infusion device **1010** (i.e., with this device **1010**'s unique code), the receiver will remain in an active mode until a complete sequence of commands has been received, or until the receiver times out due to a lack of RF communications from the RF programmer **1012**. Preferably, upon recognition of a valid RF programmer **1012** trying to communicate with the receiver, the external infusion device **1010** will activate its audio beeper (or its vibrator or the like) to let the user know that the external infusion device **1010** has been activated by the RF programmer **1012**. Typically, the receiver of the infusion device **1010** expects to receive a message with a valid preamble and message type, a recognized unique code, a valid function code (e.g., activate, bolus, suspend, or the like), an appropriate message count used by the receiver for reduction of RF interference problems, and a valid CRC on the transmitted message to ensure message integrity. Alternative embodiments, may include different message contents or components.

[**0072**] In operation, as discussed above, the RF programmer **1012** may be used to program several capabilities, such as an audio (or vibration) bolus, a suspension of external infusion device operation, a temporary basal rate, an extended bolus (such as square wave, ramp, triangular or the like) or dual wave bolus. In addition, the user may program a profiled bolus that uniquely matches the needs of the individual user (for instance it may contain square, ramp, pulse or curved portions that make up the profile to be delivered over a period of time). It should be noted that the capabilities may also be directly programmed on the external infusion device **1010** using the same sequence on the keypad of the external infusion device **1010**.

[**0073**] The RF programmer **1012'**, since it includes a display **1150** may use the same programming protocol and key sequences as those used to program the external infusion device **1010** using the keypad **1024** and LCD **1028** on the external infusion device **1010**. Alternatively, the RF programmer **1012'** may use more sophisticated programming techniques, such as single key programming, if the display **1150** includes the capability to use touch screen techniques, or may use additional keys in the keypad **1152** that are specifically identified with particular programming features on the external infusion device **1010**.

[**0074**] The Bolus estimator **1014** (or carbohydrate estimator that estimates a bolus based on carbohydrate consumption (CHO)) assists the user with carbohydrate counting and in determining precise dosing adjustments to account for meals. Carbohydrates are the primary, but not the only, factor affecting blood glucose levels. Generally, it is sufficient to account just for the carbohydrates. It also encourages the user to enter current blood glucose values before using this feature, which will also be viewed quite favorably by the health care professional, since it increases compliance with the medical regimen and improves control. In alternative embodiments, the bolus estimator **1014** in the external infusion device **1010** can be connected or coupled to a glucose monitor by way of the RF programmer **1012** (or other data transfer) to provide direct input to the bolus estimator **1014**. In still further embodiments, the external infusion device **1010** may utilize a more complicated keypad and/or RF programmer **1012**, and a code is assigned for each food. Then the code for each food to be consumed is entered into the external infusion device **1010**. An example of Bolus Estimators can be found in U.S. patent application Ser. No. 60/096,994 filed Aug. 18, 1998 and is entitled "INFUSION DEVICE WITH REMOTE PROGRAMMING, CARBOHYDRATE CALCULATOR AND/OR VIBRATION ALARM CAPABILITIES," or U.S. patent application Ser. No. 09/334,858 filed Jun. 17,1999 and is entitled "EXTERNAL INFUSION DEVICE WITH REMOTE PROGRAMMING, BOLUS ESTIMATOR AND/OR VIBRATION ALARM CAPABILITIES," both of which are herein incorporated by reference.

[**0075**] Further embodiments of the present invention include a vibration alarm **1016** that provides a noticeable vibration in addition to or in lieu of an audible alarm. The resulting tactile sensation of the vibration make the alarms more noticeable during sleep, when not thinking clearly due to various conditions, or the like, to improve the likelihood that the user will respond to an alarm. Thus, a vibration alarm **1016** can improve safety and control. In addition, the vibration alarm **1016** may be less publicly noticeable, and thus more useable in quiet settings, such as libraries, lectures, shows, or the like, or in loud settings where the alarm might go unnoticed, such as parties, concerts, or the like. In further embodiments, the RF programmer **1012** may include a vibration alarm (not shown) that can deliver a vibration alarm to the user in addition to, or instead of, the vibration alarm **1016** from the external infusion device **1010**. Alternatively, the RF programmer **1012** may provide a vibration alarm and the external infusion device **1010** may provide an audible alarm or vice versa. In preferred embodiments, all alarms will gradually escalate in frequency or volume so that the user can terminate them as soon as they are noticed. In alternative embodiments, the alarms may change tones or intermittently stop to draw attention to the alarm condition. In further alternatives, the infusion device **1010** may use the transmitter/receiver **1026** to transmit the alarm to a remotely located device, such as a communication-station, modem or the like to summon help.

[**0076**] In addition, as shown in **FIG. 29, a** relay **2004** may be capable of providing sensor set **2150** and telemetered characteristic monitor transmitter **2100** data to a remotely located individual via a modem connected to the relay **2004** for display on a monitor, pager or the like. The data may also be downloaded through a Communication-Station **2008** to a remotely located computer **2006** such as a PC, lap top, or the like, over communication lines, by modem or wireless connection, as shown in **FIG. 29**. Also, some embodiments may omit the Communication Station **2008** and uses a direct modem or wireless connection to the computer **2006**. In further embodiments, the telemetered characteristic monitor transmitter **2100** transmits to an RF programmer, which acts as a relay, or shuttle, for data transmission between the sensor set **2150** and a PC, laptop, Communication-station, station, or the like. The telemetered characteristic monitor transmitter **2100** and characteristic monitor **2200** may also be combined with other medical devices to combine other patient data through a common data network and telemetry system.

[**0077**] As shown in FIGS. **30-33**, a characteristic monitor **2200** may include a display **2208** that is used to display the results of the measurement received from the sensor in the sensor set **2150** via the telemetered characteristic monitor transmitter **2100**. The results and information displayed includes, but is not limited to, trending information of the characteristic (e.g., rate of change of glucose), graphs of