities would employ 100 to 250 workers, of which 50 percent would be involved in the direct production of the drive while the-remaining individuals would be engineering and support personnel. FF 484. Microtek at this time has not received any production orders for 3-1/2 inch floppy disk drives and has no plans to manufacture these drives for inventory purposes (FF 486); however, if production orders are received, initial production of the drives would commence (FF 488).

Prior to January 1985, all units of the TM 50 floppy disk drive shipped to the United States were inspected at the Chatsworth facility. The quality control inspection included testing the first 100 drives received in each shipment, then randomly selecting 80 units of the next 1,000 drives. If ten percent of this selected group fails testing, the entire shipment is pulled for re-examination. FF 461.

As of January 1985, complainant has been successful in implementing certain inspection criteria in Bombay, India. FF 462. The TM 65-4s, TM 65-2s, and the TM 50s manufactured and assembled in India at Eastern

75

P•ciph•rals are subject to quality control inspection at Zastern Peripher,:ls. ?F 453. All ,warranty repairs and service on the TN 110 unit:: drop-shipped to IEr! in Singapore are performed in Singapore. FF 471.

2. Texas Peripherals.

Texas Peripherals (TP) is a joint venture owned equally by Tandy Corporation and complainant. Tandon became a member of this joint venture in January 1934. FF 403. Tandon and Tandy each own equal interests in TP, and revenues and profits are divided equally between the two companies. FF 414. The initial cost to Tandon for joining the joint venture was the contribution of Tandon'3 half-height flexible disk technology and a c-ish paylent of $1 '.9 million. FF 496. In fiscal year 1984, Tandon was allocated $808,416 in profit from the TP venture. FF 494.

TP was formed for the purpose of manufacturing disk drives in the Unite' States for sale either to Tandy or Tandon. FT 495. TP facilities currently consist of approximately 37,000 square feet of manufacturing and commerci71 space. FF 497. As of December 1984, TP manufactured at its facilities in Fort Worth, Texas, the Tn 100-1, a full-height .single-sided floppy disk drive, the TM 65-1, a half-height 5-1/4 inch single-sided disk drive, anl TM 65-2, a half-height 5-1/4 inch doubl•-sided disk drive. FF 503. TP purchases all of its head assemblies for the In 55-2 from -Tandon. Fr 192.

TP commenced production of the Ti 65-2 in late 1981. FF 50:; Opn., at 122-26. Most of the T165-2s FF 505; Opn., at 123. TP received a purchase order on October 9, 1934,

76

Tandy Home Computer for 6,000 TM 55-2 floppy disk driv--. FF 512; Opn., at.124-25: To date, TP has shipped double-side2 floppy disk drives to Tandy. FF 509; Opn., at 125-26.

C TP received its

C prior to the hearing.

C Hochman, Tr. 1535-40 (Apr. 15, 1933). TP received its

C

C prior to the hearing. Hochman, Tr. 1540 (Apr. 15, 1935).

C Most of the production equipment located at TP

C . TP is

C . FF. 805.

C As of April 15, 1985, TP employed persons. During April 1935, TP

C plans to . In :ay 1985, TP will probably . Thos

C

. FF 498, 806.

3. Control Data Corporation/Magnetic Peripherals.

Control Data Corporation (CDC) was granted a license by Tandon on September 30, 1984, to manufacture and sell dis% drives under the '573 patent. FF 513. The license agreement resulted from a--claim by Tandon that the drives manufactured by Magnetic Peripherals, Inc. (:;PI), a partially-owned subsidiary of CDC, were covered by the '573 patent. FF 723. Some, if not all, of the head assemblies used by CDC in its double-sided floppy :Hs% drives pro laced in the United States are manufactured by Lafe, which is located in Taiwan or Xorea. FF 393.

77

:!?I is looate.: in Oklahoma City, Oklahoma, and m:nufaCtures dis% drives for sale by CDC to the omn market. 'Fr 511. As of 1933, the 0%lahoma City' facility occupie:1 approximately 100,000 square feet of building space. r7 523.

The floppy disk drive market was relatively stable until mid-1)84. At that time the market• brca;ic- unstable and prices dropped an average of $10 per unit per month. FF 69C),• 739. Based upon CDC's cost of production in the United States, CDC in the third quarter of 1934 started to question whether it should stay in the business and made the decision to move production of drives offshore. FF 525. CDC continues to assemble and test approximately percent of its requirements for half-height 5-1/4 inch double-sided floppy disk drives at its Oklahoma City facility. FF 52r). The' estimated maximum production capacity at CDC's Oklahoma City facility is drives per year, or approximately units a month. It would take CDC at least months to produce at this level; the necessary tooling is in place, but CDC has laid off or furloughed a number of its personnel. FF 513, 527, 741.

CDC in 1983 shipped $ worth of floppy disk drives or units. FF 729. CDC by December 30, 1984 had shipped.$ worth of *floppy* disk drives or units. FF 730. CDC as of December 30, 1984, had firm purchase orders for 1985 of floppy disk drive units and had projected 3 high probability sales forecast for 1985 of units. FT 731. 'lost of the above floppy disk drives ate-- 5-1/4 inch half-height or full-h•ig•t drives. The old 3-inch products constitute about percent -of CDC's sales. Of the 5-1/4 inch full-height products, percent plus 3re .cable-side l confiarations; of the 5-1/4 inch half-height products, are doale-sideil configurations. Fr 514-15.

Drawings, specifications, manufacturing assemOly instructions, and technical support for disk drives manufactured overseas for CDC originate from the Oklahoma City facility. FF 529. Approximately 50 percent of the materials used to assemble drives offshore is currently procured by CDC in the United States; however, with the exception of initial vendor qualification, testing of incoming parts takes place at the manufacturing site. FF 530. Those disk drives that are manufactured offshore are tested offshore, though quality control for these products also is conducted at Oklahoma City through a sampling process. FF 531. CDC customer liaison, application and engineering support, and service and repair for disk drives produced both offshors and in ths'Unitsd States is based in the United States. FF 533..

In 1933, :1PI employed approximately 350 indiViduals at its Oklahoma City facility. In 1984, the number of employees involved in the floppy disk drive business has increased to between 650 to 675 individuals. of CDC's Oklahoma City facility, howsvSr, has been ongoing since the third quarter of 1994. In October 1984, CDC laid off 450 individuals from its Oklahoma City facility. In February 1995, CDC made announcement with respect to the termination of employees at its Oklahoma City facility. FF 521, 750. Production of CDC floppy disk drives will also be offshore in a few weeks. The only activity that will continue in the United States is snginesring, ongoing tests, product support, and any limited customer-unique specification work. Approximately 75 CDC smployess will be associated with this group after April 15, 1995. CDC would probably need to lay off an additional 130 employees in order to reach the 75 psrson level. FF 751.

79

4. Shugart.

Shugart Associates was formed in the mid-1970s by Allen Shugart and several key employees who had worked together at /BM and Memorex on disk drive designs. FF 299. Shugart was granted a license by Tandon on July 1, 1980, to manufacture and sell disk drives under the '573 patent. FF 3. By the end of 1981, Shugart employed 2,700 individuals and had annual sales of approximately $198 million. FF 324. The company was located in Sunnyvale and Roseville, California, and Nogales, Mexico (400 employees). FF 300, 344.

Shugart's annual sales for 1983 was $240 million dollars. At that time, Shugart was the world's second largest manufacturer of floppy disk drives behind Tandon. FF 339. Shugart first became profitable in July 1975. The extreme competitive environment at the end of 1983 caused Shugart's profitability to erode substantially. The first time Shugart saw a rapid erosion of its profitability was in 1983. Shugart recorded an operating loss in January 1984. FF 340.

On December 19, 1983, after examining economic studies concerning what would be required to make the business fully profitable, Xerox concluded that it could no longer support Shugart. As of January 1, 1984, Shugart's annual reported sales for fiscal year 1983 was $240 million. Xerox concluded that even given substantial investments, Shugart could not be made profitable within the next 12 to 18 months. FF 343.

On January 15, 1984, Shugart employed 2,600 people in the United States and 600 in Mexico and occupied about 490,000 square feet of space at Roseville and Sunnyvale, California. FF 344. In October 1983, Shugart experienced its first layoff. Shugart had grown to 3,600 employees, all but 550 of whom were

80

located in the United States. The October layoff equaled 7-1/2 percent of the work force. FE. 338. Oy December 6, 1984, Shugart had experienced several more layoffs, and its employment force had been reduced to 1,600 to 1,700 employees, 400 of whom were in Mexico. FF 344. In January 1985, Xerox formally announced the closing of Shugart at a time when it still employed 1,400 individuals. FF 346.

Shugart manufactured a 3-1/2 inch double-sided floppy disk drive at Sunnyvale, California, in 1982. FF 347. Following a meeting in May 1932 with Dysan Corporation's president, Shugart formed a venture group to pursue the design and development of the 3-1/2 inch drive. A small company environment was created, and the best engineers from Shugart were picked for the engineering organization. The project used high-volume automated lines for production. FP 348.

Single-sided 3-1/2 inch drives were introduced into the marketplace in April 1983. FF 349. In October 1983, a double-sided version of the 3-1/2 inch drive was introduced. The double-sided 3-1/2 inch drive employed Tandon's patented technology. FF 350. Evaluation sales were made of the 3-1/2 inch double-sided disk-drives to 15-20 accounts, including Apple Computer, Wang, Convergent Technologies, Nixdorf, and Uoneywell-aull. FF 351. Approximately 2000 to 3000 double-sided Shugart 3-1/2 inch drives were sold in 1983. FF 352. On December 6, 1984, Shugart had plant capacity for 100,000 3-1/2 inch double-sided floppy disk drives per year located in Sunnyvale, California. FF 353.

Shugart was still manufacturing double-sided floppy disk drives in the United States on December 6, 1984, including 8-inch and 3-1/2 inch products. *FF* **345.**

81

D. Reason to believe that a Domestic Industry Exists.

Based upon-the evidence of record, there is reason to believe that as of December 6, 1984, the date in which the complaint was filed in this investigation, the domestic operations of complainant and its licynseez constituted a domestic industry for purposes of S 337. Deterioration of the domestic industry during Commission proceedings does not undermine the conclusion that the business constituted an industry at the time the complaint was filed.

82

VI. EFFICIENT AND ECONOMIC OPERATION

In order to prevail under S 337, a complainant must establish that the relevant domestic industry is efficiently and economically operated. The guidelines set forth by the Commission to assess whether a domestic industry is efficiently and economically operated include: (1) use of modern equipment and manufacturing facilities; (2) investment in research and development; (3) profitability of the relevant product line; (4) substantial expenditures in advertising, promotion, and development of consumer goodwill; and (5) effective quality control programs. Ram Certain Methods for Extruding Plastic Tubing, Inv. No. 337-TA-110, 218 U.S.P.Q. 348 (1982); Certain Coln Operated Audio Visual Games and Components Thereof, Inv. No. 337-TA-105, 216 U.S P 0 1106 (1982); Certain Slide Fastener Stringers and Machines and Components Thereof, Inv. No. 337-TA-85, 216 U.S P 0 907 (1981).

A. Evidence of Efficient and Economic Operation.

In 1982, Tandon became the largest independent (i.e., noncaptive) manufacturer of floppy disk drives sold to OEMs. FF 612. Tandon today produces more floppy disk drives than any other company and is also the world's largest manufacturer in the random access disk drive market for micro-computer systems. FF 613-14. Tandon has apparently developed a high-quality, half-height 5-1/4 inch drive which it continues to sell to many demanding buyers including IBM. But during the period from late 1982 to the latter part of 1984, Tandon lagged behind competition in developing and having such a drive available for sale. See Certain Floppy Disk Drives, Inv. No. 337-TA-203, Summary Determination, at 58-60 (Apr. 26, 1985).

83

In 1983, Shugart was the second largest floppy disk drive manufacturer behind Tandon.. FF 668. In 1983, CDC had approximately a 20 percent share of the domestic business for full-height 5-1/4 inch floppy disk drives and a minimal percentage of the business for half-height 5-1/4 inch disk drives. In 1984, CDC had approximately a 20 percent share of the full-height 5-1/4 inch floppy disk drive business and a 10 percent share of the half-height 5-1/4 inch disk drive business. At the present time, CDC has increased its share of the full-height business, but only has a 2 percent share of the half-height business. FF 669.

Tandon's net income and growth rate of net income are as follows:

Fiscal Year	Net Income	% Increase over Previous Year
1981	$ 4,505,000	198.9%
1982	$15,735,000	249.3%
1983	$23,658,000	50.4%
1984	$29,436,000	24.4%

FF 615.

Tandon's use of maximum vertical integration has provided the company with some of the lowest manufacturing costs in the industry. FF 616. Tandon has been able to obtain and retain major accounts, including IBM, AT&T, and Tandy. For example, in fiscal year 1984, IBM accounted for approxiinately 58 percent of Tandon's net sales. FF 617.

Tandon's research and development expenditures as a percentage of net sales for the last five fiscal years are as follows: fiscal year 1980 - 4.2 percent; fiscal year 1981 - 5.3 percent; fiscal year 1982 - 4.0 percent; fiscal year 1983 - 4.5 percent; and fiscal year 1984 - 4.1 percent. FF 619.

Approximately $7.5 million of the $15.3 million spent by Tandon in fiscal v--sr 1994 for research and development is attriutable to research an development relating to floppy disk drives. IT 520. Tandon has also expended' approximately $ on the research and development of the T71 300 series floppy disk drive. .FF 621.

For fiscal year 1982 through fiscal year 1984, Tandon spent $ on marketing and sales for all its products. FF 622. Since 1982, Tandcn has participated in the following major industry expositions: June. 1032 - National Computer Conference (NCC); September 1982 - Peripheral. Equipment Expo; November 1982 - Comdex; April 1933 - Comdex; May 1933 - NCC; November l9f:3 - Comdex; July'1984 - NCC; and November 1954 - Comdex. FF 623.

Prior to January 1955, all units of the Tn 50 floppy disk drive shipped to the United States were inspected at the:Chatsworth facility. The quality control inspection included testing the first 100 drives received in each shipment, then randomly selecting 80 units of the next 1,000 drives. If ten percent cf this selected group fails testing, the entire shipment is pulled for re-examination. FF 461.

Tandon employees are eligible for disability insurance under .a plan administered by the State of California. FF 624. Tandon provides its full-time employees with Term Life Insurande equal to one year's adjusted pay, Dental Ecpense Insurance, and Accidental Death and Dismemberment Insur:fnce. FF 625. Tandon .also provides its full-time employees the opportunity-to join the Performance Plus Savings Plan whereby they may have up to six percent of their pre-tax wages deducted from their paychecks and invested in the plan. The investments are matched to a certain de,3ree by Tandon and will vest wtth

the employee at certain percentage rates depending upon the number years the individual is employed with Tandon. FF 626. Finally, Tandon employees have the option of participating in health care plans. FF 627.

B. Questions as to Efficient and Economic Operation.

1. Efficiency of Tandon's Production in India.

Tandon contracts with various companies in India for the assembly or purchase of components used by Tandon in its final products and for the purchase of complete half-height 48 TPI 5-1/4 inch flexible disk drives. FF 628. The Indian companies include Tandon Magnetics (India) Pvt., Ltd (TMI), Tandon Motors Pvt., Ltd. (TMM), Barnala Electronics (Barnala), Tancom Electronics (Tancom), and Eastern Peripherals Pvt., Ltd. (Eastern Peripherals). FF 629. All of the Indian companies are owned and controlled, directly or indirectly, by the family of Manohar Lal Tandon, who is a brother of Sirjang Lal Tandon. FF 635. Sirjang Lal Tandon is the President, and a director and principal shareholder, of Tandon Corporation. FF 633. Sirjang Lal Tandon is not a shareholder, officer, or director of any of the Indian companies. FF 636. Tandon believes that the termination of its present relationship with any of the Indian companies would result in increased costs of procurement or manufacture of the component parts and finished drives they supply. FF 630.

The contract assembly and purchase transactions between Tandon and the Indian companies are coordinated and effected through Tandon Associates, Inc. which acts on behalf of the various Indian companies. Tandon Associates directly invoices Tandon Corporation for the products and services of the

Indian companies at prices reflecting a mark-up for the services of Tandon Associates. FE. 631. Tandon Associates is not owned or controlled by Tandon Corporation and provides the service of being the representative for all of the contract facilities in India. FF 632. Tandon Associates is a California corporation owned by Jawahar Lal Tandon, a brother of Sirjang Lal Tandon. FF 634. Sirjang Lal Tandon is not a shareholder, officer or director of Tandon Associates. FF 636. Tandon believes that its relationship with Tandon Associates is beneficial. Its corporate personnel can only deal with one entity in the United States who coordinates all the separate companies in India. FF 632.

Tandon operates•a wholly-owned subsidiary in Singapore known as Tandon Singapore Ltd. This subsidiary manufactures the TM 100, the TM 101 and certain Wincheiter disk drives. FF 465.- IBM secures its disk drives from this Singapore subsidiary at Singapore. Tandon has choosen to manufacture in India, however, not through a subsidiary, but through separate companies owned and controlled by a brother of Tandon's president. An intermediary company, which is owned by another brother of Tandon's president and is not controlled by complainant, is interposed between Tandon and the Indian suppliers and adds an additional mark-up for its services. Tandon's philosophy of maximum vertical integration has provided it with some of the lowest costs in the industry, but questions concerning the efficiency of Tandon's relationship with the Indian companies should be exploked during the permanent relief phase of this investigation.

2. Questions of Product Quality and Delivery.

Quality and product support are important factors in a company's ability to sell disk drives and maintain an OEM as a customer. FF 637. Quality problems can overcome any existing advantage a disk drive producer has by virtue of being the OEM supplier and may cause the OEM to seek another vendor. FF 638-39. It is vital to an OEM that the supplier of disk drives keep to the delivery schedule, otherwise the OEM may have difficulty remaining competitive. FF 640.

There is evidence of record that Tandon has had a number of problems with the quality of its floppy disk drives and its delivery schedule. In 1982. Convergent Technologies designed a new computer system known as the "next generation." Tandon was originally intended to source the double-sided floppy disk drives for this system because of the price and availability of the drive. FF 642 . Convergent ultimately did not use Tandon drives because it found that the Tandon drive did not meet its quality requirements. FF 643. Some of the problems Convergent had with Tandon's drives originated with Convergent rather than Tandon. FF 643.

In the fall of 1982, Kaypro developed a transportable computer called the Kaypro-2. It had two floppy drives that were 5-1/4 inch single-sided, 48 TPI. FF 644. Kaypro purchased the drives for the Kaypro-2 and the Kaypro-4, which used a full-height 5-1/4 inch double-sided floppy disk drive, from Tandon primarily because of availability and price. FF 645. Kaypro began encountering field problems with Tandon's drives. It received complaints from end users as well as dealers. The complaints concerned the

88

failure of the drive to function when the disk is put into the drive and general read-write faults. Tandon advised Kaypro that the problemt arose because Kay;;ro did not know how to interface the drive in the computer. FF 646.

In the spring of 1983, Kaypro generated a new computer, the Kaypro-10. The new system was to have a half-height double-sided drive. Kaypro deciCed to use a Tandon drive primarily because of cost and availability. Tandon assured Kaypro that it could meet Kaypro's 2.5 percent maximum reject rate. FF 647. In the summer of 1983, Kaypro experienced major rejection problems with the Tandon drives. Xaypro's dealers informed Kaypro that if it continued to supply Tandon drives, their affiliation with Kaypro would be terminatea. rr 648. In January 1934, Kaypro terminated its purchases from TanCon. Fr 649. Some of the problems that Kayp/ro had with Tandon's drives may have originate with Kaypro. FF 550.

Other examples of quality problems with Tandon's products demonstrate that the customers do not necessarily consider the problems serious enough to preclude consideration of Tandon as a supplier for floppy disk drives. A Tandon memo dated January 10, 1984, which summarizes discussions held between Tandon and Tandy Advanced Computer Products concerning the Tn 50-1 and T:1 55-2 floppy disk drives, concluded that Tandon could restore its credibility if it C were able to ship drives per month. FF 653. Also, an early October 1984 Product Evaluation Request/Report from the Computer Product Engineering division of Tandy concerning TP's half-height 5-1/4 inch double-sided disk drive, the 1"-1 65-2, which was built from a kit supplied by Tandon, conslulel,

"This drive is equal or better than the TE7C Drive. It will hold alignment longer, and handle shipping better due to the cast c assis. . . . This drive is acc•ptable." CX 727, at Bates No. 023602; see FF 667.

A Tandon Customer Contact Report with Lanier Business Products Inc. for February 24, 1934, indicated that in the past,

. However, after the Tandon employee

. FF 656.

A Tandon Customer Contact Report with S.C.I. for September 4, 1934, indicated that S.C.T. had purchased drives from Qume

Qume also developed problems, and S.C.I. went to Mitsubishi. The report concluded that Mitsubishi was

FF 653.

Industry publications have discussed the problem of Tandon's product quality. An article in the July 9, 1934, edition of the Computer Systems Ne. ':s quotes a. managing director of an investment firm as follows: "_;umber one, they [Tandon] are suffering a loss of market share in floppies to the Japanese, and number two, they have had manufacturing problems that have to a lo•er-quality product. The quality issue is important because it has 11':!, in some cas--s, to a return of product to TanjJn and the buildup of

90

excessively high inventory levels." FF 651: An author of a California investment letter is also quoted in the same article: "At some point, Japanese vendors will come in with Iow-cost, high-quality products . . . Tandon has the low cost; they have to get their quality up. • • •N FF 652.

The questions concerning the quality of Tandon's products should be explored further during the permanent relief phase of this investigation.

C. Reason to Believe Efficient and Economic Operation.

There is sufficient evidence on record to demonstrate a reason to believe that the domestic industry is efficiently and economically operated. The questions as to the operation of the domestic industry do not show that there is no reason to believe that the industry is efficient and economic. This issue is fair ground for litigation, however, and the parties during the hearing on permanent relief shouldaddress complainant's relationship with the Indian companies and the quality of Tandon and its licensees products. Complainant also should submit further evidence as to the efficient and economic operation of its licensees.

91

V/. INJURY

As a final element in a S 337 investigation, complainant must ahow that respondents' unfair methods of competition and unfair acts have the effect or tendency to destroy or substantially injure the domestic industry. 19 U.S.C. S 1337(a). Injury requires proof Separate and independent from evidence of an unfair act. Complainant must establish a causal relationship between respondents' unfair acts and the injury suffered as a result of such acts.

A. Substantial Injury.

Several factors are relevant to a determination of substantial injury to a domestic industry, including, but not limited to: (1) ceclining sales; (2) lost costumers; (3) decreased employment; and (4) decreased production and profitability. Ca$_m$ Certain Vertical Milling Machines, Inv. No. 337-TA-133 (1984); Certain Drill Point Screws for Drywall Construction, Inv. No. 337-TA-115 (1983); Spring Assemblies, 216 U.S.P.Q. at 242-45. While the Commission requires that a causal nexus be established between the alleged injury and the unfair act in the importation of the product, the Commission also recognizes that "rulnder patent law, a patent is a lawful monopoly, and the owner of a valid patent is entitled to 100 percent of the domestic market for the product covered by the patent. Thus all sales of infringing articles covered by a patent rightfully'belong only to the patentee." Spring Assemblies, 216 U.S.P.Q. at 243.

1. The Domestic Floppy Disk Drive marker -- 1982-19b5.

The domestic market for computers and double-sided floppy disk drives exhibited significant growth through 1983. Salt of double-sided disk drives in the United States increased from 350,000 drives in 1980 to 3,951.000 drives in 1983. FF 670. The most significant growth in 1983 sales was for double-siaed 5-1/4 inch disk drives, which increased from 804,000 drives in 1982 to 3,496,000 drives in 1983. FF 670. This overall sales increase was reflected in sales by individual companies. For example, Tandon's salts of double-sided disk drives increased from 498,000 drives in 1982 to 1,084,600 drives in 1983. FF 682. Shugart's sales increased from 78,900 drives to 215,900 drives; CDC's sales, from 81,600 to 421,800 drives; and Micro Peripheral's sales, from 65,900 drives to 401,200 drives. FF 683-85. An estimate of the mid-1983 market price for 5-1/4 inch full-height double-sided floppy disk drives was $150 to $200 per drive and for 5-1/4 inch half-height double-sided disk drives, $125 to $135 per drive. FF 694-95. By the end of 1983, prices for half-height disk drives closed at about $117 per unit as price competition from Japanese disk drives intensified. FF 677.

The late 1983 burgeoning competition from Japanese disk drives was in part a result of the mid-1981 request for quote (RFQ) by Nippon Telephone and Telegraph (NTT) for 100,000 to 500,000 half-height double-sided disk drives. FF 671-77. NTT requested 15 to 20 Japanese companies to-submit price bids on this order, but only TUC, Mitsubishi, and Matsushita had disk drive capacity at that time and the RFQ required that successful recipients demonstrate some production capacity. Fr 673-74. Matsushita, which held a licensing agreement

93

with Shugart, warned Shugart that- the result of the NTT R1'2 would be to generate •Xceas capacity in the Japanese disk drive market and sales of Japanese disk drives to the United States. FF 675. Shugart was also informed by Matsushita that Japan's Ministry of International Trade and Industry (MITI) had decided that computer peripherals, including floppy disk driv•s, would be an important endeavor for Japanese industry in the 1930s. FF 676. Shugart initially faced price competition from Japanese companies in Europe- in mid-1933, then in the United States in late 1933. FF 677. In 1934 an? r-3r1y

C 1935,

C . FF 679-61.

From 1982 to 1933 the double-sided floppy disk drive market x^hibit,„1-..1 structural change- from full-height to half-height drives. In the 5-1/4 inch double-sided disk• drive market, the half-height version increased its market share from 24.8 percent in 1982 to 54.7 percent in 1983. FF 691. This shift refl-cted an overall industry trend toward smaller components. FF 697. Both Tandon and Shugart experienced difficulti•s during this period in developing and marketing a half-height disk drive. Fr 692-93.

The floppy disk•drive market was relatively stable until mid-1934. At that time the market became unstable as disk drive prices dropped an average of $10 per unit each month. FF 696. 3y the end of 1984, prices for full-height 5-1/4 inch double-sided disk drives ranged between $85 and $95 per unit and are currently between $65 and $33 per unit (FF 694); prises for

C half-height 5-1/4 inch double-sined disk drives were $ per driv• r.d are

C currently at.:,out $ per drive for substantial, new procurement quantit!ez. FF 695. Price erosion was alleged to be a major factor in Tandon's and Shugart's decreasing profitability. FF 573, 811.

94

Disk drive price declines in 1984 are attributable to at least three factors: .(1) intense price competition in the personal compUter industry and corresponding price pressure on dis% drive suppliers; (2) the emergerfce of numerous foreign manufacturers in Japan and elsewhere: and (3) a rapid and broad-based industry trend toward lower-priced half-height 5-1/4 inch floppy disk drives. FF 697. In 1984,

C

. FF 699. Since December 1984, Ti7AC prices have decreased by from 30 to 40 percent. Fr 700.

2. Shugart.

Shugart was granted a license by Tandon on July 1, 1930, to manufacture and sell disk drives under the '573 patent. FF 701. Shugart did not face competition in the United States from Japanese double-sided floppy disk drives until mid- to late-1983. As 1933 progressed, price erosion in the half-height disk drives brought prices down to the $117 per unit range, and the profitability of Shugart's operations correaponiingly declined. *FF* 677, 707, 709.

Shugart laid-off 7-1/2 percent of its work force in October 1983. FF 712. Shugart suffered its first loss in 1984. FF 714. On December 19, 1983, Xerox concluded that it could no.longer support Shugart; even with substantial investments, Shugart could not be maae, profitable- witnin the 12 to 18 months. FF 717. By December 6, 1994, Shugart's ford• had been reduced frOt 2,600 employees at the b.'giuning of the year to 1,300 employees. FF 713. In January 1935, Xerox formally announced the clozin• of -

Shagart, and correntlY has already sold or is in the process of selling the various parts of Shugart's domestic facilitie:. 7F 720-21. (3e.. Imm-diate and Substantial farm, Opn., at 112-14, for a more detailed discus:lion.)

3. Control Data Corporation.

Control Data Corporation (CDC) *was* granted a license by Tandon.on September 30, 1934, to manufacture and sell disk drives under the '573 patent. 'FF 722. CDC in 1934 experienced an operating loss in its floppy disk drive business of $ and is currently operating its 5-1/4 inch floppy disk drive business . FF 747-43.

CDC decided in the third quarter of 1984 to move production of its disk drives offshore. In October 1934, CDC laid off 450 employees. Fr 739, 750. CDC continues to.assemble and test approximately percent of its requirements for half-height 5-1/4 inch double-sided disk drives at its Oklahoma City facility. rr 740. Approximately 75 CDC employees will be associated with its continued domestic operations after April 15, 1935, which requires CDC to lay off an additional 150 employees. FF 751. (See Immediate and Substantial Harm, Opn., *at* 114-21, for a more detailed discussion.)

4. '"axes Peripherals.

Texas Peripherals (TP) is a joint venture entered into-between Tandon Tandy. TP was formed in January 1934 for the purpose of manufacturing disk drive; in the United States for sale to either Tan Son or Tandy. 7F 750-51. TP's April 1984 sales forecast did not envision the sale of double-sild Usk

drive sales by TP until October 1984. TP forecasted 5311-s of 32,350 double-sided disk drives for November 1984 and 23,230 drives for December 1984. FF 763. Continued growth was expected for double-sided disk-drives based upon the forecasted requirements of Tandon and Tandy. FF 763.

On October 9, 1984, TP received an order for 6,000 double-sided disk drives from Tandy Home Computer. FF 775. Although the units delivered by TP were (FF 778-82), the TP joint venture committee recommended in a February 1985 joint venture committee meeting that

. FF 791. If TP had been price competitive with respect to the'other floppy disk drive vendors, the qualification. process for its drives would have continued. FF 792. Ti' 'is

. FF 794-95. (See Immediate and Substantial Harm, Opn., at 121-30, for a more detailed discussion.)

5. Tandon.

The sale of Tandon floppy disk drives decreased from units in 1983. o units in 1984. FF 812-13. :lost of the decline in 1984 was the result of weak sales in the second half of the year; sales decreased from 301,993 drives in the first half of 1984 to 174,594 drives in the second half. FF 314.

Tandon earned a positive profit for fiscal years 1980 through 1384, although the ratio of net income to net sales detreased from 10.5 percent in 1932 to 7.3 percent in 1984. FF 807-03. Approximately 80 percent of Tandon's

97

sales in 1984 were floppy disk drives, and approximately 95 percent of those sales were for double-sided floppy disk drives. FF 397, 399. Tandon suffered a-loss in the last two quarters of calendar year 1984 and the firdt quarter of - calendar year 1935. The losses increased from 7.6 percent of net sales in the third quarter of 1984 to 32.6 percent of net sales in the first quarter of 1935. FF 809-10. (Tandon's income and Loss information reflects its total cOrporate operations including subsidiaries.)

FroM fiscal year 1983. to fiscal year 1984, employment at TandOn's U.S. facilities dropped from 3,300 persons to 1,505 persons. Tandon attributes this decline primarily to the "restructuring of its manufacturing operations to emphasize offshore production of mature product lines." *FF* 815.

There is evidence that Tandon lost sales because of competition. from respondent's double-sided disk drives. At least three Tandon customers ( ) switched to TEAC or 1itsubishi. FF 823-24, 836. Six customers) evaluated Tandon's double-sided disk drive products, but purchased units from TEAC or Mitsubishi. Four of these evaluations occurred in June-October 1984. FF 825-28, 839-40. There is little information on record with respect to why these customers chose to buy from respondents. Some of the customers may have decided not to select Tandon's drives because of quality or delivery problems. See Fr 634, 646, 643. In addition, some instances of lost sales cited by Tandon occurred irf 1982. or 1983, when the market was expanding rapidly and Tandon appeared to be- relatively healthy. FF 828-33, 836-33, 841-42.

There is nb..doubt that the domestic industry at issue'in this investigation suffered substantial injury in 1984 and continues to suffer substantial injury. Sales, employment, and profitability have all decreased during the course of 1994; and the health of the industry continues to deteriorate during the course of this investigation. See Opn., at 112-34. There are a myriad of factors contributing to this decline, including depressed computer sales in the last half of 1984, pressure from computer OEMs on suppliers to loweepricts, a general industry trend toward smaller, hard to manufacture, but lower-priced components, competition from disk drive suppliers other than respondents, and the move offshore by floppy disk drive producers in search of lower-cost production. The evidence, however, demonstrates that competition in the United States from respondents' double-sided disk drives contributed to the injury suffered by the U.S. industry.

There is a reason to believe that the unfair methods of competition and unfair acts of respondents in the importation of double-sided floppy disk drives into the United States, or in their sale, substantially injured the domestic industry at issue in this investigation.

B. Tendency to Substantially Injure.

When an assessment of the market in the presence of-the accused imported product demonstrates relevant conditions or circumstances from which probable future injury can be inferred, a tendency to substantially injure the domestic "industry has been shown. Certain Combination Locks, Recommended Determination, Inv. No. 337-TA-47, at 24 (1979). Relevant conditions or

circumstances may include foreign cost advantage and production capacity, ability of the imported product to undersell complainant's product, or suhstantial manufacturing capacity combined with the intention to penetrate the United States market. Certain Methods for Extruding Plastic Tubing, Inv. No. 337-TA-110, U.S.P.Q. 348 (1982); Reclosable Plastic Bags, Inv. No. 337-TA-22 (1977); Panty Hose, Tariff Comm'n Pub. No. 471 (1972). The legislative history of 5 337 indicates that "[w]here unfair methods and acts have resulted in conceivable loss of sales, a tendency to substantially injure such industry has been established." H.R. Rep. 93-571, 93 Cong., 1st Sess. 78 (1973), citing,. In re Von Clemm, 108 U.S.P.Q. 371 (C.C.P.A. 1955); see also Bally/Midway Mfg. CO. v. U.S. Int'l Trale Comm'n, 219 U.S.P.Q. 97, 102 (C.A.F.C. 1983).

There is evidence of record that during the remainder.of 1985, many ovls will evaluate and select double-sided disk drive vendors. Tandon is in head-to-head competition with other disk drive suppliers for these accounts. FF 848-58. Once an OEM selects a floppy disk drive vendor for one of its products, certain factors weigh against changing the vendor. Such factors include additional time and effort to evaluate a new vendor, retraining personnel and customers, and changes in sales manuals and software. FF 845.

TEAC Japan has the capacity to produce 200,000 disk drives per month. FF 859. In September 1984, the TEAC respondents forecasted_ sales to the United States double-siied 5-1/4 inch disk drives per. month FF 367. In January 1935, TEAC America listed 30 major OEMs as "target accounts," including FF 863. TEAC Japan

C also maintains

C , and TEAC expects disk drive prices to fall an additional 15 to 20 percent over the next year. FF 360-61.

C MELCO has the capacity to produce in Japan approximately products and carriage assemblies per month. FF 833. In fiscal year 1984, th.' C Mitsubishi respondents shipped approximately disk drives per month. FF 334, The floppy disk drive inventory at MELCO[1],s Koriyama works in Japan C increased from units in March 1984 to units in December 1984. C The December inventory included 5-1/4 inch disk drives. FF' 837. In • January 1985, :ME LA projected 1985 floppy disk drive sales of $ and C 1936 sales of $ which, based on a „conservative price estimate of $30 • per unit, would result in planned shipments of about disk drives per C ronth to the United States. FF 889. About percent of the 1985 sales are expected to be for 5-1/4 inch disk drives. FF 889. :MICO is currently considering new double-sided disk' drive products for sale in the United StateS. One possible product is a inch double-sided • floppy disk drive ( ) Also under discussion • is a inch double-sided disk drive. FF 392... Tandon-expects to compete with the Mitsubishi respondents and other Japanese companies for double-sided 8-inch•disk-drive customers who formerly purchased from Shugart. FF 554.

Sony is currently competing for sales of 3-1/2 inch disk drive at;major' Units.d State-` OEM accounts. *FF* 898-99. A.numk*r of major, OEMs, includinj IBM, are in the process of designing new computer models which will.. pronly

101

incorporate 3-1/2 inch microflnppy disk drives. The combine,: orders for thre major accounts may be as much as 1,300,000 disk drives per year. FF 900. To date, the Sony respondents have supplied few double-sided 3-1/2 inch floPpy disk •rivc to the United States other than to their major customer, . FF 286. Sony's current 3-1/2 inch disk drive has a '?any customers approache by Sony have re:!ected this drive because their specifications called for a . FF 902.. Several of these potential customers stated

. FF 903. The decision whether to

FF 904. Sony A3E also in the past attempted to design a 3-1/2 inch disk drive that was plug compatible with 5-1/4 inch drives. ThiS disk drive was originally seleduled to be available in early 1985, but it was never produced in commercial quantities. *FF* 901. Sony has placed with potential customers some double-sided 3-1/2 inch disk drives. **IT** 899.

The TEAC, Mitsubishi, and Sony respondents have both the production capacity and intent to further compete with the domestic industry at issue in this investigation. There is also evidence ofrespondents' ability. to unlersell complainant's product. Fr 707, 709-10, 745, 787-19; se-- Opn., at 113-19, 127-23. Sony.has shipped only small volumes of double-sided 3-1/2 inch floppy .:isk drives to the United States and

. It must be recognized, however, that the 3-1/2 inch market is the newest and most volatile segment of this industry, and some technical problems at the early stages of development are to be expected. Despite its apparent problems, Sony has established itself in the 3-1/2 inch market anti is in an advantageous position to exploit the resulting market expansion. See Opn., at 62-65.

There is a reason to believe that there exists a tendency to substantially injure the domestic industry at issue in this investigation.

103

VIII. FACTORS BEARING ON APPROPRIATENESS OF TEMPORARY RELIEF

A. Probability of Success on the Merits.

Probability of success on the merits is an evaluation of how likely it is complainant will be able to establish a violation of S 337. Complainant has met the threshold requirement of "reason to believe" a violation exists. The various elements which make up a S 337 violation must now be reviewed to determine the extent to which this threshold has been exceeded. The elements include: (1) the unfair practices; (2) the existence of an efficient and economic domestic industry; and (e) substantial injury or the tendency to substantially injure the domestic injury as a result of respondents' activities.

1. Unfair Practices.

Preheating discovery and the 12 lay hearing on temporary relief allowed the parties to thoroughly contest the issues concerning validity of the '573 patent, and, on the basis of the existing record, validity is established by at least a preponderance of the evidence. Respondents' arguments have failed to overcome the presumption of validity. Secondary evidence of commercial success, licensing, and acceptance by the industry is highly persuasive.

Proof of Sony's infringement of the '573 patent is clear and exceeds the reason to believe threshold by a substantial margin. Proof of TEAC's and Mitsubishi's infringement also exceeds the reason to, believe threshold, but by a much narrower margin. The parties for the permanent relief phase of this investigation may wish to perform additional product testing or develop other

104

evidence to advance their views concerning infringement. -Complainant may also wish to refine its testing to meet the objections and criticisms of respondents. The question of TEAC's and Mitsubishi's infringement of the '573 patent is fair grounds for litigation during the hearing on permanent relief.

2. Efficient and Economic Domestic Industry.

Complainant has established reason to believe that as of December 6, 1984, its domestic operations and the domestic operations of several of its licensees, including Texas Peripherals, Control Data Corporation, and Shugart, constitute a domestic industry for the purposes of S 337. Proof of the existence of a domestic industry far exceeds the threshold reason to believe. Respondents have raised questions, however, concerning the extent to which Tandon's operations should be considered part of the domestic industry. It appears from the record on temporary relief that complainant's operations by themselves may not constitute a domestic industry. It is only through the addition of the domestic operations of complainant's licensees that the industry is established for purposes of S 337.

Complainant has also established reason to believe that the domestic industry is efficiently and economically operated. The evidence of the licensees efficient and economic operation far exceeds the threshold and shows a probability of success on the merits. However, additional confirming evidence in the permanent phase would be useful.

Respondents have raised valid questions concerning the efficient and economic operation of complainant's•operations, especially with regard to quality and delivery problems associated with Tendon's products and the relationship between Tandon and the Indian companies. Whether Tandon's own

105

operations should constitute part of the domestic industry, and if SD, whether it is efficiently and economically operated, is fair grounds for litigation during the hearing on permanent relief in this investigation.

3. Substantial Injury and Tendency to Subztantial Injury.

Complainant has established that there is a high probability it will succeed in proving that respondents' activities have the effect or tendency to substantially injure the domestic industry.

Respondents sales of double-sided floppy disk drives in the Unite0. States have steadily increased. There is also evidence that respondent TEAC has

. There is virtually no dispute that respondents have the capability and intent to continue selling in the United States. The parties, however, should submit further evidence with regard to the full panoply of market factors that may have or will contribute to the injury of the domestic industry, in order to better define the substantiality of the effect or tendency of respondents' activities to injure the industry.

Conclusion as to Probability of Success on the Merits.

Complainant's probability of succ'-ss on the merits differs for each of the elements whicl, comprise a violation of 5 337. The essential element of patent infringement with respect to TEAL and Mitsubishi has risen to or is slightly above the threshold reazon to believe. Sony's infringement of the patent far

tlIrs' s1.311.

The level at which the evidence exceeds the reason to. believe threshold also varies on the question of a domestic industry. The issue of whether the domestic industry consists only of the licensees, or of the licensees and Tandon, is not crucial in the same sense as the question of patent infringement. IE it is ultimately established that Tandon's own domestic operations do not constitute part of the domestic industry, or that Tandon's operations are not efficiently and economically operated, a violation can nevertheless be established on the basis of the domestic operations of the licensees.

There is a high probability that the alleged unfair acts of respondents have the effect or tendency to substantially injure the domestic industry, though this finding may be tempered by additional evidence as to other market activity that may have had a significant impact on complainant and its licensees.

Complainant's probability of success on the merits therefore differs for each respondent on each issue of proof required to find a violation of S 337. There is a greater probability of success with respect to the Sony respondents than as to the TEAC and Mitsubishi respondents as to the issue of patent infringement. If ultimately it is established that respondents have engaged in unfair methods of competition, there is a greater probability of success with respect to the TEAC and Mitsubishi respondents than as to the Sony respondents on the questions concerning the breadth of the domestic industry and injury to it. Complainant has adduced sufficient evidence to raise serious questions concerning the merits of this case, which are fair grounds for litigation on the request for permanent relief.

B. Immediate and Substantial Harm.

To establish immediate and substantial harm requires a showing that during the interim period injury will occur which is greater than that necessary to establish a basis for permanent relief under 5 337. Fluidized Apparatus, Inv. No. 337-TA-182/188, Comm'n M^morandum Op. 17, 20, 22. The existence of some injury to the domestic industry is not by itself sufficient to show that there will be immediate and substantial harm to that industry in the absence of temporary roliF-f.

> The purpose of both standards (immediate and substantial) is to preserve an approximate status quo pending final resolution of proceedings. Thus, in Commission practice, the concept of "immediacy" means that the anticipated harm must be likely to occur before the Commission is able to issue permanent relief. The notion of "substantial harm" requires that the injury to the domestic industry be so significant that it would_ not fully recover from the harmful effects of the section 337 violation once permanent relief is granted. (Footnote omitted.)

Slide Fastener Stringers, 216 U.S.P.Q. at 917.

During the closing arguments for the hearing on temporary relief, respondents and staff counsel asserted that the assessment of immediate and substantial harm involves only that period seven to twelve months after the Notice of Investigation ha3 been published in the Federal Register. Newman, Tr. 3170-71; Brunsvold, Tr. 3196-97; Partner, Tr. 3211-14; see Ondeck, Tr. 3207-08. In accordance with this view, the administrative law judge is to look prospectively to determine whether immediate and substantial harm to the domestic industry, which cannot await permanent relief, is likely to occur. This view would eliminate from consideration substantial harm that occurred from the time the complaint was filed to the seven month period when the Commission is likely to rule on the matter.

Th••r•• is no justitication for eliminating from consideration of temporary ''Ain', harm or injury which may have occurred from the filing of the complaint to a period seven months skint notice of tht investigation Was published in the Ftdtral the siaiutt; the Commission Rults of Practice and Procedure, or court and ComMission precedents support such a highly circumscribed analysis. Such a rule would permit rtspondents to inflict during this tarlitr ptriod substantial harm to the domestic industry without subjecting themselves to the possibility of temporary relief. This analysis is also inappropriate because it is entirely dependent upon thn speed of the administrative process.

Congronsional intention, pertinent analogies to court proceedings, and logic, all point to the consideration of immediate and substantial harm as that injury which occurs subsequent to the filing of the complaint. For example, the court of appeals in Rally/Midway stressed that S 337 must be interpreted "in light of the actual business operations that the Commission was endeavoring to protect from unfair competition • • • ." 219 U.S.P.Q. at 100. The Commission determined that the domestic industry did not exist when the Commission decided the' case. The court held that tht proper date for determining the existence of a domestic industry is the date on which the complaint is Eiledand reversed the Commission. id.

> The' Commission's interpretation of section 337(a) also produces anomalous results. IE.tht effect of the unfair practices has been to injure seriously the affected business during th ‣ administrative proceeding . . • the importation would violatt section 337(a). if; however, the infringers were so effective that they succeeded in capturing all of complainant's business and therefore destroyed the reltvant "industry," then there would bt, no violation under the Commission's theory. The result would bt that the infringing importers whose unfair practices ware most effective, i.e., those who succeeded in destroying their AmtricAl competition, would be trtated more favorably than thosf' whose unfair practices were less successful.

The Bally/Midway case was not decided in the context of a request for temporary relief; yet, the decision provides important guidelines for determining how to apply the rule for immediate and substantial harm. Temporary relief is discretionary with the Commission. In exercising this discretion, the Commission attempts to protect an existing business from rapid destruction as a result of unfair methods of competition in the importation of articles into the United States, or in their sale. To apply the rule of immediate and substantial harm in the manner suggested by respondents and staff counsel would circumscribe the Commission's ability to protect a domestic industry from rapid destruction or crippling harm. The Commission in deciding whether temporary relief is appropriate must take into account all of the harm to the industry that may have occurred from the date the complaint was filed and will occur prior to the time permanent relief can be obtained. To hold otherwise would allow those infringing importers who are quick and effective in their destruction of the domestic industry to be treated more favorably than those whose unfair practices give less immediate results.

The above methodology comports with the practice of federal district courts in deciding whether to issue preliminary injunctions. In federal district courts, the status 22 ante which is threatened by irreparable harm during the pendency of a case is measured by "the last uncontested status which preceded the pending controversy." Westinghouse Electric Corp. v. Free Sewing Machine Co.; 256 F.2d 806, 808 (7th Cir. 1958); see Regents of Univ. of California v. ABC, Inc., 747 F.2d 511, 514 (9th Cir. 1984). In federal court the controversy is commenced by the filing of a complaint. Fed. R. Civ. P. 4. Bally/Midway indicates that the same rule should apply to Commission procedures.

The major...difference between federal court proceedings for preliminary injunction and Commission proceedings for temporary relief under S 337 is the availability in federal courts of temporary restraining orders. Such an order may be issued ex parte for a period of ten days. The order may at the judge's discretion be extended for an additional ten days. The adverse party may file a motion to dissolve or modify the restraining order. Fed. R. Civ. P. 65(b).

The court in order to convert the temporary restraining order beyond its effective date to a preliminary injunction must hold an adversary hearing. The usual practice in complex cases is for the parties to stipulate to the continuance of the restraining order in return for an early trial. Thus, courts by reason of the temporary restraining order are better able to prevent irreparable harm to the status 322 during the pendency of the proceeding.

The Commission rules do not mandate a trial-type hearing as a predicate to the issuance of temporary relief. 19 C.F.R. S 210.24(*)(1)(iv). However, it would be difficult in most cases, and particularly patent-based investigations, to render meaningful decisions on the basis of conflicting affidavits without agreement of the parties. Absence of a temporary restraining order procedure should not preclude consideration of injury or harm to the domestic industry which has taken place prior to the Commission's determination on whether to award temporary relief. Except where the Commission is convinced that the domestic industry has been destroyed and cannot be resuscitated by temporary relief (i.e., issuance of relief would be futile), such relief if otherwise appropriate should be awarded so long as the immediate and substantial harm occurred after the complaint was filed.

111

1. Shugart.

Shugart was formed in the mid-1970s by Allen Shugart and several key employees who had worked together at IBM and Memorex on disk drive designs. FF 702. By January 1976, Shugart was a single-product company with sales of $1.5 million to $3.0 million in 1975 and projected sales of $6.0 million for 1976. Actual 1976 sales were $9.0 million. The single product was an 8-inch single-sided floppy disk drive selling for $400 to $500 per unit. FF 703. Shugart was acquired by Xerox Corporation on December 16, 1977. FF 315.

By the end of 1981, Shugart employed 2,700 individuals and had annual sales of approximately $198 million. The company was located in Sunnyvale and Roseville, California, and Nogales, Mexico (300 employees). FF 704. In 1981, Shugart announced a full-height 5-1/4 inch double-track density version and double-sided version of its own design. After Shugart began to sell these products, it began to notice some pricing competition from Tandon, Control Data, and Japanese companies. Shugart was principally concerned about the competition from Control Data and secondarily, from Tandon. FF 705. At the spring 1982 National Computer Conference, Shugart was the only company that displayed a half-height product. At the fall 1982 Comdex show, Shugart, Tandon, and Control Data showed half-height double-sided floppy disk drives. Twelve to fifteen Japanese suppliers also showed their half-height products. FF 706. In April 1983, Shugart assessed the market conditions in Europe and saw extreme price competition from five or six Japanese manufaCturecs. Shugart also saw lower price bidding in the United States from Japanese half-height products. FF 707.

112

As 1983 progressed, price erosion in half-height drivei brought prices down into the range of $120 per unit. Shugart turned to its Japanese . licensee, Matsushita, and entered into a purchase agreement for half-height double-sided floppy disk drives with prices ranging from $124 to under $100 per unit depending upon the quantity ordered. FF 708. Shugart soon found itself in head-to-head competition with Japanese products at major United States and European accounts. FF 335. The outcome was that we had to adjust all of our pricing substantially downward yet again with severe price erosions and then profit erosions that had to naturally follow." Sollman, Tr. 98; see FF 709.

Shugart first became profitable in July 1975. The first time Shugart saw a rapid erosion of its profitability was in 1983. Shugart suffered its first operating loss in January 1984. FF 714. Shugart's annual sales for 1983 was $240 million dollars. At that time, Shugart was the world's second largest manufacturer of floppy disk drives behind Tandon. FF 713. The extreme competitive environment at the end of 1983 caused Shugart's profitability to erode substantially. *FF* 714.

Shugart had charted the price declines of 1983 and concluded that the decline had a very negative long-term impact. Shugart considered several economic alternatives to recover from the erosion in profits, including setting up an offshore production facility in either Singapore, Taiwan, or South Korea. FF 715. Task forces established by Shugart in mid to late 1982 recommended the immediate establishment of a production facility in Singapore. Shugart was unable to receive management's approval for the establishment of this facility. FF 716.

In October 1.983, Shugart experienced its first layoff. Shugart had grown to 3,600 employees, all but 550 of whom were located in the United States. The October layoff equaled 7-1/2 percent of the work force. FF 712. On December 19, 1983, after examining economic studies concerning what would *be* required to make the business fully profitable, Xerox concluded that it could no longer support Shugart. As of January 1, 1984, Shugart's annual reported sales for fiscal year 1983 was $240 million. Xerox concluded that even with substantial investments, Shugart could not be made profitable within the next 12 to 18 months. FF 717.

On January 15, 1984, Shugart employed 2,600 people in the United States and 600 in Mexico and occupied about 490,000 square feet of space at Roseville and Sunnyvale, California. By December 6, 1984, Shugart had experienced several more layoffs, and its employment force had been reduced to 1,600 to 1,700 employees, 400 of whom were in Mexico. FF 718. Shugart was still manufacturing double-sided floppy disk drives in the United States on December 6, 1984, including 8-inch and 3-1/2 inch products. FF 719. In January 1985, Xerox formally announced the closing of Shugart at a time when it still employed 1,400 individuals. FF 720. Xerox has already sold or is in the process of selling the various parts of Shugart's domestic facilities. FF 721.

2. Control Data Corporation.

Control Data Corporation (CDC) was granted a license by Tandon on September 30, 1984, to manufacture and sell disk drives under the '573 patent. FF 722. The license agreement resulted from a claim by Tendon that the drives manufactured by Magnetic Peripherals, Inc. (MPI), a partially-owned

subsidiary of CDC, were covered by the '573 patent. FF 723. Some, if not all, of the head assemblies used by CDC in its double-sided floppy disk drives produced in the United States are manufactured by Lafe, which is located in Taiwan or Korea. FF 724.

CDC's industry position in 1983 represented approximately 20 percent of the full-height floppy disk drive market and a minimal percentage of the half-height floppy disk drive market. FF 725. CDC's industry position in 1984 represented approximatly 20 percent of the full-height floppy disk drive market and 10 percent of the half-height floppy disk drive market. FF 726. CDC's current industry position approximates more than 20 percent of the full-height disk drive market and 2 percent of the half-height floppy disk drive market. FF 727. CDC's industry position in the total disk drive market, which includes Winchester and floppy disk drives, was 40 percent for 1983 and 27 percent for 1984. *FF* 728.

CDC in 1983 shipped $ worth of floppy disk drives or units. FF 729. CDC by December 30, 1984 had shipped $ worth of floppy disk drives or units. FF 730. CDC as of December 30, 1984, had firm purchase orders for 1985 of floppy disk drive units and had projected a high probability sales forecast for 1985 of units. FF 731. of the above floppy disk drives are 5-1/4 inch half-height or full-height drives. The old 8-inch products constitute about percent of CDC's sales. Of the 5-1/4 inch full-height products, percent plus are double-sided configurations; of the 5-1/4 inch half-height products, are double-sided configurations. FF 732.

CDC's five-year manufacturing plan prepared in late 1983 forecasted its 1984 requirements for 5-1/4 inch half-height floppy disk drives as units and 1985 requirements as units. FF 733. CDC is Currently committed to build floppy disk drives, but only has orders for 40 percent of that number. At this time, CDC is projecting sales in 1985 on the order of units. FF 734.

CDC's estimate of the prevailing market prices for full-height 5-1/4 inch double-sided floppy disk drives for mid-1983 averaged between $ per unit; for mid-1984, between $ per unit; for the end of 1984, between $ per unit. Current prices on normal bids range between $ per unit, though CDC has heard a low bid of $. FF 735. CDC's estimate of the prevailing market prices for half-height 5-1/4 inch double-sided floppy disk drives for the summer of 1984 ranged from $ per unit; the fall of 1984, under $ per unit; and the end of 1984, $ per unit. Current prices for any substantial new procurement are in the $ per unit range. FF 736. In late 1983, CDC, based on the existing market conditions, projected that the 1984 prices for its Model No. 9298 and No. 9299 half-height 5-1/4 inch double-sided floppy disk drives would be $ per unit and $ per unit, respectively, and the 1985 prices, $ per unit and $ per unit, respectively. FF 737.

On April 4, 1984, CDC defined its major competition in the half-height 5-1/4 inch double-sided floppy disk drive market as follows:

Shugart

C Japanese
C
C

C
C
C

Tandon

C
C

FF 738.

The floppy disk drive market was relatively stable until mid-1984. At
• that time the market became unstable and prices dropped an average of $ per unit per month. Based upon CDC's cost of production in the United States, CDC
• in the third quarter of 1984

and made the decision to move production of drives offshore.
• *FF* 739. CDC continues to assemble and test approximately percent of its requirements for half-height 5-1/4 inch double-sided floppy disk drives at its Oklahoma City facility. FF 740. The estimated maximum production
• capacity at CDC's Oklahoma City facility is drives per year, or
• approximately units a month. It would take CDC at least
• three months to produce at this level; the necessary tooling is in *place,*

. *FF 741.*

was and is a CDC OEM customer for some flexible and numerous rigid
• drives. CDC has an ongoing business relationship with and is trying to
• keep that business. CDC ceased being a vendor for half-height
• product in the mid or third quarter 1984; "

Ousley, Tr. 671-72. CDC thinks that Mitsubishi received business at this time. FF 742. CDC has attempted to half-height double-sided floppy disk drive business. CDC has quoted prices as low as $ per unit, . CDC believes that Mitsubishi is currently supplying with this product. FF 743.

In the third quarter of 1984, CDC attempted to solicit from its business for half-height floppy disk drives. CDC at this time was quoting prices for half-height drives at $ per unit. CDC was unsuccessful in its bid for this business and is unsure who finally received this order, but was told that there were three or four vendors who price bids ranged from $ per unit. CDC was informed within two weeks of the hearing on temporary relief in this investigation that in order to obtain business, it would have to bid less than $ per unit. CDC was told that several vendors could quote such prices to , including FF 745.

CDC has a national agreement with two distributors, to distribute through these companies almost all of its disk products and tape products. CDC's contracts with its distributors are for a short time period and the distributors have the privilege of returning products to CDC if they are unable to sell them. compete in a very price sensitive market where there are 10 to 15 major domestic distributors. CDC sells its half-height product to its distributors at $ per unit. Other distributors

• are purchasing drives in the $ per unit range, and CDC is under pressure to reduce its pricis to obtain business. A major national distribution competitor of which has been offered prices for floppy disk drives

C in the $ per unit range uses a drive. FF 746.

CDC experienced a write-down and operating loss in its flexible disk

C drive business last year of $. FF 748. CDC is currently

• operating its 5-1/4 inch floppy disk drive business

. FF 747. Based upon monthly analyses beginning in the fourth quarter

• of 1984, CDC in its February 1985 financial review

C

. FF 749.

of CDC's Oklahoma City facility has been ongoing since the third quarter of 1984. In October 1984, CDC laid off 450 individuals from its

• Oklahoma City facility. In February 1985, CDC made announcement with respect to the termination of employees at its Oklahoma City facility. FF 750. "

C

c Ousley, Tr. 684 (Apr. 10, 1985). Also, of CDC floppy disk drives will be offshore a few weeks after the completion of the hearing on temporary relief. Id. The only activity that will continue in the United States is engineering, ongoing tests, product support, and any limited customer-unique specification work. Approximately 75 CDC employees will be associated with this group after April 15, 1985. CDC will need to lay off an additional 150 employees in order to reach the 75 person level. FF 751. The decision to begin moving CDC's production facilities offshore was made in September 1984. FF 751.

After , the production line at the Oklahoma City facility . CDC will . FF 752. The only reason that CDC at this time is if there was an increased demand over its current contracts with foreign suppliers. While there would still remain a with respect to the production of floppy disk drives in the United States should an exclusion order be issued in this case, the would not be that great. CDC would be expected to manufacture wherever the cost would be lowest for the corporation (FF 753-54): "

." Ousley, Tr. 710-11.

CDC has made the decision to move its floppy disk drive business offshore based on current market conditions. "If those market conditions were to reverse rapidly, then we have the plant, the people and the process in place . . . . I think given that the foreign competition that we have seen is the major reason , if that were to stop, then, we would have an opportunity to ." Ousley, Tr. 689-90. "Our [CDC's] stated corporate position from the chairman of our board is that

." Ousley, Tr. 711-12.

There are currently 30 to 35 foreign manufacturers foi double-sided floppy disk drives. TEAC is a very formidable competitor and ranks in the top five of these foreign manufacturers. CDC does not see Mitsubishi in as many places as it does TEAC, but Mitsubishi is somewhere in the top ten of the foreign manufacturers. "Sony we do not see very often other than as it relates to 3-1/2 inch, which is all futures basically at this point in time." FF 756. If a restraining order affected the marketplace price for double-sided floppy disk drives such that CDC was able to realize higher prices, the order would definitely affect CDC's decision with respect to its Oklahoma City facility. FF 757. 'I don't know the effect that these three companies (TEAC, Mitsubishi, and Sony) alone would have versus the others. . . . definitely would help, but whether that would make the decision for us, I really can't represent that today.' Ousley, Tr. 722; see id., Tr. 724.

A restraining order issued during the July 1985 time frame would probably be too late to alter CDC's decision with respect to its Oklahoma City facility. °My then we will . . . (be) doing something with our production line. So I mean it is a real time issue for us. The decision has already been made, and we are going down that path. And so each day that goes by, it becomes much more difficult for us to do anything in Oklahoma City.'" Ousley, Tr. 723.

3. Texas Peripherals.

Texas Peripherals-(TP) is a joint venture owned equally by Tandy COrporation and complainant. Tendon became a member of this joint venture in January 1984. FF 760. TP was formed for the purpose of manufacturing disk

121

drives in the United States for sale either to Tandy or Tandon. FF 761. As of December 1984, TP manufactured at its facilities in Fort Worth, Texas, the TM 100-1, a full-height single-sided floppy disk drive, the TM 65-1, half-height 5-1/4 inch single-sided disk drive, and the TM 65-2, a half-height 5-1/4 inch double-sided disk drive. FF 762. TP purchases all of its head assemblies for the TM 65-2 from Tendon. FF 763.

On April 25, 1984, the projected production of TP floppy disk drives for October 1984 was 27,117, for November 1984, 43,450; and for December 1984, 39,430. Of those drives planned for production in October 1984, 1000 would be half-height double-sided floppy disk drives; in November 1984, 32,350 would be half-height double-sided floppy disk drives; and in December 1984, 28,230 would be half-height double-sided floppy disk drives. TP forecasted continued growth of its floppy disk drive production such that by February-March-April 1985, TP planned to ship 68,652 drives a month, 50,052 of which would be half-height double-sided floppy disk drives. This projection was based upon the forecasted requirements of Tandy and Tendon (though in this forecast, the Tendon required drives were minimal). FF 764. In the spring of 1984, the joint venture committee authorized $300,000 for tooling in which to set up TP. FF 766.

The projected average selling price for TP's half-height double-sided floppy disk drive as of April 25, 1984, was $86 per unit. In spring 1984, TP submitted bids with respect to this product to various Tandy divisions. At this time, $86 per unit was considered a competitive bid for this type of product. FF 765.

On May 15, 1984, TP delivered working samples of the TM 65-2 to various Tandy divisions, including Tandy Advanced Products, Tandy Home Computer, Tandy Computer Assy., Tandy Systems Design, and Computer Product Engineering. This drive was assembled at TP from a kit supplied by Tandon and

C . FF 767. On June 15, June 16, and July 15, 1984, TP scheduled the delivery of pre-production samples of the TM 65-2 to Tandy Home Computer, Tandy Computer Assy., Tandy Systems Design, and Tandy Advanced Products. Some of these pre-production samples were later delivered to the various Tandy divisions in late June, July, or August 1984. The pre-production samples were more representative of TP's production units and contained some degree of TP's configurations. FF 768.

TP's profit plan for fiscal 1985 indicated that production of the half-height 5-1/4 inch double-sided disk drive was scheduled to begin October 1984. By May 23, 1985, production of this floppy disk drive was expected to reach 30,000 units per month. This level of production was less than originally anticipated because Tandy had decided to continue to use the full-height product in its Model 4 computer instead of switching to a half-height product. FF 769.

As of September 1984, $264,300 of the equipment budget had been committed to vendors to fabricate the tooling for the TM 65 product. TP planned to have its tooling in place by December 1984. The commitments to vendors for tooling were made in expectation of volume business for the TM 65 from Tandy. FF 770.

As of September 19, 1984, TP's production line was capable of producing the quantities needed to achieve its financial objectives.

> The plant capacity was shown to range from 30,000 drives per month in December (1184) to better than 50,000 as we approach March [19851. We are not capacity limited.
>
> The TEAC $77 drive has been the driving force by which we seem to be measuring all of our future pricing. • • • Steve Huenemeier (representing Tandon) has been looking at these costs together with Texas Peripherals and felt that the ultimate objective should be a drive with a material cost under $50. If this goal is met, then we should easily be able to compete.

CX 727, at Bates No. 028568, 028569; see FF 771-72.

As of September 19, 1984, volume buying was considered a necessary condition to achieve the reduced costs for the TP floppy disk drive. "Jim Mortensen (representing Tandy) will be exploring the avenues to encourage Tandy to make these types of commitments [sic)." CX 727, at Bates Nos. 028569. An order of 30,000 units per month was considered necessary to procure material in the volumes required to get a $50 per unit material cost. FF 773.

A Product Evaluation Request/Report on TP's half-height 5-1/4 inch double-sided disk drive was received by TP from the Computer Product Engineering division of Tandy in early October 1985. The report concluded, *This drive is equal or better than the TEAC Drive. It will hold alignment longer, and handle shipping better due to the cast chassis. • • • This drive is acceptable.' CX 727, at Bates No. 028602; see FF 774.

TP on October 9, 1984, received an order for 6,000 units of the TM 65-2 floppy disk drives from Tandy Home Computers, a division of Tandy. The order was scheduled for delivery as follows: 1,000 by November 15, 1984; 2,000 by

124

December 15, 1984; and 3,000 by January 15, 1985. FF 775. TP

TP delivered the first 50 units for qualification testing in November 1984. FF 776. TP

. TP decided that it

. FF 777.

Hochman, Tr. 1647. TP's next delivery of 400 units did not take place until the first days of January 1985. TP hoped that the

. FF 776.

The units delivered by TP to Tandy Home Computer

The initial report on the first drives sent to Tandy Home Computer in November 1984 gave a breakdown on the

. FF 778.

FF 778. Tandy Home Computer

125

. FF 778. As of February 1985, TP had progressed

" Hochman, Tr. 1618-19; see *FF* 779.

The only major problem that remained as to TP's floppy disk drives concerned a soft error problem. (A soft error increases the time it takes the computer to recover data.) The soft error rate displayed by the units manufactured by TP were in excess of what TP's competition was displayed under the same circumstances. FF 780. TP

. FF 781. At the February 1985 joint venture committee meeting, however the discussion of the was considered secondary to the main issue of whether

FF 783.

TP's cost of production at the time it stopped its half-height double-sided floppy disk drive program was $ per unit. TP was

126

." Hochman, Tr. 1610-11. TP's selling price at the time it of its half-height double-sided floppy disk drive program was $. *FF* 784.

Tandy Home Computers indicated in October 1984, when it first placed its order with TP for half-height 5-1/4 inch double-sided disk drives, that

. FF 787. If

. FF 788. an August 1984,

. FF 680.

By February 1985, TP needed to

." Hochman, Tr. 1626; see FF 789. Both TEAC and competed with TP for the Tandy Home Computers business.

. FF 789. As of February 12, 1985, the lowest projected total cost for the TM 65 was in the $ price range for an order of total full-height and half-height floppy disk drives

127

per month. At this price, TP's profits on the sale of floppy disk drives would be between , with an end of the year net profit before taxes averaging . FF 790. "It was also noted that even this optimistic figure would require that Texas Peripherals still sell at $10.00 above the TEAC price assuming the $60 unit to be real." CX 727, at Bates No. 028591. Such a profit level was

. FF 790.

The recommendation was made at the February 1985 joint venture committee meeting that

. FF 791. "Texas Peripherals' low volume cannot compete with producers of high volume. Everyone agreed that intangible benefit of proximity to the customer base may no longer be a viable condition for maintaining a manufacturing facility devoted to the Slimline (half-height] drive.

." CX 727, at Bates No. 028592. To date, Tandy Home Computers

. FF 782. If TP had been price competitive with respect to the other floppy disk drive vendors, the qualification process for its drives would have continued. FF 792.

It became apparent as of February 1985, that Tandy Home Computers' planned

. Tandy Home Computers has awarded some of its double-sided floppy disk drive business to . *FF* 793.

C TP is

C . FF 794. TP is

C ." Hochman, Tr. 1610. TP is

C

FF 795.

C TP has assembled in its plant approximately TM 65-2 floppy disk

C drives. TP

C FF 796. As of December 1984,

C however, TP has produced approximately units of the TM 100, a

C full-height single-sided floppy disk drive, and units of the TM 65,r1, a half-height 5-1/4 inch single-sided disk drive. As of April 15, 1985, TP has outstanding purchase orders for TM 100s and TM 65-1s. Except for the head assembly, the mechanical parts of the TM 65-1 are the same as those found in the TM 65-2. FF 797. TP could produce on a double shift TM 65-2 double-sided floppy disk drives a month. FF 798. As of February 25, 1985, TP's

. FF 799. TP's

' FF 800. TP's

. FF 801. TP's

. FF 802. TP for the most part is proceeding on time with . FF 803.

TP received order for production of the TM 100, a full-height single-sided floppy disk drive, before the hearing on temporary relief. Hochman, Tr. 1639-40 (Apr. 15, 1985). TP received order for production of the TM 65-1, a half-height 5-1/4 inch single-sided disk drive, before the hearing. Hochman, Tr. 1640 (Apr. 15, 1985). Most of the production equipment located at TP will be needed to complete production of for the TM 65-1. TP is scheduled to complete production on the for the TM 65-1s the . FF 805.

As of April 15, 1985, TP employed persons. During April 1985, TP plans to . In May 1985, TP will probably . Those will continue to produce current orders of the TM 65-1 . FF 806.

4. Tandon.

"Marketing windows* open whenever an OEM customer is looking for a new drive; that is, these windows open during evaluation of suppliers and their drives and close once a vendor has been selected. FF 908. Marketing windows reopen if a vendor can not continue supplying a drive and the customer must look elsewhere. FF 909.

The marketing window for 8-inch double-sided floppy disk drives is currently flat and beginning to close because of the increase in demand for smaller disk drives. See Opn., at 59-60. There continues to be opportunities in this area, however, with established customers. FF 554-55. The shift in consumer preference for the small floppy disk drives is a long term market factor. FF 555.

The first year in which double-sided 5-1/4 inch floppy disk drives outsold double-sided 8-inch disk drives was 1982. FF 547. The 5-1/4 inch double-sided disk drive is expected to dominate the floppy disk drive market at least through 1987. See FF 547. Many large OEMs, however, have already passed the design stage for 5-1/4 inch floppy disk drive computers and selected vendors for their products. Still, the marketing window for alternative suppliers of 5-1/4 inch floppy disk drives remains open. See Opn., at 60-65; see FF 910. The move by ISM to offer a computer with 1.6 megabyte dual-sided 5-1/4 inch disk drives also has opened another important window of opportunity for high capacity floppy disk drive manufacturers. FF 913.

It is expected that several major computer OEMs will soon announce next-generation computer products with 3-1/2 inch disk drives. FF 911. The initial OEM orders for 3-1/2 inch disk drives will be crucial in determining

future market position among floppy disk drive manufacturers. Those floppy disk drive manufacturers that fail to achieve initial OEM orders while the window is open will tend to be relegated to a niche position in the market; they could even be forced to leave the market altogether. FF 912. The desire to introduce new computer models by fall of 1985 may lead many computer OEMs to place critical initial orders for disk drives between May and July 1985. Placement of such orders will close important windows for sales opportunities. FF 914. Therefore, many important sales opportunities which are now open could begin closing as early as May, June, or July 1985. FF 915; see Opn., at 60-65.

Tandon remains in competition with the TEAC, Mitsubishi, and Sony respondents for several major accounts which will be awarded during the next few months (FF 916):

1. Tandon is in competition with Sony for a contract offered by for floppy disk drives a year. The vendor selection date is May 1985. The contract is for 3-1/2 inch double-sided floppy disk drives. Tandon is seeking to sell its TM 304. FF 917.

2. Tandon is in competition with TEAC and Mitsubishi for a contract offered by . The contract is for a 1.6 megabyte 5-1/4 inch double-sided floppy disk drive. Tandon is seeking to sell its TM 65-8. FF 918.

3. Tandon is in competition with TEAC and possibly Mitsubishi for a contract offered by for units. The selection date is August 1985. The contract is for 3-1/2 inch double-sided floppy disk drives. Tandon is seeking to sell its TM 306 (1.0 megabyte) and TM 65 (1.6 megabyte) drives. FF 919.

4. Tandon is in competition with Mitsubishi for an order with Compaq regarding 1.6 megabyte 5-1/4 inch drives. FF 920.

5. Tandon is in competition with TEAC and Mitsubishi for an order with for 1.6 megabyte 5-1/4 inch double-sided floppy disk drives. Tandon is seeking to sell its TM 65-8. FF 921.

6. Tandon is in competition with TEAC and possibly Mitsubishi for a contract offered by . .. The vendor selection date for a 1.0 megabyte drive is April 1985. The vendor selection date for a 1.6 megabyte drive is October 1985. The contract on the 1.0 megabyte is for drives per year by 1986. The product referred to is the 3-1/2 inch double-sided floppy disk drive. Tandon is seeking to sell its TM 308) and TM 309 (1.6 megabyte). . FF 922.

7. Tandon is seeking to sell its TM 304 and TM 309 drives to for the following offers: (1) a vendor selection date of October 1985 for units per'year at operation ( ); (2) a vendor selection date of October 1985 for units per year at operation ( ); and (3) a vendor selection date of August 1985 for units per year at operation.

. FF 924.

8. Tandon is in competition with Mitsubishi for for a 1.0 megabyte 5-1/4 inch double-sided floppy disk drive. This order is for drives per year starting June 1985. The vendor selection is in May 1985. *FF* 925.

9. Tandon is in competition with TEAC and Mitsubishi for a contract offered by for double-sided 3-1/2 inch and 5-1/4 inch floppy disk drives per year. The vendor starting date is August 1985. Tandon is seeking to sell its TM 308 (1.0 megabyte), TM65-8 (1.6 megabyte), and TM 65-2L (0.5 megabyte) drives. FF 926.

10. Tandon is in competition with Mitsubishi for a contract offered by for double-sided 3-1/2 inch floppy disk drives per year. The vendor selection date is May 1985. FF 927.

11. Tandon's TM 848 is in competition with Mitsubishi (and one or two other Japanese companies) for Shugart's 8-inch disk drive account. This account is in excess of several hundred thousand drives per year. FF 928.

In 1982, Tandon and its present licensees held 76.0 percent of the United States OEM market for 5-1/4 inch and 8-inch double-sided floppy disk drives, while respondents TEAC and Mitsubishi held just 6.8 percent of this market. FF 686; see FF 689. In 1983, Tandon and its present licensees held 55.0 percent of the United States OEM market for 5-1/4 inch and 8-inch double-sided floppy disk drives, while respondents TEAC and Mitsubishi held just 20.7 percent of

133

this market. FF 687; see FF 690-92. The current United States market share of TEAC, Mitsubishi, and Sony is between 18 and 19 percent for all double-sided disk drives. FF 688, 756.

5. Existence of Immediate and Substantial Harm to the Domestic Industry.

The initial decision to close Shugart was made on December 19, 1983. Xerox concluded that even with substantial investments, Shugart could not be made profitable within the next 12 to 18 months. By December 6, 1984, Shugart had experienced several layoffs, and Xerox formally announced the closing of Shugart in January 1985. Xerox has already sold or is in the process of selling the various parts of Shugart's domestic facilities. The evidence therefore indicates that temporary relief would not serve to resuscitate Shugart. Issuance of temporary relief as to Shugart would be futile.

The decisions and the domestic operations of Control Data Corporation have also been made and are now being put into effect. Respondents and the Commission investigative attorney argue that

- temporary relief would have no effect on the status of these companies.
- The decisions and CDC, however, are more recent than the decision to close Shugart, February/March 1985 and the third quarter of 1984, respectively, and there is testimony that temporary relief may cause the
- individuals responsible for to reevaluate their decisions. Hochman, Tr. 1641-42; Ousely, Tr. 689-90, 722-25, 733; Patterson,
- Tr. 1761-62. A decision to of these companies may depend on the impact that temporary relief will have on the floppy disk drive market; yet, it is impossible to predict the extent of this impact and its actual

effect on the marketplace. The decisions _and CDC may or may not be reversed by the issuance of temporary relief; however, there is some evidence that the decisions may be reversed if the competitive positions of these firms were to improve. The issuance of temporary relief as to and CDC may resuscitate their domestic operation and thus is not futile.

Tandon is not confronted with the possible shutdown of its domestic operations, but rather is concerned with the closure of marketing opportunities. Once an OEM selects a floppy disk drive vendor for one of its products, certain factors weigh against changing the vendor. Such factors include additional time and effort to evaluate a new vendor, retraining personnel and customers, and changes in sales manuals and software. The tact that Tandon is in head-to-head competition with respondents demonstrates that substantial injury may occur to complainant before the Commission is able to act on permanent relief. Though the case against the Sony respondents is not as persuasive with respect to Tandon as it is against the other respondents, it must be recognized that the 3-1/2 inch market is the newest and most volatile segment of this industry and that Sony has established itself in this market and is in a good position to exploit the resulting market expansion. See Opn., at 101-03. A degree of substitutability also exists between 3-1/2 inch floppy disk drives and other double-sided drives such that Sony's drives may compete to some extent with the 8-inch and 5-1/4 inch drives produced by complainant and its licensess. See Opn., at 63-65.

The injury to the domestic industry is so significant that it is not likely to recover fully from the harmful effects of respondents' activities once permanent relief is granted. Substantial harm has occurred and further substantial harm is likely to occur before the Commission is able to issue permanent relief in this investigation.

C. Harm to Respondents.

Because respondents sell double-sided floppy disk drives in the United States on a continuing basis and engage in ongoing efforts to make new sales of such drives, a temporary exclusion of respondents' products except under bond would undoubtedly cause them harm. The extent of the harm to respondents is to be balanced directly against the immediate and substantial harm to the domestic industry during the pendency of the investigation.

Respondents argue that temporary relief would seriously interrupt their customer supply arrangements. Even if respondents ultimately prevail on the merits, they may lose customers and be replaced by other suppliers because the supplier's reputation for providing reliable and uninterrupted product delivery is a primary concern in an OEM's selection of that supplier. FF 931, 937-38. A supplier's reputation is also important because disk drives must often be customized to accommodate the unique specifications of a particular OEM customer. Customization often ties an OEM to a particular supplier and requires an investment in time and preparation on part of the OEM and the supplier. FF 932-33. OEMs also frequently have specific performance requirements which further limits their selection of available disk drive suppliers. FF 934. Finally, the OEMs process for selecting a particular

supplier may require an evaluation period of six months or more, though it is not unusual for an OEM to qualify more than one disk drive manufacturer. FF 935. If the disk drive used by an OEM is a standard type drive, an evaluation may not be necessary. FF 936.

A temporary exclusion order is not necessarily an absolute bar to importations by respondents of the products in issue. Bond must be set by the Commission, and the importations may continue under bond. 19 U.S.C. S 1337(e). The relationship between respondents and their customers may not be disrupted in the short time before the hearing on complainant's request for permanent relief, if respondents choose to continue importation under bond. The extensive ties which respondents argue exist between an OEM and its supplier, including customization, computer specifications, and product evaluation, will continue to tie the OEM customer to its floppy disk drive supplier where the product continues to *be* imported under bond. If respondents continue activity under bond which threatens grievous harm to a domestic industry, as is presently the case, the balance of hardships tips decidedly in favor of the domestic industry. See 7 J. Moore, W. Taggart s J. Wicker, Moore's Federal Practice S 65.04(1) (2nd ed. 1981).

D. Public Interest Factors.

If, during the course of an investigation, the Commission determines that there is a reason to believe that there is a violation of S 337, the Commission may direct that the imported articles be barred from the United States unless after taking into account the effect of such exclusion upon the

public health and welfare, competitive conditions in the United States economy, the production of like or directly competitive articles in.the United States, and United States consumers, it finds that such articles should not be excluded." 19 U.S.C. S 1337(e). The Commission considers these factors as overriding in its administration of the statute; if the effect of the issuance of temporary relief would have a greater adverse impact on the public interest than would be gained from protecting complainant's interest, relief should not be granted. Conversely, the conclusion that the public interest would not be impaired by temporary relief is not sufficient reason to justify issuance of that relief if not otherwise appropriate.

There is no evidence of record that the exclusion of respondents' floppy disk drives from the United States will have any adverse effect upon the public health and welfare. The record suggests, however, that the temporary exclusion will influence competitive conditions in the United States economy in the sale of double-sided floppy disk drives, United States consumers, and, to a lesser extent, the production of like or directly competitive articles in the United States.

Respondents TEAC and Mitsubishi are principal importers of double-sided 5-1/4 inch floppy disk drives. Respondent Sony is seeking to be a leader in the double-sided 3-1/2 inch floppy disk drive market. TEAC and Mitsubishi commenced selling their products in the United States sometime in late 1982 or early 1983, and quickly achieved an influential market position. The domestic price levels for floppy disk drives have dropped substantially since that . time. Tandon and its current licensees have lost substantial market share.

Tandon moved a number of its labor-intensive manufacturing operations offshore, and its labor costs should be as low or lower then the Japanese importers. The domestic operations of CDC has also decreased substantially, and the record indicates that Shugart has ceased and TP may cease operations.

Tandon's early market success and leadership position was achieved through its earlier full-height versions for single-sided and double-sided floppy disk drives. Tandon failed to develop next generation products which were acceptable to customers during the 1982-1984 period. This is one reason Tandon lost its market share. It was not until the latter part of 1984 that Tandon developed a competitive half-height 5-1/4 inch drive. Tandon now appears to be in a Competitive position in the marketplace, though there remains some questions concerning its internal structure and the quality and delivery of Tandon's drives. The licensees appear to have engaged in efficient and economic competition.

If respondents' products were barred from the United States except under bond during the pendency of this investigation, it might halt the slide of the domestic industry towards total destruction, and perhaps permit it to continue on an upward trend. For example, if TP had been price competitive with respect to the other floppy disk drive vendors, and if further lowered its price, the qualification process for its drives would have continued. FF 792.- Temporary relief would also allow Tandon to fairly compete with Sony in the 3-1/2 inch floppy disk drive market. Such competition would in the long run be beneficial to competitive conditions in the United States economy as it would tend to stimulate further production of double-sided floppy disk drives in the United States.

The impact of temporary relief on both OEM and final consumers would not be significant. Respondents' drives are not barred by the issuance of temporary relief because a temporary exclusion order would permit importation under bond. If OEMs continue to purchase respondents' disk drives under bond, there need *be* no substantial disruption of the computer industry or of the supply of computers to the buying public, with the exception of changes that may occur due to a possible increase in price. See FP 978. If importation is continued under bond, it can be assumed that a portion of the increased costs for respondents' floppy disk drives may be absorbed by respondents so as to retain customers, diluting any upward pressure on prices to OEM consumers.. Finally, because the disk drive constitutes only a portion of the total cost of a computer system, and because competition among OEMs for customers is currently keen, the additional cost of temporary relief to the final consumer would probably be minimal.

Concern was also expressed with respect to the costs to OEMs of switching disk drive suppliers if respondents' disk drives are effectively barred from the United States. FF 950-51, 955. Although additional costs may be incurred by some OEMs, other factors would mitigate the possible harm to the overall OEM industry. Those OEMS in the early stages of specifying the design of their next computer models can readily interchange floppy disk drives from different manufacturers during the design and evaluation phases for a new computer model. FF 952-53. Substitutes for the allegedly infringing floppy disk drives that are available to computer manufacturers include the various models of dual-sided disk drives offered by the domestic industry, as well as

140

all drives off'-rtd by the non-respondent importers. FF ˙954, Many disk drive customers have a second source of supply, and a large OEM customer typically keeps from one to three monihi supply of floppy disk drivei in inventory. FF 957-58. The impact on consumers of a:temporary exclusion order Would not be substantial.

For the above reasons, a giant of temporary relief in ihii inyestigation will not a(lversely effect the public interest.

C. Appropriateness of Temporary Relief.

The factors for determining whether complainant's motion for temporary relief should be granted, having been analyzed individually, must now be balanced against each other to determine whether the request for temporary relief is appropriate.

There is a greater probability of success with respect to the Sony respondents than as to the TEAC end Mitsubishi respondents on the issue of patent infringement. If it is established that respondents have engaged in unfair methods of competition, there is a greater probability of'succSs with respect to the TEAC and Mitsubishi respondents than as to the Sony respondents on the questions concerning the breadth of the domestic industry and injury to it. Ai previously discussed, serious quesiions obviously remain regarding the merits of this case which are fair grounds for

litigation on the request for permanent relief. However, the Commission need not find probable success on the merits in order to issue temporary relief. Washington Metropolitan Area v. Holiday Tours, 559 F.2d 841, 843-44 (D.C. Cir. 1977), cited in Copper Rod, 214 U.S.P.Q. at 894. That is, a complainant need not establish a 50 percent plus probability of success on the merits to secure temporary relief. To adhere to such a requirement would disqualify all difficult cases from the possibility of temporary relief. Such a requirement also leads to early and perhaps premature decisions on the merits of a case. The standard applied by this Commission is the same as applied by federal courts in similar situations: One seeking temporary relief to preserve the threatened status sta ante must show either probable success on the merits, and the possibility of irreparable injury, or serious questions as to whether a violation has occurred plus a showing that the balance of hardships tips sharply in the favor of complainant.

The factor which overshadows all others in this investigation is the overwhelming immediate and substantial harm to the domestic industry in the absence of the requested temporary relief. Much of the crippling injury has already occurred, and temporary relief may not effectively resuscitate parts of the domestic industry. The fact that temporary relief will not resuscitate certain parts of the domestic industry is not a certainty, however, and further immediate and substantial harm is anticipated. Temporary relief should be denied only if it is certain to be futile. If there is no such certainty, it should not be denied because it might not work. If it is

otherwise appropriate to issue temporary relief, it should be issued, and left to market forces to determine whether or not the temporary exclusion order will be effective.

The harm to respondents if temporary relief is granted is low. Similarly, a grant of temporary relief in this investigation will not adversely affect the public interest.

Consideration of the pertinent factors, shows that the balance decidedly tips in favor pf the complainant. There has not only been a showing of the possibility of irreparable harm, there has been a substantial, if not overwhelming, demonstration that irreparable harm has and will continue to-occur during the pendency of this investigation. There will be harm to respondents, but in view of the bonding provision, such harm is comparatively slight. Finally, there are virtually no public interest factors militating against issuance of temporary relief, while the public interest in favor of effective enforcement of S 337 of the Tariff Act of 1930, as amended, strongly favors the issuance of temporary relief.

For the above reasons, complainant's motion for temporary relief in the matter of Certain Double-Sided Floppy Disk Drives and Components Thereof is granted.

FINDINGS OF FACT

I. JURISDICTION

1. The United States International Trade Commission, pursuant to section 337 of the Tariff Act of 1930, as amended, has jurisdiction over the subject matter of this investigation, because the alleged unfair acts and unfair methods of competition involve importation and sale of articles alleged to infringe complainant's U.S. Letters Patent No. 4,151,573 (the '573 patent). Notice of Investigation, 50 Fed. Reg. 4,276 (Jan. 30, 1985).

II. THE PARTIES

A. Complainant and Interested Persons.

2. Tendon Corporation is a California Corporation having its principal place of business at 20320 Prairie Street, Chatsworth, California 91311. Founded in 1975, it is the world's largest manufacturer of random access disk drives for microcomputer systems and the world's largest producer in the market of floppy disk drives. These systems include word processors, personal computers, and small business computep. Complaint, 44 3, 4; SRX 172, Tandon's Response to Sony's Request for Admission, Nos. 86, 87 (Feb. 11, 1985).

3. Shugart Associates, a subsidiary of Xerox Corporation, is located at 475 Oakmead Parkway, Sunnyvale, California 94086. Shugart is a licensee of Tandon's•U.S. Letters Patent No. 4,151,573 (the '573 patent) as of July 1, 1980. Complaint, 4 59; CX 616..

4. Control Data Corporation (CDC) is headquartered at 8100-34th Avenue, South Minneapolis, Minnesota 55420. CDC was granted a license on September_30, 1984, to manufacture and sell disk drives under the '573 patent. Complaint, ir 64; CX 620; Ousley, Tr. 629.

5. Magnetic Peripherals, Inc. (MPI), is a partially-owned subsidiary of Control Data Corporation, and headquartered at 8100-34th Avenue, South Minneapolis, Minnesota 55420. MPI was granted a license on September 30, 1984, to manufacture and sell disk drives under the '573 patent. CDC is a 67 percent majority owner of MPI; part owners of MPI include Honeywell, Sperry, and Bull. Complaint, ¶c 59, 62; Ousley, Tr. 627-29; CX 620.

6. Texas Peripherals, Inc. (TP), located at 3131 W. Bolt Street, Fort Worth, Texas 76110, is a joint venture of Tendon and Tandy Electronics. Under the joint venture agreement, TP Ras a non-exclusive license under the '573 patent to manufacture and sell TP's products. Complaint, 4 63; CX 722, at 7.

7. Mitsubishi Electric Corporation (MELCO) is a Japanese company organized and existing under the laws of Japan. MELCO's principal place of business is located at 2-3 Marunouchi 2-chome, Chiyoda-ku, Tokyo 100. MELCO designs, manufactures, and sells double-sided floppy disk drives for importation into the United States. Complaint, 4 14(a); CX 401.

8. Mitsubishi Electronics America, Inc. (MELA),with offices at 911 Knox Street, Torrance, California 90502, is a domestic company and a subsidiary of MELCO. MLA imports, sells, and distributes within the United States double-sided floppy disk drives manufactured by MELCO. MELA and MELCO will be referred to collectively as Mitsubishi. Complaint, Q 14(b); CX 401, 404.

9. TEAC Corporation (TEAC Japan) is a Japanese company organized and existing under the laws of Japan. TEAC Japan's principal place of business is located at 3-7-3 Naka-cho, Husashino, Tokyo 180. TEAC Japan designs, manufactures, and sells double-sided floppy disk drives for importation into the United States. Complaint, 4 14(c); CX 1.

10. TEAC Corporation of America (TCA), with offices at 7733 Telegraph Road, Montebello, California 90640, is a domestic company and a subsidiary of TEAC Japan. TCA imports, sells, and distributes within the United States double-sided floppy disk drives. TEAC Japan and TCA will be collectively referred to as TEAC. Complaint, 4 14(d); CX 1.

11. Sony Corporation (Sony) is a Japanese company organized and existing under the laws of Japan. Sony's principal place of business is located at 6-7-35, KIta-shinagawa, Shinagawa-ku, Tokyo 141. Sony designs, manufactures, and sells double-sided floppy disk drives for importation into the United States. Complaint, 4 14(e); CX 203, 204.

12. Sony Corporation of America (SONAM), with offices at Sony Drive, Park Ridge, New Jersey 07656, Is a domestic company and a subsidiary of Sony. SONAM imports, sells, and distributes within the United States double-sided floppy disk drives. Sony and SONAM will be collectively *referred* to as Sony. Complaint, 4 14(f); Mergentime Dep., CX 252, Tr. 40; CX 203, 204.

III. UNFAIR METHODS OF COMPETITION

A. Background of the Invention.

13. In 1964, the state-of-the-art drive was reel-to-reel tape drive. Sollman, Tr. 10-11.

14. In 1964 or 1965, the industry pursued an information storage product called a magnetic card random access memory device. Sollman, Tr. 12. IBM also was working on a new storage device called a disk drive, using a rigid disk 30 inches in diameter. Sollman, Tr. 13-15.

15. About 1972 a floppy disk drive was being developed by 15 to 20 different companies in the United States. Sollman, Tr. 31; see id., 23.

16. U.S. Letters Patent No. 4,151,573 (the '573 patent) issued on April 24, 1979, from Application Serial No. 805,731 (the '731 application) *filed* June 13, 1977, and names Sirjang L. Tandon, Alfred C. Hackney, and Roy A. Applequist as the joint inventors. The patent is entitled, "Magnetic Recording Device for Double-Sided Media." CX 601; see CX 611.

17. Single-sided **floppy** disk drive systems were in use prior to the advent of double-sided **floppy** drives. The single-sided drives employ a single transducer for contacting the disk. On the opposite side from the transducer, and also in contact with the disk, was a felt pressure pad to press the disk against the transducer. CX 601, col. 1, lines 20-36; CX 643.

18. The double-sided **floppy** disk drive described in the '573 patent includes in part a dual read/write head or transducer assembly for transferring data to and from the floppy disk, a central hub and spindle for

gripping and rotating the disk, a front cover which may be pivoted open to permit insertion and removal of the disk, and a mechanism for positioning the transducer assembly to a selected radial track position. The floppy disk is enclosed within a protective cover jacket having access slots through which the transducers can come into contact with the opposed surfaces of the disk. CX 601, col. 3, lines 49-63.

19. With reference to the specification and drawings of the '573 patent which describe and show an exemplary form of the patent, there is included a read/write transducer assembly comprising generally a carriage, a lower or first transducer (also called the aide 0 transducer) for transferring data to and from one side of the disk, and an upper or second transducer (also called the side 1 transducer) which opposes the lower transducer and transfers data to and from the other side of the disk. CX 601.

20. The lower side 0 transducer is mounted on the carriage while the upper side 1 transducer is mounted on a support arm that is coupled to the carriage by a flexure spring which serves as a pivot for the support arm. CX 601.

21. A torsional spring loads the support arm towards the carriage thereby urging the upper side 1 transducer towards the disk and the opposed lower side 0 transducer. CX 601.

22. The upper head is mounted at the end of a short length gimbal spring that permits the upper transducer to pitch and roll in response to the tendencies of the disk to deflect. CX 601.

23. In November 1976, IBM introduced the world's first double-sided floppy disk drive. Sollman, Tr. 60-61.

24. The diskettes for the IBM double-sided disk drive were coated on both sides. The disk drive placed two heads, one on each side of the diskette, in contact or near-contact with the diskette. The heads were both cantilevered and the diskette would flow between them. Sollman, Tr. 61-62.

25. The industry reaction was that the next generation of disk drives was to be double-sided. Soliman, Tr. 62-63.

26. The IBM double-sided head assembly is described in the '573 patent under the "Background of the Invention." That description, in pertinent part, states:

> Recently, however, the floppy disc industry has started to use both sides of the floppy disc for data transfer operations, the purpose primarily being to increase capacity. Thus only a single relatively low speed accessing mechanism continues to be employed, and the transducers on opposite sides of the element are in a generally opposed relation, with only a slight offset in the head gaps to avoid flux interaction. Because it is thought necessary to account for perturbations in movement of the flexible disc from its principal plane, recording heads and mounts are utilized that are essentially derived from the flying head technology. Specifically, a pair of small identical slider heads are used, each mounted adjacent the end of a long resilient cantilevered head support, and mechanically urged together with a total force of approximately 8 grams. The concept is that as the flexible disc deviates from its principal plane, both of the heads tend to follow the actual position of the disc passing between them and permit contact recording without excessive wear or signal degradation.

CX 601, col. 1, lines 37-57.

27. At the time of the invention of the '573 patent, the IBM approach was considered by those in the industry to be the only practical approach to achieving double-sided floppy disk recording and reproduction. Comstock, Tr. 1510-11.

28. In the Tandon patent, PIN double-sided head assembly was described as having significant deficiencies:

> There are, however, significant problems and limitations arising from the use of this double, symmetrical and very compliant head mechanism. The resilient mounts are relatively complex and must be precisely manufactured, and therefore are costly to manufacture and maintain. Furthermore, they require redesign, by each floppy disc manufacturer, of the carriage, head support mechanisms and associated structure, because [sic] they have volumetric configurations incompatible with current structures. In addition, the head loading force and the mechanical configuration require that special provision be made to insure that the head does not constantly land at the same point and thereby cause undue *wear.* In addition, the long flexible columns used in the existing type of structure tend to bend in a slight S shape or shift differentially in response to perturbations in the disc surface position. This introduces both a degree of offset relative to the track center, reducing reproduced signal amplitude and tending to limit the positional accuracy which can be obtained, which in turn limits the track density which can be achieved. Furthermore, the two resiliently mounted heads do not settle quickly into operative relation, once landed on the disc, and this delay must be taken into account before data transfer operations can begin. Of great importance from the standpoint of the floppy disc systems manufacturer is the fact that he not only cannot use a portion of his existing inventory for heads and carriages, but must redesign a portion of his system for the *new* double-sided configuration.

CX 601, col. 1, line 62 to col. 2, line 24.

29. The IBM approach wes also the subject of the declarations of two engineers filed in support of the '573 patent. According to these declarations, the IBM product was, amcng other things, subject to positioning errors and "column buckling," and was cacaplex and difficult to manufacture. Huelners peel., CX 611 (Feb. 28, 1978); Suikh Decl., CX 611 (Feb. 28, 1978).

30. The difficulties encountered by IBM in the manufacture of the IBM double-sided transducer assembly are described in IBM U.S. Letters Patent No. 4,263,630. This patent indicates that special fabrication techniques had to be adopted by IBM to assure that the transducer suspensions were precisely symmetrical and that they would bear against the disk with uniform forces. CX 651.

31. IBM U.S. Letters Patent No. 4,202,020 relates to a control system for randomizing the loading and unloading of the IBM double-sided floppy disk drive transducer assembly to overcome the media wear problems caused by the IBM transducer assembly. CX 649.

32. The device embodied in the Tendon patent solved the problems encountered by the IBM double-sided disk drive by providing an asymmetrical transducer assembly in which one of the transducers is used as a fixed positional *reference* for the floppy disk. Comstock, Tr. 394; CX 601, col. 2, lines 44-52.

33. The essence of the '573 patent is that the lower or side 0 head is in a fixed position with respect to the nominal plan of the disk so that it provides a reference surface for the pliant disk. Comstock, Tr. 1494.

34. The invention described by the '573 patent is substantially simpler, less costly, easier to maintain, and more stable and reliable in operation than the IBM-type two-sided transducer structure and solved the "column buckling" problem. Smith, Tr. 2316; CX 611, Muelner Decl. (Feb. 28, 1978), 4 6; Smith Decl. (Feb. 28, 1978), 4 6.

35. The disk is very pliant and limp, and acts almost like a tape. The envelop gives the disk support. Comstock, Tr. 1583.

36. The following excerpt from Electronic News, July 10, 1979, states:

> Some Firms Drop IBM 2-sided Floppy Head Design
>
> Magnetic head problems that have severely impacted sales of double-sided floppy disc drives ... have forced several OEM vendors to turn to a head design different from IBM's, long-considered the defacto industry standard.
>
> CalComp, *Pertec* and Siemens are among the firms that have stopped using the IBM *head* design and have begun using the design developed jointly by Tendon Magnetics and CalComp. These firms claimed the IBM design, which uses two floating heads [to] read and record data is less efficient and more expensive to make.
>
> Industry observers have said the media year problem has been the main reason double-sided sales have not been anywhere near what experts had expected. Suppliers admitted being at least nine months behind schedule for double-sided.
>
> The Tendon design incorporates a fixed head for reading and recording on the bottom of the diskette and a floating head at the top of the diskette. Its supporters claim that even if the problems in the IBM have been solved the Tandon head is still the more attractive alternative.
>
> * * *
>
> Terry J. Hardie, Product Sales Manager at CDC, said the primary problems with the IBM design have been during the loading and unloading of the heads. lie said because of the *design the* heads continuously loaded and unloaded at the same spot on the diskette, causing quick media wear.
>
> Mr. Hardie *said* CDC has attempted to solve the problem by softening the force which is required to load and unload.

CX 640.

* * *

37. The following excerpt from an article appearing in Systems International, April 1980, and entitled "Mini-Floppy Disk Drives," states:

> The double-sided r/w head for floppy disc drives was first introduced by IBM and soon taken up by other companies. It was a dual flexure head by which is meant that both sides of the r/w head moved when it was loaded on the floppy disc . . . . The idea behind using a dual flexure head was its apparent ability to allow each head to follow closely the contours of the media on both sides of the floppy disc. Tests indicated that early designs did not meet the 'tap-tap' test, wherein the head is repeatedly loaded on the same spot on the rotating disc. The highly dual flexure head had the tendency not to land flat: sharp edges of the head would cut into the mylar of the disc. In addition, when the *head* made contact with the media it would rebound several times before settling. Tap-tap tests were showing media damage after a short period of operation. A more successful design was later introduced by Tandon Magnetics. This company designed a single flexure head . . . which after some final refinements worked well and eliminated the severe media wear of the dual flexure head. Many double sided disc vendors today utilize Tendon.

CX 633, at 44.

B. Independent Claims 1, 5, and 12 of the '573 Patent.

38. Claims 1, 5, and 12, which comprise the independent claims of the '573 patent, read as follows:

> 1. A device for maintaining a pair of magnetic transducers in operative relation with both sides of a non-rigid planar magnetic recording media comprising:
>
> a first transducer mounted relative to a first side of the media and having a fixed position in a direction normal to the plane of the media despite movement to different positions along the plane of the media, the first transducer being disposed in data traasfer position relative to the media;
>
> a support mechanism adjacent to the second side of the media in a region opposite the first transducer;
>
> a second transducer coupled by gimbal support teens to the support mechanism in opposition to the first transducer and movable toward and away from the plane of the media; and
>
> means coupled to said support mechanism for urging said second transducer toward said first transducer and said media to maintain both transducer in operative relation with the intervening media with the first transducer serving as a fixed positional reference despite tendencies of the media to deviate in position from its nominal plane and the second transducer matingly accommodating said tendencies by virtue of its gimbal support.

5. A device for maintaining a pair of magnetic transducers in operative relation with opposite sides of a non-rigid magnetic recording media comprising:

a first non-gimballed transducer mounted on a first side of the media and having a relatively fixed position relative to the plane of the media in which the first transducer is in operative relationship with the first side of the media;

a pivotable support arm having a pivot axis in fixed spatial relationship to the first transducer, and extending along the second side of the media to a region opposite the first transducer;

a a second transducer coupled by gimbal means to the support arm in opposition to the first transducer and being movable relative to the plane of the media and to the first transducer; and

means coupled to said support arm for urging said second transducer and the media toward said first transducer with a force such that close operative relationship is maintained between each transducer and the associated side of the intervening media, with tendencies of the media to deviate from its nominal plan being compensated by the second transducer.

12. In a magnetic recording system in which a carriage supporting two magnetic heads is shifted radially relative to a center-driven pliant magnetic disc to provide data transfer with selectable record tracks on either side of the selectable record tracks on either side of the disc, [the] improvement comprising:

a first transducer fixedly coupled to the carriage for bearing against a first side of the disc in an invariant position in a direction normal to the plane of the disc;

and means including a second gimbal mounted transducer movably coupled to the carriage for bearing against the second side of the disc in opposed relation to the first transducer, the second transducer being movable toward and away from the plane of the disc and the first transducer, said means including resilient means urging said second transducer toward said first transducer with sufficient force to maintain close operative relationship between both said transducers and the disc despite deviation of portions of the disc during movement thereof, with the second gimbal mounted transducer compensating tendencies of the pliant disc to deflect.

CX 601, cols. 6-8.

39. The '573 patent refers to a head assembly to be used in a floppy disk drive "system." Column 3 of the specification, starting on line 49, for simplicity, refers-to another patent for further details about the disk drive system such as the hub and the spindle. Comstock, Tr. 1503.

40. Claims 1 and 12 of the '573 patent relates to the provision of a fixed reference along a direction that is normal or perpendicular to the nominal plane of the media called the Z-axis. Comstock, Tr. 1505, 1514.

41. Claim 5 provides that the first or side 0 head shall be "non-gimballed." A gimbal is a spring which permits various angular deviations, that is, pitch and roll type motions as well as Z-axis or translational movements. Comstock, Tr. 1514-15.

42. Claim 12 relates to a magnetic recording "system" in which the improvement comprises a first transducer (side 0) that is fixedly coupled to the carriage and bears against the first side of the disk in an invariant position in a direction normal to the plane of the disk, and a second transducer (side 1) which is gimbal-mounted and moveably coupled to the carriage. Comstock, Tr. 1500-02.

43. Claim 7 of the '573 patent, which is dependent upon claim 5, defines the gimbal means coupling the second transducer to the support arm as providing the second transducer with two axes of freedom of movement. Comstock, Tr. 1948.

44. During the prosecution of the '573 patent application before the U.S. Patent and Trademark Office, the examiner rejected claims 1, 5, and 12 as originally presented., principally because of an IBM Technical Disclosure Bulletin (Reference R) (CX 609) which generally depicts the transducer assembly of the IBM double-sided disk drive. Comstock, Tr. 1510-11; CX 611; CX 609.

45. Column 1, lines 37 et seq., of the '573 patent, describes the type of design generally described in CX 609 in which both heads are floating relatively free. Comstock, Tr. 1513.

46. The IBM double-sided floppy disk drive and its transducer assembly, as represented by the description thereof in the application that issued as the '573 patent and in the cited IBM Technical Disclosure Bulletin is the most relevant prior art, and that art was before the examiner. Comstock, Tr. 1507-11, 1513, 1526; CX 611.

47. Reference R (CX 609) shows an approach to achieving double-sided operation in which both of the recording heads were permitted to float quite freely and to follow the undulations of the disk which contrasts with the approach exemplified by the '573 patent where one of the heads is fixed and serves as a positional reference for the disk. Comstock, Tr. 1512.

48. There is a dramatic difference in the basic philosophy of the design reflected in Reference R and the subject matter of the Tendon patent. Comstock, Tr. 1512.

49. The IBM double-aided floppy disk drive is also the subject of: (1) IBM Patent No. 4,089,029 issued to Castrodale et al.; (2) an article entitled "The IBM Diskette and Diskette Drive," by James T. Engh, published September 1981 in the IBM Journal of Research and Development; and (3) a manual entitled "IBM 5114 Diskette Maintenance Information Manual." CX 625; CX 646; CX 664.

50. Upon the filing of amendments to claims 1, 5, and 12, the '573 patent application was allowed by the examiner and the patent was issued. CX 611.

C. Development of Double-Sided Floppy Disk Drives by IBM.

51. In 1971, IBM was developing a single-sided floppy disk drive for use with 8-inch diameter single-sided flexible disks. This project was known as the 33 FD. IBM announced the product which incorporated the 33 FD in the fall of 1972, and the product was first delivered in spring 1973. The drive of the 33 FD was a single read/write head. Engh, Tr. 904-05.

52. In the 33 FD disk drive, the head carriage assembly was mounted on a lead screw. The lead screw was driven by a motor so that as the screw rotated the head could move across the disk within a certain limit. The pressure arm opposite the head was operated by a solenoid mechanism. When the disk was dropped into the unit, the pressure arm would go forward and exert slight pressure against the disk so that the read/write head would be in intimate contact with the disk. The head was fixed in relation to the nominal plane in which the disk would rotate. Engh, Tr. 913-15; SRPX 17, 20.

53. SRPX 20 is a head carriage assembly used in the IBM 33 FD flexible disk drive. SRPX 21 is a head button of the kind contained in SRPX 20. The sensitive element in the head button is the narrow black stripe down the center of the head button that is surrounded by the white material. Engh, Tr. 907-08.

54. Opposite the head button on SRPX 20 is a small red pressure pad. Engh, Tr. 909.

55. The head button on the 33 FD is in intimate contact with the disk, and when electric signals are sent to the head button through an assembly of wires, reading and writing take place on the disk. Engh, Tr. 913.

56. In the 33 FD, the read/write head was fixed in relation to the nominal plane of the disk and would not have any gimballing, roll, pitch or Z-axis movement. Engh, Tr. 914-15.

57. As a result of the• large response to the 33 FD, IBM customers suggested that IBM improve the performance and capacity of the disk drive and the diskette. Accordingly, IBM began a project to develop a successor to the 33 FD, which was known as the 43 FD. Preliminary planning and discussions for this project began in 1972, and in the latter half of 1973 hardware analysis and studies were begun on the 43 FD project. Engh, Tr. 915-16.

58. During the development process for the 43 FD, IBM considered different types of head configurations. The first type of head design (hereafter "type one") consisted of two fixed heads. In this

embodiment, both heads were rigidly affixed and separated by a fixed space so that a diskette could be dropped between the heads in the fixed space. The heads were mounted on an assembly that pivoted so that one head could be brought into the plane of the disk, into contact with the disk, or rotated out and the other head brought into contact with the plane of the disk. Engh, Tr. 916-18.

59. Tests were conducted at IBM on a prototype of the head assembly of the type one disk drive. Before proceeding to production on this design, it would have to satisfactorily pass the stress test. The stress test utilized "non-nominal" disks, which is a disk that has been bent or crimped, or whose envelope is flexed. The stress test was used as a go/no-go test. Engh, Tr. 932-34.

60. The stress tests on the type one head assembly were unacceptable because satisfactory head-to-disk compliance could not be obtained. Any irregularities in the diskette caused excessive bounce and unsatisfactory wear on the medium. As a result of this unsatisfactory outcome, the decision was made not to pursue this particular *head* design. Nevertheless, IBM did obtain a patent on the type one design. Engh, TF. 932, 934-36; CX 603; CX 664, at 706.

61. A second configuration considered by IBM for its 43 FD disk drive consisted of a modification of the existing 33 FD drive (hereafter "type two"). In this design, the pressure pad arm of the 33 FD drive was replaced with a second head which was mounted in a position where the pressure pad was mounted so that the head would come into contact with

the other side of the disk. Thus, one head was fixed and the other head was movable into the plane of the disk. The construction of the movable *head* allowed it to roll and pitch. The model of the type two head configuration was built in late 1973 or early 1974. Engh, Tr. 918, 926-27.

62. A model of the type two head assembly was made for purposes of testing in about November-December 1973. This head configuration was also subjected' to stress testing with non-nominal *disks* to determine whether the concept showed enough promise to proceed with further testing of the entire drive mechanism. The results were not satisfactory, and further work on this design ceased in January 1974. The tests were conducted over a period of about four weeks. It was determined that the type two approach suffered the same head compliance problems as were encountered with the type one design. Engh, Tr. 939-44; Castrodale, Tr. 971, 974; CX 739.

63. In the IBM report authored by Mr. Engh, entitled The IBM Diskette and Diskette Drive," published in 1981, the following description of the type two design was provided:

> The next approach used one head rigidly mounted and the second head on a flexible suspension. The second head closed on the disk, and the suspension system provided a pressure on the disk and a resilience to absorb disk irregularities. Again, a stable compliance was not achieved. The principal problem was the unpredictability of disk dynamic movements over a *wide* range of environments with a variety of diskettes.

CX 664, at 706.

64. The work done on the type two approach *was not* disclosed outside of IBM, and within IBM only those with a *need* to know were aware of this approach. There is no indication that any test data *was* accumulated or maintained about the type two design, and no technical disclosure bulletin was ever issued on this design. In addition, IBM never commercially marketed a product which embodied the type two design. Engh, Tr. 939-40, 942-45, 948; Castrodale, Tr. 974-77.

65. The type two head assembly model was also tested with normal disks, that is, disks manufactured to meet IBM specifications and tolerances. The test results with the normal disks on the type two design were acceptable. Castrodale, Tr. 956.

66. IBM did not file a totent application on the type two design configuration. Castrodale, Tr. 976.

67. In about 1975 or 1976, after the 43 FD disk drive went into production, IBM *needed to* create stress disks. It was necessary to write these disks with enhanced precision. To accomplish this, IBM engineers immobilized one of the heads of the type three disk drive (see FF 69-71, infra) so as to minimize the off track contribution allowed by gimballing. This in-house disk writer, thus, utilized the type two head design concept. Castrodale, Tr. 978-80.

68. The test disk writer was used exclusively in-house at IBM, and none of the test disks were commercially sold or used in public. Castrodale, Tr. 978, 981-82.

69. At about the same time that IBM engineers were working on the type one and type two head configurations, they were also developing a prototype and doing experimental work on the type three design. As a result of the early successes shown with this third alternative, it was *decided* to direct the most effort to developing this design. The type three design was ultimately used in the 43 FD disk drive which was commercially introduced in 1976. Engh, Tr. 929-30, 944.

70. Development work on the type three design began in about January 1974. Although IBM's existing Winchester technology was used as a primary reference point for the type three head configuration, this project required a significant amount of further development over the next two years before it reached the point of commercialization. The type three design was embodied in IBM's 43 FD and was first commercially available in January 1976. Engh, Tr. 946-47.

71. A patent was obtained on the type three disk drive, U.S. Letters Patent No. 4,089,029 to Castrodale, entitled "Data Storage Apparatus Using a Flexible Magnetic Disk." The abstract of the patent describes the type three, configuration as follows:

> A data storage apparatus having a thin flexible disk with magnetic recording surfaces on both faces and a carriage embracing the disk and carrying a pair of transducers in contact with opposite faces of the disk. Each of the transducers is mounted on a relatively weak gimbal spring. Relative rigid load arms bear on dimples located at the centers of the transducers to form universal joint connections with the transducers. The gimbal springs and universal joint connections allow the transducers to pitch and roll with wobbling movements of the flexible disk without movement of the load arms. The load arms are mounted on relatively stiff gimbal spring portions for applying a predetermined force to the transducers holding them in engagement with the disk while allowing yielding movement of the transducers in directions normal to the disk engaging faces of the transducers.

Castrodale, Tr. 980; CX 646.

72. IBM's first double-sided floppy disk drive, 8-inch, model 43 FD, was introduced in March or April of 1976 and was first shipped in June 1976; it used a "type 3" modification, viz., each head mounted in a flexible suspension. Engh, Tr. 919, 930, 946.

D. Shugart.

73. Shugart sold a single-sided 8-inch floppy disk drive with a fixed read/write head cemented into the carriage from September 1973 until after the announcement of the first double-sided floppy disk drive by IBM in 1976. Sollman, Tr. 37-38, 202-03.

74. In July-August 1976, Shugart endeavored to take a leadership position in the floppy disk drive industry and decided to attempt doubling the capacity of its products. Three different approaches were considered: (1) write more bits around each track; (2) write narrower tracks to put more tracks around the disk; and (3) utilize both sides of the disk (double-sided recording). Sollman, Tr. 58-59. Shugart decided to pursue the double-track density approach. Sollman, Tr. 60.

75. In November 1976, IBM introduced the first double-sided floppy disk drive. The disk drive was part of a Model 360-1 bank terminal controller. Sollman, Tr. 60. But see FP 72.

76. The diskettes for the IBM double-sided disk drive was coated on both sides. The diSk drive placed two heads, one of each side of the diskette, in contact or near-contact with the diskettes. The heads were .cantilevered and the diskettes would flow between them. Sollman, Tr. 61-62. The industry reaction was that IBM had just informed the industry that the next generation of disk drives was to be double-sided. Sollman, Tr. 63.

77. Shugart, like others *in* the industry, decided to design its own double-sided disk drive. Shugart overnight gave up the double-track density approach and informed its major OEM customers of its decision. Sollman, Tr. 64.

78. A program was initiated at Shugart to design a double-sided floppy disk drive. Sollman, Tr. 63-64.

79. The double-sided design program received highest priority with all Shugart resources devoted to the project. Fifteen to twenty engineers were originally assigned to the project, and this number increased to 80 engineers at one point. Sollman, Tr. 65-66.

80. Considerable Shugart research facilities at Sunnyvale, California, were also devoted to the design effort, as well as those of Xerox' Palo Alto facility, subsequent to December 16, 1977, when Xerox Corporation purchased Shugart. Sollman, Tr. 66-67.

81. Shugart officially introduced a double-sided disk drive product, the SA-850, in April 1977 and started shipments in June 1977. In the fall of 1977, customers began to return the product because the magnetic head structures used were beginning to strip the oxides off the diskettes, which destroyed the customer's information. Sollman, Tr. 67, 68.

82. Shugart engaged in a highly intensive crash effort to solve the design problems associated with its double-sided product. Approximately 10 different designs were tried over a number of years. Sollman, Tr. 67-68. Approximately $4.0 to $5.0 million was expended by Shugart on the design. Sollman, Tr. 68.

83. Shugart's competitors were experiencing similar results in their pursuit of both IBM-type and non-IBM-type head designs -- media wear problems and unsatisfactory product. Sollman, Tr. 69.

84. One competitor, CalComp, advertised that it had a successful double-sided floppy disk drive product. Sollman, Tr. 69.

85. Shugart purchased three CalComp disk drives for testing by its engineers. The engineers discovered that the CalComp disk drives employed a head assembly manufactured by Tandon Magnetics of Chatsworth, California, and that the drives worked well with a *wide* range of media. Sollman, Tr. 70-71.

86. The Shugart engineering department considered the CalComp drive to be a very interesting product, but because they believed they were close to a break-through on their own design,, the engineering department preferred to put all their efforts in this design. Sollman, Tr. 71-72.

87. After further Shugart design efforts failed, Shugart's President prevailed on Shugart management to begin patent licensing discussions with Tandon Corporation. Sollman, Tr. 73. The licensing negotiations were successful, and a license agreement was signed between Tandon and Shugart which embodied the Tandon patented technology. Sollman, Tr. 74.

88. A license agreement for the technology incorporated in the '573 patent was signed by Tandon and Shugart on July 1, 1980. Sollman,' Tr. 74; CX 616.

89. Shugart placed the Tendon patented technology in its disk drive products and the SA-850 became a successful and highly profitable product. The technology was also added to the 5-1/4 inch disk drive, the SA-450. Sollman, Tr. 74-75.

90. Shugart does not know why it could not solve the double-sided floppy disk drive problem. "I think today that is probably one of the largest corporate enigmas that remains. We threw everything at that design. In fact, we *even* had designs identical to Tandon's that were there earlier in our attempts, and we couldn't make those work either." Sollman, Tr. 75.

E. CalComp.

91. Prior to 1976, California Computer Products, Inc. (CalComp) was manufacturing single-sided floppy disk drives. These were 8-inch drives that were similar to the IBM 23 FD and 33 FD single-sided drives. CalComp's single-sided disk drive had a single read/write head that was fixed in relation to the nominal plane of the disk, and did not have any provision for pitch or roll or Z-axis movement. On the other side of the disk there was a head pressure pad arm that was mounted so as to move toward and away from the head on side 0. Smith, Tr. 2282-84; Meyer, Tr. 2061-63; SRPX 20.

92. When IBM announced its 8-inch double-sided floppy disk drive in 1976, CalComp *decided* to develop its own double-sided floppy disk drive to remain competitive in the market. CalComp's original plan was to enter the market with a reverse engineered IBM-type double-sided drive. Smith, Tr. 2284-85; Meyer, Tr. 2066-68.

93. In 1976, CalComp did not have the technical capability to design a double-sided floppy disk drive in-house, and thus entered into an agreement with Tandon Magnetics to design the heads. Meyer, Tr. 2068; Smith, Tr. 2285, 2313.

94. A group was formed at CalComp in September-October 1976 to develop this double-sided floppy disk drive which was known as the Small Disk Operation. Mr. Henry Meyer was the director of this program. Mr. Malcolm Smith was responsible for the mechanical engineering aspects of the program, and served as a liaison with Tendon Magnetics. In his capacity as liaison with Tandon, Mr. Smith made frequent visits to Tandon's facilities, ranging from about once per week in the early phases of the program to daily at later stages of development. Mr. Smith's function was, in part, to evaluate the test data developed by Tandon. Meyer, Tr. 2068-69; Smith, Tr. 2286, 2288-89.

95. When the Tandon/CalComp double-sided disk drive development program began in about October 1976, Tandon was proceeding with a reverse-engineered IBM approach. At this point, it was felt by both Tandon and CalComp that market acceptance for their double-sided drives depended on following the IBM design. Smith, Tr. 2285, 2291-92, 2314-15; Meyer, Tr. 2076-78; SRX 29.

96. After CalComp received preliminary sketches and a sample carriage of the IBM-type double-sided drive from Tandon, it was determined that this drive would not fit the existing carriage of CalComp's single-sided drive. CalComp preferred to adapt the new double-sided drive to its single-sided carriage so as to avoid having to change the configuration of the chassis, and so as to be able to use the existing head load solenoid, stepper motor and lead screw arrangement. CalComp felt it was in its best interest to adapt their single-sided drive largely because its largest customer, DEC, had a license with CalComp that it intended to exercise. It would have been necessary for CalComp to engage in a long approval cycle before being allowed to change the design. Smith, Tr. 2286-87; Meyer, Tr. 2079-80.

167

97. To adapt the single-sided drive to a double-sided head configuration, CalComp's engineers proposed investigation of a design wherein it would not be necessary to alter the bottom head. This involved redesigning the load arm of the single-sided drive which had the pressure pad. The movable upper arm would be replaced by a different arm which would have a gimballed flexure and a head. Smith, Tr. 2287; Meyer, Tr. 2081.

98. When CalComp evaluated the pros and cons of the IBM approach and modification of their existing drive, they felt that it would be best to proceed with both designs in parallel. In about October 1976, CalComp requested Tendon to work on both design concepts concurrently. Meyer, Tr. 2081-82.

99. Initially, Tandon's work concentrated on the reverse-engineered IBM approach, and modification of the CalComp single-sided drive was delayed. To speed the development of the modified CalComp design, in late November 1976, Hr. Smith made a very crude model of the modified design at CalComp and discussed the design with Mr. Tendon. Mr. Smith's preliminary testing of this model showed some ability to read and write, but it destroyed the medium. Smith, Tr. 2292-94.

100. In February 1977, CalComp received from Tandon a model of the single-sided CalComp drive modified to be double-sided. Tests conducted on this model at CalComp gave very good results. At a meeting of CalComp and Tendon personnel held in March 1977, CalComp expressed its strong preference to proceed with the modified CalComp single-sided design. Although Mr. Tandon .expressed his view that this was not a wise decision, Tandon did proceed to modify CalComp's single-sided drive to make it double-sided. Smith, Tr. 2296-98.

101. The double-sided floppy disk drive that CalComp ultimately marketed was a modification of its single-sided drive. This model performed better than the IBM double-sided drive because it did not destroy the medium as rapidly as the IBM design and was not subject to column buckling, as was the IBM design. In addition, the CalComp double-sided drive was less expensive than IBM's drive. Smith, Tr'. 2298-2300; SRPX 10.

***102. In* order to manufacture the CalComp double-sided drive, it was necessary to prepare design drawings. The drawings for the button head, the upper head, the gimbal flexure, and the critical locating dimensions for the upper and lower heads were prepared by Tandon. The drawings for the carriage and the upper arm were provided by CalComp. The method of attaching the head assembly to the carriage was initially proposed by CalComp, but was later modified by Tandon. Smith, Tr. 2300-02.**

103. Under the terms of Tendon's proposal to CalComp for development of the double-sided floppy disk drive, Tandon stated that the head and flexure design were proprietary to Tandon. The design and development of the carriage and associated hardware was stated to be proprietary to Calcomp. SRX 29.

104. In the Attichment to the CalComp "letter of authorization" from Meyer to Tandon, dated November 15, 1976, the three phases of the double-sided floppy disk drive development project were defined. In addition, CalComp agreed to treat as proprietary to Tandon the tool design for Tandon's head fabrication techniques. At the end of Phase II of the project, CalComp would own the carriage and drive design, including the tooling, and specifically the carriage arm and the carriage-arm-to-carriage interface. Tandon would own the slider and the suspension flexure. SRX 43.

105. Figure 1 of the '573 patent depicts the embodiment as it was exhibited in the CalComp carriage. The CalComp carriage is different from others in use in the market in that the boss, which was used to mount the guide shaft into the drive, is fairly massive in the head area, and the boss at the rear of the carriage is relatively narrow. Smith, Tr. 2305-07; CX 601.

106. In about September 1977, Mr. Meyer learned that Tendon had filed a patent application on the CalComp double-sided floppy disk drive design. Initially, Mr. Meyer was annoyed to hear that the application had been filed, and apparently felt that Mr. Smith should be named as one of the inventors, and that CalComp's name should be associated with the patent. Mr. Meyer's concern about the propriety of Tandon's patent application was apparently allayed by Mr. Tandon's representation that the patent would cover only the head and the suspension flexure rather than the entire assembly. Meyer, Tr. 2225-28; SRX 79.

107. In about March 1977, CalComp considered whether it was interested in obtaining a patent on the new double-sided drive configuration. The design was submitted to CalComp's patent committee. It was the opinion of the patent committee that the design probably was not patentable. Meyer, Tr. 2139-41.

108. In February 1978, Mr. Smith filed a declaration in the PTO in support of Tandon's patent application. Smith, Tr. 2326-27; CX 611, Smith Decl. (Mar. 6, 1978).,

170

F. The IBM Parken Patent No. 3,514,770.

109. The IBM Patent No. 3,514,770 (the '770 patent or Parken patent) related to a double-sided magnetic card reader. CX 642.

110. The most significant difference between the Parken device and the subject matter of the Tandon patent is that the former is not a disk drive but a card reading system, and the media that it works with is a "stiffly flexible" card as opposed to a "non-rigid" or "pliant" disk. Comstock, Tr. 1955; CX 642.

111. Mr. Bogucki recollects that the duty of disclosure, as of about 1977, was to call to the attention of the United States Patent and Trademark *Office any art that* the attorney thought would be deemed to affect the claims. Bogucki, Tr. 2966.

112. The duty of disclosure under 37 C.F.R. § 1.56 has *remained* constant from 1977 to 1984. Bogucki, Tr. 2970-71.

113. Mr. Bogucki was aware 1978 that the British Patent Office considered six references, including the Parken patent (TRX 98). Bogucki, Tr. 2989-91.

114. Mr. Bogucki agreed that prior art cited by a foreign patent office against a related foreign application should be examined by the attorney handling the U.S. application to see whether that prior *art* is material. Bogucki, Tr. 2972.

115. Mr. Bogucki agreed that the examination of art cited i n connection with foreign applications should be done carefully by the attorney handling the U.S. application; however, careful examination does not necessarily mean lengthy examination. Bogucki, Tr. 2972.

116. Mr. Bogucki agreed that a U.S. attorney shOuld become familiar with the prior art cited in connection with corresponding foreign applications. Bogucki, Tr. 2972.

117. In using the term "non-rigid" in the claims of the '573 patent application, Mr. Bogucki had in mind the physical characteristics of a floppy disk. Bogucki, Tr. 2974, 2978.

118. "pion-rigid" within the meaning of the Tandon patent, pertains to the flexibility of a floppy disk. Comstock, Tr. 1894; CX 642.

119. The heads in the Parken patent are mounted to rotate about their roll axes and their mountings, which include ball bearings, and are very free. This allows alignment of the heads with a canted magnetic card. The card forces the heads apart and determines the roll position of the heads. Comstock, Tr. 1957; CX 642.

120. The heads in Parken are relatively massive, necessitating a choice of components, including the loading spring, to minimize bounce resulting from the inertial forces of the heads passing over the card or "chip." Such media would not be suitable for reading a given piece of information a million or more times, as required in a disk drive. The heads in Parken might provide only 10,000 readings of a given record before destruction of the media. Comstock, Tr. 1959-60; CX 642.

121. Parken is designed for very low recording densities, on the order of 800 bits per inch, whereas disk drives of the kind involved in the Tandon patent have recording densities approaching 6,000 bits per inch. This difference requires a different treatment of the heads and the head-to-recording medium contact or interface or compliance. Comstock, Tr. 1959; CX 642.

172

122. The recording tracks on the magnetic card used with the Parken card reader are linear rather than concentric circles on a floppy disk. In the Tendon patent, the heads are moved "to" the desired reading position and then the disk rotates relative to the heads to accomplish reading; whereas in Parken patent the card is moved to the reading position and then the head is moved across the card to accomplish the reading or writing. In.Parken, the heads move across the card by means of a flywheel and cam drive. Comstock, Tr. 1956-57; CX 642.

123. Mr. Stanley Brown, TEAC's technical expert, testified that the mag card that TEAC used as a trial exhibit (TRPX 1) is not known to be the one that was used with the device represented in the Parken patent. Brown, Tr. 2534.

124. The Parken card reader patents states as follows: "If somewhat lower bit density *is* acceptable, adjustment freedom about axes 31 and 32 can be substituted for the preferred free rotation." TRX 9B, at 2, lines 13-16 (emphasis added).

125. Parken does not state that only one of the heads can be provided with "adjustment freedom." TRX 9B, at 10.

126. The term "fixed" is not used in the Parken patents. TRX 98, at 10.

127. The Parken card reader patents are less relevant to the claimed subject matter of the '573 patent than the IBM double-sided floppy disk drive, as exemplified by the IBM Technical Disclosure Bulletin, Vol. 18, No. 7, and the description in the '573 patent (col. 1, line 37 to col. 2, line 24), both of which were before the Examiner. Comstock, Tr. 1507-11, 1513, 1526, 1955; CX 601; CX 611; TRX 9B; TRX 10.

173

128. The Parken '770 patent, which was filed in 1967, is owned by IBM. CX 642.

129. There is no indication in the 1981 Engh article, wtach details the history of the IBM double-sided floppy disk drive development at IBM, nor in the testimony of Engh or Castrodale, the designers of the IBM double-sided drive, that IBM looked to the Parken invention, or to any other developments in the card reader art for guidance in the designing of the double-sided disk. CX 664; Engh, Tr. 900-50; Castrodale, Tr. 950-82.

G. Coverage of the Tendon Double-Sided Floppy Disk Drives by the '573 Patent.

130. The Tandon Model Nos. TM 50, TM 55, TM 65, TM 100, TM 101, TM 306, and TM 848 are covered by at least claims 1, 5, and 12 of the '573 patent. Comstock, Tr. 1534-36.

131. The CDC Model Nos. 9409, 9428, and 9429 are covered by at least claims 1, 5, and 12 of the '573 patent. Comstock, Tr. 1536; CPX 21-25.

132. The Tendon Model Nos. TM 65 and TM 100 sold by TP are covered by at least claims 1, 5, and 12 of the '573 patent. Comstock, Tr. 1534-36..

H. The Accused Products.

1. Sony.

133. The accused Sony Model 0A-D32W 3-1/2 inch double-sided floppy disk drive includes a transducer assembly in which the lower transducer is bonded to a metal strap which in turn is bonded to the carriage. CX 693, 'photos 23, 25; CPX 12A; CPX 12B; CPX 15.

134. The upper transducer in the Sony disk drive is mounted on a rectangular gimbal element carried by a support arm pivotally mounted on the carriage. CX 693, photos 23, 24; CPX 12A; CPX 12B; CPX 15.

2. Mitsubishi.

135. The various Mitsubishi (MELCO) double-sided disk drive transducer assemblies are described in Exhibit MRX 27, the written witness statement of Toshikazu Hayashi, and are shown in a series of sketches attached to that statement. Hayashi, MRX 27.

136. There are several models of double-sided flexible disk drives manufactured by MELCO. The double-sided disk drives manufactured by MELCO and exported to the United States include four 8-inch disk drive models (14 2893, M 2894-4/5, M 2894-6, and M 2896-6), three 5-1/4 inch series of drives designated Mark I, Mark II, and M3 series and comprising 13 models (Mark I Models: M 4851, M 4852, M 4853, M 4854, and M 4855; Mark II Models: M 4851-1 or -3, M 4853-1 or -3, M 4854-1 or -3, and M 4855-1; and M3 Models: M 4851A-3), and one 3-1/2 inch disk drive, Model MF 353. Hayashi, MRX 27, 4 5.

137. The Mitsubishi double-sided floppy disk drives include the Mark I Series, the Mark II Series, the M3 Series, all comprising 5-1/4 inch drives, the MF 353 3-1/2 inch drive, and four 8-inch double-sided disk drive models. Hayashi, MRX 27.

138. All 12 models of the Mark I and Mark II Series (which includes the Model M 4851 which was tested by Tendon) have identical gimbals on which the upper and lower transducers are mounted. Comstock, Tr. 1572, 1574; CX 615, 4 6; Hayashi, MRX 27, Or 23-25, Figs. 5, 6, 8-10.

175

139. The flexure on which the upper head is mounted in the Mitsubishi Mark I drive is a gimbal spring. The upper and lower flexure elements are identical. Comstock, Tr. 1781, 1782.

140. The Mitsubishi Mark I and Mark II Series, as exemplified by the M 4851 tested by Tandon, includes a lower transducer mounted on a circular slotted sheet metal support element backed up by a load finger formed integrally with the plastic carriage. A rubber pad is disposed between the load finger and the lower surface of the sheet metal support. CX 693, photos 19, 20, 21; Hayashi MRX 27, if 15-21, 23-25, Fig. 8; Comstock, Tr. 1564-65, 1568-69, 1592-93, 1782, 1790.

141. The upper head of the Mitsubishi Mark I and Mark II Series, is mounted on a gimbal spring which in turn is carried by a support arm pivotally coupled to the carriage. CX 693, photos 19, 22; Hayashi, MRX 27, 4 17; Comstock, Tr. 1781.

142. The disk drive Models M 4852, M 4853,-M 4854 and M 4855 of the Mark I series differ in some respects from the M 4851 model in their overall disk drive structures and circuit board configurations, and there are some differences in slider and core dimensions; however, the basic construction of the carriage and magnetic head assemblies of these other models are the same as the above-described Model M 4851. Hayashi, MRX 27, 21.

143. The Mitsubishi M3 Series has a transducer assembly identical to that of the Mark I/Mark II Series, except that the pad between the load fingei and the lower transducer support has been omitted, leaving a gap of 20-80 micrometers between those two elements, and the lower head support is a "single ring" construction to provide a greater spring constant about the roll axis. Hayashi, MRX 27, 4 27, Fig. 15.

144. In the Mitsubishi Model MF 353, the lower transducer is mounted on a sheet metal spring element having a thickness 60 percent greater than the spring element mounting the upper head (0.16 mm vs. 0.10 mm). No load fingers are employed in this design. Hayashi, MRX 27 31, 32, Figs. 16-19.

145. In the Mitsubishi Models M 2893 and M 2894-4/5 8-inch drives, the lower transducer is mounted on two, parallel flexure elements with a load point in between. The upper transducer is mounted on a single flexure element; no load point is used behind this element. Hayashi, HRX 27, Figs. ld-lf, 2c, 2d.

I. Infringement

1. Tandon Tests: General.

146. Certain tests were conducted at Tendon on two samples of each of the following production double-sided floppy disk drive models manufactured by Respondents:

(a) Mitsubishi Model M 4851 5-1/4 inch floppy disk drive (CPX 11A, CPX 110;

(b) TEAC Model FD-543-02-U 5-1/4 inch floppy disk drive (CPX 10A, CPX 100; and

(c) Sony Model 0A-D32W-10 3-1/2 inch floppy disk drive (CPX 12A, CPX 12B).

Nathanson, Tr. 1316-18; Nathanson, CX 716, 44 26, 27.

147. The same tests were conducted at Tandon on two samples of each of the following production double-sided floppy disk drive models manufactured by Tandon:

(a) Tandon Model TM 100-2A 5-1/4 inch floppy disk drive (CPX 23); and

(b) Tandon Model TM 848E 8-inch floppy disk drive (CPX 22).

Nathanson, Tr. 1318; Nathanson, Cx 716, 11 17, 26.

148. The same tests were conducted at Tandon on two samples of the following prior art production double-sided floppy disk drive model manufactured by IBM:

(a) IBM Model 53 FD 8-inch floppy disk drive.

Nathanson, Tr. 1312; CPX 16; CPX 17; Nathanson, CX 716, 11 17, 26.

149. The Tandon tests were conducted under the supervision of Mr. Marshall Nathanson, Tandon's Senior Staff Engineer. Nathanson, Tr. 1309, 1476; Nathanson, CX 716, 11 1-3.

150. Mr. Nathanson formulated the tests, decided what data would be required, and established test procedure protocols to assure the reliability and accuracy of the tests, the data, and the results. Nathanson, Tr. 1413, 1476.

151. A preliminary survey was made to determine the test and calibration procedures, instrumentation ranges, how to mount the test probes,• and so forth. Nathanson, Tr. 1473-74; Nathanson, CX 716, 1 4.

152. All of the data obtained from the preliminary survey were recorded in Exhibit TRX 13, a first data notebook. Nathanson, Tr. 1473-74; TRX 13; Nathanson, CX 716, 1 4.

153. The data compiled from the Tandon tests were recorded in three data notebooks identified as Exhibits CX 622, CX 623, and CX 624, and these formed the basis for Exhibit CX 716, Mr. Nathanson's witness statement. Nathanson, CX 716, 11 24, 25.

154. Generally, the Tandon tests directed by Hr. Nathanson purported to measure the motions or displacements of the transducers and a sample floppy disk, as well as the stiffnesses or spring rates of those components. Nathanson, CX 716, 44 13, 15, 17, 19, 20, 22.

155. The motion and spring rate measurements were used in formulae devised by Mr. Nathanson. Nathanson, Tr. 1413, 1470; CX 716, 1111 14, 16, 18, 21, 22, 43, 50, 56, 63.

156. The Tendon tests, and their relationship to the claims of the '573 patent, consisted of the following:

(a) Disk and transducer motions and spring rates along the Z-axis, that is, in a direction normal or perpendicular to the plane of the disk (claims 1 and 12). CX 716, VI 13, 15, 38-50;

(b) Disk and transducer motions and spring rates about the pitch axis (claim 5). CX 716, 1f4 17, 52, 54-63; and

(c) Transducer motion about the roll axis (because of instrumentation limitations, disk motion about the roll axis could not be measured) and disk and transducer spring rates about the roll axis (claim 5). CX 716, Sic 19, 22, 53-73.

157. The Tendon tests purported to determine the extent to which the lower or side 0 head *serves* as a positional reference for the disk along the Z-axis and about the pitch and roll axes. Comstock, Tr. 1523-24.

158. Various measurements were used in an attempt to calculate the *degree* of insensitivity of the transducers to being displiced along the Z-axis and about the pitch and roll axes due to the forces imposed on the transdUcers by the rotating disk which because of *its* waviness, has a tendency to 'undulate or deviate from its nominal plane. Nathanson, CX 716, cir 14, 16, 18, 21 22.

159. An attempt was made to measure the degree to which heads move due to the influence of disks, and the degree to which heads restrain disk movement. To do this the disk motion that exists in the absence of heads was measured and compared to movement in the presence of heads. Nathanson, Tr. 1470.

2. Tendon Tests: Methodology.

160. For measuring the transducer and disk motions and spring rates, the Tandon tests utilized a variety of sensitive instrumentation and measuring techniques, including capacitance and photonic probes, load cells, and laser beam technology. Nathanson, CX 716.

161. There are two advantages for having made two types of measurements, that is, motion measurements (with the disk drive in operation) and spring rate measurements. In the operation of the disk drive, all three elements -- the two heads and the disk sandwiched in between -- tend to move together so that it is difficult to sort out the influence of the various elements. In contrast, the spring rate measurements can be *made* on each of the elements independently so that a much better picture can be developed as to which element is contributing to the overall result that is observed during the normal operation of the disk drive. Comstock, Tr. 1528-30.

162. The formulae convert the data to a percentage. The percentage purports to indicate the amount or extent to which the lower *head* is fixed, that is, the degree to which it really serves as a positional reference. Comstock, Tr. 1523-24.

163. For example, in claim 1 of the '573 patent (which calls for a first transducer having a fixed position in a direction normal to the plane of the disk so that it can serve as a positional reference), the actual operation of the drive during the *free* movement of the disk is X, and when the heads are in a position where they would be writing or reading on that disk the motion of the heads is five percent of X, then you could say the heads are in a 95 percent fixed condition. Comstock, Tr. 1525.

164. The floppy disk used with disk drives are very pliant and can be strongly influenced by small forces. Clamping of the disk by the hub of the spindle drive can send wrinkles through the disk and those wrinkles can be different from one clamping to another. Accordingly, *when* the disk is inserted and clamped, one may see a wide range of variation in the disk waviness. The disk was inserted in the drive and clamped. All measurements were made without changing that clamping of the disk so that all measurements on a particular machine were related to the fixed clamped condition of the disk. Comstock, Tr. 1582-83.

165. For purposes of the Tandon tests, a single representative, off-the-shelf disk was used for all dynamic tests of each of the three different size drives. Nathanson, Tr. 1436; Nathanson, CX 716, 4 137.

166. For example, the same disk, a standard production disk not selected for any particular characteristics, was used for all of the 5-1/4 inch floppy disk drives tests conducted by Mr. Nathanson. The disk was not taken out of the drive during any testing. It *was clamped* into position, all the tests involving that *disk were run, and it was not removed from the drive until that testing had been completed. Comstock, Tr. 1954.

167. During the taking of data, the disk was neither removed from the drive nor re—oriented in the drive. Nathanson, Tr. 1436, 1480.

168. To provide access for the instrumentation used to test the various disk drives, several minor modifications had to be made to the test drives. Nathanson, CX 716, ir 35.

169. None of these modifications affected the structural integrity of the drives or the accuracy of the tests, nor do they detract in any way from the subject tests as accurate representations of the normal use of the disk drives tested. Nathanson, CX 716, 4 35.

170. The TEAC disk drive was unique among the disk drives tested in that it had a chassis made of sheet metal instead of cast aluminum. Nathanson, Tr. 1476-79.

171. Because chassis displacement was found to be significant in the test TEAC disk drive, this displacement was measured and subtracted from both disk and side 0 transducer displacement data using a phased overlay technique. Nathanson, Tr. 1476-77; Nathanson, CX 716, Or 41, 42.

172. Mr. Nathanson's phased overlay approach for correction of chassis motion in the TEAC Model FD-54B that he tested is scientifically valid and correct. Brown, Tr. 2581.

173. Chassis displacements were also measured in the Mitsubishi, Sony, Tandon, and IBM disk drives, but these were found to be insignificant relative to the disk and transducer displacements. Therefore, they were not subtracted from the displacement data for those drives. Nathanson, Tr. 1374-80, 1476-79; Nathanson, CX 716, 4 41.

3. TEAC and Mitsubishi Tests.

174. Mr. Yasunori Murayama, an engineer employed by TEAC, conducted certain tests on the TEAC Models FD 54B and FD 55B double-sided floppy drives and on the Tandon TM 100-2A. Some of these tests were recorded on videotape. CX 744A; TRX 27, VC 35-40; TRPX 1.

175. In none of the TEAC tests were any measurements made of the disk Z-axis, pitch, or roll motions or disk spring rates. Murayama, Tr. 2482, 2494, 2496-97; Brown, Tr. 2622, 2629; CX 744A; TRPX 1.

176. Mr. Stanley Brown, TEAC's technical expert, agreed that in the TEAC drives, one would obtain different Z-axis displacements of the lower head depending upon the particular disk used. Brown, Tr. 2618.

177. Mr. Toshikazu Hayashi, an engineer employed by Mitsubishi Electric, directed certain tests on sample Mitsubishi and Tandon double-sided disk drives. Some of these tests were recorded on videotape, Exhibit MRX 9. Hayashi, Tr. 2845, 2851, 2861; MRX 1-13.

178. Mr. Hayashi did not conduct any tests on the disk itself while it was revolving in a Mitsubishi drive to determine the size of the disk undulations. Hayashi, Tr. 2866-67.

179. Mr. Martyn Lewis testified as a technical expert on behalf of Mitsubishi, but he did not witness the actual tests conducted in Japan which were *shown* on the videotape, Exhibit MRX 9. Lewis, Tr. 2900.

180. Certain of the tests performed by TEAC and Mitsubishi related to the head loading and unloading operation. Comstock, Tr. 1948; CX 744A; MRX 5.

4. Tandon Test Data and Results.

181. The Tandon Z-axis data purport to show that each of the floppy disk drives tested, with the.notable exception of the IBM drive, are asymmetric. The IBM drive is symmetric, and the lower heads of the other drives move much less proportionately than the lower head of the IBM drive in relation to disk movement.

Table I

Z-Axis Disk and Transducer Motion Data

	Mitsubishi	TEAC	Sony	Tendon 5-1/4	Tandon 8	IBM
A (microinches)	1300	2714	4200	2317	2500	5200
B (microinches)	29	155	20	17	59	3139
I (X)	97.8	94.3	99.5	99.3	97.6	39.6

Table II

Z-Axis Disk and Transducer Spring Rate Data

	Mitsubishi	TEAC	Sony	Tendon 5-1/4	Tendon 8	IBM
Kho (8ms/in)	20,000	18,000	72,000	164,000	60,000	50
Khl (8ms/in)	200	167	200	200	200	50
Kd (gms/in)	50.	50	100	5fl	66.7	120
I (X)	99.75	99.73	99.86	99.97	99.89	45.45

Comstock, Tr. 1950-51; Nathanson, CX 716, 114 43,50.

182. In Table I, FF 181, "A" is the measured disk Z-axis motion or displacement, "B" is the side *0* transducer Z-axis displacement, and "I" is the *degree* of insensitivity of the side 0 transducer to the applied Z-axis displacement of the disk. Nathanson, CX 716, 4 43.

183. In Table I, "I" was calculated as follows:

$$I - (1-B/A) X 100$$

Nathanson, CX 716, 4 43.

184. In Table II, FF 181, K_{ho}, K_{hi}, and K_d are, respectively, the measured Z-axis spring rates of the 0 transducer and its mounting structure, the side 1 transducer and its mounting structure, and the floppy disk. "I" is the degree of sensitivity of the transducer to being displiced along the Z-axis by the disk. Nathanson, CX 716, 4 50.

185. In Table II, "I" was calculated as follows:

$$I - [1 - (K_d/(K_d + K_{ho} + \quad x 100$$

Nathanson, CX 716, 4 50.

186. According to Tandon's technical expert, the data *in* Tables I and II show that the Mitsubishi, TEAC, Sony, and Tandon drives comprise one category of double-sided floppy disk drives having an asymmetrical transducer assembly construction in which the lower or side 0 transducer provides a positional reference for the disk. Comstock, Tr. 1950-52.

187. This face, FF 186, is in contrast to the prior art IBM double-sided floppy disk drive in which both of the transducers tend to follow or comply with the waviness or undulations of the disk. Comstock, Tr. 1950-52.

188. The measurements of disk pitch motion (li_d), side 0 transducer pitch motion (P_h), and side 0 transducer roll motion (R_h), as compiled by Nathanson, are shown in Table III, below, for each of the six disk drives tested. Table III also shows Nathanson's calculations of the degree of insensitivity ("I," in 1) of the side 0 transducer to being displaced about its pitch axis due to the forces applied by the disk about that axis.

Table III

2-Axis Disk and Transducer Spring Rate Data

	Mitsubishi	TEAC	Sony	Tandon 5-1/4	Tandon 8	IBM
Pd (arc-mins)	13.56	12.33	16.10	13.07	15.39	27.82
Ph (arc-mins)	0.15	0.69	0.15	0.30	0.45	22.62
I (2)	98.9	94.4	99.1	97.7	97.1	18.7
Rh (arc-mins)	0.60	0.15	0.15	0.30	0.45	18.17

189. Table IV, below, there is shown for each of the subject floppy disk drives, the measured pitch and roll spring rates of the disk (K_d), the side 1 transducer (K_{ti}), and the side 0 transducer (K_m). Table IV also shows, for each drive, the *degree* of insensitivity ("I," in 2) of the transducer system about the pitch and roll axes on account of the forces imposed by the disk as compiled by Nathanson. Nathanson, CX 716, 4 63.

186

Table IV

Pitch Spring Rate Data

Drive Make	Head 0 Spring Rate (gm-in/rad)	Head 1 Spring Rate (gm-in/rad)	Head System Spring Rate (gm-in/rad)	Disk Spring Rate (gm-in/rad)	Head System Pitch Invariance
Mitsubishi	28.92	28.53	57.45	17.75	76.40
TEAC	56.81	3.09	59.90	17.75	77.14
Sony	44,445	7.63	44,452.63	17.75	99.96
Tandon 5-1/4"	126,316	15.57	126,332	17.75	99.99
Tandon 8"	120,000	15.20	120,015	17.75	99.99
IBM 8"	5.52	5.52	11.04	17.75	38.35

Roll Spring Rate Data

Drive Make	Head 0 Spring Rate (gm-in/rad)	Head 1 Spring Rate (gm-in/rad)	Head System Spring Rate (gm-in/rad)	Disk Spring Rate (gm-in/rad)	Head System Pitch Invariance
Mitsubishi	24.42	24.45	48.87	14.77	76.79
TEAC	1,135	2.07	1,137.07	14.77	98.72
Sony	44,445	4.82	44,449.82	14.77	99.96
Tandon 5-1/4"	126,316	5.71	126,331.7	14.77	99.99
Tendon 8"	126,316	7.07	126,323	14.77	99.99
IBM 8"	4.05	4.05	8.1	14.77	35.42

CX 716, 4 63.

190. The value of "I" in Table II, FF 189, was calculated using the following formula:

$$I = (1-P_h/P_d) \times 100$$

Nathanson, CX 716, 4 56.

191. The value of "I" in Table IV, FF 189, was calculated using the following formula:

$$I = [1 - K_d/(K_d + K_{ho} + K_m)] \times 100$$

Nathanson, CX 716, 4 63.

187

192. Tandon's technical expert has rendered the opinion that the data in Table III and IV show that the Mitsubishi, TEAC, Sony, and Tandon drives form one category of double-sided floppy disk drive, while the prior art IBM drive forms another, distinct category, based on the insensitivity figures. In the IBM drive, the transducers tend to follow the pitch and roll undulations of the disk, while in the Mitsubishi, TEAC, Sony, and Tandon drives, they do not. Comstock, Tr. 1950-52.

193. The test results in Table III and IV show that in each of the double-sided floppy disk drives of Mitsubishi and TEAC, the lower or side 0 transducer is "non-gimballed" and has "a relatively fixed position relative to the plane of the media" within the meaning of claims 5 of the '573 patent. Comstock, Tr. 1537-38; 1782.

194. The test results set forth in the Tables tend to show that in each of the double-sided floppy disk drives of Mitsubishi, TEAC, and Sony, the lower or side 0 transducer either functions as if it had, or in the case of Sony, has "a fixed position in a direction normal to the plane of the media" and serves "as a fixed positional reference despite tendencies of the media to deviate in position from its nominal plane" within the meaning of claim 1 of the '573 patent and functions as if it was, or as in the case of Sony is, "fixedly coupled to the carriage . . . in an invariant position in a direction normal to the plane of the disc" within the meaning of claim 12 of the '573 patent. Comstock, Tr. 1540, 1554, 1564.

195. The Mitsubishi *head* mounting does not permit the lower head to incline freely in response to the forces exerted by the disk, and although it appears to be gimballed, *in reality it* is not fully gimballed. Comstock, Tr. 1564-65, 1568-69, 1592-93, 1782, 1790.

188

196. The Mitsubishi lower head mounting consists of a "gimbal structure." However, in dynamic operation, the stiffness of the lower mounting (gimbal plus backup structure) is much greater than the stiffness of the disk material such that the heads force the disk to be flattened out. Thus, the lower head is non-gimballed. CX 614, 4 6, at 13-14.

197. In the IBM double-sided floppy disk ,iriv lel 53 FD, both heads are mounted in a highly flexible manner in accordance with the principal outlined in CX 609, and the test data reveals that in the IBM drive the heads are not serving as a positional reference for the disk but tend to follow the movements of the disk to a very high degree. Comstock, Tr. 1524.

198. The IBM drive, as represented by CX 609, has heads which show about 70 percent of the movement of ,the disk, that is, the heads are only fixed about 30 percent. In the measurements that were made on the Tandon drive and respondents' drives, the degree to which the heads responded to the urgings of the disk was quite small, on the order of a few percent. Converted to an indication of fixedness or invariance, the heads of those drives are not following the disk to the extent of 95 percent or more. Comstock, Tr. 1524.

199. The test data developed at Tandon tend to show that the IBM double-sided floppy disk drive, which is described in *Reference* R cited by U.S. Patent and Trademark Office (CX 609), falls into a class of drives having two flexibly mounted heads that follow the disk, and that the Sony, TEAC, and Mitsubishi floppy disk drives that were tested fall into another class in which one of the heads provides a reference for the disk. Comstock, Tr. 1950-51.

200. The Nathanson test equipment s his basic set-up, and the approaches to accumulate data that he used were excellent. Brown, Tr. 2602-03.

201. The results of the Nathanson laser beam test are more accurate than the TEAC laser beam test in that there is a multiplication based on the lever arm of the beam and, therefore, Mr. Brown would rely more on the accuracy of those measurements than on those in the TEAC videotape. Brown, Tr. 2600-02.

202. The various formulae used by Mr. Nathanson and which appear in his witness statement produce an understandable kind of single number that makes comparisons useful. Comstock, Tr. 1521-22, 1527, 1530-31.

203. Test data submitted by TEAC supports the conclusion of infringement to the extent that it'shows spring rate measurements which agree very closely with the results that Mr. Nathanson obtained. Comstock, Tr. 1593-94.

204. Mr. Nathanson determined that the Z-axis spring rate for the lower head on the TEAC Model 548 drive was about 18,000 grams per inch, whereas TEAC calculated the same spring rate to be about 16,500 grams per inch on the Model 55B. Brown, Tr. 2606-07; Murayama, Tr. 2485.

205. The data taken by *Mr.* Nathanson was relied on by the TEAC expert to support the motions that occur during operation of the TEAC drives. Brown, Tr. 2528, 2531.

206. The test data submitted by Mitsubishi also tend to support the tests conducted at Tandon in that the agreement between spring rate measurements was very good. Comstock, Tr. 1594-95.

207. Mitsubishi measured a lower head spring rate in the Tandon TM 100-2A of about two million grams per inch as opposed to 164,000 grams per inch measured by Tandon. Although one might draw the conclusion that these numbers are dramatically different, if one looks at them from the perspective of the effect that such a difference has with respect to the question of whether the heads provides a positional reference for the disk or not, then that difference does not affect it at all. Comstock, Tr. 1594-95.

a. Sony.

208. The Sony Model AO-D32W-10 3-1/2 inch double-sided floppy disk drive is covered by claims 1, 5, and 12 of the '573 patent. Comstock, Tr. 1538-39.

b. TEAC.

209. In July 1978, TEAC was given several sets of Tandon head assemblies and a copy of the application that issued as the '573 patent, as well as specific technical information respecting the head assemblies. TRX 27, at 2.

210. The approximate worst case showing of Z-axis movement of the lower head in the TEAC Model 55B drives tested by Mr. Murayama would show movement of approximately 140 microinches less than that measured by Tandon. Brown, Tr. 2618-19.

191

211. The lower head of the TEAC floppy disk drive is mounted on a flexure 'which appears to be a one-axis gimbal supported by a massive structural element beneath the flexure mounting allowing. This flexure is not designed to permit roll movement, but allows some pitch movement and limited Z-axis movement. Comstock, Tr. 1961-62; CX 693, photos 15, 17.

212. Because of these characteristics of the lower head flexure in the TEAC drive, it appears to be a gimbal viewed from above, but only partially functions as such because it actually has a rigid supporting structure under it severely limiting resilience or flexibility. Comstock, Tr. 1962-63.

213. The TEAC Model 548-02-U double-sided floppy disk drive incorporates or substantially incorporates the subject matter of claims 1, 5, and 12 of the '573 patent. Comstock, Tr. 1554-62; CPX 10A; CPX 7; CPX 13.

c. Mitsubishi.

214. The Mitsubishi Model M 4851 double-sided floppy disk drive incorporates or substantially incorporates the subject matter of claims 1, 5, and 12 of the '573 patent. Comstock, Tr. 1563-69; CPX 11A; CPX 14; CPX 8.

215. The pitch angles assumed by the heads in the Mitsubishi M 4851 drive were insignificant or negligible in comparison to the natural slope angles of the disk media measured in the operating situation, except free from the confining influence of the heads. CX 614, ir 8, at 16.

216. Even though a visual examination of the lower head of the Mitsubishi drive may suggest two-axes of freedom, pitch and roll, the Mitsubishi drive has a rigid structure under it limiting the resilience and flexibility. For practical purposes, the lower heads of these machines have partially "non-gimballed" head mounts within the meaning of claim 5. CX 614, 8, at 16.

217. There is reason to believe the Mitsubishi Mark I Series 5-1/4 inch double-sided floppy disk drives either literally or under the doctrine of equivalents infringe claims 1, 5, and 12 of the '573 patent. Comstock, Tr. 1573.

218. There is reason to believe each and every one of the 12 Mitsubishi Mark I and Mark II Series disk drive models either literally or under the doctrine of equivalents infringe at least independent claims 1, 5, and 12 of the '573 patent. Comstock, Tr. 1574; CX 615, 4 6.

219. The Mitsubishi M 3 Series 5-1/4 inch double-sided floppy disk drives has a very high likelihood of infringing claims 1, 5, and 12 of the '573 patent based on the Hayashi *witness* statement and particularly in light of the structural supporting element mounted below the lower or side 0 head. Comstock, Tr. 1575-76; CX 615, IN 6-11; Hayashi, MRX 27, it 27.

2206 The Mitsubishi MF 353 3-1/2 inch double-sided floppy disk drive has a strong likelihood of infringing claims 1, 5, and 12 of the '573 patent to a strong likelihood based upon what is shown in the Hayashi witness statement sketches. Comstock, Tr. 1576-77; CX 615, 44 12-14; Hayashi, MRX 27, 31.

193

221. FF 220 is based on the fact that the lower element supporting the lower head in the MF 353 is 60 percent thicker than the element supporting the upper head, which means that the lower transducer and its mounting structure is about four times stiffer than the upper transducer and its mounting structure. Comstock, Tr. 1577-79; CX 615, 4 13; Hayashi, MRX 27, ir 31.

222. Based on the sketches appended to the Hayashi witness statement, the Mitsubishi M 2893 and M 2894-4/5 8-inch double-sided drives infringe the claims of the '573 patent. Comstock, Tr. 1579-80; CX 615, ir 15.

223. FF 222 is based on the fact that the lower transducer is mounted on two flexures designated by the numerals 4 and 25 in the Hayashi witness statement as opposed to the upper head which is mounted on a single flexure 10. Comstock, Tr. 1579-81; CX 615, 4 15; Hayashi, MRX 27, 4 11.

224. Based on the Hayashi witness statement, MRX 27, the Mitsubishi Model M 4851 tested by Tandon fairly represents the Mitsubishi Mark I, Mark II, and M3 Series (the MF 353 and the two 8-inch models mentioned above). Each of these Mitsubishi drives uses an asymmetrical transducer system in which one of the transducers is more stiffly mounted than the other and acts as a positional reference for the disk during operation of the drive. CX 615, ir 17.

225. The Mitsubishi M 3 Series 5-1/4 inch double-sided disk drive; the MF 353 3-1/2 inch double-sided disk drive; and the Models 2893 and H 2894-4/5 8-inch double-sided disk drives all have -- like the M 4851 and the other Mark I and Mark II Series models -- an asymmetrical head assembly construction. CX 615, 4 16.

226. In the opinion of Tandon's expert witness, Mr. Comstock, the observed pitch behavior during the normal operation of the disk drive using the laser method is a very good indication of how stiff the suspension actually is and he would rely on it for a determination that the Mitsubishi transducer suspension is a stiff rather than highly flexible suspension. The laser approach is an actual operating condition of the machine which allows one to see what is actually happening. Comstock, Tr. 1567-68.

227. According to Mr. Comstock, the transducer 0 spring rate in the Mitsubishi drive is probably different when the system is under load than when it is under a no-load condition under which the spring rate measurements were made. When the loading force of the upper transducer is actually present during operation of the disk drive, Mr. Comstock's opinion is that the intimacy of contact *between* the lower transducer and the supporting structure underneath increases the stiffness about the pitch axis over and above that measured for pitch spring rate. Thus, in actual operation, the lower transducer provides a pitch angle reference for the disk. Comstock, Tr. 1568-70, 1953.

228. In the TEAC and Mitsubishi drives tested by Tandon, the lower heads function as a fixed positional reference and are the equivalent of those elements as claimed. Comstock, Tr. 1591-92.

229. The lover heads in the Mitsubishi models depicted in the Hayashi witness statement function as fixed positional references for the disk and are the equivalent of the claimed elements in claims 1 and 12 of the '573 patent. Comstock, Tr. 1592.

230. The lower heads in the TEAC. and Mitsubishi drives tested by Tendon function as if they were non-gimballed and there is a strong likelihood that the lower head would function in a non-gimballed fashion in the Mitsubishi drives shown in the Hayashi sketches. Comstock, Tr. 1592-93.

J. Alleged Inequitable Conduct.

231. Raymond A. Bogucki has been registered to practice before the U.S. Patent Office for approximately 33 years. He has a degree in mechanical engineering. Bogucki, Tr. 2959.

232. Mr. Bogucki was the attorney in charge of prosecuting the '573 patent. Bogucki, Tr. 2959-60.

233. Prior to 1978, it was the practice of Mr. Bogucki to file documents in the PTO calling the examiner's attention to prior art that was relevant to the matter at issue. He had also submitted prior art to the PTO that was cited against the foreign counterpart of U.S. applications that he was prosecuting. Bogucki, Tr. 2971.

234. Mr. Bogucki agrees that prior art cited by a foreign patent office against a foreign counterpart application should be examined by the attorney handling the U.S. case to see whether that prior art is material. Bogucki, Tr. 2972.

235. Mr. Bogucki believes that the IBM Technical Disclosure Bulletin (CX 609) is more relevant than the Parken patent to the claims of the '573 patent. The IBM bulletin was an attempt to be a solution and the Parken patent, in contrast, is the type of device that would .immediately wear out a

disk. Thus, when one looks at the structural properties,,it is evident that the Parken patent is directly contrary to what you would want to do in a floppy disk drive. Bogucki, Tr. 3095-96.

236. Mr. Bogucki did not consider the Parken patent germane because there was a stiff (chip) member that is going to be recorded on and read by a couple of big magnetic heads that have the same relationship as they move across it. That has nothing to do with the floppy disk problem, either in terms of suggesting a solution to it or providing something that is material to the '573 claims. Bogucki, Tr. 3008.

237. When Mr. Bogucki used the term "non-rigid" in the patent claims to describe a non-rigid planar magnetic media, he had in mind a type of bendable physical characteristics that one would find in the floppy disk element that is recited in the '573 patent. Bogucki, Tr. 2974-78.

238. To Mr. Bogucki, the word "stiffly" in Parken is the operative word, because everything has a degree of flexibility. The stiffness is inherent in the fact that one is running these big heads across this little chip. If it were not stiff it would give way and it would jam. Bogucki, Tr. 3012-13.

239. Floppy disks are pliant material, or something which by itself will deviate from the plane of rotation in both radial and circumferential directions. This does not fall within the definition of "stiffly flexible" according to Parken. Bogucki, Tr. 3013.

240. The prior art that is referred to in the '573 patent is the only thing that Mr. Bogucki knew about. He relied on the inventors to learn how things were done in the IBM approach. Bogucki, Tr. 2985.

197

241. Mr. Bogucki became aware of this British version of the Parken patent before he became aware of the U.S. version. In September 1978, he had received a notification from his British patent agent that the British version had been referred to in an initial communication from the British Patent Office along with other patents. He looked at Parken within several days of when it came into his office. Bogucki, Tr. 2990-91.

242. Mr. Bogucki first became aware Of the U.S. Parken patent in connection with litigation with MPI concerning the Tandon patent, which was much later than his first awareness of the British version. Bogucki, Tr. 2995.

243. There was an initial refusal of the Tandon British patent by the British Patent Office on the basis of prior art, including the Parken' patent. When the British Patent Office called the Parken patent to Mr. Bogucki's attention, the claims were changed to correspond to the U.S. claims, and arguments were submitted as to the distinctions and fundamental differences in the structure and the mode of operation. Bogucki, Tr. 2996-98.

244. Mr. Bogucki had a telephone interview with the examiner concerning the Tandon application in June 1978 to find out the examiner's thinking. Mr. Bogucki does not believe he amended the claims as a result of the telephone interview; the amendments were done at the time of the personal interview in August 1978. Bogucki, Tr. 3000-01.

245. Mr. Tandon and Mr. Cell were at the interview with Mr. Bogucki. They brought with them different materials including the Tandon disk drive with the dual head assembly and an IBM double-sided disk head assembly. Mr. Tandon discussed the nature of the IBM system and the problems with it. They also discussed the examiner's differences with them as to the language. Bogucki, Tr. 3003.

246. When he first viewed Parken,* Mr. Bogucki carefully analyzed the supporting structure of Parken to determine that both heads would be controlled by the media. Bogucki, Tr. 3028-29.

247. In the case of a stiffly flexible chip, the nominal plane of the chip is the plane of the chip. No mention is made in Parken of any deviation in any way from that plane. The plane of the chip is.where the surface is and that determines where the transducers go. Bogucki, Tr. 3058.

248. The phrase "nominal plane of the media" is only meaningful when dealing with a pliant, floppy disk which undulates and has the data aligned in circumferential variations. It is not relevant when dealing with a stiffly flexible element which itself defines the plane of the media. Bogucki, Tr. 3059.

249. In the Parken structure, the first transducer does not serve as a fixed positional reference despite tendencies of the media to deviate in position from its nominal plane. Bogucki, Tr. 3060-61.

250. After the Tandon patent issued, Mr. Bogucki asserted infringement against Yang Electromagnetics Systems. Bogucki, Tr. 3077.

251. After Mr. Bogucki received correspondence from an attorney at Yang Electromagnetics Systems, he looked at the Parken patent again in more detail; Bogucki, Tr. 3034-35.

252. Pierson, Semmes, Crolius & Finley conducted a validity study and concluded that Mr. Bogucki had disclosed "the most pertinent reference - during interview on August 3, namely IBM Patent 4,089,029 (CX 6461." CX 754.

253. Mr. Bogucki did not have a search conducted for the '573 patent application because there was limited time available. The Tandon people were very knowledgeable as to the actual state of the art in the manufacture of floppy disk drives and they were very much aware of the problems involved in the IBM double—sided disk drives. Bogucki, Tr. 3097-98.

254. The 800 bits per inch of Parken teaches away from what Tandon was doing at the time the '573 patent application was filed. Bogucki, Tr. 3100.

255. Tandon has licensed IBM under the Tandon patent. There was no preceding litigation which led to the license. Further, Mr. Bogucki states that IBM did not assert the Parken patent in negotiations with Tandon. Bogucki, Tr. 3102.

IV. IMPORTATION ANT) SALE

A. TEAC.

256. TEAC Japan is a Japanese Company which designs, manufactures, and sells double-sided floppy disk drives for importation into the United States. CX 203; CX 204.

257. TEAC America (TCA) is a subsidiary of TEAC Japan which imports, sells, and distributes double-sided floppy disk drives in the United States. CX 203; CX 204.

258. Both TCA and TEAC sell TEAC double-sided floppy disk drives in the United States, with TCA accounting for 15 percent of these sales. Brehme, Tr. 2704.

C 259. From October 1982 to September 1983, TEAC sold .double-sided disk drives in the United States. CX 694, at 13.

260. From October 1983 to September 1984, TEAC sold double-sided disk drives in the United States. CX 694, at 14.

261. In October-December 1984, TEAC sold double-sided disk drives in the United States. CX 694, at 14.

262. TEAC does not import or sell in the United States 8-inch double-sided disk drives. CX 685, Interrogatory No. 1; CX 686, Interrogatory No. 1.

263. The larger OEM sales in the United States are conducted by TEAC. Brehme, Tr. 2704.

264. TCA has a one-story office, repair and warehouse facility comprising of about 80,000 square feet in Montebello, California, employing about 113 persons. Two regional sales offices of about 100 square feet are located in Santa Clara, California, and Dallas, Texas. Sales personnel in Boston and Chicago work from their homes. CX 686, at 7.

265. For TCA to make a profit, it attempts to sell its floppy disk C drive percent above "base cost." Base cost is the price of the drive FOB Japan, plus customs charge, plus freight, plus brokerage. Brehme, Tr. 2715.

266. The cost component of TCA's profit measurement uses a standard cost that is the summation of actual FOB Japan price plus estimated cost for freight, customs, and brokerage. Brehme, Tr. 2780.

267. The estimated cost for freight customs and brokerage remains C the same for months. Brehme, Tr. 2780.

B. Mitsubishi.

268. Mitsubishi Electric Corporation (MELCO) is a Japanese corporation which designs and manufactures double-sided floppy disk drives for importation into the United States. CX 447, at 45; CX 401;

269. Mitsubishi Electronics America, Inc. (MELA), is a subsidiary of MELCO, which imports sells and distributes double-sided floppy disk drives manufactured by MELCO. CX 447, at 45; CX 401.

C 270. From October 1982 to September 1983, Mitsubishi shipped C double-sided disk drives to the United States, of which about percent were C 5-1/4 inch disk drives. About of these disk drives were 8-inch drives not alleged to have infringed the '573 patent. CX 690, Interrogatory No. 7.

202

271. From October 1983 to September 1984, 'double-sided, floppy disk drives were shipped by Mitsubishi to the United States. Of this c total, about were double-sided 3-1/2 inch disk drives, about were C 5-1/4 inch disk drives, and about were 8-inch disk drives. The 8-inch drives did not infringe the '573 patent. CX 690, Interrogatory No. 7.

C 272. From October 1984 to December 1984, double-sided, floppy disk drives were shipped by Mitsubishi to the United States. Of this c total, about were double-sided 3-1/2 inch disk drives, were 5-1/4 c inch disk drives, and were 8-inch disk drives. The 8-inch drives did not infringe the '573 patent. CX 690, Interrogatory No. 7.

273. Mitsubishi manufactures, imports into, and sells in the United States the following models of double-sided floppy disk drives: ?F 353, M4851, M4851-1, M4851-3, M4851A-3, M4852, M4853, M4853-1, M4853-3, M4854, M4854-1, M4854-3, M4855, M4855-1, M2893, M2894-6, M2896-6, M2894-4/5. CX 687, Interrogatory No. 1 (Feb. 15, 1985); CX 689, Interrogatory No. 1 (Feb. 22, 1985).

274. Mitsubishi Model MF 353 is a 3-1/2 inch double-sided floppy disk drive. CX 405; CX 689, Interrogatory No. 1.

275. Mitsubishi Models M4851, M4951-1, M4851-3, M4852, M4853, M4853-1, M4853-3, M4854-1, M4854-3, M4855, and M4855-1 are 5-1/4 inch double-sided floppy disk drives. CX 404; CX 689, Interrogatory No. 1.-

276. Mitsubishi Models M2893, M2894-6, M2896-6, and M2894-4/5 are 8-inch double-sided disk drives. CX 403; CX 689, Interrogatory No. 1.

277. Mitsubishi Model M4851-A is known as a "M3" drive and represents a third generation of the original M4851. Foster Dep., CX 447, at 97; CX 689, Interrogatory No. 1.

278. MELA sells double-sided floppy disk drives through its own direct sales force and a network of regional distributors. CX 688, Interrogatory No. 12.

279. MELA has warehousing facilities in Torrance and Compton, California. Foster Dep., CX 447, at 67, 69.

280. MELA performs quality assurance procedures on disk drives *received* from MELCO for sale in the United States. MRX 41(C), 4 4; Foster, Tr. 2926.

281. Mitsubishi America performs service and repair in the United States on drives it distributes. MRX 41(C), Q 4; CX 447, at 31, 78.

282. On a new Mitsubishi product, 100 percent of the product may undergo quality assurance testing by MELA in the United States. On mature product lines, the testing may be reduced to 20 percent. CX 447, at 75-76.

283. Usually, Mitsubishi disk drive repairs are effected by MELA in the United States. CX 447, at 77-79.

284. MELA performs application engineering support in the United States with respect to floppy disk drives manufactured by MELCO. CX 447, at 40.

C. Sony.

285. Sony and SONAM import into the the United States and sell in the United States double-sided flexible disk drives alleged to infringe the '573 patent. Sony, Answer to Complaint; SONAM, Answer to Complaint.

286. Sony sold a total of double-sided full-height floppy disk drives to United States destinations between fourth quarter 1983 and c first quarter 1985. Of this total, units were sold to which has a license agreement with Tandon. CX 692, Interrogatory Nos. 7, 8; CX 617.

287. SONAM and/or Sony has marketed in the United State's three C models of microfloppy disk drives:

C

C

C

C

Mergentime Dep., CX 252, vol. I, at 77-78, 81; CX 205.

288. Sony began to offer in the U.S. its Slimline double-sided microfloppy disk drive in the thikd quarter of 1984. CX 208, at 3.

C 289. In first quarter 1985, Sony sold double-sided C 3-1/2 inch floppy disk drives to and C double-sided 3-1/2 inch floppy disk drives to CX 692, Interrogatory Nos. 7, 8.

290. Sony products are sold to United States customers in two ways: Sony sells microfloppy disk drives to SONAM, who sells the disk drives for evaluation purpoises to United States OEMs: and Sony directly drop-ships microfloppy disk drives to its larger United States accounts. Mergentime Dep., CX 252, Vol. I, at 65-69.

291. SONAM is the United States sales representative for Sony. Its major responsibility is to promote Sony as a reliable OEM supplier. Mergentime bep„ CX 252,. Vol. II, at 132..

292. SONAM has three major functions: (1) it makes the initial contact with the United. States customer, delivers evaluation units, and then turns the account over to Sony; (2) it does follow-up visits to SOny's United States customers.: ond (3),it services Sonlo.s large United States accounts, such as . Mergentime Dep., CX 252, Vol.. II, at 14-15, 24.

293. SONAMLhas four to five employees in the United States dedicated to microfloppy disk drive sales. Mergentime Dep., CX 252, Vol. II, at 129.

294. SONAM performs no manufacture of double-sided floppy disk drives in the United States. CX 202.

295. SONAM performs no research and development of double-sided floppy disk drives in the United States. CX 202.

296. SONAM receives a two, percent commission on every sale by Sony to a United States customer. Mergentime Dep., CX 252, Vol. I, at 68. SONAM receives approximately a 28 percent commission on sales it makes itself to United States customers. Langer ,, CX 254, at 113-14.

297. Title transfer on drives sold by Sony to SONAM takes place at the .o.b. Japan shipping point,. Mergentime Dep., CX 252, Vol. T, at 99.

298. SONAM must add six percent over the f.o.b. price to break even on sales. of microfloppy disk drives. Generally, SONAM's goal is to add on 15 percent to the f.o.b. price- Mergentime Dep., CX 252, Vol. I, at 75.

206

A. Shugart and General Marketplace Background.

299. Shugart Associates was formed in the mid-1970s by Allen Shugart and several key employees who had worked together at IBM and Memorex on disk drive designs. Sollman, Tr. 36-40. In 1976, Shugart had 50 to, 60 employees, 25 of whom were engineers formerly from IBM and Memorex. Sollman, Tr. 39.

300. Shugart was located in Sunnyvale, California. Sollman, Tr. 39.

301. By January 1976, Shugart was a single-product company with sales of $1.5 million to $3.0 million in 1975 and projected sales of $6.0 million for 1976. Actual 1976 sales were $9.0 million. The single product was an 8-inch single-sided floppy disk drive selling for $400 to $500. Sollman, Tr. 37-38, 42.

302. The Shugart 8-inch floppy disk drive was competitive with other floppy diskette drives in the marketplace. "But the one thing that they all tried to maintain was IBM compatibility, so any OEM customer could be secure in his belief that IBM written diskettes could be read and updated on that product." Sollman, Tr. 38-39.

303. Shugart, together with Dyson Corporation and Information Terminals Corporation, developed the first 5-1/4 inch disk drive. Sollman, Tr. 47-50. The dimensions were the result of efforts to design a disk drive at the request of Dr. Wang, Chairman of Wang Laboratories, who desired a smaller disk drive for a desk-top system which was to be a precursor to the personal computer. Sollman,'Tr. 42-44, 48-49.

207

304. In 1976, Wang Laboratories was a $200 million-a-year corporation making a word processing unit costing $30,000. The system used a tape drive storage system. Dr. Wang's vision was to use a tape diskette unit in a desk-top product that would sell for approximately $10,000. Sollman, Tr. 44-45.

305. A prototype of the 5-1/4 inch disk drive was shown unofficially to certain companies about April 1976, then later at a trade show in May 1976. Sollman, Tr. 47-52.

306. The first shipment of the 5-1/4 inch single-sided disk drive to Wang Laboratories occurred in August 1976. Sollman, Tr. 53-54.

307. At first, sales of the 5-1/4 inch single-sided disk drive were slow due to an industry reaction of disbelief since IBM was using 8-inch disk drives and the product was not IBM compatible. Sollman, Tr. 53-54. However, with the growth of the personal computer market in 1977-1978, the 5-1/4 inch disk drive began to sell. Sollman, Tr. 54.

308. By 1977, at the time of the development of the 5-1/4 inch floppy disk drive, the state of the art in technology of floppy disk drives, was the Shugart SA-800, a single-sided floppy disk drive with 8000 kilobyte capacity. Sollman, Tr. 55-56.

309. In July-August 1976, Shugart endeavored to take a leadership position in the floppy disk drive industry and decided to attempt doubling the capacity of its products. Three different approaches were considered: (1) write more bits around each track; (2) write narrower tracks to put more tracks around the disk; and (3) utilize both sides of the disk (double-sided recording). Sollman, Tr. 58-59. Shugart decided to pursue the double-track density approach. Sollman, Tr. 60.

310. In November 1976, IBM introduced the first double-sided floppy disk drive. The disk drive was part of a Model 360-1 bank terminal controller. Sollman, Tr. 60. But see FF 72.

311. The diskettes for the IBM double-sided disk drive was coated on both sides. The disk drive placed two heads, one on each side of the diskette, in contact or near-contact with the diskettes. The heads were cantilevered and the diskettes would flow between them. Sollman, Tr. 61-62. The industry reaction was that IBM had just informed the industry that the next generation of disk drives was to be double-sided. Sollman, Tr. 63.

312. Shugart, like others in the industry, decided to design its own doublesided disk drive. Shugart overnight gave up the double-track density approach and informed its major OEM customers of its decision. Sollman, Tr. 64.

313. A program was initiated at Shugart to design a double-sided disk drive. Tile [Shugart] believed that we were a leading supplier of OEM products and to allow our customers to compete effectively with IBM we would have to allow their systems to interchange information with the IBM systems. To do anything other than that would take ourselves right out of the marketplace." Sollman, Tr. 64.

314. The double-sided design program received highest priority with all Shugart resources devoted to the project. Fifteen to twenty engineers • were originally assigned to the project, and this number increased to 80 engineers at one point. Sollman, Tr. 65-66.

209

315. Considerable Shugart'research facilities at Sunnyvale, California, were also devoted to the design effort, as well as those of Xerox' Palo Alto facility, subsequent to December 16, 1977, when Xerox Corporation purchased Shugart. Sollman, Tr. 66-67.

316. Shugart officially introduced a double-sided disk drive product, the SA-850, in April 1977 and started shipments in June 1977. In the fall of 1977, customers began to return the product because the magnetic head structures used were beginning to strip the oxides off the diskettes, which destroyed the customer's information. Sollman, Tr. 67, 68.

317. Shugart engaged in a highly intensive crash effort to solve the design problems associated with its double-sided product. Approximately 10 different designs were tried over a number of years. Sollman, Tr. 67-68. Approximately $4 to $5 million was expended by Shugart on the design. Sollman, Tr. 68.

318. Shugart's competitors were experiencing similar results in their pursuits of both IBM-type and non-IBM-type head designs -- media wear problems and unsatisfactory product. Sollman, Tr. 68-69.

319. One competitor, CalComp, advertised that it had a successful double-sided floppy disk drive product. Sollman, Tr. 69.

320. Shugart purchased three CalComp disk drives for testing by its engineers. The engineers discovered that the CalComp disk drives employed a head assembly manufactured by Tendon Magnetics of Chatsworth, California, and that the drives worked well with a wide range of media. Sollman, Tr. 70-71.

210

321. The Shugart engineering department considered the CalComp drive to be a very interesting product, but because they believed they were close to a break-through on their own design, the engineering department preferred to put all their efforts in this design. Sollman, Tr. 71-72.

322. After further Shugart design efforts failed, Shugart's President prevailed on Shugart management to begin patent licensing discussions with Tandon Corporation. Sollman, Tr. 73. The licensing negotiations were successful, and a license agreement was signed between Tendon and Shugart which embodied the Tendon patented technology. Sollman, Tr. 74.

323. Shugart placed the Tendon patented technology in its disk drive products and the SA-850 became a successful and highly profitable product. The technology was also added to the 5-1/4 inch disk drive, the SA-450. Sollman, Tr. 74-75.

324. By the end of 1981, Shugart employed 2,700 individuals and had annual sales of approximately $198 million. The company was located in Sunnyvale and Roseville, California, and Nogales, Mexico (300 employees). Sollman, Tr. 75-76.

325. In 1981, Shugart announced a full-height 5-1/4 inch double-track density version and double-sided version of its own design. After Shugart began to sell these products, it began to notice pricing competition from Tendon, Control Data, and Japanese companies. Shugart was principally concerning about the competition from Control Data and secondarily, from Tandon. Sollman, Tr. 76-77.

326. Sometime in 1981 or 1982, Shugart became concerned about competition from Japanese companies. Sollman, Tr. 77. That is, in mid-1981, Nippon Telephone & Telegraph (NTT) had announced that it would award a major - contract for 100,000 to 500,000 floppy disk drives, which would have been the largest order in the world outside of IBM. Sollman, Tr. 78. NTT invited 15 to 20 Japanese companies to bid on a "half-height" double-sided mini-floppy disk drive having a 1.6 megabyte capacity. No American companies were invited to bid. Sollman, Tr. 79, 80.

327. One condition for bidding on the NTT contract was that a company demonstrate production capability. At the time of the request for bid, only two or three Japanese companies (TEAC, Matsushita, and perhaps Mitsubishi) had production facilities, and the remainder were newcomers to the industry. Sollman, Tr. 79-80.

328. Shugart was forewarned in mid-1981 of the consequences of the NTT bid by its Japanese licensee Matsushita Communications, Inc. Matsushita told Shugart that the Japanese market would not be large enough to sustain the production of these 15-20 companies and that these companies could be expected to begin selling their products in the United States. Sollman, Tr. 80-81; see id., Tr. 77-78, 84-85.

329. The Shugart-Matsushita license agreement dated back to 1975 when trade barriers in Japan were 22-1/2 percent. Shugart judged that it would be impossible to break the trade barrier and licensed Matsushita to manufacture and sell Shugart's technology in Japan. Matsushita was not permitted to sell its products in the United States. Sollman, Tr. 81.

330. After the Matsushita warning about future competition from Japan, Shugart immediately started developing two new products, Model A and Model B. This type of product was currently selling in the marketplace for $250 in moderate OEM volumes. Shugart set as a goal to come up with a half-height disk drive that could be sold profitably at about $140 to $160. Sollman, Tr. 82, 83-84, 86.

331. At the spring 1982 National Computer Conference, Shugart was the only company that displayed a half-height product. At the fall 1982 Comdex show, Shugart, Tendon, and Control Data showed half-height double-sided floppy disk drives. Twelve to fifteen Japanese suppliers also showed their half-height products. Sollman, Tr. 87.

332. As a result of the 1982 Comdex show, Shugart increased the pressure on the Model A and Model B groups to meet cost targets and to get the products set for high volume manufacturing. The goal was to rune a product at the 1-10 million a year level and to be extremely competitive in the $140-$150 range. Sollman, Tr. 92-93.

333. In April 1983, Shugart *assessed* the market conditions in Europe and saw extreme price competition at *key* and vital accounts from five or six Japanese manufacturers. Shugart also saw lower price bidding in the United States from Japanese half-height products. Sollman, Tr. 93-95.

334. As 1983 progressed, price erosion in half-height drives brought prices down into the $120 range, and Shugart Model A and Model B were dropped. Sollman, Tr. 93-95. Shugart instead turned to its Japanese licensee, Matsushita, and entered into a purchase agreement for half-height

ti

double-sided floppy disk drives with prices ranging froi $124 to under $100 depending upon the quantity ordered. Sollman, Tr. 97. The Matsushita manufactured products were known as the 455 and 465. Sollman, Tr. 96-97.

335. In 1983, Shugart found itself in head-to-head competition with Japanese products at virtually every major United States and European account. Sollman, Tr. 97-98. The outcome was that we had to adjust all of our pricing substantially downward yet again with severe price erosions and then profit erosions that had to naturally follow." Sollman, Tr. 98.

336. Shugart lost the NCR bid to TEAC; Shugart bid $125, TEAC bid $112. The contract was for 200,000 units per year. Sollman, Tr. 98.

337. Shugart lost the Convergent Technologies bid to Mitsubishi for 100,000 drives per year. Sollman, Tr. 98-99.

338. In October 1983, Shugart experienced its first layoff. Shugart had grown to 3,600 employees, all but 550 of whom were located in the United States. The October layoff equaled 7-1/2 percent of the work force. Sollman, Tr. 99.

339. Shugart's annual sales for 1983 was $240 million dollars. At that time, Shugart was the world's second largest manufacturer of floppy disk drives behind Tendon. Sollman, Tr. 100-01.

340. The extreme competitive environment at the end of 1983 caused Shugart's profitability to erode substantially. Shugart first became profitable in July 1975. The first time Shugart saw a rapid erosion of its - profitability was in 1983 such that in January 1984, it suffered an operating loss. Sollman, Tr. 101.

341. Shugart had charted the price declines of 1983 and concluded that the decline had a very negative long-term impact. Sollman, Tr. 101. Shugart considered several economic alternatives to recover from the erosion in profits, including setting up an offshore production facility in either Singapore, Taiwan, or South Korea. Sollman, Tr. 101-02.

342. Shugart task forces in mid to late 1982 recommended the immediate establishment of a production facility in Singapore. Shugart was unable to receive management's approval. Shugart needed the approval of Fuji-Xerox, a Japanese joint venture owned by Shugart's parent corporation Xerox and Fuji-Foto Films, before any manufacturing could take place in that part of the world. Shugart never received the approval of Fuji-Xerox. Sollman, Tr. 103-04.

343. On December 19, 1983, after examining economic studies as well as what would be *required to make* the business fully profitable, Xerox concluded that it could no longer support Shugart. As of January 1, 1984, Shugart's annual reported sales for fiscal year 1983 was *240 million. Xerox concluded that even given substantial investments, Shugart could not be made profitable within the next 12 to 18 months. Sollman, Tr. 104-06, 107.

344. On January 15, 1984, Shugart employed 2,600 people in the United States and 600 in Mexico and occupied about 490,000 square feet of space at Roseville and Sunnyvale, California. By December-6, 1984, Shugart had experienced several more layoffs, and its employment force had been reduced to 1,600 to 1,700 employees, 400 of whom were in Mexico. Sollman, .Tr. 109, 111-12.

345. Shugart was manufacturing double-sided floppy disk drives in the United States on December 6, 1984, including 8-inch and 3-1/2 inch products. Sollman, Tr. 113.

346. In January 1985, Xerox formally announced the closing of Shugart at a time when it employed 1,400 individuals. Sollman, Tr. 111.

347. Shugart manufactured a 3-1/2 inch double-sided floppy disk drive at Sunnyvale, California, in 1982. Sollman, Tr. 113-14, 116-17.

348. Following a meeting in May 1982 with Dysan Corporation's president, Shugart formed a venture group to pursue the design and development of the 3-1/2 inch drive. Sollman, Tr. 116-18, 119. A small company environment was created, and the best engineers from Shugart were picked for the engineering organization. The project was located at Sunnyvale, California, and used for production high-volume automated lines. Sollman, Tr. 119-20.

349. Single-sided 3-1/2 inch drives were introduced into the marketplace in April 1983. Sollman, Tr. 120-21.

350. In October 1983, a double-sided version of the 3-1/2 inch drive was introduced. Sollman, Tr. 121. The double-sided 3-1/2 inch drive employed Tandon's patented technology. Sollman, Tr. 120, 121.

351. Evaluation sales were made of the 3-1/2 inch double-sided disk drives to 15-20 accounts, including Apple Computer, Wang, Convergent Technologies, Nixdorf, and Honeywell-Bull. Sollman, Tr. 123-24.

352. Approximately 2000-3000 double-sided Shugart 3-1/2 inch drives were sold in 1983. Sollman, Tr. 125.

353. On December 6, 1984, Shugart had plant capacity for 100,000 3-1/2 inch double-sided floppy disk drives per year located in Sunnyvale, California. Sollman, Tr. 126-27.

354. At the time of the fall 1982 Comdex show, there were nine United States manufacturers of double-sided floppy disk drives: Qume, Shugart, Control Data, Remex, MFE Corporation, Siemens, Micropolis, Micro Peripherals, and Tandon. Sollman, Tr. 88-90; CX 678, at DT 11-11, DT 13-13.

355. Qume is not profitable. Qume went offshore to Taiwan in November 1982 although some modest United States production remains. With IBM's termination of the IBM PCjr contract, Qume may not be able to continue in the marketplace. Qume is not a Tandon licensee. Sollman, Tr. 131-32;• CX 616-21, 696.

356. Shugart has essentially closed its doors. Sollman, Tr. 132.

357. Control Data Corporation recently laid off 950 employees and is planning to move production offshore. Sollman, Tr. 132.

358. Remex went out of business in 1983. Remex is not a Tendon licensee. Sollman, Tr. 132; CX 616-21, 696.

359. MFE Corporation went out of business in 1983. MFE Corporation is not a Tandon licensee. Sollman, Tr. 132; CX 616-21, 696.

360. Siemens went out of business in late 1983 or early 1984. Siemens is not a Tandon licensee. Sollman, Tr. 132-33; CX-616-21, 696.

361. Micropolis is still in business as a corporation but withdrew from the floppy disk business in 1984. Micropolis is not a Tendon licensee. Sollman, Tr. 133-34; CX 616-21, 696.

217

362. Micro Peripherals went out the business in. mid-1984. Sollman, Tr. 134.

363. Tandon is currently the remaining strong domestic participant in the double-sided floppy disk drive market. Sollman, Tr. 134.

364. A total of 25 floppy disk drive manufacturers were headquartered in the United States as of December 1982 and December 1983. By December 1984, there were only 20 floppy disk drive manufacturers in the United States. During 1984, seven manufacturers of floppy disk drives in the United States *ceased* production, went into bankruptcy, or were sold to foreign corporations, including Amlyn, Hi-Tech Peripherals, Micropolis Corp., Remex, Tabor, and World Storage Technology. Additionally, in February 1984, Xerox Corporation, which owned Shugart, sold its 5-1/4 inch floppy disk drive line to Matsushita. CX 677-79; Heidi, CX 711, at 40.

8. Tandon Head Assemblies.

365. In 1975, Tendon first sold floppy disk drive heads and head assemblies to disk drive manufacturers. TRX 48, at 040634.

366. Tendon was incorporated in California in February 1976. During its first year of operations, the company established itself as a leading manufacturer of flexible disk drive recording head assemblies. CX 666, at 1.

367. In 1976, Tendon captured about 80 percent of the total floppy disk drive head assembly market. TRX 48.

368. In 1977, Tandon developed and patented its first double-sided head assembly. CX 665, at 018632.

369. From 1977 to 1981 Tendon sold head assemblies and components for head assemblies. Huenemeier, Tr. 426-28.

370. Tandon continued to sell recording heads directly to customers in fiscal year 1984. CX 666, at 22.

371. In fiscal 1984, Tandon's net unit sales of head assemblies totaled , while its net unit sales of disk drives totaled CX 709.

372. Since its formation, Tandon has utilized offshore manufacturing in India on a contract basis for high volume production of labor intensive components and various completed products. CX 666, at 2.

373. In 1979, some Tandon head assemblies were assembled in India. MRX 31, at 24378-79..

374. The manufacture of head assemblies was the first component moved by Tandon overseas because of the relatively large amount of labor involved in manufacture of this component. Sirjang Tandon, TRX 26E, at 221.

375. Beginning about June 1978, Tandon had contracted *with* Tandon Magnetics (India) Pvt., Ltd. (TMI), for the assembly and testing of certain ferrite recording head and disk drive products. TRX 47, at 022892-94.

376. Tandon contracted with TMI concerning conditions governing TMI's assembly and testing in Bombay, India, of certain ferrite recording heads and disk drives for Tandon. The contract (Tandon/TMI contract) is due to terminate on . TRX 47, at 022892-94, 022900.

377. The specific services to be performed by TMI under the Tandon/TMI contract, and the dates of such performance, is determined pursuant to purchase orders issued by Tandon during the term of the contract.

According to the terms of the contract, in each purchase order the date desired by Tandon for completed assembly and shipment to Tandon is specified, and as is the price information. TRX 47, at 022893.

C **378. According to the Tandon/TMI contract,**

C

C

C

C

C . **TRX 47, at 022895.**

C **379. According to the Tandon/TMI contract,**

C

C

C . **TRX 47, at 022899.**

380. According to the Tandon/TMI contract, Tandon provides TMI with all equipment, material, and know-how, and TMI provides reasonably sufficient structural facilities and a skilled labor force (with regard to the performance of the specified services). .TRX 47, at 022896.

C **381. According to the Tandon/TMI contract,**

C

C . **TRX 47, at 022896.**

C **382. According to the Tandon/TM/ contract,**

C . **TRX 47, at 022898.**

383. Mr. Huenemeier was unaware whether Tandon had any suppliers of double-sided floppy disk drive head assemblies other than TM' from December 1984 to the present. Huenemeier, Tr. 464.

384. In 1984, Tandon listed the Indian facility as the only Tandon facility producing head assemblies. TRX 48, at 040636-37.

385. Head assemblies for the following double-sided floppy disk drives of Tandon are assembled offshore in India and subject to quality control in India: TM 50, TM 65-2, TM 65-4, TM 100-2, TM 100-4, TM 101-4, and TM 848. Huenemeier, Tr. 437-39, 446-48, 509, 522.

386. The head assemblies used in the Tandon TM 848-2, are bought from TMI by Tandon Associates in India, and Tandon obtains them from Tandon Associates. Huenemeier, Tr. 438, 441-42.

387. Tandon Associates is separate from Tandon Corporation and . provides the service of being the representative of all of the contract facilities in India. Huenemeier, Tr. 442.

C 388. The head assemblies for all TM 848s produced in October-December 1984 were assembled in India. Huenemeier, Tr. 437, 509.

389. Tandon does not currently manufacture commercial quantities of head assemblies in the United States. Huenemeier, Tr. 799.

390. Any manufacture in the United States by Tandon of head assemblies is limited to engineering and development programs, and small initial production runs of less than 100 units. Huenemeier, Tr. 799.

391. The head assemblies for Texas Peripherals' TM 65-1 and TM 65-2 C come from . The head assemblies for Texas Peripherals' TM 10-0 come from C . Hochman, Tr. 1633.

392. Texas Peripherals procures all of its double-sided head assemblies from TMI through Tandon. Huenemeier, Tr. 474-75.

393. Lafe, a supplier of head assemblies located in Taiwan or Korea, probably suppliers all head assemblies for MPI. Ousley, T . 697-98:

394. Through 1984, Shugart obtained 60 percent of its head assemblies from Mexico. Sollman, Tr. 199, 201.

395. The license agreement between Tandon and Matsushita specified C that,

. TRX 55, at 027632.

C. Tandon -- Disk Drives.

396. Tandon began manufacturing complete double-sided floppy disk drives in 1979. By 1982, Tandon had become the largest independent (not including production for captive use) manufacturer of floppy disk drives sold to OEMs. Complaint, 1 12(h); CX 678, Table 5.

397. Tandon's net sales for fiscal years 1982, 1983, and 1984 were $150,490,000, $303,369,000, and $400,792,000, respectively. For the same years, floppy disk drives accounted for 89 percent, 82 percent, and 80 percent of its net sales. CX 666, at 2, 29.

398. Tandon currently produces the following models of double-sided floppy disk drives: the TM 100, a 5-1/4 inch full-height floppy disk drive; the TM 65, a 5-1/4 inch half-height, direct drive floppy disk drive; the TM 848, a 8-inch, half-height direct drive floppy disk drive; the TM 50, a 5-1/4 inch half-height belt-driven floppy disk drive; and the TM 101, a modification of the TM 100. Ruenemeier, CX 722, at 5.

399. In fiscal year 1984, approximately percent of Tandon's total floppy disk drive business was double-sided. Serge, CX 717, at 2.

222

400. Tandon manufactures all of its TM 848, 8-inch half-height floppy disk drives in the United States at Chatsworth, California. In fiscal C year 1984, Tandon's net sales of TM 848's was $. CX 709; Serge, CX 717, at 3.

401. Tandon's offshore and domestic manufacture for fiscal year 1984, ending September 30, 1984, by model number, is as follows: •

	Model	Offshore Units	Domestic Units	Total
C	TM 50			
C	TM 55/55D			
C	TM 65			
C	TM 100			
C	TM 101			
C	TM 848			

(1) These figures reflect manufacture of both single- and double-sided disk drives. Serge, CX 717, at 3-4; Serge, Tr. 871.

402. For the first quarter of fiscal 1985 (October-December 1984) C Tandon produced TM 100s in Singapore, TM 50s and TM 65s C in India, and TM 848s in the United States. SRX 176, at 5.

403. Anthony Francis Serge is the corporate costs control manager of Tandon Corporation, and has been employed by Tandon since February of 1982. Serge, CX 717, at 1-2.

404. Mr. Serge conducted a value-added analysis for Tandon-produced floppy disk drives that relied on profit and loss statements, bills of material, other cost related reports, and shipping records. Serge, CX 717; Serge, Tr. 859-59.

405. Mr. Serge's value-added analysis was based on April-June 1984 data, but Mr. Serge testified that the information is representative of current activity and costs. Serge, Tr. 862, 864.

406. With the exception of the TM 100, Tandon's records for floppy disk drives do not separate single-sided and double-sided drives. Serge, Tr. 858.

407. Based on Mr. Serge's analysis, the following costs and percentages of total product cost are attributable to the activities performed by Tandon in the United States:

	TM 50		TM 65	
	$/unit	percent	$/unit	percent
Material:				
C Labor Value-Added				
C Material Variance				
C Material Support				
C Labor Support				
Engineering:				
C Corporate				
C Divisional				
Marketing:				
C Corporate				
General & Admin:				
C Corporate				
C Divisional				
C Customs:				
Foreign Value-Added:				
C Singapore				
C India				
C TOTAL COST:				

Serge, CX 717, at attachments A-1 to D-1.

408. Based on Mr. Serge's analysis, the following' costs and percentages of total product cost are attributable to the activities performed by Tandon in the United States:

	TM 100		TV 101	
	$/unit	percent	$/unit	percent
Material:				
C Labor Value-Added				
C Material Variance				
c Material Support				
C Labor Support				
Engineering:				
C Corporate				
C Divisional				
Marketing:				
C Corporate				
General & Admin:				
C Corporate				
C Divisional				
C Customs:				
Foreign Value-Added:				
Singapore				
C India				
C TOTAL COST:				

Serge, CX 717, at attachments A-1 to D-1.

409. Mr. Serge considered that based on his analysis, value-added in C the United States accounted for percent, percent, percent, and percent of the production costs for the TM 50, TM 65, TM 100, and TM 101 floppy disk drives, respectively. Serge, CX 717, at 5

410. Based on a Tandon Corporation income statement of November C 1984, United States costs in April-June 1983 accounted for percent of the combined production cost of T.1 100s and TM 101s. In July-September 1984, this C percentage fell to percent. CX 709.

411:1 Tancon's cost data for the TM 50 are based upon schedules which refer to the single-sided TM 50 floppy disk drive because during fiscal year 1984, the TM 50 was predominantly a single-sided product. Serge,: Tr. 869-70.

412. Cost data for the TM 100 represent both single-sided and double-sided drives. Cost data for the TM 65 and TM 101 represent double-sided drives only. Serge, Tr. 878-79.

413. The components of material costs include the per unit labor cost for testing and packing in the United States ("Labor value added"), customs duties (for the TM 100 and TM 101 only), material variance (for the TM 100 and TM 101 only), material support overhead (for the TM 50 and 65 only), and labor support overhead. Serge, CX 717, at 6.

414. According to Dr. Baled, "burn-in" testing of disk drives at Tandon involved placing disk drives on racks and plugging them in. This test involved no extensive manual labor and lasted about four hours. 'Midi, Tr. 1181-83.

415. For the TM 50, U.S. labor costs for testing and packing C accounted for perdent of the total unit cost of production, while for the C TM 65, TM 100, andTM 101;:these costs accounted for percent, percent, C and percent, respectively, of the total unit cost of production. Serge, CX 717, attachments B-1, B-2, D-1, D-2, A-1, A-2, C-1, C-2.

C 416. For the TM 100 and TM 101, customs duties acbounted for percent and percent, respectively, of the total unit cost of production. Serge, CX 717, attachments A-1, C-1.

417. Material variance represents those components, parts, or supplies that are necessary in the operation due to shrinkage, scrapping, or damage of the product, that are generated through the inspection and quality assurance of imported disk drives. Serge, Tr. 885-86.

C 418. Material variance accounted for percent of the total unit C cost of production for the TM 100, and percent of the total unit cost of production for the TM 101. Serge, CX 717, attachments, A-1, C-1.

419. Material overhead (support) represents costs for receiving, inspection, and planning groups as a function of disk drives as they enter Tandon. This cost is included in Tandon's inventory costs. Serge, Tr. 885.

C 420. Material overhead costs for the TM 50 accounted for percent of the total unit cost and for the TM 65, percent of the total unit cost. Serge; CX 717, attachments B-1, D-1.

421. Labor overhead (support) represents administrative, supervisory, quality control, quality assurance, quality engineering, and product support costs. Serge, Tr. 886.

422. Labor overhead costs were allocated equally between the four C product lines at $ per unit. This represents percent, percent, C percent, and percent, respectively, of the total unit cost of the TM 50, TM 65, TM 100, and TM 101 disk drives, respectively. Serge, CX 717, attachments B-1, D-1, A-1, C-1.

423. Unit engineering costs were calculated on both the corporate and divisional levels. Corporate unit engineering costs were calculated by multiplying total corporate engineering costs by an "effort" variable of which represents the percentage of floppy disk drives to total product shipped by Tandon in April-June 1984. The engineering cost, attributed to floppy disk drives was then divided by the total. number of disk drives sold ih April-June 1984 to arrive at a per unit corporate engineering cost. Corporate engineering costs include research and development (R&D) costs. Serge, Tr. .$7274, 887, 897-98, 985; CX 717, at 7.

424. Of the $1.6.3, million. spent on research and development by Tendon in fiscal year 1584,- $7.5 million was spent on floppy disk_drive R&D. Haldi, Tr. 1223.

425., Mr. Serge, testified that the R&D costs he used in his value added analysis d,id not include R&D for non-floppy disk products, although R&D for media manufacturing, pleated media manufacturing, or Winchester subsystem development may have been included in the R&D allocated to floppy disk drives. Serge, Tr. 990-93.

C 426. For each product line, the unit engineering cost was $
C This represents percent, percent,. .percent, and percent of the total unit cost of the TM 50, TM 65, TM 100, and TM 101 disk drives, respectively. Serge, CX 717, attachments 131, D-1, A-1, C-1.

427.. In addition to corporate-wide engineering functions, each of the operating divisions maintains its, own engineering staff, which includes sustaining engineering. for the products developed by that division. See FF 453. Total "divisional" engineering costs are multiplied by the effort
C variable of , and then divided by the total number of floppy disks sold, to arrive at a divisional unit engineering cost. Serge, Tr. 872-73; Serge, CX 717, at 7.

228

428. Sustaining engineering is a continuing engineering process to handle problems that come up on existing products. Serge, Tr. 874; see FF 453.

429. For each product line, the divisional unit engineering cost was C $, and represents percent, percent, percent, and percent of the total unit cost of the TM 50, TM 65, TM 100, and TM 101 disk drives, respectively. Serge, CX 717, attachments B-1, D-1, A-1, C-1.

430. Engineering is a stand-alone department, and engineering costs are separate from labor support costs. Serge, Tr. 886-87.

431. The marketing unit cost is based on an allocation of total C corporate marketing costs to floppy disk drives based on the effort variable. This cost is then divided *by* the total number of floppy disk drives to arrive at a unit marketing cost. Serge, Tr. 887-88; Serge, CX 717, at 7.

432. Marketing costs include salaries, commissions expenses, advertising, technical or engineering support provided by the marketing group C (product specs), technical documentation, and departmental overhead associated with marketing and product support operations. Serge, Tr. 880.

C 433. For each product line, the. unit marketing cost was $, and C represents percent, percent, percent, and percent of the total unit cost of the TM 50, TM 65, TM 100, and TM 101 disk drives, respectively. Serge, CX 717, attachments B-1, D-1, A-1, C-1.

434. General and administrative costs are broken out between corporate and divisional general and administrative costs. These costs are c calculated by application of the effort variable of to total general administrative costs. Unit costs are then calculated by dividing these costs by the number of disk drives. Serge, Tr. 887; Serge, CX 717, at 7.

435. General and administrative costs encompass the executive offices and officers, the finance departments, the personnel and payroll departments, as well as the operational management that may fall within the division as opposed to the executive levels. Serge, Tr. 881.

436. For each product line, the corporate general administrative C unit cost was $, and represents percent, percent, percent, C and percent of the total unit cost of the TM 50, TM 65, TM 100, and TM 101 floppy disk drives, respectively. Serge, CX 717, attachments B-1, D-1, A-1, C-1.

437. For each product line, the divisional general administrative C unit cost was $, and represents percent, percent, percent, and C percent, respectively, of the total unit cost of the TM 50, TM 65, TM 100, and TM 101 floppy disk drives. Serge, CX 717, attachments B-1, D-1, A-1, C-1.

438. In fiscal year 1984, Tandon leased buildings for its principal executive offices and domestic manufacturing operations in Chatsworth, Simi Valley, Thousand Oaks, San Jose, and Santa Clara, California, which occupied 515,000 square feet. CX 666, at 18.

439. Currently, Tandon's leased buildings in the United States occupy 448,000 square feet. Huenemeier, CX 722, at 2.

440. Tandon's facility at Simi Valley is not involved in the assembly of floppy disk drives, but has a Winchester disk drive facility, a printed circuit board assembly operation, and some warehouse space. Printed circuit boards are used in floppy disk drive production. Huenemeier, Tr. 429.

441. Tandon's facility at Santa Clara is not involved in the production of floppy disk drives. Huenemeier, Tr. 432-33.

442.1 The research and development group at Santa Clara is primarily involved in R&D for Winchester disk drives, but may have been assisting Microtek (see FF 475-92) in its endeavors with regard to the 3-1/2 inch product. Huenemeier, Tr. 491.

443. Tandon's facility at Thousand Oaks houses the Voyager Division, which makes computer sub-system and computer systems. Huenemeier, Tr. 430-31.

444. Tandon's Chatsworth facility occupies seven leased buildings c occupying approximately square feet. Approximately employees at Chatsworth are devoted to floppy disk drive manufacture and related .activities, such as marketing, administration, and research and development. Elsner, CPX 33, Interrogatory No. 4; CPX 33 at 189-90; see also Huenemeier, CX 722, at 12.

C 445. Of the square feet and employees devoted to floppy disk drive manufacturing at Chatsworth, TM 848 manufacturing occupies about sauare feet and and employs employees. Elsner, CPX 33, Interrogatory No. 4; CPX 33, at 191.

C 446. In the remaining square feet, about employees are engaged in warehousing, administration, finance, and other corporate-related functions. Elsner, CX 33, at 191-92.

447. With the exception of development of the 3-1/2 inch disk drive, all research and development for Tandon's floppy disk drives is done in the United States at Tandon's Chatsworth facility. The Tandon's Chatsworth R&D C facility includes approximately square feet of building space, C offices, full-test and evaluation laboratories, engineers, C technicians, document control individuals, and drafting employees. Huenemeier, CX 722, at 10.

443. R&D expenses accounted for 5.0 percent of net sales in fiscal 1983 and 4.0 percent in fiscal 1984. CX 666, at 23.

449. All R&D and engineering in connection with the original design of Tandon's TM 100s and TM 101s (assembled in Singapore and at TP), TM 50s (assembled in India), and TM 65 (assembled in India and at TP), has been conducted in the United States. All drawings and specifications defining the product as a result of such R&D and engineering were prepared in the United States. All engineering prototypes were assembled and tested in the United States to insure that the design met the product objectives. Huenemeier, CX 722, at 12-13.

450. The R&D and the production of engineering prototype units And pilot production for the TM 100s, TM 101s, TM 65s and TM 50s had been completed by December 6, 1984. Huenemeier, Tr. 498-99.

451. The development of the double-sided TM 100 took place between 1978 and 1979. Huenemeier, Tr. 443.

452. The development of the TM 848 double-sided disk drive took place in the 1980 to 1981 time frame. Huenemeier, Tr. 444.

453. After a product is in production, production problems are occasionally confronted which require technical evaluation and solution. This evaluation is customarily performed by manufacturing engineers and is referred to as "sustaining engineering." In addition, after a product is in production, there are ongoing efforts to improve the production process both in terms of enhancing the quality of the product and in reducing costs. With respect to Tandon's floppy disk drives produced overseas, all or virtually all of such sustaining engineering has been and continues to be performed by Tendon in the United States. Huenemeier, CX 722, at 15-16.

454. According to complainant's economic expert, R&D activities in the flexible disk drive industry take place at a pace that is independent of current production, and they take place at a site that is removed from current production. R&D activities tend to be of a non-recurring nature, where production tends to be a highly repetitive flow process down an assembly line. Haldi, Tr. 1272.

455. Primarily as a result of Tandon's restructuring of its manufacturing operations to emphasize offshore production of mature product lines, Tandon's employment in the United States during fiscal year 1984 decreased to 1,605 as of December 1, from a level of 3,300 a year earlier. Employment in Singapore increased from 2,500 to 2,997 over the same period. CX 666, at 18.

456. Tandon contracts with various companies in India for the assembly or purchase of component used by Tandon in its final products and for the purchase of complete half-height 48 TPI 5-1/4 inch flexible disk drives. CX 666, at 11.

457. The Indian companies include Tendon Magnetics (India) Pvt., Ltd. (TMI), which assembles recording heads and certain labor-intensive disk drive sub-assemblies; Tandon Motors Pvt., Ltd. (TMM), which manufactures precision stepper motors used in Tandon's flexible and rigid disk drives; Barnala Electronics (Barnala), which manufactures harness assemblies for use in Tandon's disk drives; Tancom Electronics (Tancom), which manufactures; rigid disk drive recording heads; and Eastern Peripherals Pvt., Ltd. (Eastern Peripherals), which manufactures completed half-height 48 TPI 5-1/4 inch flexible disk drives. CX 666, at 11.

458. TMI provides contract assembly services to Tandon pursuant to an agreement under which Tandon provides TMI with the raw materials and know-how required for the assembly of recording heads and disk drive subassemblies, and TMI uses its best efforts to perform all assembly operation requested by Tandon. This agreement will extend to December 1, 1985, at which time it may be extended by mutual agreement or terminated by either party. CX 666, at 11-12.

459. Finished products and components are purchased directly by Tandon from TMM, Barnala, Tancom, and Eastern Peripherals pursuant to standard purchase orders placed by Tandon, and there are no long-term purchase commitments from Tandon to any of the Indian companies. CX 666, at 12.

460. The contract assembly and purchase transactions between Tandon and the Indian companies are coordinated and effected through Tandon Associates, Inc., which acts on behalf of the various Indian companies and directly invoices Tandon at prices reflecting a mark-up for the services of Tandon Associates for the products and services of the Indian companies. CX 666, at 12.

C 461. The Indian companies manufacture approximately C TM 50s a month, of which about are offered for sale in the United States. Prior to January 1985, all TM 50s shipped to the United States were inspected at Chatsworth. In January 1985, the disk drives were subjected to standard 105(d) evaluation, which includes testing the first 100 drives received in each shipment and then 80 of the next 1,000 drives selected randomly. If 10 percent of this selected group fails the testing, then the entire shipment is pulled for re-examination. Ruenemeier, CX 722, at 9-10.

462. The 105(d) evaluation of Indian-assembled di'sk drives at Chatsworth was made in conjunction with the successful implementation of certain inspection criteria in Bombay as of January 1985. Huenemeier, Tr. 490.

463. Quality control on Tandon's TM 65-4, TM 65-2, and TM 50 is performed by Eastern Peripherals in India, the sole place of manufacture. Huenemeier, Tr. 450-51.

464. Eastern Peripherals has produced half-height flexible disk drives of the single- and double-sided variety in the quantities of 60,000 to 80,000 per month. Huenemeier, Tr. 784.

465. Tandon's wholly-owned subsidiary in Singapore is Tandon Singapore Ltd. This subsidiary manufactures the TM 100, the TM 101, and certain Winchester disk drives. Huenemeier, CX 722, at 6.

466. Double-sided TM 100s are assembled only in Singapore. Huenemeier, Tr. 449.

467. Tandon Singapore Ltd. currently produces about TM 100s C a month, of which units are shipped to Chatsworth. Huenemeier, CX 722, at 10.

468. All of the TM 100s that are shipped to Chatsworth from Singapore are subjected to quality control at Singapore, and then subjected to 105(d) sample testing at Chatsworth. Huenemeier, Tr. 473.

469. Approximately 149,000 of the 150,000 TM 100s produced in Singapore are double-sided. Huenemeier, Tr. 490.

470. Approximately 129,000 of the 150,000 TM 100s produced in Singapore are quality-tested in Singapore and then drop-shipped directly to IBM in Singapore. Huenemeier, Tr. 490-91.

471. All warranty repairs and service on the TM 100 units drop shipped to IBM in Singapore are currently performed in Singapore. Huenemeier, CX 722, at 18.

C 472. Tandon

C

C . Huenemeier, Tr. 295-96.

C 473. Tandon

. Huenemeier, Tr. 297.

474.

. Huenemeier, Tr. 528.

D. Tandon Microtek.

475. Tandon is currently developing a family of 3-1/2 inch double-sided disk floppy drives (the 304, 306, and 308) in San Jose, California, at its Microtek subsidiary. Huenemeier, Tr. 287-88; See CX 666, at 7.

476. Tandon has completed its engineering prototype activities on the TM 306 and pre-production involving 50-100 units of TM 304s and TM 306s has started at Microtek for the purpose of providing samples to Tandon's marketing organization. Huenemeier, Tr. 289.

C 477. Tandon's Microtek subsidiary occupies square feet of C manufacturing space and employs about persons with respect to the design and development of the TM 300 series of 3-1/2 inch double-sided disk drives. Microtek has acquired tooling for the manufacture of these drives and intends to commence production in San Jose, California, as soon as an order of commercial production has been received. Huenemeier, CX 722, at 26.

478. Microtek has acquired tooling for the purpose of commercial production of the TM 304 and TM 306. The cost of this tooling was $400,000. ProductiOn tooling comprises the various molds and jigs that are used to fabricate the piece parts that are used in the assembly of the flexible disk drive. Huenemeier, Tr. 289-90.

479. Tooling purchased by Microtek for the 3-1/2 inch dbuble-sided floppy disk drive would be located at vendors who would supply various parts for which they are tooled, including the chassis and other parts. Haldi, Tr. 1212-13.

480. For research and development regarding the TM 300 series,

C Tandon has spent anywhere from $ to $ and has employed from

C employees, primarily engineers. Huenemeier, Tr. 294.

481. Microtek has sold evaluation units of its TM 304 and TM 306 to customers. Abraham, Tr. 1019.

482. In order for Microtek to commence production of 3-1/2 inch disk drives in commercial quantities, parts would have to be ordered into production from Microtek's vendors, workers would have to be hired and trained to commence assembly of the parts into a disk drive, and quality control inspection and testing procedures would have to be set up. This process would take 90 to 120 days. Haldi, Tr. 1275-76.

483. It would take 90 to 120 days to achieve volumes in the 10,000 unit per month range for TM 300 series drives at Microtek. Huenemeier, Tr. 291; Haldi, Tr. 1196.

484. Production at Microtek at the 10,000 unit per month level would employ 100 to 250 workers, with about 50 percent being direct production personnel and the remaining being engineering and support personnel. Huenemeier, Tr. 292-93.

485. According to Mr. Huenemeier, the Microtek facility has the capacity to produce 20,000 to 30,000 3-1/2 inch flexible disk drives per month. Huenemeier, Tr. 292.

486. Currently, Microtek has no production orders for 3-1/2 floppy disk drives, and has no plans to produce these drives for inventory purposes. Huenemeier, Tr. 752.

487. Orders are being solicited by Microtek for double-sided 3-1/2 inch disk drives. Huenemeier, Tr. 753.

488. If production orders are received at Microtek for the 3-1/2 inch disk drive, initial production would be at Microtek. Huenemeier, Tr. 753.

489. Based on initial expectations of large-volume orders, Nicrotek had plans to move production of the TM 306 offshore in late 1984. Huenemeier, Tr. 754. 4*Ww,

490. Microtek may determine to move manufacture of its 3-1/2 inch disk drive offshore, if demand conditions warrant such a move. Haldi, Tr. 1246-47.

491. Microtek currently produces Winchester disk drives which it sells to the OEM market. Huenemeier, Tr. 433, 756.

492. Mr. Huenemeier believes that the TM 35 (another 3-1/2 inch drive that Tendon had been developing) never went into production because the TM 35 program was scrapped in favor of a program that would meet the specifications of IBM. Mr. Huenemeier believes that the TM 308 of the TM 300 series at Microtek was designed to meet IBM requirements. Muenemeier, Tr. 457-58.

E. Texas Peripherals.

493. Effective January 1, 1985, Tendon entered into a joint venture agreement with Tandy Corporation for the joint ownership and operation of Texas Peripherals (TP), a Fort Worth, Texas manufacturer of full-height, 5-1/4 inch flexible disk drives. CX 666, at 14; CX 619.

494. Tendon and Tandy each own equal interests in TP, and revenues and profits are divided equally between Tandon and Tandy. In fiscal year 1984, Tendon was allocated $808,416 in profit from the TP venture. CX 666, at 14.

495. The joint venture agreement provides that TP will sell its products exclusively to only Tandy and Tendon unless otherwise agreed to by Tandy and Tendon. During fiscal year 1984, substantially all production of TP was purchased by Tandy. CX 666, at 14.

496. The initial cost to Tendon for joining the joint venture was the contribution of Tandon's half-height flexible disk technology, as well as a payment of approximately $1.9 million. Huenemeier, Tr. 302.

497. TP facilities currently consist of approximately 87,000 square feet of manufacturing and commercial space. CX 666, at 14.

498. Approximately 350 to 360 persons are employed by TP. Hochman, Tr. 1648; CX 666, at 14.

499. The current representatives of the TP joint venture committee are Herschel Hochman, the general manager of TP; Dr. Patterson, a vice president of Tandy; Jim Mortenson, a vice president of Tandy; Steven Huenemeier of Tandon; and Dennis Trafficante, a vice president of Tandon. Huenemeier, Tr. 299.

500. During 1982 and 1983, TP manufactured a full-height 5-1/4 inch single-sided drive called the TM 100-1, as well as an 8-inch flexible disk product. Huenemeier, Tr. 300.

501. Tandy had received a license from Tandon to produce a single-sided TM 100, and that license was used for TM 100-1 production at TP during 1982-1983. Huenemeier, Tr. 300.

502. From 1982 to 1983, approximately 20,000 to 25,000 single-sided TM 100s per month were manufactured by TP for sale to Tandy. Huenemeier, Tr. 301.

503. Since December 1984, TP has been assembling single-sided TM 100s, and single- and double-sided TM 65s. Hochman, Tr. 1632.

504. From January to December 1984, TP produced single-sided TM 100s. Huenemeier, CX 722, at 8.

505. In late 1984, TP commenced production of 5-1/4 inch half-height double-sided floppy disk drives referred to as the TM 65. TP has actually assembled approximately double-sided TM 65s. Huenemeier, CX 722, at 8; Tr. 1614.

506. Most of the TM 65-2 double-sided disk drives produced by TP were . The cost of the was. c approximately $ per unit. Some TM 65-2 drives were manufactured , but the percentage of drives produced from C is unknown. Hochman, Tr. 1613-14.

C 507. Tandon has purchased double-sided TM 65s from TP. Huenemeier, CX 722, at 8.

508. TP received a purchase order from Tandy Home Computer dated October 9, 1984 for 6,000 TM 65-2 double-sided floppy disk drives. These disk drives were to be delivered over a three month period commencing in October or November of 1984. CX 707; Huenemeier, Tr. 361-62;

C 509. To date, TP has shipped double-sided disk drives to Tandy. Huenemeier, CX 722, at 8.

F. Control Data Corporation/Magnetic Peripherals.

510. Control Data Corporation (CDC) is a majority (67%) owner of Magnetic Peripherals, Inc. (MPI). The other owners of MPI are Honeywell, Sperry, and Bull. Flexible disk drives are produced by the subsidiary, MPI. Ousley, Tr. 629, 691.

511. MPI manufactures disk drives solely for CDC for sale to the OEM market. Ousley, Tr. 631.

512. CDC has a license from Tandon with respect to Tandon's patent on double-sided disk drives. Ousley, Tr. 632; CX 620.

513. CDC became a Tandon licensee on September 30, 1984. Ousley, Tr. 702; CX 620.

C 514. Approximately percent of the 5-1/4 inch full height disk C drive production in 1983 and 1984 was double-sided. of the 5-1/4 inch half-height product was double-sided in 1984. Ousley, Tr. 649-50.

515. The 8-inch double-sided floppy disk drive product line C accounted for about percent of CDC/MPI orders in 1984. Ousley, Tr. 649.

516. In 1983, CDC/MPI had approximately 20 percent of the full-height disk drive market and a minimal share of the half-height market. Ousley, Tr. 633.

517. In 1984, CDC/MPI had approximately 10 percent of the total 5-1/4 inch market, with approximately 20 percent of the full-height and 10 percent of the half-height markets. Ousley, Tr. 633, 703.

518. The estimated maximum production capacity at CDC in Oklahoma is 550,000 drives. Ousley, Tr. 669.

519. Presently, CDC/MPI his about two percent of the half-height market. In the full-height market, CDC/MPI's market share may have increased from 20 percent because the total market has declined, but no actual market share was available. Ousley, Tr. 633-34.

520. The 5-1/4 inch double-sided full-height and half-height floppy disk drives manufactured by CDC/MPI were originally designed in Oklahoma City. Ousley, Tr. 634-35.

521. In 1983, CDC/MPI employed approximately 350 persons in Oklahoma City in the manufacture of floppy disk drives. In 1984, the number of employees in the floppy disk drive business was between 650 and 675. At the present time, CDC/MPI employs approximately 100 to 150 persons in the floppy disk drive business in the United States, of which 25 are involved in research and development. Ousley, Tr. 641-43.

522. CDC/MPI currently sells 5-1/4 inch full-height floppy disk drives (No. 9409) and 5-1/4 inch half-height floppy disk drives (Nos. 9428 and 9429). Ousley, Tr. 629; CX 728.

523. In 1983, CDC/MPI 's Oklahoma City facilities covered approximately 100,00 square feet, which was devoted to manufacturing. Ousley, Tr. 642.

524. CDC/MPI's decision to move some of its facilities offshore occurred in late September 1984. Implementation of this decision occurred in October 1984, when 450 employees were terminated. Ousley, Tr. 691-92.

525. The decision to move offshore was based on an unstable market c situation in the last half of 1984, when CDC/MPI . CDC/MPI believed that it could produce approximately C $ cheaper offshore on a per unit basis ($ in the United States . compared to $ offshore). Ousley, Tr. 666-67.

526. CDC/MPI continues to assemble and test about percent of its drives in Oklahoma City. This volume will not likely move offshore because it is made up of drives which require special requirements. Ousley, Tr. 668.

527. CDC/MPI currently has capaCity in Oklahoma City to produce half-height drives per month. It would require C months to reach production at that level. Overseas capacity is units C annually (per month). CDC/MPI has inventories of units. Ousley, Tr. 666-68.

528. CDC/MPI contracts with foreign suppliers for its offshore disk drive requirements and is currently purchasing from its foreign supplier at C $ per month. Ousley, Tr. 668-69.

529. Drawings, specifications, manufacturing assembly instructions, and technical support for disk drives manufactured overseas for CDC/MP/ come from CDC/MPI in Oklahoma City. Ousley, Tr. 636-37.

530. Approximately 50 percent of the materials used to assemble drives offshore are currently procured by CDC/MPI in the United States. With the exception of initial qualification of a vendor, testing of incoming parts takes place at the manufacturing site. Ousley, Tr. 637-40.

531. The disk drives that are manufactured offshore are also tested offshore, and quality control for drives produced offshore also takes place in Oklahoma city through a sampling process. Ousley, Tr. 638-39, 699-700.

532. The CDC/MPI activities in connection with identifying and selecting test equipment for quality control .takes place in the United States. Ousley, Tr. 636.

533. CDC/MPI customer liaison, application and engineering support, and service and repair are based in the United States for disk drives produced offshore and in the •United States. Ousley, Tr. 638-39.

534. Lafe, located in Korea, supplies all the head assemblies for CDC/MPI's double-sided disk drives. Ousley, Tr. 698.

535. CDC/MPI currently has parts on hand to build units for 1985, but has firm orders for approximately percent of this total. Current forecast for 1985 sales is about units. Ousley, Tr. 651-52.

536. CDC/MPI attempted to develop a 3-1/2-inch, double-sided floppy_ disk drive, starting in 1983. CDC/MPI initially planned to produce this drive in Oklahoma City, but shelved the product in the fourth quarter of 1984 because of low market prices. Ousley, Tr. 679-81, 700.

537. A rough prototype of the 3-1/2 inch drive may have been shown to customers, but nothing was actually given to a customer. Ousley, Tr. 729.

538. The CDC/MPI 3-1/2 inch floppy disk drive was of a design that worked from a technical standpoint. Ousley, Tr. 682.

539. If market conditions improved and CDC/MPI on the 3-1/2 inch disk drive, CDC/MPI would consider resuming the 3-1/2 inch disk drive project. Ousley, Tr. 682.

540. CDC/MPI has explored 1.6 megabyte drives, which were in the prototype stage in the fourth quarter of 1984. However, this product will not c be pursued because . Ousley, Tr. 686.

541. Production of the 1.6 megabyte drive would have been in Oklahoma City and then most likely moved to the Far East for contract production. Ousley, Tr. 687.

542. CDC/MPI has an inventory of disk drives and has a commitment with an offshore supplier to purchase units. If CDC/MPI c does not purchase the units, it would incur some penalty. CDC/MPI c would go into domestic production C . Ousley, Tr. 709-10.

G. Substitution.

543. All floppy disk drives perform essentially the same storage and retrieval functions for small computers, which means that from both a technical and broad economic perspective all floppy disk drives are potentially substitutes for one another. Haldi, CX 711, at 48; see CX 666, at 14.

544. The economic concept of substitutes includes but goes beyond technical and engineering possibilities of substitution. Not only must it be technically possible to substitute one product for another, but the purchaser must also regard the products as substitutes for each other. Heidi, CX 711, at 48.

545. Competition for the principal floppy drive configurations has come from newer floppy drives offering more capacity, smaller size, or lower price. CX 679, at SUM-16.

546. Disk drives of different diameters compete most intensely at the early design or product planning stage. At other times, competition tends to to be limited to disk drives having the same diameter. Haldi, CX 711; at 52; see Sollman, Tr. 211-12; Abraham, Tr. 1087-89; Ousley, Tr. 718.

547. The following table shows U.S. sales of disk drives by size from 1980 to 1983, and forecasted shipments for 1984 and 1985:

Shipments of Floppy Disk Drives to United States Destinations by All Manufacturers, Domestic and Foreign

(Thousands of Units)

	1980	1981	1982	1983	-3.984(E)	1985(E)
ADD FDD'S	1,258	2,336	3,394	8,169	11,662	15,138
8-INCH						
Single-Side	464	517	449	216	146	73
Two Sides	221	269	401	455	414	346
Total	685	786	850	672	560	419
5.25 INCH						
Single-Side	444	1,287	1,731	3,732	3,840	3,839
Two Sides	129	264	804	3,496	6,198	8,457
Total	573	1,550	2,535	7,228	10,038	12,296
MICROFLOPPIES						
			9	269	1,064	2,423

Haldi, CX 711, at 27.

548. In 1976, the "state of the art" was an 8-inch floppy disk drive incorporated in the Wang desk top computer system. Sollman, Tr. 44.

549. The first shipment of the 5-1/4 inch single-sided disk drive occurred in August 1976. Sollman, Tr. 53-54.

550. At first sales of the 5-1/4 inch disk drive were slow since IBM was using 8-inch disk drives. Sollman, Tr. 53-54.

551. With the explosion of the personal computer market in 1977-1978, the 5-1/4 inch disk drive began to sell. Sollman, Tr. 54.

552. In both 1980 and 1981, sales of 8-inch double-sided disk drives outnumbered sales of 5-1/4 Inch double-sided disk drives in the United States. CX 711, at 27.

553. In 1982, a Tendon customer asked for a quote for both 5-1/4 inch and 8-inch disk drives, and similar request for quotes have subsequently occurred. Abraham, Tr. 1126-27.

554. Tendon seeks customers for the TM 848, including customers that plan to go out of the 8-inch drive computer because of Shugart's exit from the 8-inch disk drive market. The 8-inch drive business is estimated at several hundred thousand drives per year, and Tendon expects to compete with Mitsubishi and one or two other Japanese companies for that business. Abraham, Tr. 1127-30.

555. The market for double-sided 8-inch disk drives is flat. Although there is no new business for the 8-inch drive, there are continuing opportunities with established customers. The marketing window for 8-inCh disk drives is closing due in part to the increase in demand for smaller disk drives. This shift in consumer preference is a long term factor. Abraham, Tr. 1068-69.

556. Dr. Haldi did not include 8-inch disk drives in his analysis because he believed that only 3-1/2 inch and 5-1/4 inch disk drives were being imported, and because the 8-inch disk drive is gradually falling out of the marketplace as an important factor. Haldi was aware of no new computer products that are incorporating the 8-inch disk drive. Heidi, Tr. 1232.

557. The 8-inch disk drive market has declined because of the wealth of software available for 5-1/4 inch and 3-1/2 inch disk drives, and the use by IBM and Apple of 5-1/4 and 3-1/2 inch formats. Haldi, Tr. 1237-38.

558. OEMs initially considered all sizes of drives when designing a new product. For example, in 1982, OEMs considered whether to use an 8-inch drive or a smaller drive, but many settled on a 5-1/4-inch disk drive. Abraham, Tr. 1088.

559. Tendon offers its full repertoire of disk drives, including the 8-inch disk drive, to customers designing a new computer system. However, Mr. Abraham could not remember the last time a new computer system used an 8-inch drive. Few customers currently ask for and consider the 8-inch drive for a new computer *system.* Abraham, Tr. 1130-32.

560. Only in 1978 or 1979 did the smaller size of the disk drive become a critical factor, and this was due to IBM's initial use of a 5-1/4 inch disk drive at that time. Sollman, Tr. 205-06.

561. When the market initially began to expand for 5-1/4 inch disk drives, there was a 5-1/4 inch software shortage. Langer, Tr. 2442.

562. Mr. Sollman first *saw* a single-sided 3-1/2 inch disk drive (the ."microfloppy") in June 1981 at the NCC show. It was produced by Sony. Sollman, Tr. 114.

563. Disk/Trend Report reported the first U.S. shipment of microfloppy disk drives in 1982, when 9,000 units were sold. In 1983, 269,000 units were sold, and Disk/Trend's estimate for 1984 sales is 1,064,000 units. CX 711, at 27.

564. In 1983, only 3.8 percent of total sales of 3-1/2 inch disk drives were double-sided. In 1984, this percentage was estimated at 23.9 percent. CX 679, at DT15-9.

565. Initially, there was no standard size for microfloppy disk drives, and diameters ranged from 3.4 inches to 3.9 inches. The time frame was April 1982. Sollman, Tr. 116.

566. An industry standards committee was formed in roughly Hay 1982, and a standard microfloppy disk size (3-1/2 inches) was agreed to approximately a year later. Sollman, Tr. 118.

567. Shugart introduced a single-sided 3-1/2 inch floppy disk drive in April 1983, and a double-sided 3-1/2 inch disk drive was introduced in October 1983. Sollman, Tr. 121.

568. In 1983, Shugart sold evaluation units of the double-sided 3-1/2 inch disk drive to approximately 15 to 20 accounts. Sollman, Tr. 123-24.

569. Sony began to offer in the United States its Slimline double-sided microfloppy disk drive in the third quarter of 1984. CX 208, at 3.

570. Mr. Sollman described the three levels of factors affecting interchangeability of disk drives. The factors most critical for compatibility are: (1) interchangeability of media from one drive to another; (2) physical interchangeability of one drive for another; (3) whether

different disk drives use the same set of signals, and (4) whether different disk drives use the same set of connectors with the same output. Other less critical factors include the interchangeability of spare parts, the timing of input signals, and power usage differentials. Sollman Tr. 262-63. Other types of compatibility are the disk drive's rotational speed and its track-to-track access time. Sollman, Tr. 22.

571. The major incompatibility between disk drives is in the size (diameter) of the diskette (media) which the disk drives use. Abraham, Tr. 1143-46.

572. A 5-1/4 inch disk cannot be placed in an 8-inch drive. Abraham, Tr. 1090.

573. In terms of media interchange compatibility, a 3-1/2 inch double-sided disk drive cannot be made compatible with a 5-1/4 inch double-sided disk drive. Sollman, Tr. 219.

574. Diskettes are interchangeable between drives of different makes if the diameters of the drives are the same. Abraham, Tr. 1018.

575. In order for data stored on a 5-1/4 inch disk to be transferred to a 3-1/2 inch disk, the data would have to be regenerated, which is a laborious process. Abraham, Tr. 1091-92.

576. Electrical interfacing between 3-1/2 inch and 5-1/4 inch drives is the same for those devices that are quoted as being compatible. Abraham, Tr. 1145.

577. Some Japanese 3-1/2 inch disk drive manufacturers advertise their product as being compatible with 5-1/4 inch disk drives. CX 247.

578. The Sony 0A-D32W is a 3-1/2 inch double-sided floppy disk drive that is interface compatible with an 8-inch disk drive. Mergentime, CX 252, at 73; CX 205, at 750569.

579. The significance of interface compatibility between an 8-inch and a 3-1/2 inch drive is that less redesigning would be required to convert an 8-inch computer system into a 3-1/2 inch computer system. Mergentime, CX 252, at 79-80.

580. Mr. Abraham of Tandon is not aware of a situation where an OEM has replaced an 8-inch drive with a 3-1/2 inch drive. An OEM would unlikely replace a TM 848 (8-inch drive) or TM 100 (5-1/4 inch drive) with a TM 304 or TM 306 (3-1/2 inch drives) in an existing system because of diskette (media) incompatibility. Abraham, Tr. 1016-18.

581. Competition between 3-1/2 inch and 5-1/4 inch drives takes place primarily in the procurement of new products. Ousley, Tr. 718.

582. If a new product is a small desk top or portable computer, customers want the smallest; smallest is best in many cases. OEMs would want to evaluate 3-1/2 inch products for their next generation of machines, even though the current generation machine may be using a 5-1/4 inch disk drive. Ousley, Tr. 718.

583. An OEM could potentially substitute a 3-1/2 inch drive in the *space* formerly occupied by a 5-1/4 inch drive the way OEMs replaced full-height 5-1/4 inch drives with half-height 5-1/4 inch drives, by keeping the larger bezel. Ousley, Tr. 718-19.

251

584. In an existing product, the probability of substitution of 3-1/2 inch drives for 5-1/4 inch drives is less than the substitution of half -height for full-height 5-1/4 inch drives, because the 3-1/2 inch drive differs more in terms of length and width. However, if the 3-1/2 inch disk drive is priced lower than the 5-1/4 inch disk drive, this substitution may be made. Ousley, Tr. 719-20.

585. Media incompatibility complicates the substitutability issue between 3-1/2 inch and 5-1/4 inch disk drives. Ousley, Tr. 720-21.

586. Mr. Ousley was not aware of any cases where CDC had bid on an OEM contract with a 5-1/4 inch disk drive and lost the business to a 3-1/2 inch disk drive. Ousley, Tr. 721.

587. According to Mr. Langer of SONAM, the change from a 5-1/4 inch disk drive to a 3-1/2 inch disk drive would be difficult because it would involve substantial design changes, including size, wiring, and plugs. Langer, Tr. 2416.

588. For several years all 8-inch and 5-1/4 inch full-height disk drives were 3-1/2 inches high. In 1981, Tendon introduced its first 8-inch disk drive which was only 1-3/4 inches high, the half-height disk drive. Half-height drives are expected to replace full-height drives in many of the most widely distributed microcomputer products within the next two years. CX 670, at DT13-7, DT13-11; CX 679, at DT14-4; Haldi, CX 711, at 18A-18B.

589. In many cases, because of a lower price, customers switched from full height drives to half height drives, keeping the full height bezel. Ousley, Tr. 719.

590. TEAC's half-height disk drives competed against full-height disk drives for sales to

.

Brehme, CX 48, at 185-90.

591. In the Spring 1982 NCC show, only Shugart showed a half-height product, which it had developed with Matsushita. Sollman, Tr. 87.

592. In the Fall 1982 Comdex show, half-height disk drives were shown by Tandon, Shugart, and CDC, as well as by 12 to'15 Japanese suppliers. Sollman, Tr. 87.

593. In January 1983, IBM discontinued purchasing full-height disk drives from Tandon and agreed to purchase newer products such as fast-access Winchester disk drives and half-height 5-1/4 inch flexible disk drives for use in microcomputer products. CX 667, at 11.

594. There exists a rapid and broad-based industry trend toward half-height 5-1/4 inch flexible disk drives and higher capacity Winchester disk drives. This trend has resulted in significant and immediate price erosion in earlier models of full-height flexible disk drives. CX 667, at 12.

595. The half-height disk drive allowed miniaturization and at the same time took advantage of the availability of 5-1/4 inch software. Langer, Tr. 2415.

596. The following table shows sales of full-height and half-height double-sided disk drives, by disk drive diameter, for 1980 through 1983, and forecasted sales for 1984 and 1985:

Shipments of Floppy Disk Drives World-Wide, by Diameter and Height

(in Thousands of Units)

	1982	1983	1984(E)	1985(E)
8-INCH DRIVE				
full-height	286.2	241.9	192.4	142.6
half-height	195.3	436.1	491.8	454.9
5-1/4 *INCH*				
full-height	955.1	2,572.5	2,732.8	2,252.8
half-height	314.3	3,107.3	6,189.2	10,132.1"

CX 679, at DT12-10, DT14-13; CX 678, at DT11-10, DT13-13.

596A. With respect to new computer systems, Compaq has switched from a 5-1/4 inch disk drive to a 3-1/2 inch disk drive, and IBM has indicated that it will have a 3-1/2 inch disk drive in its new generation PC. Ousley, Tr. 721.

597. The 3-1/2 inch disk drive is typically sold in a *desk* top or portable computer, but this market has been disappointing in 1985. Software availability has been a problem for the 3-1/2 inch computer market--there are currently about 170-175 software programs available on 3-1/2 inch diskettes, whereas there are about 10,000 software programs available on 5-1/4 inch diskettes. Langer, Tr. 2409-12.

598. According to Mr. Langer of SONAM, it would take nine years for availability of 3-1/2 inch software to match that of 5-1/2 inch software, but this time frame depends on IBM's decision with respect to introduction of a 3-1/2 inch computer, as well as 3-1/2 inch software development. Langer, Tr. 2461-63.

599. The effect of IBM not having introduced a 3-1/2 inch drive computer is that there is practically no market for 3-1/2 inch disk drives. Langer, Tr. 2418-19.

600. If IBM enters the market with a 3-1/2 inch computer, it is likely that other OEMs would follow with 3-1/2 inch machines. Langer, Tr. 2442.

601. Sony's 3-1/2 inch disk drive has a

C . Langer, Tr. 2425-29.

602. According to Mr. Sollman, disk drives have become more like commodity items, where pricing plays a greater role than it did five years ago. Sollman, Tr. 210.

603. Although evaluation of a disk drive by an OEM normally takes from three to six months, if the OEM is using a standard type drive, evaluation may not even be necessary, according to Mr. Sollman. Sollman, Tr. 249-50.

604. A "marketing window' exists when an OEM is in the process of designing a new computer system. The window is open when vendors are being considered and when drives are being evaluated and tested. Once a vendor is chosen, the marketing window is generally closed. Abraham, Tr. 1056-58.

605. Once a vendor is chosen, it is more difficult for another vendor to compete successfully for future business because:

(1) OEMs spend a substantial amount of time and effort to evaluate a vendor's product'from technical and marketing standpoints.

(2) The effort and expense needed to change the-product support, including training of personnel and customers, sales manuals, software and spare parts, substantially prohibits an OEM from changing vendors.

(3) Economies of scale suggests that it is in the interest of the OEM to enter a long term relationship with a vendor because the price is generally lower for larger quantities purchased.

(4) Vendor loyalty frequently influences an OEM to maintain a relationship with a particular vendor whose service has been satisfactory.

Abraham, CX 714, at 3-4.

606. For a customer to switch suppliers, the economic reasons for switching must be stronger than the four reasons a customer has not to switch. Abraham, Tr. 1106-07.

607. The marketing window would open if the selected vendor could not deliver the drives. Reasons for not supplying a drive to a customer would be non-payment by the customer, or customer dissatisfaction with the vendor caused by quality problems with the disk drives or delivery problems by the vendor. Abraham, Tr. 1060-62.

608. The marketing window for double-sided 3-1/2 inch disk drives is currently wide open. Abraham, Tr. 1067.

609. The marketing window for double-sided, higher capacity 5-1/4 inch disk drives *is* wide open with respect to mid to late 1985. Abraham. Tr. 1067.

610. The computer systems sold by OEMs are evolving rapidly, and to remain competitive, an OEM producer must bring into the market a new system with the latest advances as soon as possible, or risk falling behind. Abraham, Tr. 1109-10.

611. For a disk drive to be considered a viable economic substitute as a second source of supply, it must meet the technical specifications of the primary source disk drive as well as look like the primary source drive. Heidi, CX 711, at 52.

257

612. In 1982, Tandon became the largest independent (i.e., noncaptive) manufacturer of floppy disk drives sold to OEMs. Haldi, CX 711, at 39.

613. Tandon is currently the world's largest manufacturer in the market of random access disk drives for micro-computer systems. SRX 172, Tandon Response to Admission No. 86 (Feb. 12, 1985).

614. Tandon is currently the world's largest producer in the market for floppy disk drives. SRX 172, Tandon Response to Admission No. 87 (Feb. 12, 1985).

615. Tandon's net income and growth rate of net income are as follows:

Fiscal Year	Net Income	% Increase over Previous Year
1981	$ 4,505,000	198.9%
1982	$15,735,000	249.3%
1983	$23,658,000	50.4%
1984	$29,436,000	24.4%

Haldi, CX 711, at 39.

616. "Tandon's product philosophy of maximum vertical integration has paid off handsomely, by providing some of the lowest costs in the industry and a high level of control over the firm's ability to grow with demand." 1983 Disk/Trend Report, CX 678, at MFGR-11 (Dec. 1983).

617. Tandon has obtained and retained major accounts for companies with advanced technological knowledge and high performance requirements, including IBM, AT&T, and Tandy. For example, in fiscal year 1984; IBM accounted for approximately 58 percent of Tandon's net sales. IBM has followed the practice of placing orders providing for deliveries over periods not exceeding six months. Haldi, CX 711, at 39; CX 666, at 8.

618. Tandon tests all raw materials and components prior to manufacture and runs mechanical, integrity, and reliability tests on completed floppy disk drives. Haldi, CX 711, at 43.

619. Tandon's research and development expenditures as a percentage of net sales for the last five fiscal years are as follows: FY 1980 - 4.2%; FY 1981 - 5.3%; FY 1982 - 4.0%; FY 1983 - 4.5%; and FY 1984 - 4.1%. CX 666, at 20; Haldi, CX 711, at 43.

620. Approximately $7.5 million of the $16.3 million spent by Tandon in fiscal year 1984 for research and development is Attributable to research and development on floppy disk drives. Haldi, Tr. 1223; see CX 666, at 29.

C 621. Tandon has expended approximately $ on the research and development of the TM 300 series floppy disk drive. Huenemeier, Tr. 294.

622. For fiscal year 1982 through fiscal year 1984, Tandon spent

C on marketing and sales for all its products. Haldi, CX 711, at 43-44.

623. Since 1982, Tandon has participated in the following major industry expositions: June 1982 - National Computer Conference *(NCC);* September 1982 - Peripheral Equipment Expo; November 1982 - Comdex; April 1983 - Comdex; May 1983 - NCC; November 1983 - Comdex; July 1984 - NCC; and November 1984 - Comdex. Haldi, CX 711, at 44.

624. Tandon employees are eligible for disability insurance under the state plan administered by the State of California. CX 670.

625. Tandon provides its full-time employees with Term Life Insurance equal to one year's adjusted pay, Dental Expense Insurance (no cost for employee but contribution required for dependent coverage), and Accidental Death and Dismemberment Insurance. CX 671.

626. Tandon provides its full-time employees the opportunity to join the Performance Plus Savings Plan whereby they may have up to six percent of their pre-tax wages deducted from their paychecks and invested in the plan. Such investments are matched by Tandon (100 percent up to four percent of pre-tax wages, then 50 percent thereafter to six percent) and will vest with the employee at a rate of 25 percent after two years of service, 50 percent after three years, 75 percent after four years, and 100 percent after five years. CX 672.

627. Tandon employees have the option of participating in the following health care plans: Kaiser Foundation Health Plan; INA Health Plan of California; and Maxicare. Health Plan. CX 673; CX 674; CX 675.

628. Tandon contracts with various companies in India for the assembly or purchase of components used by Tandon in its final products and for the purchase of complete half-height 48 TPI 5-1/4 inch flexible disk drives. CX 666, at 11.

629: The Indian comprlif.:: include. Tandon nagw-tics (India) Pvt., Ltd. (T1I), which asse•mialus re-cording hf.adn and certain lahor-intf.nsiv-drive. .:Lid-asse-mblif•s; Tandon !Intors Pvt., Ltd. (T:::1), which mannfacturufA: prf•cision ste•ppe.r motors used in Tandon's Cl•xible- and rigil disk Arive.;; Barnala Electronics (Barnala), which manufacturf-s harness assf.mhlies fur use in Tandan's dink Arivf-s; Tancom Electronics (Tancom), which manufactures diuk Jr ive re-cording he-ads; and Caste.rn 14-riphe-rals Pvt., Ltd. (East..r;, ahich manufacture•s compl•tf-d half-height 12 TPI 5-1/4 inch irivfss. CX crin, at 11.

630. Tandon that the te-rmination of its pre-se-ht relationship with any of the. Indian companies would result in inctf-ane•d costs of procurf..mnt or manufacture- of the compone-nt parts and drive•n thf-y zupply. CX 56Z„ at 13.

n31. The- contract assembly and purchase. tranz:actions hutwee„ Tandon and the Indian companie-s are- coordinate-d and f-CCe-cted through Tandon Associate's, Inc., which acts on be-half of the- various Indian componif•::. Tandon Ansociate•s diructli invoice•c. Tandon Corporation for the• product.: ::I• sf-rvic'3 of the. Indian compani•s at prices rellf-cting a mark-up for the• service-s of Tandon Associate-s. CX (66, at 12.

632. Tandon Associates is sr-parate% from Tandon Corporation and provide-z the- service of being the- reprf-sntativf- for all of the contract facilities in India. Tandon Corporation personnel the'rf•for•can only (14'31 "ith one entity in the- Unite-d State-s, and id not coordinate• the- activities the separate- companies in India. Hue-nome'if-r, Tr. 442.

261

633. Sirjang Lal Tandon is the President, and a director and principal shareholder, of Tandon Corporation. CX 666, at 12.

634. Tandon Associates is a California corporation owned by Jawahar Lal Tandon, a brother of Sirjang Lal Tandon. CX 666, at 12.

635. All of the Indian companies are owned and controlled directly or indirectly by the family of Manohar Lal Tandon, who is a brother of Sirjang Lal Tandon. CX 666, at 12.

636. Sirjang Lal Tandon is not a shareholder, officer, or director of Tandon Associates or any of the Indian companies. CX 666, at 12.

637. Quality and product support are important factors in a company's ability to sell disk drives and maintain an OEM as a customer. Haldi, Tr. 1220; Huenemeier, Tr. 734.

638. Since the marketplace for computers is very competitive, quality problems with computers can harm an OEM's business. Abraham, Tr. 1107.

639. Quality problems can overcome any existing advantage a disk drive producer has by virtue of being the existing OEM supplier and cause the OEM to seek another supplier. Abraham, Tr. 1029, 1061, 1071-72.

640. It is vital to an OEM that the supplier of disk drives keep to the delivery schedule, otherwise the OEM may have difficulty remaining competitive. Abraham, Tr. 1109-10.

641. Convergent Technologies buys components, disk drives, and high technology things, in order to integrate them into computer systems for resale to OEMs. Tjon, Tr. 2026.

642. In 1982, Convergent designed a new computer system, the "next generation" or'14-GEN. Tandon was originally intended to source the double-sided floppy disk drives for this system because of the price and availability of the drive. Tjon, Tr. 2027-28.

643. Convergent ultimately did not use Tandon drives because it found that the Tandon drive did not meet the requirements and allow Convergent to ship the quality levels it wanted. Some of the problems Convergent had with Tandon's drives originated with Convergent rather than Tandon. Tjon, Tr. 2037-39.

644. Kaypro specializes in test instrumentation. Anjard, Tr. 1977. In the fall of 1982, Kaypro developed a transportable computer called the, Kaypro-2. It had two floppy drives that were 5-1/4 inch single-sided, 48 TPI. Anjard, Tr. 1978.

645. Kaypro purchased the drives for the Kaypro-2 and the Kaypro-4, which used a full-height 5-1/4 inch double-sided floppy disk drive, from Tandon primarily because of availability and price. Anjard, Tr. 1978.

646. Kaypro began encountering field problems with the Tandon drives. It received complaints from end users as well as dealers. Anjard, Tr. 1979. The complaints received concerned the failure of the drive to function when the disk is put into the drive and general read-write faults. Anjard, Tr. 1979-80. Tandon advised Kaypro that the problems arose because Kaypro did not know how to interface the drive in the computer. Anjard, Tr. 1981.

647. In the spring of 1983, Kaypro generated a new computer, the Kaypro-10. The new system was to have a half-height double-sided drive. Kaypro decided to use a Tandon drive primarily because of cost and availability. Anjard, Tr. 1982-83. Tandon assured Kaypro that it could meet Kaypro's 2.5 percent maximum reject rate. Anjard, Tr. 1985.

648. In the summer of 1983, Kaypro experienced major reject problems with the Tandon drives. Kaypro claims a fallout rate of 60 percent going into production. In addition, Kaypro received reports of a 50 percent failure in the field. Anjard, Tr. 1986, 1990. Kaypro's dealers informed Kaypro that if it continued to supply Tandon drives, their affiliation with Kaypro would be terminated. Anjard, Tr. 1991.

649. In January 1984, Kaypro terminated its purchases from Tandon. Anjard, Tr. 1992. Kaypro has four suppliers: Toshiba; Shugart (Matsushita); Mitsubishi; and Epson. Anjard, Tr. 1993. The total reject rate for these vendors is under two percent. Anjard, Tr. 2001.

650. Environmental conditions were endemic at Kaypro. It failed to develop clean areas. Anjard, Tr. 2002. Also, one or two million dollars of inventory was lost and never accounted for because of lack of an in-out control system. Anjard, Tr. 2004.

651. An article in the July 9, 1984, edition of the Computer Systems News quotes Donald Sinsabaugh, managing director of Swergold, Chefitz & Sinsabaugh, as follows:

"The company [Tandon] has a lot of work to do over the next 12 months to recover from its problems. • • • Number one, they are suffering a loss of market share in floppies to the Japanese, and number two, they have had manufacturing problems that have led to a lower-quality product. The quality issue is important because it has led, in some cases, to a return of product to Tandon and the buildup of excessively high inventory levels.

They have got to solve those major problems before they can be a long-term, viable competitor."

MRX 26, at 501254.

652. An article in the July 9, 1984 edition of the Computer Systems News quotes Michael Murphy of the California Technology Stock Letter as follows:

"At some point, Japanese vendors will come in with low-cost, high-quality products . . . . Tandon has the low cost; they have to get their quality up. Their increasing use of overseas manufacturing is a big plus from them, because they save a bundle of money sourcing components offshore, and they can afford to throw a whole lot of bodies at improving quality, if they need to. They paid all their dues in terms of design work and manufacturing from a cost side, and now they'll probably get the quality improving form here."

MRX 26, at 501254.

653. A Tandon memo dated January 10, 1984, summarizes discussions held between Tandon and Tandy Advanced. The discussion centered on the

C TM 50-1 and TM 55-2 floppy disk drives.

C

C

C ."

MRX 25.3, at 027814; TRX 398.

654. INTENTIONALLY UNUSED.

655. INTENTIONALLY UNUSED.

656. A Tandon Customer Contact Report with Lanier Business Products Inc. for February 24, 1984, indicated that in the past, "

C

C

C

." The report concluded that Tandon could possible sell Lanier the TM 252. MRX 25.2, at 026307.

657. A letter from Convergent Technologies dated March 30, 1984,

C

C . MRX 25.2, at 041654.

C 658. A Tandon telex dated April 2, 1984, states that Tandon had

C

C

C . TRX 43E.

C 659. A Tandon telex dated April 6, 1984, states that [6]

C

C

C

C " MRX 25.3, at 026288; TRX 43D.

266

660. A Tandon memo dated April 26, 1984, summarizes a visit by Tandon to Bell Labs for the purpose of

." TRX 44B.

661. A Tandon memo dated June 4, 1984, summarizes discussions held between Tandon and Sperry Univac. The memo indicates that Sperry Univac would not discuss the TM 65-4, TM 848E-2, TM 503 and TM 703

. Sperry Univac did discuss Tandon's TM 252. MRX 25.3, at 026481; TRX 43C.

662. A Tandon Customer Contact Report with Engram Assoc. for June 28 1984, details with the TM 848-2. TRX 438.

663. A Tandon Customer Contact Report with S.C.I. for September 4, 1984, indicated that S.C.I.

Qume developed problems, so S.C.I. went to Mitsubishi.

." MRX 25.2, at 026472.

664. In a document entitled "Strategic Profile, Tandon Corporation, 5-1/4" Floppy Drives, TM 100/65/50," authored by Bill Williams on July 23, 1984, Mr. Williams lists the areas which need attention at Tandon as follows: (1)

C

-C

." Mr. Williams lists Tandon's strengths as follows: (1)

C

C ." SRX 115, at 039272; see id., at 039274.

665. The perception of Control Data Corporation in the summer and fall of 1984 as to Tandon's reputation for quality was that Tandon had trouble with their half-height drives. By the summer of 1984, however, CDC believed that Tandon was getting to where they needed to be for the half-height drive business. Ousley Tr. 659-60.

666. CDC had the same perception with respect to Tandon's reputation for quality in Tandon's full-height drives in 1983. CDC believed that by early 1984, Tandon had solved its problem with its full-height drive. Ousley, Tr. 660.

6G7. A Product Evaluation Request/Report on TP's half-height 5-1/4 inch double-sided disk drive was received by TP from the Computer Product Engineering division of Tandy in early October 1985. (The report is dated August 19, 1984, and October 3, 1984.) This report concluded, "This drive is equal or better than the Teac Drive. It will hold alignment longer, and handle shipping better due to the cast chassis. . . . This drive is acceptable." Hochman, Tr. 1655-59; CX 727, at Bates No. 028599-604.

668. In 1983, Shugart was the second largest floppy disk drive manufacturer in the world behind Tandon. Sollman, Tr. 100-01.

669. In 1983, CDC had approximately a 20 percent share of the full-height 5-1/4 inch floppy disk drive business and a minimal percentage of the half-height 5-1/4 inch disk drive business. In 1984, CDC had approximately a 20 percent share of the full-height 5-1/4 inch floppy disk drive business and a 10 percent share of the half-height 5-1/4 inch disk drive business. At the present time, CDC has increased its share of the full-height business but only has a 2 percent share of the half-height business. Ousley, Tr. 633-34.

VII. INJURY:

IMMEDIATE AND SUBSTANTIAL HARM

A. Substantial Injury

1. General.

670. Sales of double-sided floppy disk drives increased steadily from 350,000 units in 1980 to 3,951,000 units in 1983. The growth was most significant for sales of 5-1/4 inch double-sided disk drives, which increased from 804,000 drives in 1982 to 3,496,000 drives in 1983. CX 711, at 27.

• 671. In mid-1981, Mr. Sollman of Shugart was informed by its license agreement partner Matsushita that a major contract award for floppy disk drives would be made by Nippon Telephone and Telegraph (NTT). Sollman, Tr. 78

672. In mid-1981, NTT informed the vendor community in Japan about a potential request for quote (RFQ) of between 100,000 and 500,000 half-height double-sided disk drives. This would have been the largest order in the world outside an IBM order. Sollman, Tr. 78-79.

673. Fifteen to 20 Japanese companies were requested by NTT to bid on this contract, and at that time only TEAC, Matsushita, and Mitsubishi had floppy disk drive production capacity. Th. other companies were newcomers. No United States companies were requested to quote. Sollman, Tr. 79-80.

674. The RFQ required the successful recipients to demonstrate a production capacity of some magnitude. Sollman, Tr. 79.

675. Matsushita warned Shugart that the result of the NTT request for quote would be to generate excess capacity in the Japanese market and sales of Japanese disk drives in the United States. Sollman, Tr. 80.

676. "Shugart was also informed by Matsushita that MITI had decided in 1981 that computer peripherals, including floppy disk drives, would be an important area of endeavor for Japan in the 1980s. Sollman, Tr. 84-85.

677. Shugart first faced price competition from five or six Japanese companies in Europe in mid-1983 TEAC and Mitsubishi were predominant. Price competition in the United States was not that severe at that time, although price competition from Japan became more intense at the end of 1983, when prices closed at $117. Sollman, Tr. 94-95.

678. According to Mr. Sollman of Shugart, price declines contributed substantially to Shugart's deteriorating profits in 1983. Sollman, Tr. 269-71.

679. In January 1985, a TCA gross profit report showed that TCA,was selling floppy disk drives to A&A International (the international purchasing arm of Tandy (TRX 28(c), at 2)) at a unit price of $ and a unit cost of

C $. CX 16, at 252250.

680. In a Tandy memo, TEAC was quoted as saying that their August 1984 selling price of $

C

C . CX 741, at 2986.

681. Mr. Brehme of TCA believed that Mitsubishi is not making a profit. The basis for this belief is the reported existence of an oversupply of Mitsubishi disk drives in Japan. Brehme, Tr. 2754-55, 2766, 2768-69.

682. Tandon's sales of double-sided disk drives increased from 498,800 drives in 1982 to 1,084,600 drives in 1983. CX 678, at DT11-11, DT13-13; CX 679, at DT12-11, DT14-15.

683. Shugart's sales of double-sided disk drives increased from 78,900 drives-in 1982 to 215,900 drives in 1983. CX 678, at DT11-11, DT13-13; CX 679, at DT12-11, DT14-15.

684. CDC's sales of double-sided disk drives increased from 81,600 drives in 1982 to 421,800 drives in 1983. CX 678, at DT11-11, DT13-13; CX 679, at DT12-11, DT14-15.

685. Micro Peripheral's sales of double-sided disk drives increased from 65,900 drives in 1982 to 401,200 drives in 1983. CX 678, at DT11-11, DT13-13; CX 679, at DT12-11, DT14-15.

686. In 1982, Tandon and its present licensees held 76.0 percent of the United States OEM market for 5-1/4 inch and 8-inch double-sided disk drives, while respondents TEAC and Mitsubishi held 6.8 percent of the market. CX 678, at DT11-11, DT13-13.

687. In 1983, Tandon and its present licensees held 55.0 percent of the United States OEM market for 5-1/4 inch and .8-inch double-sided disk drives, while respondents held 20.7 percent. CX 679, at DT12-11, DT14-15.

688. The current United States market share of TEAC, Mitsubishi, and Sony is between 18 percent and 19 percent for all double-sided disk drives. Abraham, Tr. 1123-26.

689. in 1982, Tandon and its licensees held 81.6 percent of the United States OEM market for 5-1/4 inch double-sided disk drives, while respondents Mitsubishi and TEAC held 5.5 percent of this market. CX 678, at DT13-13.

690. In 1983, Tandon and its licensees held 55.6 percent of the United States OEM market for 5-1/4 inch double-sided disk drives, while respondents held 21.5 percent. All of the 26.0 percentage point drop in Tandon's and its licensees' market share between 1982 and 1983 was at the expense of Tandon, while Tandon's licensees actually expanded their market share. CX 678, at DT13-13; CX 679, at DT14-15.

691. From 1982 to 1983, the half-height disk drive increased its worldwide share of the 5-1/4 inch double-sided disk drive market from 24.8 percent to 54.7 percent. Total world OEM sales of the 5-1/4 inch double-sided disk drive increased from 1,269,400 units in 1982 to 5,679,800 units in 1983, with most of this increase attributable to half-height drives. CX 678, at DT13-11; CX 679, at DT14-13.

692. According to Tandon, it was late in entering the half-height 5-1/4 inch floppy disk drive market in part due to the theft of trade secrets by its own employees. Haldi, Tr. 1302-03.

693. Shugart endeavored to develop 5-1/4 inch half-height disk drives (products A and B), but in 1983 decided to market Matsushita-produced 5-1/4 inch half-height disk drives (models 455, 465) in the United States instead, because the price from Matsushita was lower than Shugart's own estimated cost of production for products A and B. Sollman, Tr. 82-83, 268-69.

694. CDC's estimate of the prevailing market prices for full-height 5-1/4 inch double-sided disk drives ranged from $ per unit-in mid-1983; for mid-1984, between $ per unit; for the end of 1984, between $ per unit. Current prices on normal bids range between $ per unit. Ousley, Tr. 652-53.

273

695. CDC's estimate of the prevailing market prices for half-height 5-1/4 inch double-sided floppy disk drives for the summer of 1984 ranged from per unit; for the fall of 1984, under $ per unit; at the end of 1984, $ per unit. Current prices for any substantial new procurement are in the $ per unit range. Ousley, Tr. 653-54.

696. The floppy disk drive market was relatively stable until mid-1984. At that time the market became unstable and prices dropped an average of $ per unit per month. Ousley, Tr. 666-67.

697. According to Tandon's financial statements, floppy disk price declines in fiscal 1984 were attributable to at least three factors: (1) intense price competition in the personal computer industry and corresponding price pressure on disk drive suppliers; (2) the emergence of numerous foreign manufacturers in Japan and elsewhere; and (3) a rapid and broad-based industry trend toward (lower-priced) half-height 5-1/4 inch floppy disk drives. CX 666, at 22; CX 667, at 12.

698. TCA tries to sell at a price that percent above its base cost (f.o.b. Japan price, freight, and customs). Brehme, Tr. 2715.

699. In 1984, TEAC Japan dropped its disk drive prices to TCA and TCA's United States price dropped accordingly. Brehme, Tr. 2715-16.

700. Since December 1984, TEAC prices have decreased by from 30 to 40 percent. Brehme, Tr. 2711.

2. Shugart.

701. Shugart Associates, a subsidiary of Xerox Corporation, is located at 475 Oakmead Parkway, Sunnyvale, California 94086. Shugart is a licensee of Tandon's U.S. Letters Patent No. 4,151,573 (the '573 patent) as of July 1, 1980. Complaint, 1 59; CX 616.

702. Shugart was formed in the mid-1970s by Allen Shugart and several key employees who had worked together at IBM and Memorex on disk drive designs. Sollman, Tr. 36-40. In 1976, Shugart had 50 to 60 employees. Sollman, Tr. 39.

703. By January 1976, Shugart was a single-product company with sales of $1.5 million to $3.0 million in 1975 and projected sales of $6.0• million for 1976. Actual 1976 sales were $9.0 million. The single product was an 8-inch single-sided floppy disk drive selling for $400 to $500. Sollman, Tr. 37-38, 42.

704. By the end of 1981, Shugart employed 2,700 individuals and had annual sales of approximately $198 million. The company was located in Sunnyvale and Roseville, California, and Nogales, Mexico (300 employees). Sollman, Tr. 75-76.

705. In 1981, Shugart announced a full-height.5-1/4 inch double-track density version and double-sided version of its own design. After Shugart began to sell these products, it began to notice some pricing competition from Tandon, Control Data, and Jakmnese companies. Shugart was principally concerned about the competition from Control Data and secondarily, from Tandon. Sollman, Tr. 76-77.

275

706. At the spring 1982 National Computer Conference, Shugart was the only company that displayed a half-height product. At the fall 1982 Comdex show, Shugart, Tandon, and Control Data showed half-height double-sided floppy disk drives. Twelve to fifteen Japanese suppliers also showed their half-height products. Sollman, Tr. 87.

707. In April 1983, Shugart assessed the market conditions in alropt and saw extreme price competition at key and vital accounts from five or six Japanese manufacturers. Shugart also saw lower price bidding in the United States from Japanese half-height products. Sollman, Tr. 93-95.

708. As 1983 progressed, price erosion in half-height drives brought prices down into the $120. range. Sollman, Tr. 93-95. Shugart turned to its Japanese licensee, Matsushita, and entered into a purchase agreement for half-height double-sided floppy disk drives with prices ranging from $124 to under $100 depending upon the quantity ordered. Sollman, Tr. 97.

709. In 1983, Shugart found itself in head-to-head competition with Japanese products at virtually every major United States and European account. Sollman, Tr. 97-98. The outcome was that we had to adjust all of our pricing substantially downward yet again with severe price erosions and then profit erosions that had to naturally follow." Sollman, Tr. 98.

710. Shugart lost a NCR bid to TEAC; Shugart bid $125, TEAC bid $112. The contract was for 200,000 units per year. Sollman, Tr. 98.

711. Shugart lost a Convergent Technologies bid to Mitsubishi for 100,000 drives per year. Sollman, Tr. 98-99.

276

712. In October 1983, Shugart experienced its first layoff. Shugart had grown to 1,600 employees, all but 550 of whom were located in the United States. The October layoff equaled 7-1/2 percent of the work force. Sollman, Tr. 99.

713. Shugart's annual sales for 1983 was $240 million dollars. At that time, Shugart was the world's second largest manufacturer of floppy disk drives behind Tandon. Sollman, Tr. 100-01.

714. The extreme competitive environment at the end of 1983 caused Shugart's profitability to erode substantially. Shugart first became profitable in July 1975. The first time Shugart saw a rapid erosion of its profitability was in 1983. In January 1984, it suffered an operating loss. Sollman, Tr. 101.

715. Shugart had charted the price declines of 1983 and concluded that the decline had a very negative long-term impact. Sollman, Tr. 101. Shugart considered several economic alternatives to recover from the erosion in profits, including setting up an offshore production facility in either Singapore, Taiwan, or South Korea. Sollman, Tr. 101-02.

716. Shugart task forces in mid to late 1982 recommended the immediate establishment of a production facility in Singapore. Shugart, however, was unable to receive management's approval for the establishment of this facility. That is, Shugart needed the approval of Fuji-Xerox, a Japanese joint venture owned by Shugart's parent corporation Xerox and Fuji-Foto Films, before any manufacturing could take place in that part of the world. Shugart never received the approval of Fuji-Xerox. Sollman, Tr. 103-04.

277

717. On Decmher 19, 1983, after examining studies regarding the economic climate as well as what would be required to make the business fully profitable, Xerox concluded that it could no longer support Shugart. As of January 1, 1984, Shugart's annual reported sales for fiscal year 1983 was $240 million. Xerox concluded that even with substantial investments, there would be no way to make Shugart profitable within the next 12 to 18 months. Sollman, Tr. 104-06, 107.

718. On January 15, 1984, Shugart employed 2,600 people in the United States and 600 in Mexico and occupied about 490,000 square feet of space at Roseville and Sunnyvale, California. By December 6, 1984, Shugart had experienced several more layoffs, and its employment force had been reduced to 1,600 to 1,700 employees, 400 of whom were in Mexico. Sollman, Tr. 109, 111-12.

719. Shugart was still manufacturing double-sided floppy disk drives in the United States on December 6, 1984, including 8-inch and 3-1/2 inch products. Sollman, Tr. 113.

720. In January 1985, Xerox formally announced the closing of Shugart at a time when it still employed 1,400 individuals. Sollman, Tr. 111.

721. Xerox has already sold or is in the process of selling the various parts of Shugart's domestic facilities. Sollman, Tr. 113.

3. Control Data Corporation.

722. Control Data Corporation (CDC) was granted a license on September 30, 1984, to manufacture and sell disk drives under the '573 patent. Complaint, 1 64; CX 620; Ousley, Tr. 629, 632-33.

278

723. Magnetic Peripherals, Inc. (MPI), is a partially-owned subsidiary of Control Data Corporation. MPI was granted a license on September 30, 1984, to manufacture and sell disk drives under the -'573 patent. The license agreement resulted from a claim by Tandon that the drives manufactured by MPI were covered by the '573 patent. Complaint, 11 59, 62; CX 620; see Ousley, Tr. 627-29, 632-33.

724. CDC's subsidiary MPI manufactures flexible disk drives. CDC as a parent company of MPI does not manufacture flexible disk drives. Ousley, Tr. 691. Some, if not all, of the head assemblies used by CDC in its double-sided floppy disk drives produced in the United States are manufactured by Lafe, which is located in Taiwan or Korea. Ousley, Tr. 698.

725. CDC's industry position in 1983 approximated 20 percent of the full-height floppy disk drive market and a minimal percentage of the half-height floppy disk drive market. Ousley, Tr. 633.

726. CDC's industry position in 1984 approximated 20 percent of the full-height floppy disk drive market and 10 percent of the half-height floppy disk drive market. Ousley, Tr. 633.

727. CDC's current industry position approximates more than 20 percent of the full-height disk drive market and 2 percent of the half-height floppy disk drive market. Ousley, Tr. 633-34.

728. CDC's industry position in the total disk- drive market, which includes Winchester and floppy disk drives was 40 percent for 1983 and 27 percent for 1984. Ousley, Tr. 634.

729. CDC in 1983 shipped $ worth of floppy disk drives or C units. Ousley, Tr. 645, 647; CX 729, 730.

ti

730. CDC by December 30, 1984, had shipped $ worth of floppy disk drives or units. Ousley, Tr. 645-46, 648; CX 729, 730.

731. CDC as of December 30, 1984, had firm purchase orders for 1985 of 79,000 floppy disk drive units and had projected a high probability sales forecast for 1985 of units. A high probability order is defined as an order CDC can make a definite commitment and order parts. New prospects and new business are not reflected in this number. Ousley, Tr. 648-49; CX 730.

732. The numbers recited in FF 725-31 cover 5-1/4 inch full-height and 5-1/4 inch half-height products. Of the 5-1/4 inch full-height products, percent plus are double-sided configurations; of the 5-1/4 inch half-height products, are double-sided configurations. The old 8-inch products-constitute maybe percent of the numbers. Ousley, Tr. 649-50.

733. CDC's five-year manufacturing plan prepared in late 1983 forecasted its 1984 requirements for 5-1/4 inch half-height floppy disk drives as units and 1985 requirements as units. Ousley, Tr. 650-51; CX 731.

734. CDC is currently committed to have its offshore supplier build floppy disk drives, but only has orders for percent of that number. At this time, CDC is projecting sales in 1985 on the order of units. Ousley, Tr. 652, 709-10.

735. CDC's estimate of the prevailing market prices for full-height 5-1/4 inch double-sided floppy disk drives for mid-1983 averaged between $ - per unit; for mid-1984, between $ per unit; for the end of 1984, between $ per unit. Current prices on normal bids range between $ per unit, though CDC has heard a low bid of $. Ousley, Tr. 652-53.

280

736. CDC's estimate of the prevailing market prices for half-height 5-1/4 inch double-sided floppy disk drives for the summer of 1984 ranged from per unit; the fall of 1984, under $ per unit; end of 1984, $ per unit. Current prices for any substantial new procurement are in the $ per unit range. Ousley, Tr. 653-54.

737. In late 1983, CDC based on the existing market conditions projected that the 1984 prices for its Model Nos. 9298 and 9299 half-height 5-1/4 inch double-sided floppy disk drives would be $ per unit and $ per unit, respectively, and the 1985 prices, $ per unit and $ per unit, respectively. Ousley, Tr. 656-57; CX 732.

738. On April 4, 1984, CDC defined its major competition in the, half-height 5-1/4 inch double-sided floppy disk drive market as follows:

Shugart

Japanese

Tandon

CX 733.

739. The floppy disk drive market was relatively stable until mid-1984. At that time the market became unstable and prices dropped an average of $ per unit per month. Based upon CDC's cost of production in the United States, CDC in the third quarter of 1984 and made the decision to move production of drives offshore. Ousley, Tr. 666-68.

740. CDC continues to assemble and test approximately percent of its requirements for half-height 5-1/4 inch double-sided floppy disk drives at its Oklahoma City facility. Ousley, Tr. 668.

741. The estimated maximum production capacity at CDC's Oklahoma City facility is drives per year, or approximately units a month. It would take CDC at least months to produce at this level; the necessary tooling is in place, . Ousley, Tr. 669.

742. Compaq was and is a CDC OEM customer for some flexible and numerous rigid drives. CDC has an ongoing business relationship with and is trying to keep that business. CDC ceased being a vendor' for half-height product in the mid or third quarter 1984;

." CDC thinks that Mitsubishi received 'business at this time. Ousley, Tr. 671-72.

282

743. CDC has attempted to half-height double-sided floppy disk drive business. CDC has quoted prices as low as $ per unit, . CDC believes that Mitsubishi is currently supplying with this product. Ousley, Tr. 673, 727-29.

744. In 1984, CDC supplied approximately full-height floppy disk drives at a cost of $ per unit. Prices for half-height floppy disk drives forced CDC to reduce its prices for full-height drives. , however, elected to switch from full-height to half-height drives and canceled its business with CDC. now obtains half-height'floppy disk drives from Panasonic. Ousley, Tr. 674-75.

745. In the third quarter of 1984, CDC attempted to solicit from its business for half-height floppy disk drives. CDC at this time was quoting prices for half-height drives at $ per unit. CDC was unsuccessful in its bid for this business and is unsure who finally received this order, but was told that there were three or four vendors whose price bids ranged from $ per unit. CDC was informed within two weeks of the hearing on temporary relief in this investigation that to obtain business, it would have to bid less than $ per unit. CDC was told that several vendors could quote such prices to , including Ousley, Tr. 675-76.

746. CDC has a national agreement with two distributors, . CDC distributes through these companies almost all of its disk products and tape products. CDC's contracts with its distributors are for a short time period and the distributors have the privilege of returning

products to CDC if they are unable to sell them. compete in a market where there are 10 to 15 major domestic distributors; this market is very price sensitive. CDC sells its half-height product to its distributors at $ per unit. Other distributors are purchasing drives in the $ per unit range, and CDC is under pressure to reduce its prices to obtain business. A major national distribution competitor of which has been offered prices for floppy disk drives in the $ per unit range uses a drive. Ousley, Tr. 676-77.

747. CDC is currently operating its 5-1/4 inch floppy disk drive business . Ousley, Tr. 682-83.

748. CDC experienced a writedown and operating loss in its flexibili disk drive business last year of $. Ousley, Tr. 683.

749. Based upon monthly analyses beginning in the fourth quarter of 1984, CDC in its February 1985 financial review

. Ousley, Tr. 683.

750. of CDC's Oklahoma City facility has been ongoing since the third quarter of 1984. In October 1984, CDC laid off 450 individuals from its Oklahoma City facility. In February 1985,

-

." Ousley, Tr. 683-84, 692 (Apr. 10, 1985).

284

751. In a few weeks, of CDC floppy disk drives will be offshore. Ousley, Tr. 684 (Apr. 10, 1985). The only activity that will continue in the United States is engineering, ongoing tests, product support, and any limited customer-unique specification work. Approximately 75 CDC employees will be associated with this group after April 15, 1985. CDC will need to lay off an additional 150 employees in order to reach the 75 person level. Ousley, Tr. 6114-85, 723. The decision to begin moving CDC's production facilities offshore was made in September 1984. Ousley, Tr. 691-92.

752. After by CDC, the production line at the Oklahoma City facility . CDC will

C

C

Ousley, Tr. 688-89 (Apr. 10, 1985).

753. CDC has made the decision

C

C

C

C

C

C

." Ousley, Tr. 689-90.

C

754. The only reason that CDC at this time is if there was an increased demand over its current contracts with doreign suppliers. See FF 734, 749. While there would still remain with respect to the production of floppy disk drives in the

285

United States vis-a-vis the contract supplier should an exlusion order be issued in this case, the would not be that great. CDC would be expected to manufacture wherever the cost would be lowest for the corporation: "

." Ousley, Tr. 710-11.

755. Our [CDC's] stated corporate position from the chairman of our board is that

." Ousley, Tr. 711-12.

756. There are currently 30 to 35 foreign manufacturers for double-sided floppy disk drives. Ousley, Tr. 712. TEAC is a very formidable competitor and ranks in the top five of these foreign manufacturers. CDC does not see Mitsubishi in as many places as it does TEAC, but Mitsubishi is somewhere in the top ten of the foreign manufacturers. "Sony we do not see very often other than as it relates to 3-1/2 inch, which is all futures basically at this point in time." Ousley, Tr. 715-16, 717.

757. If a restraining order affected the marketplace price for double-sided floppy disk drives such that CDC was able to realize higher prices, the order would definitely affect CDC's decision with respect to its Oklahoma City facility. "I don't know the effect that these three companies [TEAC, Mitsubishi, and Sony] alone would have versus the others. . . . [I]t definitely would help, but whether that would make the decision for us, I really can't represent that today." Ousley, Tr. 722; see id., Tr. 724.

758. A restraining ord"r issued during the July 19d5 time frame would probably be too late to alter CDC's decision with respect to its Oklahoma City facility. "(Bly then we will . . . (be] doing something with our production line. So I mean it is a real time issue for us. The decision has already been made, and we are going down that path. And so each day that goes by, it becomes much more difficult for us to do anything in Oklahoma City." Ousley, Tr. 723.

759. A restraining order would have a market impact when it "hit the press." How quickly the order would affect the actual signing of contracts at higher prices, however, is too difficult to predict. Ousley, Tr. 724.

4. Texas Peripherals.

760. Texas Peripherals (TP) is a joint venture owned equally by Tandy Corporation and Tandon. Tandon became a member of this joint venture in January 1984, and supplied its licenued technology to TP. CX 619; Huenemeier, Tr. 299, 302.

761. TP was formed for the purpose of manufacturing disk drives in the United States for sale either to Tandy or Tandon. Huenemei•r, CX 722, at 7-8; see Hu•nemeier, Tr. 303, 304; Hochman, Tr. 1691; CX 619, Art. IX, 5 9.01.

762. As of December 1984, TP manufactured at its facilities in Fort Worth, Texas, the TM 100-1, a full-height single-sided floppy disk drive, the TM 65-1, a half-height 5-1/4 inch single-sided disk drive, and the TM 65-2, a half-height 5-1/4 inch double-sided disk drive. Hochman, Tr. 1631-32; see CX 666, at 14.

763. TP purchases all of its head assemblies for the TM 65-2 from Tandon. Hochman, Tr. 1633.

287

764. On April 25, 1984, the projected productioh of TP floppy disk drives for October 1984 was 27,117; for November 1984, 13,450; and for December 1984, 39,430. Of those drives planned for production in October 1984, 1000 would be half-height double-sided floppy disk drives; in November 1984, 32,350 would be half-height double-sided floppy disk drives; and in December 1984, 28,230 would be half-height double-sided floppy disk drives. TP forecasted continued growth of its floppy disk drive production such that by February-March-April 1985, TP planned to ship 68,652 drives a month, 50,052 of which would be half-height double-sided floppy disk drives. CX 727, at Bates No. 028560. This projection was based upon the forecasted requirements of Tandy and Tandon (though in this forecast the Tandon required drive:; were minimal). Huenemeier, Tr. 312-14, 319-20; see, CX 727, at Bates Nos. 028549-50.

7(5. On April 25, 1934, the projected average selling price for TP's half-height double-sided floppy disk drive was $86 per unit. Huenemeier, Tr. 315-16; CX 727, at Bates No. 028560. In spring 1984, TP submitted bids with respect to this product to the various Tandy divisions at this price. Huenemeier, Tr. 316-17. At this time, $86 per unit was considered competitive bid for this type of product. Huenemeier, Tr. 317; see id., Tr. 308.

766. In the spring of 1984, the joint venture committee authorized $300,000 for tooling in which to set up TP. Huenemeier, Tr. 321; CX 706, at 2.

767. On May 15, 1984, TP delivered working samples of the TM 65-2 to various Tandy divisions, including Tandy Advanced Products, Tandy Home Computer, Tandy Computer Assy., Tandy Systems Design, and CPE (Computer Product Engineering). Huenemeier, Tr. 317-18; CX 727, at Bates No. 028549.

C This drive was assembled at TP

C . Huenemeier, Tr. 318; Hochman, Tr. 1644-45.

768. On June 15, June 16, and July 15, 1984, TP scheduled the delivery of pre-production samples of the TM 65-2 to Tandy Home Computer, Tandy Computer Assy., Tandy Systems Design, and Tandy Advanced Products. Only some of these pre-production samples were later delivered to the various Tandy divisions in late June, July, or August 1984. The pre-production samples were more representative of TP's production units and contained some degree of TP's configurations. Huenemeier, Tr. 318-19; CX 727, at Bates No. 028549.

769. TP's profit plan for fiscal year 1985 indicated that production of the half-height 5-1/4 inch double-sided disk drive was scheduled to begin October 1984. By May 23, 1985, production of this floppy disk drive was expected to reach 30,000 units per month. This level of production was less than originally anticipated (FF 764) because Tandy had decided to continue to use the full-height product in its model 4 computer instead of switching to a half-height product. Huenemeier, Tr. 305, 322-24; CX 727, at Bates. No. 028572.

770. As of September 1984, $264,300 of the budget for tooling had been committed to vendors to fabricate the tooling for the TM 65 product. See FF 766. TP planned to have its tooling in place by December 1984. The_ commitments to vendors for tooling were made in expectation of volume business for the TM 65 from Tandy. Huenemeier, Tr. 321-22; CX 706, at 2; see CX 727, at Bates No. 028568.

771. As of September 19, 1934, TP's production line was capable of producing the quantities needed to achieve its financial objectives (s•• Fr 764). "The plant capacity was shown to range from 30,000 drives per month in December)19841 to better than 50,000 as we approach March 119851. ar- not capacity limited." CX 727, at Bates Nos. 028566, 028568; see Huenemeier, Tr. 324-25.

772. The minutes of the September 19, 1984, joint venture committe ' meeting inJicate that a major topic of discussion was the strategy by which Tandy, Tandon, and TP would be able to compete in the marketplace with the new floppy disk drive. "The 'MAC $77 drive has been the driving force by which we seem to be measuring all of our future pricing. . . . Steve Huenemeier [representing Tandon] has be..n looking at these costs together with Texas Peripherals and felt that the ultimate objective should be a drive With a material cost under $50. If this goal is met, then we should easily be able to compete." CX 727, at Bates No. 028569; see Huenemeier, Tr. 325-27; Hochman, Tr. 1676.

773. As of September 19, 1984, volume buying wjs cunsil•r•d a necessary condition to achieve the reduced costs for the TP floppy :link drive. "Jim Mortensen [representing Tandy) will be exploring the avenu e s to encourage Tandy to make these types of committments [sic]." An ord•r of 30,000 units per month was considered necessary to procure material in the. volumes required to get a $50 per unit material cost. CX 727, at Bates Nos. 028569, 028571; Huenemeier, Tr. 327.

774. A Product Evaluation Request/Report on TP's half-height 5-1/4 inch double-sided disk drive was received by TP from the Computer Product Engineering division of Tandy in early October 1985. (The report is dated August 19, 1984, and October 3, 1984.) This report concluded, "This drive is equal or better than the Teac Drive. It will hold alignment longer, and handle shipping better due to the cast chassis. . . . This drive is acceptable." Hochman, Tr. 1655-59; CX 727, at Bates No. 028599-604.

775. TP on October 9, 1984, received an order for 6,000 units of the TM 65-2 floppy disk drives from Tandy Home Computers, a division of Tandy. The order was scheduled for delivery as follows: 1,000 by November 15, 1984; 2,000 by December 15, 1984; and 3,000 by January 15, 1985. Hochman, Tr. X614, 1616, 1659; CX 727, at Bates No. 028608; see Huenemeier, Tr. 361-62.

776. TP

: TP delivered the first 50 units for qualification testing in November 1984. TP's next delivery of 400 units did not take place until the first days of January 1985. TP hoped that the units would become qualified at that time and that it could pick up production quickly and complete the orders by February and March 1985. Hochman, Tr. 1614-15; see Huenemeier, Tr. 363-65.

777. TP only delivered of the floppy disk drives requested by Tandy Home Computers for November 1984

. TP decided that it would be best to deliver units in order to

. TP could then

291

." Hochman, Tr. 1647.

778. The units delivered by TP to Tandy Home Computer

. The initial report on the first drives sent to Tandy Home Computer in November 1984 gave a breakdown on the the customer found in the drive.

1.

. Tandy Home Computer

. Hochman, Tr. 1615-17, 1660-67; see id., Tr. 1648-50; CX 727, at Bates Nos. 028586-87.

779. As of February 1985, TP had progressed

." Hochman, Tr. 1618-19; see id., Tr. 1666-67.

780. The only major problem that remained as to TP's floppy disk drives concerned a soft error problem. A soft error increases the time it takes the computer to recover data. The soft error rate displayed by the units manufactured by TP were in excess of what TP's competition was displaying under the same circumstances. Hochman, Tr. 1619; Huenemeier, Tr. 365-68; CX 727, at Bates No. 028591; see Patterson, Tr. 1751.

781. TP

. Hochman, Tr. 1623, 1624; see id., Tr. 1618-21; Huenemeier, Tr. 368, 369.

782.

. Hochman, Tr. 1650 (Apr. 15, 1985Y.

783. At the February 1985 joint venture committee meeting, the discussion was considered secondary to the main issue of whether TP

. Hochman, Tr. 1622-23, 1625-26; CX 727, at Bates Nos. 028591-92; see Huenemeier, Tr. 369-70.

784. TP's cost of production at the time it

those units came from

• • • • Hochman, Tr. 1613.

Hochman, Tr. 1610-11.

786. TP's selling price at the time it halted production of its half-height double-sided floppy disk drive program was $. Hochman, Tr. 1613.

787. Tandy Home Computers indicated in October 1984, when it first placed its order with TP for half-height 5-1/4 inch double-sided disk drives, that there would be follow up orders at $ per unit if TP . Hochman, Tr. 1624-25.

788. If Tandy Home Computers TP's TM 65-2 units, TP planned to reduced the sales price per unit from $. Hochman, Tr. 1617.

789. By February 1985, TP needed to

." Both TEAC and competed with TP for the Tandy Home Computers' business. TEAC had proposed a modified version of its double-sided floppy disk drive per unit. Hochman, Tr. 1611, 1625-28, 1676-83; CX 740; see CX 727, at Bates No. 028591; Huenemeier, Tr. 370-71.

790. As of February 12, 1985, the lowest projected total cost for the TM 65 was somewhere in the $ price range for an order of total full-height and half-height floppy disk drives per month. Hochman, Tr. 1671-73, 1675-76; CX 727, at Bates No. 028596. At this price, TP's profits on the sale of floppy disk drives would between percent, with an end of the year net profit before taxes average of percent. Hochman, Tr. 1673, 1683-84; CX 727, at Bates Nos. 028591, 028598; see Huenemeier, Tr. 372-73. "It was also noted that even this optimistic figure would require that Texas Peripherals still sell at $10.00 above the TEAC price assuming the $60 unit to be real." CX 727, at Bates No. 028591. Such a profit level was

C

. Hochman, 1673-74; CX 619, Art. IX, S 9.01.

791. The recommendation was made at the February 1985 joint venture committee meeting that

C

. Hochman, Tr. 1634, 1682-83. 'Texas Peripherals' low volume cannot compete with producers of high volume. Everyone agreed that intangible benefit of proximity to the customer base may no longer be a viable condition for maintaining a manufacturing facility devoted to the Slimline [half-height] drive.

." CX 727, at Bates No. 028592; see Huenemeier, Tr. 371-73, 375, 376-77, 379.

792. If TP had been price competitive with respect to the other floppy disk drive vendors, the qualification process for its drives would have continued. Patterson, Tr. 1753, 1760-61.

793. It became apparent as of February 1985, that Tandy Horn, C Computers' planned to C . Hochman, Tr. 1617-18, 1634-35. Tandy Home Computers has awarded some of its C double-sided floppy disk drive business to Hochman, Tr. 1636; see id., Tr. 1636-38.

794. TP C . Hochman, Tr. 1608; Huenemeier, Tr. 389.

795. TP C ." Hochman, Tr. 1608, 1610. TP C . CX 619, Art. IX, S 9.01; Huenemeier, CX 722, at 7-8; see FF 761.

796. TP assembles in its plant approximately TM 65-2 floppy disk drives. TP . Hochman, Tr. 1614, 1628.

797. As of December 1984, TP has produced approximately units of the TM 100, a full-height single-sided floppy disk drive, and units of the TM 65-1, a half-height 5-1/4 inch single-sided disk drive. As of April 15, 1985, TP has outstanding purchase orders for C TM 100s and TM 65-1s. Except for the head assembly, the mechanical parts of the TM 65-1 are the same as those found in the TM 65-2. Hochman, Tr. 1632-33, 1669.

798, TP could produce on double shift TM 65-2 double-sided floppy disk drives a month. Hochman, Tr. 1628; FF 764.

799. As of February 25, 1985, TP's

SX 6(C), No. 1031.

800. As of February 25, 1985, TP's

SX 6(C), No. 1Q31.

80Z. As of February 25, 1985, TP's

SX 6(C), No. 1031.

297

802. As of February 25, 1985, TP's

SX 6(C), No. 1031.

803. TP for the most part is proceeding on time

. Hochman, Tr. 1638-39.

804. TP received for production of the TM 100, a full-height single-sided floppy disk drive, . Hochman, Tr. 1639-40 (Apr. 15, 1985). TP received order for production of the TM 65-1, a half-height 5-1/4 inch single-sided disk drive, prior to the hearing. Hochman, Tr. 1640 (Apr. 15, 1985).

805.

. Hochman, Tr. 1693.

. Hochman, Tr. 1640.

806. As of April 15, 1985, TP employed persons. During the month of April 1985, TP plans to . In May 1985, TP will probably . Those will continue to produce current orders of the TM 65-1

Hochman, Tr. 1692-93; see Huenemeier, Tr. 388.

298

5. Tandon.

807. Selected Tandon incomo. statement data (including subsidiary operations) for each of the past five fiscal years ended September 28, are as follows:

	Five Years Ended September 28, 1984				
	1980	1981	1982	1983	1994
Net Sales	$22,761	$54,152	$150,490	$303,369	$400,792
Cost of Sales	16,617	37,567	105,262	219,822	311,106
Gross Profit	6,144	16,585	45,228	83,547	89,686
Product Research & Development	960	2,870	6,042	13,741	16,269
Selling, General & Administrative Expenses.	2,124	5,735	13,798	36,830	30,113
Interest & Other Expenses .	228	707	289	1,262	2,568
Interest Incomt.	---	(817)	(3,268)	(4,644)	(1,315)
Income before provision for income taxes. . .	2,832	8,090	28,367	36,358	42,051
Provision for Income Taxes	1,325	3,585	12,632	12,700	12,615
Net Income	1,507		15,735	23,658	29,436

CX 666, at 20.

808. For Tandon and its subsidiaries, the ratios of net income to net sales for each of the fiscal years 1980 through 1984 are as follows:

1980	1981	1982	1983	1984
7.6%	8.3%	10.5%	7.8%	7.3%

CX 666, at 20.

809. A summary of Tandon's quarterly operating results for calendar year 1984 and first quarter 1985 is as follows:

	March 30, 1984	June 29, 1984	September 28, 1984	December 28, 1984	March 29, 1985
Net Sales	$105,672	$106,257	$95,808	$90,664	$61,126
Gross Profit	27,378	27,764	8,838	(7,410)	(14,515)
Income Before Income Taxes	16,057	16,024	(4,349)	(21,963)	(28,440)
Net Income (loss)	10,437	10,416	(724)	(15,374)	(19,910)

CX 666, at 44; CX 667, at 4.

299

810. For Tandon and its subsidiaries, the ratios of net income to net sales for each of the quarters in calendar year 1984 and the first quarter of 1985 are as follows:

1Q 1984	2Q 1984	3Q 1984	4Q 1984	1Q 1985
9.9%	9.8%	(7.6%)	(17.0%)	(32.6%)

CX 666, at 44; CX 667, at 4.

811. Price erosion is a factor in Tandon's decreasing profitability. CX 666, at 22; Haldi, Tr. 1291-92.

812. In 1983, Tandon's sales volume of double-sided floppy disk drives was units. CX 702.

813. In 1984, Tandon's sales volume of double-sided floppy disk. c' drives was units. CX 702.

814. During 1984, Tandon's sales of double-sided floppy disk drives decreased from units in the first half of the year to units in the second half of the year. CX 702.

815. From fiscal year 1983 to fiscal year 1984, United. States employment at Tandon dropped from 3,300 persons to 1,605 persons. Tandon attributes this decline primarily "to restructuring of its manufacturing operations to emphasize offshore production of mature product lines." CX 666, at 18.

816. In 1982, Tandon had a 60.5 percent market share of the United States 5-1/4 inch double-sided disk drive market, and Mitsubishi and TEAC had a combined market share of 5.5 percent. CX 678, at DT13-13.

300

817. In 1983, Tandon had a 30.5 percent market share of the United States 5-1/4 inch double-sided disk drive market, and Mitsubishi and TEAC had a combined market share of 21.5 percent. CX 679, at DT14-15.

818. In 1982, Tandon had a 23.8 percent market share of the United States 8-inch double-sided disk drive market, and Mitsubishi had a 11.5 percent market share. CX 678, at DT11-11.

819. In 1983, Tandon had a 20.7 percent market share of the United States 8-inch double-sided disk drive market, and Mitsubishi had an 11.2 percent market share. CX 679, at DT12-11.

C 820. In fiscal year 1984, Mitsubishi and TEAC sold and disk drives, respectively. CX 694; CX 690.

C 821. In October-December 1984, Mitsubishi and TEAC sold and disk drives, respectively. CX 690; CX 694.

C 822. Tandon recently received a purchase order from IBM for . Prior to that order, Tandon . Huenemeier, Tr. 296; Haldi, Tr. 1269.

823. In June 1984, placed an order • for double-sided disk drives with TEAC. was a prior customer of TM 100s and had evaluated the TM 65-2 and TM 65-4 for a proposed purchase of minimum units over 12 months. Abraham, CX 714, at-6.

C 824. selected TEAC for a double-sided • floppy disk order. was a prior Tandon TM 100 customer and evaluated • the TM 65, but decided to place its order with TEAC for to units over a 12 month-period. Abraham, CX 714, at 6.

825. In November 1984, placed an order with TEAC for to double-sided 5-1/4 inch floppy disk drive units per year starting November 1984. had evaluated the TM 65. Abraham, CX 714, at 7.

826. selected TEAC as vendor for to double-sided floppy disk drives per year over Tandon's TM 65. Abraham, CX 714, at 7.

827. In June 1984, , gave TEAC an order for to floppy disk drives per year. Other competitors for this account included Mitsubishi and Shugart. evaluated Tendon's TM 65-2L. Abraham, CX 714, at 7.

828. In 1983, ordered double-sided floppy disk drives from TEAC. Tandon had sought this business. Abraham, CX 714, at 7-8.

829. In October 1982, gave TEAC an order for approximately double-sided floppy disk drives per year. Abraham, CX 714, at 5.

830. In October 1983, selected TEAC for an order of approximately double sided floppy disk drives per year. Abraham, CX 714, at 5.

831. In September 1983, gave an order of to double-sided disk drives to TEAC. Abraham, CX 714, at 5-6.

832. In June 1983, gave an order to TEAC for double-sided floppy disk drives per year. Abraham, CX 714.

302

833. In September •983, , gave an order to TEAC. In October 1984, gave TEAC an order for double-sided floppy disk drives per month. Abraham, CX 714, at 8.

834. In November 1984, , gave TEAC an order for double-sided 5-1/4 inch floppy disk drives over three years. Abraham, CX 714, at 8.

835. In October 1984, cancelled an order for approximately TM 65-2L disk drives after delivery of units and awarded the balance of drives to TEAC. CX 714, at 5.

836. , cancelled a July 29, 1983, order for TM 55s with $ of product still on order from Tandon and switched to Mitsubishi. Abraham, CX 714, at 9.

837. In October 1983, , gave Mitsubishi an order for double-sided floppy disk drives. Abraham, CX 714, at 9.

*4-c 838. In April 1983, , awarded Mitsubishi an order for double-sided floppy disk drives per year. Abraham, CX 714, at 10.

839. In October 1984, selected Mitsubishi for an order of double-sided floppy disk drives per year. had evaluated Tandon's TM 65-8. Other competitors included TEAC. Abraham, CX 714, at 10.

840. On October 1984, selected Mitsubishi for an order of approximately drives per year. had evaluated Tandon's TM 65-2L. Other competitors for this order included TEAC and Shugart. Abraham, CX 714, at 10-11.

303

C 841. In November 19_83,

gave Mitsubishi an order for double-sided 5-1/4 inch floppy disk drives. Abraham, CX 714 at 10-11.

842. In June 1983,

gave Mitsubishi an order for 5-1/4 inch double-sided disk drives. Abraham, CX 714 at 11.

843. Tandon bid on each of the orders contained in findings 823 to 842. Abraham, Tr. 1142-43.

B. Tendency to Injure.

1. Future Sales.

844. The period of time during which the marketing of a new product is most opportune is frequently referred to as the "marketing window." This window opens when a demand for a new product is identified. Once an OEM has selected its vendor(s) for a particular product, the window of opportunity associated with that product has substantially closed. Abraham, CX. 714, at 2.

845. The marketing window can reopen if the selected vendor can not deliver the disk drive. Abraham, Tr. 1059-62.

846. Once an OEM selects a floppy disk drive vendor for one of the OEM's products, there are certain factors which may weigh against changing the vendor for the product. For example, OEMs spend a substantial amount of time and effort to evaluate a vendor and its product and a change in vendors may require retraining of personnel and customers and changes in sales manuals and software. Additionally, OEMs tend to enter into long term contracts. Abraham, CX 714, at 2-4.

847. Lost sales to a given OEM may be significant not only because of the particular contract lost, but also because of potential sales opportunities for future business with that OEM. Abraham, CX 714, at 4.

848. is scheduled to select a vendor in May 1985 for an order of 3-1/2 inch double-sided floppy disk drives per year. Tandon is seeking to sell its TM 304. Abraham, CX 714, at 5.

849. is also seeking a vendor on a 1.6 MB 5-1/4 inch double-sided drive. Tandon is seeking to sell its TM 65-8 there and is in head-to-head competition with TEAC and Mitsubishi. Abraham, CX 714, at 15.

850. is scheduled to select a vendor in August 1985 for to 3-1/2 inch double-sided floppy disk drives. Tandon is seeking to sell its TM 308 (1 MB) and TM 309 (1.6 MB) drives and is in head-to-head competition with TEAC. Abraham, CX 714, at 16.

851. Tandon is in head-to-head competition with TEAC and Mitsubishi at , for an order for 1 MB 5-1/4 inch double-sided floppy disk drives. Tandon is seeking to sell its TM 65-8. Abraham, CX 714, at 16.

852. Tandon is in head-to-head competition with TEAC for an order from , of 3-1/2 inch double-sided floppy disk drives. Vendor selection is scheduled for April 1985 (1 MB) and October 1985 (1.6 MB). The quantity of 1 MB drives involved is per year by 1986. Tandon is seeking to sell its TM 308 ( ) and TM 309 (1.6 MB). Abraham, CX 714, at 16.

353. is also seeking a vendor for 1.6 mn 5-1/4 inch double-sided floppy disk drives, as a second source to Approximately units will be ordered and vendor selection is scheduled for about July 1935. Tandon is offering its TM 75-3. Abraham, CX. 714, at 17.

854. is seeking a vendor for 3-1/2 inch double-sided drives at several locations and has a vendor selection date of October 1935, for a quantity of per year for its , operation ( ). Vendor selection is scheduled for October 1935 for an order of 120,000 drives per year for its operation ( ). Tandon is seeking to *sell* its TM 304 and TI! 309 drives. Abraham, CX 714, at 16, 17.

855. , is seeking a vendor for a 1 113 5-1/4 inch double-sided floppy disk drive. Tandon is in head-to-head competition with Mitsubishi for an order of drives per year there starting June 1985 with vendor selection in May 1935. Abraham, CX 714, at 17, 18.

356. Tandon is in head-to-head competition with TEAC and Mitsubishi at . A vendor start date of August 1935 is schedule there for an order of double-sided 3-1/2 inch and 5-1/4 inch floppy disk drives per year. Tandon is seeking to sell its TM 303 (1 MB), TM 65-3 (1.6 MB), and Ti! 64-2L (0.5 MD) drives. Abraham, CX 714, at 13.

357. IIELA has had discussions during the past six months with Commodore concerning the potential sale of drives to that company. Foster, Tr. 304.

306

353. MELA continues to meet with Wang with the hope of doing business with it. Foster, Tr. 399.

2. TEAC.

359. TEAC Japan has a disk drive capacity of 200,000 drives per month. Brehme, Tr. 2703.

860. TEAC maintains an ongoing cost reduction program which results in lower prices. Brehme, Tr. 2738, 2742-43.

861. Disk drive prices are expected to fall an additional 15 to 20 percent over the next year. Brehme, Tr. 2703.

862. In 1985, Matsushita, TEC, Epson, TEAC, Mitsubishi, and Alps have quoted factory prices in Japan ranging from
for 5-1/4 inch half-height double-sided drives in the 100,000 quantity range. The amount to be added to these prices to obtain a delivered United States price would be roughly $9 or less. Chidambaram, Tr. 1713-16.

863. In a document dated January 11, 1935, TCA listed 30 major an "target accounts" for fiscal 1935, including

C . Brehme, Tr. 2709; CX 18, at 250927.

864. TEAC double-sided disk drives compete against those of Tandon, Texas Peripherals, Control Data Corporation, and Shugart. Brehme, Tr. 2745, 2766; CX 43, at 185-90, 197-204.

865. TEAC Japan's forecast for TCA's sales in fiscal year 1985 was

C units per month. CX 10, at 250925; Brehme, Tr. 2707-01.

866. TCA's own forecast for its sales in fiscal year 1985 was units per month. CX 18, at 250925; Brehme, Tr. 2707-08.'

867. Based on a September 1984 report, TEAC has plans for total production of its FD-53/54/55 series double-sided 5-1/4 inch disk drives of C units in 1935, of which units were reserved for export, C and units (

. CX 8, at Bates No. 251230; Beckerman Dep., CX 49, at 103-03; haldi, CX 711, at 57.

868. TEAC is presently competing for 3-1/2 inch double-sided disk drive sales at major United States 0:Ms. Brehme, Tr. 2767.

869. TEAC distributes disk drives in the United States in C approximately the following percentages: percent to retail distribution type customers; percent to the middle tier of industrial type customers; C' and percent to large OEMs. TCA sells percent of total TEAC sales in the United States. Brehme, Tr. 2772-74.

870. The **oEn** sales are the most important to TEAC because the retail distribution sales are dependent to some extent on the OEN sales. Also, sales to the retail distribution and industrial customers are somewhat cyclical and unpredictable. Brehme, Tr. 2772-73.

371. The larger volume sales made by TEAC to United States customers are made by TEAC Japan. Brehme, Tr. 2704.

872. TEAC sells disk drives to A&A Japan, the Japanese office of A&A International, a purchasing arm of Tandy. Osawa, TRX 23, at -2-3.

573. A&A Japan acquires title in Japan to the drives and subsequently exports them to the United States to **A&A** International. Accordingly, TEAC sells drives to MA Japan at the f.o.b. Tokyo price. Osatia, TRX 28, at 3.

374. Sometimes, drives are sold by TEAC's United States subsidiary, TCA, to A&A International in the United States. However, nearly all disk drives which are sold directly to A&A Japan are from TEAC Japan. Osawa, TRX 23, at 3.

375. To date, the lowest price offered by TEAC to A&A Japan for the double—sided floppy disk drives being sought has been $
Osawa, TRX 28, at 7.

376. Lately, A&A has applied further *pressure* on TEAC to lower its quoted price . Osawa, TRX 23, at 7.

877.

C

C

C . Osawa, TRX 23, at 8.

878. Included in TEAC's customer list are the following companies:

C

C

C . CX 17.

879. Both TEAC Japan and TCA sell double—sided floppy disk drives, with TCA accounting for 15 percent of the sales of TEAC floppy disk drives. Brehme, Tr. 2704.

880. TEAC's research and development, allocated to the entire floppy disk drive products, is conducted in laboratories totaling 112 square meters and employing 22 individuals. CX 694, at 24.

309

881. TEAC warehousing is done at Tokyo system Unyu Kabushiki 3-534-1, Tateno, Higashi Yamato, Tokyo, Japan. Approximately 30 percent of 2,706 square meters of the floor space of the warehouse is used for floppy disk drives. CX 694, at 24.

382. TEAC's marketing, distribution, and sales conducted in Japan encompass 50 square meters in the facility and nine employees have such functions. CX 694, at 24.

3. Mitsubishi.

333. Mitsubishi has production facilities in Japan with a capacity of approximately products and carriage assemblies per month. CX -690, Interrogatory No. 11.

834. The monthly production of Mitsubishi over fiscal year 1934 was approximately units per month. CX 690, Interrogatory No. 11.

835. Mitsubishi's double-sided disk drives compete with double-sided disk drives sold by Tandon, Shugart, and Control Data Corporation. Foster, CX 447, at 303-327.

886. There is a percent surplus of production capacities at Mitsubishi's loriyama Works. CX 690, Interrogatory No. 11.

837. Mitsubishi's inventory of floppy disk drives at its Xoriyama Works in December 1984 was 137,077 disk drives, of which 124,930 were 5-1/4 inch disk drives. In March 1984, the inventory level was 25,557 units. CX 690, at attachment 4.

310

888. Mr. Brehme of TCA believed that Mitsubishi is not making a profit. The basis for this belief is the reported existence of an oversupply of Mitsubishi disk drives in Japan. Brehme, Tr. 2754-55, 2766, 2768-69.

889. In a report dated January 14, 1985, MELA projected disk drive sales of $ in 1985, and $ in 1986. Of the 1985 forecast, was for 5-1/4 inch disk drives, $ was for 3-1/2 inch disk drives, and $ was for 8-inch disk drives. CX 470, at 512106.

890. With the exception of 8-inch double-sided disk drives, Mitsubishi devotes employees and square meters to manufacture and production of double-sided floppy disk drives. This activity takes place in Koriyama Works in Japan. Manufacture of 8-inch double-sided disk drives is done under Mitsubishi's technical guidance in OA Research Institute, Ltd., which is a subcontract factory of Mitsubishi. CX 690, Interrogatory No. 9.

891. All research and development for Mitsubishi's double-sided floppy disk drives is carried out in Japan. Foster Dep., CX 447, at 47; CX 688, Interrogatory No. 9.

892. Mitsubishi is currently considering new double-sided disk drive products for sale in the United States. One is a inch double-sided floppy disk drive with a . Also under discussion is a inch double-sided disk drive and additional models of a inch double-sided disk drive. Foster Dep., CX 447, at 140-49.

311

W73. UT= devotes employees and square peters to research and development of double-sided floppy disk drives. This activity takes place in Japan. CX 690, Interrogatory No. 9.

894. Design engineering for Mitsubishi's double-sided floppy dish drives occurs in Japan. Foster Dep., CX 447, at 43.

395. Product engineering for Mitsubishi's double-sided floppy disk drives occurs in Japan. Foster Dep., CX 447, at 43.

396. Primary quality control for Mitsubishi's double-sided floppy disk drives occurs in Japan. Foster Dep., CX 447, at 63-64.

C 897. HELCO devotes employees and square meters to marketing, distribution, salei, and warehousing of double-sided floppy disk drives.' CX 690, Interrogatory No. 9.

4. Sony.

393. In September 1984, SONAII forecast sales in February 1935 of 3-1/2 inch disk drives, of which were single-sided and were double-sided disk drives. CX 240.

899. SONAR has placed with potential customers approximately

C . CX 202, Interrogatory No. 7; CX 692, at 4; Mergentime Dep., CX 252, Vol. I, at 119-20.

900. A number of major OEMs, including IBM, are thought to be in the process of designing new computer models which will incorporate 3-1/2 inch microfloppy disk drives. Digital Equipment Corporation (DEC) is expected to select a double-sided microfloppy vendor in May 1935; Compaq is expected to choose a supplier by August 1935; and the IBM plant in Boca Raton, Florida, is

thought to have a vendor selection date set for April 1935 and October 1905. The IBU order is expected to be for 1,000,000 units per year, and the combined DEC and Compaq orders are expected to be for 300,000 units per year. Abraham, CX 714, at 15-16.

901. Sony introduced a 5-1/4 inch plug-compatible version of its 3-1/2 inch double-sided floppy disk drive (0A-D3311), which was advertised as being capable of replacing standard mini-floppy drives without any interfacing problems. The double-sided version

. CX 210; Mergentime Dep., CX 252, Vol. I, at 119-20.

902. Sony's 3-1/2 inch disk drive was

. Langer, Tr. 2426-23.

903.

. Langer, Tr. 2423. ,

904.

. Langer, Tr. 2429-30.

905. Tandon is seeking to sell its 3-1/2 inch double-sided floppy disk drive to major OEM accounts such as . Abraham, CX 714.

313

906.

. Langer, Tr. 2423; Brehme, CX 43, at 195-96, 305.

907. Research and development for all Sony disk drive products is done in Japan. Manufacturing for Sony floppy disk drive products is done in Japan. Quality control for Sony floppy disk drive products is done in Japan. Langer, Tr. 2444.

5. Tandon.

903. "Marketing windows" open whenever an OEM customer is looking for a new drive. Abraham, Tr. 1057. Thus, these windows open during evaluation of vendors and their drives and close once a vendor has been selected. Abraham, Tr. 1057-5C.

909. Marketing windows reopen if a vendor can not continue supplying a drive and the customer must look elsewhere. Abraham, Tr. 1059.

910. The marketing window for 5-1/4 inch double-sided half-height, high capacity floppy disk drives is currently open. Abraham, Tr. 1067.

911. It is expected that several major computer OEMs will soon announce next-generation computer products with 3-1/2 inch disk drives. Haldi, CX 711, at 74.

912. The initial OEM orders for 3-1/2 inch disk drives will be crucial in determining future market position among floppy disk drive manufacturers. Those floppy disk drive manufacturers that fail to achieve initial OEM orders while the window is open will tend to be relegated to a niche position in the market, and they could even be forced to leave the market altogether. Haldi, CX 711, at 74.

913. The move by ISM to offer a computer with 1.6 megabyte dual-sided 5-1/4 inch disk drives has opened another important window of opportunity for floppy disk drive manufacturers. Haldi, CX 711, at 74-75.

914. The desire to introduce new computer models by fall of 1985 may lead many computer OEMs to place critical initial orders for disk drives between May and July 1985. Placement of such orders will cause important windows of sales opportunities to close. Haldi, CX 711, at 76.

915. Many important windows of sales opportunities which are now open could begin closing as early as May, June, or July 1935. Haldi, CX 711, at 76-77.

916. Tandon remains in competition with Sony, TEAC, and Mitsubishi for several major accounts which will be awarded during the next few months. Abraham, CX 714, Sr 17.

917. Tandon is in competition with Sony for a contract offered by for floppy disk drives a year. The vendor selection date is May 1985. The contract is for 3-1/2 inch double-sided floppy disk drives. Tandon is seeking to sell its TM 304. Langer Dep., CX 254, Tr. 71-72; Abraham, CX 714, ¶1 17.

918. Tandon is in competition with TEAC and Mitsubishi for a contract offered by . The contract is for a 1.6 megabyte 5-1/4 inch double-sided floppy disk drive. Tandon is seeking to sell its T1 65-8. Abraham, CX 714, IT 17.

919. Tandon is in competition with TEAC and possibly Mitsubishi for a contract offered by for units. The selection date is August 1985. The contract is for 3-1/2 inch double-sided floppy disk drives. Tandon is seeking to sell its TI 306 (1.0 megabyte) and TI1 65 (1.6 megabyte) drives. Foster Dep., CX 447, Tr. 369-70; Abraham, CX 714, S 17.

920. Tandon is in competition with Mitsubishi for an order with regarding 1.6 megabyte 5-1/4 inch drives. Foster Dep., CX 447, Tr. 365-69.

921. Tandon is in competition with TEAC and Mitsubishi for an order with for 1.6 megabyte - 5-1/4 inch double-sided floppy disk drives. Tandon is seeking to sell its TM 65-8. Abraham, CX 714, t 17.

922. Tandon is in competition with TEAC and possibly Mitsubishi for a contract offered by . The vendor selection date for a 1.0 megabyte drive is April 1985. The vendor selection date for a 1.6 megabyte drive is October. The contract on the 1.0 megabyte is for drives per year by 1986. The product referred to is the 3-1/2 inch double-sided floppy disk drive. Tandon is seeking to sell its TM 308 ( ) and TM 309 (1.6 megabyte). Foster Dep., CX 447, Tr. 373-74; Abraham, CX 714, iT 17.

. CX 242, Bates No. 770644.

923. Tandon is in competition with Mitsubishi for a contract offered by . The contract is for a 1.6 megabyte 5-1/4 inch double-sided floppy disk drive as a second source to . Approximately

units will be ordered. The vendor selection will take place in July 1935. Tandon is offering its TM 75. Foster Dep., CX 447, Tr. 371-75; Abraham, CX 714, c 17.

924. Tandon is seeking to sell its TM 304 and TM 309 drives to for the following offers: (1) a vendor selection date of October 1985 for units per year at , operation ( ); (2) a vendor selection date of October 1935 for units per year at , operation ( ); and (3) a vendor selection date of August 1985 for units per year at , operation. Abraham, CX 714, ST 17.

. Langer, Tr. 2428.

925. Tandon is in competition with Mitsubishi for for a 1.0 megabyte 5-1/4 inch double-sided floppy disk drive. This order is for drives per year starting June 1985. The vendor selection is in May 1985. Foster Dep., CX 447, Tr. 376; Abrahan, CX 714, 4 17.

926. Tandon is in competition with TEAC and Mitsubishi for a contract offered by for double-sided 3-1/2 inch and 5-1/4 inch floppy disk drives per year. The vendor starting date is August 1935. Tandon is seeking to sell its TM 303 (1.0 megabyte), TN 65-8 (1.6 megabyte), and T!1 65-2L (0.5 megabyte) drives. Foster Dep., CX 447, Tr. 378-79; Abraham, CX 714, ST 17.

927. Tandon is in competition with Mitsubishi for a contract offered by C , for double-sided 3-1/2 inch floppy disk drives per year. The vendor selection date is May 1935. Langer Dep., CX 554, Tr. 382-83; Abraham, CX 714, Sr 17.

923. Tandon's TM 848 is in competition with Mitsubishi (and one or two other Japanese companies) for Shugart's 3-inch disk drive account. This account is in excess of several hundred thousand drives per year. Abraham, Tr. 1129.

C. Possible Harm to Respondents..

929. The distribution and sale of double-sided floppy disk drives in the United States is a large and vital part of MELA's business. Foster, MRX 41C, Sr 5.

930. MELA employs approximately persons in the United States. of these employees are directly involved in the distribution and sale of disk drives. The double-sided floppy disk drive operations at iELA require the equivalent of at least full-time employees. Foster, MRX 41C, Sr 5; Foster Dep., CX 447, at 83, 133.

931. The reputation of a disk drive supplier for providing a reliable and uninterrupted delivery of a product is a primary concern in en OEM's selection of a supplier. Foster, MRX 41C, Sr 8.

932. One reason that the reputation is very important is that the drives must often be customized to accommodate the unique specifications of a particular oEn customer. Foster, MRX 41C, ii 8. Customizing a drive to suit a particular OEM often ties the OEM to a particular drive supplier and requires an investment in time and preparation on the part of the OEM and/or the supplier. Foster, Tr. 2929, 2932.

933. A customized bezel provided by MELA to some of its OEM customers would typically cost the OEM an additional $1.00 per drive for an order of 20,000 disk drives. Foster, Tr. 2933-35.

934. In addition to the customizing which is done to the exterior of a disk drive in order to suit a particular OEM, OEMs frequently have specific performance requirements which further limit the selection of available disk drive suppliers. MRX 41C, ST 9.

935. Selection of a particular disk drive supplier frequently follows an evaluation period which may extend over a period of six months. Drives that are not qualified by an OEM during this period are generally eliminated from consideration by the OEM for use in the computer system for which the evaluation was conducted. From these remaining qualified suppliers, the OEM selects a primary source of the disk drives. It is not. unusual for there to be only one supplier of the disk drives qualified for a particular computer system (Foster, MRX 41C, 1 10), though an OEM often qualifies more than one disk drive manufacturer (Foster, Tr. 2934). Some OEMs have a second supply source for their drives. Foster, Tr. 2934.

936. The evaluation of disk drives by an OEM normally takes thief‘ to six months. If the disk drive is a "commodity-type" disk drive, an evaluation may not even be necessary. Sollman, Tr. 251-53

937. In view of the evaluation procedure and the customization undertaken by the OEM and the disk drive supplier, the ability of the supplier to deliver the product on time and without significant interruption is a primary concern to the OEM. Foster, MRX 41C, 1 11.

938. Implicit in the selection of MELA as a supplier of a customized drive is the fact that the OEM frequently cannot substitute "standard" disk drives of another supplier in the event the supply of disk drives from MELA is interrupted. Foster, MRX 41C, 1 11.

939. SONAM has four facilities in some way involved with flexible disk drives. These facilities are located in Paramus, New Jersey, and San Jose and Compton, California. Corporate headquarters is located in Park Ridge, New Jersey. Langer, Tr. 2402.

320

940. SONAM performs quality assurance activities on the disk drivf•s that it imports into the United States. These quality assurance functions include an AQL level testing at the Compton facility, which insures that thf• product did not suffer any shipping damage. Langer, Tr. 2402-03.

941. SONAM also performs quality assurance activities at its facility in San Jose, including a 100 percent inspection and full performance testing of new products during the evaluation cycle. Parallel inspection takes place at the Paramus facility. Langer, Tr. 2403.

942. SONAM has plans to open an additional new warehouse facility in Burlingame, California. This facility will have the capability to perform full performance testing. Langer, Tr. 2403-04.

943. The quality assurance for the drives supplied to any OEM customer by SONAM will be performed in the United States. Langer, Tr. 2463.

944. SONAM performs engineering activities with regard to flexible disk drives in the United States. This engineering is basically one of product definition. The product is defined, a theoretical analysis is performed, and thereafter SONAM communicates with Sony in Tokyo where the actual bench design takes place. Langer, Tr. 2404. These engineering activities take place not only *in* San Jose but also in Paramus, New Jersey, before and after an OEM contract has been signed. Langer, Tr. 2405.

945. SONAM engages in product management; as part of its marketing functions, which includes defining the markets for the product, defining the customer base, participating in forecasting, and participating in competitive analysis. In addition, SONAM has the functionlof application engineering *where* hands-on personnel assist potential customers with product integration and sometimes conceptual problems. Langer, Tr. 2405.

946. SONAM has a service and repair facility at San Jose. This 1100 square feet facility is staffed by seven technicians. The similar facility is located in Paramus, New Jersey. Langer, Tr. 2406.

947. SONAM has plans to expand service and repair facility in proportion to its future. business. The expanding will take place both in San Jose and in Paramus. Additionally, SONAM is restructuring its regional divisions so as to have five regions rather than two. Langer, Tr. 2407. These repair centers will have responsibility for general service and repair of all flexible disk drive products. Langer, Tr. 2407.

948. SONAM performs customer repairs on-site. Its engineers frequently travel throughout the United States directly to perform on-site repair. Langer, Tr. 2407.

949. The degree of harm to respondents in this investigation from granting temporary relief to the domestic industry would depend upon the extent to which respondents' present and prospective customers change suppliers in response to the Commission's actions. See Haldi, CX 711, at 78.

322

n. Public Inti•re•st.

950. 1'•r•• a talporary orle-r (TEO) to isuw., 0:M3 would incur thu costs of re-training t'•chnicians and rf.e•valuatin9 nfw Jri:et s. Abraham, Tr. 1103.

951. Casts: ascociatf-d witl*, switching disk drive- auppli-rs include. ref-vuluuting disk drivus, re-stocking inventory, and,changing product sciort and software-. Abraham, Tr. 1103; Abraham, CX 714, at 3; c-- Tjon, Tr. 2033.

952. Although Or.r.s gene-rally cannot rf.adily interchange. drive-s from dif[f.re'nt mahufacturf•rs during production, OC:ls can rf.adily substitute• drive•, of other manuflctururs during thf• d••sign anJ evaluation • phav•s of producing a nut/ computf-r model. Haldi, Tr, 1301-05; Halli, CX 711, at 75-96.

953. Thosf- OEls tbat arf• currf-ntly in thf• f•Urly stag'. of np-cifying thf• de-sign of their next computer rnodrls are likely to i.e relatively unafff•ct,• by a df•cision to issue. an ordf•r for tf•mporary rf•if•f. lialdi, CX 711, at 81.

954. Substitutf•s for the' allegedly infringing floppy .115k lrive that arc- available• to computer manufacturers include- the- various model s of dual-sided dick drive-s offf-r1.0 by thr.'domr-stic industry, as vp•11 aa all lizk drives offe-rf•d by non-respondents. Ilaldi, CX 711, at 73.

955. Qualification of a new drive' is expensive. Firut, the• costs of tests are' high and may bf• burdf-nsome on smaller companie•s. Second, aro,/ inventory of spar,• parts built up by the- customer for an excluded drive- could be-comr. use-loss. Repairmen and technicians would also have to la,• rf-traiwd to

323

work on the *new* drives. Finally, depending on the physical characteristics of the *new* drive, the customer's technical manuals and specifications would probably need to be reprinted and its sales brochures and advertisements changed to reflect the new appearance of the product. Osawa, TRX 28(C), at 16-17.

956. If a customer's prime supply is cut off, it is not always necessary for the customer to begin searching for a new supply since many customers have an alternative source already qualified or at hand. Abraham, Tr. 1062.

957. Nany disk drive customers have second sources. Some second sources may not be ready to assume fully the increase in volume demand that might result from an exclusion order. Osawa, TRX 23(C), at 17.

953. A large an customer computer manufacturer typically keeps from one to three months supply of floppy disk drives in inventory. Abraham, Tr. 1139-40.

959. NCR Corporation's manufacturing divisions produce various types of office and business data processing equipment, including personal computers and a computer mainframe, that utilize floppy disk drives. Since 1983, NCR
C has purchased exclusively from TEAC approximately units of the various models of the TPI half—height 5-1/4 inch double—sided floppy disk drive. Walter, TRX 61(C), at 1-2.

960. NCR requires that the drives produced by TEAC include a bezel (face plate) having a color unique to NCR. One of NCR's customers, Sperry Univac, also requires a uniquely colored bezel. The customized bezels are difficult to produce and have taken months to perfect by evaluating different

324

samples from TEAC. Walter, TRX 61(C), at 2. NCR, however, has the capability to paint the custom colored bezel itself to match its requirements. Walter, Tr. 2556, 2559.

C 961. NCR has inventory sufficient to last approximately NCR maintains a service inventory of replacement and repair parts for TEAC disk drives worth approximately $. Walter, TRX 61(C), at 3, 4.

C 962. NCR 5-1/4 inch 96 TPI half-height double-sided floppy disk drives. Walter, TRX 61(C), at 3.

963. Evaluation and selection of a disk drive and disk drive vendor may be a time-consuming and costly process in which many concerns are at stake, ranging from the electrical and physical characteristics of the drive to the reputation and shipping performance of the vendor. Even where disk drives are plug compatible (i.e., where one can physically be substituted in place of another), they often are not software compatible and thus cannot be freely interchanged without further modification being made to the overall system. Walter, TRX 61(C), at 5.

964. The first step in the NCR qualification process, which is
C estimated to require , would be to research the market, identify potentially acceptable drives, and obtain units for evaluation. After evaluation drives are secured, the drives will be subjected to a life
C evaluation test that last approximately . Walter,
C TRX-61(C), at 5-6. NCR would not require to identify potentially acceptable drives and obtain units for evaluation if it had a specification and a sample of a potentially acceptable drive. Walter, Tr. 2559; see id., Tr. 2545-46.

325

965. In light of the anticipated time involved in the initial test and life evaluation test, NCR would not place an order until approximately after cessation of shipments from TEAC. Furthermore, a disk drive vendor typically requires approximately between receipt of a sizable order and delivery of the full amount of drives. Therefore, it is possible that would elapse between exclusion of TEAC's drives and delivery to NCR of the first drives from a qualified, authorized vendor. Walter, TRX 61(C), at 6-7; Walter, Tr. 2549.

967. NCR estimates the cost of qualifying a new drive and vendor at . This cost includes initial testing and life evaluation testing. Retraining field engineers, building up inventory for repair/replacement. parts, and revising technical manuals and other publications, would involve additional costs to NCR. Walter, Trx 61(C), at 7-8.

963. Convergent Technologies buys components, disk drives, and high technology things, in order to integrate them into computer systems for resale to OENs. Tjon, Tr. 2026.

969. If NCR changed floppy disk drive manufacturers tomorrow, there would still be existing systems in the market place that would need repair, so that all of its inventory of parts would be used to repair existing drives until that inventory was used up. Walter, Tr. 2559-60.

970. In 1932, Convergent designed a *new* computer system, the "next generation" or N—CEN. Tandon was originally intended to source the double—sided floppy disk drives for this system because of the price and availability of the drive. Tjon, Tr. 2027-28.

971. Convergent ultimately did not use Tandon drives because it found that the Tandon drive did not meet the requirements and allow Convergent to ship the quality levels it wanted. Some of the problems Convergent had with Tandon's drives originated with Convergent rather than Tandon. Tjon, Tr. 2037-39. Convergent uses Mitsubishi drives in the *N-GEN* system. Tjon, Tr. 2030, 2037-39.

971. If Convergent was unable to obtain in May or June 1985, the Mitsubishi drives for the N-GEN system, Convergent would probably have to shut down for about nine months its who'e manufacturing operation for the *U-GEN.* Tjon, Tr. 2026, 2031-32. That is, Convergent would have to go through a vendor survey to identify viable vendors and conduct an engineering qualification on two or three vendors. This process would take about three months. Once a vendor was selected, retooling would take approximately six months. Tjon, Tr. 2031-32, 2052.

972. Upon a selection of a vendor, Convergent would then have to retool its computer system to match the vendor chosen. This selection and retooling process would probably cost well in excess of $100,000. Soft retooling would not be possible because of the volumes involved in Convergent's N-GCN program. Tjon, Tr. 2030, 2031-32, 2050-52.

973. In addition to the six-month time period required by Convergent to evaluate and retool for an alternate disk drive supplier, Convergent customers would also have an evaluation period during which time its computer system with the new drive would be evaluated by the customer. Tjon, Tr. 2056.

974. Convergent would encounter significant problems with its customers if it had to switch drives from Mitsubishi to another supplier. One reason for these problems would be that the U-GEN system would look different. Another reason would be that all of the customers product literature would have to be changed to accommodate the new drive. Also, all of the field service depots would have to be restocked with drives and mating covers of the new supplier which was selected. Tjon, Tr. 2032-33.

975. A TEO would likely have an effect on the prices of double-sided floppy disk drives, aside from any embargo effect. Haldi, Tr. 1172, 1302. Such a price effect, if high enough, could serve as an embargo; this depends on the bonding situation. Haldi, Tr. 1174-75.

976. In economic terms, a TEO would have a price effect but not an embargo effect on economic activity within the computer industry, due to the fact that respondents' floppy disk drives will still be available to the United States OEMs under bond. Haldi, Tr. 1172-73.

977. The extent of the price effect depends upon the amount of the bond that might be put on the importation respondents' floppy disk drives during the temporary relief phase of this investigation. Haldi, Tr. 1174.

978. Except for some increase in price, there need be no substantial disruption of the computer industry or of the supply of computers to the buying public, even if OEMs were to continue to purchase respondents' allegedly infringing disk drives under bond during the temporary relief phase of this investigation. Haldi, CX 711, at 83-84.

CONCLUSIONS OF LAW

1. The U.S. International Trade Commission has jurisdiction over unfair methods of competition and unfair acts in the importation into or sale in the United States of products the effect or tendency of which is to destroy or substantially injure an industry, efficiently and economically operated, in the United States. 19 U.S.C. S 1337.

2. The Commission has subject matter jurisdiction over the double-sided floppy disk drives and components thereof at issue in this investigation that have been imported into or sold in the United States. FF 1.

3. U.S. Letters Patent No. 4,151,573 is valid. Opn., at 10-29.

4. Patent infringement is an unfair act or method of competition under 19 U.S.C. S 1337. In re Von Clemm, 108 U.S.P.O. 371 (C.C.P.A. 1955).

5. There is reason to believe that the double-sided Sony 3-1/2 inch floppy disk drives literally infringe claims 1, 5, and 12 of the '573 patent. There is reason to believe that the double-sided floppy disk drives of TEAC and Mitsubishi (except for certain admittedly non-infringing models) literally infringe claim 5 of the '573 patent. Opn., at 30-42, 46-47.

6. There is reason to believe that the double-sided floppy disk drives of TEAC and Mitsubishi (except for certain admittedly non-infringing models) infringe claims 1, and 12 of the '573 patent by reason of the doctrine of equivalents. Opn., at 30-38, 42-45, 48.

7. There is reason to believe that the TEAC, Mitsubishi, and Sony respondents have imported into or sold in the United States double-sided floppy disk drives. Opn., at 48-50.

8. The domestic industry in this investigation is defined by the domestic activities of the patentee and its licensees devoted to the manufaCture, distribution, research and development, and sale of double-sided floppy disk drives. Opn., at 51-57.

9. The domestic industry in this investigation includes all of the double-sided floppy disk drives of complainant and its licensees which incorporate the claims of the '573 patent. Opn., at 58-65.

10. There is reason to believe that as of December 6, 1984, the date in which the complaint was filed in this investigation, the domestic operations of complainant and its licensees constituted a domestic industry for purposes of S 337. Opn., at 66-82.

11. There is reason to believe that the domestic industry at issue in this investigation is efficiently and economically operated. Opn., at 83-91.

12. There is reason to believe that the alleged unfair methods of competition and unfair acts of respondents in the importation of double-sided floppy disk drive into the United States, or in their sale, have the effect or tendency to substantially injure the domestic industry at issue in this investigation. Opn., at 92-103.

13. There is a reason to believe that a violation of S 337 of the Tariff Act of 1930, as amended, exists in the importation of certain double-sided floppy disk drives and components thereof, or in their sale, by reason of infringement of U.S. Letters Patent No. 4,151,573, the effect or tendency of which is to destroy or substantially injure an industry, efficiently and economically operated, in the United States. Conclusions of Law 3-13.

14. Complainant's probability of success on the merits differs for each respondent. There is a greater probability of success with respect to the Sony respondents than as to the TEAC and Mitsubishi respondents with regard to the issue of patent infringement. If ultimately it is established that respondents have engaged in unfair methods of competition, there is a greater probability of success with respect to the TEAC and Mitsubishi respondents than as to the Sony respondents on the questions concerning the breadth of the domestic industry and injury to it. Opn., at 104-07.

15. Except where the Commission is convinced that the domestic industry has been destroyed and cannot be resuscitated by temporary relief (i.e., issuance of relief would be futile), temporary relief, if otherwise appropriate, should be awarded so long as the immediate and substantial harm occurred after the complaint was filed. Opn., at 108-11.

16. Substantial harm has occurred and further substantial harm is likely to occur before the Commission is able to issue permanent relief in this investigation. Opn., at 112-36.

17. Harm to the respondents in this investigation is relatively low. Opn., at 136-37.

18. A grant of temporary relief in this investigation will not adversely affect the public interest. Opn., at 137-41.

19. Consideration of the pertinent factors in this investigation shows that the balance decidedly tips in favor of complainant's request for temporary relief. Opn., at 142-43; Conclusions of Law 14-18.

INITIAL DETERMINATION AND ORDER

Based on the foregoing opinion, findings of fact, conclusions of law, and the record as a whole, and having considered all pleadings and arguments, the administrative law judge finds that there is reason to believe that a violation of S 337 exists in the importation of certain double-sided floppy disk drives and components thereof, or in their sale, by reason of infringement of U.S. Letters Patent No. 4,151,573, the effect or tendency of which is to destroy or substantially injure an industry, efficiently and economically operated, in the United States. Following this determination, the administrative law judge extensively reviewed the specific facts bearing on (1) complainant's probability of success on the merits, (2) immediate and substantial harm to the domestic industry in the absence of temporary relief, (3) harm to the respondents if the request for temporary relief is granted, and (4) the effect that the issuance of temporary relief would have on the public interest. 19 C.F.R. S 210.24(d). The administrative law judge finds that complainant's request for temporary relief is appropriate based upon consideration of these factors.

For the above reasons, it is the administrative law judge's INITIAL DETERMINATION that complainant's Motion No. 215-1 for temporary relief should be and is granted. The administrative law judge hereby CERTIFIES to the Commission this Initial Determination together with the record of the temporary relief phase of this investigation.

In accordance with Rule 210.44(b), all material found to be confidential by the administrative law judge under Rule 210.6(a) is to be given in camera treatment for five years from the termination date of this investigation.

The Secretary is instructed to serve a public version of this Initial Determination upon all parties of record and the confidential version upon all counsel of record who are signatories to the protective order issued by the administrative law judge on January 30, 1985. To expedite service of the public version, counsel is hereby ordered to serve on the administraive law judge by no later than June 5, 1985, a copy of this Initial Determination with those sections considered by the party to be confidential bracketed in red ink.

This Initial Determination shall become the determination of the Commission 30 days after its date of service unless the Commission within those 30 days shall have ordered review of this Initial Determination, or certain issues herein, pursuant to Rules 210.54(b) or 210.55. 19 C.F.R. S 210.53(h).

Any party to this investigation may request a review by the Commission of this Initial Determination by filing with the Secretary a petition for review, except that a party who has defaulted may not petition for review of any issue regarding which the party is in default. A petition of review shall be filed within five (5) days after the service of this Initial Determination. 19 C.F.R. S 210.54(a).

ney Harri
Administrat Law'Judge

Issued: May 30, 1985

333