NON-CONFIDENTIAL

2013-1084

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

CENTILLION DATA SYSTEMS, LLC,

Plaintiff-Appellant,

v.

QWEST COMMUNICATIONS INTERNATIONAL, INC.,
QWEST CORPORATION,
and QWEST COMMUNICATIONS CORPORATION,

Defendants-Appellees.

Appeal from the United States District Court for the
Southern District of Indiana in consolidated case nos.
04-CV-0073 and 04-CV-2076, Senior Judge Larry J. McKinney

BRIEF OF PLAINTIFF-APPELLANT CENTILLION DATA SYSTEMS, LLC

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February 27, 2013

CERTIFICATE OF INTEREST

Counsel for Plaintiff-Appellant Centillion Data Systems, LLC, certifies the following (use "None" if applicable):

1. The full name of every party or amicus represented by me is:

Centillion Data Systems, LLC

2. The name of the real party in interest (if the party named in the caption is not the real party in interest) represented by me is:

None

3. All parent corporations and any publicly held companies that own 10 percent or more of the stock of the party or amicus curiae represented by me are:

CTI Group (Holdings), Inc. is the parent corporation of Centillion Data Systems, LLC, and owns 10 percent or more of its membership interest.

4. The names of all law firms and the partners or associates that appeared for the party or amicus now represented by me in the trial court or agency or are expected to appear in this court are:

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CONFIDENTIAL MATERIAL OMITTED

The material omitted on page 8 characterizes technical or proprietary information contained in Qwest's Memorandum in Support of its Motion for Summary Judgment of Non-Infringement, ECF No. 884, which was filed "Under Seal"; the material omitted on page 9 characterizes technical or proprietary information contained in Centillion's Brief in Support of its Motion for Partial Summary Judgment of Infringement, ECF No. 872, which was filed "Under Seal"; the material omitted on page 19, line 17, through page 20, line 8, characterizes technical or proprietary information contained in Centillion's Brief in Support of its Motion for Partial Summary Judgment of Infringement, which was filed "Under Seal"; the material omitted on page 20, lines 9-11, characterizes technical or proprietary information contained in the Declaration of Dr. Jack D. Grimes, ECF No. 887, which was filed "Under Seal"; the material omitted on page 21 n.11, quotes a document designated by Qwest as "ATTORNEYS' EYES ONLY"; the material omitted on page 22, lines 2-8, discusses and quotes a deposition transcript designated as "Confidential – Attorneys' Eyes Only"; the material omitted on page 22, lines 12-14, characterizes technical or proprietary information discussed in the Declaration of Dr. Jack D. Grimes, ECF No. 899, which was filed "Under Seal"; the material omitted on page 22, lines15-16, describes technical or proprietary information designated as "ATTORNEYS' EYES ONLY"; the material omitted on page 22 n.12, characterizes technical or proprietary information; the material omitted on page 23, lines 1-2 and 4-5, characterizes and quotes confidential or proprietary material discussed in Qwest's Surreply Brief in Opposition to Centillion's Motion for Partial Summary Judgment, ECF No. 905, which was filed "UNDER SEAL"; the material omitted on page 23, lines 6-7, quotes a passage from the Declaration of Venkat Ashok, eCF No. 881, which was filed "Under Seal"; the material omitted on page 28 characterizes testimony contained in a deposition transcript designated as "Confidential – Attorneys' Eyes Only"; the material omitted on page 29 discusses technical or proprietary information; the material omitted on page 38, lines 8-11, quotes Centillion's Brief in Support of its Motion for Partial Summary Judgment of Infringement, which was filed "Under Seal"; the material omitted on page 38, lines 15-18, quotes Qwest's Opposition to Plaintiff's Motion for Partial Summary Judgment, ECF No. 889, which was filed "Under Seal"; the material omitted on page 39 n.18, quotes the Expert Report of Jack D. Grimes, Ph.D., which was filed as an exhibit to a document (ECF No. 883) that was filed "Under Seal"; the material omitted from page 41 characterizes technical or proprietary information and quotes a deposition transcript designated as "Confidential – Attorneys' Eyes Only"; the material omitted on page 42 quotes confidential or proprietary material contained in

Qwest's Surreply Brief in Opposition to Centillion's Motion for Partial Summary Judgment, which was filed "UNDER SEAL"; the material omitted on page 43, lines 2-5 characterizes technical or proprietary information discussed in the Declaration of Dr. Jack D. Grimes, ECF No. 899, which was filed "Under Seal" and quotes a document designated as "ATTORNEYS' EYES ONLY"; the material omitted from page 43, lines 7-9 characterizes technical or proprietary information contained in documents filed "Under Seal"; the material omitted from page 53-54 quotes Qwest's Memorandum in Support of its Motion for Summary Judgment of Non-Infringement, ECF No. 884, which was filed "UNDER SEAL"; the material omitted from pages 54-55 characterizes technical or proprietary information discussed in Declaration of Dr. Jack Grimes, ECF No. 877, which was filed "Under Seal."

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STATEMENT OF RELATED CASES

The following statements are supplied pursuant to Federal Circuit Rule 47.5:

1. This Court has previously decided an appeal in this case involving the same parties. In case numbers 2010-1110, -1131, this Court vacated-in-part, reversed-in-part, and remanded the district court's grant of Qwest's Motion for Summary Judgment of Non-Infringement and Centillion's Motion for Partial Summary Judgment of No Anticipation. The Court filed its opinion on January 20, 2011. The panel consisted of Judges Lourie, Linn, and Moore, with Judge Moore writing the panel opinion. *See Centillion Data Sys., LLC v. Qwest Commc'ns Int'l, Inc.*, 631 F.3d 1279 (Fed. Cir. 2011).

2. Plaintiff-Appellant Centillion Data Systems, LLC and its counsel are not aware of any other case pending in this Court or in any other court that will directly affect or be directly affected by this Court's decision in the pending appeal.

JURISDICTIONAL STATEMENT

1. This is an action for patent infringement under 35 U.S.C. § 271. Pls.' 2d Am. Compl., A364-69. The district court had jurisdiction under 28 U.S.C. §§ 1331 and 1338(a).

2. Because jurisdiction over this case was based, in whole or in part, on 28 U.S.C. § 1338, exclusive jurisdiction over this appeal rests with the United States Court of Appeals for the Federal Circuit under 28 U.S.C. § 1295(a)(1).

3. On October 15, 2012, the district court filed an Order that, *inter alia*, granted Qwest's[1] Motion for Summary Judgment of Non-Infringement. A5031-55.

4. On October 30, 2012, the district court filed an Amended Entry of Judgment, which dismissed the claims of Centillion Data Systems, LLC ("Centillion") with prejudice, dismissed Qwest's affirmative defenses and its declaratory judgment claim without prejudice, and awarded Qwest its costs in the amount of $251,245.92. A5065-66.

5. On November 13, 2012, Centillion timely filed and served its Notice of Appeal pursuant to Rules 3(d) and 4(a) of the Federal Rules of Appellate Procedure. A5081-115.

[1] The terms "Qwest" and "Qwest Defendants" refer to the defendants, Qwest Communications Int'l, Inc. and Qwest Corp., and to the consolidated plaintiffs, Qwest Corp. and Qwest Communications Corp.

6. Following the entry of the district court's Amended Entry of Judgment on October 30, 2012 and its denial of Plaintiffs' Motion to Reconsider the award of costs on November 20, 2012, A5127-28, Centillion timely filed and served its Amended Notice of Appeal on November 30, 2012. A5129-66.

STATEMENT OF THE ISSUES

1. Whether the district court erred in granting Qwest's Motion for Summary Judgment of Non-Infringement by the eBill Companion (eBC) system based on its determination that the eBC Back Office does not "organiz[e] [the data files] into a format for ...display" on a personal computer when (a) Qwest did not dispute the presence of this claim element in its Motion for Summary Judgment of Non-Infringement, (b) Centillion had neither notice nor an opportunity to present evidence and argument regarding this claim element, (c) it was undisputed that conversion of the data files into PC-compatible ASCII format satisfies this claim limitation, and (d) at a minimum, genuine disputes of material fact exist regarding the presence of this element in eBC.

2. Whether the district court erred in granting summary judgment of non-infringement by the Logic system when a genuine dispute of material fact exists as to whether the system was capable of generating summary reports in which the inclusion of PACs functions to “select[] or make[] specific, the character of” the billing records and whether that satisfies the “as specified by the user” limitation of the claims.

3. Whether the district court erred in holding that customization of eBC data files for customers using third-party client applications does not meet the “as specified by the user” limitation of the claims when the district court based

this holding on its erroneous determination that Centillion had conceded previously that direct infringement by Qwest's customers requires use of the eBC client application and genuine disputes of material fact exist as to whether customization of the eBC data files satisfies the "as specified by the user" claim limitation.

4. Whether the district court abused its discretion in awarding litigation costs to Qwest in the amount of $251,245.95, when Qwest failed to substantiate its bill of costs and the district court made no specific findings that Qwest's claimed costs were necessarily obtained for use in the case.

STATEMENT OF THE CASE

This is an action for patent infringement under 35 U.S.C. § 271, which returns to this Court for a second time following the district court's granting of Qwest's Motion for Summary Judgment of Non-Infringement on a ground not raised by Qwest in support of its motion and on two other grounds as to which genuine disputes of material fact exist. Moreover, the district court awarded Qwest litigation costs exceeding $250,000, initially without giving Centillion the opportunity to object to Qwest's bill of costs and without any apparent review of the requested costs to determine if the expenses to which they related were necessarily obtained for use in the case.

Centillion filed its original complaint in the United States District Court for the Southern District of Indiana on January 12, 2004. A204-82.[2] The Complaint alleged that the Defendants had directly infringed United States Patent No. 5,287,270 ("the '270 Patent"), titled "Billing System," "by making, using, offering for sale, or selling a method and system for electronic billing, processing, reporting, and analysis of telephone charges …." Compl. ¶ 14, A207. Centillion

[2] Centillion originally named as defendants Bellsouth Corporation, Convergys Corp., Mid America Computer Corp., Qwest, Telephone Data Systems, Inc., and Traq-Wireless, Inc. Compl. ¶¶ 5-10, A205-06. Centillion filed a Second Amended Complaint on June 15, 2004, which added Citizens Communications Company as a defendant and which named Qwest Communications International, Inc. and Qwest Corporation as defendants. 2d. Am. Compl. ¶¶ 9-10, A365.

further alleged that the Defendants had actively induced infringement or had contributorily infringed the '270 Patent. *Id.* On May 11, 2004, Qwest Corporation and Qwest Communications Corporation filed a declaratory judgment complaint against Centillion and CTI Group (Holdings), Inc., Centillion's corporate parent, in the United States District Court for the Western District of Washington, seeking declaratory relief of noninfringement and invalidity. A387-92. On December 21, 2004, the federal court in Washington transferred Qwest's declaratory judgment action to the Southern District of Indiana. A376-92. The district court in Indiana consolidated these actions on February 14, 2005.[3] A393-95; *see* Cent. Mot. to Consolidate, Jan. 21, 2005, ECF No. 170, A370-92.

On April 15, 2009, the parties filed cross-motions for summary judgment relating to infringement and validity. The district court ruled on those motions in an Amended Order filed October 29, 2009, which granted Qwest's Motion for Summary Judgment of Non-Infringement and denied Centillion's Motion for Partial Summary Judgment of Infringement, and granted Centillion's Motion for Partial Summary Judgment of Validity and denied Qwest's Motion for Summary Judgment of Invalidity based on the purported availability of the COBRA/TRACE billing product developed by NYNEX in the late 1980s.

[3] The non-Qwest Defendants are no longer parties for reasons not germane to this appeal.

Am. Order, Oct. 29, 2009, ECF No. 828, A1243-80.[4] On November 17, 2009, Qwest filed a Bill of Costs seeking $251,245.95. ECF No. 830, A1281-95. These costs consisted primarily of $73,918.70 for transcripts and $177,177.13 for copying expenses. A1281. Qwest's bill of costs did not include receipts or any declaration of counsel explaining why the substantial costs were "necessarily obtained for use in the case." *See* 28 U.S.C. § 1920. The Clerk never acted on Qwest's bill of costs, however. Centillion filed its notice of appeal on November 30, 2009. ECF No. 831, A1296-1345.

This Court vacated and remanded that portion of the district court's opinion granting summary judgment to Qwest on non-infringement. *Centillion Data Sys., LLC v. Qwest Commc'ns Int'l, Inc.*, 631 F.3d 1279 (Fed. Cir. 2011). The Court held that, to infringe a system claim, a single party need not control each and every element of the claim, but need only use the system as a whole by putting every element collectively into service. *Id*. at 1284. The Court further held that Qwest's customers "use" the system as a matter of law when they utilize both the on demand operation and the standard operation of the system. *Id.* at 1285.

Following remand, and over Centillion's objections, the district court allowed Qwest to file a new motion for summary judgment on issues purportedly

[4] The district court also held that neither Qwest nor its customers could be liable for direct infringement of method claim 47. Am. Order 35-36; A1277-78. Centillion did not challenge this ruling on appeal.

unresolved by this Court's prior opinion. Sched. Order 3, Aug. 12, 2011, ECF No. 868, A1371-73. Qwest filed its motion on September 16, 2011, A3499-3501, asserting three principal arguments. First, Qwest argued that the asserted system claims require that a user actually utilize one of the

[5] features of Qwest's

in order to satisfy the "specified by the user" limitation of the claims. Qwest Mem. in Support of Mot. for Summ. J. ("Qwest Mem.") 23-24, Sept. 16, 2011, ECF No. 884, A3827-28. Second, Qwest asserted that there is no direct evidence that any "specific" Qwest customer actually utilized one of those features. Qwest Mem. 24-27, A3828-31. Third, Qwest argued that, in the alleged absence of any such direct evidence, Centillion could not rely on circumstantial evidence from which a jury could find that "at least one" Qwest customer infringed the claims by performing billing analysis using one or more of the Accused Systems[6] in which at least one of those features

was implemented. Qwest Mem. 20-22, A3824-26.

Qwest argued, in addition, that it lacked the requisite intent to be subject to liability for indirect infringement and, in addition, that it could not be held liable

[5] Pursuant to Fed. Cir. R. 28(d)(1)(A), Centillion has enclosed "confidential" material in brackets.

[6] The "Accused Systems" are Logic, eBill Companion ("eBC"), and Insite.

for contributory infringement because the Accused Systems had allegedly substantial, non-infringing uses. Qwest Mem. 27-35, A3831-39. Qwest did not predicate its motion on the alleged absence of the "organizing … into a format for … display" claim element. Indeed, Qwest expressly reserved any arguments that the Accused Systems did not contain all the elements of the claims of the '270 Patent. Qwest Mem. 19-20 n.5, A3823-24.

Centillion also moved for partial summary judgment of infringement. ECF No. 871, A1374-76. It argued, with ample citations to the evidence, including admissions of Qwest's corporate representative, that eBC satisfied all of the claim limitations. Cent. Br. in Support of Mot. for Partial Summ. J. 18-32, Sept. 16, 2011, ECF No. 872, A1402-16. (Centillion elected not to include Logic in its motion for partial summary judgment.) Neither in response to Centillion's motion nor at any other time did Qwest dispute that the

See Cent. Br. 25, A1409. Indeed, at no time did the parties have any reason to believe that this claim element was in dispute.

The district court initially ruled on the cross-motions for summary judgment on September 28, 2012. Order, ECF No. 927, A5235-58. Although the district court held that the inclusion of PACs in a customer's billing information

and customization for customers who elected not to use the eBC client application did not satisfy the "as specified by the user" limitation of the claims, *id.* 16-17, A5250-51, it held that use of the on-demand feature satisfied this claim limitation and that a disputed issue of material fact exists regarding whether Qwest's eBC customers used that feature. *Id.* 17-18, A5251-52. The district court also held that eBC generated preprocessed summary reports within the meaning of the "data processing means" claim element. *Id.* 20, A5254.

The district court held, however, that eBC did not satisfy the "data processing means" claim element because eBC did not organize the summary reports into a format for display on a personal computer. *Id.* 20-21, A5254-55. As a result, the district court held that eBC did not contain all of the required claim elements and, accordingly, there could be no direct infringement by Qwest's customers as a matter of law. *Id.* 21-22, A5255-56. In the absence of direct infringement, Qwest could not be liable for indirect infringement.[7] *Id.* 22, A5256.

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[7] In one of several notices of supplemental authority filed by the parties in connection with their cross-motions for summary judgment, Centillion apprised the district court of this Court's en banc ruling in *Akamai Technologies, Inc. v. Limelight Networks, Inc.*, 692 F.3d 1301 (Fed. Cir. 2012), *petition for cert. filed*, 81 U.S.L.W. 3438 (U.S. Feb. 1, 2013) (No. 12-960). *See* Cent. Notice of Supplemental Authority, Sept. 5, 2012, ECF No. 922, A4884-87. Centillion noted that *Akamai* related to Qwest's liability for active inducement of infringement due to its *customers*' direct infringement not only through their *use* of the patented invention, but also as a result of their having *made* the system, as clarified in *Akamai*. *Id*. at 2-3, A4885-86. In its Orders granting Qwest's motion for summary judgment and denying Centillion's, the district court

The district court vacated its original order on its own motion October 4, 2012. ECF No. 928, A5259-60. The district court termed its September 28 Order "not complete" and promised a new order within 30 days. *Id.*

The district court issued its revised Order on October 15, 2012. ECF No. 929, A5031-55. The principal difference between the vacated order and the revised order was the inclusion of all of Qwest's Accused Products in the latter. The district court's infringement analysis of eBC was unchanged. *Id.* 14-22, A5044-52. As for Logic, however, the district court determined, based on its prior holding that inclusion of PACs does not satisfy the "as specified by the user" limitation, that the Logic system also does not infringe the '270 Patent. *Id.* 18, A5048. As noted, the district court repeated its prior determinations that customization of the data files at the request of customers using third-party client applications did not satisfy the "as specified by the user" limitation based on its erroneous belief that Centillion had conceded before this Court that infringement required use of Qwest's eBC client application software. *Id.*

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apparently misunderstood the relevance of *Akamai* to Qwest's potential liability as an *indirect* infringer under the "make" prong of § 271(a). Instead, the district court seems to have believed, incorrectly, that Centillion was relying on *Akamai* to resurrect its argument that Qwest, itself, was liable for direct infringement under the "make" prong of § 271(a). *See* Order [vacated] 14 n.3, ECF No. 927, Sept. 28, 2012, A5248; Order [revised] 15 n.2, Oct. 15, 2012, ECF No. 929, A5045. On remand, this Court should clarify that Qwest is subject to liability for indirect infringement under both the "use" and "make" prongs of the statute.

In its rulings concerning eBC and Logic, the district court ignored evidence of record presented by Centillion demonstrating that the Accused Systems satisfied all of the claim limitations of the '270 Patent. In so doing, the district court decided numerous disputed factual issues favorably to Qwest, contrary to Rule 56.

The Entry of Judgment accompanying the revised Order provided that each side would bear its own costs. Entry of Judgment, Oct. 15, 2012, ECF No. 930, A5056. On October 23, 2012, Qwest filed a Motion to Reconsider the portion of the Judgment requiring each party to bear its own costs. Mot. to Reconsider, ECF No. 932, A5058-60.[8] In its Motion to Reconsider, Qwest asked the district court to award it the costs claimed in its 2009 Bill of Costs. Mot. to Reconsider 1, A5058. Because the clerk never acted and this Court reversed the district court's prior grant of summary judgment of non-infringement in 2011, Centillion never filed objections to Qwest's bill of costs.

The district court granted Qwest's Motion to Reconsider and entered its Order and an Amended Entry of Judgment on October 30, 2012, as Centillion was preparing its opposition that was not due until November 9, 2012.[9] Order,

[8] Qwest moved separately to amend the Entry of Judgment to add a paragraph dismissing its affirmative defenses and its declaratory judgment claims without prejudice. Mot. to Amend Entry of J., Oct. 23, 2012, ECF No. 931. Centillion did oppose this motion.

[9] *See* S.D. Ind. Local Civ. R. 7.1(c)(2)(A).

ECF No. 933, A5063-64; Am. Entry of Judgment, ECF No. 934, A5065-66. The district court's analysis consisted of a statement that Centillion had not made a showing that Qwest should not be awarded its costs. Order 2, A5064.

On November 5, 2012, Centillion filed a Motion to Reconsider and to Amend the Judgment. ECF No. 935, A5067-70. In its brief, Centillion argued that the district court's premature grant of Qwest's Motion to Reconsider deprived Centillion of the opportunity to respond. Br. 2-4, ECF No. 936, A5074-76. Centillion also argued that the costs awarded were excessive and that Centillion should be allowed to challenge the elements of the award of costs. *Id.* 4-6, A5076-78.

Although the district court agreed that it had ruled on Qwest's Motion to Reconsider prematurely and granted Centillion's Motion to Reconsider solely on that basis, it declined to modify its award of costs. Order on Pl.'s Mot to Reconsider, Nov. 20, 2012, ECF No. 941, A5127-28. In so doing, the district court simply accepted Qwest's statements – filed in opposition to Centillion's motion to reconsider – that all of the costs listed in its bill of costs were "necessary" to litigate the action. *Id*. 2, A5128. The district court concluded that "This case has been pending for nine years. To say that it has been paper intensive is an understatement." *Id*. At no time did the district court examine the elements of the bill of costs award; it simply affirmed them.

STATEMENT OF FACTS

A. The Parties

Centillion is the successor in interest to Compucom Communications Corporation. In 1994, Compucom changed its name to Centillion Data Systems, Inc. and, on February 12, 2001, merged with CTI Group (Holdings), Inc. ("CTIG"), Centillion's parent company. As part of that merger, ownership of the '270 Patent was transferred from Centillion Data Systems, Inc. to Centillion Data Systems, LLC.

CTIG is a publicly traded corporation that specializes in providing billing management, telemanagement, and data management software and services for telecommunications service providers and their corporate customers. CTIG has developed a suite of products marketed to telecommunications service providers that allows their customers (typically large companies) to analyze telephone bills effectively. CTIG's customer base includes businesses such as Sprint, Cox Business Services, Verizon, and Alltel. Many Fortune 500 companies, as well as mid-sized and smaller organizations, either utilize the CTIG product suite or have licensed the technology process through the company's Intellectual Property Management Program.

Qwest Communications International, Inc. is a Delaware corporation, with its headquarters located in Colorado. *See* Qwest Mem. in Support of Mot. for

Summ. J. of Noninfringement 10, ECF No. 618, Apr. 15, 2009, A478. Qwest Communications International is the direct or indirect parent company of all of the Qwest parties named or otherwise implicated in this action. *Id.* Qwest is a nationwide communications and entertainment company.

B. The Patent in Suit

The United States Patent and Trademark Office issued the '270 Patent to Compucom Communications Corporation on February 15, 1994. A1-74. "The '270 Patent discloses a system for collecting, processing, and delivering information from a service provider, such as a telephone company, to a customer." *Centillion*, 631 F.3d at 1281. The system includes a "back end," under the control of the service provider, in which a customer's billing records are "preprocessed" and reorganized into a format in which they can be used on commonly-available personal computers (PCs), and a "front end," under control of the customers, at which the billing records transferred from the back end may be "additionally processed" on such a PC. *See id.*

At issue in this appeal are system claims 1, 8, 10 and 46 of the '270 patent. Claim 1 is illustrative:

> 1. A system for presenting information concerning the actual cost of a service provided to a user by a service provider, said system comprising:
>
> storage means for storing individual transaction records prepared by said service provider, said transaction records relating to

individual service transactions for one or more service customers including said user, and the exact charges actually billed to said user by said service provider for each said service transaction;

data processing means comprising respective computation hardware means and respective software programming means for directing the activities of said computation hardware means;

means for transferring at least a part of said individual transaction records from said storage means to said data processing means;

said data processing means generating preprocessed summary reports ***as specified by the user*** from said individual transaction records transferred from said storage means and ***organizing said summary reports into a format for storage, manipulation and display on a personal computer data processing means***;

means for transferring said individual transaction records including said summary reports from said data processing means to said personal computer data processing means; and

said personal computer data processing means being adapted to perform additional processing on said individual transaction records which have been at least in part preprocessed by said data processing means utilizing said summary reports for expedited retrieval of data, to present a subset of said selected records including said exact charges actually billed to said user.

'270 Patent col.31 l.39 - col.32 l6; A69 (emphasis added highlighting limitations at issue).

In the specification, the language "reorganizes … billing data into an optimal format for storage, manipulation, and display on commonly-available personal computers" (*id.* col.3 ll.19-21, A55; *id.* col.10 ll.24-27; A58), refers to the process by which customers' billing data received from telecommunications

carriers in "unstructured, flat-file format" (*id.* col.11 ll.6-7, A59) is converted into a format that the customers' PCs can utilize, i.e., a "PC-compatible" format. Preferably, that format is described in the specification as "a table format *suitable for loading* into the particular database system used to manage the data on the subscriber's personal computer." *Id.* col.4 ll.36-39. A55 (emphasis added); *see also id.* col.32 ll.10-14, A69.

> The Detailed Description of the Preferred Embodiment describes:
>
> a program TPSB10 [that] perform[s] an extensive and complex mainframe processing procedure in order to reduce the [customers' billing] information to a form which is sufficiently compact and compatible to be subsequently manipulated on a personal computer … The TBSB10 program … edits and reformats the data into a format that the target PC … can process.

Id. col.11 ll.11-28 A59. This reformatting of the billing records is summarized in the Conclusion to the specification: "Extensive preprocessing of the billing records is performed to place the records in a form compatible for use with inexpensive personal computers … In a first processing step … the records are … reformatted into an optimal organization for further processing on a personal computer." *Id.* col.30 ll.51-59, A68; *see also* Order on Claim Construction 3, Jan. 9, 2008, ECF No. 394, A413 (quoting '270 Patent col.3 ll.57-63: "Another aspect of the invention involves … rearranging [the billing] information in such manner that it is optimally pre-processed and reformatted into a form appropriate for efficient and rapid use in subscribers' personal computers ….").

It is apparent, therefore, that the language "format for storage, manipulation and display on a personal computer" means that the data is laid out in a form that is PC-compatible, i.e., that its layout is such that the data can be further processed on a personal computer. Preferably, that layout is "a table format suitable for loading into" a database on a personal computer. Contrary to the conclusion reached by the district court (Order 22, ECF No. 929, A5052), nothing in the specification suggests that the reorganized data must actually *be* loaded into a database, or that it "interact" with a format file within such a database, in order for it to allow further processing on a PC, including "display" of the data. In this regard, nothing in the specification suggests that the reorganized data – prior to actually being loaded into the database of a PC – must be provided with formatting information beyond their minimum semantic elements, such as information that might inform or enhance a viewer's perception of the data when it is ultimately displayed.[10] The only mention of such formatting information in the specification is in connection with an End-User Application Program that may be installed on customers' PCs. '270 Patent col.23 l.58 - col.30 l.25, A65.

The End-User application includes a database into which the preprocessed billing records may be imported and analyzed, and provides various options

[10] Such formatting information might include, for example, boldface, italics, color, and other features.

by which reports may be printed or sent to a PC monitor for viewing. Notably, the end-user program includes a "Sys-Param" file, separate from the billing record files, that contains "the appropriate report header data … so that the report can be *properly formatted*" when displayed. *Id.* col.25 ll.61-63, A66 (emphasis added). In the preferred embodiment, therefore, the data files "interact" with "format" files only after they are imported into the end-user application on a customer's PC. Nothing in the specification suggests that the records, which are converted into a PC-compatible format by the mainframe processing procedure, must interact with a separate file to obtain header data even before the records are imported into the client application on the customer's PC.

C. The Accused Systems

The Accused Systems consist of Logic, eBC, and Insite (a re-branded version of eBC). *Centillion*, 631 F.3d at 1281. Both Logic and eBC include a "back end," under control of the service provider, consisting of one or more servers (e.g., LATIS and eBC Back Office – "eBCBO"), and a "front end," under control of the customer, consisting of a client application installed on a PC. *See id.* The customer's billing records are

Cent. Br. 6, Sept. 16, 2011, ECF No. 872, A1390.

Id. 11, A1395.

The eBC system was introduced by Qwest in 2002

See id.

Id. 6-7, A1390-91.

Id. 9,

A1393. Qwest provided these so-called "data only" customers with a

Decl. of Dr. Jack

D. Grimes ¶¶ 6-11, Oct. 14, 2011, ECF No. 887 ("Grimes Decl. II"), A4018-21. This documentation was necessary in order for the data to be properly processed by the third-party client application.

In addition to its enhanced data-handling capacity and flexibility in use of third-party client applications, the eBC system allowed customers to make "on demand" requests for billing records covering a specific time period. Both Logic and eBC, however, allowed customers to enter PACs in their billing records

so that they could run reports sorted by projects, offices, departments, etc.[11] In order to implement this functionality, customers were required to contact their account representatives at the time the service was initiated and request that PACs be included in their billing records. Order 6, Oct. 15, 2012, ECF No. 929, A5036. If a customer did not choose to have this functionality implemented, the PAC field in its billing records would include a "null" value. *Id.*

The preprocessing of the billing records at the back end of the Accused Systems included a reorganization of the data from a mainframe-type format into a PC-compatible table format suitable for loading into the databases installed on the PCs of Qwest's customers. In particular, as explained by Venkat Ashok,

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[11] The importance of the PAC feature to its commercial customers was recognized early on by Qwest. In an August 2000 article, Qwest's Director of Customer Financial Services touted the "competitive advantage" provided by e billing, and especially the flexibility to allocate and report on charges within the organizations of its commercial customers made possible by the PAC feature: "Qwest's commercial customers also want to structure the billing information … *by customer account codes or project codes* (ideal for consulting companies, law offices, etc.)." Greg Stephan, *Qwest Implements E.bill Solution in Record Time*, 2 e.bill 32, 36, Aug. 2000, filed as Ex. 16 to Mem. of Law in Support of Cent. Motion in Limine No. 5, Oct. 16, 2009, ECF No. 773, A5173 (emphasis added). During the migration of its customers from Logic to eBC in 2002, problems in implementing the PAC feature threatened the loss of many of its commercial customers. *See, e.g.*, email from a Qwest customer representative to Qwest technical support requesting assistance in resolving these problems for one such customer:

Ex. 12 to Cent. Opp. to Qwest's Mot. for Summ. J., Oct. 17, 2011, ECF 886, A3997.

Qwest's designated corporate witness under Rule 30(b)(6) of the Federal Rules of Civil Procedure,

Ashok Dep. 41:4-8, 41:20-42:17, Nov. 19, 2008, ECF No. 872, A1428-29; *see also* Ashok Dep. 288:25-291:10, Nov. 20, 2008, ECF No. 872, A2100-01.[12]

The eBC billing records were transferred to Qwest's customers in the form of

(Decl. of Dr. Jack D. Grimes ¶¶ 10-14, Nov. 4, 2011, ECF No. 899, A4754; "Grimes Decl. III"), which

See eBC BackOffice Support Document 1-2, ECF No. 873, A2054-55. As repeatedly asserted

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Compare Expert Report of Jack D. Grimes, Ph.D., Ex. 2, 6-8, Jan. 8, 2009, ECF No. 883, A3654-56 (infringement analysis claim chart for eBC claim element 1.e), *with id.* Ex. 3, 4-6 (infringement analysis claim chart for Logic claim element 1.e), A3661-63.

by Qwest, however,

Qwest Surreply Br. in Opp. to Cent. Mot. for Partial Summ. J. 4, Nov. 21, 2011, ECF No. 905, A4800

(citing Ashok Decl. ¶ 29, Sept. 16, 2011, ECF No. 881, A3512:

); *see also* Bradley Walton, Rebuttal Expert Report 22, Feb. 6, 2009, ECF 890-2, A4196 ("[T]here exist substantial non-infringing uses for the data files that are provided to the customer by both Logic and eBill Companion. For example, these data files can readily be used by customers to either display or print out the data received without further analysis or manipulation").

SUMMARY OF THE ARGUMENT

This appeal concerns two phrases in the claims around which the district court's grant of summary judgment revolved: (1) "as specified by the user," and (2) "organizing said summary reports into a format for storage, manipulation, and display" on a PC. The district court misinterpreted and misapplied those phrases, thus causing its infringement analyses of the accused Logic and eBC systems to be fundamentally flawed. Summary judgment of non-infringement

by the Accused Systems should be reversed as both procedurally and substantively erroneous.

Notably, the district court did not base its grant of summary judgment on the narrow grounds asserted by Qwest in its motion. Qwest limited its motion to the alleged absence of evidence of "use" of the Accused Systems by its customers, expressly reserving the right to address specific claim limitations, particularly "specified by the user," at a later time. Qwest Mem. 19-20 n.5, A3823-24. Similarly, the "organizing into a format for storage, manipulation, and display" limitation was undisputed and never substantively addressed by either party in its pleadings, motions, or briefs.

Nevertheless, the district court undertook to base its summary judgment of non-infringement on those very limitations. In the case of the "organizing" language it did so without notice and opportunity to be heard; and, in the case of the "specified by" language, by making a series of findings that were not in any way germane to the issue, and ultimately violating a fundamental tenet of patent law by failing to apply the claim language – as the district court itself had construed that language – against the Accused Systems. The district court's conclusion that neither of the Accused Systems infringed was thus based on its incorrect interpretation and application of those claim limitations.

"organiz[ed] into a format…for display"

The district court's holding that eBC does not infringe because Centillion had not brought forth evidence that either LATIS or the eBCBO organizes the summary reports into a "format for … display" on a PC turned on an issue that was not in dispute. As a result, the district court rendered summary judgment on this issue *sua sponte* without notice and opportunity to be heard. Its holding in this regard devolved from an implicit interpretation[13] of that language that is contrary to the intrinsic evidence, including the very words of the claim itself.

Throughout the course of this litigation, there has never been any dispute that the language "format for storage, manipulation, and display" meant that the summary reports are organized into a form that is PC-compatible, and that **[**the layout of the ASCII text (.TXT) files generated by the back end of**]** the eBC system clearly satisfied this limitation. Nevertheless, after improperly parsing the claim language so as to focus on the word "display," the district court concluded that the eBC .TXT files are not in a "format for … display" until they are imported into

[13] The Order granting summary judgment did not set forth an express interpretation of the "organizing … into a format" language of the claims. Insofar as its non-infringement analysis, however, implies an interpretation unsupported by the intrinsic evidence, it is inconsistent with the Order on Claim Construction itself. *See* Order on Claim Construction 26-31, Jan. 9, 2008, ECF No. 394, A436-41.

a database in a client application where they can "interact" with "a .FMT file and schema." Order 22, A5052.

That conclusion imposed unwarranted limitations on the claims. According to the district court, not only do the claims require that the "data processing means" organize the data into a format that is "suitable for loading" into a database system on a PC ('270 Patent col.4 ll.36-39, A55), but the data must actually *be* loaded into such a database system, requiring additional software structures and processing steps that "allow [for] display" of the data on a PC monitor. Order 22, A5052. There is no basis in the claim language, the specification, or any other intrinsic evidence to support such an embellishment of the claims.

The specification states repeatedly that the summary reports are converted by the "data processing means" into a "PC-compatible" format; in other words, the layout of the data is arranged such that it can be recognized and processed by a PC, e.g., as an ASCII text file. This interpretation is entirely consistent with the claim language itself in which the term "format" applies equally to the words "storage" and "manipulation," as well as to "display." Apparently aware that .TXT files can be readily stored and manipulated on PCs, the district court based its analysis on the cropped phrase "format for … display" (Order 22, A5052), with storage and manipulation replaced by ellipses. When the claim language is considered as a whole, however, it is apparent that the term "format" refers

to the layout of the data that makes it "suitable for loading into" a database system on a PC; it does not infer some higher degree of "formatting" that may advantageously be provided after the data are actually imported into such a database and ultimately displayed (e.g., "column heading information" that provides descriptions of the data fields), as is implicit in the district court's analysis.

Nor does the specification in any way support the district court's conclusion that infringement requires the summary reports to "interact" with format files in a database located at the *back end* of the system. Indeed, the basic concept of the invention is to "preprocess" the billing data at the back end, preferably in a mainframe-type computer, and then transfer the preprocessed data to the customer's PC for "additional processing." The preferred embodiment of the invention set forth in the specification thus describes the summary reports as being imported into the database of a client application only *after* they are transferred to the customer's PC.

The preferred embodiment further describes the summary reports as being combined with "header data" contained in format files in the client application database so that the reports will be "properly formatted" when displayed. '270 Patent col.25 ll.61-63, A66. In other words, in the preferred embodiment, the client application performs *additional* formatting of the summary reports *after*

the mainframe processing procedure organizes the summary reports into a format for storage, manipulation, and display on a PC. The district court's infringement analysis, however, implies a claim construction in which the summary reports are "properly formatted" for display – not simply organized into a PC-compatible format – *prior* to being transferred to the PC. That construction is not only unsupported by the specification, but would actually exclude the preferred embodiment. As this Court has noted, such a claim construction is "rarely, if ever, correct and would require highly persuasive evidentiary support." *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1583 (Fed. Cir. 1996). No such evidence exists here.

It is undisputed that

Ashok Dep. 41:4-8; 41:20-42:17, Nov. 19, 2008, A1428-29; *see also* Ashok Dep. 288:25-291:10, Nov. 20, 2008, ECF No. 872, A2100-01. When the claim language is properly construed, therefore, it is apparent that the district court's holding that Centillion has not brought forth evidence that the eBC .TXT files are "organiz[ed] into a format for … display" is incorrect. Accordingly, there is, at least, a genuine dispute of fact and summary judgment of non-infringement by the eBC system should therefore be reversed.

"as specified by the user"

The district court construed the passive phrase "as specified by the user" to mean that "the service customer selects, or makes specific, the character of [the summary reports]."[14] Order on Claim Construction 34, A444. In view of this Court's prior ruling that "[t]his claim term has a broad construction" (*Centillion*, 631 F.3d at 1289) and the substantial evidence of record that inclusion of

makes specific the character of the data, there are genuine issues of material fact that preclude summary judgment of non-infringement by the Logic system. Moreover, even though the district court enunciated the correct "two-step process" for undertaking an infringement analysis, its holding that the inclusion of PACs in customer billing information did not satisfy this claim limitation did not comply with the requirements of that process.

[14] Although this construction technically changed the transitivity of the verb in the phrase from the intransitive form ("specified") to the transitive form ("selects, or makes"), it should not be deemed to have introduced a method of use limitation into the claim or otherwise converted a limitation expressed in the passive voice into a so-called "active limitation," notwithstanding the introductory words "the service customer …." The district court, however, ruled that its construction requires Centillion to provide evidence (albeit circumstantial evidence) that Qwest's customers "actively" selected or made specific "the character of" the data. Order 18-19, A5048-49. Centillion requests, therefore, that this Court review that ruling and, if necessary, modify the claim construction so that the transitivity of the verb is consistent with the claim language (e.g., "the character of which may be selected or made specific by the service customer").

As an initial matter, the district court improperly granted summary judgment without first finding the absence of a genuine dispute of material fact. Fed. R. Civ. P. 56(a); *see Mercatus Grp., LLC v. Lake Forest Hosp.*, 641 F.3d 834, 839 (7th Cir. 2011).[15] A genuine dispute of material fact exists when "the evidence is such that a reasonable jury could return a verdict for the nonmoving party." *Anderson v. Liberty Lobby, Inc.*, 477 U.S. 242, 248 (1986). Instead, the district court made a series of irrelevant determinations, none of which was germane to whether the inclusion of PACs serves to "select[], or make[] specific, the character of" Qwest's .TXT files (found by the court to constitute the claimed "summary reports"). Indeed, the district court failed to mention the substantial evidence of record demonstrating that the inclusion of PACs does, in fact, satisfy the "as specified by the user" limitation. *See* Decl. of Dr. Jack D. Grimes ¶¶ 5-7, 10, 11 and 13, Sept. 8, 2011, ECF No. 877 ("Grimes Decl. I"), A2930-31, 2933-34. Moreover, the district court violated a fundamental tenet of patent law in failing to apply the claim language – even as it had itself construed it – against the accused Logic system. Summary judgment of non-infringement by the Logic system should, therefore, be reversed.

[15] The law of the Seventh Circuit, the regional circuit, governs whether the district court appropriately granted summary judgment. *See, e.g., Lexion Med. LLC v. Northgate Techs., Inc.*, 641 F.3d 1352, 1358 (Fed. Cir. 2011); *Micro Strategy Inc. v. Bus. Objects, S.A.*, 429 F.3d 1344, 1349 (Fed. Cir. 2005).

The district court also erred in holding that customization of eBC data files for customers using third-party client applications does not meet the "as specified by the user" limitation of the claims. Order 18, A5048. Notwithstanding the dicta in a footnote in this Court's opinion in the prior appeal (*Centillion*, 631 F.3d at 1286 n.2), Centillion did not concede that third-party client applications were outside the scope of the claims. Instead, the statements cited by the district court focused on whether Qwest was subject to liability for "use" of the system, rather than whether Logic or eBC satisfied all of the claim elements of the '270 Patent. Centillion neither intended to exclude – nor did it exclude – Qwest's customers that utilize third-party client applications to process their billing records. Thus, Centillion has never conceded – in this Court or elsewhere – that Qwest's customers only infringe the '270 Patent when they use Qwest's client application software. Based on the evidence of record, there is at least a genuine dispute of material fact that customization of eBC .TXT files at the request of certain customers "selects, or makes specific, the character of" the records.

Costs

Finally, the district court erred in taxing costs exceeding $250,000 in favor of Qwest. Qwest failed properly to support its claimed costs when it filed its bill of costs in November 2009. Despite this failure, the district court allowed the costs in full. It took this action on short notice and without scrutinizing the claimed

costs to determine if they were necessarily obtained for use in the case. Although the district court belatedly considered Centillion's objections, it summarily reaffirmed its costs award. The district court's sole apparent rationale was that the case had been pending for nine years and had been "paper intensive." Because Qwest failed to substantiate its costs properly and the district court failed to make the required findings, the district court's taxation of costs must also be vacated and remanded.

ARGUMENT

A. Standard of Review

Applying Seventh Circuit law, this Court should review the trial court's grant of summary judgment without deference. *See Mercatus Grp.*, 641 F.3d at 839; *Chaklos v. Stevens*, 560 F.3d 705, 710 (7th Cir. 2009); *accord Motionless Keyboard Co. v. Microsoft Corp.*, 486 F.3d 1376, 1379 (Fed. Cir. 2007) (citing *Genentech, Inc. v. Amgen, Inc.*, 289 F.3d 761, 767 (Fed. Cir. 2002)). "The court shall grant summary judgment if the movant shows that there is no genuine dispute as to any material fact and the movant is entitled to judgment as a matter of law." Fed. R. Civ. P. 56(a). In reviewing a grant of summary judgment, an appellate court must construe all facts in the non-movant's favor. *Kuhn v. Goodlow*, 678 F.3d 552, 555 (7th Cir. 2012); *Mercatus Grp.*, 641 F.3d at 839. This Court should affirm only if, viewing the record in such a favorable light to Centillion, no

reasonable jury could have rendered a verdict in Centillion's favor concerning infringement of the '270 Patent. *See Mercatus Grp.*, 641 F.3d at 839 (citing *Wilson v. Williams*, 997 F.2d 348, 350 (7th Cir. 1993)); *see also Crown Packaging Tech., Inc. v. Rexam Beverage Can Co.*, 559 F.3d 1308, 1312 (Fed. Cir. 2009); *IMS Tech., Inc. v. Haas Automation, Inc.*, 206 F.3d 1422, 1429 (Fed. Cir. 2000).

The law of the Seventh Circuit also governs this Court's review of the district court's award of costs. *See, e.g., Summit Tech., Inc. v. Nidek Co.*, 435 F.3d 1371, 1374 (Fed. Cir. 2006) (citing *Kohus v. Cosco, Inc.*, 282 F.3d 1355, (Fed. Cir. 2002) (additional citations omitted)). This Court should review carefully whether any particular item of expense is recoverable. *See Majeske v. City of Chicago*, 218 F.3d 816, 824 (7th Cir. 2000) (citing *SK Hand Tool Corp. v. Dresser Indus., Inc.*, 852 F.2d 936, 943 (7th Cir. 1988)); *see also Summit*, 435 F.3d at 1374 ("[w]hether a particular expense may be recovered under section 1920 is an issue of statutory construction, subject to de novo review"; citing *Kohus*, 282 F.3d at 1357) (additional citations omitted). Once it determines that the district court properly found a particular item of expense recoverable, this Court should review the award of costs for abuse of discretion. *See Cengr v. Fusibond Piping Sys., Inc.*, 135 F.3d 445, 453 (7th Cir. 1998).

Claim construction is a question of law, which this Court reviews de novo, and without deference. *Medtronic, Inc. v. Boston Scientific Corp.*, 695 F.3d 1266,

1271 (Fed Cir. 2012); *Lexion*, 641 F.3d at 1356; *Cybor Corp. v. FAS Techs.*, 138 F.3d 1448, 1451 (Fed. Cir. 1998) (en banc).

B. The District Court Erred in Granting Summary Judgment of Non-Infringement by the eBC System

1. The District Court Granted Summary Judgment on a Ground Not Raised by Qwest, Without Giving Notice and an Opportunity to be Heard, in Violation of Rule 56(f)(2)

In holding that that eBC does not infringe because neither LATIS nor eBC Back Office organizes the summary reports into a format for display (Order 22, A5052), the district court granted summary judgment of non-infringement sua sponte on a ground not raised by either party and without prior notice that this claim term was even at issue. In so ruling, the district court violated Rule 56(f) of the Federal Rules of Civil Procedure and case law prohibiting the grant of summary judgment sua sponte without notice and an opportunity to present evidence and argument.

Although a district court may grant summary judgment on grounds not raised by one of the parties, it may only do so after giving the parties notice and an opportunity to respond. Fed. R. Civ. P. 56(f)(2). *See Lynch v. Northeast Reg'l Commuter R.R.*, 700 F.3d 906, 910-11 (7th Cir. 2012).[16] Even before the

[16] The Federal Circuit's view of sua sponte grants of summary judgment is consistent with the Seventh Circuit's. *See Eon-Net LP v. Flagstar Bancorp*, 249 Fed. App'x 189, 193-94 (Fed. Cir. 2007) ("a court may not sua sponte grant

addition of the current version of Rule 56(f) in 2010, district courts could not grant summary judgment on grounds not raised by a party without prior notice and a reasonable opportunity to respond. *See Celotex Corp. v. Catrett*, 477 U.S. 317, 326 (1986) (district courts have power to enter summary judgments sua sponte "so long as the losing party was on notice that she had to come forward with all of her evidence"); *Pourghoraishi v. Flying J, Inc.*, 449 F.3d 751, 765 (7th Cir. 2006). The Seventh Circuit has admonished that granting summary judgment sua sponte "warrants special caution." *Sawyer v. United States*, 831 F.2d 755, 759 (7th Cir. 1987). Indeed, the Seventh Circuit has termed sua sponte dismissals "hazardous" because they:

> Conflict with traditional adversarial concepts of justice to the extent that they make the district court "a proponent rather than an independent entity." … Second, such dismissals may ultimately waste, rather than economize, judicial resources, by producing appeals and remands that might have been avoided. … [and] Third, *sua sponte* dismissals may prejudice plaintiffs by depriving them of an opportunity to amend their complaints or to argue against the dismissal.

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summary judgment on a particular ground without giving the non-moving party notice and an opportunity to present evidence and argument in opposition") (citing *Pandrol USA, LP v. Airboss Ry. Prods.*, 320 F.3d 1354, 1356 (Fed. Cir. 2003); *Fin. Control Sys. Pty, Ltd. v. OAM, Inc.*, 265 F.3d 1311, 1321 (Fed Cir. 2001)).

Sawyer, 831 F.2d at 759 (citations omitted); *see also English v. Cowell*, 10 F.3d 434, 437 (7th Cir. 1993) ("The opportunity to respond is deeply imbedded in our concept of fair play and substantial justice").[17]

Here, the district court failed to provide notice that it was considering granting summary judgment of non-infringement against Centillion based on the claim term "organizing said summary reports into a format for storage, manipulation, and display" on a personal computer. Qwest limited its Motion for Summary Judgment of Non-Infringement to the alleged absence of evidence of "use" of the accused systems by its customers. Qwest Mem. 1, 19-27, A3823-31. Qwest also argued that it lacked the requisite intent to have committed indirect infringement, and that it could not be liable for contributory infringement because its products had substantial, non-infringing uses. *Id.* 27-35, A3831-39.

At no time did Qwest argue that it was entitled to summary judgment of non-infringement because the Accused Systems did not satisfy any element of the claims. Instead, Qwest expressly reserved its right to address specific claim limitations – particularly "specified by the user" – at a later time. Qwest Mem. 19-20 n.5; A3823-24. It did not mention the claim term "organizing into a format for storage, manipulation, and display." Given the limited scope of Qwest's

[17] In vacating and remanding the dismissal of plaintiff's claims, the court exercised its jurisdiction under Seventh Circuit Rule 36 to instruct that the case be reassigned to a different district judge. *Id*. at 440.

motion for summary judgment, Centillion had no duty to adduce evidence or otherwise respond to grounds not asserted by Qwest. *See Costello v. Grundon*, 651 F.3d 614, 629, 635 (7th Cir. 2011); *Sublett v. John Wiley & Sons, Inc.*, 463 F.3d 731, 736 (7th Cir. 2006); *Pourghoraishi* , 449 F.3d at 765. The Seventh Circuit has explained:

> When a party moves for summary judgment on ground A, the opposing party need not address grounds B, C, and so on; the number of potential grounds for (and arguments against) summary judgment may be large, and litigation is costly enough without requiring parties to respond to issues that have not been raised on pain of forfeiting their position.

Titran v. Ackman, 893 F.2d 145, 148 (7th Cir. 1990) (citing *Malhotra v. Cotter & Co.*, 885 F.2d 1305, 1310 (7th Cir. 1989)).

So too here. Qwest moved for summary judgment of non-infringement asserting four discrete issues and expressly reserved for a later date its arguments and defenses regarding specific claim elements. Centillion had no reason to adduce evidence that the eBC system met the "organized into a format for … display" or any other claim element in response to Qwest's motion.

Nor did Centillion's own Motion for Partial Summary Judgment of Infringement put it on notice that summary judgment of non-infringement might be granted on the grounds relied upon by the district court. A party's decision to move for summary judgment on one ground does not mean that the moving party has been fairly apprised of an adverse summary judgment decision on other

grounds of which it did not have notice. *R.J. Corman Derailment Servs., LLC v. Int'l Union of Operating Eng'rs, Local Union 150*, 335 F.3d 643, 650 (7th Cir. 2003). Although Centillion's Motion for Partial Summary Judgment of Infringement noted that the "organized into a format for storage, manipulation and display" element was present in the eBC system, this term was not disputed by Qwest or otherwise thought to be in issue. Centillion's brief in support of its Motion for Partial Summary Judgment contained, as paragraph 19 of its Statement of Material Facts Not in Dispute, the assertion that:

Cent. Br. 9, A1393 (citing A2112-15); *see also* Cent. Br. 25, A1409.

Notably, Qwest's opposition to Centillion's motion did not allege that this element was absent from the eBC system. Instead, Qwest answered this statement of undisputed fact in a qualified and nuanced manner, stating

Qwest Opp. 4, A4060 (emphasis added). At no point did Qwest

argue that the eBCBO server did not organize the data into a format for display on a customer's PC.[18]

Therefore, Centillion lacked reasonable notice that the district court would rule that the eBC system does not organize the summary reports into a format for display on a customer's personal computer, and certainly had no reason to anticipate that any such ruling might be based on the specific grounds set forth in the district court's order. Not only did Centillion have no obligation to adduce evidence or argument on this ground in response to Qwest's Motion for Summary Judgment of Non-Infringement, it had no reason to adduce evidence on this issue in support of its own Motion for Partial Summary Judgment beyond that stated in support of its statement of material fact not in dispute no. 19. "[T]he Federal Rules impose a number of duties upon non-movants, but clairvoyance is not among them." *Edwards v. Honeywell, Inc.*, 960 F.2d 673, 675 (7th Cir. 1992).

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[18] In response to the statement in the infringement analysis claim charts prepared by Dr. Grimes, Centillion's expert, which concluded that

(*see* Expert Report of Jack D.Grimes, Ph.D. Ex. 2, at 8, ECF No. 883, A3656), Bradley Walton, Qwest's non-infringement expert, answered only that "Dr. Grimes has not provided any evidence of individual transaction records being transferred from said storage means, or organizing summary reports into a format for storage and manipulation and display on a personal computer." Walton Rebuttal Expert Report 15, Feb. 6, 2009, ECF 890-2, A4189. To the contrary, Dr. Grimes cited, and the record contains, abundant evidence that eBC satisfies this claim limitation.

The district court's summary judgment that eBC did not infringe the '270 Patent should be vacated as not in compliance with Rule 56(f).

2. The Phrase "Organizing Said Summary Reports into a Format for Storage, Manipulation and Display" Means that the Layout of the Data Files is Converted into a PC-Compatible Format

Without the benefit of expert testimony – or even argument of counsel – the district court concluded that "[n]either LATIS nor eBC Back Office … performs the steps necessary to format the .TXT file for display." Order 22, A5052. In reaching that conclusion, the district court did not expressly define the phrase "format … display." Its determination that the eBC .TXT files are not "organiz[ed] … into a format for … display" until they "[interact] with a .FMT file and schema within the eBC client application," however, effectively construed the phrase such that organization of the data into a PC-compatible format, suitable for loading into a database of a client application, does not satisfy this claim limitation. That construction is plainly inconsistent with the intrinsic evidence, as well as the district court's Order on Claim Construction itself. Accordingly, the district court's holding that Centillion "has not brought forth evidence that [LATIS and eBCBO] 'organiz[e] … summary reports into a format for … display'" was erroneous and should be reversed.

a. The eBC .TXT Files are Converted by the eBCBO into a "Format for Storage, Manipulation and Display" on a PC

The relevant claim language is not the cropped phrase "format ... for display" upon which the district court focused. Rather, the phrase at issue is "organizing said summary reports into a format for storage, manipulation and display on a personal computer …." '270 Patent col.31 ll.59-61, A69. The intrinsic evidence establishes that this language refers to the conversion of the billing records from a mainframe format into a PC-compatible format that is suitable for loading into a database of commonly available personal computers. *See* discussion at 17-19, *supra.* It is undisputed that **[**the conversion of the eBC data files from an XML format into a PC-compatible ASCII text format by the eBCBO**]** satisfies this definition. As explained by Mr. Ashok, Qwest's designated corporate witness,

Ashok

Dep. 41:4-8; 41:20-42:17, Nov. 19, 2008, ECF No. 872, A1428-29; *see also* Ashok Dep. 288:25-291:10, Nov. 20, 2008, ECF No. 872, A2100-01.

At a minimum, Centillion has proffered evidence establishing the existence of a genuine dispute of material fact concerning whether the data is "organized into a format for storage, manipulation and display on a PC." *See* Grimes Decl. I ¶ 4,

ECF No. 877, A2930 (referencing his expert reports and citing evidence contained in claim chart regarding eBC).[19]

b. The eBC .TXT Files May be Displayed on a PC Without Use of a Client Application

Even assuming, arguendo, that the district court was justified in parsing the claim language so as to focus on the recited "display" functionality of the claims, it was wrong to conclude that the eBC .TXT files cannot be displayed on a PC unless they are imported into a client application. Indeed, Qwest repeatedly asserted that a client application was not needed for display of the billing records:

Qwest Surreply 4, Nov. 21, 2011, ECF No. 905, A4800 (citing Ashok Decl. ¶ 29, Sept. 16, 2011, ECF No. 881, A3512));

see also Walton Rebuttal Report 22, Feb. 6, 2009, ECF 890-2, A4196.

c. The District Court Misapprehended the Purpose of the .FMT file and Improperly Read the Database Limitation of Dependent Claim 3 into Claim 1

The district court's conclusion that an .FMT file is "necessary *to format* the .TXT file for display" (Order 22, A5052; emphasis added) is unsupported by the record and reflects its flawed view of the claim term "format" as a verb instead of a noun. Initially, the issue is not what is necessary "to format" the .TXT

[19] Dr. Grimes' claim chart for eBC was reproduced in full in connection with Qwest's initial Motion for Summary Judgment of Non-Infringement, filed April 15, 2009, ECF No. 621, A641-55.

file, but rather what *is* "the format" of the .TXT file. With regard to the .FMT file, the record indicates only that it contains (Grimes Decl. III ¶¶ 10, 13, A4754) and is

There is no support for the district court's assertion that "viewing of the.TXT files requires additional .FMT files …." Order 21, A5051. Indeed, as discussed above, Qwest itself repeatedly asserted that

Nor is there any basis for treating the word "format" as a verb rather than a noun, as it is used in the patent claims, which misunderstanding has permeated the district court's analysis of this issue.

In this connection, not only is Claim 1 not limited to a means for "formatting" the summary reports as they are loaded into a database, but the claim does not even expressly recite a "database." Rather, that element is recited in dependent claim 3, which states: "said data is reorganized into a table format suitable for loading into an *operative database structure* for said personal computer processing means." '270 Patent col.32 ll.10-13, A69 (emphasis added). The district court's conclusion that infringement would require an .FMT file to "interact" with a .TXT file as it is being loaded into a database within the eBC client application effectively reads the database limitation of dependent claim 3

into claim 1. It is, therefore, presumptively incorrect under the doctrine of claim differentiation. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1315 (Fed. Cir. 2005) (en banc) ("[T]he presence of a dependent claim that adds a particular limitation gives rise to a presumption that the limitation in question is not present in the independent claim"); *see also Acumed LLC v. Stryker Corp.*, 483 F.3d 800, 806 (Fed. Cir. 2007) ("That presumption is especially strong when the limitation in dispute is the only meaningful difference between an independent and dependent claim").

d. The District Court's Construction of the Claims Would Exclude the Preferred Embodiment

The district court's construction of the claims, such that the .TXT files are not in a "format for … display" unless they "interact" with formatting information in a database at the *back end* of the system, would exclude the preferred embodiment. Such a construction is "rarely, if ever, correct." *See Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d at 1583. This case is no exception to the rule.

The specification describes an End-User Application, installed on a PC located at the *front end* of the system, that includes a database in which a "Sys-Param" file provides "header information" so that the data files may be "properly formatted" for display. '270 Patent col.25 ll.61-63, A66. It should be apparent, therefore, that this End-User application – as described in the specification – would

improperly be excluded from the scope of the claims as construed by the district court.

* * *

In view of the foregoing, the district court's judgment of non-infringement by the eBC system should be vacated and reversed. The judgment was procedurally improper under Rule 56(f) and substantively erroneous under basic principles of claim construction. Based upon a correct claim construction, in which the "organizing … into a format" language is properly construed in view of the intrinsic evidence, there is at least a genuine dispute of material fact that the eBC system infringes the system claims of the '270 Patent. Accordingly, summary judgment of non-infringement by the eBC system was erroneous and should be reversed.

C. The District Court Erred in Granting Summary Judgment of Non-Infringement by the Logic System

1. There is a Genuine Dispute of Material Fact as to Whether Inclusion of PACs in Customer Billing Data Satisfies the "As Specified By the User" Limitation

This Court has previously held that "the act of subscribing to the service" causes the back-end processing of the Accused Systems to generate the requisite summary reports. *Centillion*, 631 F.3d at 1285. Since that holding remains the law of the case, it follows that if a service customer, ancillary to the act of subscribing, contacts its service representative to specify that it wishes its reports to include

PAC data, any reports so generated must, by any definition, be "specified by the user."

Notably, this Court has held that the phrase "as specified by the user" has a broad definition. *Id.* at 1289. It thus concluded that since an alleged prior-art COBRA customer defining which record type it wanted "is arguably 'select[ing] or mak[ing] specific, the character of' a report," summary judgment of no anticipation by the COBRA system was improper. *Id.* That holding, of course, related to the issue of validity. Nevertheless, if the selection of a particular report "type" from among three or four different types *(e.g.*, TOLL, Local, equipment, etc.) is "arguably 'select[ing] or mak[ing] specific, the character of' a report" – despite having *no* actual input into the content of the report itself – then certainly specifying the inclusion of PAC data in a report – which *does* materially affect the content of the record – should also at least arguably satisfy this claim limitation for purposes of infringement. As this Court has repeatedly instructed, "[i]t is axiomatic that claims are construed the same way for both invalidity and infringement." *Amgen, Inc. v. Hoechst Marion Roussel, Inc.*, 314 F.3d 1313, 1330 (Fed. Cir. 2003); *see also Amazon.com, Inc. v. Barnesandnoble.com, Inc.*, 239 F.3d 1343, 1351 (Fed. Cir. 2001) ("Because the claims of a patent measure the invention at issue, the claims must be interpreted

and given the same meaning for purposes of both validity and infringement analyses").

The district court did not make a derivative construction of the term "character," or indicate that it intended it to have anything other than its ordinary meaning: "any feature used to separate ... distinguishable things … into categories." *See Webster's Third New Int'l Dictionary* 376 (1993). Nor is there anything in the intrinsic evidence that would suggest another meaning. *See Advanced Fiber Techs. Trust v. J&L Fiber Servs., Inc.*, 674 F.3d 1365,1373 (Fed. Cir. 2012) ("derivative construction" of non-claim term necessitated in order to elucidate meaning of claim).

Inclusion of PAC data clearly affects the "character" of the records. Indeed, the very purpose of the PAC feature is to separate distinguishable things – in this case, billing records – into categories. Qwest's Logic User Manual describes several reports that can be run on the customers' client applications using PACs as a sort variable. Qwest Logic 2.0 User Manual 108-09, June 2001, ECF 886, A3928-29 (including dedicated access calls by called number, toll-free switched service calls by calling number, and excessive call duration). PACs are thus important features for differentiating the data in the records and separating them into categories, i.e., making their "character" specific, as claimed.

In view of the foregoing, as well as the evidence and expert declarations of record (e.g., Grimes Decl. I ¶¶ 5-7, 10, 11 and 13, A2930-31, A2933-34), there exists, at least, a genuine dispute of material fact whether the inclusion of PACs in the Logic billing data satisfies the "as specified by the user" limitation.

2. The District Court Failed to Undertake a Proper Two-Step Infringement Analysis

The district court correctly stated that "[r]eviewing whether a particular device or system infringes a patent is a two-step process," Order 12, A5042 (citing *CAE Screenplates, Inc. v. Heinrich Fiedler GMBH & Co.*, 224 F.3d 1308, 1316 (Fed. Cir. 2000); *K-2 Corp. v. Salomon S.A.*, 191 F.3d 1356, 1362 (Fed. Cir. 1999)); however, it failed to follow the second step in that process in determining whether the inclusion of PACs in customer billing information meets the "as specified by the user" limitation of the claims, as that term was defined. Specifically, while the district court repeated a number of Qwest's arguments relating to PACs, none of those points was germane to whether the inclusion of PACs "selects, or makes specific, the character of" the billing records; to wit:

- **"configured completely outside of the Logic and eBC application framework"[20]**

It is not clear exactly what the district court meant by this determination other than a customer is required to contact its service representative in order

[20] Order 17, A5047.

to arrange to have its billing records include PAC data, and the customer enters the PAC information when making a telephone call. The fact remains, however, that this is no different than subscribing to the service in the first place – an act which this Court has already held causes the back-end processing of the Accused Systems to generate the requisite summary reports (*Centillion*, 631 F.3d at 1285) – despite being "outside of the … application framework."

- **"may be used by customers regardless of whether they analyze billing records with Logic, eBC, with a third-party application or not at all"[21]**

This determination does not in any way relate to whether the inclusion of PACs, if and when used, and regardless of the client application, "selects, or makes specific, the character of' the billing records.

- **entry of PAC data by customers optional: "not required"; PAC field appears in billing records "even if customers choose not to enter a PAC"[22]**

The optional nature of the PAC feature is irrelevant. An empty PAC field – or one with null values – does not allow the records to be sorted into categories using PAC as a distinguishing feature. Only if the customer has arranged to implement this feature is the back-end processing ("data processing means") capable of generating summary reports "as specified by the user."

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[21] *Id.*

[22] *Id.*

- **"no different than inclusion of the telephone number ... a mere piece of data"[23]**

It is beyond dispute that all the call records are merely "piece[s] of data." But PAC is the only "piece of data" that the customer must specifically request to be included in its billing records. Certainly the client application will permit records to be sorted by various criteria, including telephone numbers, area codes, and other fields and information in the data. Unlike telephone numbers and other data that are inherent to the telephone call *per se,* however, PAC values are unique in that they constitute ancillary information useful only for billing analysis. The PAC feature is further unique in that the customer must first contact its service representative to have that functionality implemented. Grimes Decl. I ¶ 11, A2933.

* * *

In view of the foregoing, it is apparent that the district court's analysis of the PAC issue was fundamentally flawed since it failed to comply with this Court's requirements for undertaking a proper infringement analysis. For that reason, and because there is a genuine dispute of fact as to whether the inclusion of PACs in customer billing data satisfies the "as specified by the user" limitation,

[23] *Id.*

summary judgment of non-infringement by the Logic system was in error and should be reversed.

D. The District Court Erred in Holding that Customization of the eBC Data Files for Customers Using Third-Party Client Applications Did Not Meet the "As Specified by the User" Limitation of the Claims

1. Centillion Did Not Concede That Infringement Required Use of the eBC Client Application Software

The district court's holding that Qwest's customization of eBC data files for particular customers who run their own client application software to perform billing analysis does not satisfy the "as specified by the user" claim limitation was based on a misunderstanding of this Court's prior opinion in this matter and Centillion's Opposition to Qwest's Motion for Summary Judgment of Non-Infringement. Citing what it acknowledged was dicta in this Court's opinion, the district court concluded that Centillion had conceded that, in order to infringe, a Qwest customer must install Qwest's client application software. Order 13-14, A5043-44. The footnote to which the district court referred was footnote 2 of this Court's prior opinion, which cited page 31 of Centillion's opening appellate brief. 639 F.3d at 1286 n.2. That passage, however, dealt solely with whether Qwest should be subject to liability as a direct infringer through use of the system. In connection with its argument that Qwest put the Accused Systems into service and collectively used their components, Centillion argued that Qwest controlled

and benefitted from the systems, as a whole, once its customers installed the client application software. It was in this context that Centillion stated, "Qwest's customers, of course, independently determine whether they want to use the Accused Systems; however, once they install the software and accept the terms of Qwest's license, their personal computers are 'adapted' to perform 'additional processing' as claimed." Cent. App. Br. 31, A3527.

Similarly, the passage from Centillion's appellate brief quoted by the district court (Order 13-14, A5043-44) – but not cited by this Court – focused more on Qwest's control of the system as a whole through its instructions to its customers, not on specific claim limitations. Although Centillion specifically referred to Qwest's client application software, the discussion focused on "use," and not whether the Accused Systems contained each and every claim limitation. *Id*. 14, A3526. And while Centillion acknowledged that a client application had to be installed on the PC in order to adapt it to perform "additional processing" of the records, it never "conceded" that it had to be one of *Qwest's* client applications. That was not the focus of the last appeal, which considered only the district court's grant of Qwest's motion for summary judgment based on the single-entity theory.[24]

[24] Centillion's initial cross-motion for partial summary judgment in 2009 dealt solely with the eBC system. Although Centillion did not appeal from the denial of that motion, that its brief continued to address use of the eBC client application

Indeed, Centillion expressly represented to this Court that the Accused Systems include "third-party client applications that are formatted according to the schema provided by Qwest." Cent. App. Resp. and Reply Br. 8, June 11, 2010; A3891; *see also id.* 33-34 n.18, A3896-97; Grimes Decl. II ¶¶ 6-14, A4018-23. This is hardly the type of "clear, deliberate, and unambiguous concession" of the type described in *United States v. Cunningham*, 405 F.3d 497, 503-04 (7th Cir. 2005), cited by the district court (Order 14, A5044), in which the defendant expressly conceded the position concerning application of sentencing guidelines he later tried to alter in briefing and oral argument before the court of appeals.

Similarly, Centillion's response to Qwest's Statement of Undisputed Material Fact No. 37, on which the district court also relied (Order 18, A5048), does not constitute a concession that customers who perform additional processing of the records using their own client application software do not satisfy the "as specified by the user" claim limitation. Qwest's Statement of Undisputed Material Fact No. 37 stated:

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in the context of its discussion of the single-entity issue in the prior appeal was not germane to the issue in that appeal.

Qwest Br. 14, A3818. Although Centillion did not dispute this statement of material fact, it has nothing to do with whether Qwest's customers who utilize their own client applications can be direct infringers.

Centillion has never conceded – in this Court or elsewhere – that Qwest's customers only infringe the '270 Patent when they use Qwest's client application software. The district court's determination to the contrary was error, as is its conclusion, based on that determination, that Qwest's customization of eBC data files for particular customers does not satisfy the "as specified by the user" limitation.

2. Genuine Issues of Material Fact Exist as to Whether "Customization" of the Fields in the eBC .TXT Files at the Request of Certain Customers "Selects, or Makes Specific, the Character of" the Records

While the district court did not reach this issue, the record leaves no doubt that Qwest has customized the information in the .TXT files at the request of certain customers, thereby satisfying the "as specified by the user" limitation because such customization clearly affects the "character" of the records. Grimes Decl. I ¶¶ 8-10, A2931-33 (and exhibits thereto). For example, Qwest implemented a design proposal from its customer,

Id.

Accordingly, if this Court were to reverse the grant of summary judgment of non-infringement by the eBC system and remand the case for trial, Centillion should be entitled to present evidence that the eBC system satisfies the "as specified by the user" limitation, not only because of its capability of generating summary reports "on demand" (Order 18, A5048), but also because of its capability of generating summary reports in which Qwest has customized the .TXT files at the request of the customer.

E. The District Court Abused its Discretion in Awarding Qwest its Costs Because Qwest Failed to Satisfy its Burden of Proving that the Costs it Claimed were Necessarily Incurred for Use in the Case

The district court's unexplained award of costs to Qwest constituted an abuse of discretion. Qwest "carries the burden of showing that the requested costs were necessarily incurred and reasonable." *Trs. of Chicago Plastering Inst. Pension Trust v. Cork Plastering Co.*, 570 F.3d 890, 906 (7th Cir. 2009) (affirming trial court's denial of certain costs that were not appropriately documented); *Majeske v. City of Chicago*, 218 F.3d at 824; *see Synopsis, Inc. v. Ricoh Co., Ltd. (In re Ricoh Co. Ltd. Patent Litig.)*, 661 F.3d 1361, 21367 (Fed. Cir. 2011) (burden on prevailing party to establish amount of costs and expenses to which it is entitled). When challenged "a prevailing party must offer some reliable

documentation or other proof that its bill of costs represents the allowable costs that it actually and necessarily incurred during the litigation." *See Summit*, 435 F.3d at 1381. Here, in the face of Centillion's objection to the district court's award, Qwest did not offer, and the district court did not demand, any such proof. Qwest was obliged to provide supporting documentation for its costs. It did not.

Moreover, the district court was required to make findings that the costs were reasonable and necessary. *Cengr*, 135 F.3d at 454 (district court should explain its decision to award or deny costs). Without a statement of reasons, an appellate court "has no real basis upon which to judge whether the trial court acted within the proper confines of its discretion." *Gardner v. Southern Ry. Sys.*, 675 F.2d 949, 954 (7th Cir. 1982) (citations omitted); *see Weilhaupt v. Am. Med. Ass'n*, 874 F.2d 419, 430 (7th Cir. 1989) (district court's discretion to determine and award reasonable costs "is not unfettered").

This also did not occur. Qwest sought, and the district court included in the amended judgment, costs of $251,245.81. The district court's lone explanation for awarding Qwest the full amount of its claimed costs seems to be its observation that the case had been pending for nine years (even though Qwest only sought costs allegedly incurred during the first six years), and that the litigation had been "paper intensive." A5166. The stakes or complexity of a patent case, however, cannot support an otherwise unsubstantiated award of costs. *See Summit*, 435 F.3d

at 1381 ("the fact that a case is particularly complex does not give the prevailing party an unchecked right to collect nearly $400,000 in costs").

Turning to the specific elements, Qwest's claim for $177,117.13 for "photocopy[ing], imaging, and printing costs" was insufficiently supported and many of the items are inappropriate. A prevailing party is entitled to recover "[f]ees for exemplification and the costs of making copies of any materials where the copies are necessarily obtained for use in the case." 28 U.S.C. § 1920(4). "Although section 1920(4) does not demand page-by-page precision, a bill of costs must represent a calculation that is reasonably accurate under the circumstances." *Summit*, 435 F.3d at 1380 (vacating portion of costs award for photocopying expenses lacking reasonable proof) (citations omitted); *see Synopsis, Inc. v. Ricoh Co.*, 661 F.3d at 1368 (vacating award for insufficiently supported copying expenses); *Weilhaupt*, 874 F.2d at 430-31 (reversing an award of copying expenses when district court failed to make any findings whether the expenses awarded were allowable and reasonable).

Like the claimed expenses found wanting in *Summit*, the list submitted with Qwest's bill of costs gives no indication of the purpose of any of the photocopying, whether it was directed to "presenting evidence to the court," or whether all of the copies were necessary to litigate Qwest's case. Moreover, Qwest's bill of costs contains no indication of the number of copies made, the rates charged for any of

this work, or whether multiple sets of copies were made. *See Kulumani v. Blue Cross Blue Shield Ass'n*, 224 F.3d 681, 685 (7th Cir. 2000) (remanding for consideration of whether claimed expenses for copying multiple sets of documents claimed were necessarily obtained for use in the case). Without this information, neither Centillion nor this Court can determine whether any or all of these items were proper and whether the amounts being charged were reasonable.

Several of the items related to copying appear objectionable on their face. For example, charges for creating and maintaining a database are not recoverable under § 1920(4). *See Summit*, 435 F.3d at 1378-79 (excluding costs for "database development"). Qwest's bill of costs sought recovery for, *inter alia*, for "Database Management." (A1291). Other entries include copying for "expert review" and "deposition preparation." (A1294). This Court has cautioned against applying § 1920(4) in a way that would result in an award of costs for things such as attorneys' fees, expert witness fees, and trial preparation, items that are outside the scope of a bill of costs. *See Summit*, 435 F.3d at 1377 n.5.

With respect to Qwest's claim of almost $74,000 for transcripts, Qwest is only entitled to "[f]ees for printed or electronically recorded transcripts necessarily obtained for use in the case." 28 U.S.C. § 1920(2). A trial court may not tax the costs of transcripts provided merely for the convenience of the requesting attorney. *Barber v. Ruth*, 7 F.3d 636, 645 (7th Cir. 1993). Without

back-up and invoices, there is no way for Centillion or this Court to determine whether the claimed transcript expenses are appropriate.

The district court's expedited decision to grant Qwest's motion for reconsideration and enter an Amended Judgment to include costs in the amount of over $250,000, before the clerk had taxed costs and Centillion had an opportunity to raise specific objections, was procedurally improper. This Court should vacate the award of costs.

CONCLUSION

For the foregoing reasons, the judgment of non-infringement by the district court and the award of costs should be vacated and reversed, and the case remanded for trial on the merits.

DATED: February 27, 2013

Respectfully submitted,

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CERTIFICATE OF COMPLIANCE

I hereby certify, pursuant to Rule 32(a)(7)(C) of the Federal Rules of Appellate Procedure, that the body of this brief, beginning with the Jurisdictional Statement on page 1 and ending with the last line of the Conclusion on page 59, and including headings, footnotes, and quotations, contains 13,832 words, in compliance with the type-volume limitation of Rule 32(a)(7)(B)(i) of the Federal Rules of Appellate Procedure.

DATED: February 27, 2013

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ADDENDUM

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF INDIANA
INDIANAPOLIS DIVISION

CENTILLION DATA SYSTEMS, LLC, Plaintiff vs. QWEST COMMUNICATIONS INTERNATIONAL, INC. and QWEST CORPORATION, Defendants.	)	1:04-cv-0073-LJM-DKL
QWEST CORPORATION and QWEST COMMUNICATIONS CORPORATION, Consolidated Plaintiffs, vs. CENTILLION DATA SYSTEMS, LLC and CTI GROUP (HOLDINGS), INC., Consolidated Defendants.	)	1:04-cv-2076 (consolidated with above)

ORDER

Pending before the Court are two motions for summary judgment (AMotions@): Plaintiffs Centillion Data Systems, LLC=s and CTI Group (Holdings) Inc.=s (collectively, ACentillion@) Motion for Partial Summary Judgment of Infringement [Dkt. No. 871],[1] and Defendants Qwest Communications International, Inc. and Qwest Corporation, and Consolidated Plaintiffs Qwest Corporation and Qwest Communications Corporation's

[1] Contemporaneously with the Motions, Centillion filed Plaintiffs Centillion Data Systems, LLC=s and CTI Group (Holdings), Inc.=s Request for Oral Argument on Their Motion for Partial Summary Judgment of Infringement [Dkt. No. 879]. Subsequently, the request was renewed in Centillion=s Renewed Motion for Oral Argument on Motions for Summary Judgment [Dkt. No. 921]. The Court has sufficient information to decide the Motions without oral argument and, therefore, **DENIES** Centillion=s requests for oral argument [dkt. nos. 879, 921].

In addition, following the submission of supplemental authority and briefing on the same, Qwest filed its Motion for Leave to File a Sur-Reply to Centillion=s Reply in Support of Its Notice of Supplemental Authority [Dkt. No. 918]. The Court concludes that a surreply is unnecessary given the extensive briefing already file and **DENIES** Qwest=s motion [dkt. no. 918].

collectively, AQwest@) Motion for Summary Judgment of Non-Infringement [Dkt. No. 880]. The Court has considered the parties= arguments and evidence and rules as follows.

I. BACKGROUND

On February 15, 1994, the United States Patent and Trademark Office issued United States Patent No. 5,287,270 (A›270 Patent@), titled ABilling System,@ to Compucom Communications Corporation. ›270 Patent. Broadly speaking, the ›270 Patent allows telephone service providers to provide subscribers with detailed call information that can be easily organized and analyzed. *Id.* Following a corporate reorganization, the ›270 Patent was transferred to its current owner, Centillion Data Systems, LLC. Dkt. No. 872 at 4 & 2.

A. RELEVANT CLAIMS OF THE ›270 PATENT

Centillion accuses Qwest of infringing claims 1, 8, 10, and 46 of the ›270 Patent. Dkt. No. 884 at 7 & 2. Those claims recite:

> 1. A system for presenting information concerning the actual cost of a service provided to a user by a service provider, said system comprising:
>
> storage means for storing individual transactions records prepared by said service provider, said transaction records relating to individual service transactions for one or more service customers including said user, and the exact charges actually billed to said user by said service provider for each said service transaction;
>
> data processing means comprising respective computation hardware means and respective software means for directing the activities of said computation hardware means;
>
> means for transferring at least a part of said individual transaction from said storage means to said data processing means;

said data processing means generating preprocessed summary reports as specified by the user from said individual transaction records transferred from said storage means and organizing said summary reports into a format for storage, manipulation and display on a personal computer data processing means;

means for transferring said individual transaction records including said summary reports from said data processing means to said personal computer data processing means; and

said personal computer data processing means being adapted to perform additional processing on said individual transaction records which have been at least in part preprocessed by said data processing means utilizing said summary reports for expedited retrieval of data, to present a subset of said selected records including said exact charges actually billed to said user.

* * *

8. A system for presenting, under control of a user, usage and actual cost information relating to telecommunications service provided to said user by a telecommunications service provider, said system comprising:

telecommunications service provider storage means for storing records prepared by a telecommunications service provider relating to telecommunications usage for one or more telecommunications subscribers including said user, and the exact charges actually billed to said user by said service provider for said usage;

data processing means comprising respective computation hardware means and respective software programming means for directing the activities of said computation hardware means;

means for transferring at least a part of the records from said service provider storage means to said data processing means;

said data processing means generating preprocessed summary reports as specified by the user from said telecommunications usage records transferred from said storage means and organizing said summary reports into a format for storage, manipulation and display on a personal computer data processing means;

means for transferring said telecommunications usage records including said summary reports from said data processing means to said personal computer data processing means;

said personal computer data processing means being adapted to perform additional processing on said telecommunications records which have been at least in part preprocessed by said data processing means utilizing said summary reports for expedited retrieval of data, to present a subset of said telecommunications usage records including said exact charges actually billed to said user.

* * *

10. A system as in claim 8 wherein said selected records relating to telecommunications usage and cost comprise at least one telecommunications call detail record corresponding to a unique telecommunications call to be billed to said subscriber, said call having a length determined by said telecommunications carrier.

* * *

46. A system as in claim 8 wherein an information interchange media means in the form of a data communications line is employed for transferring said selected records from said data processing means to said personal computer data processing means.

›270 Patent col.31 l. 39Bcol.36 l. 7.

B. QWEST=S PRODUCTS

Centillion contends that Qwest infringed the ›270 Patent through its Logic, eBill Companion, and Insite products (collectively, AAccused Products@). Centillion moves for summary judgment only as to the eBill Companion (AeBC@) application. Dkt. No. 872 at 12n.5. However, Qwest has moved for summary judgment of non-infringement as to all of the Accused Products. Dkt. No. 884 at 9.

The parties agree that Qwest was aware of the ›270 Patent prior to the design and introduction of both Logic and eBC. Dkt. No. 883-6 at 7B8; Dkt No. 881 at ¶ 5. Qwest contends that it attempted to design around the ›270 Patent and, as a result, the Accused Products were Aless robust than desired.@ Dkt. No. 884 at 16 & 20. While designing the

Accused Products, Qwest=s designers purportedly did not seek legal advice as to whether their design effectively designed around the ›270 Patent, instead relying on internal discussions among designers. Dkt. No. 886-5 at 4.

Logic is the predecessor system to eBC and was introduced in 1997; it was discontinued in 2002 except for use by specific customers. Dkt. No. 881 at 2 ¶ 4; Dkt No. 883-6 at 9. Qwest introduced eBC in 2002. Dkt. No. 872-1 at 11. Insite is a product offered to BellSouth customers, and Centillion contends that Insite is functionally identical to both Logic and eBC, *see* Dkt. No. 828 at 8; *see also Centillion Data Sys., LLC v. Qwest Commc'ns Int'l, Inc.*, 631 F.3d 1279, 1281 (Fed. Cir. 2011), therefore, addressing infringement of the Logic and eBC products in detail will resolve the infringement issue with respect to Insite. All of the Accused Products are available to commercial customers. Dkt. No. 883-9 at 5.

There are two parts to either the Logic or the eBC product: a back-end system and the Qwest client application software. Dkt. No. 881 at 2 ¶ 3. *See also Centillion Data Sys.*, 631 F.3d at 1281. The back-end systems collect electronic monthly billing information. Dkt. No. 881 at 2 ¶ 3. Qwest sends the billing information either by CD-ROM or by download to individual customers for their use. *Id.* Qwest customers may choose to install Qwest client application software, such as Logic or eBC, on a personal computer, which allows for additional functionality, but the Qwest software is not necessary to utilize the monthly billing information. Dkt. No. 872-10 at 33. *See also Centillion*, 631 F.3d at 1281. The billing information consists of call detail records (ACDRs@) for each discrete call captured by Qwest=s telecom switches. Dkt. No. 872 at 13 & 10; Dkt. No. 881 at 2 ¶ 3. The Accused Products permit display and billing analysis

of long-distance telecommunications usage for particular customers. Dkt. No. 872-10 at 12; Dkt. No. 881 at 2 ¶ 3.

To prepare the billing information sent to customers, the CDRs captured through Qwest=s telecom switches are processed in the LATIS systemCa software application that runs on various serversCwhere each CDR is rated to include the exact charges actually billed for a given call. Dkt. No. 872 at 13B14 && 11, 13. This rating process includes application of various promotional pricing and discounts. *Id.* The rated CDRs are stored in several locations in Qwest=s architecture, including the Billing Data Server (ABDS@), which is a hard disk device capable of receiving, retaining, and supplying data. *Id.* at 14 & 12. In eBC, from the BDS, CDRs are transferred via data communication lines to eBC Back Office, a software application written in Java and XML, upon request. *Id.* at 14 && 13B14.

Qwest customers may register to use a feature called project account codes or "PACs" in both the Logic and eBC products. PACs allow a customer to insert codes corresponding to particular employees, types of calls, or offices. *Id.* at 7 & 20. A customer using this feature enters the relevant PAC in addition to dialing the relevant telephone number; the PAC data becomes part of the CDR for that call. *Id.* at 6 & 19. In the files created by eBC or Logic, PACs are included for calls on which they are used. *Id.* For calls made without using PACs, the data file includes a null value in the PAC field. *Id.*

In the eBC product, eBC Back Office uses the CDR information to create .TXT files. Dkt. No. 892 at 4 & 6. The .TXT files include a collection of all billing records for a given customer. Information on the .TXT files mirrors that contained in the individual

CDRs. Dkt. No. 881 at 6 & 19. For delivery to customers, the .TXT files are combined with .FMT files, which are manually created by Qwest personnel. Dkt. No. 892 at 4 & 6. The .FMT files, along with aspects of the eBC customer portal, provide the schema for organizing the .TXT files. Dkt. No. 873-4 at 4. All customers receiving billing data through eBC receive the same .FMT files. *Id.* In order to use the billing data in the eBC client application software, a customer must receive both the relevant .TXT and .FMT files. *Id.*

The billing information, sent to the requesting customer as a .zip file, includes the relevant .TXT and .FMT files configured for use in the eBC client application. *See generally* Dkt. No. 873-8. Qwest does not require that customers receiving this billing information use the eBC client application, and the files may be used in third party applications. Dkt. No. 884 at 13 & 8. Requesting customers receive their billing information at the end of each billing cycle. Dkt. No. 872-10 at 12.

The On-Demand feature was developed by Qwest in 2002. Dkt. No. 881 at 7 ¶ 22. It is not available for users of the Logic product. *Id.* Using the On-Demand feature of the eBC product customers can request billing information for a particular previous time period. Dkt. No. 881 at 8 & 23. Further, Qwest has provided customization of the data provided to some eBC customers, which generally is comprised of additional fields. *Id.* at 8 ¶ 26.

C. PROCEDURAL HISTORY

On January 12, 2004, Centillion brought suit against Qwest in this Court. Dkt. No. 1. On February 14, 2005, the suit was consolidated with a related suit by Qwest against

Centillion, originally filed in the United States District Court for the Western District of Washington and transferred to this Court, seeking a declaratory judgment of non-infringement or invalidity of the ›270 Patent. *See* Dkt. No. 174.

On January 9, 2008, following briefing and argument, the Court issued its Order on Claim Construction (A*Markman* Order@). The Court construed the disputed claim terms as follows:

CLAIM TERM	**CONSTRUCTION**
Aactual cost@	not a claim limitation
Aexact charges actually billed@	the rated cost assigned to each individual transaction record
Ameans for storing@	a device capable of receiving, retaining, and supplying data
Adata processing means@	functions: (1) generating preprocessed summary reports; and (2) organizing said summary reports into a format for storage manipulation and display on a personal computer data processing means structure: a computer that is programmed to segregate data by customer and record type, to edit and accumulate data to produce reports, to create database tables and additional records for storage, and to convert data, and its equivalents
Aas specified by the user@	the service customer selects, or makes specific, the character of
Ameans for transferring@	functions: (1) transferring at least part of said individual transaction records from said storage means to said data processing means; and (2) transferring said individual transaction records including said summary reports to said personal computing data processing means structure: magnetic tape, disk, or data communication lines, or their equivalents

Aadditional processing@	more action upon or further manipulating
Aindividual transaction records@	records of discrete events

Dkt. No. 394 at 46.

On October 29, 2009, based on the claim construction set forth in the *Markman* Order and extensive briefing from the parties, the Court issued its Amended Order on summary judgment. *See generally* Dkt. No. 828. The Court concluded that the ›270 Patent is valid, having not been rendered obvious by previously issued patents. *Id.* at 31. The Court further concluded that Qwest was not liable for direct infringement because it neither operated all potentially infringing aspects of the Accused Products nor directed its customers to use the Accused Products in an infringing manner. *Id.* at 34. Because it concluded that there was no underlying act of direct infringement, the Court concluded that Qwest could not be held liable for indirect infringement. *Id.*

Centillion appealed the Court's conclusion of non-infringement to the Federal Circuit. Dkt. No. 852 at 3. On May 2, 2011, the Federal Circuit issued an Order vacating in part, reversing in part, and remanding the case back to this Court. *See generally Centillion*, 631 F.3d 1279. The Federal Circuit concluded that Qwest did not engage in direct infringement. *Id.* at 1286. However, it further concluded that the standard operation of the Accused Products by Qwest=s customers constitutes Ause@ for a direct infringement analysis, although it acknowledged that the Ause@ determination was not a complete finding of infringement, as no comparison of the Accused Products and the claim limitations had occurred. *Id.* at 1285. It remanded the case to this Court for a determination as to whether Qwest could be held liable for indirect infringement based on its customers= use of the Accused Products. *Id.* at 1286.

Following remand, the parties filed the present Motions. Centillion requests a finding that Qwest indirectly infringed Claims 1 and 8 of the ›270 Patent by providing the eBC application to customers and instructing them as to its use in an infringing manner. Dkt. No. 872 at 41. Qwest requests a finding of non-infringement as to the entirety of the ›270 Patent, contending that the Accused Products do not meet all the claim limitations of the ›270 Patent and, alternatively, Qwest did not have the requisite *mens rea* for indirect infringement. Dkt. No. 884 at 6B7. Since filing the Motions, the parties have filed a number of supplemental materials. *See generally* Dkt. Nos. 886, 889, 898, 901, 903, 905, 914B15, 920, 922B26.

The Court includes additional facts below as necessary.

II. STANDARDS

A. SUMMARY JUDGMENT

As stated by the Supreme Court, summary judgment is not a disfavored procedural shortcut, but rather is an integral part of the federal rules as a whole, which are designed to secure the just, speedy, and inexpensive determination of every action. *See Celotex Corp. v. Catrett*, 477 U.S. 317, 327 (1986); *see also United Ass›n of Black Landscapers v. City of Milwaukee*, 916 F.2d 1261, 1267B68 (7th Cir. 1990). Motions for summary judgment are governed by Federal Rule of Civil Procedure 56(a), which provides in relevant part:

> The court shall grant summary judgment if the movant shows that there is no genuine dispute as to any material fact and the movant is entitled to judgment as a matter of law.

Once a party has made a properly-supported motion for summary judgment, the

opposing party may not simply rest upon the pleadings but must instead submit evidentiary materials showing that a material fact is genuinely disputed. FED. R. CIV. P. 56(c)(1). A genuine dispute of material fact exists whenever Athere is sufficient evidence favoring the nonmoving party for a jury to return a verdict for that party.@ *Anderson v. Liberty Lobby, Inc.*, 477 U.S. 242, 249 (1986). The nonmoving party bears the burden of demonstrating that such a genuine dispute of material fact exists. *See Matsushita Elec. Indus. Co. v. Zenith Radio Corp.*, 475 U.S. 574, 586B87 (1986); *Oliver v. Oshkosh Truck Corp.*, 96 F.3d 992, 997 (7th Cir. 1996). It is not the duty of the Court to scour the record in search of evidence to defeat a motion for summary judgment; rather, the nonmoving party bears the responsibility of identifying applicable evidence. *See Bombard v. Ft. Wayne Newspapers, Inc.*, 92 F.3d 560, 562 (7th Cir. 1996).

In evaluating a motion for summary judgment, the Court should draw all reasonable inferences from undisputed facts in favor of the nonmoving party and should view the disputed evidence in the light most favorable to the nonmoving party. *See Estate of Cole v. Fromm*, 94 F.3d 254, 257 (7th Cir. 1996). The mere existence of a factual dispute, by itself, is not sufficient to bar summary judgment. Only factual disputes that might affect the outcome of the suit in light of the substantive law will preclude summary judgment. *See Anderson*, 477 U.S. at 248; *JPM Inc. v. John Deere Indus. Equip. Co.*, 94 F.3d 270, 273 (7th Cir. 1996). Irrelevant or unnecessary facts do not deter summary judgment, even when in dispute. *See Clifton v. Schafer*, 969 F.2d 278, 281 (7th Cir. 1992). If the moving party does not have the ultimate burden of proof on a claim, it is sufficient for the moving party to direct the court to the lack of evidence as to an element of that claim. *See Green v. Whiteco Indus., Inc.*, 17 F.3d 199, 201 & n.3 (7th Cir.

1994). AIf the nonmoving party fails to establish the existence of an element essential to [her] case, one on which [she] would bear the burden of proof at trial, summary judgment must be granted to the moving party.@ *Ortiz v. John O. Butler Co.*, 94 F.3d 1121, 1124 (7th Cir. 1996).

B. PATENT INFRINGEMENT

Under 35 U.S.C. ' 271(a) , Awhoever without authority makes, uses, offers to sell, or sells any patented invention . . . within the United States . . . infringes the patent.@ Reviewing whether a particular device or system infringes a patent is a two-step process. *See CAE Screenplates v. Heinrich Fiedler GMBH*, 224 F.3d 1308, 1316 (Fed. Cir. 2000); *K-2 Corp. v. Salomon S.A.*, 191 F.3d 1356, 1362 (Fed. Cir. 1999). First, the Court must interpret the disputed claims, Afrom a study of all relevant documents,@ to determine their scope and meaning. *K-2 Corp.*, 191 F.3d at 1362; *see also Dolly, Inc. v. Spalding & Evenflo Cos., Inc.*, 16 F.3d 394, 397 (Fed. Cir. 1994). Second, the Court must determine if the accused device, system, or process comes within the scope of the properly construed claims, either literally or by a substantial equivalent. *See K-2 Corp.*, 191 F.3d at 1362; *Dolly*, 16 F.3d at 397; *SmithKline Diagnostics v. Helena Labs. Corp.*, 859 F.2d 878, 889 (Fed. Cir. 1988). In this case, the first phase of the infringement analysis, claim construction, occurred prior to the instant Motions. *See* Dkt. No. 394. Therefore, the Court=s analysis focuses on the second phase of the infringement analysis.

The patent owner bears the burden of proving infringement. *Dynacore Holdings Corp. v. U.S. Philips Corp.*, 363 F.3d 1263, 1273 (Fed. Cir. 2004). The Federal Circuit has found in this case that Qwest did not engage in direct infringement, either on its own

or through vicarious liability for any infringing acts by its customers. *See Centillion*, 631 F.3d at 1286. The present Motions, therefore, address indirect infringement only. There are two types of indirect infringement: contributory infringement and inducement to infringe. Both types of indirect infringement require an underlying act of direct infringement. *Akamai Techs., Inc. v. Limelight Networks, Inc.*, Nos. 2009-1372, -1380, -1416B17, 2012 WL 3764695, at *4 (Fed. Cir. Aug. 31, 2012) (per curiam) (citing *Deepsouth Packing Co. v. Laitram Corp.*, 406 U.S. 518, 526 (1972); *Aro Mfg. Co. v. Convertible Top Replacement Co.*, 365 U.S. 336, 341 (1961); *Henry v. A.B. Dick Co.*, 224 U.S. 1, 12 (1912)).

III. DISCUSSION

As an initial matter, the parties disagree as to whether Centillion previously conceded that Qwest=s customers must use Qwest=s client software to directly infringe, as opposed to inputting data received from Qwest into a third-party application with similar functionality. In its opinion, the Federal Circuit noted in dicta that ACentillion concedes that in order to infringe, the customer must install Qwest=s client software.@ *Centillion*, 631 F.3d at 1286n.2. Centillion contends that it made no such concession and maintains that infringement may be found even if customers process records sent from Qwest using a third-party application rather than Qwest=s software. However, a review of Centillion=s appellate brief convinces the Court that Centillion made such a concession. Dkt. No. 883-1 at 5 (AOnly if the installation of the eBill Companion client application, the downloading of call data, and its importation into the eBC client application are completed according to Qwest=s step-by-step directions are the customers= personal computers

›adapted to perform additional processing= as set forth in the claims.@). Centillion may not revoke an admission made before the Court of Appeals on remand to this Court. *See United States v. Cunningham*, 405 F.3d 497, 503B04 (7th Cir. 2005) (stating that a concession made in appellate brief is binding on the party). Therefore, the Court limits Centillion=s claims to customers purportedly using Qwest=s application, rather than a third-party application, to process records and proceeds accordingly.

A. DIRECT INFRINGEMENT

To prove direct infringement, Centillion must show by a preponderance of the evidence that every limitation of the claim asserted to be infringed has been found in the accused device, either literally or by equivalent. *Cross Med. Prods. v. Medtronic Sofamor Danek, Inc.*, 424 F.3d 1293, 1310 (Fed. Cir. 2005). For terms construed as Ameans-plus-function@ terms, infringement Arequires that the relevant structure in the accused device perform the identical function recited in the claim and be identical or equivalent to the corresponding structure in the specification.@ *Applied Med. Res. Corp. v. U.S. Surgical Corp.*, 448 F.3d 1324, 1333 (Fed. Cir. 2006) (citing *Lockheed Martin Corp. v. Space Sys./Loral, Inc.*, 324 F.3d 1308, 1320 (Fed. Cir. 2003)). A party may prove direct infringement by circumstantial evidence. *Vita-Mix Corp. v. Basic Holding, Inc.*, 581 F.3d 1317, 1326 (Fed. Cir. 2009).

As the parties agree, and the Federal Circuit concluded, that Qwest did not directly infringe the ›270 Patent, Centillion must show that direct infringement occurred through

Qwest=s customers= use of the Accused Products.[2] The Federal Circuit concluded that Qwest=s customers Ause@ the Accused Products as a matter of law, but the Court noted that this finding did not conclude the direct infringement inquiry. *Centillion*, 631 F.3d at 1285B86. The Court must still determine whether the Accused Products meet all limitations of the claim terms. *Cross Med. Prods.*, 424 F.3d at 1310. In this type of direct infringement analysis, where the steps allegedly constituting infringement are performed sequentially by numerous non-related actors, rather than a single company or actor, it must be shown that the Accused Products meet all the claim limitations when fully operated and that the Accused Products were indeed operated as such. *Cf. Akamai Techs.*, 2012 WL 3764695, at *4B*5.

1. CLAIM 1

The parties agree that the Accused Products encompass all of the following elements of Claim 1:

A system for presenting information concerning the actual cost of a service

[2] In one of its supplemental authority submissions, Centillion contends that the Federal Circuit en banc decision in *Akamai Technologies, Inc. v. Limelight Networks, Inc.*, No. 2009-1372, 2012 WL 3764695 (Fed. Cir. Aug. 31, 2012) (per curiam), undermines the Federal Circuit=s previous statement in this litigation that AQwest does not >make= the patented invention . . . as a matter of law.@ *See Centillion*, 631 F.3d at 1288. Centillion argues that it should be permitted to argue that Qwest is a direct infringer through Amaking@ the patented invention. *See generally* Dkt. No. 922.

Having reviewed *Akamai* and the Federal Circuit=s decision in this case, the Court concludes that *Akamai* does not require reevaluation of the Federal Circuit=s finding. *Akamai* states that Athe party that adds the final element to the combination >makes= the infringing product and is thus liable for direct infringement even if others make portions of the product.@ 2012 WL 3764695, at *11. In this case, there is little doubt that Qwest=s customers complete the system by installing and using the Accused Products on their PCsCin other words, the final element is added by the customer, not Qwest. *Akamai* does not control clearly enough to justify deviation from the Federal Circuit=s clear statement that Qwest is not a direct infringer under either the Ause@ or Amake@ standard. *See Centillion*, 631 F.3d at 1288.

Although Qwest still may be held liable as an indirect infringer if Qwest=s customers are found to be direct infringers and other legal criteria are met, the Federal Circuit=s decision as to Qwest=s status as a direct infringer is the law of the case and will be upheld as such.

> provided to a user by a service provider, said system comprising:
>
> storage means for storing individual transaction records prepared by said service provider, said transaction records relating to individual service transactions for one or more service customers including said user, and the exact charges actually billed to said user by said service provider for each said service transaction;
>
> data processing means comprising respective computation hardware means and respective software programming means for directing the activities of said computation hardware means;
>
> means for transferring at least a part of said individual transaction records from said storage means to said data processing means;
>
> . . . .
>
> means for transferring said individual transaction records . . . from said data processing means to said personal computer data processing means . . . .

›270 Patent col.31 ll. 39B55, 63B66. In other words, elements one, two, three, and four of Claim 1, as well as a portion of element six, are present in the Accused Products. *See generally* Dkt. No. 872; *see also* Dkt. No. 889 at 9.

However, Qwest contends that neither Logic nor eBC contain the other elements of Claim 1. Specifically, Qwest contends that Centillion has not proven that any of Qwest=s customers use either Logic or eBC in a manner that satisfies the Aas specified by the user@ limitation of element five of Claim 1. *See* ›270 Patent col.31 l.57. In addition, Qwest contends that the data processing means of the Accused Products do not generate Asummary reports,@ Acreate database tables,@ Aedit data,@ or Asegregate data . . . by record type@ as required by elements five, six, and seven, *see id.* at col.31 ll. 57, 64; col.32 l. 3, as well as the Court=s construction of the means-plus-function limitations of the Adata processing means@ term. *See* Dkt. No. 394 at 31. The Court addresses these contentions in turn.

a. Aas specified by the user@

The fifth element of Claim 1 requires Asaid data processing means generating preprocessed summary reports as specified by the user from said individual transaction records transferred from said storage means and organizing said summary reports into a format for storage, manipulation and display on a personal computer data processing means[.]@ ›270 Patent col.31 ll. 56B62. In the *Markman* Order, the Court construed Aas specified by the user@ to mean Athe service the customer selects, or makes specific, the character of.@ Dkt. No. 394 at 34. Centillion contends that both Logic and eBC satisfy the Aas specified by the user@ limitation through the use of PACs and that eBC's On-Demand functionality, as well as customizations to the .TXT files made in response to requests by particular customers also satisfy this limitation.

The Court concludes that inclusion of PACs in customer=s billing information does not meet the Aas specified by the user@ limitation of the fifth element of Claim 1. Qwest=s customers' use of PACs is configured completely outside of the Logic or eBC application framework, and PACs may be used by customers regardless of whether they analyze billing records with Logic, eBC, with a third-party application, or not at all. Dkt. No. 881 at 7 & 20. Customers may enter a PAC when placing a call, but they are not required to do so, and a section for PACs is included in the billing information provided by Qwest in conjunction with Logic or eBC even if customers choose not to enter a PAC. Dkt. No. 891-2 at 15B16. Inclusion of PACs in the billing information generated by Qwest is no different than inclusion of the telephone number dialed, a mere piece of data, and there is little doubt that dialing a particular telephone number does not satisfy the Aas specified by

the user@ limitation. In short, the Court concludes that use of PACs does not meet the Aas specified by the user@ limitation and, as such, the Logic product does not infringe Claim 1 of the '270 Patent.

In addition, the Court concludes Qwest's customization of eBC data files for particular customers does not satisfy the Aas specified by the user@ limitation. Centillion contends that changes made to the .TXT files in response to customer feedback, such as from Wells Fargo, meet the Aas specified by the user@ limitation. However, Centillion concedes that customers who have had their data files customized cannot use the eBC client application software. Dkt. No. 884 at 19 (Statement of Material Facts Not in Dispute ¶ 37 ("SMFND ¶ 37"); Dkt. No. 886 at 13n.10 (stating that Centillion does not dispute Qwest's SMFND ¶ 37, among others). As discussed above, Centillion has already conceded that infringement requires use of the eBC client application software. Therefore, the Court concludes that any Acustomization@ of eBC data files alleged by Centillion does not meet the Aas specified by the user@ limitation of Claim 1.

However, the Court concludes that use of eBC's On-Demand feature does meet the Aas specified by the user@ limitation. On-Demand allows a customer to submit a request to receive billing information for a particular previous billing cycle. Dkt. No. 881 at 7 & 22. In doing this, the customer Aselects . . . the character of@ the information being provided, specifying that the information cover only a particular time period. Qwest argues that because the time period selected is limited by billing cycleCin other words, a customer cannot request just any time period, but instead the time period requested must correspond to a billing cycleCthe Aas specified by the user@ limitation is not met. However, Aas specified by the user@ does not require as much flexibility as Qwest would

like, and it is sufficient that the customer may select a subset of available time ranges, even if that selection must correspond to a particular billing cycle.

Having determined that use of the On-Demand feature meets the Aas specified by the user@ limitation, the Court still must determine what evidence is necessary to show this element. Qwest contends that Centillion must bring forth evidence of specific customers that specified the character of the data and reports they were receiving, above and beyond evidence that the On-Demand feature provides the capacity to allow customers to make those selections. Centillion contends that the Court=s claim construction of Adata processing means@ in conjunction with Aas specified by the user@ renders the limitation one of capability, not actual operability.

Examining the language of the claims, the Court concludes that mere capacity is insufficient. The fifth element of Claim 1 speaks of a Adata processing means generating . . . reports as specified by the user,@ language that speaks of the data processing means taking some sort of action to bring the reports into existence. However, Qwest=s contention that Centillion must bring forth evidence such as customer deposition testimony of use of the On-Demand feature asks too much, as Centillion may prove that the feature was used through circumstantial evidence. *Vita-Mix Corp.*, 581 F.3d at 1326. Reviewing the evidence, the Court concludes a genuine dispute of material fact exists as to whether at least one of Qwest=s customers used the On Demand feature. For instance, Nick Bates of MedQuist, Inc. sent a complaint to Qwest=s help desk stating, AI am trying to download On-Demand files, I receive the emails that state that they are completed, but they do not appear on the website for me. A co-worker of mine has no problem with this feature.@ Dkt. No. 886-9 at 3. Contrary to Qwest=s argument, this is

more than the descriptions in the user=s manual found insufficient by the Federal Circuit in *Mirror Worlds*. *See Mirror Worlds, LLC v. Apple, Inc.*, No. 2011-1392, 2012 WL 3800812, at *8B*9 (Fed. Cir. Sept. 4, 2012). The Court concludes that use of eBC's On-Demand feature meets the Aas specified by the user@ limitation of Claim 1 and that there is a factual dispute as to whether Qwest=s customers actively used the feature.

b. Means-plus-function construal of Adata processing means@

Qwest contends that eBC does not have a Adata processing means@ as that term was construed in the *Markman* Order.[3] Centillion contends that eBC Back Office, LATIS, or a combination thereof is a Adata processing means@ as defined by the Court. The Court construed Adata processing means@ as a means-plus-function term under 35 U.S.C. ' 112, & 6. Specifically, the Court concluded that a data processing means performs the functions of (1) generating preprocessed summary reports and (2) organizing said summary reports into a format for storage manipulation and display on a personal computer data processing means. Dkt. No. 394 at 31. The structure corresponding to these functions was construed as Aa computer that is programmed to segregate data by customer and record type, to edit and accumulate data to produce reports, to create database tables and additional records for storage, and to convert data into a PC-compatible format and its equivalents.@ *Id.* As noted above, infringement of a means-plus-function term Arequires that the relevant structure in the accused device perform the identical function recited in the claim and be identical or equivalent to the

3 The Court has concluded that the Logic product does not contain the "as specified by the user" limitation of Claim 1, therefore, it will not address the other limitations of that claim with respect to the Logic product.

corresponding structure in the specification.@ *Applied Med. Res. Corp.*, 448 F.3d at 1333. Equivalence in structure may be proven Aby showing that [] two [structures] perform the identical function in substantially the same way, with substantially the same result.@ *Kemco Sales, Inc. v. Control Papers Co.*, 208 F.3d 1352, 1364 (Fed. Cir. 2000).

Examining the required functions of the data processing means, the Court concludes that the eBC Back Office and LATIS, or a combination thereof, generates preprocessed summary reports as required by the claims. In the *Markman* Order, the Court defined Asummary report@ as Aa collection of analyzed and/or reorganized data.@ Dkt. No. 394 at 41. The Court left open the possibility that a report including all billing information for a particular customer would constitute a summary report and did not place any limitation on the format of the summary report. *Id.* The eBC Back Office organizes the billing information by customer and inserts that information into various .TXT files, although viewing of these .TXT files requires additional .FMT files constructed by Qwest personnel outside of the eBC framework. Dkt. No. 892 at 4 & 6. These .TXT files, even apart from the .FMT files, are sufficient to constitute summary reports as that term has been construed, as they include Aa collection of . . . reorganized data.@ Centillion has brought forth evidence that at least some of Qwest=s customers receive their billing information and use it in eBCCin other words, at least some of Qwest=s customers receive the .TXT files, preprocessed summary reports. *See, e.g.*, Dkt. No. 872 at 18 & 27. Therefore, the Court concludes that eBC Back Office generates a preprocessed summary report.

Turning to the other required function of the data processing means, however, the Court concludes that eBC Back Office, LATIS, or a combination thereof, does not

Aorganiz[e] said summary reports into a format for storage manipulation and display on a personal computer data processing means.@ *See* Dkt. No. 394 at 31. Although LATIS and eBC Back Office perform the steps necessary to create a summary reportCthe relevant .TXT fileCneither of those systems organize the summary reports into a format for display on a personal computer. Instead, the customer must be provided with a .FMT file and schema within the eBC client application to interact with the .TXT file and allow display of the summary reports on a personal computer. Dkt. No. 892 at 4 & 6. The .FMT file is generated by Qwest personnel apart from either LATIS or eBC Back Office. *Id.* Neither LATIS nor eBC Back OfficeCthe alleged data processing meansCperforms the steps necessary to format the .TXT file for display. Because Centillion has not brought forth evidence that the so-called data processing means Aorganiz[e] . . . summary reports into a format for . . . display,@ the Court concludes that eBC fails to perform a required function of the data processing means and, therefore, fails to meet all limitations of Claim 1.

As noted above, direct infringement requires that every limitation of the claim asserted to be infringed has been found in the accused device, either literally or by equivalent. *Cross Med. Prods.*, 424 F.3d at 1310. For means-plus-function limitations, the relevant structure must Aperform the identical function recited in the claim.@ *Applied Med. Res. Corp.*, 448 F.3d at 1333. Because the Court concludes that the data processing means of eBC does not perform all required functions set forth in the limitations of Claim 1, the Court concludes that eBC does not infringe Claim 1 of the ›270 Patent.

2. CLAIM 8

Claim 8 tracks Claim 1 specifying operation by Atelecommunications service providers@ and involving Atelecommunication usage records.@ *See generally* ›270 Patent col.32 ll. 30B46. As the parties do not dispute that Qwest is a Atelecommunications service provider@ and any records distributed by Qwest are Atelecommunication usage records,@ the direct infringement analysis for Claim 8 is identical to the analysis for Claim 1. *See Dayco Prods., Inc. v. Total Containment, Inc.*, 329 F.3d 1358, 1371 (Fed. Cir. 2003) (requiring identical construction of identical claim terms). Because, as discussed above, neither Logic nor eBC infringe all the limitations of Claim 1, and the relevant limitations of Claim 8 contain identical claim terms, the Court concludes that Logic and eBC do not infringe Claim 8 of the ›270 Patent.[4]

B. INDIRECT INFRINGEMENT

In order for Qwest to be held liable for indirect infringementCeither contributory infringement or inducement of infringementCan underlying act of direct infringement, in this case committed by Qwest=s customers, must be shown. *Akamai Techs.*, Nos. 2009-1372, 1380, 1416B17, 2012 WL 3764695, at *4 (citing *Deepsouth Packing Co. v. Laitram Corp.*, 406 U.S. 518, 526 (1972); *Aro Mfg. Co. v. Convertible Top Replacement Co.*, 365 U.S. 336, 341 (1961); *Henry v. A.B. Dick Co.*, 224 U.S. 1, 12 (1912)); *see also Toshiba Corp. v. Imation Corp.*, 681 F.3d 1358, 1364 (Fed. Cir. 2012). As discussed

[4] As Claims 10 and 46 of the ›270 Patent are dependent claims based on Claim 8, the Court concludes that Logic and eBC do not infringe those Claims either. Likewise, having concluded that neither Logic nor eBC infringe any of the asserted claims, the Court also concludes that, as a functional equivalent of either of those products, Insite also does not infringe the asserted claims.

above, the Accused Products fail to satisfy all claim limitations of the ›270 Patent and, therefore, no direct infringement has occurred. Consequently, Qwest cannot be held liable for indirect infringement[5] and is entitled to summary judgment.

IV. CONCLUSION

For the reasons set forth herein, the Court rules as follows:

1) Plaintiffs Centillion Data Systems, LLC=s and CTI Group (Holdings) Inc.=s Motion for Partial Summary Judgment of Infringement [Dkt. No. 871] is **DENIED**.

2) Defendants Qwest Communications International, Inc. and Qwest Corporation, and Consolidated Plaintiffs Qwest Corporation and Qwest Communications Corporation=s Motion for Summary Judgment of Non-Infringement [Dkt. No. 880] is **GRANTED**.

3) Plaintiffs Centillion Data Systems, LLC=s and CTI Group (Holdings), Inc.=s Request for Oral Argument on Their Motion for Partial Summary Judgment of Infringement [Dkt. No. 879] is **DENIED**.

4) Qwest's Motion for Leave to File a Sur-Reply to Centillion's Reply in Support of Its Notice of Supplemental Authority [Dkt. No. 918] is **DENIED**.

5) Centillion=s Renewed Motion for Oral Argument on Motions for Summary Judgment [Dkt. No. 921] is **DENIED**.

IT IS SO ORDERED this 15th day of October, 2012.

LARRY J. McKINNEY, JUDGE
United States District Court
Southern District of Indiana

Distribution attached.

[5] Because Centillion has not shown that direct infringement has occurred, the Court declines to address whether Qwest had the requisite *mens rea* to indirectly infringe the ›270 Patent.

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UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF INDIANA
INDIANAPOLIS DIVISION

CENTILLION DATA SYSTEMS, LLC, Plaintiff vs. QWEST COMMUNICATIONS INTERNATIONAL, INC. and QWEST CORPORATION, Defendants.	)	1:04-cv-0073-LJM-DKL

QWEST CORPORATION and QWEST COMMUNICATIONS CORPORATION, Consolidated Plaintiffs, vs. CENTILLION DATA SYSTEMS, LLC and CTI GROUP (HOLDINGS), INC., Consolidated Defendants.	)	1:04-cv-2076 (consolidated with above)

ENTRY OF JUDGMENT

Through an Order dated October 15, 2012, the Court granted summary judgment in favor of Defendants, Qwest Communications International, Inc. and Qwest Corporation, and against Plaintiff, Centillion Data Systems, LLC, on Plaintiff's claims that Defendants infringed United States Patent No. 5,287,270. Plaintiff shall take nothing by way of its Complaint. All claims having been resolved on the merits, Judgment is entered accordingly. Each party shall bear its own costs.

IT IS SO ORDERED this 15th day of October, 2012.

Distribution attached.

LARRY J. McKINNEY, JUDGE
United States District Court
Southern District of Indiana

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UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF INDIANA
INDIANAPOLIS DIVISION

CENTILLION DATA SYSTEMS, LLC, Plaintiff vs. QWEST COMMUNICATIONS INTERNATIONAL, INC. and QWEST CORPORATION, Defendants.	)))))))))	1:04-cv-0073-LJM-DKL
QWEST CORPORATION and QWEST COMMUNICATIONS CORPORATION, Consolidated Plaintiffs, vs. CENTILLION DATA SYSTEMS, LLC and CTI GROUP (HOLDINGS), INC., Consolidated Defendants.	)))))))))	1:04-cv-2076 (consolidated with above)

ORDER

Defendants Qwest Corporation and Qwest Communications International, Inc. and Consolidated Plaintiff, Qwest Communications Corporation (collectively "Qwest") have moved for an amendment of the Entry of Judgment entered in this cause on October 15, 2012, to add language to reserve to Qwest its invalidity defenses in case this cause returns to this Court for further consideration. The Court sees no just reason to deny this motion.

Further, Qwest also requests that the Court reconsider its Order denying Qwest its costs as set forth in it Bill of Costs filed November 17, 2009, Dkt. No. 830. *See* Dkt. No. 932. The Court concludes that it misapprehended the discretion allowed by Rule 54(d)(1) of the Federal Rules of Civil Procedure ("Rule 54(d)(1)") as set forth in Seventh

Circuit precedent concluding that it is incumbent upon the unsuccessful party to show that the prevailing party should be penalized by a denial of costs. *See e.g. Congregation of the Passion, Holy Cross Province v. Touche, Ross & Co.*, 854 F.2d 219, 221-22 (7th Cir. 1988) (concluding that the district court's discretion in awarding costs is narrowly confined by misconduct of the prevailing party or an inability of the losing party to pay) (citing, *inter alia Popeil Bros., Inc. v. Schick Elec., Inc.*, 516 F.2d 772, 774-75 (7th Cir. 1975)). No such showing has been made by Plaintiff Centillion Data Systems, LLC.

Qwest's Motion to Amend Entry of Judgment dated October 15, 2012 (Dkt. No. 931), is **GRANTED**. In addition, Qwest's Motion to Reconsider (Dkt. No. 932) is also **GRANTED**. An amended Judgment shall be entered accordingly.

IT IS SO ORDERED this 30th day of October, 2012.

LARRY J. McKINNEY, JUDGE
United States District Court
Southern District of Indiana

Distributed to all attorneys of record via CM/ECF.

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF INDIANA
INDIANAPOLIS DIVISION

CENTILLION DATA SYSTEMS, LLC, Plaintiff vs. QWEST COMMUNICATIONS INTERNATIONAL, INC. and QWEST CORPORATION, Defendants.	)	1:04-cv-0073-LJM-DKL

QWEST CORPORATION and QWEST COMMUNICATIONS CORPORATION, Consolidated Plaintiffs, vs. CENTILLION DATA SYSTEMS, LLC and CTI GROUP (HOLDINGS), INC., Consolidated Defendants.	)	1:04-cv-2076 (consolidated with above)

AMENDED ENTRY OF JUDGMENT

Through an Order dated October 15, 2012, the Court granted summary judgment in favor of Defendants, Qwest Communications International, Inc. and Qwest Corporation ("Qwest"), and against Plaintiff, Centillion Data Systems, LLC, on Plaintiff's claims that Defendants infringed United States Patent No. 5,287,270. Plaintiff shall take nothing by way of its Complaint.

Additionally, Defendants Qwest assert several affirmative defenses, including defenses of invalidity, affirmative defenses directed at unenforceability and a claim for invalidity raised in a declaratory judgment action directed at United States Patent No. 5,287,270. To promote judicial economy, the Court dismisses all of Defendants Qwest's affirmative defenses and its declaratory judgment claim for invalidity without

prejudice to Defendants Qwest's rights to re-raise the affirmative defenses and declaratory judgment claim in the future in this action to the extent that the affirmative defenses and declaratory judgment claim could have been asserted on or before October 15, 2012, if this action is remanded for further consideration.

Defendant Qwest is hereby awarded its costs in the amount of $251,245.95 as set forth at Docket No. 830.

IT IS SO ORDERED this 30th day of October, 2012.

LARRY J. McKINNEY, JUDGE
United States District Court
Southern District of Indiana

Date: 10/30/12

Laura Briggs, Clerk
United States District Court

By: Deputy Clerk

Distribution to all counsel of record via CM/ECF.

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF INDIANA
INDIANAPOLIS DIVISION

CENTILLION DATA SYSTEMS, LLC, Plaintiff, vs. QWEST COMMUNICATIONS INTERNATIONAL, INC. and QWEST CORPORATION, Defendants.	)	1:04-cv-0073-LJM-DKL

QWEST CORPORATION and QWEST COMMUNICATIONS CORPORATION, Consolidated Plaintiffs, vs. CENTILLION DATA SYSTEMS, LLC and CTI GROUP (HOLDINGS), INC., Consolidated Defendants.	)	1:04-cv-2076 (consolidated with above)

ORDER ON PLAINTIFF'S MOTION TO RECONSIDER

The Court entered judgment in favor of Defendants Qwest Communications International, Inc. and Qwest Corporation (collectively "Qwest") and against Plaintiff Centillion Data Systems, Inc. ("Centillion") on October 15, 2012. In that order the Court stated that both parties were to bear their own costs. Qwest then asked the Court to reconsider the costs ruling. The Court did reconsider and amended the Judgment to include the requested costs. Centillion has responded to the Court's amended order by filing a Motion to Reconsider of its own. Centillion points out that this Court did not give it time to respond to Qwest's Reconsideration Motion and challenges Qwest's request for costs. The Court agrees with Centillion that it should reconsider the entry of costs in light of Centillion's objections.

Having considered Centillion's objections, the Court now finds against Centillion and reaffirms its decision accessing costs. It is undisputed that Qwest is the prevailing party and is entitled to costs. The costs previously entered are not unreasonable. It remains the Court's view that the photo copying request is both reasonable and recoverable. Qwest's position that the copies were necessary to litigate its case is supported by its proffered breakdown. This case has been pending for nine years. To say that it has been paper intensive is an understatement.

Qwest's request for costs associated with depositions is likewise supported by its filings. Qwest's position that the billed depositions were necessary to the case is well founded. In short, while the Court issued its order on costs without giving Centillion a chance to challenge the request, the Court finds the challenge insufficient to require a change of its prior order.

Centillion's Motion to Reconsider is **GRANTED in part and DENIED in part**: To the extent the Motion asks the Court to review its prior entry in light of Centillion's arguments, the Motion is **GRANTED**; to the extent the Motion seeks an amendment to the Court's order on costs, the Motion is **DENIED**.

IT IS SO ORDERED this 20th day of November, 2012.

LARRY J. McKINNEY, JUDGE
United States District Court
Southern District of Indiana

Electronically distributed to all registered counsel of record via CM/ECF.

US005287270A

United States Patent [19]

Hardy et al.

[11] Patent Number: 5,287,270

[45] Date of Patent: Feb. 15, 1994

[54] BILLING SYSTEM

[75] Inventors: Robert M. Hardy, Carmel; John M. Cauffman; Lynn S. Cauffman, both of Indianapolis; Robert C. Lovell, Jr., Greenwood; Murray B. Frazier, Indianapolis; Michael L. Johnson, Indianapolis; James W. Dohrenwend, Jr., Indianapolis, all of Ind.

[73] Assignee: Compucom Communications Corp., Indianapolis, Ind.

[21] Appl. No.: 984,374

[22] Filed: Dec. 2, 1992

Related U.S. Application Data

[63] Continuation of Ser. No. 393,699, Aug. 14, 1989.

[51] Int. Cl.[5] G06F 15/20; G06G 7/52

[52] U.S. Cl. 364/408; 364/467; 364/464.01

[58] Field of Search 364/401, 406, 408, 464.01, 364/467, 464.03; 902/24; 395/650; 379/90-109, 111

[56] References Cited

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2070829 of 0000 United Kingdom .

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Proceedings of the International Switching Symposium; J. C. Martin et al., Part 2, Session 42 A Paper 5, May 7-11, 1984, AEI, Milano, Italy, pp. 1-7.

Proceedings of the National Electronics Conference; J. Mazor, vol. 37, 1983, Oak Brook, Ill. pp. 151-152.

Japan Telecommunication Review; T. Sano, vol. 30, No. 2, Apr. 1988, Tokyo, Japan, pp. 46-50.

Primary Examiner—Roy N. Envall, Jr.

Assistant Examiner—Laura Brutman

Attorney, Agent, or Firm—Jones, Day, Reavis & Pogue

[57] ABSTRACT

Telecommunications or similar bills are prepared on diskette in an optimal format for further processing, display, and analysis on popularly-available, inexpensive personal computers. A telecommunications carrier provides, for participating customers, appropriately selected billing records at the stage in the carrier's ordinary billing process after the carrier has completed all billing activities except actually printing a paper bill. This ensures that the information ultimately supplied on diskette will exactly correspond to that on the paper bill. In a first step, preferably performed on a large computer, the records are sorted, edited and reformatted into an optimal organization for further processing on a personal computer. In addition, a variety of preprocessed summary reports and graphs are prepared for rapid retrieval on the customer's computer. In a second step, preferably performed on a network of smaller computers, the reorganized records and summary reports for each customer are separated, compressed, and recorded on diskettes compatible with each customer's personal computer. A user application program on the customer's computer displays and analyzes the billing information supplied on diskette, including the billing records, preprocessed summary reports and graphs, and prepares new summary reports on demand.

85 Claims, 52 Drawing Sheets

Microfiche Appendix Included
(5 Microfiche, 454 Pages)

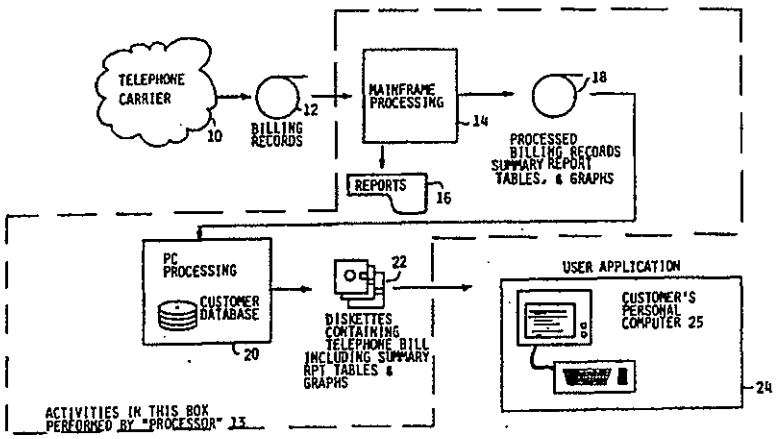
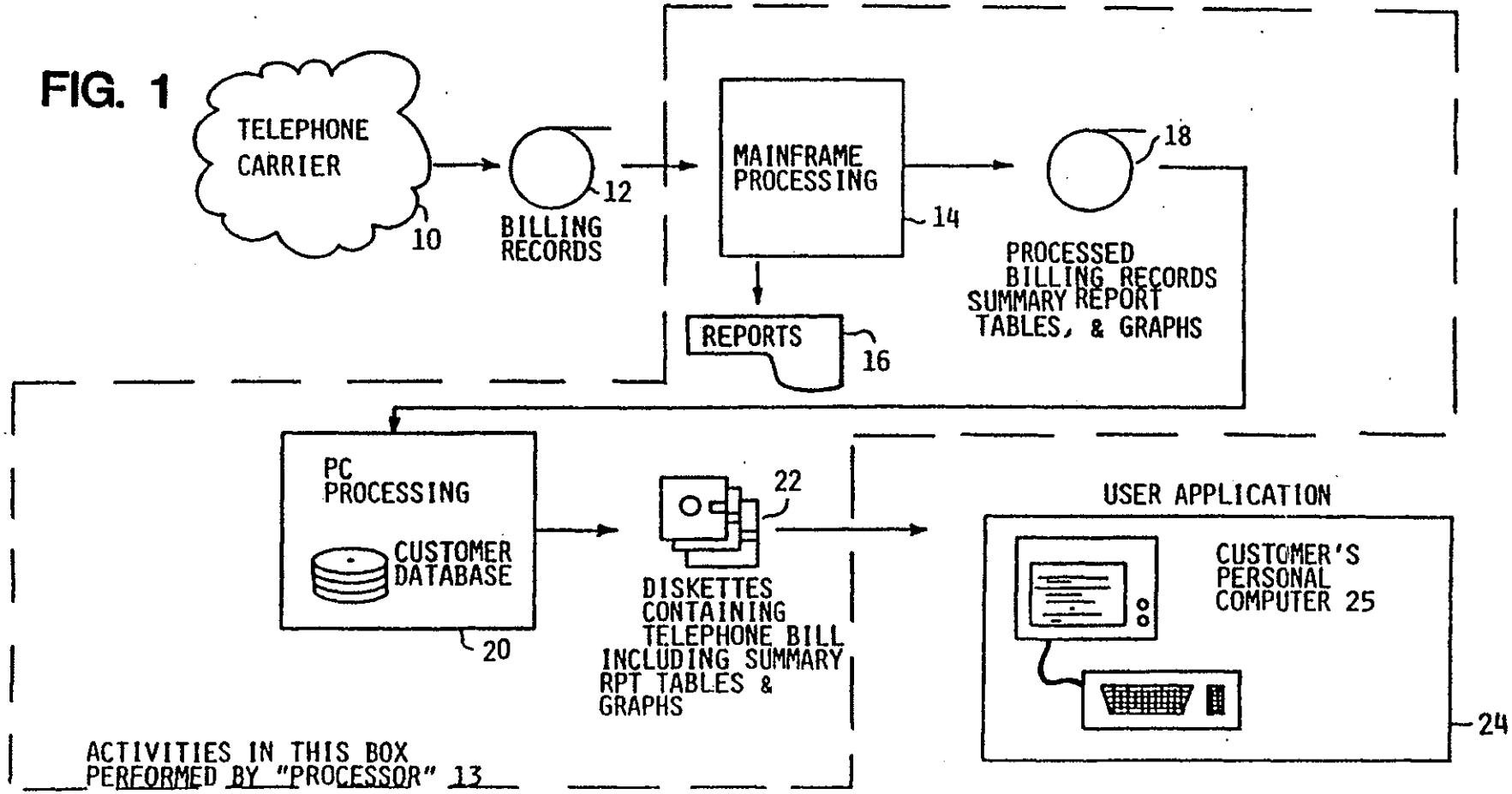


FIG. 1


TELEPHONE CARRIER
10
BILLING RECORDS
12
MAINFRAME PROCESSING
14
REPORTS
16
18
PROCESSED BILLING RECORDS SUMMARY REPORT TABLES, & GRAPHS
PC PROCESSING
CUSTOMER DATABASE
20
22
DISKETTES CONTAINING TELEPHONE BILL INCLUDING SUMMARY RPT TABLES & GRAPHS
USER APPLICATION
CUSTOMER'S PERSONAL COMPUTER 25
24
ACTIVITIES IN THIS BOX PERFORMED BY "PROCESSOR" 13

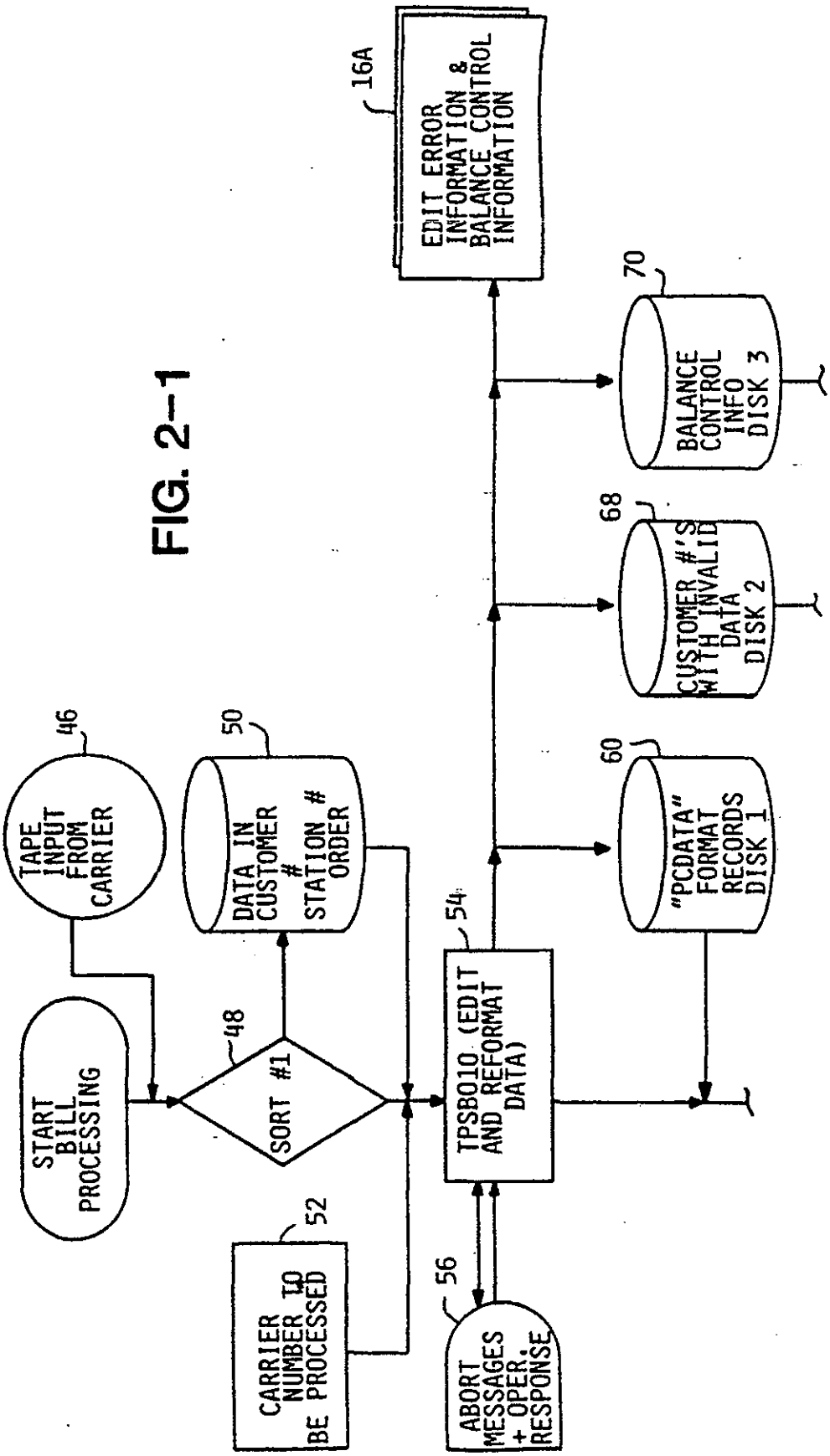

START BILL PROCESSING
TAPE INPUT FROM CARRIER
46
SORT #1
48
DATA IN CUSTOMER # STATION # ORDER
50
CARRIER NUMBER TO BE PROCESSED
52
TPSB010 (EDIT AND REFORMAT DATA)
54
ABORT MESSAGES + OPER. RESPONSE
56
EDIT ERROR INFORMATION & BALANCE CONTROL INFORMATION
16A
"PCDATA" FORMAT RECORDS DISK 1
60
CUSTOMER #'S WITH INVALID DATA DISK 2
68
BALANCE CONTROL INFO DISK 3
70

FIG. 2-1

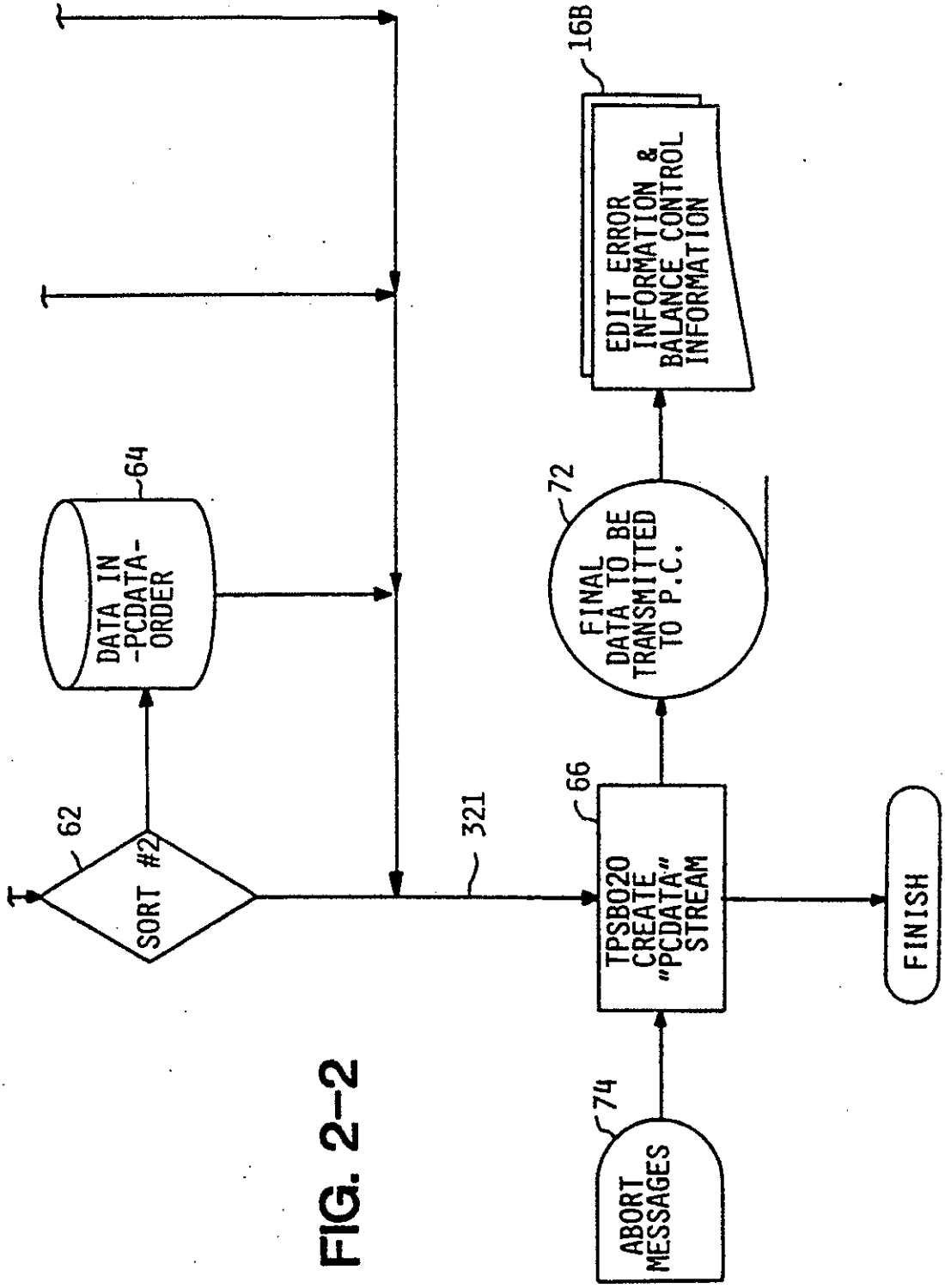

16B
EDIT ERROR INFORMATION & BALANCE CONTROL INFORMATION
64
DATA IN -PCDATA- ORDER
72
FINAL DATA TO BE TRANSMITTED TO P.C.
62
SORT #2
321
66
TPSB020 CREATE "PCDATA" STREAM
FINISH
74
ABORT MESSAGES

FIG. 2-2

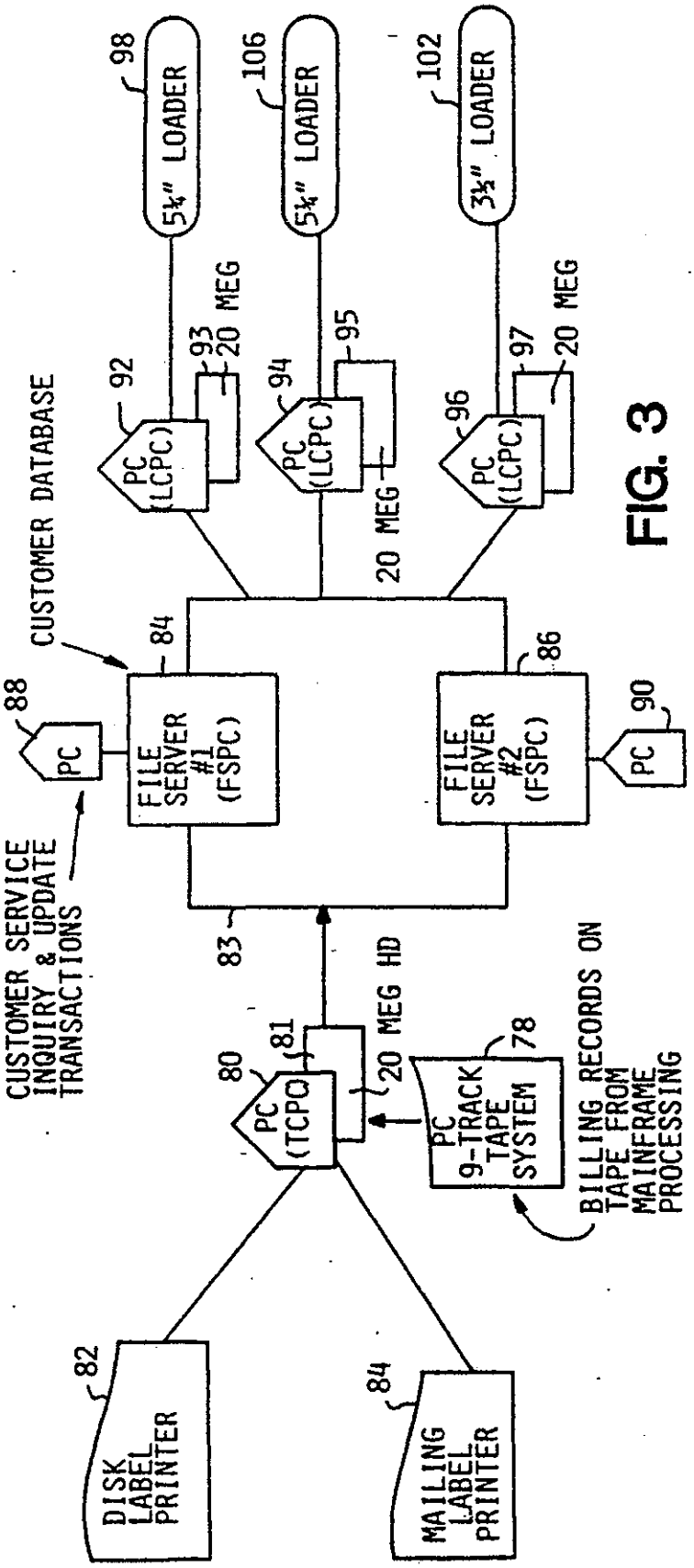

98
5¼" LOADER
106
5¼" LOADER
102
3½" LOADER
92
PC (LCPC)
93
20 MEG
94
PC (LCPC)
95
20 MEG
96
PC (LCPC)
97
20 MEG
CUSTOMER DATABASE
84
FILE SERVER #1 (FSPC)
86
FILE SERVER #2 (FSPC)
88
PC
90
PC
CUSTOMER SERVICE INQUIRY & UPDATE TRANSACTIONS
83
20 MEG HD
80
PC (TCPC)
81
78
PC 9-TRACK TAPE SYSTEM
BILLING RECORDS ON TAPE FROM MAINFRAME PROCESSING
82
DISK LABEL PRINTER
84
MAILING LABEL PRINTER

FIG. 3

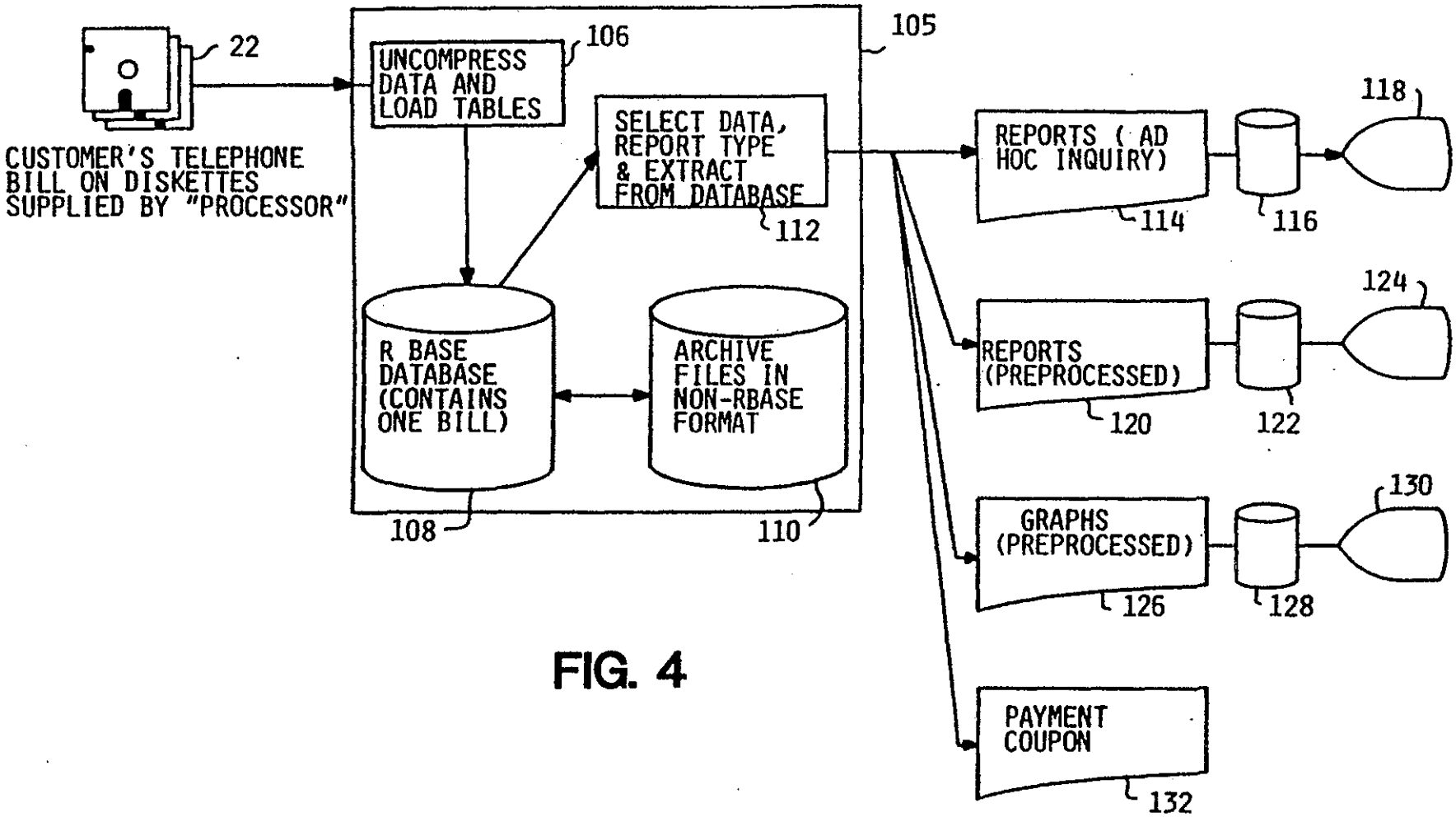

22
CUSTOMER'S TELEPHONE BILL ON DISKETTES SUPPLIED BY "PROCESSOR"
UNCOMPRESS DATA AND LOAD TABLES
106
105
SELECT DATA, REPORT TYPE & EXTRACT FROM DATABASE
112
R BASE DATABASE (CONTAINS ONE BILL)
108
ARCHIVE FILES IN NON-RBASE FORMAT
110
REPORTS (AD HOC INQUIRY)
114
116
118
REPORTS (PREPROCESSED)
120
122
124
GRAPHS (PREPROCESSED)
126
128
130
PAYMENT COUPON
132

FIG. 4

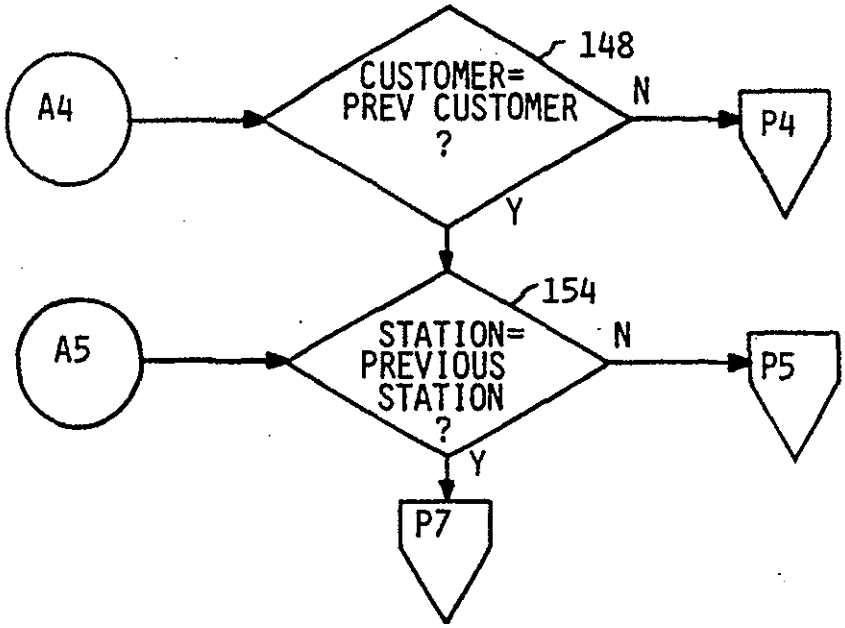
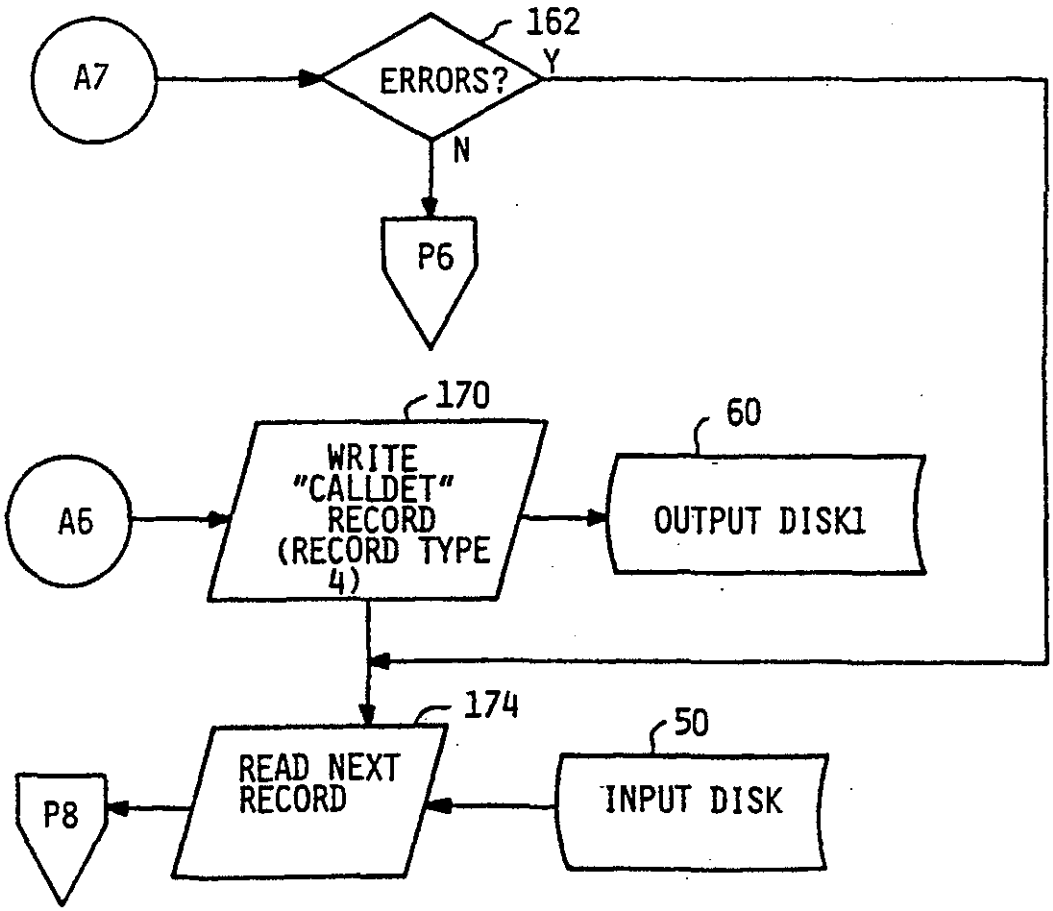

A4
148
CUSTOMER= PREV CUSTOMER ?
N
P4
Y
A5
154
STATION= PREVIOUS STATION ?
N
P5
Y
P7

FIG. 5


A7
162
ERRORS?
Y
N
P6
170
WRITE "CALLDET" RECORD (RECORD TYPE 4)
60
OUTPUT DISK1
A6
174
READ NEXT RECORD
50
INPUT DISK
P8

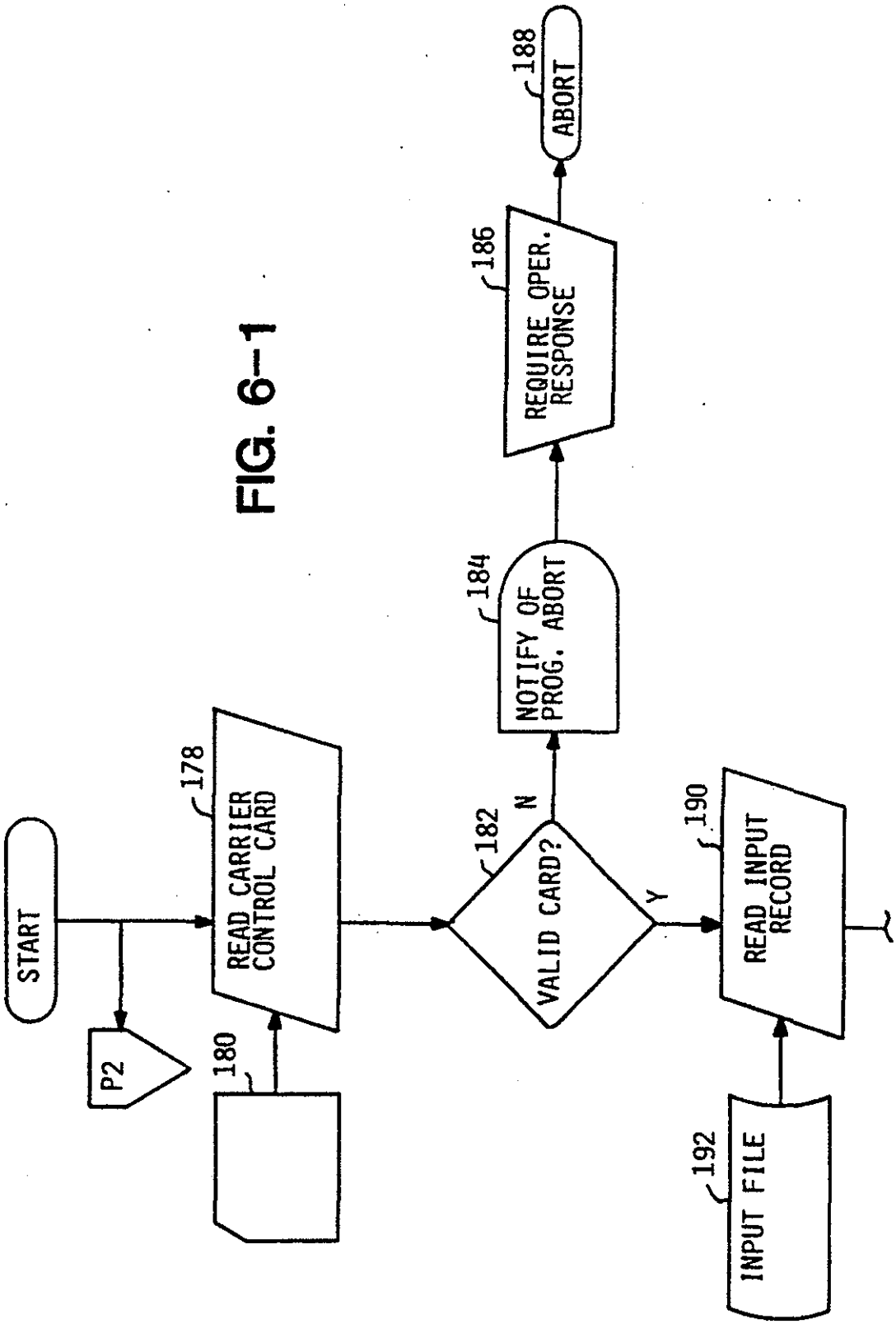

START
P2
READ CARRIER CONTROL CARD
178
180
VALID CARD?
182
N
Y
NOTIFY OF PROG. ABORT
184
REQUIRE OPER. RESPONSE
186
ABORT
188
READ INPUT RECORD
190
INPUT FILE
192

FIG. 6-1

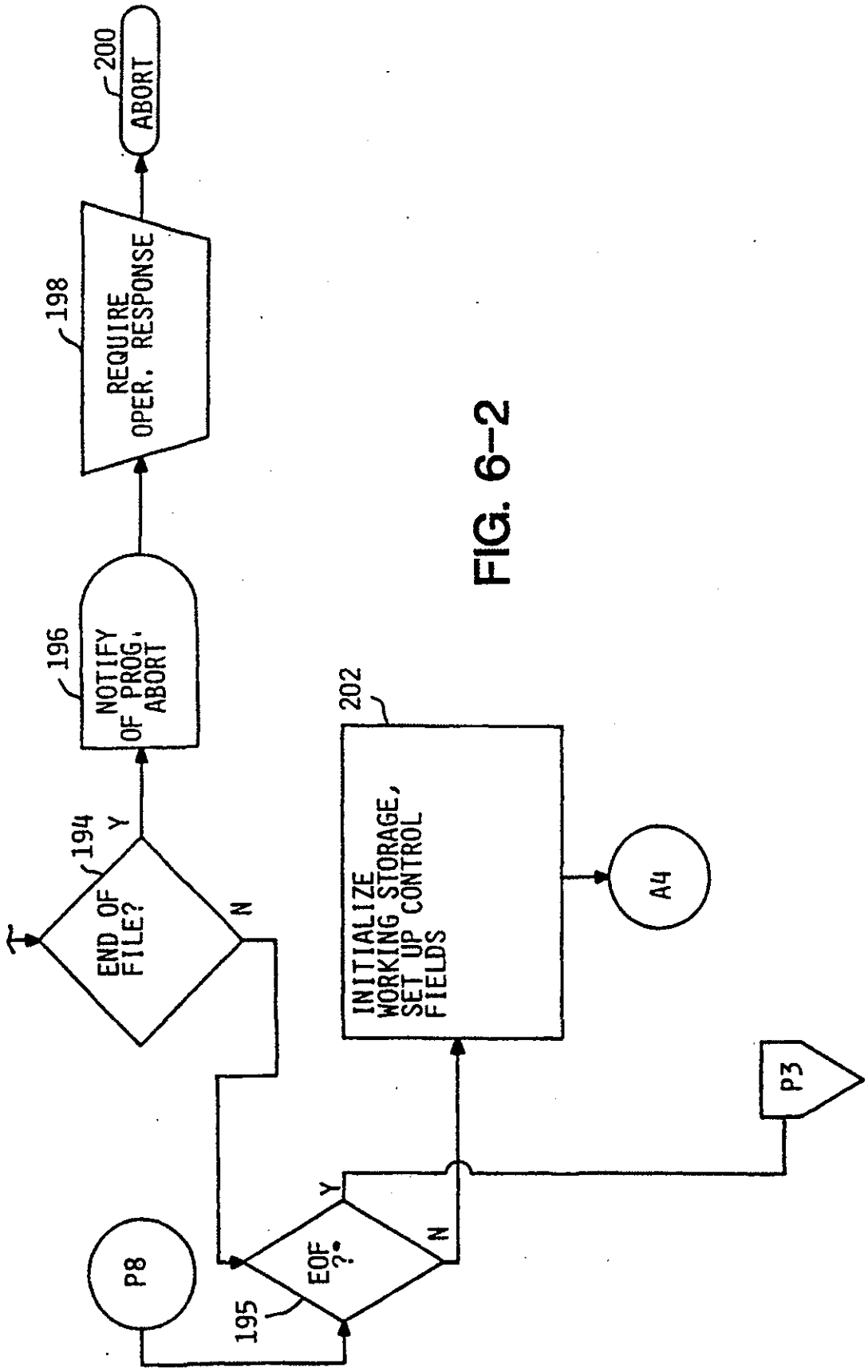

200
ABORT
198
REQUIRE OPER. RESPONSE
196
NOTIFY OF PROG. ABORT
194
END OF FILE?
Y
N
202
INITIALIZE WORKING STORAGE, SET UP CONTROL FIELDS
A4
P3
P8
195
EOF ?
Y
N

FIG. 6-2

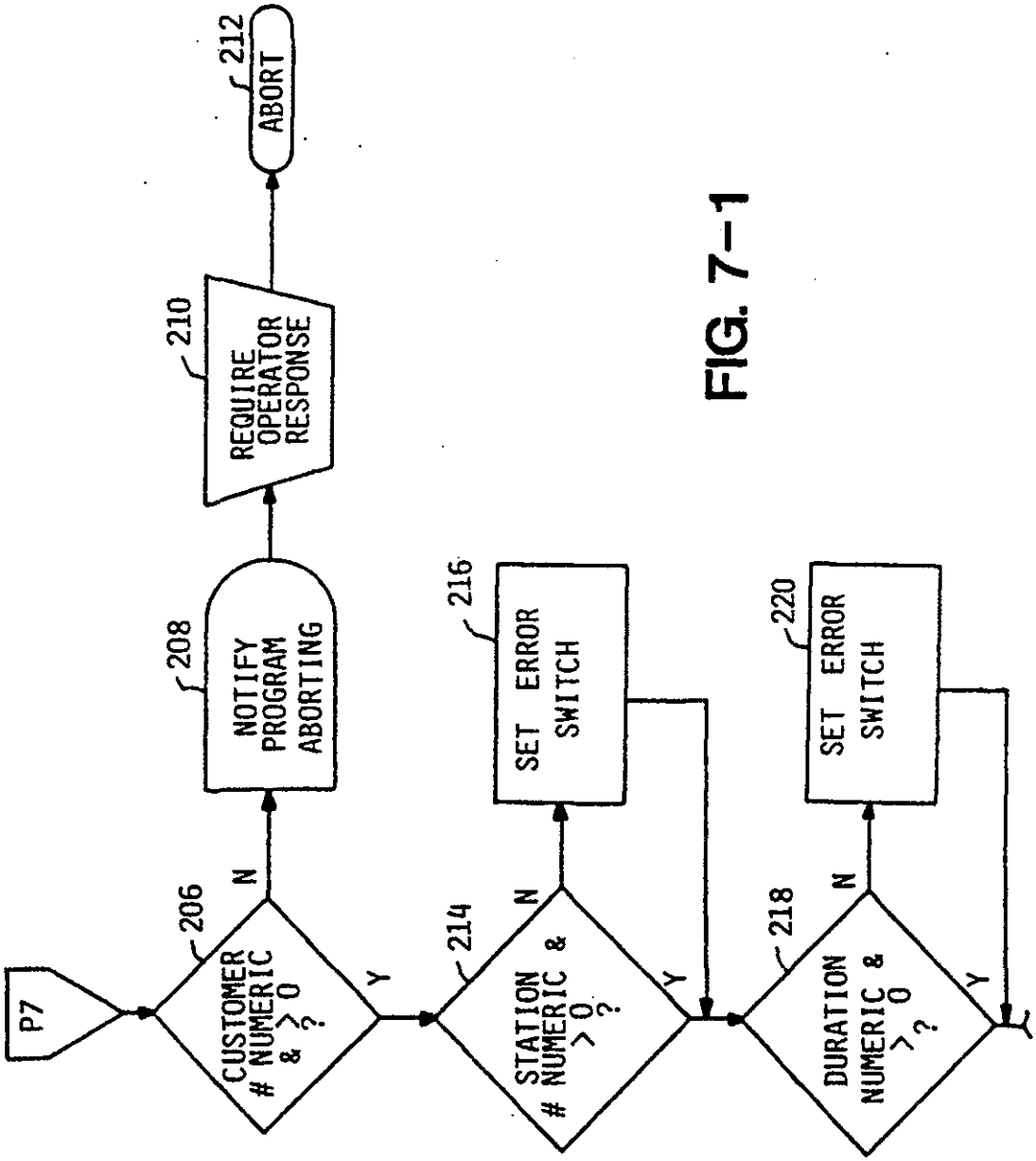

P7
206
CUSTOMER # NUMERIC & > 0 ?
N
Y
208
NOTIFY PROGRAM ABORTING
210
REQUIRE OPERATOR RESPONSE
212
ABORT
214
STATION # NUMERIC > 0 ?
N
Y
216
SET ERROR SWITCH
218
DURATION NUMERIC > 0 ?
N
Y
220
SET ERROR SWITCH

FIG. 7-1

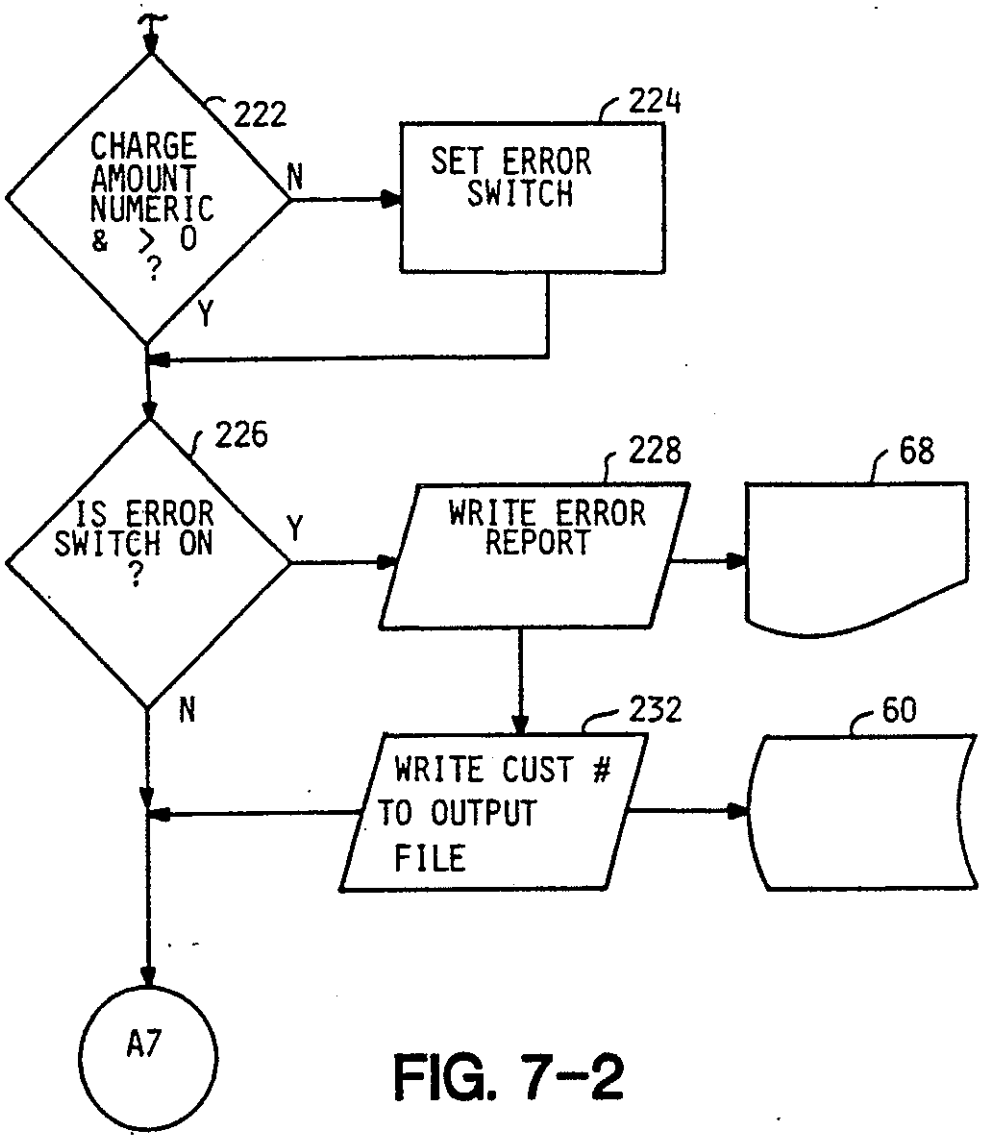

222
CHARGE AMOUNT NUMERIC & > 0 ?
N
Y
224
SET ERROR SWITCH
226
IS ERROR SWITCH ON ?
Y
N
228
WRITE ERROR REPORT
68
232
WRITE CUST # TO OUTPUT FILE
60
A7

FIG. 7-2

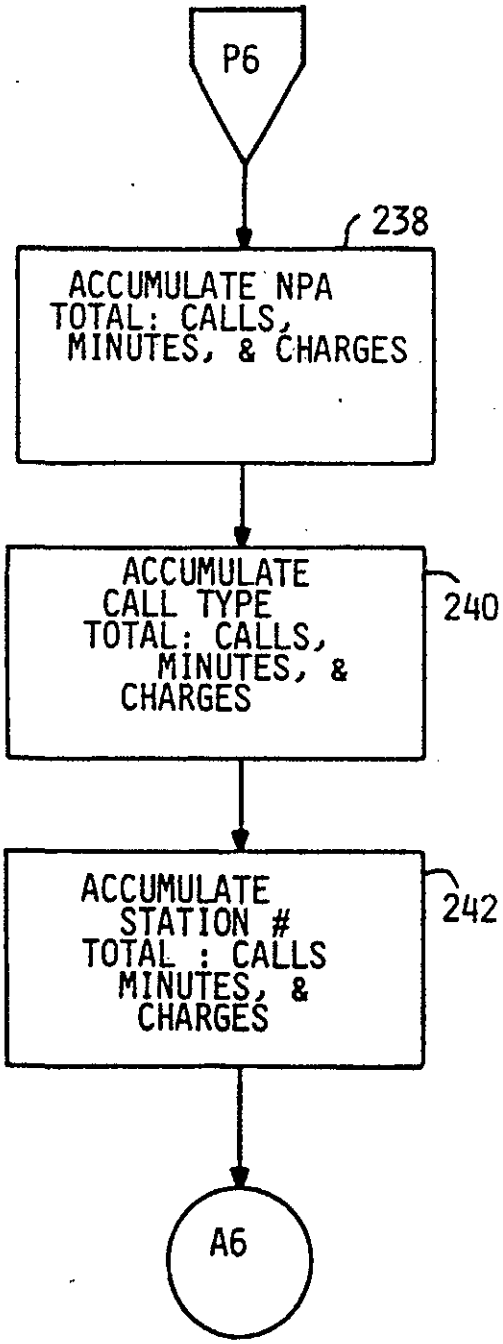

P6
238
ACCUMULATE NPA TOTAL: CALLS, MINUTES, & CHARGES
ACCUMULATE CALL TYPE TOTAL: CALLS, MINUTES, & CHARGES
240
ACCUMULATE STATION # TOTAL : CALLS MINUTES, & CHARGES
242
A6

FIG. 8

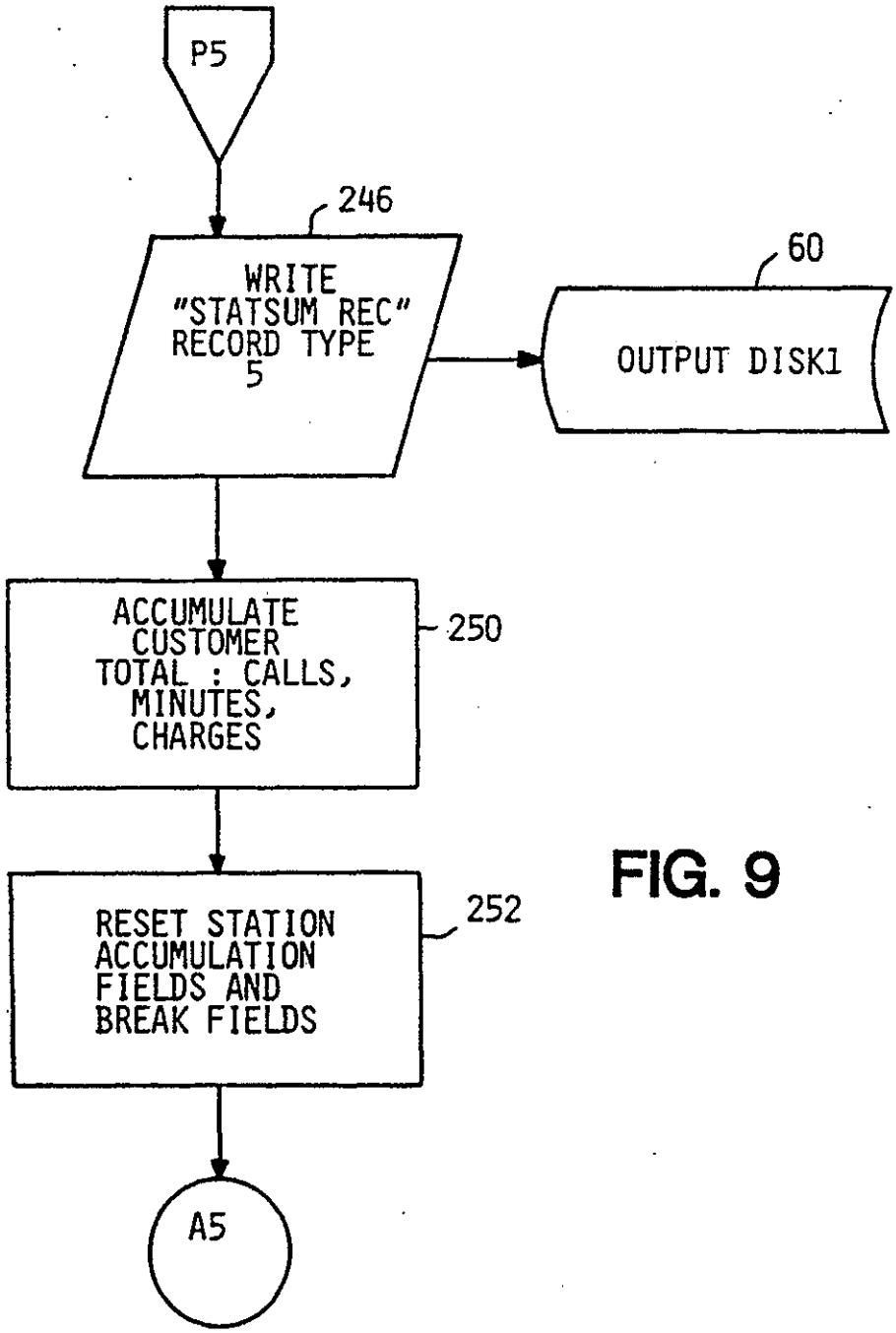

P5
246
WRITE "STATSUM REC" RECORD TYPE 5
60
OUTPUT DISK1
ACCUMULATE CUSTOMER TOTAL : CALLS, MINUTES, CHARGES
250
RESET STATION ACCUMULATION FIELDS AND BREAK FIELDS
252
A5

FIG. 9

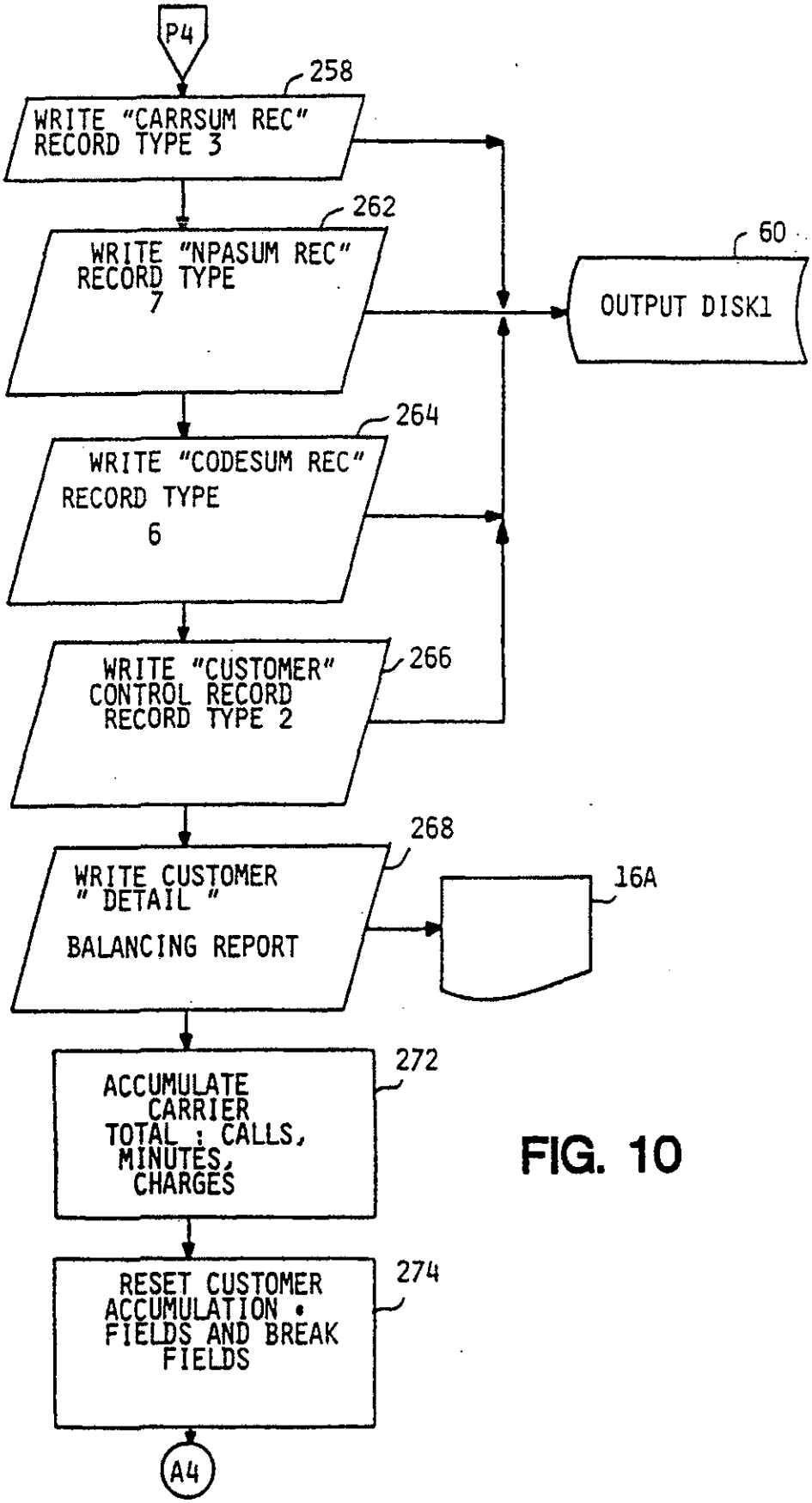

P4
258
WRITE "CARRSUM REC" RECORD TYPE 3
262
WRITE "NPASUM REC" RECORD TYPE 7
60
OUTPUT DISK1
264
WRITE "CODESUM REC" RECORD TYPE 6
266
WRITE "CUSTOMER" CONTROL RECORD RECORD TYPE 2
268
WRITE CUSTOMER " DETAIL " BALANCING REPORT
16A
272
ACCUMULATE CARRIER TOTAL : CALLS, MINUTES, CHARGES
274
RESET CUSTOMER ACCUMULATION FIELDS AND BREAK FIELDS
A4

FIG. 10

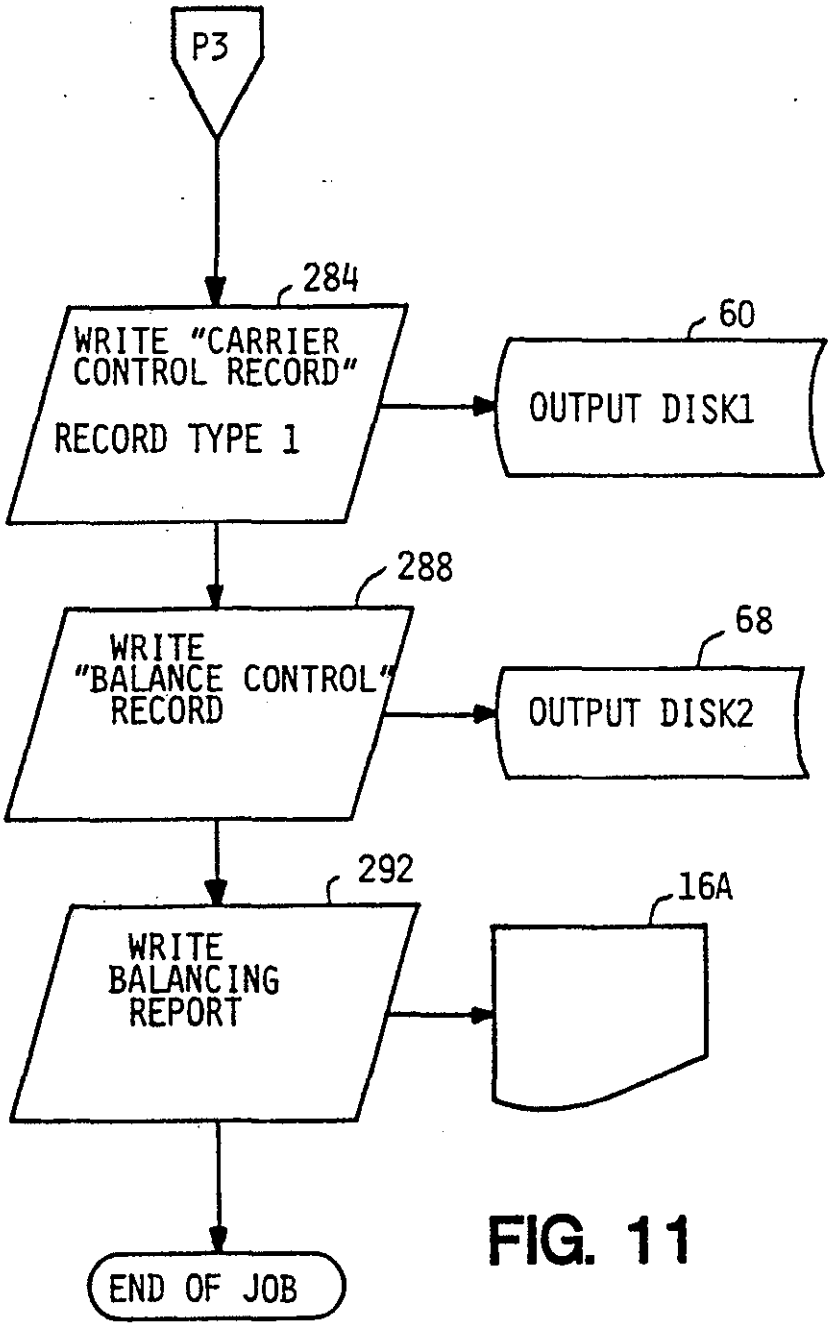

P3
284
WRITE "CARRIER CONTROL RECORD"
RECORD TYPE 1
60
OUTPUT DISK1
288
WRITE "BALANCE CONTROL" RECORD
68
OUTPUT DISK2
292
WRITE BALANCING REPORT
16A
END OF JOB

FIG. 11

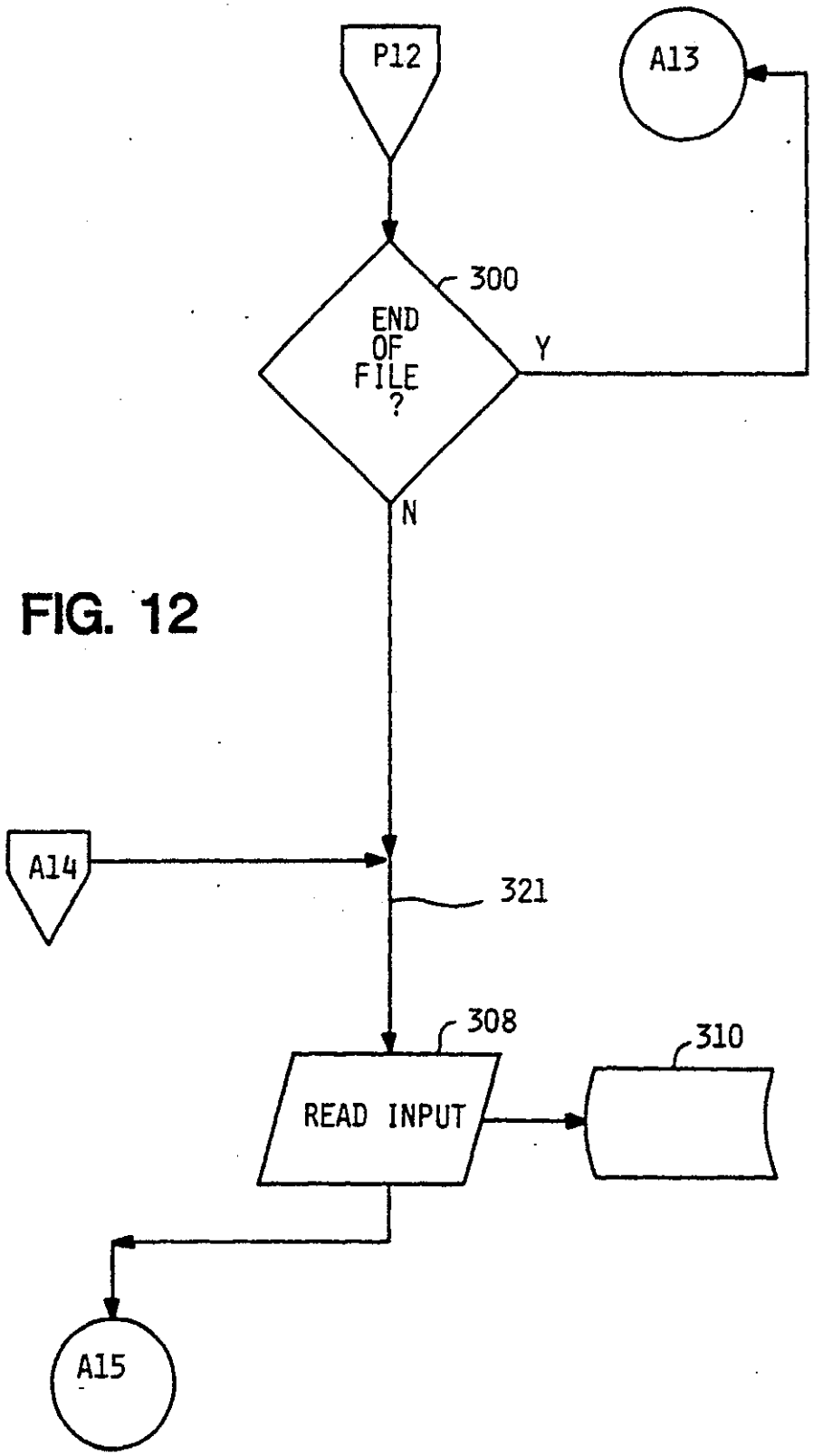


FIG. 12

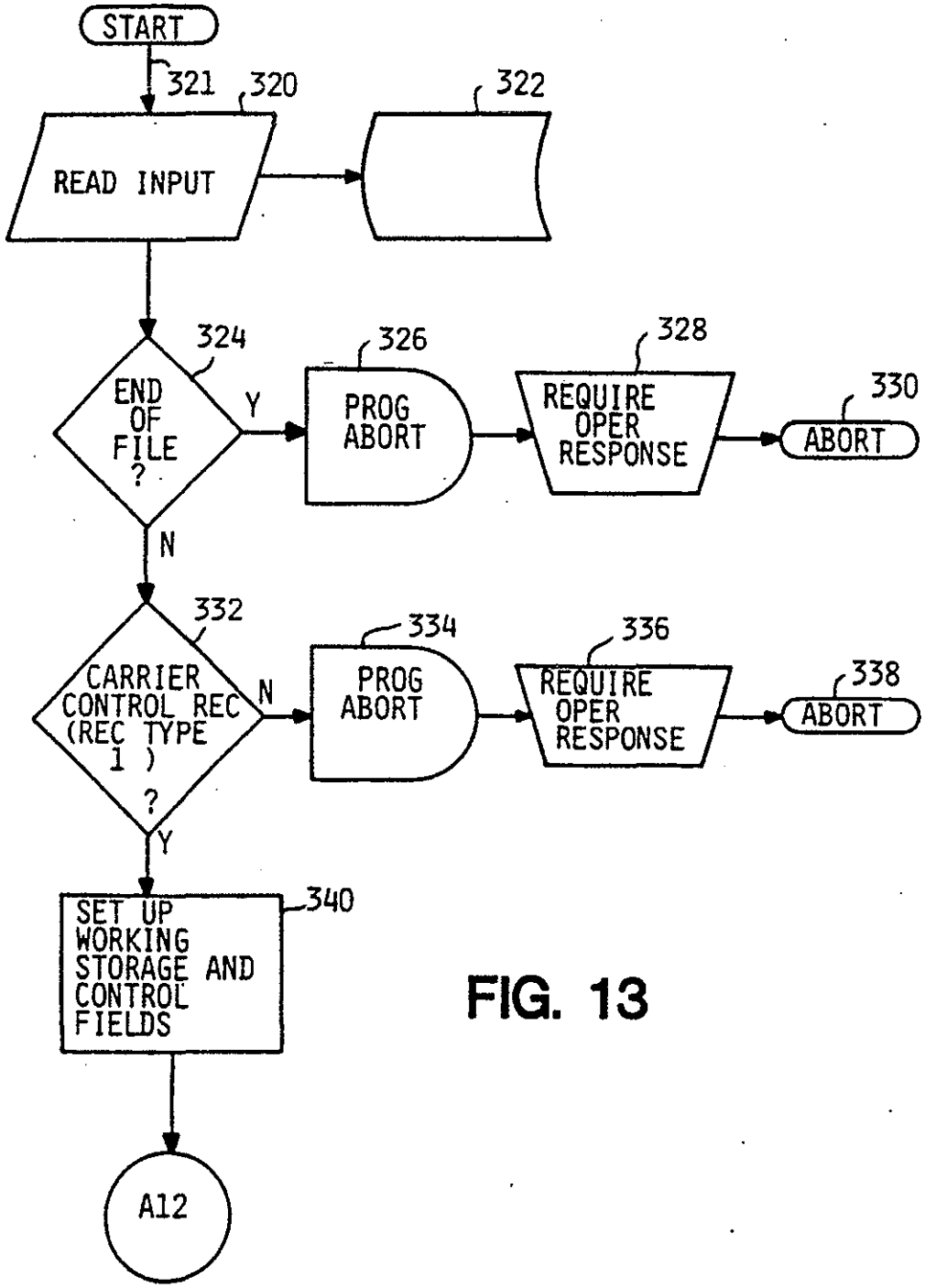

START
321
320
322
READ INPUT
324
END OF FILE ?
Y
326
PROG ABORT
328
REQUIRE OPER RESPONSE
330
ABORT
N
332
CARRIER CONTROL REC (REC TYPE 1) ?
N
334
PROG ABORT
336
REQUIRE OPER RESPONSE
338
ABORT
Y
340
SET UP WORKING STORAGE AND CONTROL FIELDS
A12

FIG. 13

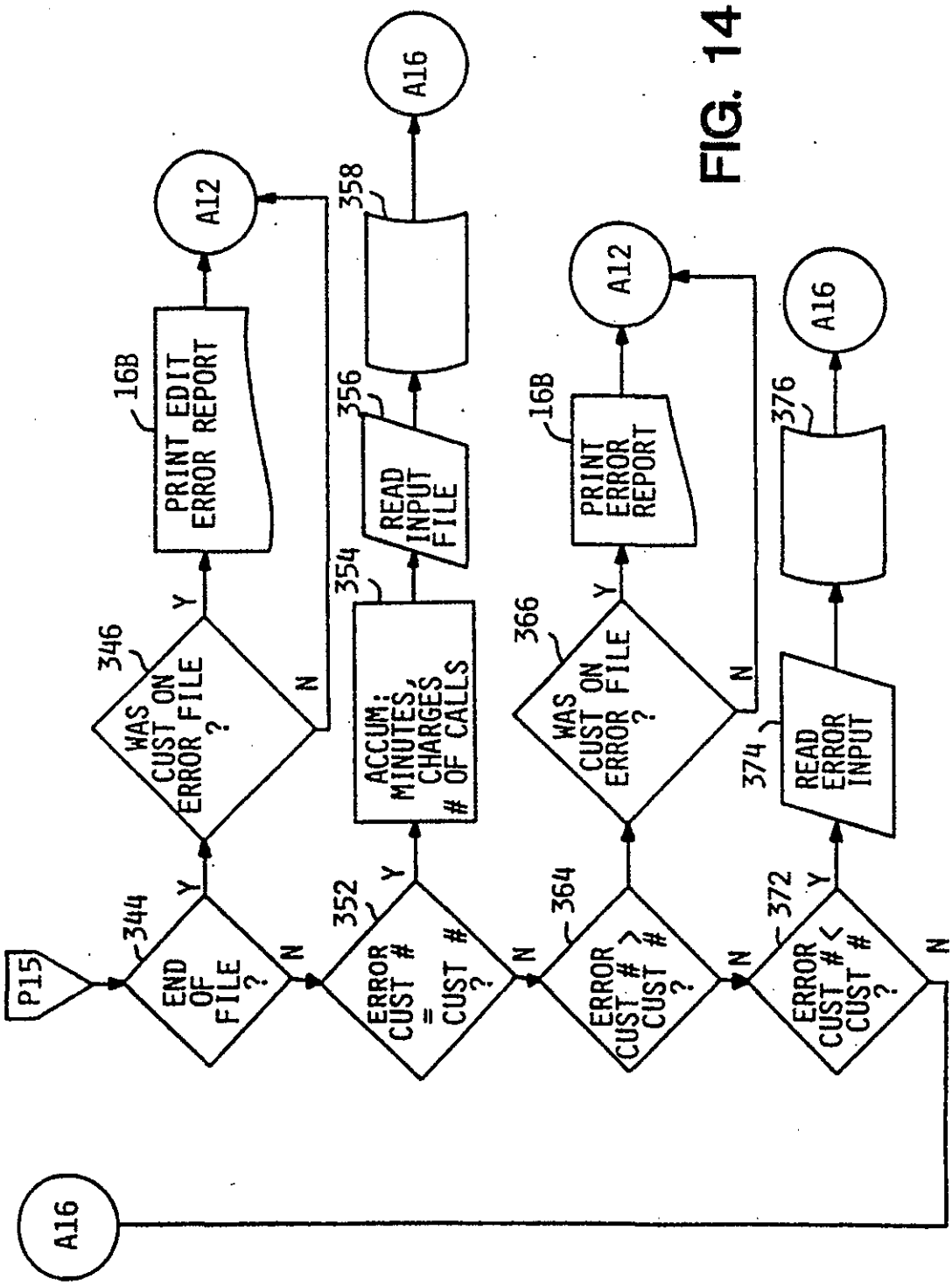
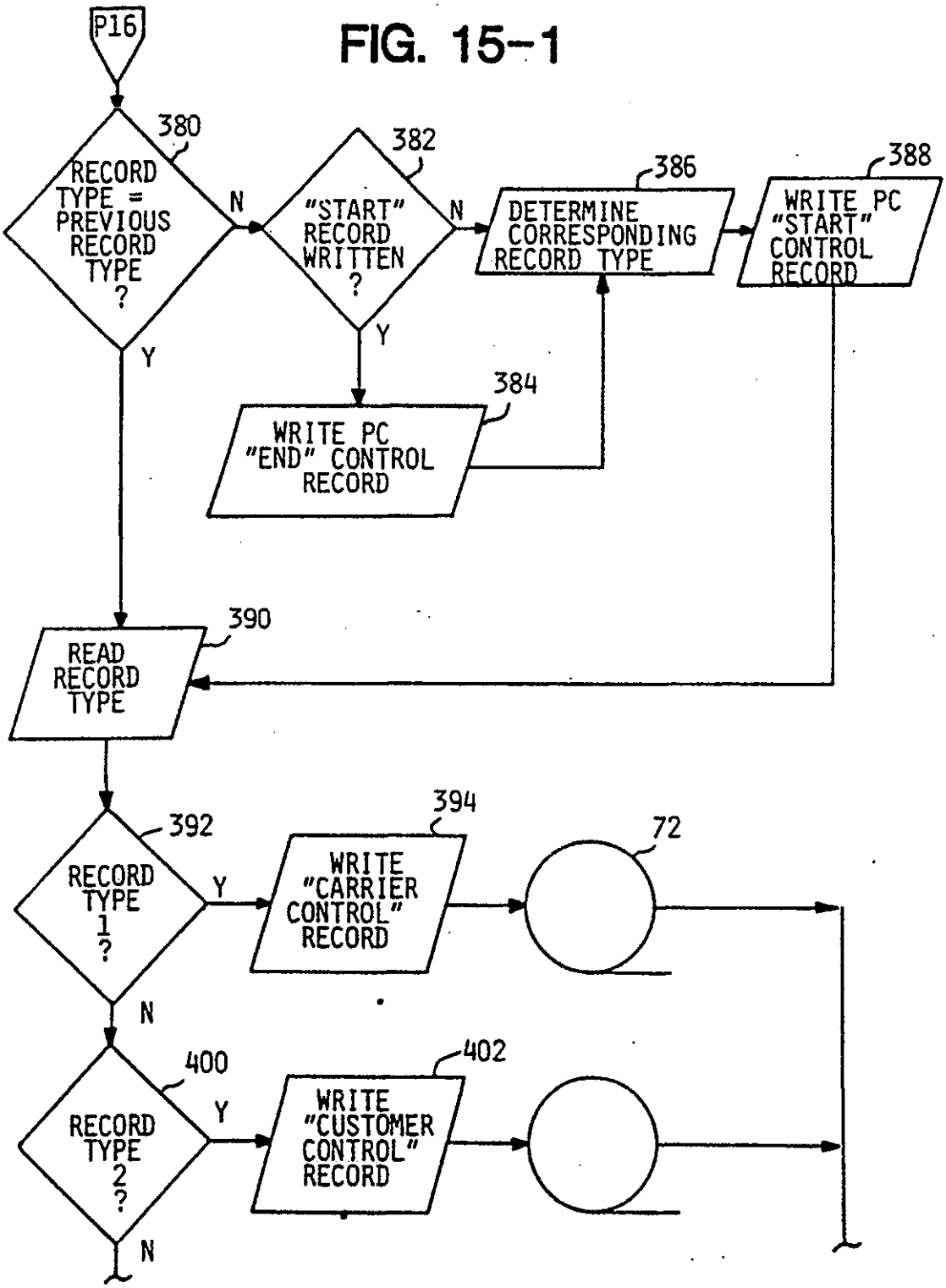

P15
344
END OF FILE ?
Y
N
346
WAS CUST ON ERROR FILE ?
Y
16B
PRINT EDIT ERROR REPORT
A12
N
352
ERROR CUST # = CUST # ?
Y
354
ACCUM: MINUTES, CHARGES, # OF CALLS
356
READ INPUT FILE
358
A16
N
364
ERROR CUST # > CUST # ?
Y
366
WAS CUST ON ERROR FILE ?
Y
16B
PRINT ERROR REPORT
A12
N
372
ERROR CUST # < CUST # ?
Y
374
READ ERROR INPUT
376
A16
N
A16

FIG. 14

FIG. 15-1


P16
380
RECORD TYPE = PREVIOUS RECORD TYPE ?
N
382
"START" RECORD WRITTEN ?
N
386
DETERMINE CORRESPONDING RECORD TYPE
388
WRITE PC "START" CONTROL RECORD
Y
Y
384
WRITE PC "END" CONTROL RECORD
390
READ RECORD TYPE
392
RECORD TYPE 1 ?
Y
394
WRITE "CARRIER CONTROL" RECORD
72
N
400
RECORD TYPE 2 ?
Y
402
WRITE "CUSTOMER CONTROL" RECORD
N

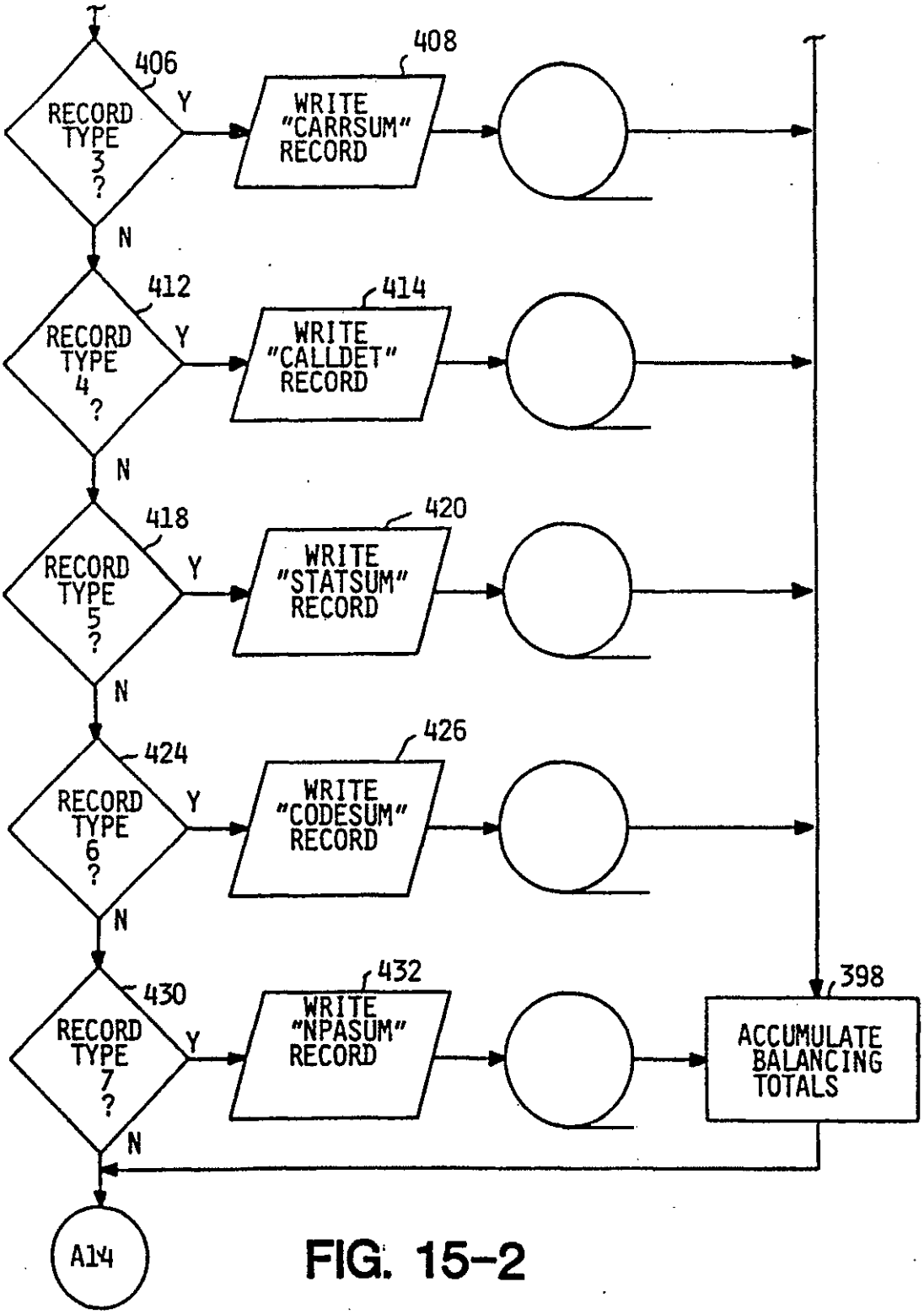

406
RECORD TYPE 3 ?
Y
408
WRITE "CARRSUM" RECORD
N
412
RECORD TYPE 4 ?
Y
414
WRITE "CALLDET" RECORD
N
418
RECORD TYPE 5 ?
Y
420
WRITE "STATSUM" RECORD
N
424
RECORD TYPE 6 ?
Y
426
WRITE "CODESUM" RECORD
N
430
RECORD TYPE 7 ?
Y
432
WRITE "NPASUM" RECORD
N
398
ACCUMULATE BALANCING TOTALS
A14

FIG. 15-2

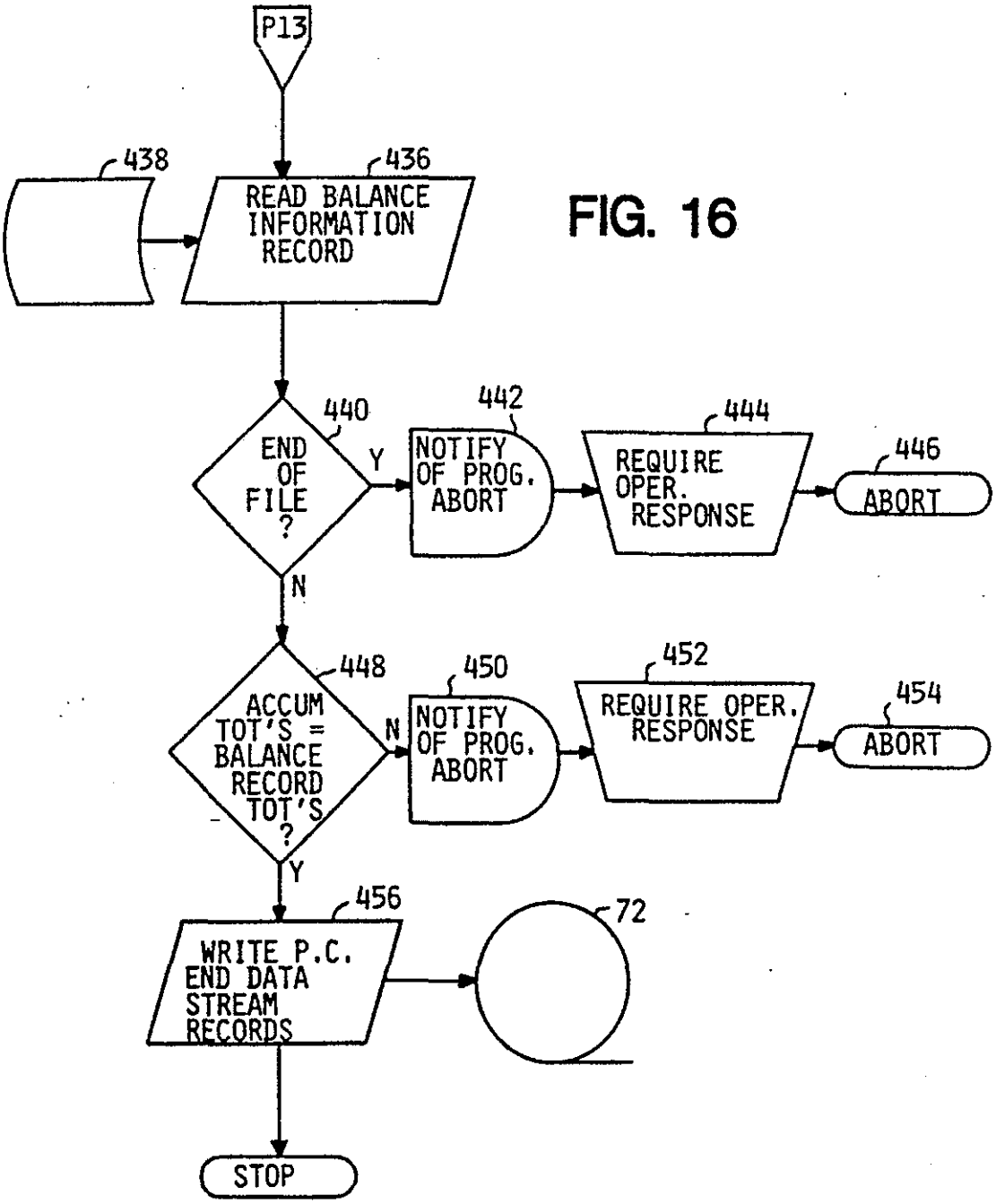

P13
438
436
READ BALANCE INFORMATION RECORD
440
END OF FILE ?
Y
442
NOTIFY OF PROG. ABORT
444
REQUIRE OPER. RESPONSE
446
ABORT
N
448
ACCUM TOT'S = BALANCE RECORD TOT'S ?
N
450
NOTIFY OF PROG. ABORT
452
REQUIRE OPER. RESPONSE
454
ABORT
Y
456
WRITE P.C. END DATA STREAM RECORDS
72
STOP

FIG. 16

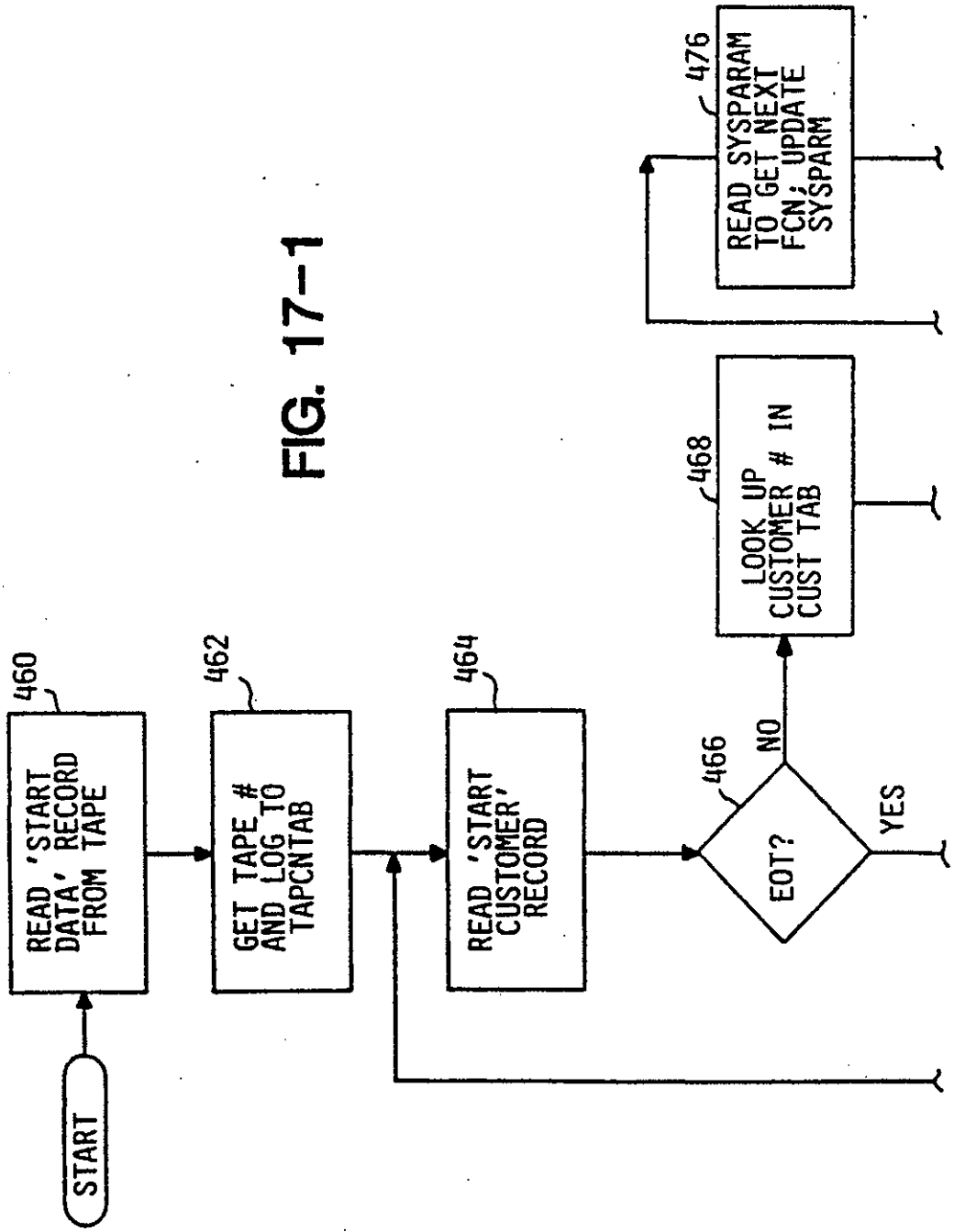

START
460
READ 'START DATA' RECORD FROM TAPE
462
GET TAPE # AND LOG TO TAPCNTAB
464
READ 'START CUSTOMER' RECORD
466
EOT?
NO
YES
468
LOOK UP CUSTOMER # IN CUST TAB
476
READ SYSPARAM TO GET NEXT FCN; UPDATE SYSPARM

FIG. 17-1

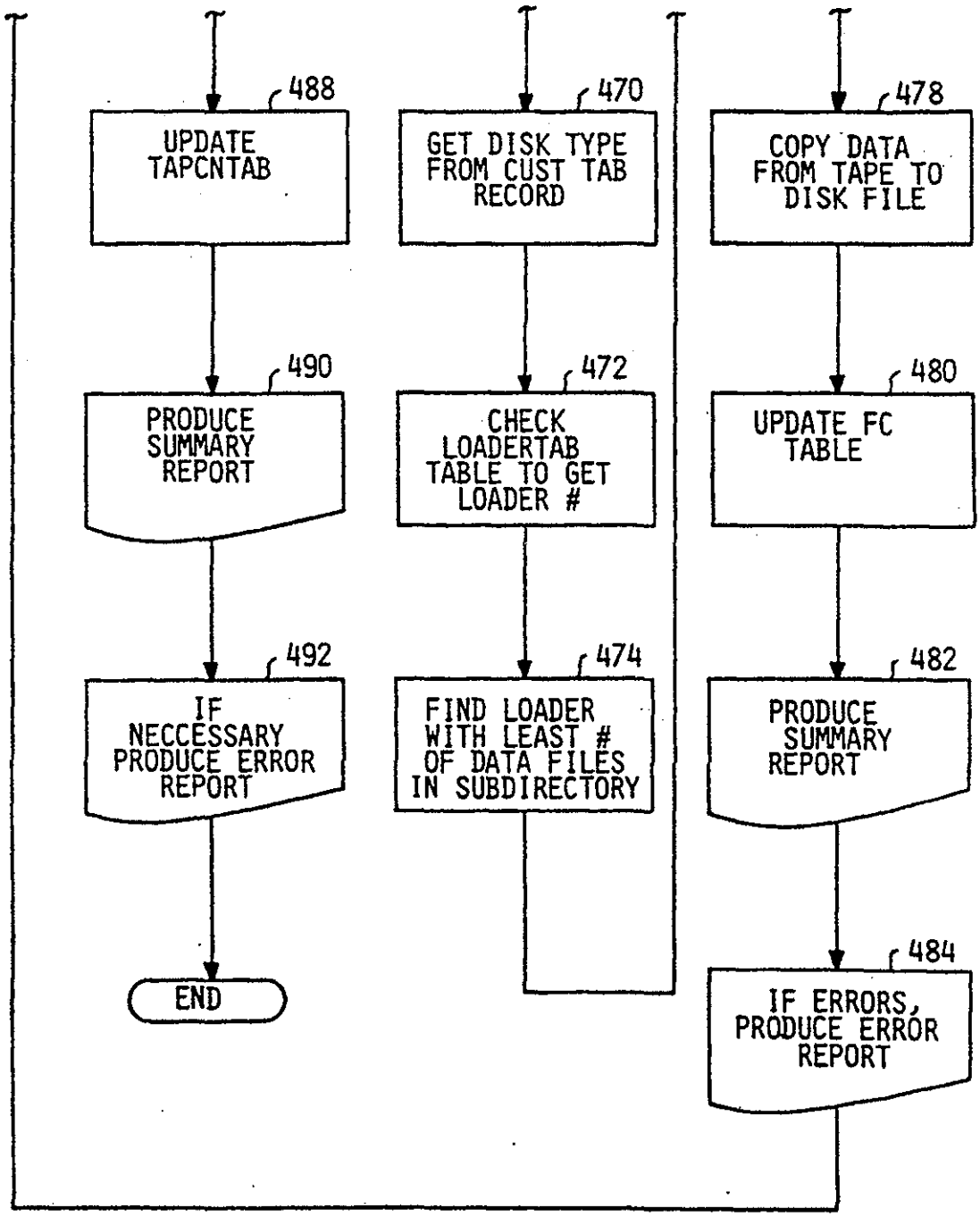

488
UPDATE TAPCNTAB
490
PRODUCE SUMMARY REPORT
492
IF NECCESSARY PRODUCE ERROR REPORT
END
470
GET DISK TYPE FROM CUST TAB RECORD
472
CHECK LOADERTAB TABLE TO GET LOADER #
474
FIND LOADER WITH LEAST # OF DATA FILES IN SUBDIRECTORY
478
COPY DATA FROM TAPE TO DISK FILE
480
UPDATE FC TABLE
482
PRODUCE SUMMARY REPORT
484
IF ERRORS, PRODUCE ERROR REPORT

FIG. 17-2

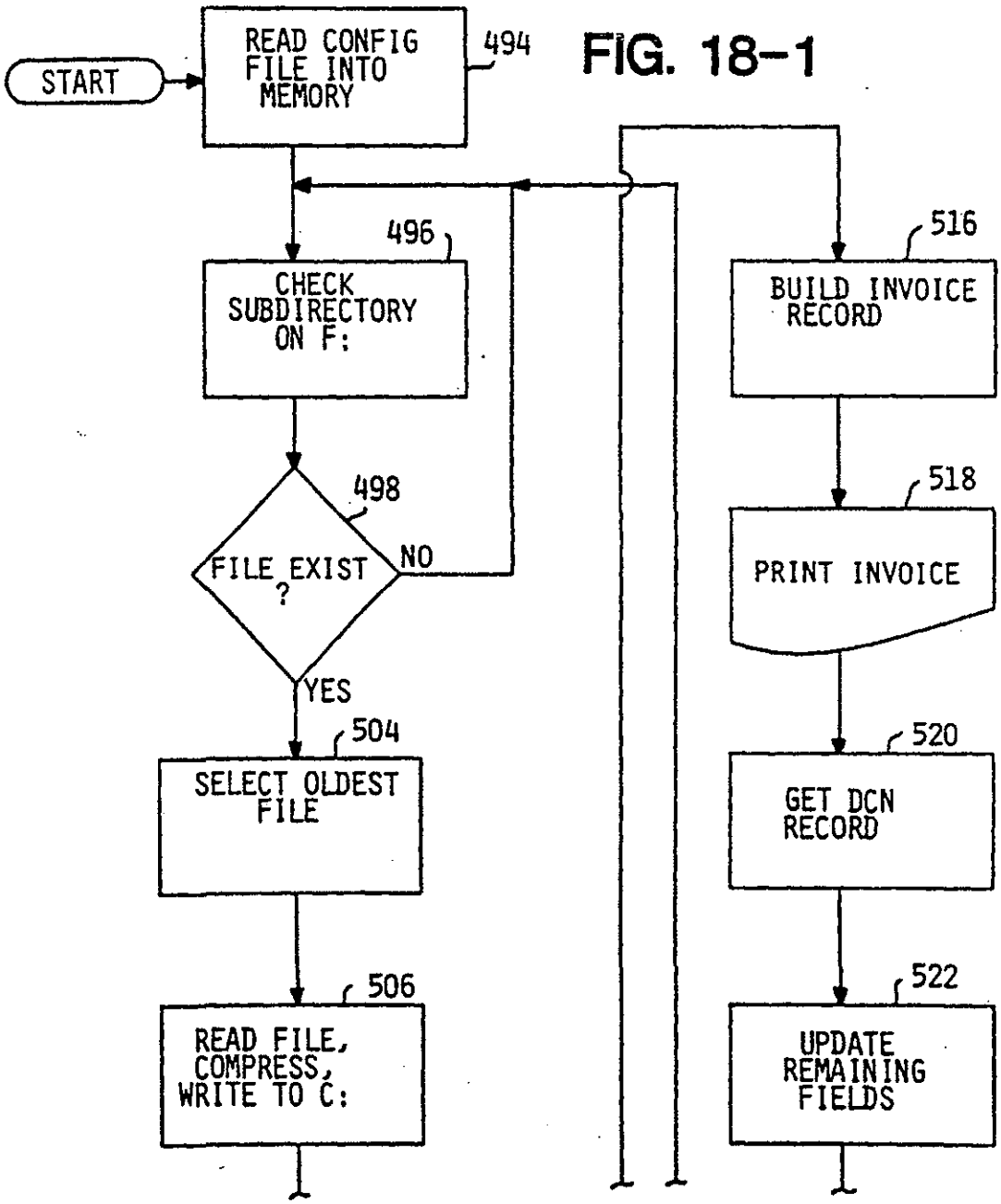

START
READ CONFIG FILE INTO MEMORY
494
CHECK SUBDIRECTORY ON F:
496
FILE EXIST ?
498
NO
YES
SELECT OLDEST FILE
504
READ FILE, COMPRESS, WRITE TO C:
506
BUILD INVOICE RECORD
516
PRINT INVOICE
518
GET DCN RECORD
520
UPDATE REMAINING FIELDS
522

FIG. 18-1

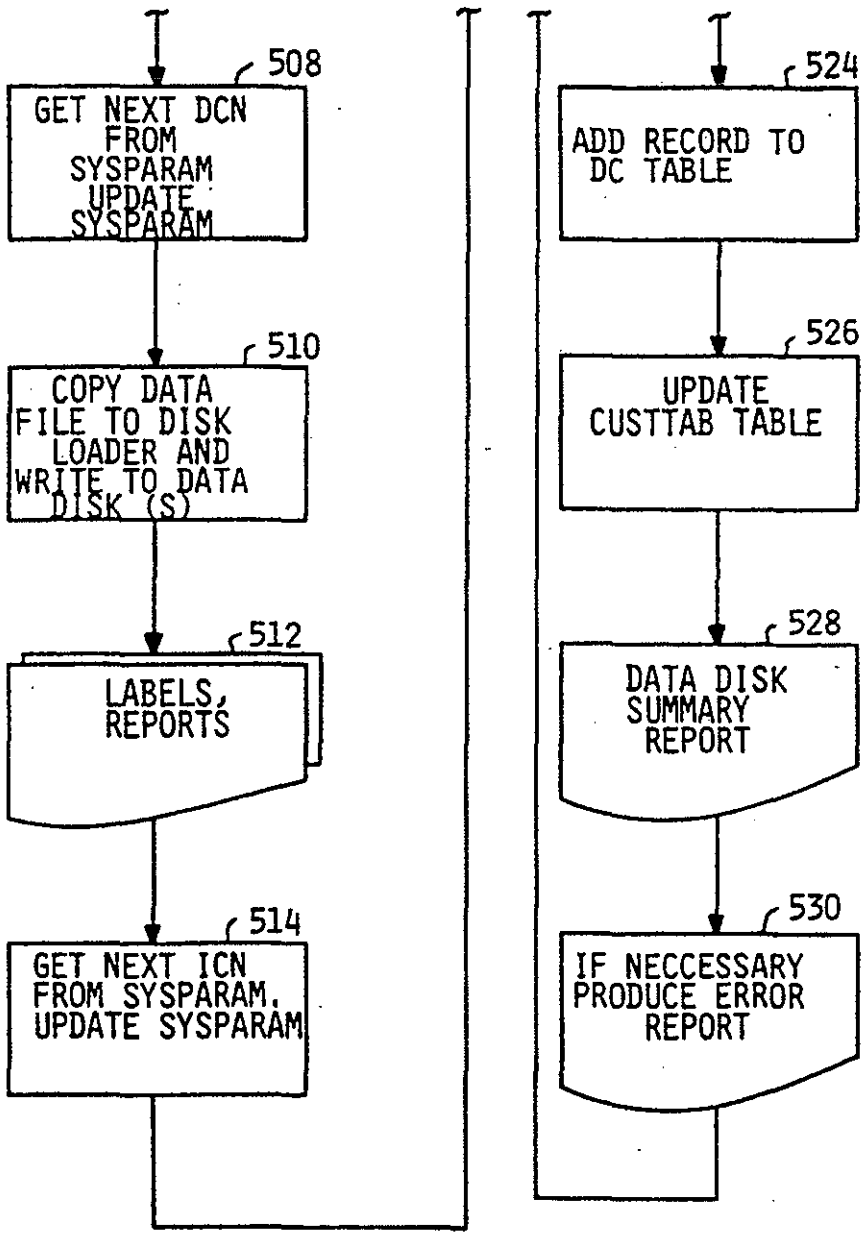

508
GET NEXT DCN FROM SYSPARAM UPDATE SYSPARAM
510
COPY DATA FILE TO DISK LOADER AND WRITE TO DATA DISK (S)
512
LABELS, REPORTS
514
GET NEXT ICN FROM SYSPARAM, UPDATE SYSPARAM
524
ADD RECORD TO DC TABLE
526
UPDATE CUSTTAB TABLE
528
DATA DISK SUMMARY REPORT
530
IF NECCESSARY PRODUCE ERROR REPORT

FIG. 18-2

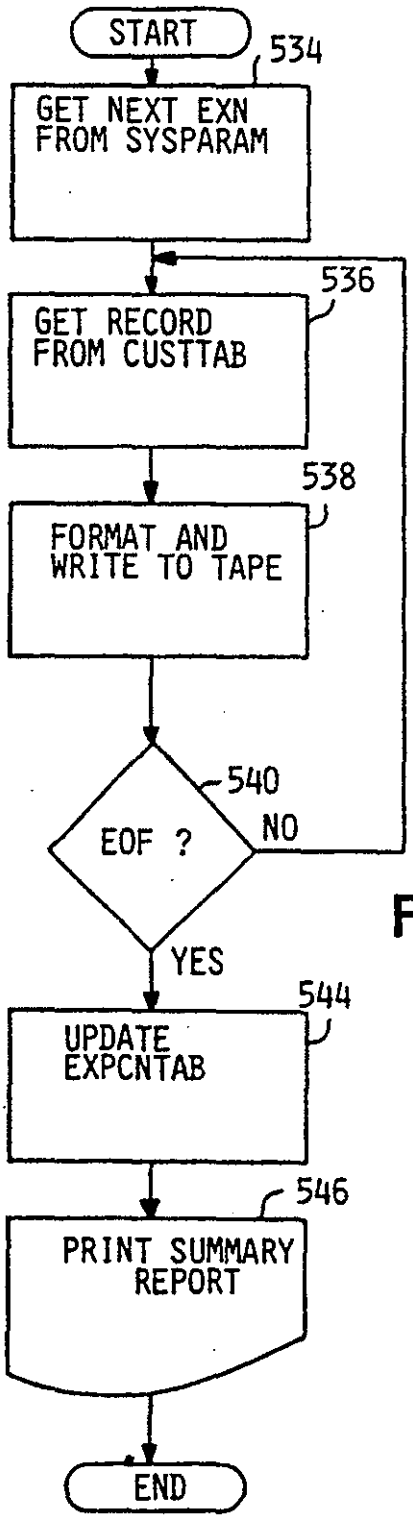

START
534
GET NEXT EXN FROM SYSPARAM
536
GET RECORD FROM CUSTTAB
538
FORMAT AND WRITE TO TAPE
540
EOF ?
NO
YES
544
UPDATE EXPCNTAB
546
PRINT SUMMARY REPORT
END

FIG. 19

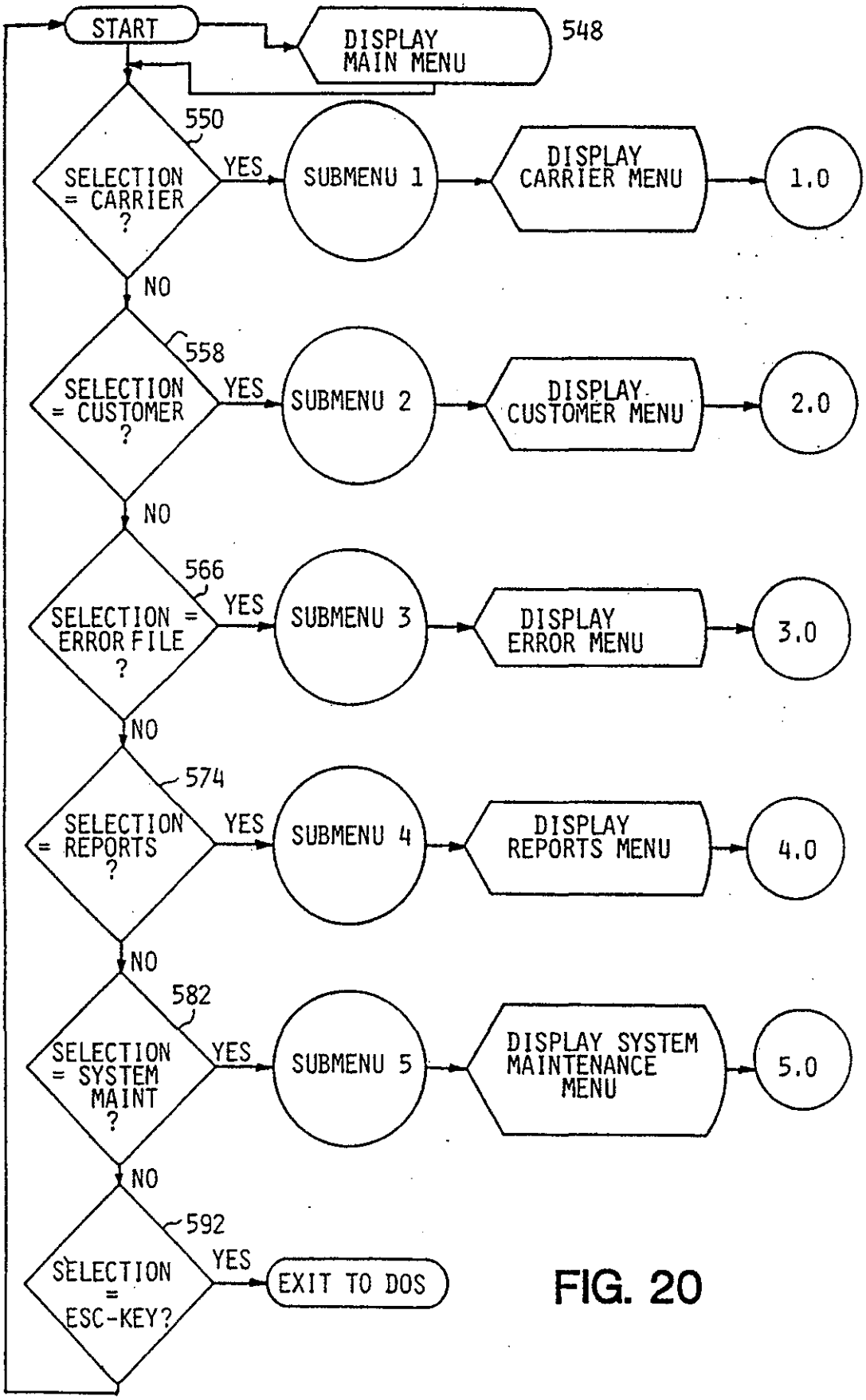

START
DISPLAY MAIN MENU
548
550
SELECTION = CARRIER ?
YES
SUBMENU 1
DISPLAY CARRIER MENU
1.0
NO
558
SELECTION = CUSTOMER ?
YES
SUBMENU 2
DISPLAY CUSTOMER MENU
2.0
NO
566
SELECTION = ERROR FILE ?
YES
SUBMENU 3
DISPLAY ERROR MENU
3.0
NO
574
SELECTION = REPORTS ?
YES
SUBMENU 4
DISPLAY REPORTS MENU
4.0
NO
582
SELECTION = SYSTEM MAINT ?
YES
SUBMENU 5
DISPLAY SYSTEM MAINTENANCE MENU
5.0
NO
592
SELECTION = ESC-KEY?
YES
EXIT TO DOS

FIG. 20

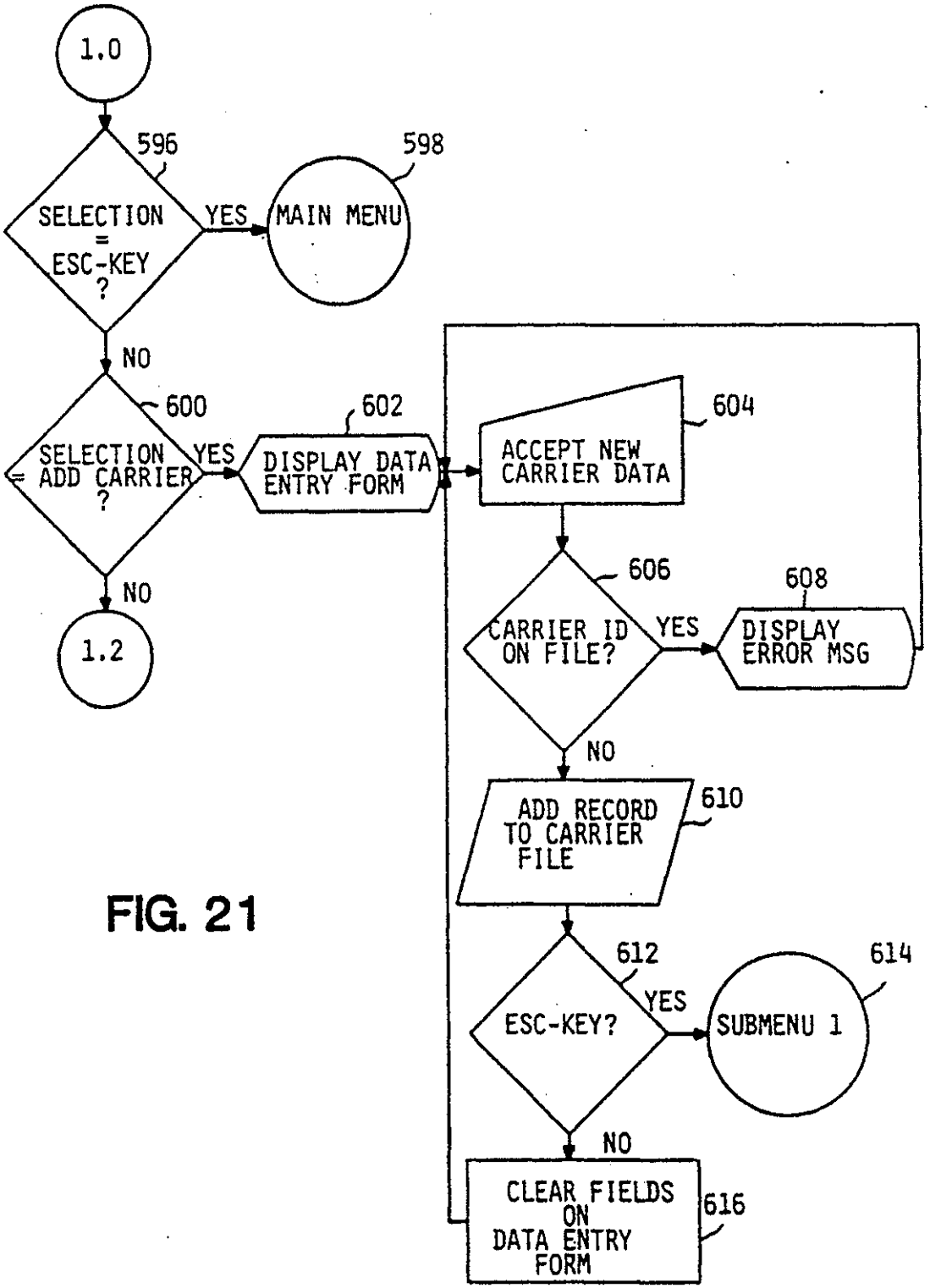
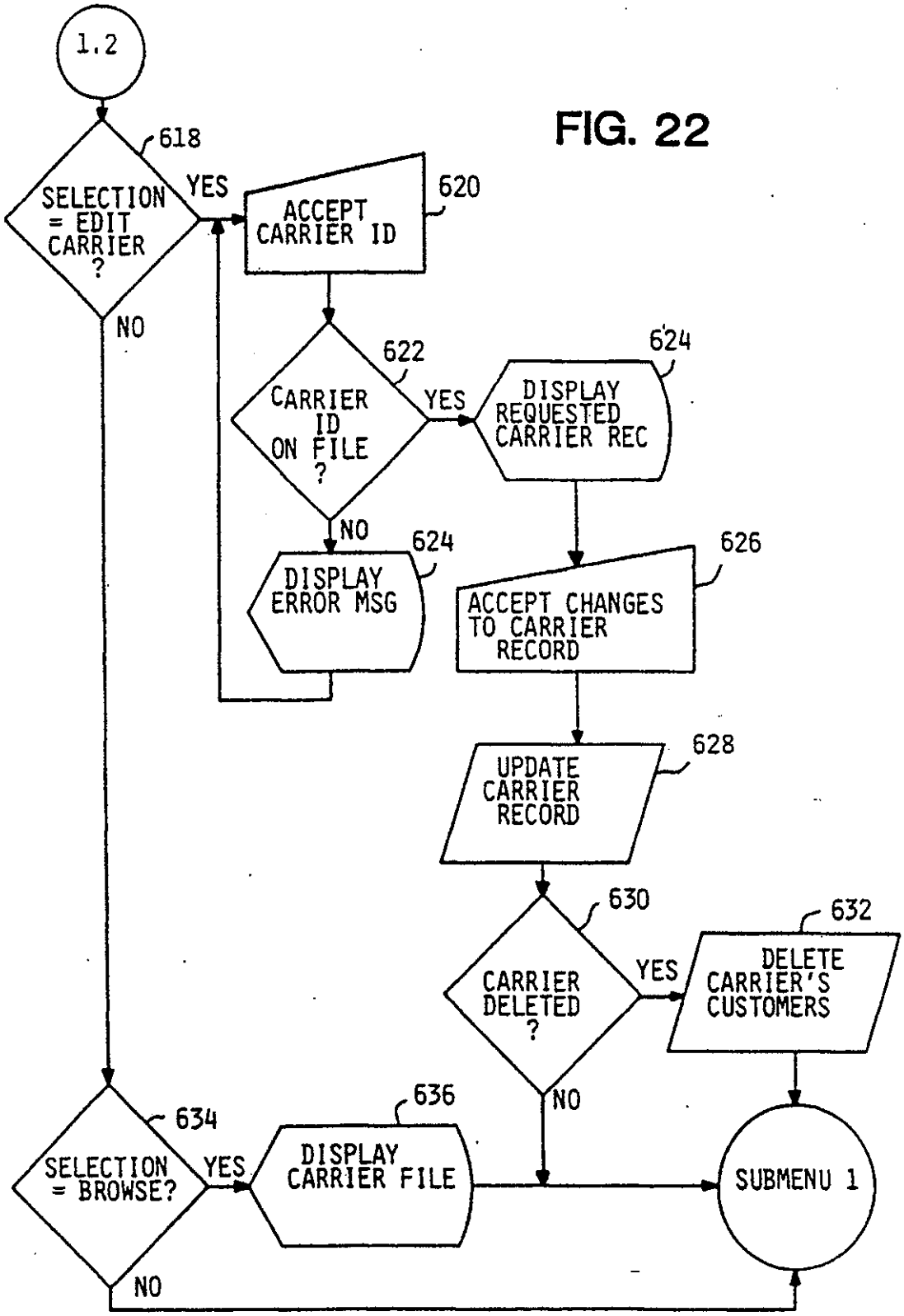

1.0
596
SELECTION = ESC-KEY ?
YES
598
MAIN MENU
NO
600
SELECTION = ADD CARRIER ?
YES
602
DISPLAY DATA ENTRY FORM
NO
1.2
604
ACCEPT NEW CARRIER DATA
606
CARRIER ID ON FILE?
YES
608
DISPLAY ERROR MSG
NO
610
ADD RECORD TO CARRIER FILE
612
ESC-KEY?
YES
614
SUBMENU 1
NO
CLEAR FIELDS ON DATA ENTRY FORM
616

FIG. 21

FIG. 22


1.2
618
SELECTION = EDIT CARRIER ?
YES
NO
620
ACCEPT CARRIER ID
622
CARRIER ID ON FILE ?
YES
NO
624
DISPLAY REQUESTED CARRIER REC
624
DISPLAY ERROR MSG
626
ACCEPT CHANGES TO CARRIER RECORD
628
UPDATE CARRIER RECORD
630
CARRIER DELETED ?
YES
NO
632
DELETE CARRIER'S CUSTOMERS
634
SELECTION = BROWSE?
YES
NO
636
DISPLAY CARRIER FILE
SUBMENU 1

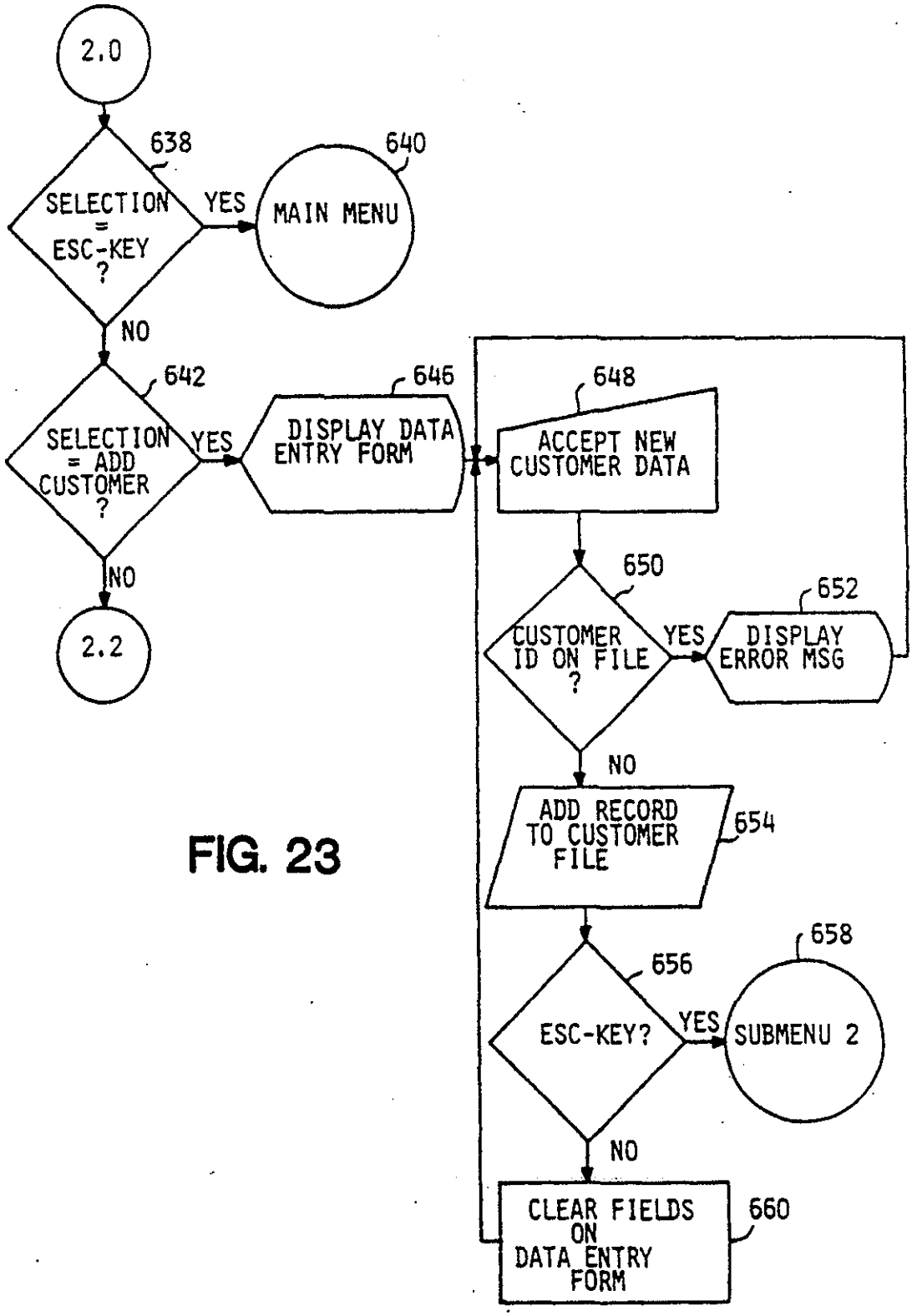

2.0
638
SELECTION = ESC-KEY ?
YES
640
MAIN MENU
NO
642
SELECTION = ADD CUSTOMER ?
YES
646
DISPLAY DATA ENTRY FORM
NO
2.2
648
ACCEPT NEW CUSTOMER DATA
650
CUSTOMER ID ON FILE ?
YES
652
DISPLAY ERROR MSG
NO
ADD RECORD TO CUSTOMER FILE
654
656
ESC-KEY?
YES
658
SUBMENU 2
NO
CLEAR FIELDS ON DATA ENTRY FORM
660

FIG. 23

FIG. 24

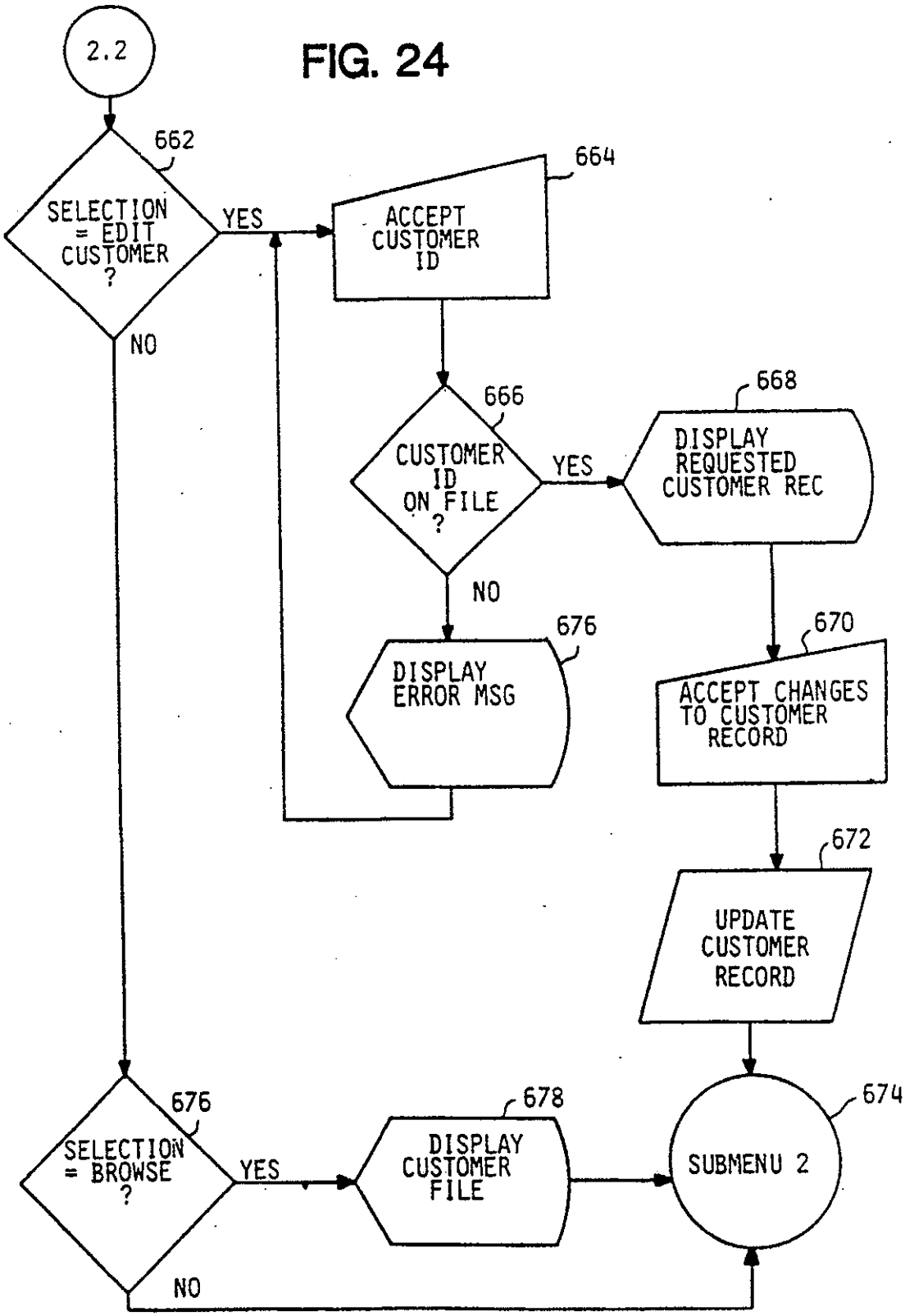
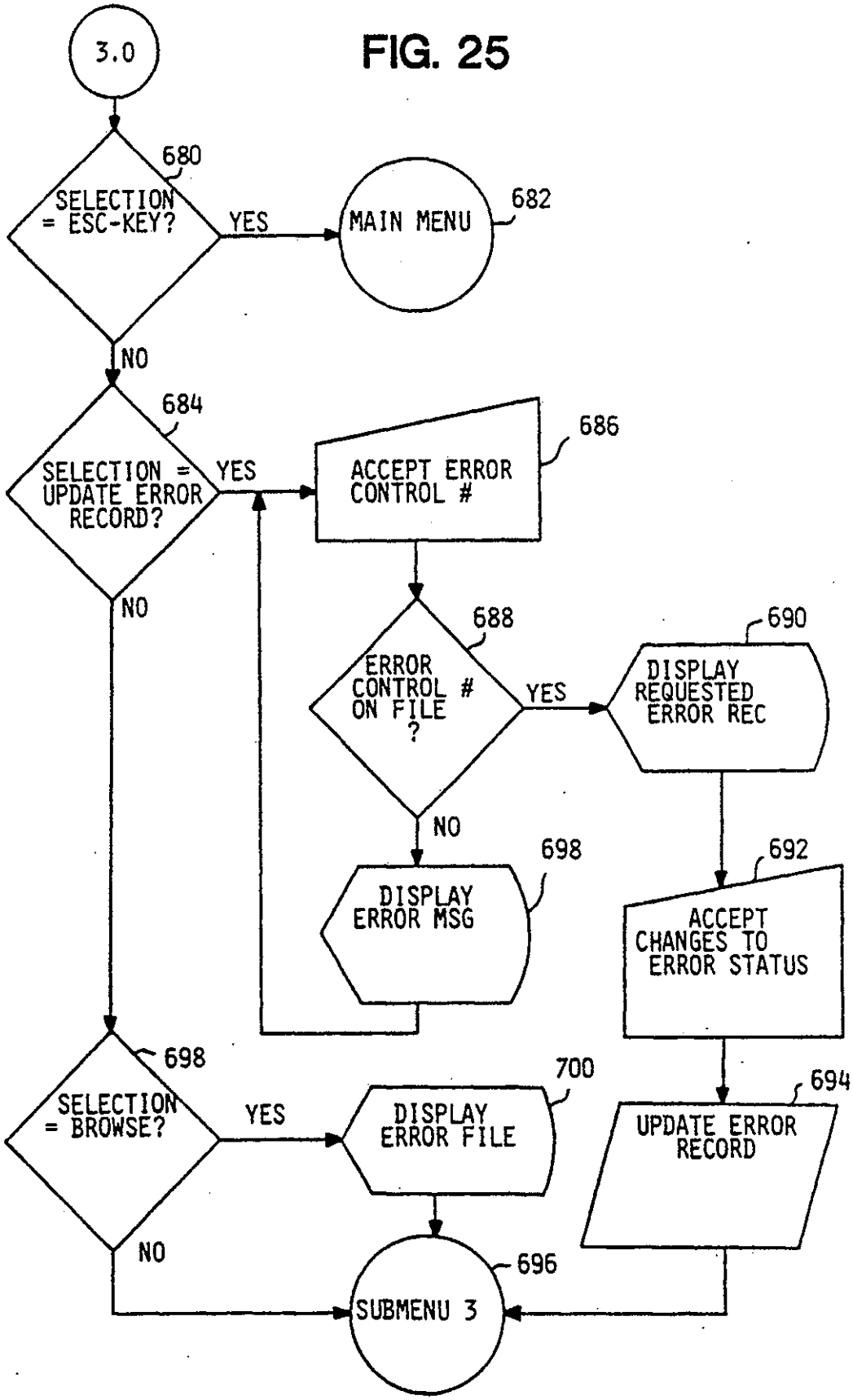

2.2
662
SELECTION = EDIT CUSTOMER ?
YES
NO
664
ACCEPT CUSTOMER ID
666
CUSTOMER ID ON FILE ?
YES
NO
668
DISPLAY REQUESTED CUSTOMER REC
676
DISPLAY ERROR MSG
670
ACCEPT CHANGES TO CUSTOMER RECORD
672
UPDATE CUSTOMER RECORD
676
SELECTION = BROWSE ?
YES
NO
678
DISPLAY CUSTOMER FILE
674
SUBMENU 2

FIG. 25


3.0
680
SELECTION = ESC-KEY?
YES
MAIN MENU
682
NO
684
SELECTION = UPDATE ERROR RECORD?
YES
686
ACCEPT ERROR CONTROL #
NO
688
ERROR CONTROL # ON FILE ?
YES
690
DISPLAY REQUESTED ERROR REC
NO
698
DISPLAY ERROR MSG
692
ACCEPT CHANGES TO ERROR STATUS
698
SELECTION = BROWSE?
YES
700
DISPLAY ERROR FILE
694
UPDATE ERROR RECORD
NO
696
SUBMENU 3

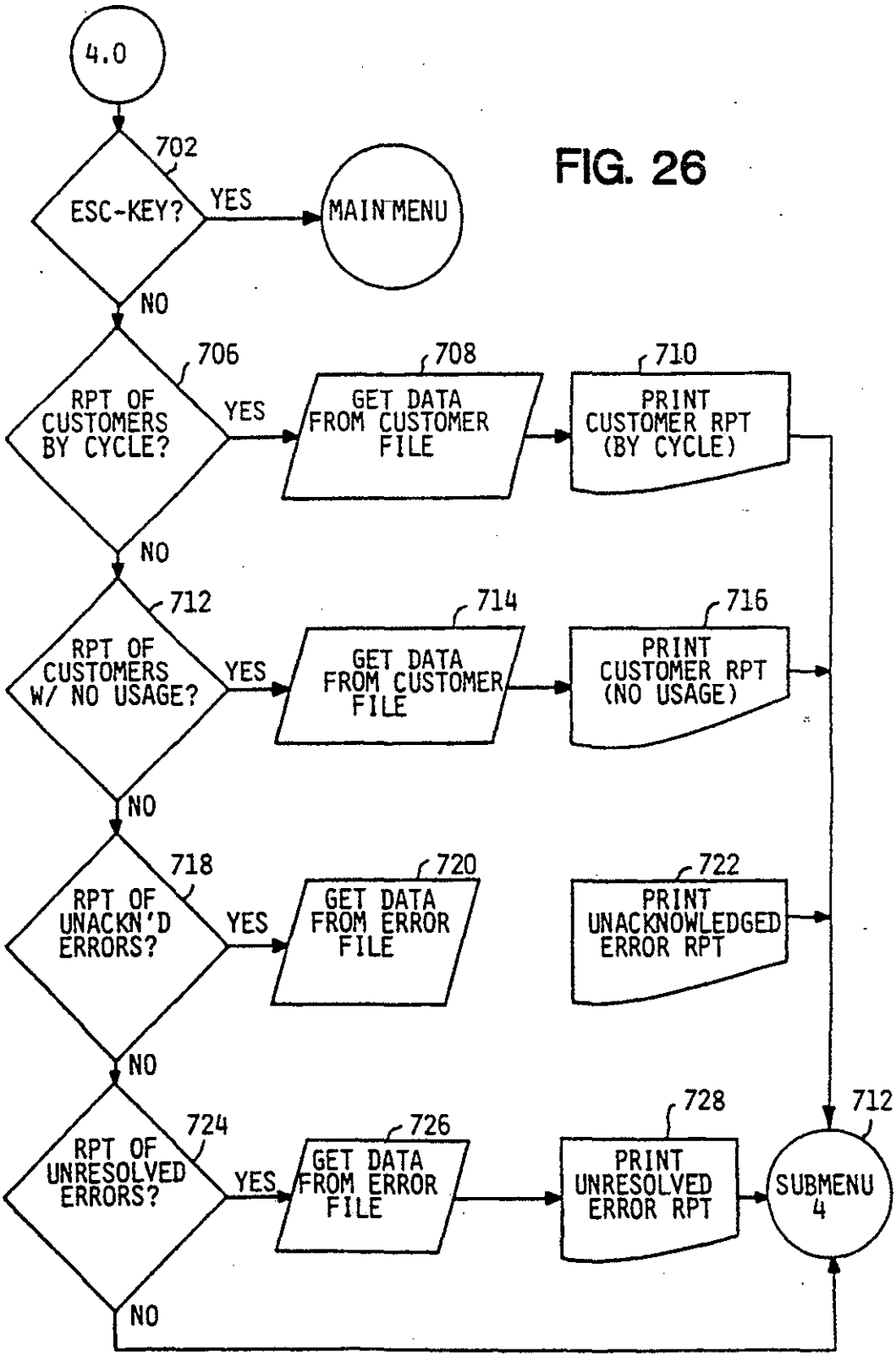
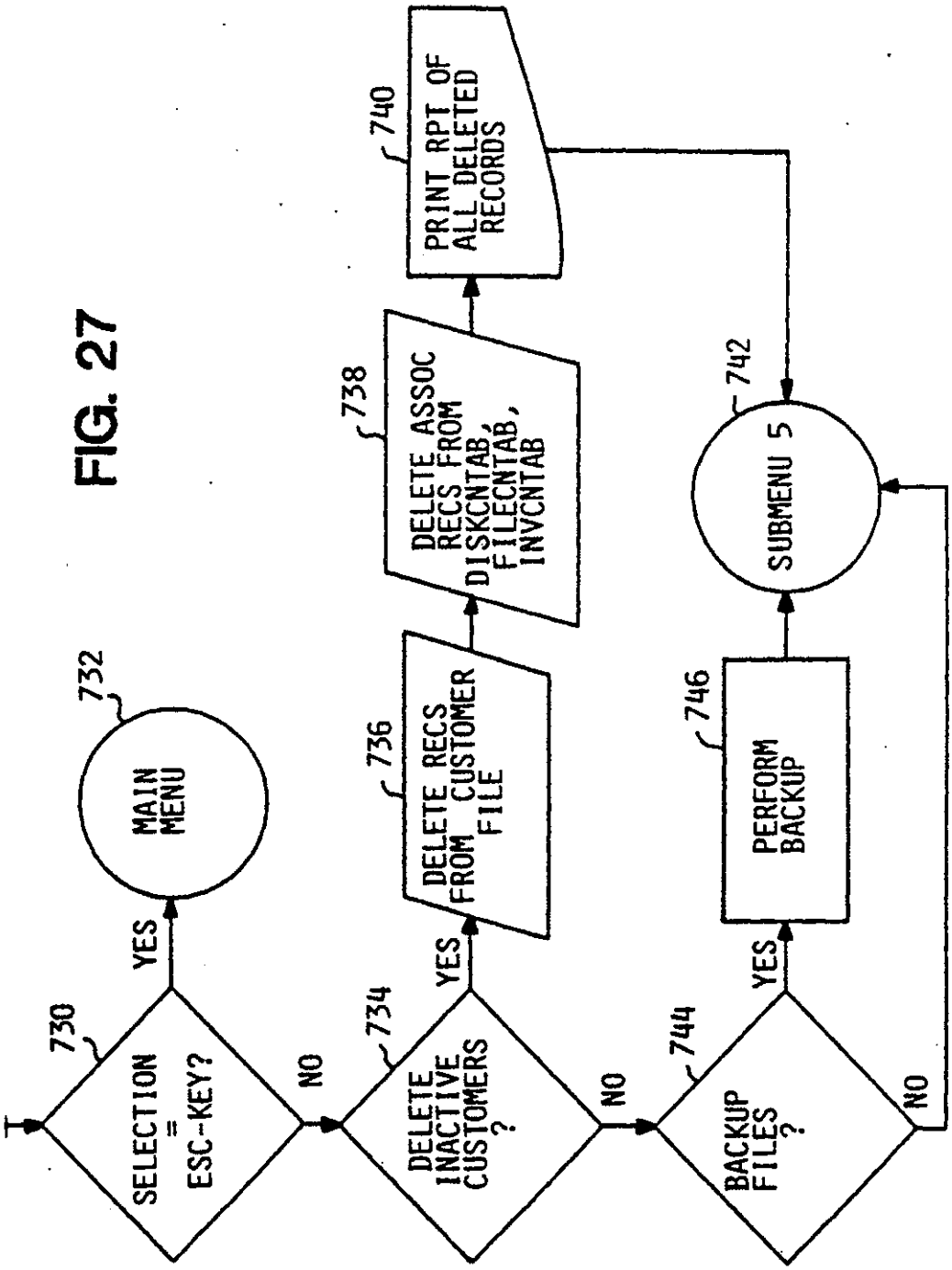

4.0
702
ESC-KEY?
YES
MAIN MENU
NO
706
RPT OF CUSTOMERS BY CYCLE?
YES
708
GET DATA FROM CUSTOMER FILE
710
PRINT CUSTOMER RPT (BY CYCLE)
NO
712
RPT OF CUSTOMERS W/ NO USAGE?
YES
714
GET DATA FROM CUSTOMER FILE
716
PRINT CUSTOMER RPT (NO USAGE)
NO
718
RPT OF UNACKN'D ERRORS?
YES
720
GET DATA FROM ERROR FILE
722
PRINT UNACKNOWLEDGED ERROR RPT
NO
724
RPT OF UNRESOLVED ERRORS?
YES
726
GET DATA FROM ERROR FILE
728
PRINT UNRESOLVED ERROR RPT
712
SUBMENU 4
NO

FIG. 26

FIG. 27


730
SELECTION = ESC-KEY?
YES
732
MAIN MENU
NO
734
DELETE INACTIVE CUSTOMERS ?
YES
736
DELETE RECS FROM CUSTOMER FILE
738
DELETE ASSOC RECS FROM DISKCNTAB, FILECNTAB, INVCNTAB
740
PRINT RPT OF ALL DELETED RECORDS
NO
744
BACKUP FILES ?
YES
746
PERFORM BACKUP
742
SUBMENU 5
NO

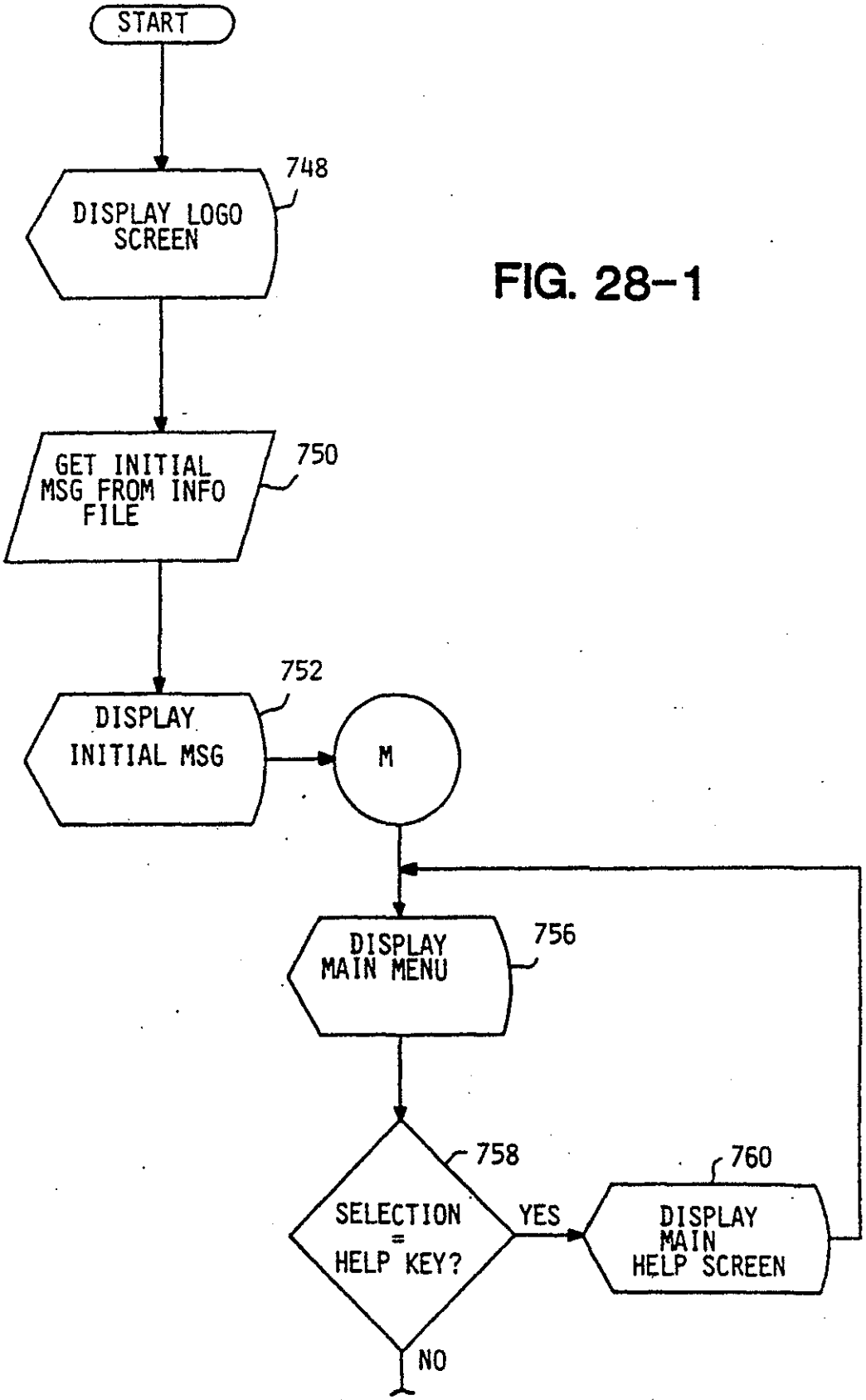

START
748
DISPLAY LOGO SCREEN
750
GET INITIAL MSG FROM INFO FILE
752
DISPLAY INITIAL MSG
M
DISPLAY MAIN MENU
756
758
SELECTION = HELP KEY?
YES
760
DISPLAY MAIN HELP SCREEN
NO

FIG. 28-1

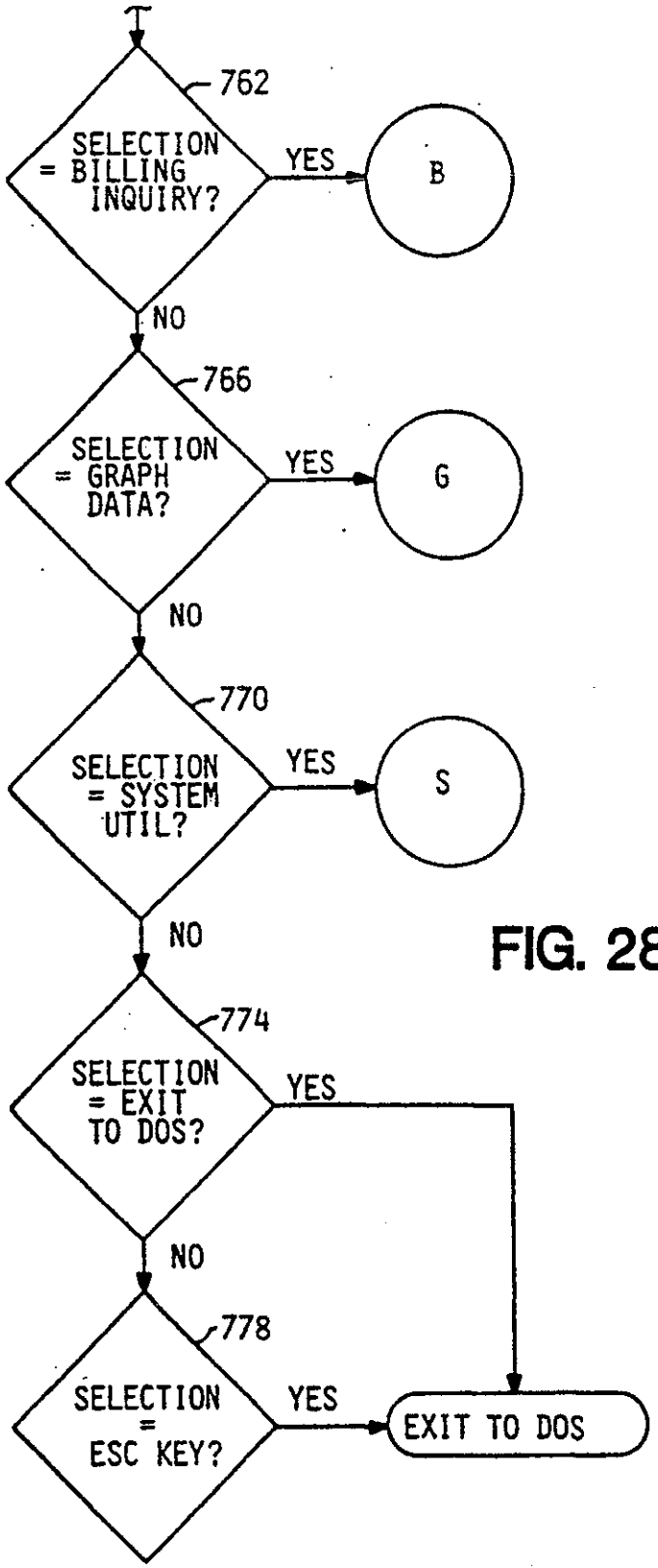

762
SELECTION = BILLING INQUIRY?
YES
B
NO
766
SELECTION = GRAPH DATA?
YES
G
NO
770
SELECTION = SYSTEM UTIL?
YES
S
NO
774
SELECTION = EXIT TO DOS?
YES
NO
778
SELECTION = ESC KEY?
YES
EXIT TO DOS

FIG. 28-2

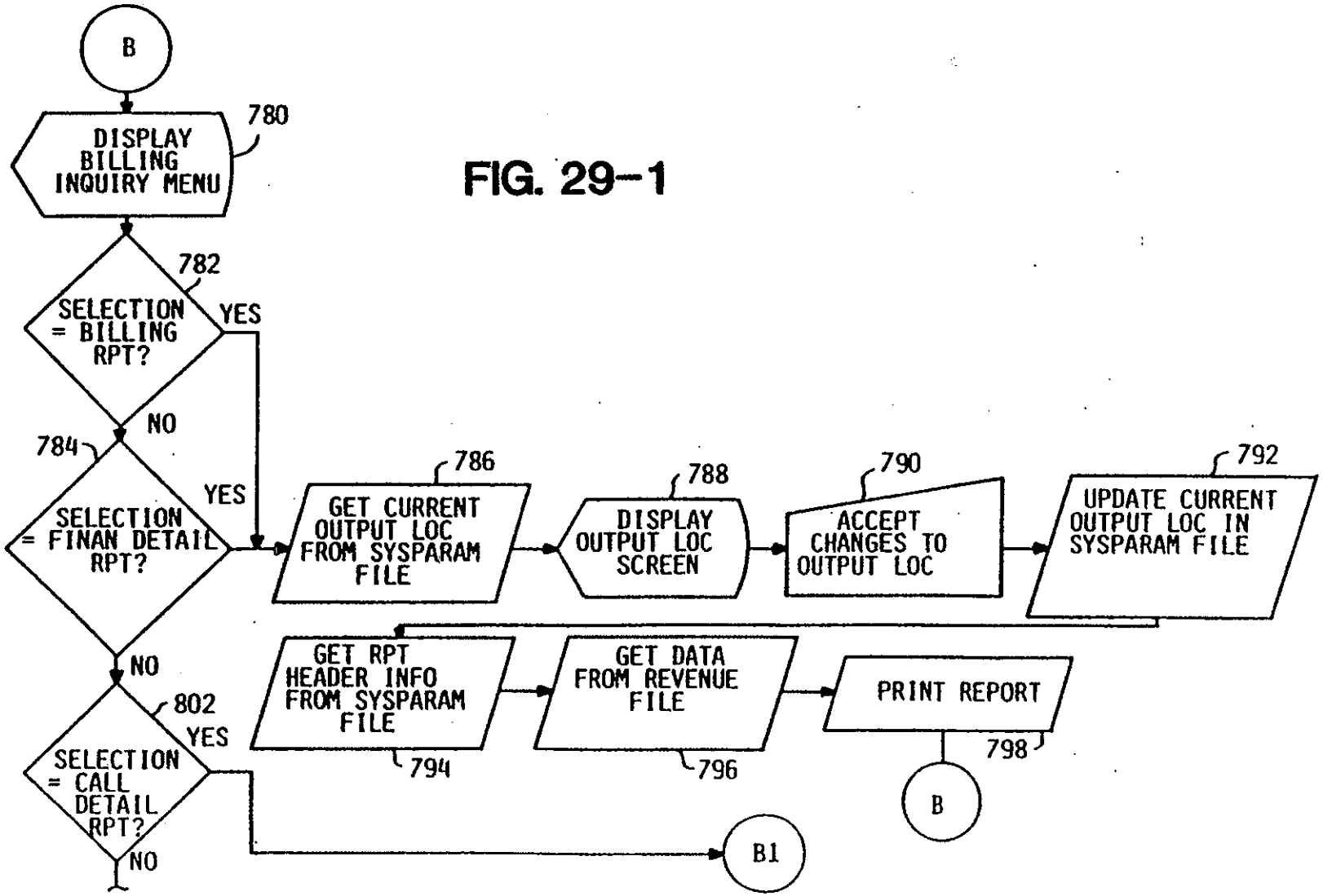
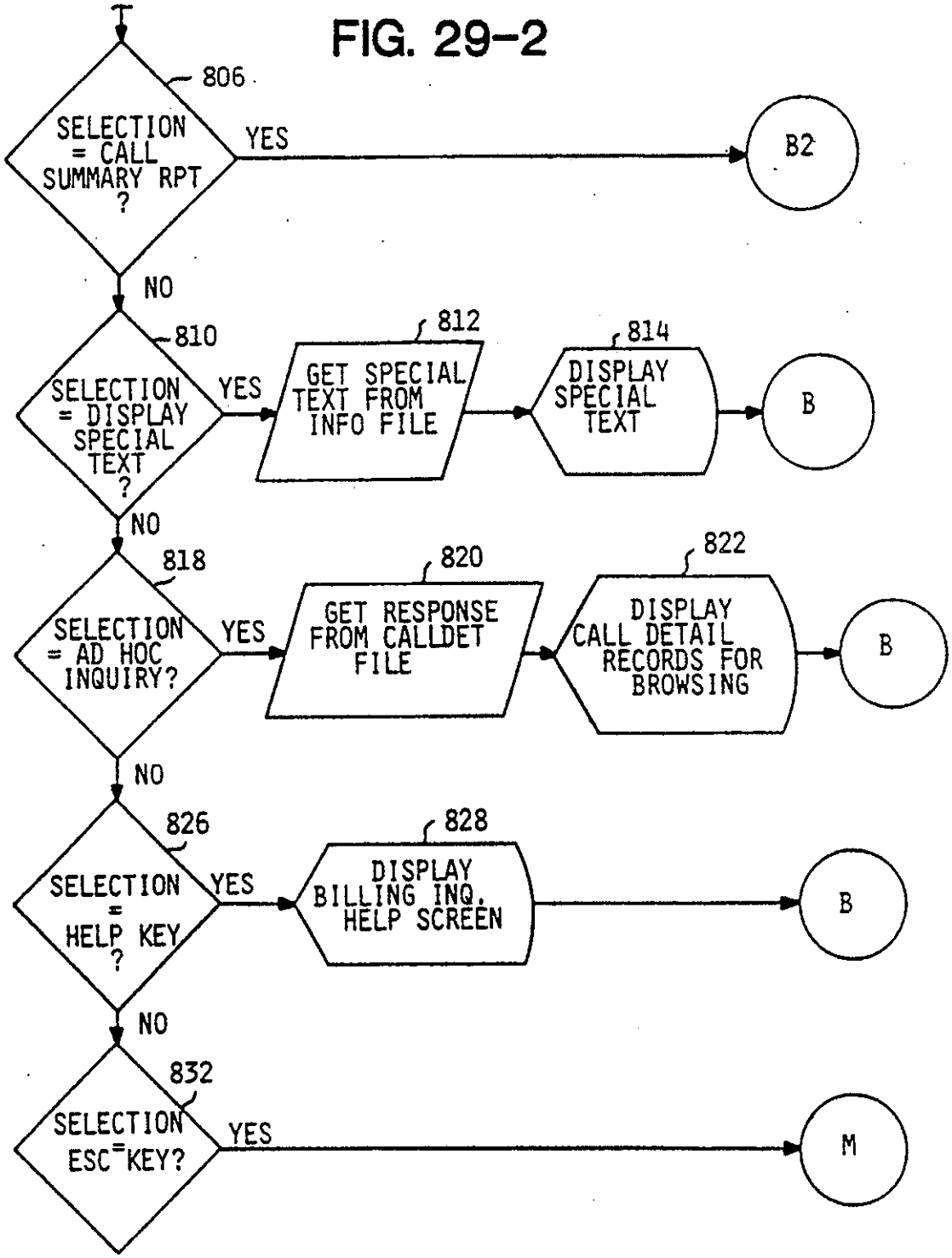

B
DISPLAY BILLING INQUIRY MENU
780
SELECTION = BILLING RPT?
782
YES
NO
SELECTION = FINAN DETAIL RPT?
784
YES
NO
SELECTION = CALL DETAIL RPT?
802
YES
NO
GET CURRENT OUTPUT LOC FROM SYSPARAM FILE
786
DISPLAY OUTPUT LOC SCREEN
788
ACCEPT CHANGES TO OUTPUT LOC
790
UPDATE CURRENT OUTPUT LOC IN SYSPARAM FILE
792
GET RPT HEADER INFO FROM SYSPARAM FILE
794
GET DATA FROM REVENUE FILE
796
PRINT REPORT
798
B
B1

FIG. 29-1

FIG. 29-2


T
806
SELECTION = CALL SUMMARY RPT ?
YES
B2
NO
810
SELECTION = DISPLAY SPECIAL TEXT ?
YES
812
GET SPECIAL TEXT FROM INFO FILE
814
DISPLAY SPECIAL TEXT
B
NO
818
SELECTION = AD HOC INQUIRY?
YES
820
GET RESPONSE FROM CALLDET FILE
822
DISPLAY CALL DETAIL RECORDS FOR BROWSING
B
NO
826
SELECTION = HELP KEY ?
YES
828
DISPLAY BILLING INQ. HELP SCREEN
B
NO
832
SELECTION ESC=KEY?
YES
M

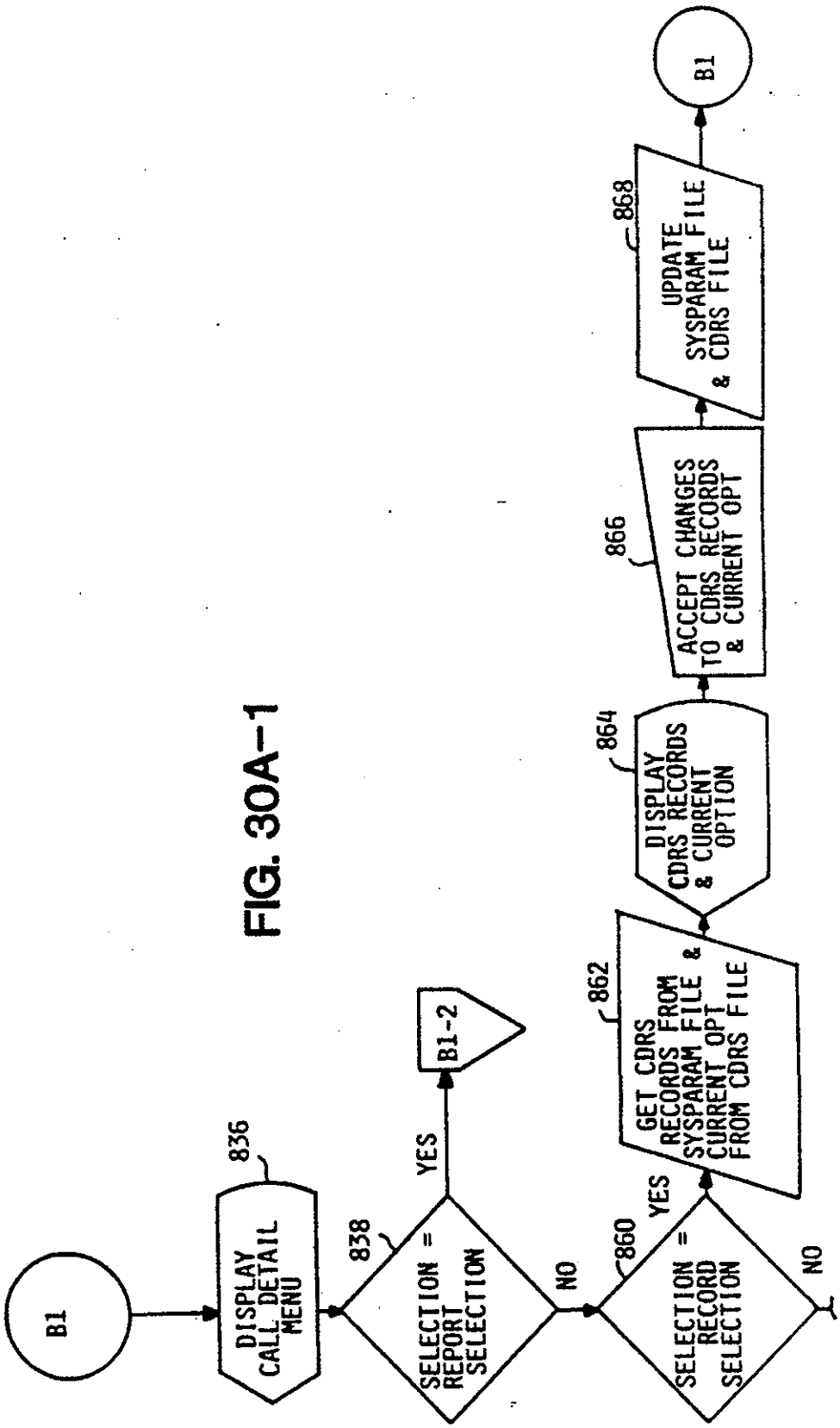

B1
836
DISPLAY CALL DETAIL MENU
838
SELECTION = REPORT SELECTION
YES
B1-2
NO
860
SELECTION = RECORD SELECTION
YES
862
GET CDRS RECORDS FROM SYSPARAM FILE & CURRENT OPT FROM CDRS FILE
NO
864
DISPLAY CDRS RECORDS & CURRENT OPTION
866
ACCEPT CHANGES TO CDRS RECORDS & CURRENT OPT
868
UPDATE SYSPARAM FILE & CDRS FILE
B1

FIG. 30A-1

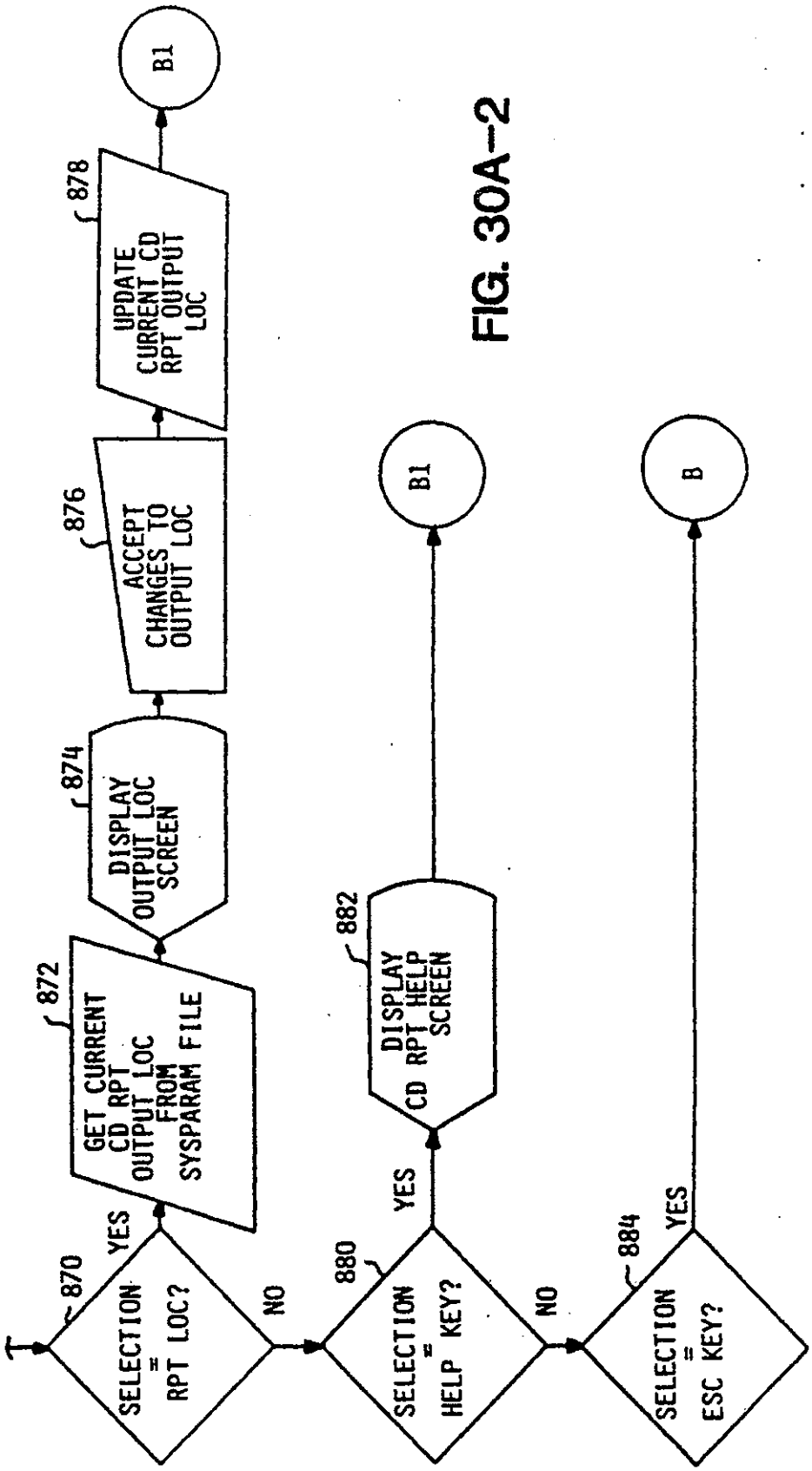

870
SELECTION = RPT LOC?
YES
872
GET CURRENT CD RPT OUTPUT LOC FROM SYSPARAM FILE
874
DISPLAY OUTPUT LOC SCREEN
876
ACCEPT CHANGES TO OUTPUT LOC
878
UPDATE CURRENT CD RPT OUTPUT LOC
B1
NO
880
SELECTION = HELP KEY?
YES
882
DISPLAY CD RPT HELP SCREEN
B1
NO
884
SELECTION = ESC KEY?
YES
B

FIG. 30A-2

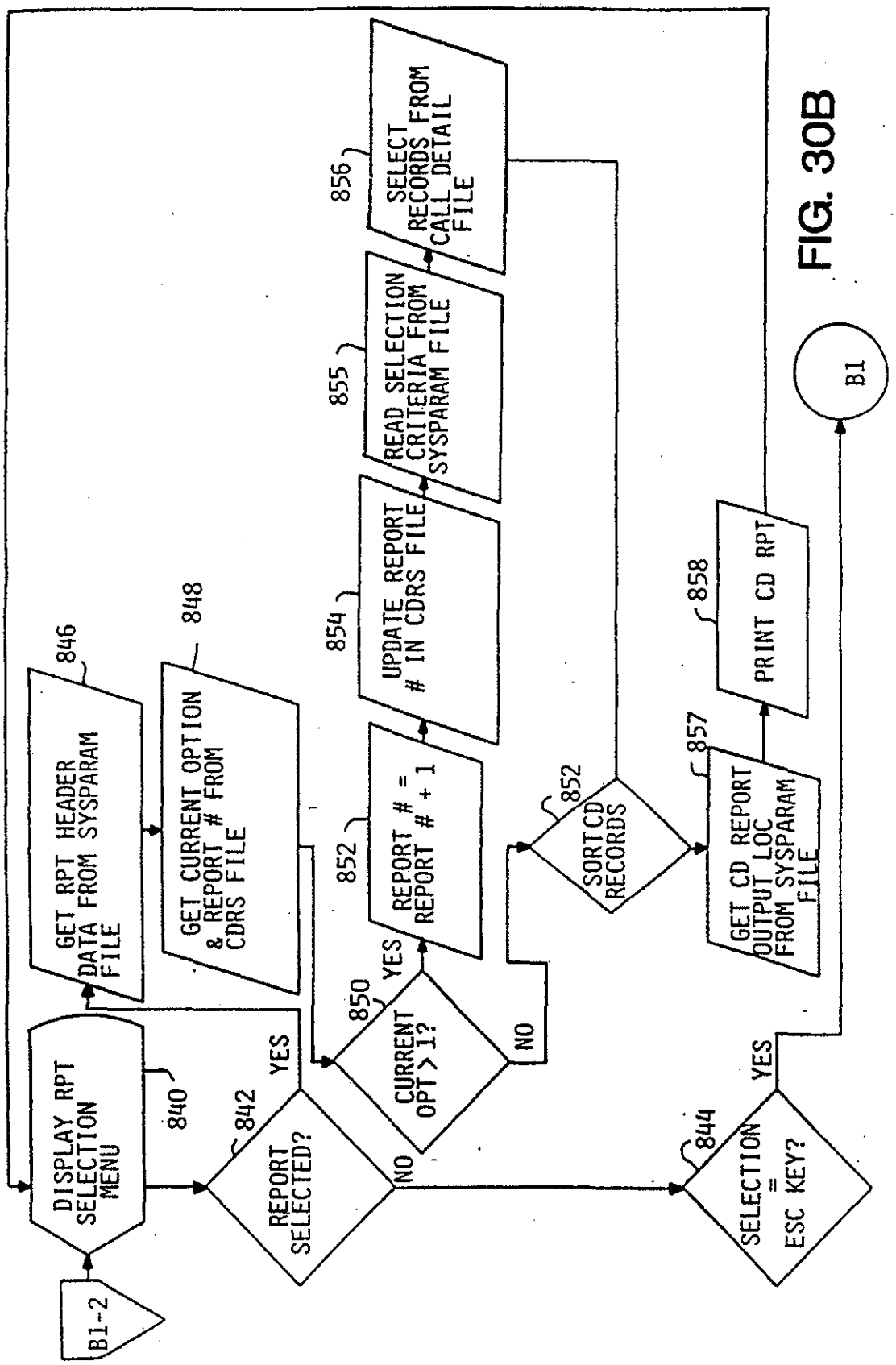
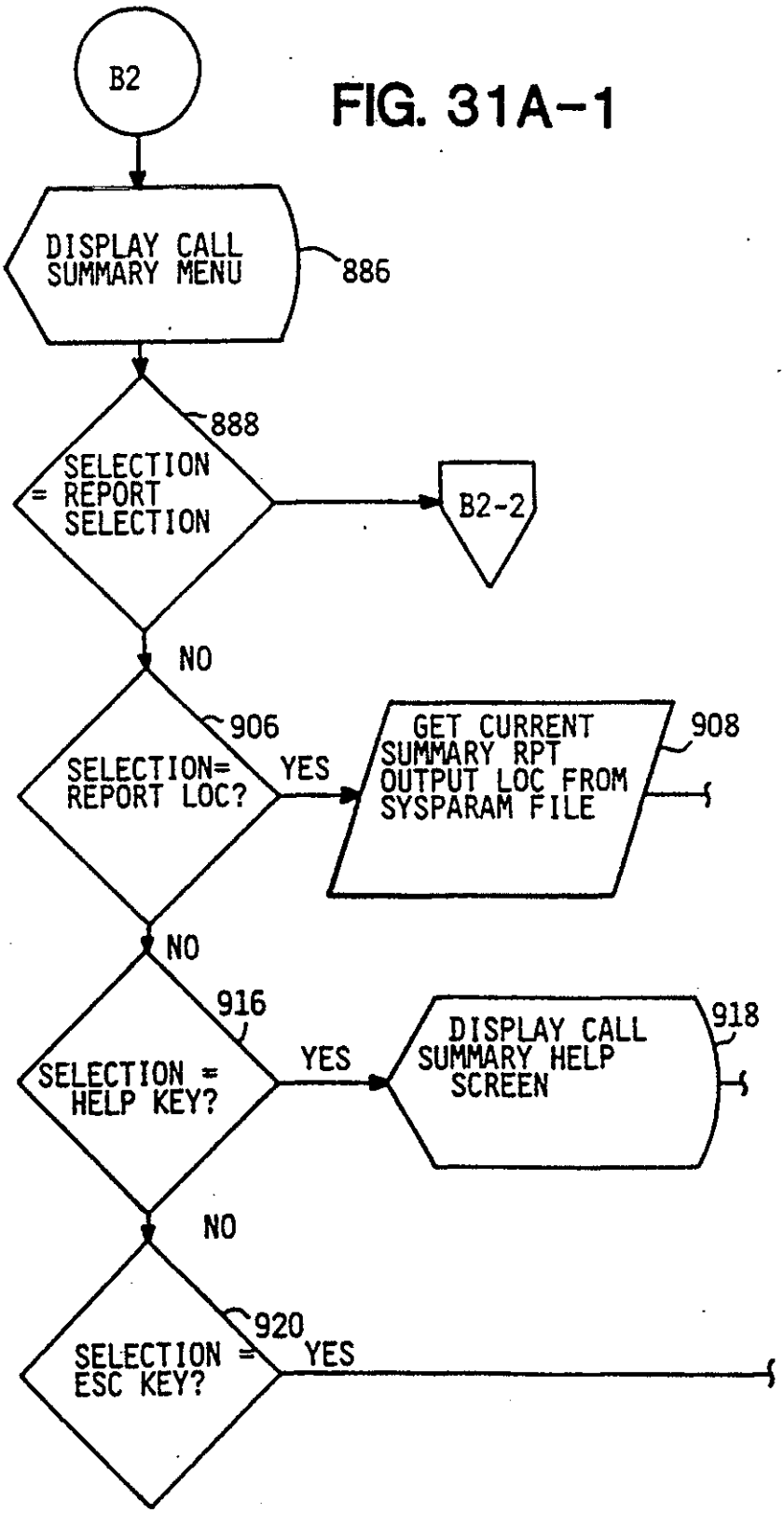

B1-2
DISPLAY RPT SELECTION MENU
840
REPORT SELECTED?
842
YES
NO
GET RPT HEADER DATA FROM SYSPARAM FILE
846
GET CURRENT OPTION & REPORT # FROM CDRS FILE
848
CURRENT OPT > 1?
850
YES
NO
REPORT # = REPORT # + 1
852
UPDATE REPORT # IN CDRS FILE
854
READ SELECTION CRITERIA FROM SYSPARAM FILE
855
SELECT RECORDS FROM CALL DETAIL FILE
856
SORT CD RECORDS
852
GET CD REPORT OUTPUT LOC FROM SYSPARAM FILE
857
PRINT CD RPT
858
SELECTION = ESC KEY?
844
YES
B1

FIG. 30B

FIG. 31A-1


B2
DISPLAY CALL SUMMARY MENU
886
888
SELECTION = REPORT SELECTION
B2-2
NO
906
SELECTION= REPORT LOC?
YES
GET CURRENT SUMMARY RPT OUTPUT LOC FROM SYSPARAM FILE
908
NO
916
SELECTION = HELP KEY?
YES
DISPLAY CALL SUMMARY HELP SCREEN
918
NO
920
SELECTION = ESC KEY?
YES

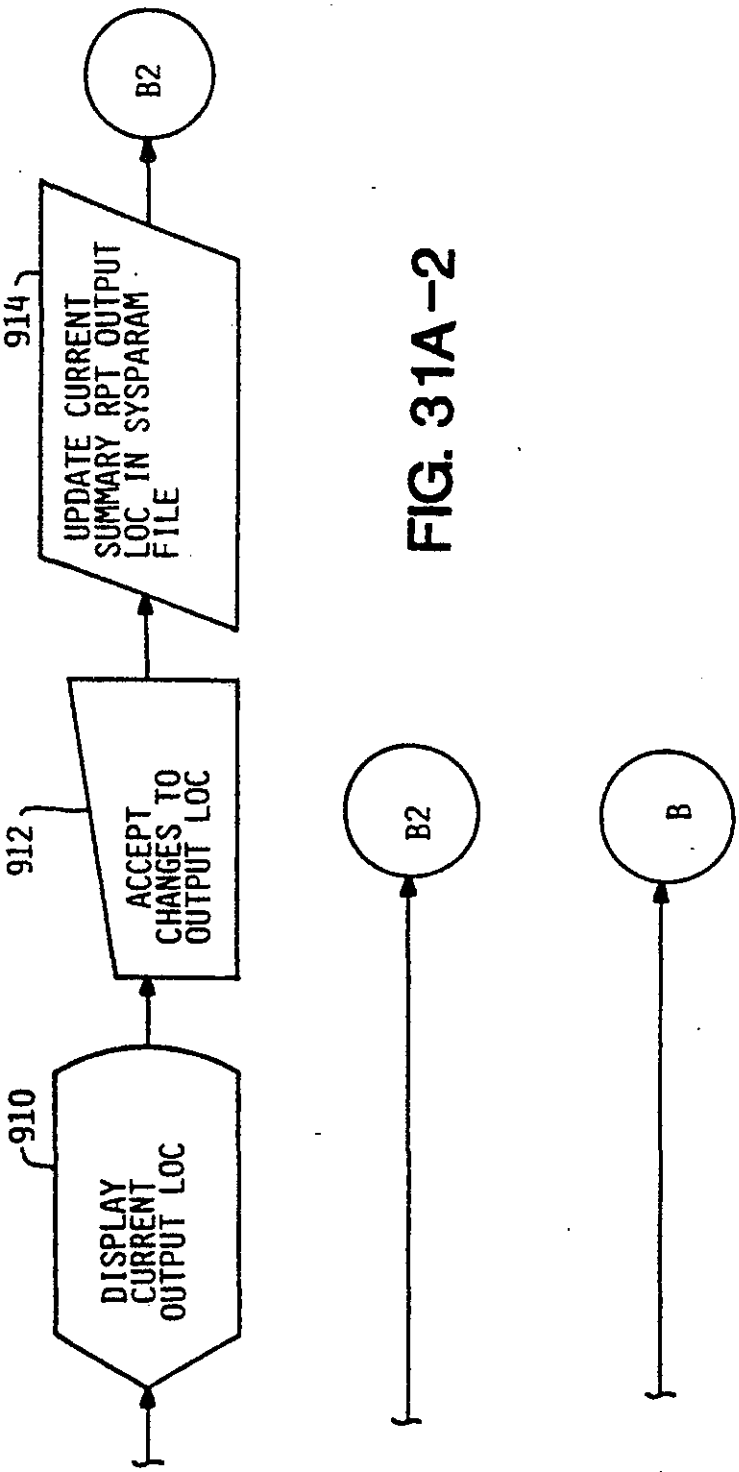

910
DISPLAY CURRENT OUTPUT LOC
912
ACCEPT CHANGES TO OUTPUT LOC
914
UPDATE CURRENT SUMMARY RPT OUTPUT LOC IN SYSPARAM FILE
B2
B2
B

FIG. 31A-2

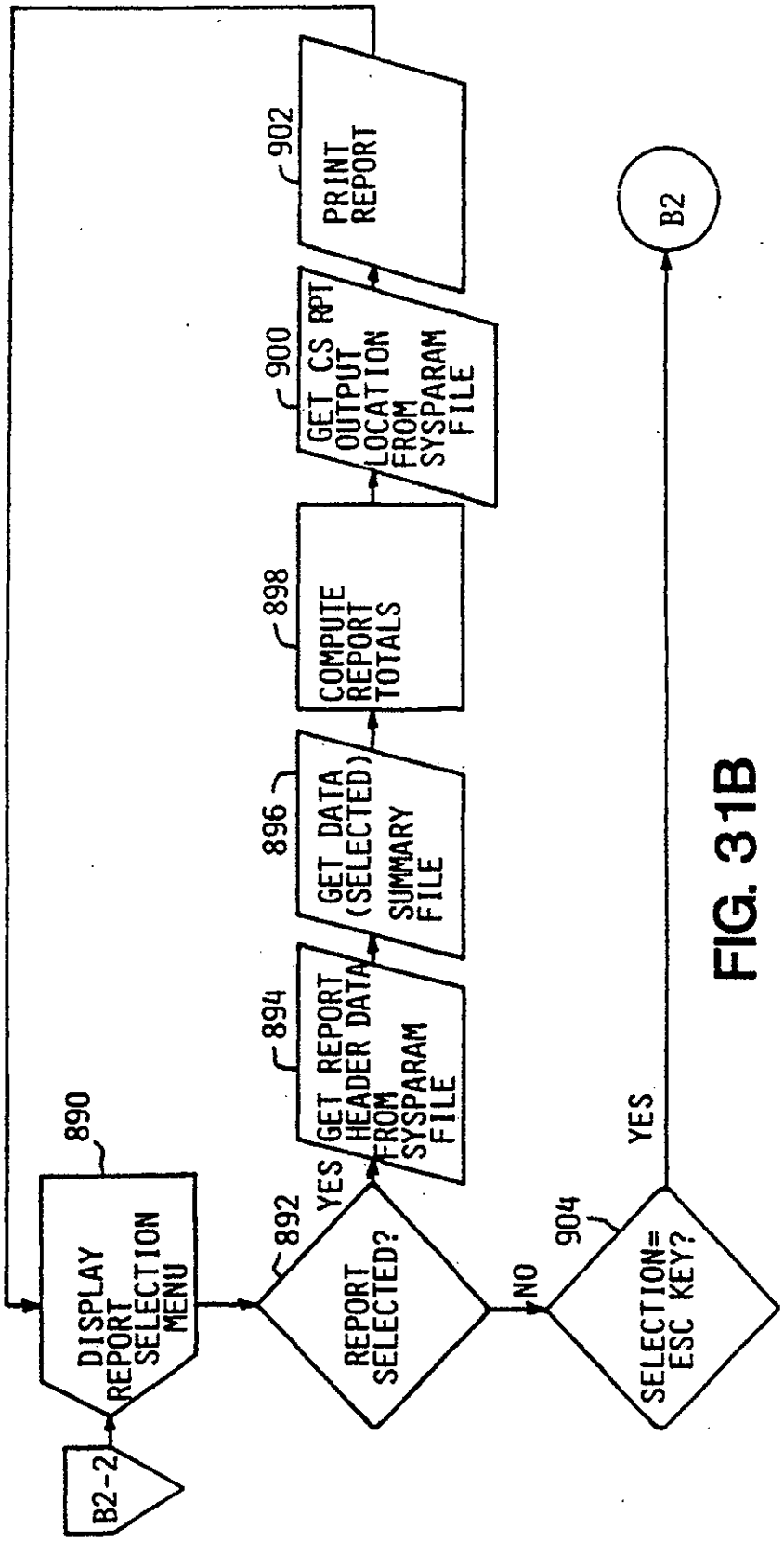

B2-2
890
DISPLAY REPORT SELECTION MENU
892
REPORT SELECTED?
YES
894
GET REPORT HEADER DATA FROM SYSPARAM FILE
896
GET DATA (SELECTED) SUMMARY FILE
898
COMPUTE REPORT TOTALS
900
GET CS RPT OUTPUT LOCATION FROM SYSPARAM FILE
902
PRINT REPORT
NO
904
SELECTION= ESC KEY?
YES
B2

FIG. 31B

FIG. 32

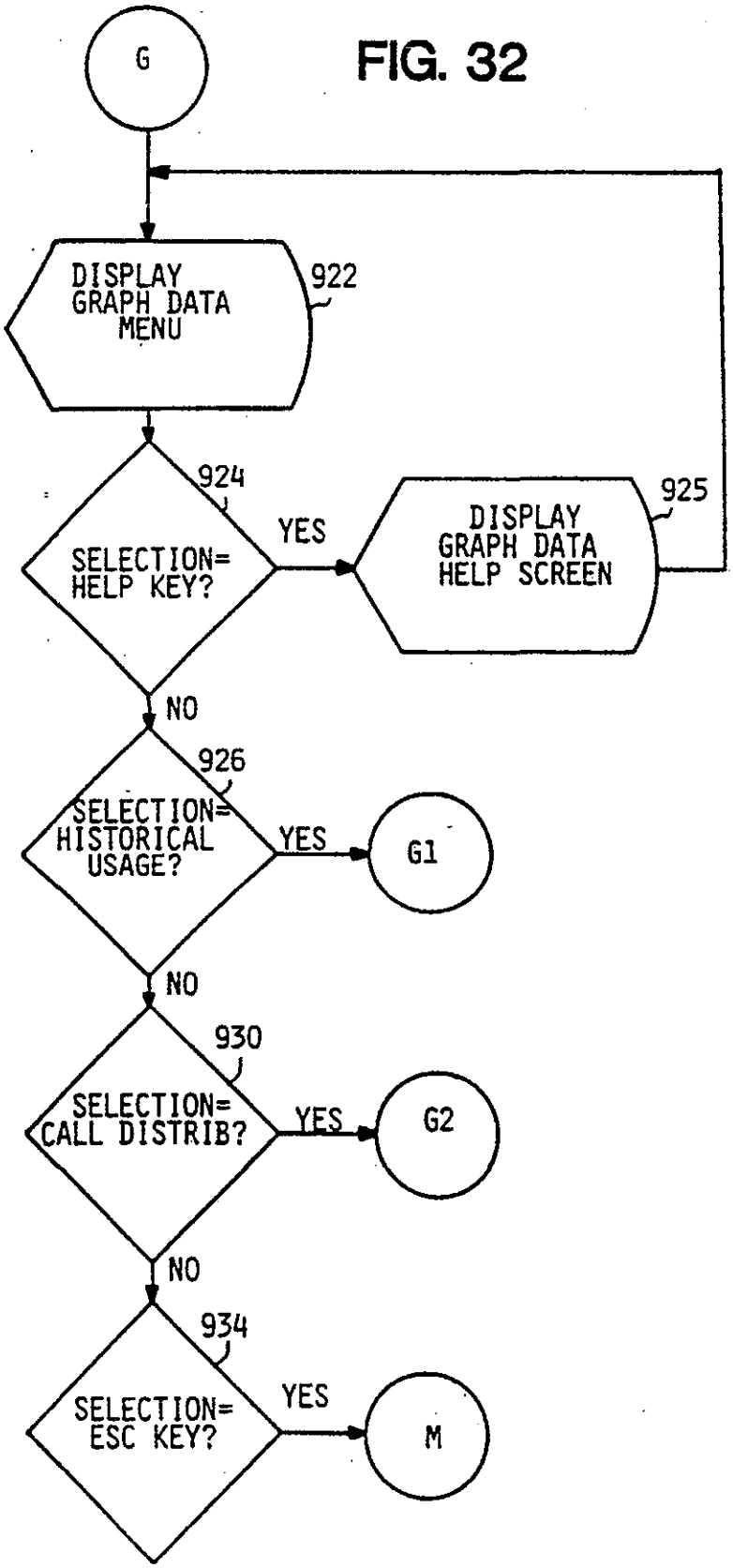
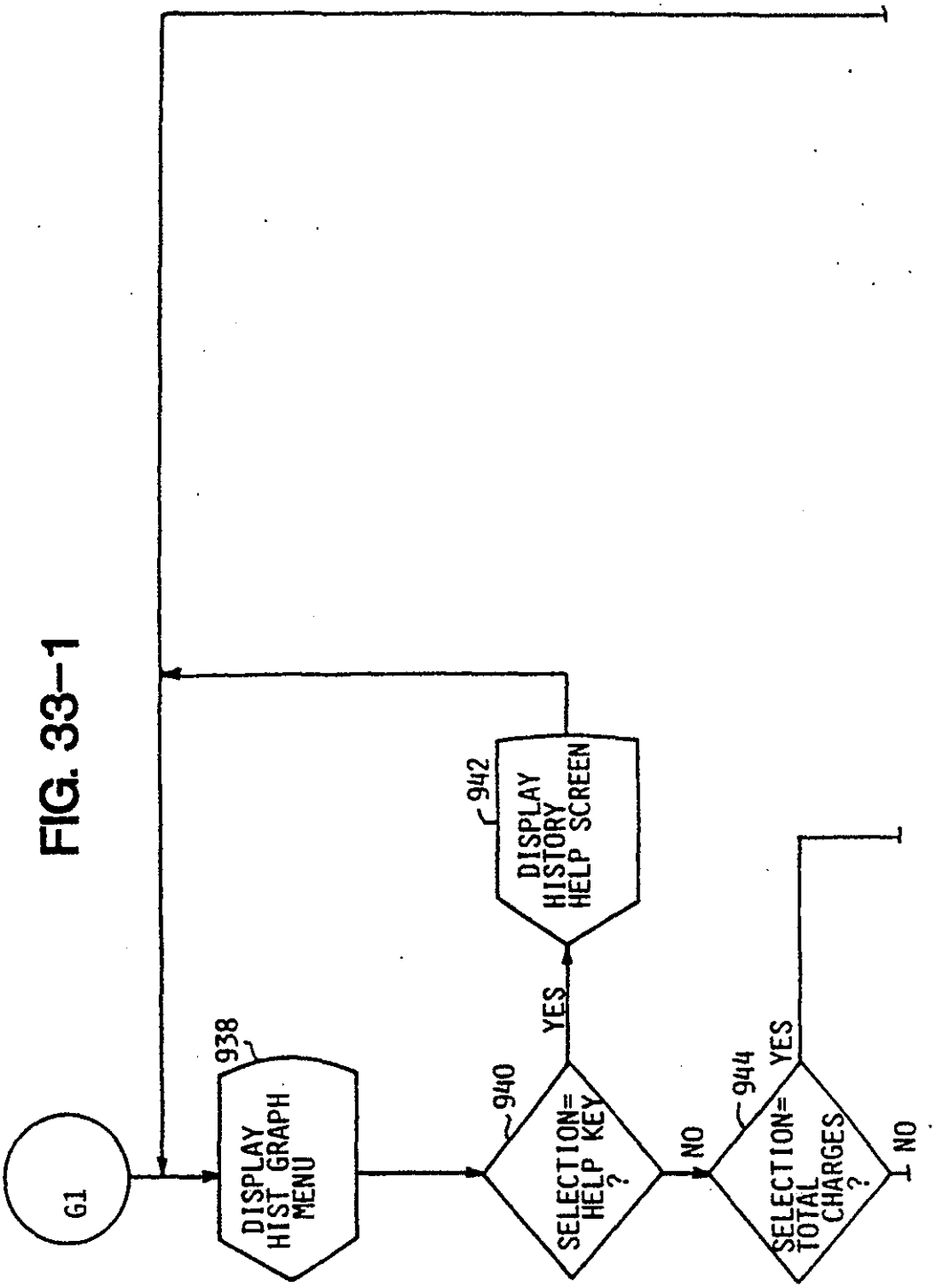

G
DISPLAY GRAPH DATA MENU
922
924
SELECTION= HELP KEY?
YES
DISPLAY GRAPH DATA HELP SCREEN
925
NO
926
SELECTION= HISTORICAL USAGE?
YES
G1
NO
930
SELECTION= CALL DISTRIB?
YES
G2
NO
934
SELECTION= ESC KEY?
YES
M

FIG. 33-1


G1
938
DISPLAY HIST GRAPH MENU
940
SELECTION= HELP KEY ?
YES
942
DISPLAY HISTORY HELP SCREEN
NO
944
SELECTION= TOTAL CHARGES ?
YES
NO

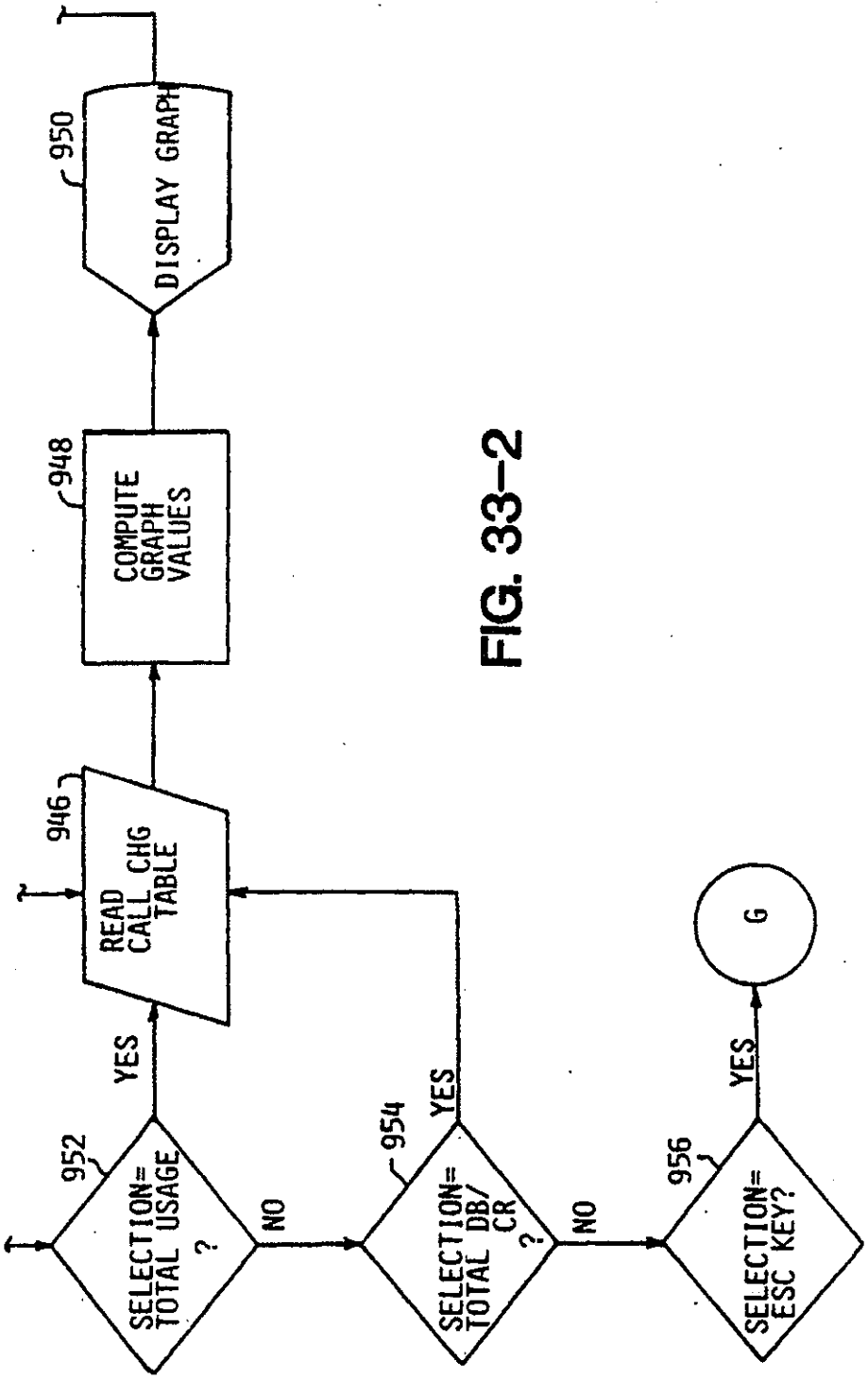
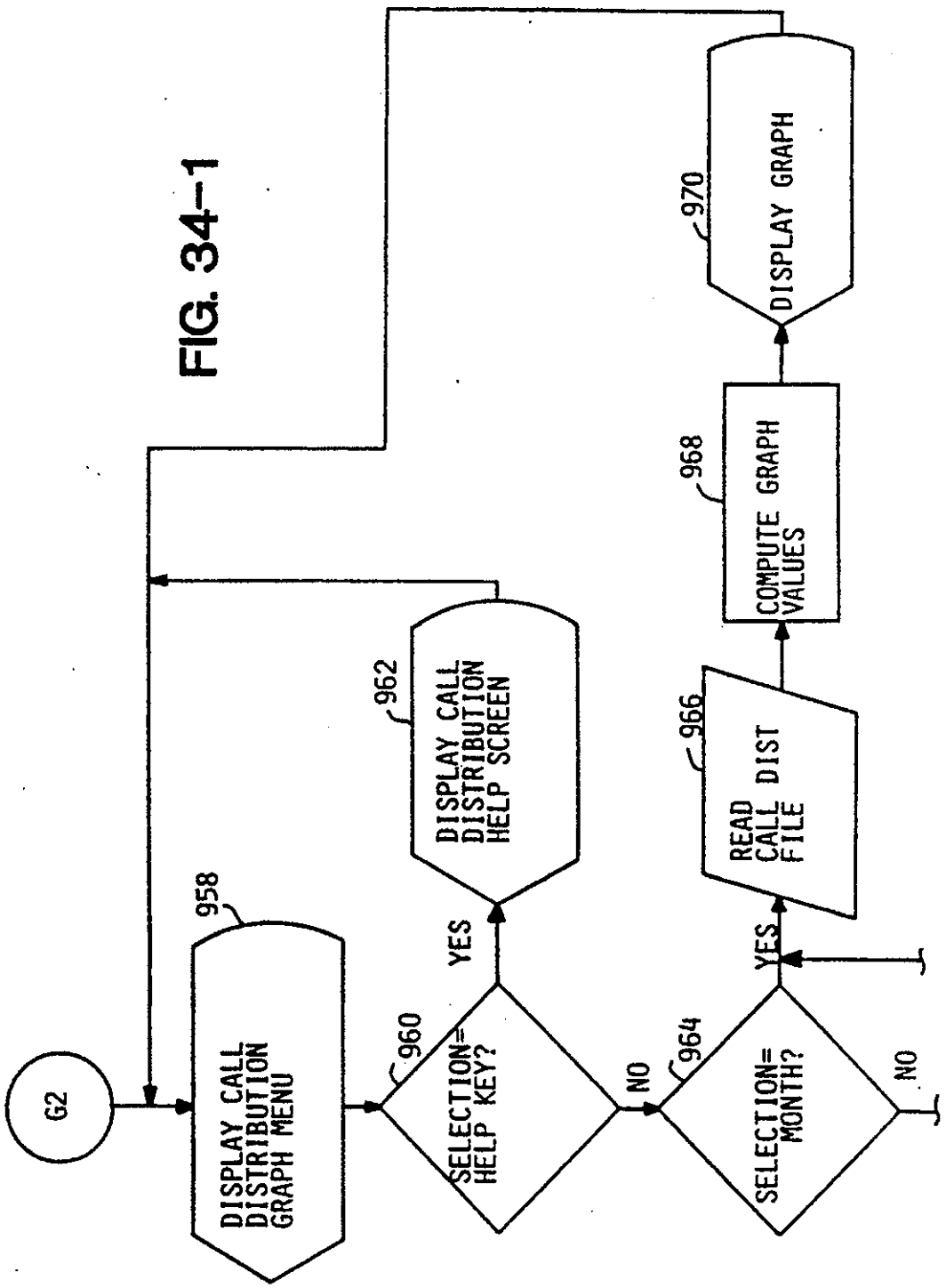

950
DISPLAY GRAPH
948
COMPUTE GRAPH VALUES
946
READ CALL CHG TABLE
952
SELECTION= TOTAL USAGE ?
YES
NO
954
SELECTION= TOTAL DB/ CR ?
YES
NO
956
SELECTION= ESC KEY?
YES
G

FIG. 33-2

FIG. 34-1


G2
DISPLAY CALL DISTRIBUTION GRAPH MENU
958
SELECTION= HELP KEY?
960
YES
DISPLAY CALL DISTRIBUTION HELP SCREEN
962
NO
SELECTION= MONTH?
964
YES
READ CALL DIST FILE
966
COMPUTE GRAPH VALUES
968
DISPLAY GRAPH
970
NO

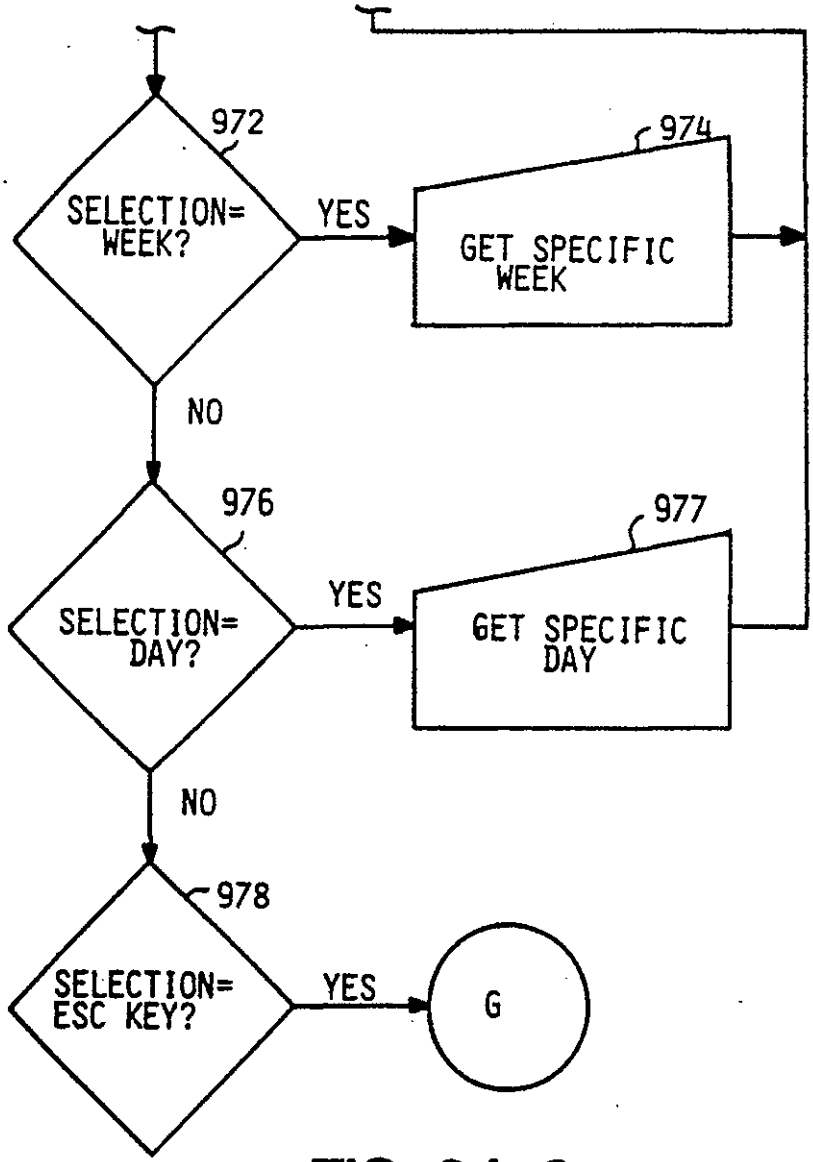

972
SELECTION= WEEK?
YES
974
GET SPECIFIC WEEK
NO
976
SELECTION= DAY?
YES
977
GET SPECIFIC DAY
NO
978
SELECTION= ESC KEY?
YES
G

FIG. 34-2

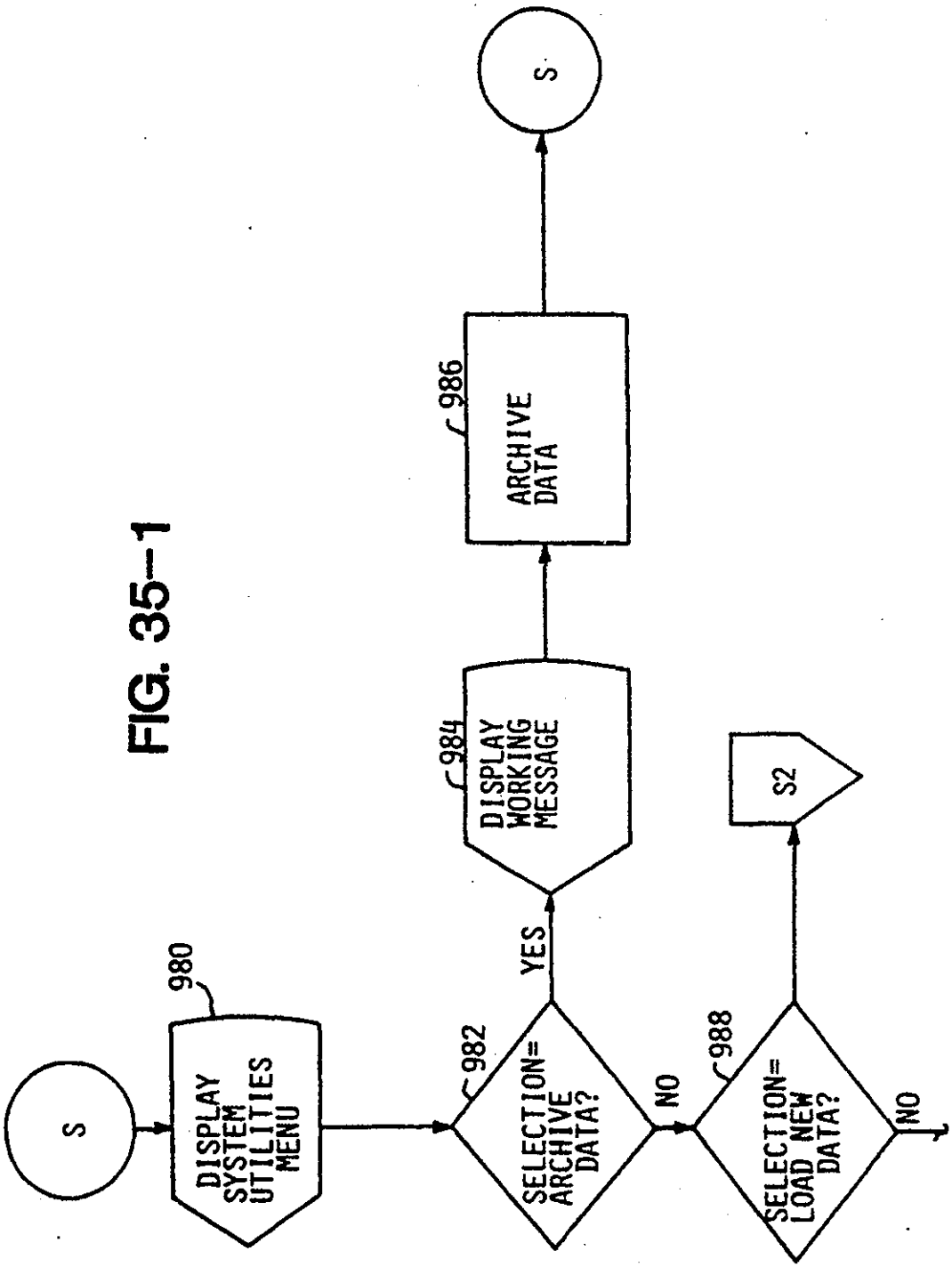
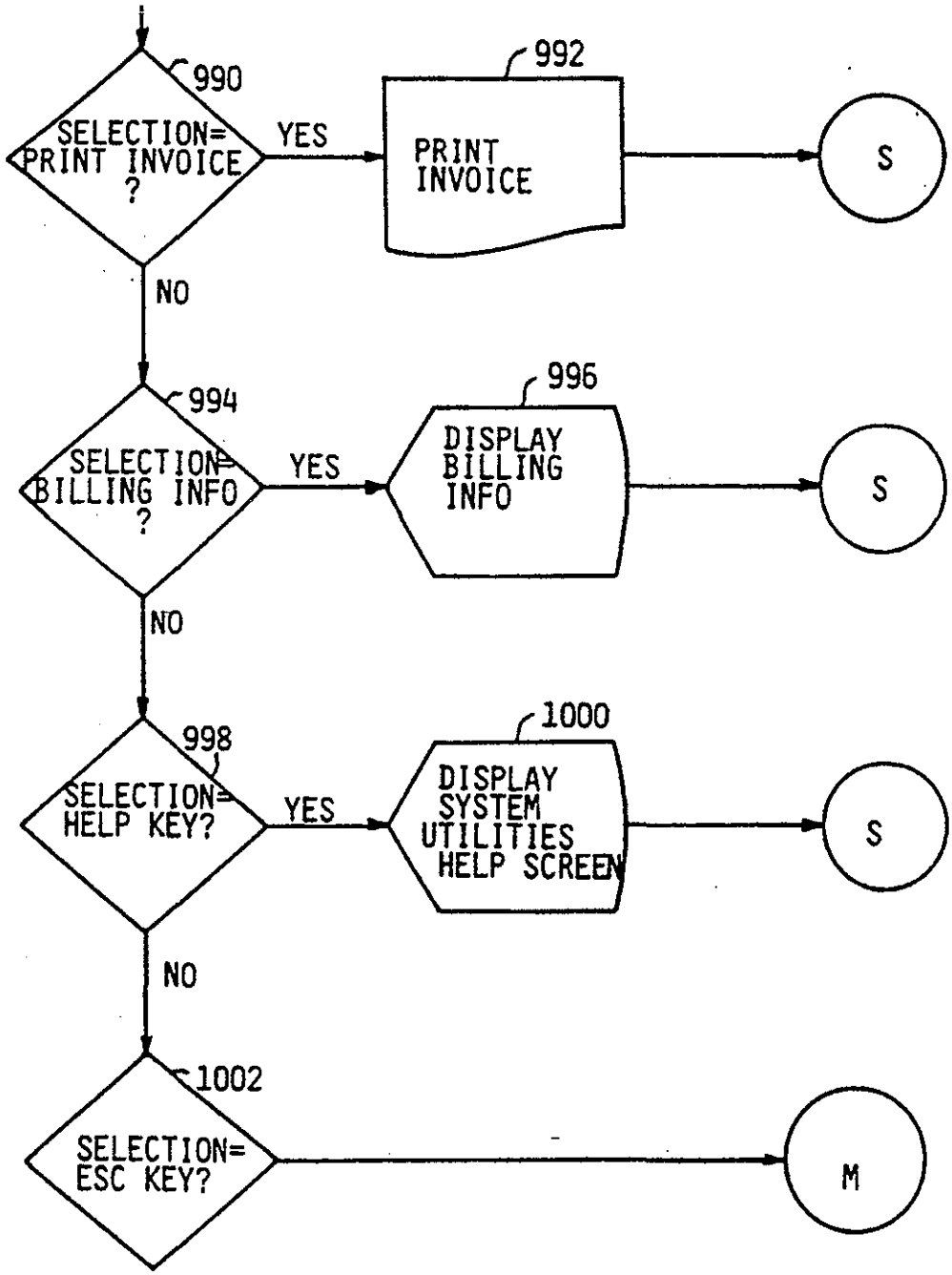

S
980
DISPLAY SYSTEM UTILITIES MENU
982
SELECTION= ARCHIVE DATA?
YES
984
DISPLAY WORKING MESSAGE
986
ARCHIVE DATA
S
NO
988
SELECTION= LOAD NEW DATA?
S2
NO

FIG. 35-1

FIG. 35-2


990
SELECTION= PRINT INVOICE ?
YES
992
PRINT INVOICE
S
NO
994
SELECTION= BILLING INFO ?
YES
996
DISPLAY BILLING INFO
S
NO
998
SELECTION= HELP KEY?
YES
1000
DISPLAY SYSTEM UTILITIES HELP SCREEN
S
NO
1002
SELECTION= ESC KEY?
M

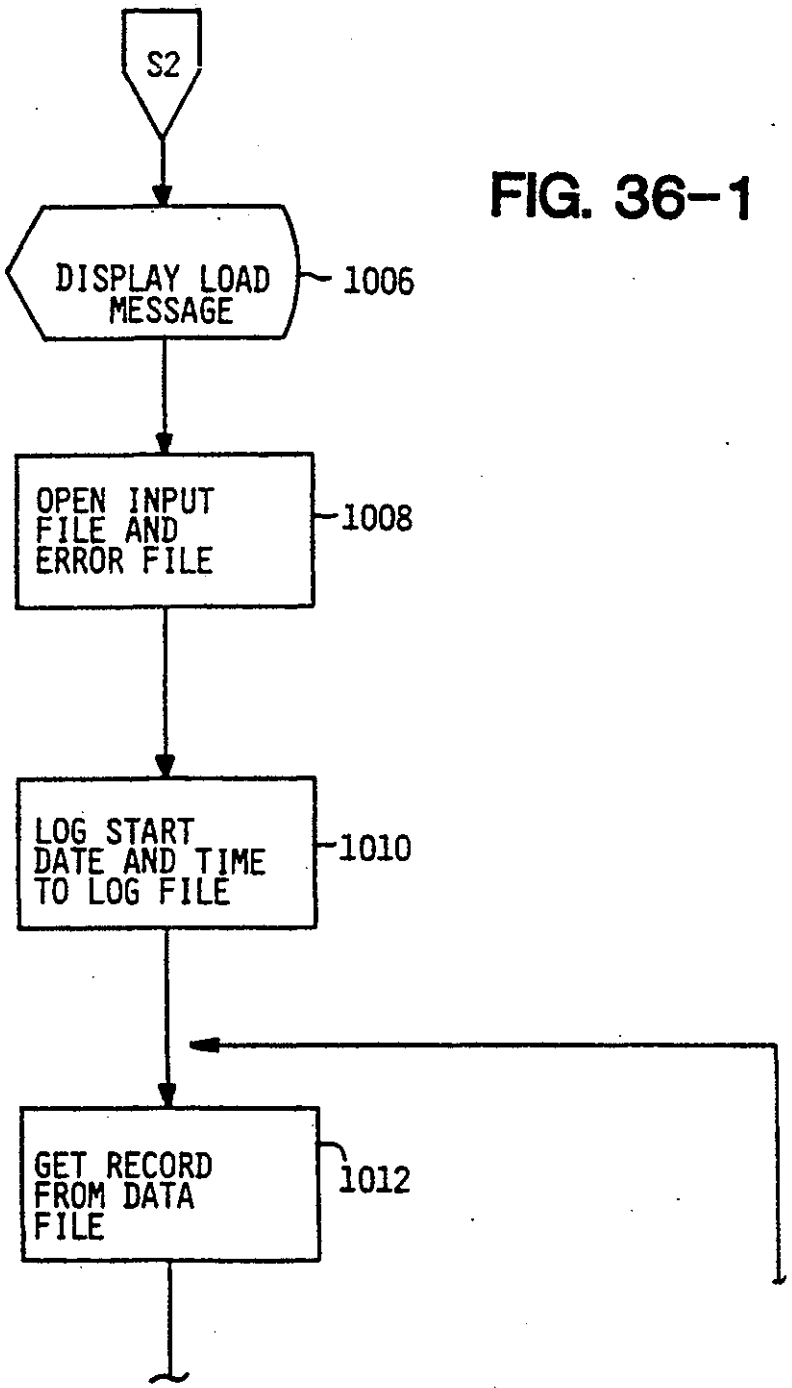

S2
DISPLAY LOAD MESSAGE
1006
OPEN INPUT FILE AND ERROR FILE
1008
LOG START DATE AND TIME TO LOG FILE
1010
GET RECORD FROM DATA FILE
1012

FIG. 36-1

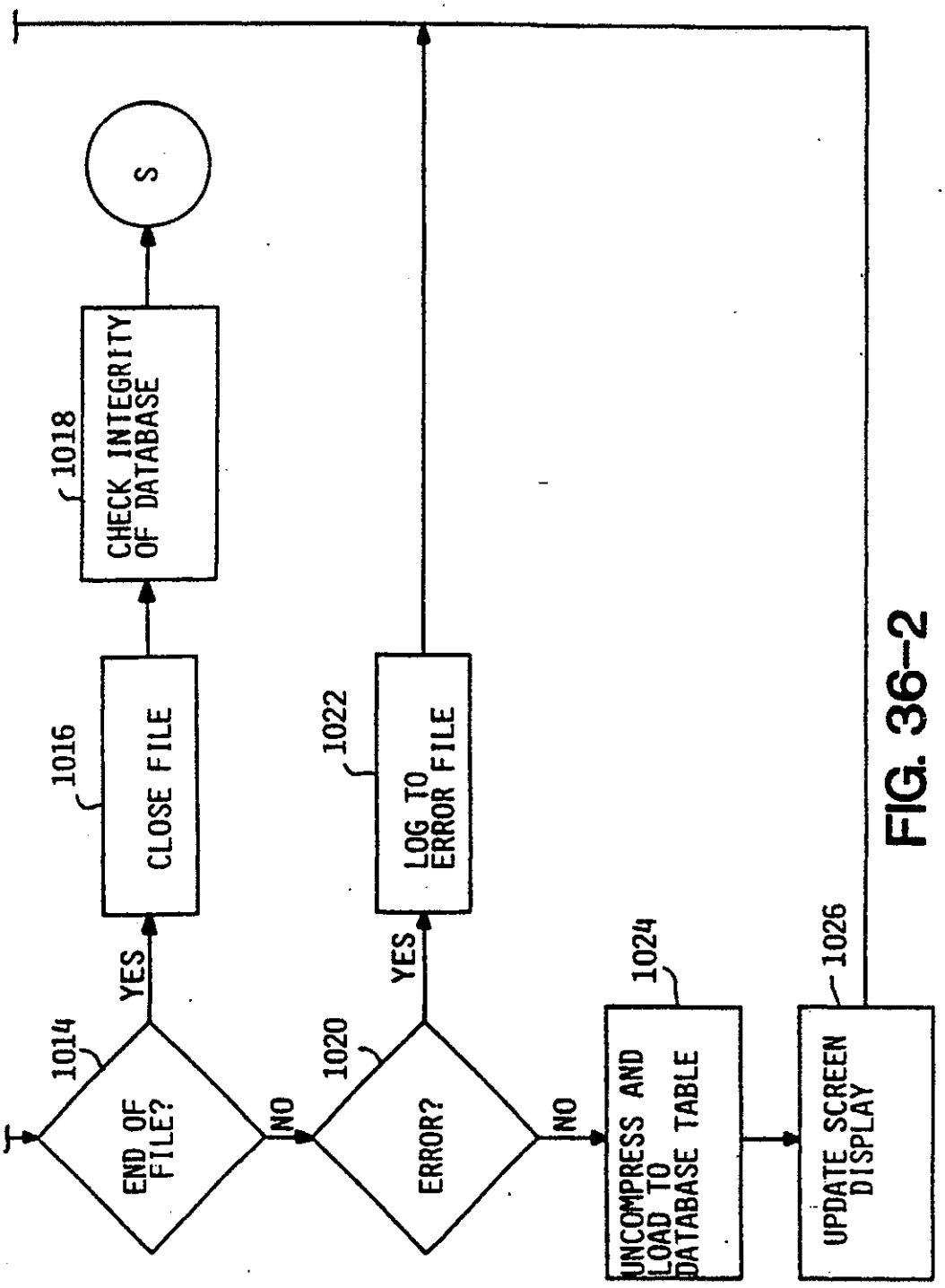

S
1018
CHECK INTEGRITY OF DATABASE
1016
CLOSE FILE
1022
LOG TO ERROR FILE
YES
YES
1014
END OF FILE?
NO
1020
ERROR?
NO
1024
UNCOMPRESS AND LOAD TO DATABASE TABLE
1026
UPDATE SCREEN DISPLAY

FIG. 36-2

BILLING SYSTEM

This application is a continuation of application Ser. No. 07/393,699 filed Aug. 14, 1989.

REFERENCE TO MICROFICHE APPENDIX

A Microfiche Appendix to this patent application, comprising 5 sheets of microfiche, contains 454 frames of computer program listings illustrating a preferred embodiment of the computer software code contemplated by the invention disclosed herein.

FIELD OF THE INVENTION

This invention relates generally to billing systems, and more particularly to systems for processing and displaying, under the control of a service customer, usage and cost information for services rendered to a customer by a service provider such as a telecommunications company, credit card company, or the like.

The invention relates particularly to systems for processing and displaying, under the control of a telecommunications service customer, usage and cost information for telecommunications services rendered to the customer by a telecommunications service provider, and to systems for providing telecommunications billing information in a form compatible with popularly available personal computers and popularly available personal computer operating systems and database management programs to permit selection, processing and display of usage and cost information under control of the telecommunications customer.

BACKGROUND OF THE INVENTION

Telecommunications costs have become a major expense for many large businesses and other organizations. Today's competitive business climate requires immediate communications between components of an organization and between the organization and its suppliers and customers. This need alone has produced over the last twenty years a dramatic increase in the use of traditional telecommunications services such as ordinary switched telephone service, leased-line telephone service and telex, typically provided by wireline common carriers. In addition, many non-traditional modes of electronic communications, such as facsimile and a variety of computer networking schemes use, as a transmission medium, either traditional or new telecommunications services offered by wireline carriers.

Organizations are under great pressure to reduce telecommunications costs while continuing to make available to their personnel and correspondents telecommunications services of acceptable quality and quantity. In order to minimize costs, attention is increasingly focused on analysis and processing of call-detail records to discover waste, unauthorized use, and savings opportunities which may arise from more efficient selection of carrier facilities.

For example, lengthy calls from a particular station may indicate inappropriate or inefficient use of the telephone by authorized personnel. A large number of calls to a particular geographical region may indicate that leased lines or tie-lines are economically justified. Since many telecommunications services are priced on a distance- and time-of-day-sensitive basis, and since several telecommunications carriers provide differing calling and volume discount plans, customers may avail themselves of additional savings opportunities by appropriately routing traffic over the lowest cost facilities and by contracting for special discounts based on usage information obtained from such analyses. A further requirement for call-detail record processing is to permit large organizations to pass along telecommunications charges to the originating department or other internal unit.

Such analysis and processing is hampered, because even large-volume telecommunications customers typically now receive a paper bill itemizing long-distance calls and other telecommunications charges by originating station. This paper bill is often the exclusive means by which the customer may obtain detailed information concerning telephone calls and other transactions from which charges arise. Further analysis is usually not provided by the carrier.

In order to process and analyze call-detail information on their own, customers have adopted a variety of techniques, but each of these has significant disadvantages. The information on a bill may be analyzed using non-automated methods, but these methods are not feasible for large customers, and even for the smallest customers are extremely expensive and error-prone. Since automated processing is preferred, some customers manually key-punch or machine-scan the paper bill into a computer system. While this approach somewhat reduces the cost of the analysis, the data entry steps remain expensive and error-prone.

Other customers may receive from the carrier a machine-readable tape containing call-detail records, but to the inventors' knowledge these tapes either carry unrated call information (i.e. the records do not include the cost of the call) or lack certain rating details without which it is impossible to exactly reconcile information on the tape with the paper bill. In addition, the type of tape media used, and the manner in which the information is organized on such tapes, require that an expensive mainframe-class computer be used to analyze the data.

Apparatus has also been developed which may be continuously connected to each outgoing station, telephone line or similar facility used by the customer and which records certain details concerning every outgoing transaction or call made over that facility. The records thereby produced may then be processed by a computer to apply an appropriate rating algorithm and arrive at an approximate cost for each transaction. However, since the customer's recording equipment is not identical to the equipment used by the carrier to acquire call-detail records, some discrepancies are virtually sure to occur, and these discrepancies will be propagated to the final results of the analysis. In addition, since the carrier's calling plans and tariffs may change frequently, a great deal of effort is required on the part of the customer to maintain up-to-date and otherwise accurate rating algorithms for processing the records.

Accordingly, the need exists for a system which provides to large-volume telecommunications customers the ability to conveniently and affordably analyze and manipulate call-detail and other telecommunications transaction information by computer, and which provides results which exactly correspond with the information printed on the customer's paper bill.

SUMMARY OF THE INVENTION

This invention contemplates a system combining standard data processing hardware and specially de-

signed software for distributing to large-volume telecommunications or other service customers telephone bills, credit card bills, and the like on diskettes compatible with commonly available small and inexpensive personal computers for customer-directed display and in-depth analysis. In brief, telecommunications or other service customers wishing to receive a diskette telephone or credit card bill subscribe for this service with their carrier or credit card company. A participating telecommunications carrier or credit card company (more generally: a "service provider," or simply "provider") extracts from its data processing facilities appropriately selected billing information for such subscriber. The provider then supplies this information to a "processor", who, according to the invention, segregates the billing data by subscriber, appropriately preprocesses the billing data to produce a variety of in-depth billing analyses in the form of graphs and summary reports, and reorganizes both raw and analyzed billing data into an optimal format for storage, manipulation, and display on commonly-available personal computers. The "processor" writes this information onto one or more diskettes compatible with the subscriber's personal computer, and distributes these diskettes to the subscriber. The subscriber, using an inexpensive personal computer and compatible software according to the invention, can display and analyze the telephone bill with greater efficiency, accuracy and flexibility than possible using the conventional paper bill. By appropriately selecting the billing information obtained from the service provider, the invention provides a telephone, credit card or other bill on diskette which is exactly reconciled with the paper bill.

One aspect of the invention includes an application software package, capable of running on a small computer (such as an IBM Personal Computer or compatible computer), which under the direction of the user can:

1. display the telephone bill (or selected subsets thereof) in its ordinary (paper-like) format;
2. display the bill (or selected subsets thereof) sorted in non-conventional order (e.g. call detail records sorted by length of call);
3. display a variety of preprocessed summary reports and graphs useful in analyzing telecommunications costs; and
4. display non-preprocessed reports according to user-formulated ad-hoc queries.

The information listed above may also be printed or written to a disk file in the user's computer for further processing by other software, such as a commercially available database management program which runs on an IBM-compatible personal computer. Information displayed by the inventive customer software is exactly reconciled with that printed on the customer's paper bill through means described below.

Another aspect of the invention involves the use of appropriate method steps and apparatus and control software for obtaining appropriate billing information from carriers and physically rearranging this information in such a manner that it is optimally pre-processed and reformatted into a form appropriate for efficient and rapid use in subscribers' personal computers, and writing the information in this format on compatible diskettes containing for distribution to subscribers

These functions may be performed by a third party processor engaged in the business of providing such services to service providers and their subscribers, or by the provider itself or perhaps even by a large corporate subscriber.

In the specific case of telephone billing, the bulk of the billing information used or supplied by a telecommunications carrier to the third-party processor for the purpose of preparing customer bills would consist of telephone-call-detail records including a carrier-assigned customer identification code, the originating station number, the called station number, a billing code classifying the type of call (e.g., night, evening or day), the length of the call, and the actual billed cost of the call according to the carrier's tariffs, volume discounts, and other billing plans. The carrier provides additional billing records to account for equipment rental charges, monthly service fees, payments, adjustments, taxes, and any other items affecting the amount billed to the customer.

According to the invention, the processor receives a subscriber's billing records from the carrier at a stage in the carrier's ordinary billing process after the carrier has posted to the subscriber's account all charges and credits, has performed all billing-related calculations for that subscriber, and is ready to print a paper bill. By selecting this specific stage of carrier bill processing from which to extract billing information, the invention ensures that the information supplied on diskette will exactly correspond to that on the paper bill.

Extensive processing is required to put the information received from a carrier into an optimal form for use on a personal computer. According to the invention, this processing is divided into two stages.

The first stage reformats data received from the carrier, segregates the records pertaining to each subscriber, analyzes billing data for each subscriber to generate a variety of preprocessed summary reports and graphs, and organizes the data into a table format suitable for loading into the particular database system used to manage this data on the subscriber's personal computer. In practice, since it is expected that the processor will receive a large number of records from carriers and the analysis performed on these records is extensive, this first stage of processing would be preferably performed on a mainframe-class computer, and is accordingly referred to hereafter as "mainframe processing."

The second stage of processing receives the information processed by the first stage, compresses this information into a more space-efficient format, for each subscriber writes this information on a diskette compatible with that subscriber's personal computer, and generates quality-control information useful in managing and tracking the production of diskette bills. These second-stage functions can be performed on a network of PC-class computers and is accordingly referred to hereafter as "PC processing."

Once diskette bills are produced in the "PC Processing" system, the resulting diskettes are mailed to customers who may use PC-compatible software according to the invention (the "user application") to display and analyze their bill. When the user receives the diskettes, the information thereon must be decompressed and loaded into a PC database using facilities provided by a user application program according to the invention. This user application preferably uses commercially available database software, such as "RBASE", a popular database package available for IBM-PC-compatible computers, to manage the billing records received on diskette. Except for a small amount of historical information used for certain graphs and summary reports,

the database can contain only one "bill" at any time. When a new bill is received, the previous bill may be archived to a non-database file (flat file) on the user's disk for convenient retrieval. The new bill then replaces the old bill in the user application database.

When writing information into the database, the user application employs commercially available software routines, such as RBASE-specific database interface routines. When reading information from the database, the user application either uses the commercially available interface routines, or a set of proprietary tree traversal routines (disclosed in the Microfiche Appendix) which substantially improve retrieval efficiency when reading sorted data from keyed tables. Thus, while the user application stores information in a database according to the RBASE storage model, the RBASE program per se is not required. However, a customer who happens to own a copy of RBASE could use it to obtain information from the database in ways not provided by the user application.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other features of this invention will be best understood by reference to the following detailed description of a preferred embodiment of the invention, taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a block diagram showing an overview of the data flow in a telephone billing system according to the present invention;

FIGS. 2-1 and 2-2 are a block diagram showing an overview of the data flow in the "Mainframe Processing" segment of the system of FIG. 1;

FIG. 3 is a block diagram showing an overview of the data flow in the "PC processing" segment of the system of FIG. 1;

FIG. 4 is a block diagram showing an overview of the data flow in the "User Application" segment of the system of FIG. 1;

FIG. 5 is a flow chart of the "main processing section" for a first processing program designated TPSB010 which is used in the "Mainframe Processing" segment of FIG. 2;

FIGS. 6-1 and 6-2 are a flow chart of the "initialization" section for the aforesaid first processing program used in the "Mainframe Processing" segment of FIG. 2;

FIGS. 7-1 and 7-2 are a flow chart of the "input data editing" section for the first processing program used in the "Mainframe Processing" segment of FIG. 2;

FIG. 8 is a flow chart of the "call detail accumulation" section for the first processing program used in the "Mainframe Processing" segment of FIG. 2;

FIG. 9 is a flow chart of the "station number break processing" section for the first processing program used in the "Mainframe Processing" segment of FIG. 2;

FIG. 10 is a flow chart of the "customer break processing" section for the first processing program used in the "Mainframe Processing" segment of FIG. 2;

FIG. 11 is a flow chart of the "end-of-file processing" section for the first processing program used in the "Mainframe Processing" segment of FIG. 2;

FIG. 12 is a flow chart of the "main processing" section for a second processing program designated TPSB020 which is used in the "Mainframe Processing" segment of FIG. 2;

FIG. 13 is a flow chart of the "initialization" section for the aforesaid second processing program used in the "Mainframe Processing" segment of FIG. 2;

FIG. 14 is a flow chart of the "erroneous customer data rejection" section for the second processing program used in the "Mainframe Processing" segment of FIG. 2;

FIGS. 15-1 and 15-2 are a flow chart of the "write PC transfer tape records" section for the second processing program used in the "Mainframe Processing" segment of FIG. 2;

FIG. 16 is a flow chart of the "end-of-file processing" section for the second processing program used in the "Mainframe Processing" segment of FIG. 2;

FIGS. 17-1 and 17-2 are a flow chart of a program used in the "PC Processing" segment of FIG. 3 for reading a mainframe-produced tape;

FIGS. 18-1 and 18-2 are a flow chart of a program used in the "PC Processing" segment of FIG. 3 for loading billing data onto PC-compatible diskettes;

FIG. 19 is a flow chart of a program used in the "PC Processing" segment of FIG. 3 for creating a mainframe-readable export tape;

FIG. 20 is a flow chart of the "main-menu" section for a customer-service file maintenance program which can be used in the "PC Processing" network of FIG. 3;

FIG. 21 is a flow chart of the "add new carrier" section for a customer-service file maintenance program of FIG. 20;

FIG. 22 is a flow chart of the "edit existing carrier" section for the customer-service file maintenance program of FIGS. 20 and 21;

FIG. 23 is a flow chart of the "add new customer" section for the customer-service file maintenance program of FIGS. 20–22;

FIG. 24 is a flow chart of the "edit existing customer" section for the customer-service file maintenance program of FIGS. 20–23;

FIG. 25 is a flow chart of the "display errors" section for the customer-service file maintenance program of FIGS. 20–24;

FIG. 26 is a flow chart of the "display reports" section for the customer-service file maintenance program of FIGS. 20'25;

FIG. 27 is a flow chart of the "system maintenance" section for the customer-service file maintenance program of FIGS. 20–26;

FIGS. 28-1 and 28-2 are a flow chart of the "main menu" section for the aforesaid "User Application" program of FIG. 4;

FIGS. 29-1 and 29-2 are is a flow chart of the "display billing inquiry" section for the "User Application" program of FIG. 4; FIGS. 30A-1, 30A-2, and 30B are flow charts of the "display call detail" subsection of the "display billing inquiry" section for the "User Application" program of FIG. 4;

FIGS. 31A-1, 31A-2 and 31-B are flow charts of the "display call summary" subsection of the "display billing inquiry" section for the "User Application" program of FIG. 4;

FIG. 32 is a flow chart of the "graph data" section for the "User Application" program of FIG. 4;

FIG. 33-1 and 33-2 are a flow chart of the "graph historical usage" subsection of the "graph data" section for the "User Application" program of FIG. 4;

FIG. 34-1 and 34-2 are a flow chart of the "graph hourly call distribution" subsection of the "graph data" section for the "User Application Program" segment of FIG. 4;

FIGS. 35-1 and 35-2 are a flow chart of the "system utilities" section for the "User Application" program of FIG. 4;

FIGS. 36-1 and 36-2 are a flow chart of the "load new data" subsection of the "system utilities" section for the "User Application Program" segment of FIG. 4.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Overall System Summary

The mainframe processing aspect of the invention involves four major activities: a first sort, an editing and table accumulation program, a second sort, and transfer tape production program. The billing information may be received from one or more telecommunications carriers via magnetic tape, disk, or data communications lines (referred to hereafter for simplicity as "billing tape" or simply "tape"). The information is received in formats roughly corresponding to the logical record layouts according to which that information is stored in each carrier's data processing facilities. Because this information will be obtained from the carrier as unstructured (flat-file) dumps of their accounting databases, records for a particular customer may appear in several files and consequently may be widely distributed along the tape. Therefore, in the first sort, the system first sorts all billing data received on the carrier tape by customer identification code and originating station number to group all records for a specific customer together.

The editing and table accumulation program performs the bulk of the mainframe processing work. This program handles the entire set of records received on the carrier tape in one pass, processing one record at a time. Since these records have been previously sorted by customer identification code and originating station number, each record is edit-checked to ensure that the appropriate type of data is contained in each field. Since the invention contemplates receiving billing information from multiple carriers, a generic internal record format is defined, to which each billing record received from various telecommunications carriers is converted according to a carrier-specific algorithm. For most records in the input stream (and particularly call-detail records), the editing and table accumulation program generates a corresponding output record in the generic format. In addition, this program accumulates data to produce for each customer a variety of precalculated summary reports and graphs which are included on the diskette bill and are thus available for display on the user's personal computer with minimal additional personal computer processing. These include the following:

- number of calls, length, and total call cost for each accounting or project code;
- number of calls, length, and total cost for day, evening and night calls for each carrier;
- number of calls, length, and total cost of calls of each call type;
- number of calls, length, and total cost for day, evening, and night calls to each terminating area code;
- number of calls, length, and total cost for calls of each product type (i.e. carrier's marketing plan);
- number of calls, length, and total cost for day, evening, and night calls from each site or location identifier;
- number of calls, length, and total cost for calls made from each originating station and authorization code;
- graphs showing historical usage by month; and
- graph showing number of calls made by hour of the day.

While these tables could be generated on the subscriber's personal computer by conventional methods using information present in call-detail records without the mainframe preprocessing contemplated by this invention, this would require a time-consuming front-to-back scan of the entire contents of the database. By preprocessing these tables on a computer with greater processing and storage resources, the present invention optimally makes the most commonly-needed reports and graphs immediately available upon the user's request, at the relatively modest expense of additional mainframe processing and additional PC database storage requirements.

In order to pass the preprocessed report information along to the user's personal computer via the diskette bill, the editing and table accumulation program generates new information records in addition to those from the input stream which are merely edited and reformatted. The ultimate target of the carrier-supplied billing information is a database located on the user's personal computer, which database is organized, at the logical level, into a number of tables. To permit subsequent processing steps to identify the information contained in records, each record which is outputted by the editing and table accumulation program has a record-type identifier, specifying the particular database table to which the record belongs.

Two additional activities are performed during the mainframe processing segment to prepare the data for transfer to a "PC Processing" network. After the editing and table accumulation program has completed, a second sorting step sorts the output file by customer identification code and record-type identifier to place the records in an optimal order for creating diskette bills and for loading the information on the diskette into the database on the user's personal computer. At this point, a file exists on the "mainframe" computer in which, for each customer whose billing information appeared on the carrier billing tape, all records are grouped consecutively, and among the records for a particular customer, all records of a specific type are grouped consecutively. A transfer tape production program adds control records expected by the "PC Processing" software at the beginning and end of this file, and surrounding the data for each carrier, customer, and table within the file. The output of the transfer tape production program is then written to a tape which will be transported to the "PC Processing" network.

In order for the customer to display and further analyze this edited and preprocessed information using the customer's personal computer, it must be placed on PC-compatible diskettes. According to the invention, the production of such diskettes is optimally performed using a network of PC-class computers. The diskette production segment is therefore referred to as "PC processing."

The "PC Processing" network reads the tape containing mainframe-processed billing records, and for each customer represented thereon produces one or more diskettes compatible with the customer's personal computer and containing that customer's telephone bill information. The network is preferably implemented

using commercially available IBM Token-Ring hardware and Novelle network software. A Tape Controller PC (TCPC) with a disk drive and a 9-track tape drive is used to read the tapes produced by the mainframe. Two File Server PC's (FSPC's) with large disk drives temporarily store billing information read from mainframe tapes until diskette bills have been successfully prepared. Also stored on the FSPC's is a master database used to track tapes and diskette bills which have been prepared by the system. Several Loader Controller PCs (LCPC's), each controlling an automated diskette loader, manage production of diskette bills. The automated diskette loader includes a diskette drive connected to the LCPC and a mechanical arrangement controlled by the LCPC which can insert and remove diskettes without operator assistance.

The "PC Processing" network operates under the control of several programs which manage the production of diskette bills. A transfer tape transcription program reads information from the mainframe-produced transfer tape. For each tape read, an entry identifying the tape is placed in the master database. For each customer found on the tape, the transfer tape transcription program looks up the customer's record in the master database to determine which size and capacity diskette that customer requires. The transfer tape transcription program then determines which of the automated diskette loaders is capable of producing that diskette, and identifies the least busy loader. The transfer tape transcription program obtains the next available disk control number (DCN) (a tracking number uniquely and serially assigned to each set of diskettes produced by the system) from the master database. The transfer tape transcription program then copies all the data for the current customer from the tape onto a file server subdirectory assigned to the identified loader. The transfer tape transcription program makes a number of housekeeping entries in various database tables and begins processing the next customer's data from the mainframe tape.

On each loader controller PC, an automated loader control program manages the actual production of diskette bills. The automated loader control program continually examines the file server subdirectory assigned to the automated diskette loader it controls. When the automated loader control program finds a file in this subdirectory, it copies the file onto a disk in the loader controller PC, applying a data compression algorithm. Data compression reduces the number of diskettes which must be produced for customers with large numbers of call-detail records. In addition, compression enhances security, since without facilities provided by the user application on the customer's personal computer, the information would be difficult to decode. The automated loader control program then copies the compressed data onto one or more diskettes, instructing the automated loader to insert and remove diskettes as required. When the automated loader control program finishes preparing diskettes for a particular customer, it automatically examines its assigned file server subdirectory to determine if files for additional customers are available.

The master database on the "PC processing" network maintains an inventory of tapes received, diskettes produced, and other customer-service related information. A package of inquiry and update programs is available to customer service agents enabling them to maintain and query this database. When new customers subscribe to the service, entries are made in the master database. An export tape production program extracts certain customer information from this database (particularly the customer's carrier-assigned identification number and a separate customer ID assigned by the "processor") to produce an export tape which may be sent to the mainframe computer to update customer databases which may be stored thereon.

Detailed System Description

FIG. **1** is a data flow overview of a system in accordance with this invention for distributing PC-compatible diskette telephone bills to large-volume telecommunications customers. In brief, telephone communications customers **24** wishing to receive diskette telephone bills subscribe for this service with their telephone carrier **10**. Participating carriers **10** provide appropriately selected billing information **12** for such all participating subscribers to a "processor" company **13** which, according to one aspect of the invention, segregates the billing data by subscriber, performs a mainframe computer preprocessing step **14** to produce a variety of in-depth billing analyses in the form of graphs and summary reports **16**, and reorganizes both raw and analyzed billing data into an optimal format **18** for storage, manipulation, and display on commonly available personal computers (referred to herein as "PC's"). The processor **13** then performs a PC processing step **20** which writes this information onto one or more diskettes **22** which are compatible with the subscriber's personal computer, and distributes these diskettes to the subscribers **24**. Then the subscriber, using an inexpensive personal computer **25** and PC-compatible software according to another aspect of the invention, can display and analyze a telephone bill with greater efficiency and flexibility than possible using the conventional paper bill. By appropriately selecting the billing information **12** which is obtained from the subscriber's carrier, however, the invention provides a telephone bill on diskette which is exactly reconciled with a standard paper bill supplied by the carrier.

The PC aspect of the invention includes an application software package, capable of running on an IBM-PC-compatible computer **25** and capable (under the direction of the end user) of: 1) displaying the telephone bill or any portions of the telephone bill in its ordinary or paper bill format; 2) displaying the bill or selected portions of the bill sorted in a non-conventional order (for example, call detail records sorted by length of call); 3) displaying a variety of pre-processed summary reports and graphs useful in analyzing the subscriber's telecommunications costs; and 4) displaying non-pre-processed reports according to user-formulated ad-hoc query requests.

But extensive processing is required to put the information **12** received from the carrier into an optimal form for use in a personal computer **25**, and it is this processing which is carried out on the mainframe class computer **14**. The steps of obtaining and rearranging appropriate billing information obtained from the carrier **10** are outlined in FIGS. **2-1** and **2-2**, which is a block diagram showing an overview of the data flow in the "mainframe processing" segment **14** of FIG. **1**.

Mainframe Processing

FIGS. **2-1** and **2-2** illustrates a batch program in which billing information from one or more telecommunications carriers **10** is received via magnetic media

or telephone communications channels in formats roughly corresponding to the logical record layouts according to which the information is presently stored in each carrier's data processing facilities. Appropriate data is selected from the carrier's accounting databases and written to tape 46 in an unstructured, flat-file format. The invention contemplates that the records for any given communications customer will most likely appear in several files in a non-serial fashion and consequently will be widely distributed along the length of the tape. Accordingly, a program TPSB010 is responsible for retrieving the information from the tape and performing an extensive and complex mainframe processing procedure in order to reduce the information to a form which is sufficiently compact and compatible to be subsequently manipulated on a personal computer.

The operation of FIGS. 2-1 and 2-2 first performs a sort 48 on the entire input data from tape 46 to produce an intermediate file 50 containing the original information rearranged in customer number and station number order. In step 52 a number identifying the telecommunications carrier for which the bills ar to be produced is read. It is contemplated that this information will be retrieved from either an operator's console, an 80-column card, or any other suitable input device. The TBSB010 program shown in step 54 edits and reformats the data into a format that the target PC 25 can process. The processing in step 54 contemplates that abort messages and other operator response or intervention can take place during processing as indicated by step 56. All edit error information and balance control information is compiled in a report 16A, which is a portion of the report output 16 of FIG.

As a result of processing step 54, records in a format designated "PCdata," customer numbers with invalid data, and balance control information all move to respective temporary storage files on respective data storage disks 1, 2, and 3, as shown by steps 60, 68 and 70. In addition to reformatting the original billing records, program TPSB010 accumulates summary reports and graphs for each customer and incorporates this data as additional records in file 60. Each record outputted by program TPSB010 includes a numeric record type identifier. SORT 2 (step 62) reorganizes the records in intermediate file 60 by customer number and record type, placing the results into temporary file 64. For each customer, all records of a particular type are now grouped together.

The data in temporary files 64, 68 and 70 is used by a second mainframe program known as TPSB020 as indicated by step 66. The latter is designed to convert the data into a PC-compatible data stream which is then stored on a 9-track tape medium in step 72. During the processing indicated in step 66 abort messages may be received as shown by step 74. On completion of the processing by program TBSB020 and writing of the final data to the 9-track tape, all edit error information and balance control information is compiled as reports 16B, which corresponds to a portion of the reports indicated at 16 in FIG. 1.

Attention is directed next to FIG. 3 which is a block diagram overview of the data flow in the "PC processing" segment 20 of FIG. 1. The PC processing system has a tape reader 78 which reads the 9-track tape that was prepared in step 72 of FIGS. 2-1 and 2-2. The output of the tape reader 78 is fed to a TCPC (Tape Controller PC) 80, which could be an IBM PC AT class machine, PS/2, or equivalent product having a 20-megabyte hard disk drive 81. Upon reading the tape information the PC 80 drives printer 82 to prepare an identification label for each individual customer diskette. The PC 80 also drives a second printer 84 which prepares mailing labels for the individual customers' diskettes.

PC 80 stores the data received from the reader 78 on a local area network 83 which includes one or more FSPCs (file server PCs), such as a file server #1, designated 84, and a file server #2. designated 86. This local area network may employ any standard local area network architecture appropriate for micro-class computers such as a ring, token ring, or other distributive area network system. It is also contemplated that this local area network will be driven by software commonly available for local area networks, such as that produced by such companies as Novelle and 3-Com.

For each customer, billing records received from the PC 80 by the local area network are temporarily stored in a file on either file server #1 or file server #2, depending upon a determination by PC 80 as to which server has fewer files waiting to be processed in its queue. Attached to file server #1 is a personal computer labelled 88, and a counterpart is attached to file server #2 designated 90, which are both available for on-line handling of customer service inquiries and updating transactions as necessary.

Each file server 84 and 86 transmits through the local area network individual customer information to be placed upon respective individual customer diskettes by one or more LCPC's (loader control PC's) which may be micro-class personal computers 92, 94, and 96 having respective 20-megabyte fixed disk drives 93, 95 and 97. Attached to each of these micro-computers are respective 5¼" and 3½" floppy diskette loaders 98, 106 and 102 which transfer the individual customer information onto individual customer diskettes of the required size. This data is preferably stored on the floppy disks in a compressed format.

FIG. 4 is a block diagram overview of the data flow in the "user application" segment 24 of FIG. 1. The floppy diskettes 22 (see also FIG. 1) are those which were produced on the loaders 98, 106 and 102 of FIG. 3. Each set of diskettes 22 constitutes an individual customer's telephone bill as supplied by the processor 13 of FIG. 1, arranged in a particular manner that facilitates rapid manipulation by the customer's personal computer running a user application program 105 according to this invention, which has been previously supplied to the customer by the processor 13 or carrier 10 of FIG. 1.

The user application program 105 includes a user application database file 108. This file is maintained on a fixed disk in the user's personal computer and stores the information for a single telephone bill (i.e. a single month's billing for a single customer) for rapid and flexible information retrieval. The database file has a structure compatible with a selected commercially available data base management system program, preferably a program widely sold under the name "RBASE." In step 106, information from a new diskette bill 22 (which was compressed as described in the section discussing FIG. 3) is restored to uncompressed form and loaded into the database file 108. Since the database file 108 may contain only a single month's bill (except for a small amount of historical trend information), each time a new diskette bill 22 is received, any previous bill in the database must first be removed. The

user application program 105 will store such previous bills removed from the database file 108 in non-database (i.e. "flat") archive files 110, which may be reloaded into the data base file 108 from time to time for further analysis.

The user application program then performs a step 112 which selects the appropriate data necessary to prepare reports of different types and extract specific information from the available data base. The resulting reports my then be printed out as standard reports or ad hoc inquiries 114, preprocessed reports 120, graphic reports 126 or a payment coupon for transmission along with payment of the bill to the telecommunications carrier 10. The first three reports can also be written to storage files 116, 122 and 128, or displayed on the video screen of the customer's personal computer 25 as indicated at 118, 124 and 130 respectively.

TPSB010

We now turn our attention to FIG. 5, which is a flow chart showing details of the main loop of the TPSB010 program 54 used in the mainframe processing segment of FIGS. 2-1 and 2-2, and FIGS. 6-1 and 6-2 which is the initialization routine carried out before entering the main loop illustrated in FIG. 5.

Apart from branching to program junction P2 which jumps to other program routines discussed below, the initialization routine of FIGS. 6-1 and 6-2 begins with step 178 where the program reads a carrier control data card 180 (or other information input device) identifying the telephone communications carrier whose individual customer records are currently being processed. Program step 182 then determines whether the carrier identification number is a valid carrier number. If the answer is negative, then in step 184 the program advises the operator of a program abort condition. Then the operator will be required to perform some manual process (step 186) before the program aborts as indicated by step 188. If a valid carrier identification number is detected by the system at step 182, however, then in step 190 the customer information is read from an input file 192, which corresponds to the data file 50 of FIG. 2.

The next step is 194, which detects an abnormal abort condition, i.e. no data at all in the file. If step 194 detects an end-of-file condition, then in step 196 the operator is notified of an abort condition, thus requiring a manual response 198 by the operator, after which the program is aborted at step 200.

If an abnormal end-of-file condition is not detected at step 194, however, then a second end-of-file (EOF) test 194 is performed to detect a normal end-of-file condition, i.e., one which occurs at the conclusion of normal processing. The reason why test 194 only detects abnormal end-file-conditions is because its input comes from step 190 at the beginning of an input record read. Test 195, in contrast, has a second input coming from program jump P8 in FIG. 5, which occurs repeatedly for each individual record. The affirmative output of step 194, therefore, goes to jump point P3 leading to the end-of-file processing routine described below in connection with FIG. 11. Conversely, the negative output of test 194 goes to step 202 which will initialize the working storage space and set up the control fields for customer processing and proceed to program branch point A4 which enters the main loop of FIG. 5.

At this point step 148 of the main program loop determines whether the program is continuing with the same customer as on the previous processing cycle, or whether processing of that customer has been completed and processing of a new customer started. It does this by determining whether the current customer ID number is or is not equal to the one processed by the previous processing cycle. If they are not equal, then a new customer is being processed and the program jumps at junction P4 to a customer break processing routine which continues at FIG. 10, described below. Subsequently, the main loop of FIG. 5 is reentered at program junction A5.

If the customer ID's are equal, however, then there is no customer break and the program proceeds in step 154 to test whether there has been a change in the current customer's station ID number. If there has been a change, the program jumps at P5 to the station number break processing routine discussed below in connection with FIG. 9, and the main loop of FIG. 5 is reentered at junction A5.

If the station number continues to be the same as on the last processing cycle, however, then the program jumps at branch point P7 to an input data editing routine discussed below in connection with FIGS. 7-1 and 7-2. The main loop of FIG. 5 is then reentered at point A7, where program step 162 determines whether there are any errors. If there are, the program immediately goes to step 174, to read the next record from temporary file 50 (FIG. 2), and exits through a program jump P8 to the error detection routine described above in connection with FIGS. 6-1 and 6-2.

If there are no editing errors, the program jumps to branch point P6 leading to the call detail accumulation routine of FIG. 8, discussed below, and the main loop of FIG. 5 is reentered at program point A6 leading to step 170 which writes a call detail record (also referred to as "record type 4") to a file 60 on data storage disk 1 (FIGS. 2-1 and 2-2). The program also then goes on to perform step 174 and jump to program point P8 as described above.

We turn next to FIGS. 7-1 and 7-2 for a detailed discussion of the "input data editing" section of "main frame processing" segment TPSB010 of FIGS. 2-1 and 2-2. The overall purpose of this step or process is to determine if an error condition exists as to any of several factors reviewed in the customer's telephone information, and to produce the necessary operator reports and files as to any error conditions detected.

Starting with program jump P7 from FIG. 5 described above, the first step 206 of this data edit process is a determination by the program of whether the customer identification number for the currently processed customer consists of only numeric values and of whether these values are greater than 0. If this determination is negative, then step 208 will notify the system operator that the program is aborting and that the program will be held frozen until the required operator response 210 is received. Then the program will abort as indicated by step 212.

Should the test of step 206 be affirmative, however, then the customer identification information is passed on to step 214 to determine if the telephone station number of the telephone call currently being processed is numeric and has a greater value than 0. If not, then program step 216 will set an error switch. Then at step 218 a determination is made whether the telephone call duration information for the currently processed telephone call is numeric and is greater than 0. If that condition is not true, then an error switch is set in step 220.

In step 222 the program determines whether the charge amount for the currently processed telephone call is numeric and greater than 0. Should that be false then an error switch is set by step 224. Should the charge amount be numeric and greater than 0 the currently processed call information is then passed on to step 226 which determines if an error switch has been activated by any of the above-described steps 216, 220 or 224. If so, the program invokes step 228 to create an error report which may be written directly to disk 2 as described above (step 68 of FIG. 2). The error report created by step 228 also is written by step 232 to another file on disk 1 which corresponds to step 60 of FIG. 2. In any case, the program then sends the currently processed telephone call information on to program junction A7 which reenter it into the main loop data flow of FIG. 5.

For more information regarding the call detail information accumulation process of the "main frame processing" program of FIG. 2, we now turn to the flow chart of FIG. 8. This routine is entered at program jump point P6 coming from the main program loop of FIG. 5 described above. The first step 238 accumulates the total number of calls, their duration, and their charges according to a standard geographic breakdown known as "NPA." The next step 240 does the same accumulation, broken down by call types, i.e., evening, off-hour or daytime full rate calls. The next step 242 does the same accumulation, broken down by customer station number. The information accumulated by steps 238, 240 and 242 is then returned for processing via program jump A6 for reentry into the data flow of the main program loop of FIG. 5.

For a more detailed understanding of the station number break routine we now turn to FIG. 9, which is a flow chart of the station number break processing section of the "mainframe processing" segment TPSB010 of FIGS. 2-1 and 2-2. This routine is entered via program jump point P5 coming from the main loop of FIG. 5. In the first step 246 a "statsum rec" or station summary record (also designated a record type 5) is created and written to output disk 1, corresponding to step 60 of FIGS. 2-1 and 2-2). This is a summary of total telephone usage in terms of the number of calls, call duration and charges, broken down by geographical area and call type, for a given customer calling station. This record is written to file 60 of FIGS. 2-1 and 2-2. The next step 250 accumulates station sum records for all customer stations, broken down by call duration and charges, for the current customer. Then in step 252 the program resets the station accumulation fields and break fields to their initial values before going on the next station for the current customer.

We now come to FIG. 10 which is a flow chart of the customer break processing section of program TPSB010 used in the "mainframe processing" segment of FIGS. 2-1 and 2-2. This routine is entered by way of program jump P4 from the main loop of FIG. 5. The program's first step 258 prepares and writes a "carsum rec" or carrier sum record (also designated record type 3) which covers the same information as the "statsum rec" of FIG. 9 but contains the total figures for all telephone calls and their duration and charges for all customer stations for a given customer and a given telephone carrier. This information is then sent for online storage to a file on disk 1, corresponding to step 60 in FIGS. 2-1 and 2-2. Similarly, step 262 prepares and writes to disk 1 (step 60 of FIG. 2) a "NPAsum rec" or NPA summary record (also designated record type 7) which contains the same information broken down geographically, e.g., by area code. The next step 264 prepares and writes to disk 1 (step 60 of FIG. 2) a "codesum rec" or code summary record (also designated record type 6) which contains the same information broken down by call type code, i.e., evening, off-hour or daytime full rate calls.

The next step 268 prepares and writes a report 16A (see also FIGS. 2-1 and 2-2), containing customer detail balancing information. Next in step 272 the carrier totals are accumulated, broken down by calls, duration, and charges. Thereafter in step 274 the program resets the customer accumulation fields and customer break fields, after which the program jumps via junction A4 back to the main program loop of FIG. 5.

We now refer to FIG. 11 which is a flow chart of the "end of the file processing" section for processing program TPSB010 used in the "mainframe processing" segment of FIGS. 2-1 and 2-2. This routine starts with program jump P3 from the "end of file" test 194 of the initialization routine of FIGS. 6-1 and 6-2. It then proceeds with step 284 in which the program prepares and writes the information for a carrier control record (also known as record type 1) to disk 1 of FIGS. 2-1 and 2-2, a procedure which corresponds to program step 60 of FIGS. 2-1 and 2-2. Next step 288 prepares and writes a balance control record to disk 2 of FIG. 2, a procedure which corresponds to program step 68 of FIG. 2. Next step 292 writes a balancing report to file 16A of FIG. 2, which corresponds to a portion of report 16 in FIG. 1. Thereafter the entire job is terminated.

TPSB020

For details of the TPSB020 program portion of the main processing procedure illustrated in FIGS. 2-1 and 2-2, we turn first to the flow chart of FIG. 12 which represents the main program loop, and the flow chart of FIG. 13 which represents an initialization routine. The "initialization" procedure of FIG. 13 begins with step 320 which represents the reading of an information stream 321 consisting of information coming from files 64, 68 and 70 and information coming from file 60 after it has been sorted by step 62 in the mainframe processing program of FIGS. 2-1 and 2-2. This information is then written to a temporary online storage file 322. In step 324 this information stream is tested to determine if an end-of-file condition is present. If it is present in step 326 the program immediately sends an abort signal which requires an operator response 328 to abort the system at step 330.

If no end-of-file condition exists, the information stream is sent on to step 332 to test for the presence of type one record, a carrier control record. If a carrier control record is not present the program at step 334 ceases execution and requires an operator response 336 which causes the system to abort at step 338. If the carrier control record is present, then the next step 340 is to set up working storage and control fields, after which the program returns via program jump A12 to the main processing loop of FIG. 12, where it enters at program point P12.

In the main loop of FIG. 12 the system first seeks to determine at step 300 whether an end-of-file condition exists. If so, then there is a program jump A13 to program point P13 in the end-of-file processing routine of FIG. 16, described below. If an end-of-file condition is not encountered, then the input data stream 321 (see

FIG. 2) is read in step 308 and written to an online storage file in step 310 to be used by other portions of the processing system. Step 308 is also executed when the main loop of FIG. 12 is entered at program point P14 coming from jump A14 of the "write PC transmit tape" routine of FIGS. 15-1 and 15-2, discussed below. After step 308 the program exits at point A15 and jumps to entry point P15 of FIG. 14, to which we turn next.

FIG. 14 is a flow chart of the "check customer error" routine of for the processing program TPSB020 used in the "mainframe processing" section of FIGS. 2-1 and 2-2. Entry into the routine of FIG. 14 is at program point P15. The first program step 344 is used to test for an end-of-file condition. If such a condition is present the system must next determine at step 346 whether the customer number was contained on the customer error file 60 (see FIGS. 2-1, 2-2, 7-1 and 7-2). If the answer is yes, then in step 348 that, fact is printed in an edit error report 16B (see FIGS. 2-1 and 2-2) which represents a portion of report 16 in FIG. 1. If the answer to test 346 is negative, or after the entry to error report 16B is made, this routine exits at point A12, and reenters the main loop of FIG. 12 at entry point P12.

If the end-of-file test at step 344 is negative, the program must then determine at step 352 whether there is an error, but the error does not affect the customer ID number (i.e., the current customer number equals the correct customer number). If so, then the program at step 354 accumulated the duration and charges and the number of the customer's calls by reading the input file data stream 321 (step 356), writes that information to a temporary file 358, and exits at A16 to the program routine of FIGS. 15-1 and 15-2.

If at step 352 there is an error and the current customer number is not equal to the correct customer number, then the system must determine at step 364 whether the error customer number is greater than the correct customer number. If that condition is found, then the system must determine at step 366 whether the customer was on the error file. If the customer appears on the error file then the information is passed on to be reported on error report 16B mentioned above. Thereafter, or if the result of test 366 is negative, the program exits from this routine at A12 to reenter the main loop at P12 in FIG. 12.

If at step 364 there is an error and the current customer number is not greater than the correct customer number, then the system must determine at step 372 whether the error customer number is less than the correct customer number. If that condition is found, then at step 374 the error information from file 68 (FIGS. 2-1 and 2-2) is read and written to a temporary file 376, after which the routine exits at A12, reentering the main loop of FIG. 12 at P12. If the test performed in step 372 is negative, however, the routine exits at A16 to enter the routine of FIGS. 15-1 and 15-2 at P16.

FIGS. 15-1 and 15-2 is a flow chart of the "write PC transmit tape" section for the TPSB020 processing program used in the "mainframe processing" segment of FIGS. 2-1 and 2-2. It starts out at step 380 where the program determines whether the current record type being processed is the same record type as was previously cycled. If that condition is false then step 382 determines whether a "start" record exists. If so, then the program will write a PC "end" control record to the file in step 384. In either case, it will next determine the corresponding record type in step 386 and in the next step 388 write a "start" PC control record.

In the event of a negative answer to test 380, or after the conclusion of step 388, step 390 then reads the record type of the current record. Steps 392, 400, 406, 412, 418, 424 and 430 in turn then determine if the current record type is 1, 2, 3, 4, 5, 6, or 7 respectively. If it is a record of type 1, then step 394 writes a "carrier control" record to be placed on the nine-track mainframe tape 72 which was discussed in connection with FIGS. 2-1 and 2-2. Similarly, If it is a record of type 2, 3, 4, 5, 6, or 7, then steps 402, 408, 414, 420 426 and 432 respectively writes "customer control, carrsum, calldet, statsum, codesum" and "NPAsum" records respectively to the nine-track mainframe tape 72. In each case, after the tape 72 is written to, the program routine in step 398 accumulates the balancing totals and then exits via program jump A14 to entry point P12 of the main loop, FIG. 12.

FIG. 16 is a flow chart of the "end of file processing" section for the TPSB020 program used in the "mainframe processing" segment of FIGS. 2-1 and 2-2. This routine is entered at program point P13 coming from jump point A13 of the main loop, FIG. 12. At step 436 the program reads the balance information record 438 previously stored online in file 70 of FIGS. 2-1 and 2-2. The program next determines in step 440 whether an end-of-file condition exists. If so, the program in step 442 will notify the operator of a program abort and halt execution until there is an operator response 444, after which the abort step 446 takes place. If the end-of-file test is negative, then a determination must be made whether the accumulated totals are equal to the balance record totals. If not, then in step 450 the program performs an abort sequence 450, 452, 454 similar to the previously described sequence 442, 444, 446.

If the test at step 448 is affirmative, however, then the program's next step 456 is to add the PC end data characters onto the data stream records and write it onto the nine-track tape 72 of FIGS. 2-1 and 2-2, after which the program terminates.

PC Processing

We now turn to the programs used in the "PC processing" segment of FIG. 3 for the reading of a mainframe-produced tape. FIG. 17 is a flow chart of the PC processing system's first program, designated "SBPROC01—read mainframe produced tape." This program begins at step 460 where it reads the output data tape 72 which was created in FIGS. 2-1 and 2-2, and which contains the processed carrier telephone bill data. The program's next step 462 is to obtain the current tape number and log it to a tape control table. (At the same time, the tape creation date and time, the number of records on the tape, the number of customers on the tape and the carrier ID are logged to the tape control table at 462.)

Next, in step 464 the system reads the "start customer" record which in itself is not the data but delimits the data belonging to a particular customer's billing information. The system then goes on to determine if an end of tape condition exists in step 466. If such a condition does not exist then in step 468 the program searches for the customer number in a customer table (CustTab). The program then in step 470 determines the disk type (5¼" or 3½") required for the particular customer by looking at the information in the aforesaid CustTab tables. The program then in step 472 checks the Loadr Tab (loader table) to obtain a proper loader number for the required size of target diskette, thus choosing be-

tween 5¼" loaders 98 and 106 on the one hand and 3½" loader 102 on the other hand. The program then in step 474 goes on to determine which loader (if there is a choice of two or more) has the smallest number of data files in its queue, and selects that one as a means of maintaining an even processing flow to the loaders.

The program in step 476 then reads a system parameters (SysParam) table to determine the next file control number (FCN), after which it updates the SysParam table. Afterward the program at step 478 copies the customer data to the disk file. In step 480 the program then adds a record to update a file control table; and in step 482 it produces a summary report of the transactions just described. If required, at step 484 it produces an error report. The program then loops back and reenters the program sequence at the start customer reading step 464, and recycles.

At step 466, if the determination is that there does exist an end-of-tape condition, then the program proceeds in step 488 to update the tape control tables (TapCnTab) and in step 490 to produce a summary report. If required, in step 492 it produces an error report. At this point, the routine described in FIG. 17 ends.

We now turn to FIGS. 18-1 and 18-2 which is a flow chart of the program referred to as SBPROC02, the loader control program used in the "PC processing" segment of FIG. 3. This loader control program begins its processing in step 494 by reading a configuration file into its memory. This enables the system to determine what is online and what are the requirements of the individual customer diskettes are. The program in step 496 then checks the appropriate subdirectory on the hard disk where the customer data file would be located, and performs a test 498 to determine if there is such a data file.

If the determination in step 498 is that the required data file does not exist, then the program loops infinitely back to steps 496 and 498 until it finds that such a file exists to be processed. By the use of this infinite loop, the system can continually poll or check to see if a file to be processed has been entered into the appropriate subdirectory.

If step 498 determines that such a file does exist, then the program in step 504 seeks out the oldest file in the appropriate directory, and in step 506 it reads and compresses that file and writes it to the local hard disk drive "C:". In step 508 it then gets the next available disk control number from the system parameters table (SysParam) so that it has the information necessary to format the target diskette in the appropriate manner. At the same time this operation updates the system parameter table by incrementing the disk control number by one.

The next program step 510 obtains a copy of the processing file created in step 506 above and copies that processing file to the disk loader in order to create the actual diskette data file. The program then at step 512 prints the disk labels and mailing labels. The next step 514 in the operation obtains from the system parameter (SysParam) tables the next available invoice control number and advises the system parameter table to increment the value by one.

The program then at step 516 creates the appropriate invoice record and prints a paper invoice at step 518 from which the customer can pay the telephone bill. Thereafter the program gets a disk control number (DCN) record (step 520), updates the fields of that record (step 522), and adds the record to a disk control (DC) table (step 524). It also updates the CustTab table mentioned previously (step 526), prepares a data disk summary report (step 528), and if necessary produces an error report (step 530). Thereafter the program loops back to reenter the subdirectory check step 496 and the described process is repeated as many times as necessary.

FIG. 19 is a flow chart of a program designated SBROC03 used in the "PC processing" segment of FIG. 3 for creating a mainframe-readable export tape. This is used by the mainframe processing system in updating its list of valid customers and producing the appropriate data streams for individual customer billing in future processing cycles. The program begins at step 534 where it reads the aforementioned system parameters (SysParam) table to determine what the next available export tape control (EXN) number is. It then obtains the next record from the aforementioned CustTab tables in step 536, reformats it and written to the export tape in step 538.

The program next looks for an end-of-file condition in step 540 and if the condition does not exist, it loops back to step 536, to get the next CustTab record. If the end of file condition is affirmative, however, the program in step 544 updates the export tape control tables (ExpCnTab) and in step 546 it prints a summary report of the export tape processing. This terminates the export tape routine.

PC Maintenance Program

We now turn to a program for updating the end-user program as changes in service conditions may require. This program is operated on the computers 88 or 90 of the network of FIG. 3 by the processor company whenever the needs of the telephone company or its subscribers require.

FIG. 20 is a flow chart of the main-menu section for the above-mentioned file maintenance program. The program is menu-driven, and the main menu display 548 allows a determination of what areas the processor wishes to change. In steps 550, 558, 566, 574, 582 and 592 the program determines whether the operator has selected submenu 1 (the carrier menu), submenu 2 (the customer menu), submenu 3 (the error menu), submenu 4 (the reports menu), submenu 5 (the system maintenance menu, or chooses to exit to DOS (the IBM personal computer operating system), respectively. If none of the above are selected, the program loops back to the start and continues to search for an operator selection from the main menu. The submenu choices mentioned above lead to program jump points 1.0, 2.0, 3.0, 4.0 and 5.0 respectively which are traced to their appropriate program routines in the following discussion.

FIG. 21 is a flow chart of the "Add New Carrier" section for the file maintenance program. When the "Add New Carrier" submenu is invoked this routine is entered via program jump 1.0 from FIG. 20. At that point step 596 gives the operator the option of using the escape key on an IBM PC keyboard, and if that key is invoked then the operator is returned to the main menu of FIG. 20 as indicated at step 598. If the escape key is not invoked, then the operator instead may invoke the add-carrier function key, whereupon program step 600 which will produce a data entry display 602 on the video screen.

If the operator inputs new information into the display 602, the program will determine in step 606 if the

new information has a proper carrier ID. If there already exists a carrier ID on file for the new carrier, then the system will display an error message 608 indicating that fact, and the program loops back to step 604 for reentry of the information. If there is no carrier ID on file as determined in step 606, then the program at step 610 will display a query message "Add Record to Carrier File?" If in response to that query message an escape key is actuated, then at step 612 the program will return to submenu 1. If, on the other hand, in response to the "Add Record To Carrier File?" prompt, some other action is taken by the operator, the files will be updated accordingly. In addition, in step 616 the fields of the data entry form 604 will be cleared and the program will back to step 604 to accept further manual data input.

If the operator selects some action other than the add carrier function in step 600, the program exits at point 1.2 to go to another routine illustrated in FIG. 22. The latter figure is a flow chart of the "Edit Existing Carrier" section for the file maintenance program. Another option 618 on the carrier submenu is editing the carrier information. If the operator chooses this option, the program in step 620 asks if the operator wishes to choose a carrier ID which is already on file. The program then determines in step 622 if the chosen carrier ID is in fact on file. If not, the program in step 624 will display an error message and loop back to step 620 to ask again if the operator wishes to use an old carrier ID.

But if at step 622 it is determined that the selected carrier ID is already on file, then the program in step 624 displays the relevant carrier record, and at step 626 asks the operator for any changes to the carrier record. It then updates the carrier record in step 628. If the carrier is to be deleted, the program in step 630 queries the user, and upon receiving an affirmative answer, then in step 632 it carries out the deletion and loops back to submenu 1. If the result of step 630 is in the negative, indicating that the carrier is not to be deleted, the program will also return to submenu 1.

It the edit carrier query of step 618 is answered in the negative, in step 634 the program will ask whether the operator wishes to browse through the carrier files. If the user responds negatively, then the user is returned directly to submenu 1. If the answer is affirmative, then the program in step 636 will display the information contained in the carrier file. When the operator finishes browsing through the carrier file, exit is to submenu 1.

FIG. 23 is a flow chart of the "Add New Customer" section of the file maintenance program used in the "PC Processing" network of FIG. 3. This routine is entered from program point 2.0, which represents a jump from program point 2.0 of FIG. 20. The first determination made by the system at step 638 is whether the operator wishes to exit the display customer menu. An affirmative answer, indicating by invoking the escape key, results in a return to the main menu (step 640). Should the operator choose to invoke some other key, then the "Add Customer" query is displayed in step 642. If the operator does not choose the "Add Customer" option, then the program jumps at 2.2 to the "Edit Existing Customer" section of the file maintenance program, which is discussed below in connection with FIG. 24.

If the operator chooses the "Add Customer" option offered in step 642, then the appropriate data entry form is displayed in step 646. Then is step 648 the system accepts the new information entered into the data form and in step 650 proceeds to check whether the new customer identification number is already on file. If so, then an error message is sent to the display in step 652 and the program loops back to step 648 to accept new data entry once again. If the new customer ID is not already on file, then the program will proceed in step 654 to add a record to the customer file.

The program in step 656 then offers the operator an option to escape from the current submenu and return to submenu 2 in step 658 if the operator invokes the escape key. Otherwise, the program in step 660 will clear the fields on the data entry form and loop back to step 648 for the acceptance of additional new customer information.

FIG. 24 is a flow chart of the "Edit Existing Customer" section for the customer service file maintenance program. It is entered through program jump 2.2 from FIG. 23 just described. Where the operator invokes the "Edit Customer" option of the customer submenu offered in program step 662, then the program at step 664 accept new customer ID information. The new customer ID information is then evaluated by the program at step 666 and a determination is made as to whether there is already such a customer ID on file. If there is, the appropriate existing customer record is displayed at step 668. Then at step 670 the program accepts changes to the relevant customer record and at step 672 the record is updated. The program then returns to submenu 2 in step 674.

But if at step 666 the customer ID is found not to be on file, the program displays an error display message to that effect and the program then returns to step 664 for the entry of valid new customer ID data.

If at step 662 the operator does not select the edit customer option step 676 offers an option to browse through the customer information file 678 (step 678). After browsing is completed, or if the browse option is refused, the program exits to step 674 and redisplays submenu 2.

FIG. 25 is a flow chart of the "Display Errors" section for the file maintenance program. It is entered through program jump 3.0 from FIG. 20 described above. The program first determines in step 680 if the operator wishes to return to the main menu (step 682), a selection which is invoked by means of the escape key. If the operator chooses some other option, the program at step 684 asks whether the operator wishes to update an error record. If the operator chooses to do so, then the user is presented by program step 686 with an opportunity to input an error entry control number. The system then determines at step 688 if the error control number is on file. If it is, at step 690 the requested error record is displayed. The program then at step 692 affords the operator an opportunity to changes to the error status. If such changes are made, then the program at step 694 updates the error record. At the end of the error record update, the program exits to submenu 3 in step 696.

If in step 688 the determination is that there is no such control number on file, then an error message is displayed in step 698. The program then returns to step 686 for correct entry of error control numbers.

If the operator chooses not to update an error record in step 684, the operator is given an option in step 698 to invoke the browse function for the error file display. If that option is exercised, then in step 700 the error file display is actuated. Afterwards, or if the user does not choose, in step 698 to select the browse function, the program returns to submenu 3 in step 696.

FIG. 26 is a flow chart of the "Display Reports" section for the file maintenance program. The program is entered by program jump 4.0 from FIG. 20. In step 702 it presents an option to exit to the main menu if the escape key is invoked. Otherwise the operator is presented in step 706 with an option to select the report of customers by cycle. If that function is invoked, then the program in step 708 will get the data from the customer file and print it out as a document 710. The program then returns to submenu 4 at step 712.

If the operator elects not to invoke the report of customers by cycle at step 706, then step 712 present the option of obtaining a report of customers with no usage. Should the operator invoke that function, the program at step 714 will get the data from the customer file and print out a customer report 716. The program will then go to submenu 4 in step 712.

Should the report of customers with no usage functionality not be invoked in step 712, then the next menu option will be the report of unacknowledged errors in step 718. If the operator invokes that selection, then the program will at step 720 obtain the data from the error file and in step 722 will print the unacknowledged error report. The program will then again return via step 712 to submenu 4.

Should the user not choose to invoke the report of unacknowledged errors in step 718, there is the remaining option of creating a report of unresolved errors in step 724. If that option is invoked, then the program in step 726 obtains the information from the error file, sends it to a printer to print an unresolved error report 728, and then returns to submenu 4 in step 712. If none of the available functions are not invoked, then the program will return directly to submenu 4.

FIG. 27 is a flow chart of the "System Maintenance" section of the file maintenance program. It is entered through program jump 5.0 from FIG. 20. This module first presents an option in step 730 to return to the main menu by actuating the escape key. If the operator does not exercise that option, the other choice is presented at step 734 to delete inactive customers. If that option is chosen, then the program at step 736 will delete the inactive records from the customer file and at step 738 will delete the associated records from the disk control table (DiskCnTab), the file control table (FileCnTab), and the invoice control tables (InvCnTab). In step 740 a report will then be printed of all of the deleted records. The program then returns to submenu 5 in step 742.

If the operator chooses not to invoke the Delete Inactive Customers function, there is a further option in step 744 of determining whether to perform a backup of files. If that option is invoked, then the program in step 746 performs the backup. After, or if that option is not chosen at step 744, the program returns to submenu 5 at step 742.

End-User-Application Program

We turn next to the "User Application" program summarized in FIG. 4, i.e. the program which is run by the end-users (telephone customers) on their own personal computers to analyze their telephone bills in accordance with the capabilities of this invention.

FIGS. 28-1 and 28-2 are a flow chart of the "Main Menu" section for the user application program, which begins with a sign-on screen display 748 of the publisher's logo and copyright notice. The program then in step 750 fetches an initial message or startup screen or the like from an information file, and in step 752 displays it on the monitor.

Ignoring for the moment a program entry point M, which will be discussed later, the program in step 756 then displays the main menu of end-user choices. The first option available for selection on this menu level is a help key. If that key is invoked at step 758, then at step 760 the program will display the main help screen for this segment of the end-user processing program, and then loop back to step 756. Should the end-user not invoke the help key, the next possible selection, presented by step 762, is a billing inquiry. When this option is selected, the program will send the end-user to the billing inquiry submenu via program jump B which leads into FIGS. 29-31, discussed below.

If the end-user should not choose the billing inquiry, the next choice available (step 766) is a graph data function. If the end-user makes this choice, he or she will then be taken into the graph data menus of subsequently discussed FIGS. 32-34 via program jump B.

Otherwise in step 770 the user may next select a system utilities option. If that selection is invoked, then the user application program will be taken to a system utility menu via program jump S leading to FIGS. 35-1, 35-2, 36-1 and 36-2, discussed below.

The next available selection is in step 774 which permits the user to exit to DOS, the operating system of the user's personal computer. If the user chooses to invoke that selection, he will be taken into the operating system directly 776, and if the user chooses instead to invoke the escape key to reject all of the preceding choices, then in step 778 the program will also exit to the operating system.

FIGS. 29-1 and 29-2 are the first of five flow charts dealing with the "Display Billing Inquiry" section for the "User Application" program of FIG. 4. It is entered via program jump B from FIG. 28, and begins in step 780 with display of a billing inquiry menu. This menu offers the user the choice of eight options: billing report, financial detail report, call detail report, call summary report, call summary report, display special text, ad hoc inquiry, help, and escape; which are implemented by program steps 782, 802, 806, 810, 818, 826 and 832 respectively.

The billing report option of step 782 and the financial detail report of step 784 are similar in their operation, differing only as to what information is extracted from the available databases for billing and for financial detail. After the user chooses either of these options, the program in step 786 reads from the system parameters (SysParam) file the currently selected output location (i.e., to the screen, to disk, to the serial port, to the parallel port) for the billing or financial detail report, and in step 788 the program then displays the current output location to the screen. The program in step 790 will then accepts any changes to the output location, and in step 792 updates the current output location in the SysParam file to make that the new default output location.

Depending on whether the selection of step 782 or that of step 784 was made, the program at step 794 will then get the appropriate report header information from the SysParam file layout and the appropriate data from the revenue file for either the billing report or the financial detail report. The appropriate information is then sent in step 798 to be printed (although if a disk file or the screen had been chosen as the output location in step 786 it would have been written to disk or to the

monitor respectively). At the end of step 798 the program returns via program jump B to initial step 780 in order to redisplay the billing inquiry menu.

If the call detail report is chosen at step 802, program jump B1 goes to the call detail menu of FIGS. 30A-1 and 30A-2, discussed below. Should the user select the call summary report at step 806 then it takes jump B2 to the call summary menu of FIG. 31A.

Step 810 offers a special text option. As presently contemplated, there are three types of special text, but there could be any number. The purpose of the special texts is to provide the system with the same features as a written bill. Standard preambles or preliminary messages may be added to the billing information in the same manner as they appear on paper bills. In addition, an epilogue might be added to the end of the bill text to advise customers of the late status of their account. Other types of material such as banners, headers, footers or textual material might also be added to make the bill more informative and flexible in the manner of a conventional bill. Such special information could be added to the bill by the individual subscriber upon request of the processor or the carrier.

If the user selects the option of step 810, then in step 812 the program gets the special text from an information file and in step 814 displays it on the screen. Then the program returns via jump B to step 780 in order to redisplay the initial billing inquiry menu.

When the user invokes the special ad hoc inquiry option of step 818, at step 820 the program gets the necessary records from the call detail (CallDet) file and in step 822 it displays these records for browsing by the end-user at 822. Afterward, it returns via program jump B to step 780 to redisplay the billing inquiry menu.

If the help function of step 826 is invoked, the program in step 828 will display the billing inquiry help screen, after which it again returns via program jump B to step 780 to redisplay the billing inquiry menu.

The final selection from the billing inquiry menu is the escape key, whereupon step 832 return to the main menu of FIG. 28 via program jump M.

FIGS. 30A-1, 30A-2, 30B-1 and 30B-2 are flow charts of the "Display Call Detail" subsection of the "Display Billing Inquiry" section for the "User Application" program of FIG. 4. The segment represented by FIG. 30A-1 and 30A-2 are entered by way of program jump B1 from FIG. 29, previously discussed, and begins in program step 836 with display of a call detail menu. The options presented to the user by this menu include the report selection function of step 838. If the user actuates that function the program will take program jump B1-2 to FIGS. 30B-1 and 30B-2.

Turning our attention now to that figure, program jump B1-2 leads to step 840 which displays a report selection menu. Then at step 842 the program tests to determine whether one of the reports offered by that menu has been selected. If a report has not been selected and the user invokes the escape key, the program step 844 returns via program jump B1 to FIG. 30A.

If in step 842 the user should select a particular report, then step 846 the appropriate report header data is obtained from the SysParam file so that the report can be properly formatted. The program then in step 848 obtains the current option and report number from a call data record selection (CDRS) file. The option number designates the type of report format requested by the user, and in particular designates how much of the available information is to be included in the report. An option number of "1" specifies that all of the available information is to be put in a single file, while higher numbers specify that the report is to be broken into several smaller files. The report number is a numerical file name for each of the file(s) containing the report which is to be written to disk.

Accordingly, in step 850 the program tests whether the current option number is greater than 1. If not, then all the available information is to be included in a single file, and the program goes immediately to step 852 where it sorts the call detail records. But if the option number is greater than 1, then a plurality of files must be written to disk under distinct file names (report numbers). In that case step 852 increments each previous report number by 1 and step 854 updates the current report number in the CDRS file so that numerically distinct file names are assigned to each of the several report files which are written to disk. Thereafter in step 855 the program reads the data selection criteria corresponding to the user's choice from the SysParam file, and in step 856 it selects from the call detail file the records designated by those criteria and sends them on for performance of the previously mentioned sort step 852.

After sort step 852, in step 857 the program gets the call detail report output location, i.e., monitor, printer, disk, etc. is determined from the system parameter file. Then, as before, the report is passed on to step 858 in which the system prints the call detail report to the designated device (location).

Returning now to FIG. 30A-1 and 30A-2, the negative branch of test 838 leads to program step 860 which tests whether the selection from the call detail men of step 836 is the record selection. If so, the program in step 862 then gets the call detail record selection (CDRS) records and the current option number from the system parameter (SysParam) file. This information is then displayed on the screen in step 864, and in step 866 the program accepts an changes the user chooses to make in the displayed information. Finally, in step 868 the SysParam and CDRS files are updated and the program returns via jump B1 to the entry point of FIGS. 30A-1 and 30A-2.

The report location menu option in step 870 permits the user to determine what device, i.e., monitor, screen, export file, printer, disk file, etc. should be the destination of the report to be generated by this area of the program. If this option is chosen, then in step 872 the program gets the current call detail (CD) report location from the SysParam file, and in step 874 the program displays the current output location on the screen, and the user is prompted to make any changes. In program step 876 the program accepts any changes to the report output location, and in step 878 it updates the corresponding information in the call detail report output location records. The program then returns via jump B1 to the display call detail menu at the entry point of FIGS. 30A-1 and 30A-2.

In program step 880 the user may select the help key. If the help key is selected, then in step 882 the call detail report help screen is displayed and the program then returns via jump B1 to the entry point of FIGS. 30A-1 and 30A-2.

The last option available on the menu of FIG. 30A is the selection of the escape key in step 884. Should that key be actuated the program returns via jump B to the entry point of FIG. 29.

FIGS. 31A-1, 31A-1 and 31B are flow charts of the "Display Call Summary" subsection of the "Display Billing Inquiry" section for the "User Application" program of FIG. 4. The segment illustrated in FIGS. 31A-1 and 31A-2 are entered via the B2 program jump which comes from FIG. 29-1 and 29-2, discussed above, and leads first to step 886 which displays a call summary menu. If the user actuates the call summary report selection from that menu in step 888, then the program will exit via program jump B2-2 to FIG. 31B where it performs step 890 to display a report selection menu. If a report is selected from that menu, as determined by step 892, then in step 894 the program gets the report header data from the system parameter file. Thereafter in step 896 it gets further information from the selected summary file, and in step 898 the program computes the report totals. Then in step 900 it gets the call summary output location from the SysParam file, and in step 902 prints the report to the designated location for printing or display or disk storage as determined from the system parameter file. At the end of that process the program returns to step 890 to redisplay the report selection menu.

If in step 892 no report selection is made, and instead the escape key is actuated, the program exits via jump B2 to FIG. 31A.

Returning now to that figure, if the report selection menu is not selected in step 888, and the report location option is selected in step 906, then the program in step 908 will get the current summary report output location (screen, printer or disk file) from the system parameter file, and in step 912 it will display that location to the user so that changes can be made. If such changes are made, then in step 914 the program proceeds to update the current summary report output location in the system parameter file. Having accomplished this, the program returns via jump B2 to the entry point of FIG. 31A in order to redisplay the call summary menu.

The user has two other options on the menu of FIGS. 31A-1 and 31A-2, one of which is a help function selected in step 916. If that choice is made then in step 918 the call summary help screen is displayed. Upon leaving this submenu, the program returns to the via jump B2 to the call summary menu step 886.

The final selection available on this menu is the escape function, which in step 920 leave the call summary menu and moves back up to a higher level menu via program jump B.

FIG. 32 is a flow chart of the "Graph Data" selection for the "User Application" program of FIG. 4. This routine is entered via program jump G from FIGS. 28-1 and 28-2, and proceeds to step 922 which displays the graph data menu. This menu has four choices represented by program steps 924, 926, 930 and 934. If the user chooses the help function of step 924, the graph data help screen will be displayed by step 925, after which the program returns to step 922 to, redisplay the graph data menu.

Among the user's other selectable options are historical usage (step 926), call distribution (step 930) and escape (step 934). If the historical usage function is selected by the user, the program branches via jumps point G1 to FIG. 33. Similarly, if the user selects the call distribution graph (step 930), the program exits via jump G2 FIGS. 34-1 and 34-2. The last available alternative for the user on the graph data menu display is the escape key function (step 934) which terminates the graph data menu display and returns to the main menu via jump M. FIGS. 33-1, 33-2, 34-1, 34-2, 35-1 and 35-2, to which these jumps lead, will now be discussed.

FIGS. 33-1 and 33-2 are a flow chart of the "graph historical usage" section of the "graph data" portion of the "User Application" program of FIG. 4. It is entered via program jump GI from FIG. 32, as discussed above, whereupon program step 938 displays the historical graph menu. From that menu the user may select the help function (step 940) which will display the historical graph help screen. On the completion of a help screen session the user will be returned to the historical graph menu of step 938.

Among the other choices on the historical graph menu are the total charges function of program step 944. Once this step is actuated, the program at step 946 will read the call charge (CllChg) tables to obtain the appropriate data to fulfill the request for total charge information graphs. The program then in step 948 computes the necessary graph values and determines the corresponding screen positions for graphic display. The graph thus computed then displayed on the monitor in step 950. At the close of the display graph session, the program returns to the historical graph menu of step 938.

The next two options available to the user from the historical graph menu include that of program step 952, a historical graph illustrating total usage, and that of the total DB/CR (total debit/credit records) function in program step 954, both of which cycle through the above-described steps 946, 948 and 950, returning then to step 938, in the same manner as the total charges selection of program step 944. The DB/CR data relates exclusively to non-call-detail records, such as leased phone lines, leased equipment, and the like; and is to be distinguished from the call detail information called for by steps 944 and 952.

The remaining option in the program section of FIGS. 33-1 and 33-2 are the escape function, which in step 966 will terminate the historical graph menu session and exit via program jump G to the entry point of FIG. 32.

FIGS. 34-1 and 34-2 are a flow chart of the "Graph Hourly Call Distribution" subsection of the "Graph Data" section for the "User Application Program" segment of FIG. 4. It is entered via program jump G2 from FIG. 32, and leads immediately to the call distribution graph of step 958. Should the user then actuate the help selection offered by program step 960, program step 962 will present a screen providing help for the Call Distribution Graph Function. After that help session is completed the program returns to the distribution graph menu step 958.

If the user chooses the month alternative of step 964, the program then will, in step 966, read from the call distribution file table (CallDist file) the necessary information to produce the graph called for. Having obtained that information, the program in step 968 then processes the information to compute the necessary values for determining the graph's appearance on the screen, and in step 970 sends the results on to the display device. At the termination of the graph display the program returns to the distribution graph menu of step 958.

Should the user decide to display the weekly distribution graph of program step 972, the user must advise the system of what specific week of the current month is desired to be graphed (step 974). Similarly, should the user decide to display the daily distribution graph of

program step 976, the user must advise the system of what specific day of the current month is desired to be graphed (step 977). After that is done, in both cases the program then cycles through previously described steps 966, 968 and 970, to display the weekly or daily graphs as the case may be, eventually returning to step 958 in the manner explained above.

The remaining alternative for the user in this particular menu is step 978, the escape function, which terminates the call distribution graph menu session, returning via program jump G to FIG. 32.

FIGS. 35-1 and 35-2 are a flow chart of the "System Utilities" section for the "User Application" program of FIG. 4. It is entered via program jump S from FIGS. 28-1 and 28-2 described above, and goes immediately to a system utilities menu at step 980. Among the choices available from that menu is that of step 982, archiving the data of the current billing cycle. Should the user choose that particular option, in step 984 a "working" message is displayed on the screen while step 986 is executed to archive all the inputted data of the current billing cycle. When the archival processing job is completed, the program then returns via program jump S to step 980 in order to redisplay the system utilities menu.

Among the other menu selections that are available to the user is the load new data function of step 988. When that option is selected, the program exits via jump S2 to a routine described below in connection with FIGS. 36-1 and 36-2.

Next the user may choose (in step 990) to print the actual invoice. Upon selection of that particular menu item the invoice will actually be prepared and printed in step 992, after which the program executes jump S to return to the menu display function of step 980

Should the user choose the option of step 994, billing information, the program in step 996 will display the billing information on the monitor, after which the program returns via jump S to step 980 to redisplay the system utilities menu.

The next option is the help function 998 offered by step 998. Upon the actuation of that particular selection the program will in step 1000 display the system utility help screen and then return via jump S to the system utilities menu at step 980.

The final alternative selection on this menu is the escape key (step 1002), which terminates the system utilities menu session and returns to the next higher level, the main menu of FIGS. 28-1 and 28-2, via program jump M.

FIGS. 36-1 and 36-2 are a flow chart of the "Load New Data" subsection of the "System Utilities" section for the "User Application Program" segment of FIG. 4. It is entered via program jump S2 from FIG. 35, previously described, whereupon step 1006 will display a message advising the user that the program is being loaded. The system then in step 1008 opens an input file in which will be stored the new data to be loaded and an error file to track all associated error information. The program in step 1010 then writes the start date and time to a log file. The system then in step 1012 fetches from the input file an appropriate record which will subsequently be loaded into the database.

After each such fetch operation the program executes a loop starting with a test 1014 to determine if the fetched data represents an end-of-file condition. If such a condition exists, the load procedure is completed, and accordingly the program in step 1016 will then close the database into which the data has been loaded. Thereafter, in step 1018 it will check the integrity of the newly created database file. And at the conclusion of the database integrity check, the program will end the loading data session and return to the system utilities menu via program jump S leading back to FIGS. 35-1 and 35-2.

If in step 1014, however, an end-of-file condition is not detected, then in step 1020 the program determines if an error has occurred. If so, in step 1022 the error will be logged to the error file previously created in step 1008, and the program loops back to step 1012 to fetch another record.

The data coming from the source file is in a compressed form, as explained above. Therefore, if the program does not encounter an error in step 1020, then in step 1024 it will use its decompression algorithm to expand the fetched data to make it suitable for subsequent use by the R-base program, and only then will load the data to the target database table.

During loading, the screen informs the user of the processing which is going on. In step 1026, therefore, after each record is expanded and loaded, the screen display is updated to reflect the processing just concluded, and the program recycles back to step 1012, continuing to do so until the end-of-file condition is detected by step 1020.

CONCLUSION

It will now be appreciated that the system of this invention provides a means for preparing on diskette telecommunications or similar bills in an optimal format for further processing, display, and analysis under customer control on popularly-available, inexpensive personal computers.

For each participating customer, the appropriately selected billing records are obtained from the telecommunications carrier. In contrast to prior art systems, the system processes not only call detail records, but additional billing records to account for equipment rental charges, monthly service fees, payments, adjustments, taxes, and any other items affecting the amount billed to the customer In addition, all billing records are obtained from the carrier at a stage in the carrier's ordinary billing process after the carrier has posted to the subscriber's account all charges and credits, has performed all billing-related calculations for that subscriber, and is ready to print a paper bill. By selecting this specific stage of carrier bill processing from which to extract billing information, the invention ensures that the information supplied on diskette will exactly correspond to that on the paper bill.

Extensive preprocessing of these billing records is performed to place the records in a form compatible for use with inexpensive personal computers, and to provide flexible, efficient access to the original records and to a variety of summary reports and graphs accumulated therefrom. In a first processing step, preferably performed on a large computer, the records are sorted, edited and reformatted into an optimal organization for further processing on a personal computer. In addition, a variety of preprocessed summary reports and graphs are prepared for rapid retrieval on the customer's computer. By preprocessing these summary items on a computer with greater processing and storage resources, the invention optimally makes the most commonly-needed reports and graphs immediately available upon the user's request, at the relatively modest expense of additional mainframe processing and additional PC database storage requirements. In a second step, preferably per-

formed on a network of smaller computers, the reorganized records and summary reports for each customer are separated, compressed, and recorded on diskettes compatible with each customer's personal computer.

A user application program according to the invention on the customer's personal computer conveniently displays and analyzes the billing information supplied on diskette. The customer may retrieve the detailed billing records in a variety of sorted orders, may select a subset of the records for further analysis, may view the preprocessed summary reports and graphs, and may prepare new summary reports on demand. Previous telephone bills are kept in archive files for repeated analysis. Billing information may be displayed on screen, printed on a printer, or written to an unstructured file for analysis beyond that provided by the user application.

This system thus solves many of the disadvantages encountered in prior-art systems for collecting, processing and analyzing billing information under customer control. Diskette bills and the user application program are optimally compatible with popularly available, inexpensive personal computers, eliminating the need for customers to own or operate large, expensive computers and software. The system provides to users billing information in computer-readable form, eliminating expensive and error-prone data-entry and manual processing steps. The system processes complete billing records and obtains these records from originating carriers at the proper stage to ensure that the diskette bills and analysis produced therefrom exactly correspond to the equivalent paper bills.

The above-described embodiment of the invention is merely one example of a way in which the invention may be carried out. Other ways may also be possible, and are within the scope of the following claims defining the invention.

The invention claimed is:

1. A system for presenting information concerning the actual cost of a service provided to a user by a service provider, said system comprising:

storage means for storing individual transaction records prepared by said service provider, said transaction records relating to individual service transactions for one or more service customers including said user, and the exact charges actually billed to said user by said service provider for each said service transaction;

data processing means comprising respective computation hardware means and respective software programming means for directing the activities of said computation hardware means;

means for transferring at least a part of said individual transaction records from said storage means to said data processing means;

said data processing means generating preprocessed summary reports as specified by the user from said individual transaction records transferred from said storage means and organizing said summary reports into a format for storage, manipulation and display on a personal computer data processing means;

means for transferring said individual transaction records including said summary reports from said data processing means to said personal computer data processing means; and

said personal computer data processing means being adapted to perform additional processing on said individual transaction records which have been at least in part preprocessed by said data processing means utilizing said summary reports for expedited retrieval of data, to present a subset of said selected records including said exact charges actually billed to said user.

2. A system as in claim 1 wherein:

said preprocessing operations include preparation of summary reports and graphs.

3. A system as in claim 1 wherein:

said data is reorganized into a table format suitable for loading into an operative data base structure for said personal computer processing means.

4. A system as in claim 3 wherein said data base is RBASE.

5. A system as in claim 1 wherein:

said data processing means comprises a first and a second data processor, said first data processor being adapted to perform said selection of said records and said second data processor being adapted to perform said preprocessing of said selected records.

6. A system as in claim 5 wherein means are provided for transferring data from said first data processor to said second data processor.

7. A system as in claim 1 wherein said data processing means comprises a single data processor adapted to perform said selection and said preprocessing operations.

8. A system for presenting, under control of a user, usage and actual cost information relating to telecommunications service provided to said user by a telecommunications service provider, said system comprising:

telecommunications service provider storage means for storing records prepared by a telecommunications service provider relating to telecommunications usage for one or more telecommunications subscribers including said user, and the exact charges actually billed to said user by said service provider for said usage;

data processing means comprising respective computation hardware means and respective software programming means for directing the activities of said computation hardware means;

means for transferring at least a part of the records from said service provider storage means to said data processing means;

said data processing means generating preprocessed summary reports as specified by the user from said telecommunications usage records transferred from said storage means and organizing said summary reports into a format for storage, manipulation and display on a personal computer data processing means;

means for transferring said telecommunications usage records including said summary reports from said data processing means to said personal computer data processing means; and

said personal computer data processing means being adapted to perform additional processing on said telecommunications records which have been at least in part preprocessed by said data processing means utilizing said summary reports for expedited retrieval of data, to present a subset of said telecommunications usage records including said exact charges actually billed to said user.

9. A system as in claim 8 wherein said records prepared by said telecommunications carrier comprise for

each said telecommunications subscriber all information required for said telecommunications carrier to produce an ordinary telecommunications bill for that telecommunications subscriber.

10. A system as in claim 8 wherein said selected records relating to telecommunications usage and cost comprise at least one telecommunications call detail record corresponding to a unique telecommunications call to be billed to said subscriber, said call having a length determined by said telecommunications carrier.

11. A system as in claim 10 wherein said telecommunications call detail record includes an exact indicia of a charge assessed by said telecommunications carrier to said subscriber for said call.

12. A system as in claim 10 wherein said telecommunications call detail record includes an exact indicia of the length of said call determined by said telecommunications carrier.

13. A system as in claim 10 wherein:

said data processing means creates additional records containing information derived from said preprocessing operations;

an information interchange media means transfers said additional records from said data processing means to said personal computer data processing means;

said personal computer data processing means being adapted to, under the control of a user, perform additional processing on said additional records created by said data processing means; and

to present a subset of said additional records as chosen by said user.

14. A system as in claim 13 wherein each said telecommunications call detail record comprises one or more indicia of a carrier code identifying a carrier through which said call was billed.

15. A system as in claim 14 wherein:

said data processing means, responsive to said carrier code indicia, accumulates for each said telecommunication subscriber a summary of said telecommunications calls billed through said carrier; and

stores said summary in carrier summary records on an intermediate storage means in said data processing means.

16. A system as in claim 15 wherein said additional records comprise at least one carrier summary record created by said data processing means.

17. A system as in claim 13 wherein each said telecommunications call detail record comprises one or more indicia of a site code identifying a customer location from which said call was placed.

18. A system as in claim 17 wherein:

said data processing means, responsive to said site code indicia, accumulates for each said telecommunications subscriber a summary of said telecommunications calls placed from each said customer location; and

stores said summary in site code summary records on an intermediate storage means in said data processing means.

19. A system as in claim 18 wherein said additional records comprise at least one site code summary record created by said data processing means.

20. A system as in claim 13 wherein each said telecommunications call detail record comprises one or more indicia of an originating station number from which said call was placed.

21. A system as in claim 20 wherein:

said data processing means, responsive to said originating station number indicia, accumulates for each said telecommunication subscriber a summary of said telecommunications calls placed from each said origination station number; and

stores said summary in originating station number summary records on an intermediate storage means in said data processing means.

22. A system as in claim 21 wherein said additional records comprise at least one originating station number summary record created by said data processing means.

23. A system as in claim 13 wherein each said telecommunications call detail record comprises one or more indicia of a date when said call was placed.

24. A system as in claim 13 wherein each said telecommunications call detail record comprises one or more indicia of a time when said call was placed.

25. A system as in claim 13 wherein each said telecommunications call detail record comprises one or more indicia of a locality where said call was terminated.

26. A system as in claim 13 wherein each said telecommunications call detail record comprises one or more indicia of a political region where said call was terminated.

27. A system as in claim 13 wherein each said telecommunications call detail record comprises one or more indicia of a terminating station number to which said call was placed.

28. A system as in claim 27 wherein:

said terminating station number indicia includes indicia of a carrier-recognized geographical area to which said call was placed;

said data processing means, responsive to said geographical area indicia, accumulates for each said telecommunications subscriber a summary of said telecommunications calls placed to each said carrier-recognized geographical area; and

stores said summary in geographical area code summary records on an intermediate storage means in said data processing means.

29. A system as in claim 28 wherein said additional records comprise at least one geographical area code summary record created by said data processing means.

30. A system as in claim 13 wherein each said telecommunications call detail record comprises one or more indicia of a length in time of said call.

31. A system as in claim 13 wherein each said telecommunications call detail record comprises one or more indicia of a project accounting code to which said call should be attributed.

32. A system as in claim 31 wherein:

said data processing means, responsive to said project accounting code indicia, accumulates for each said telecommunications subscriber a summary of said telecommunications calls to which each said project accounting code was attributed; and

stores said summary in project accounting code summary records on an intermediate storage means in said data processing means.

33. A system as in claim 32 wherein said additional records comprise at least one project accounting code summary record created by said data processing means.

34. A system as in claim 13 wherein each said telecommunications call detail record comprises one or more indicia of a billing classification code associated with said call by said carrier.

35. A system as in claim 34 wherein:

said data processing means, responsive to said billing classification code indicia, accumulates for each said telecommunications subscriber a summary of said telecommunications calls associated with each said billing classification code; and

stores said summary in billing classification code summary records on an intermediate storage means in said data processing means.

36. A system as in claim 35 wherein said additional records comprise at least one billing classification code summary record created by said data processing means.

37. A system as in claim 12 wherein each said telecommunications call detail record comprises one or more indicia of a call cost associated with said call by said carrier.

38. A system as in claim 13 wherein each said telecommunications call detail record comprises one or more indicia of miscellaneous information associated with said call by said carrier.

39. A system as in claim 8 wherein an information interchange media means in the form of a magnetic tape is employed as said means for transferring at least a part of the records from said carrier storage means to said data processing means.

40. A system as in claim 8 wherein an information interchange media means in the form of a magnetic disk is employed as said means for transferring at least a part of the records from said carrier storage means to said data processing means.

41. A system as in claim 8 wherein an information interchange media means in the form of a data communications line is employed as said means for transferring at least a part of the records from said carrier storage means to said data processing means.

42. A system as in claim 8 wherein:

said data processing means includes intermediate means for storing a plurality of said selected records for at least two of said subscribers during said preprocessing operations;

each of said selected records comprises at least indicia identifying each said telecommunications subscriber; and

said data processing means is adapted to sort said selected records responsive to said indicia identifying said telecommunications subscriber to group together logically on said intermediate storage means all of said selected records for each said subscriber.

43. A system as in claim 42 wherein:

each of said selected records corresponds to a telecommunications station number and further comprises at least indicia identifying said telecommunications station number; and

said data processing means is adapted to further sort said selected records responsive to said indicia identifying said telecommunication station number to group together logically on said intermediate storage means all of said selected records corresponding to each said telecommunications station number.

44. A system as in claim 8 wherein an information interchange media means in the form of a magnetic tape is employed for transferring said selected records from said data processing means to said personal computer data processing means.

45. A system as in claim 8 wherein an information interchange media means in the form of a magnetic tape is employed for transferring said selected records from said data processing means to said personal computer data processing means.

46. A system as in claim 8 wherein an information interchange media means in the form of a data communications line is employed for transferring said selected records from said data processing means to said personal computer data processing means.

47. A method for presenting information on a personal computer data processing means concerning the actual cost of a service provided to a user by a service provider, said method comprising:

storing individual transaction records prepared by said service provider on a storage means, said transaction records relating to individual service transactions for at least one service customer including said user, and the exact charges actually billed to said user by said service provider for each said service transaction;

transferring at least a part of said transaction records from said storage means to a data processing means;

generating preprocessed summary reports as specified by the user from said individual transaction records transferred from said storage means and organizing said summary reports into a format for storage, manipulation and display on a personal computer data processing means;

transferring said preprocessed individual transaction records including said summary reports from said data processing means to at least one personal computer data processing means;

performing additional processing of said individual transaction records on said at least one personal computer data processing means utilizing said summary reports for expedited retrieval of data;

presenting a subset of said individual transaction records chosen via said at least one personal computer data processing means including said exact charges actually billed to said user; and

said data processing means and said at least one personal computer processing means comprising respective computation hardware means and respective software programming means arranged for directing the activities of said computation hardware means.

48. A method as in claim 47 wherein said records prepared by said service provider comprise for each said service customer all information concerning telecommunications services provided to said service customer and the applicable billing rates required for said service provider to produce an ordinary telecommunications bill for that service customer.

49. A method as in claim 47 wherein said selected records relate to telecommunications usage and cost and comprise at least one telecommunication call detail record corresponding to a unique telecommunications call to be billed to said service customer, said call having a length determined by said service provider.

50. A method as in claim 49 wherein said telecommunications call detail record includes an exact indicia of a charge assessed by said service provider to said service customer for said call.

51. A method as in claim 49 wherein said telecommunications call detail record includes an exact indicia of the length of said call determined by said service provider.

52. A method as in claim 49 wherein each said telecommunications call detail record comprises one or

more indicia of a carrier code identifying a carrier through which said call was billed.

53. A method as in claim 52 wherein:

said data processing means, responsive to said carrier code indicia, accumulates for each said service customer a summary of said telecommunications calls billed through said carrier; and

said summary is stored in carrier summary records on an intermediate storage means in said data processing means.

54. A method as in claim 49 wherein each said telecommunications call detail record comprises one or more indicia of a set code identifying a customer location from which said call was placed.

55. A method as in claim 54 wherein:

said data processing means, responsive to said site code indicia, accumulates for each said service customer a summary of said telecommunications calls placed from each said customer location; and

said summary is stored in site code summary records on an intermediate storage means in said data processing means.

56. A method as in claim 49 wherein each said telecommunications call detail record comprises one or more indicia of an originating station number from which said call was placed.

57. A method as in claim 56 wherein:

said data processing means, responsive to said originating station number indicia, accumulates for each said service customer a summary of said telecommunications calls placed from each said origination station number; and

said summary is stored in originating station number summary records on an intermediate storage means in said data processing means.

58. A method as in claim 49 wherein each said telecommunications call detail record comprises one or more indicia of a date when said call was placed.

59. A method as in claim 49 wherein each said telecommunications call detail record comprises one or more indicia of a time when said call was placed.

60. A method as in claim 49 wherein each said telecommunications call detail record comprises one or more indicia of a locality where said call was terminated.

61. A method as in claim 49 wherein each said telecommunications call detail record comprises one or more indicia of a political region where said call was terminated.

62. A method as in claim 49 wherein each said telecommunications call detail record comprises one or more indicia of a terminating station number to which said call was placed.

63. A method as in claim 62 wherein:

said terminating station number indicia includes indicia of a carrier-recognized geographical area to which said call was placed;

said data processing means, responsive to said geographical area indicia, accumulates for each said service customer a summary of said telecommunications calls placed to each said carrier-recognized geographical area; and

said summary is stored in geographical area code summary records on an intermediate storage means in said data processing means.

64. A method as in claim 49 wherein each said telecommunications call detail record comprises one or more indicia of a length in time of said call.

65. A method as in claim 49 wherein each said telecommunications call detail record comprises one or more indicia of a project accounting code to which said call should be attributed.

66. A method as in claim 65 wherein:

said data processing means, responsive to said project accounting code indicia, accumulates for each said service customer a summary of said telecommunications calls to which each said project accounting code was attributed; and

stores said summary in project accounting code summary records on said intermediate storage means.

67. A method as in claim 49 wherein each said telecommunications call detail record comprises one or more indicia of a billing classification code associated with said call by said service provider.

68. A method as in claim 67 wherein:

said data processing means, responsive to said billing classification code indicia, accumulates for each said service customer a summary of said telecommunications calls associated with each said billing classification code; and

said summary is stored in billing classification code summary records on an intermediate storage means in said data processing means.

69. A method as in claim 49 wherein each said telecommunications call detail record comprises one or more indicia of a call cost associated with said call by said service provider.

70. A method as in claim 49 wherein each said telecommunications call detail record comprises one or more indicia of miscellaneous information associated with said call by said service provider.

71. A method as in claim 47 wherein an information interchange media means in the form of a magnetic tape is employed to transfer said selected records from said storage means to said data processing means.

72. A method as in claim 47 wherein an information interchange media means in the form of a magnetic disk is employed to transfer said selected records from said storage means to said data processing means.

73. A method as in claim 47 wherein an information interchange media means in the form of a data communications line is employed to transfer said selected records from said storage means to said data processing means.

74. A method as in claim 47 wherein an information interchange media means in the form of a magnetic tape is employed to transfer said selected records from said data processing means to said personal computer data processing means.

75. A method as in claim 47 wherein an information interchange media means in the form of a magnetic disk is employed to transfer said selected records from said data processing means to said personal computer data processing means.

76. A method as in claim 47 wherein an information interchange media means in the form of a data communications line is employed to transfer said selected records from said data processing means to said personal computer data processing means.

77. A method as in claim 47 wherein:

said data processing means includes intermediate means for storing during said preprocessing operations a plurality of said selected records for at least two of said service customers;

each of said selected records comprises at least indicia identifying each said service customer; and

said data processing means is adapted to sort said selected records responsive to said indicia identifying said service customer to group together logically on said intermediate storage means all of said selected records for each said customer.

78. A method as in claim 77 wherein:

each of said selected records corresponds to a telecommunications station number and further comprises at least indicia identifying said telecommunications station number; and

said data processing means is adapted to further sort said selected records responsive to said indicia identifying said telecommunications station number to group together logically on said intermediate storage means all of said selected records corresponding to each said telecommunications station number.

79. A method as in claim 47 wherein said data processing means includes a first and a second data processor and means for transferring selected records from said first data processor to said second data processor, said first data processor being adapted for selecting said records relating to service usage and exact changes from said transferred transaction records and said second data processor being adapted for said preprocessing of said selected records, said second data processor being further adapted to create additional records containing information derived from said preprocessing operations for transfer to said personal computer data processing means.

80. A method as in claim 79 wherein said additional records comprise at least one project accounting code summary record created by said second data processing means.

81. A method as in claim 80 wherein said additional records comprise at least one carrier summary record created by said second data processing means.

82. A method as in claim 81 wherein said additional records comprise at least one billing classification code summary record created by said second data processing means.

83. A method as in claim 81 wherein said additional records comprise at least one geographical area code summary record recorded by said second data processing means.

84. A method as in claim 83 wherein said additional records comprise at least one originating station number summary record created by said second data processing means.

85. A method as in claim 84 wherein said additional records comprise at least one site code summary record created by said second data processing means.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 5,287,270

DATED : February 15, 1994

INVENTOR(S) : Robert M. Hardy, et al

It is certified that error appears in the above-indentified patent and that said Letters Patent is hereby corrected as shown below:

Column 3, line 65, insert a period --.-- after "subscribers";
Column 6, line 42, delete the quotation mark " " " and insert a dash -- - --;
Column 6, line 50, delete "is";
Column 11, line 26, change "TBSBO10" to --TPSBO10--;
Column 11, line 33, insert --1.-- after "Fig.";
Column 11, line 56, change "TBSBO20" to --TPSBO20--;
Column 17, line 18, delete the comma "," after "that";
Column 20, line 10, change "SBROC03" to --SPRPC03--;
Column 26, line 34, delete "men" and insert --menu--;
Column 30, line 41, insert a period --.-- after "customer";
Column 31, line 18, delete "solves" and insert --avoids--;

In the Claim:

Col. 31:
Claim 1, line 51, insert --arranged-- after "means".

Col. 35:
Claim 45, line 67, delete "tape" and insert --disk--.

Signed and Sealed this

Sixth Day of June, 1995

Attest:

Attesting Officer

BRUCE LEHMAN

Commissioner of Patents and Trademarks

CERTIFICATE OF SERVICE

I hereby certify that on this 27th day of February, 2013, I served a true and correct copy of the foregoing Brief of Plaintiff-Appellant Centillion Data Systems, LLC through use of the Court's CM/ECF system on the Defendants-Appellees' counsel of record at their last-known addresses, as follows:

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