



US006811533B2

(12) **United States Patent**
Lebel et al.

(10) **Patent No.:** **US 6,811,533 B2**
(45) **Date of Patent:** **Nov. 2, 2004**

(54) **AMBULATORY MEDICAL APPARATUS AND METHOD USING A ROBUST COMMUNICATION PROTOCOL**

4,399,821	A	*	8/1983	Bowers	600/301
4,854,328	A	*	8/1989	Pollack	600/549
5,127,404	A		7/1992	Wyborny et al.	
5,191,326	A		3/1993	Montgomery	

(75) Inventors: **Ronald J. Lebel**, Sherman Oaks, CA (US); **Varaz Shahmirian**, Northridge, CA (US); **Sam W. Bowman, IV**, Valencia, CA (US); **Timothy J. Starkweather**, Simi Valley, CA (US); **Philip T. Weiss**, Pasadena, CA (US); **Robert C. Dennard**, Lancaster, CA (US); **John T. Armstrong**, Pasadena, CA (US); **John D. Richert**, La Habra Heights, CA (US)

(List continued on next page.)

FOREIGN PATENT DOCUMENTS

EP	0 346 783	6/1989
WO	WO 95/02426	1/1995
WO	WO 96/03168	2/1996
WO	WO 97/18639	5/1997

OTHER PUBLICATIONS

PCT International Search Report as issued in International Application No. PCT/US01/23003, Mailing Date Jul. 3, 2002.

(List continued on next page.)

Primary Examiner—Daniel Robinson

(74) *Attorney, Agent, or Firm*—Foley & Lardner LLP

(73) Assignee: **Medtronic Minimed, Inc.**, Northridge, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 482 days.

(57) **ABSTRACT**

(21) Appl. No.: **09/768,035**

(22) Filed: **Jan. 22, 2001**

(65) **Prior Publication Data**

US 2002/0173702 A1 Nov. 21, 2002

Related U.S. Application Data

(60) Provisional application No. 60/177,414, filed on Jan. 21, 2000.

(51) **Int. Cl.**⁷ **A61B 5/00; G08B 23/00**

(52) **U.S. Cl.** **600/300; 340/573.1**

(58) **Field of Search** **600/300; 340/573.1, 340/573.2, 573.3, 573.4; 434/258; 604/131, 132**

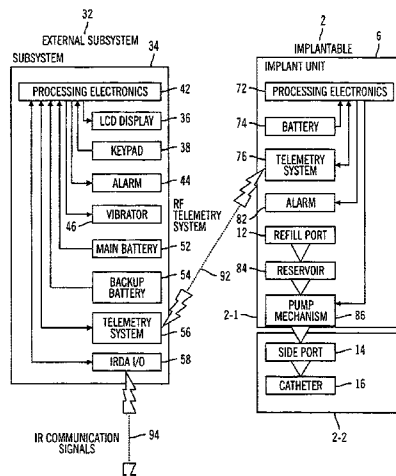
An implanted medical device (e.g. infusion pump) and external device communicate with one another via telemetry wherein messages are transmitted under a robust communication protocol. The communication protocol gives enhanced assurance concerning the integrity of messages that impact medical operations of the implantable device. Messages are transmitted using a multipart format that includes a preamble, a frame sync, a telemetry ID, data, and a validation code. The data portion of the message includes an op-code that dictates various other elements that form part of the message. The data portion may also include additional elements such as sequence numbers, bolus numbers, and duplicate data elements. A telemetry ID for the transmitting device may be implicitly embedded in the message as part of the validation code that is sent with the message and that must be pre-known by the receiver to confirm the integrity of the received message.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,910,257 A * 10/1975 Fletcher et al. 600/483

38 Claims, 3 Drawing Sheets



U.S. PATENT DOCUMENTS

5,368,562 A	11/1994	Blomquist et al.	5,876,370 A	3/1999	Blomquist
5,416,695 A	5/1995	Stutman et al.	5,935,099 A	8/1999	Peterson et al.
5,438,621 A	8/1995	Hornak et al.	5,935,106 A	8/1999	Olsen
5,456,692 A	10/1995	Smith et al.	6,024,539 A	2/2000	Blomquist
5,630,710 A	5/1997	Tune et al.	6,026,124 A	2/2000	Lee et al.
5,647,854 A	7/1997	Olsen et al.	6,123,686 A	9/2000	Olsen et al.
5,658,133 A	8/1997	Anderson et al.	6,208,894 B1 *	3/2001	Schulman et al. 607/2
5,658,250 A	8/1997	Blomquist et al.	6,364,834 B1 *	4/2002	Reuss et al. 600/300
5,659,299 A	8/1997	Williamson et al.	6,554,798 B1 *	4/2003	Mann et al. 604/131
5,669,877 A	9/1997	Blomquist	6,577,893 B1 *	6/2003	Besson et al. 600/509
5,695,473 A	12/1997	Olsen			
5,718,234 A	2/1998	Warden et al.			
5,752,976 A *	5/1998	Duffin et al. 607/32			
5,788,669 A	8/1998	Peterson			
5,791,344 A *	8/1998	Schulman et al. 600/347			
5,810,771 A	9/1998	Blomquist			

OTHER PUBLICATIONS

PCT International Search Report as issued in International Application No. PCT/US01/22926, Mailing Date Jul. 8, 2002.

* cited by examiner

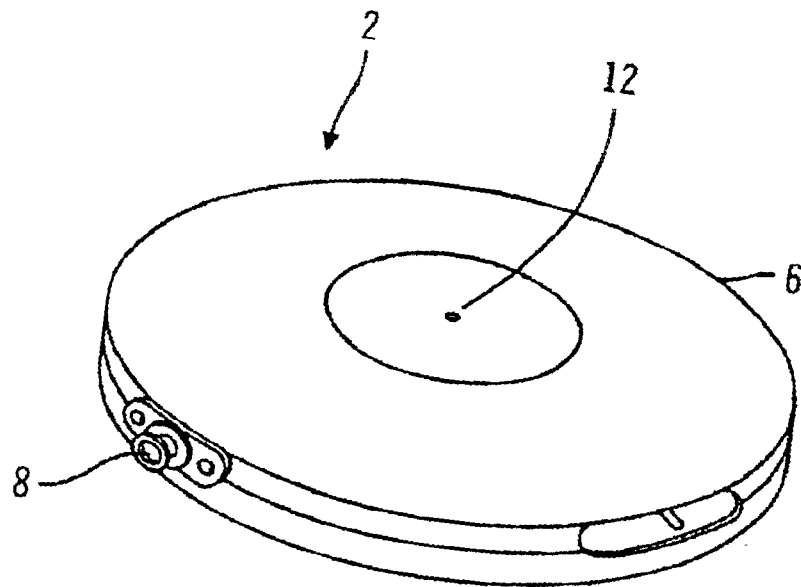


FIG. 1A

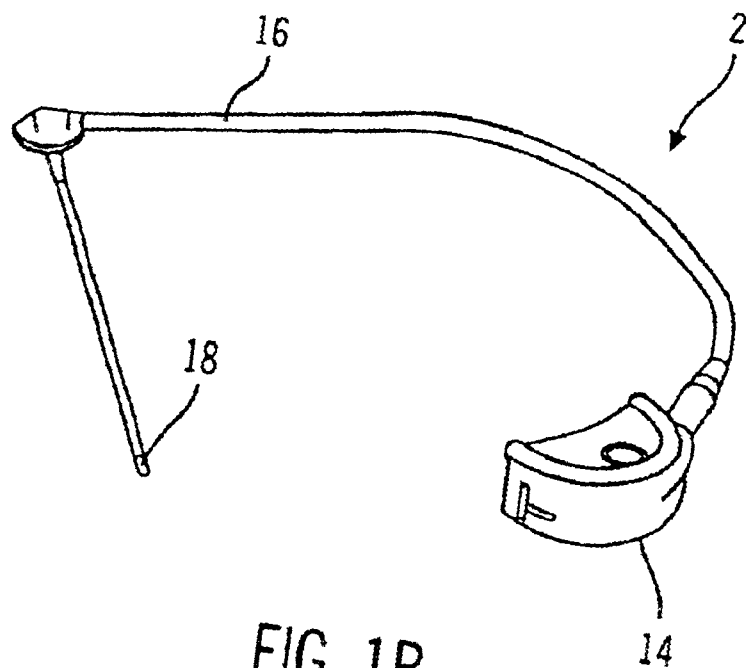


FIG. 1B

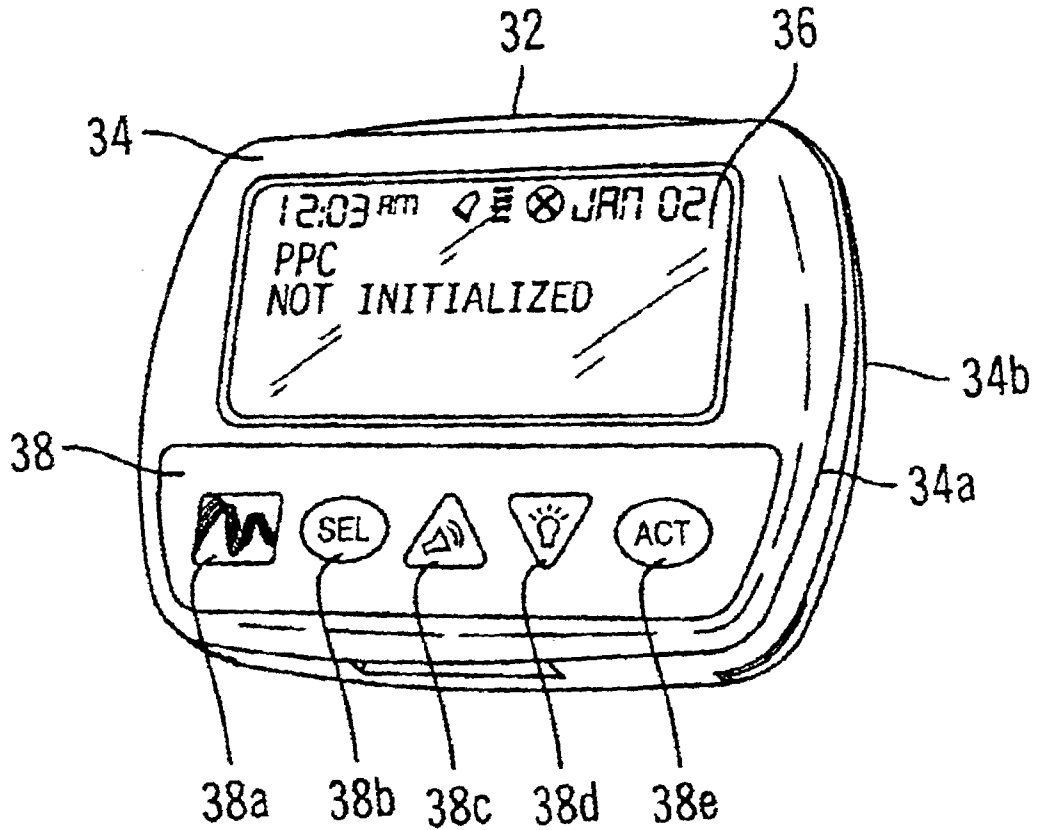


FIG. 2

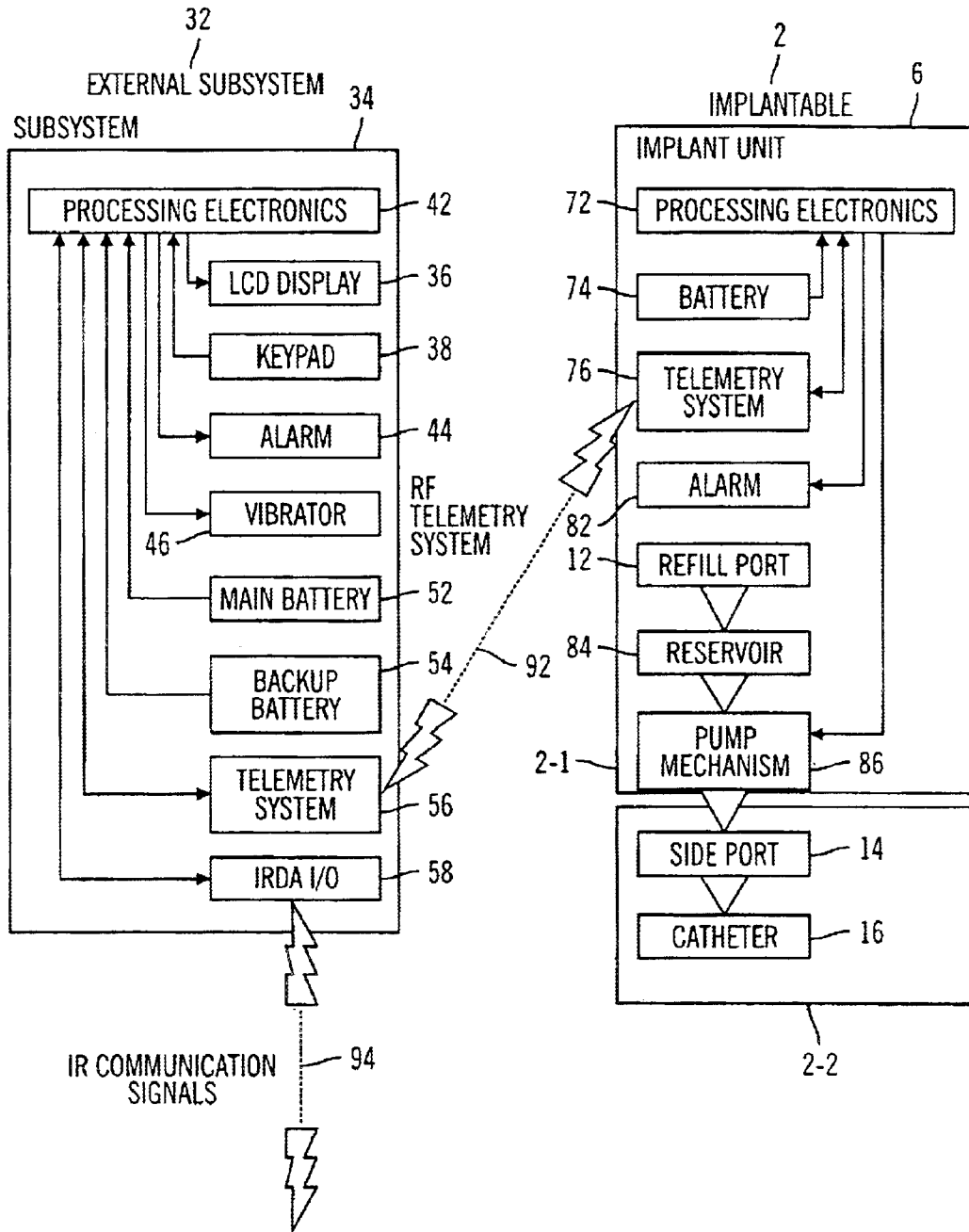


FIG. 3

Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.