

# Pill Reminder

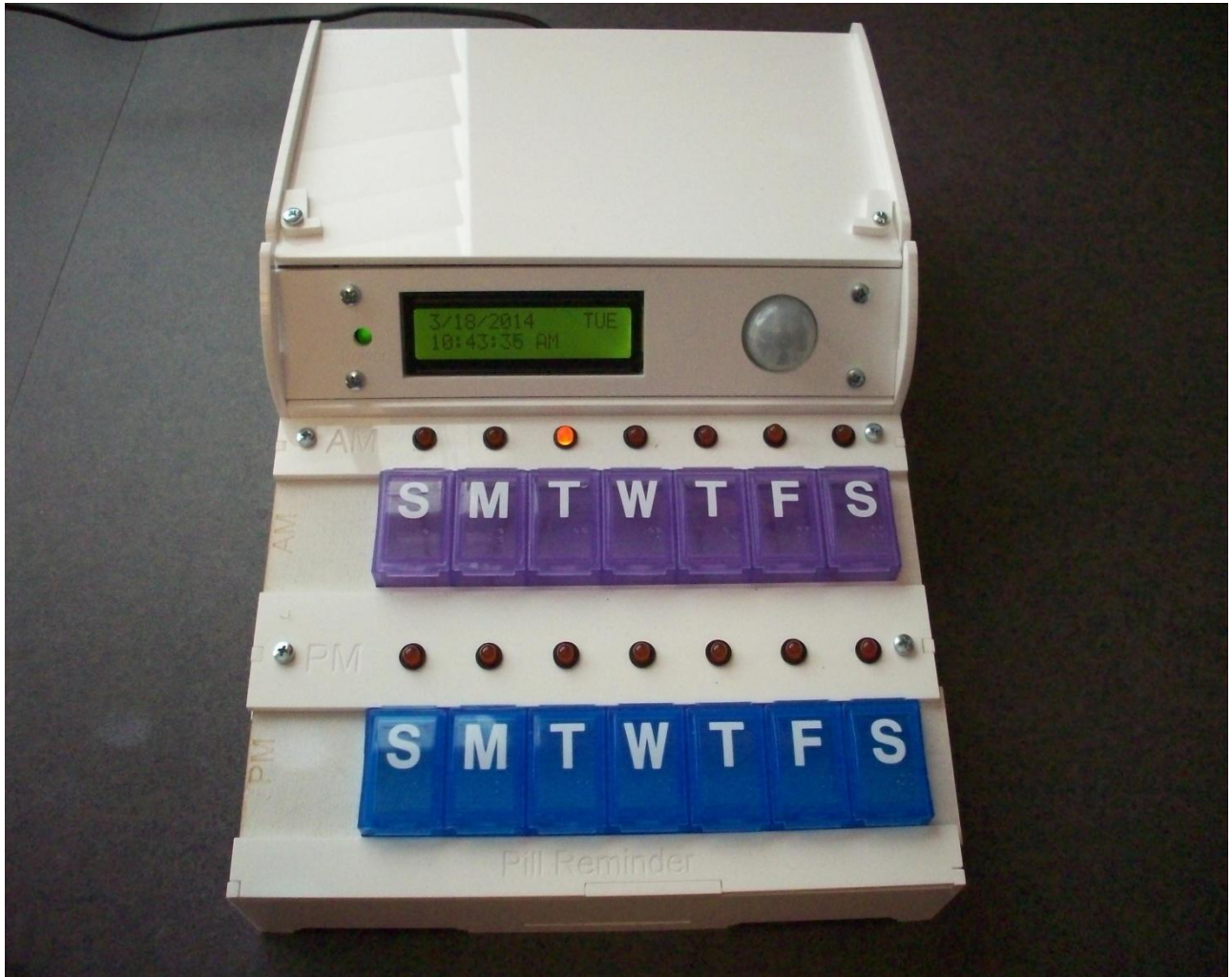
## User Manual

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Release 1.0

Shrimpware LLC

5/9/2014



Instructions for use and operation of the Pill Reminder.

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## **1 Introduction.**

The Pill Reminder is a very simple to use device to remind someone to take their medications (pills). This version of the Pill Reminder supports morning and evening pill sets. The Pill Reminder should be placed wherever a User usually takes their pills; generally either on a night stand or near a bathroom sink. The unit is moderately water tolerant but should not be submersed nor left wet for any period of time. The Pill Reminder must be located where it can be plugged in to AC electrical power.

The Pill Reminder's simplicity of operation is due to 14 Light Emitting Diodes (LEDs); one above each of AM and PM pill dispenser slots for each of the 7 days of the week. The AM light for the current day of the week lights up from 6 am to noon. The PM light for the current day of the week lights up from 6 pm to midnight. The User only needs to be instructed to open the pill dispenser slot where the LED is lit and never to open any other pill dispenser slot. At any time, the User should open that slot where the LED is lit and they should take the pills therein. If there are no pills therein, the User must be trained to understand that s/he has already taken the pills, regardless of whether or not s/he remembers doing so. As such, the Pill Reminder is appropriate for people who have mild dementia, short term memory loss, or simple absentmindedness.

The Pill Reminder has a proximity sensor on the sloped front panel. The first time that the proximity sensor is tripped within an LED lit interval, the LED will blink for approximately 4 seconds. This is an added means to gain the User's attention to taking their pills; however, the User should be trained to check the pill dispenser as often as necessary when the LED above it is lit, in order to ensure that they do not forget to take their pills.

There are no controls for the User to operate. The Pill Reminder is AC powered, but keeps time internally on battery power even when the AC power fails. The battery is good for more than 5 years of operation. The Pill Reminder automatically corrects date/time for daylight savings time (if so set) and for leap year, up to the year 2100. The internal timekeeping is accurate enough that the Pill Reminder does not need the time to be adjusted more than once per year, if that. The intent is for the Pill Reminder to be as foolproof and as simple as possible for the User: "check the dispenser slot when the LED above it is lit and take any pills therein"; period.

The Pill Reminder does not sense whether the User has opened a dispenser slot or whether the User has actually taken his/her pills. As such, it is necessary that the User have the mental capability to learn and understand the simple rules described herein. The Pill Reminder is not suitable for people with Alzheimer's disease, severe dementia, or any other impairment which would prevent the User from understanding and executing these simple, but important, instructions.

The Pill Reminder has two removable plastic pill dispensers; one for AM pills and one for PM pills. A Caregiver must swap in filled dispensers for empty dispensers on a weekly basis. The

detailed roles and responsibilities of “User” and “Caregiver” are described further in section 2 of this document.

Figure 1-1 is an annotated picture of the Pill Dispenser. The parts of the unit, and their function, are described below.

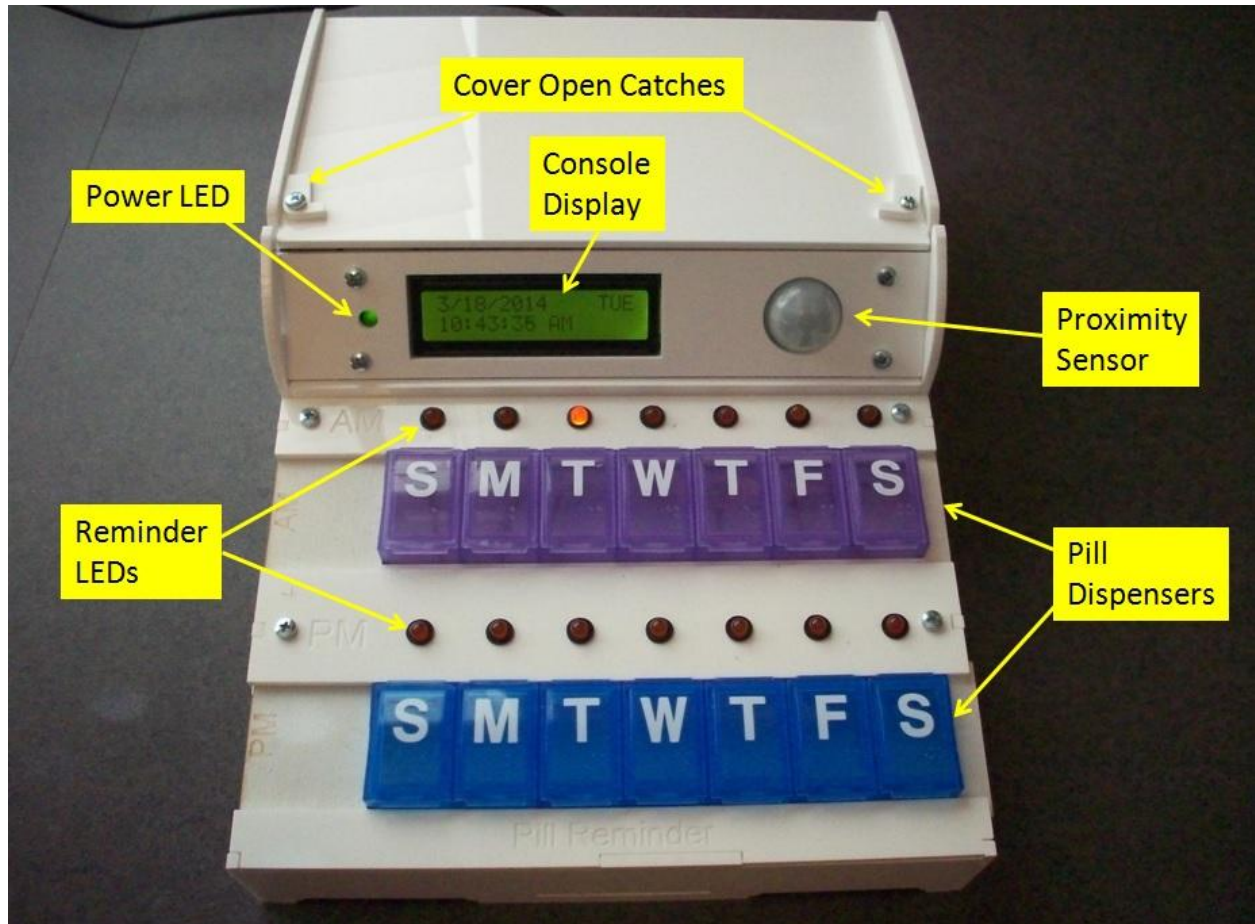


Figure 1-1. Pill Reminder Overview.

The AM and PM pill dispensers and the LEDs associated with each pill dispenser are on the accessible front of the device. The photo in figure 1-1 shows the “Tuesday AM” LED lit, because the time (at photo taking) is 10:43 AM on a Tuesday.

The Pill Reminder has a sloping front display panel with three components:

- Power LED: This LED is lit up when external power is applied to the unit.
- Console Display: The backlit LCD display normally shows the date, day of the week, and current time. It is also used for setting the time when the unit is first installed or moved.

- Proximity Sensor: This is an infrared proximity sensor that is common on alarm systems and other applications. It will sense the presence of a person within at least 4 feet away and from an angle of at least +/- 45 degrees from center.

By design, there are no controls whatsoever that are accessible from outside of the Pill Reminder. The hinged top of the enclosure is secured in place by movable catches. The catches must be moved and the cover must be opened in order to access miniature pushbuttons to reset the unit and to set the date/time. The operation of these buttons is described in section 5 of this document.



## **2 Plugging In the Pill Reminder.**

The Pill Reminder is powered by AC power via a “wall wart” power supply that comes with the unit. The power supply has a 2.1 mm plug that plugs into a jack in the back of the Pill Reminder, as shown in figure 2-1.



Figure 2-1. Back of Pill Reminder, showing the power supply plugged in.

Aside from the power jack, there is a USB connector on the back of the unit. This connector is not used in normal operation. It is available for loading new software into the unit as well as for an auxiliary +5 volt power supply option. There is no power switch or other external control. The Pill Reminder is intended to be plugged in and left that way.

When the Pill Reminder is plugged in, it initially goes through a 10 second “calibration mode”. Three things happen during this time period:

- The proximity sensor calibrates itself to the room environment. In order for proper calibration, whomever plugs the unit into AC power should stand to the side or back of the unit for the 10 second calibration period, so that the proximity sensor obtains an accurate “empty room” calibration.

- The LCD display shows the messaging “CALIBRATING ...”, as depicted in figure 2-2, below. At the end of the calibration period, the LCD display shows the date, day and time.



Figure 2-2. Calibration and Self test.

- The LEDs blink in succession: Sunday AM, Sunday PM, Monday AM, Monday PM, .... Saturday AM, Saturday PM, through 4 successive cycles. This is a self test to check that all of the LEDs are working properly. The person plugging the unit in should take note to ensure that all parts are working properly, as described above.

The Pill Reminder can similarly be reset via the internal “RESET” pushbutton, as described in section 5, below.

When the Calibration and Self Test period is complete:

- The proper LED (including no LED, according to the time) should light up. *Note: care should be taken not to trip the proximity sensor if the person plugging in the unit (or resetting it) is not the User.*
- The LCD displays the current date, current day of the week, and the current time (in 12 hour AM/PM format) on the LCD display. *Note: if the time has not been previously set, or if the internal battery has been replaced, the LCD will display a message to this effect and it will be necessary to set the date/time as described in section 5 of this document.*
- The proximity sensor will be armed immediately if any LED is on. It will re-arm automatically whenever the next LED comes on.

This is the normal mode of the Pill Reminder and the unit will remain in this mode as long as it is plugged in and not reset via the internal RESET pushbutton (section 5).



### **Pill Reminder – release 1.0**

No further operation is necessary, unless the date/time needs to be reset (i.e. due to battery replacement or relocation of the unit to a different time zone).

### **3 Roles and Responsibilities.**

There are two “people” roles associated with the Pill Reminder:

- User
- Caregiver

These two roles may be filled by one person or two different persons. An individual who can understand and execute all of the instructions in this document, but is “forgetful” about taking their pills can fulfill both roles. For more impaired people, the User and Caregiver roles should be assigned to separate people.

#### **3.1 User Role.**

The “User” is the person who takes the pills. The User’s responsibilities are to:

- Observe the LEDs.
- If an LED is on, open (and keep open) that pill dispenser slot directly below the lit LED.
- Take any pills in the open dispenser slot.

The User must be capable of being trained in these responsibilities, as elaborated in section 4, below. *If the User is not capable of being trained in these responsibilities, then the Pill Reminder is not appropriate for them.*

#### **3.2 Caregiver Role.**

The Caregiver has multiple roles and responsibilities. They are:

- Train the User thoroughly to observe the User rules stated above.
- Ensure that a fresh set of pills are properly loaded into the pill dispenser slots each and every week. The pill dispensers are removable so that the Caregiver can install a pre-filled set of dispensers once per week and take back the previous week’s empty dispensers for re-filling and replacement the following week.
- Ensure that the Pill Reminder is working correctly. This can be done by resetting the unit and observing the Calibration and Self Test cycle, as described above. The Pill Reminder can be reset in either of two ways: (1) by unplugging the power supply from the unit, waiting 5 seconds, and re-plugging the unit back in, or (2) by opening the cover and depressing the RESET pushbutton (see section 5).
- Ensure that the date and time are set correctly on the LCD display. See section 5, below, for instructions on setting the date and time.

The Pill Reminder is only an aide for helping Users to remember to take their pills. *The Caregiver has overall responsibility to ensure that the User takes their medications on time, and to assess whether the User is competent to follow their training on the proper use of the Pill Reminder.*

## 4 User Instructions.

The User instructions are, intentionally, very simple:

- If an LED is lit, open the dispenser slot under that LED and make sure that the pills in the dispenser slot are all taken.
- Check the slot where the LED above it is lit, and take any pills therein, regardless of whether the User thinks that the pills have already been taken. One way to ensure this is to train the User to keep the slot open after opening it and taking the pills, so that it remains obvious that the slot is empty.
- Never open any slot where the LED above it is not lit.

The User may also use the LCD display as a date and time clock, as it will keep time reliably, even through a power failure, and will automatically adjust for daylight savings time (if so configured) and for leap year. The LCD and LEDs will only display when AC power is on and the unit is plugged in, but the unit will keep time through a power failure and will come up with the correct date and time when power is restored.

The User may observe an error message on the LCD in the event that the internal battery needs replacement or other failure occurs. The User must be trained to inform a Caregiver immediately if the Pill Reminder is displaying an error message or otherwise not displaying the proper date and time.

The User may observe an LED blinking for about 4 seconds, and then lighting solidly. This is an added feature of the Pill Reminder that uses the proximity sensor to help catch the User's attention when they approach the Pill Reminder for the first time during any pill taking time period. However, the proximity sensor can be triggered by other people and animals, and the User must be trained to not rely on the LED blinking to check if they have taken their pills. The User should always check the pill dispenser under a lit LED and take any pills therein immediately.

## **5 Caregiver Instructions.**

### **5.1 Removing and Replacing the Pill Dispensers.**

The Pill Reminder contains two removable 7 day pill dispensers, as indicated on figure 1-1, with a close-up in figure 5-1, below.

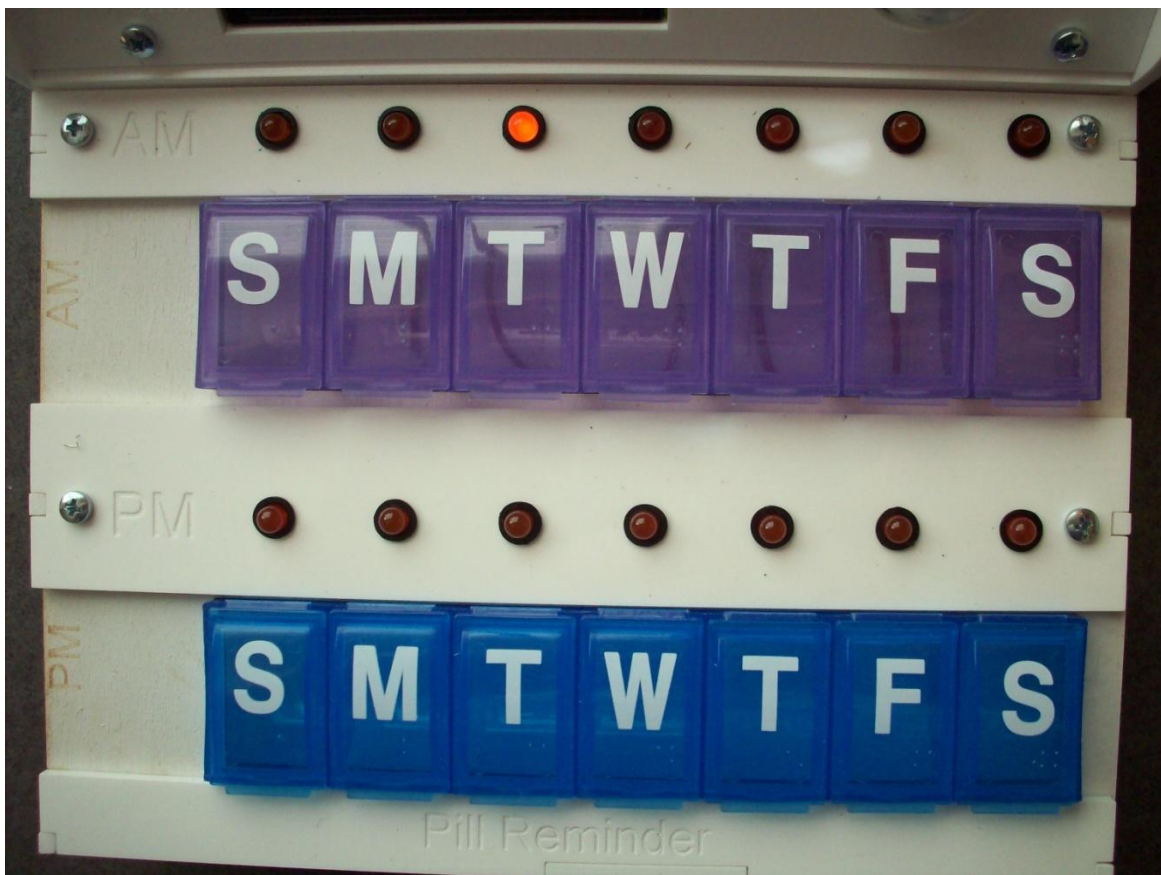


Figure 5-1. Pill Dispensers - Close-up

The pill dispensers are removable so that the Caregiver can replace empty ones with filled ones on a weekly basis, and take the empties away for refilling over the subsequent week. It is the Caregiver's responsibility to ensure that the pill dispensers are refilled properly and replaced weekly, or at any time that the User requires new pills.

Figure 5-2 shows one of the two pill dispensers removed from the Pill Reminder enclosure.



Figure 5-2. Removable Pill Dispenser.

Each plastic pill dispenser is pressed into a carrier that slides the pill dispenser in and out of the Pill Reminder unit. The carrier is notched on the left side to provide a positive detent to hold the pill dispenser into place at the proper location within the Pill Reminder. The pill dispenser is removed by gently, but firmly, by pulling the carrier to the right when facing the front of the Pill Reminder. The Pill Reminder enclosure is notched on the sides so that the dispenser, with carrier, will slide in and out of the enclosure without interference.

It is recommended that the Caregiver have an extra set of pill dispensers/carriers on hand. Each week, as it becomes time to refill the User's pills, the Caregiver can bring two filled pill dispensers (one with AM pills and one with PM pills) to the User's facility. The Caregiver should then:

- Remove the old (empty) AM and PM pill dispensers from the Pill Reminder by gently, but firmly, pulling each to the right, as viewed from the front of the unit.
- Replace the empty pill dispensers with new, refilled pill dispensers, taking care to properly place the AM and PM carriers (PM in front, AM toward the rear). Each new pill dispenser is inserted from the right side of the unit (facing forward), with the notched end to the left. The carrier is pushed into the unit, gently but firmly, until it locks into place via its detent.
- The Caregiver must double check that the correct dispenser is in the correct location, that each contains the correct pills for the correct day, that all dispenser covers are closed shut, and that the pill dispensers are fully inserted into the Pill Reminder enclosure so that each day's dispenser slot lines up directly under the proper LED.
- The Caregiver must then take away the old, empty pill dispensers and refill them properly for replacement use the following week.

Before leaving the User's facility, the Caregiver should check that the LCD display shows the correct day, date and time. See "Setting the Date and Time", below, for instructions on performing this task, as necessary.



## 5.2 Resetting Pill Reminder.

Resetting the Pill Reminder is necessary in order to recalibrate and test the unit and for setting the date and time. There are two ways to reset the Pill Dispenser: via removing power and via the RESET pushbutton inside the unit.

- Removing the power: The power is removed either by unplugging the “wall wart” power supply from AC power or by removing the power plug from the rear of the Pill Reminder (figure 2-1 shows the location). Either way, the Caregiver should wait at least 5 seconds and then plug the power back in. The Pill Reminder will be reset and will enter the Calibration and Self Test mode, as described in section 2 of this document. Removing the power requires that the internal battery backup be operational in order for the unit to keep time. Otherwise, the LCD display will show a message requiring the Caregiver to set the date and time, per the instructions in section 5.3, below.
- Pressing the internal RESET button. There are three, miniature pushbutton switches inside of the Pill Reminder. In order to access these switches, the Pill Reminder’s cover open latches must be moved into the unlatched position and the top cover lifted open (refer to figure 1-1 for the detailed location). Once the top of the unit is open, a circuit board containing the three pushbuttons is accessible; see figure 5-3.

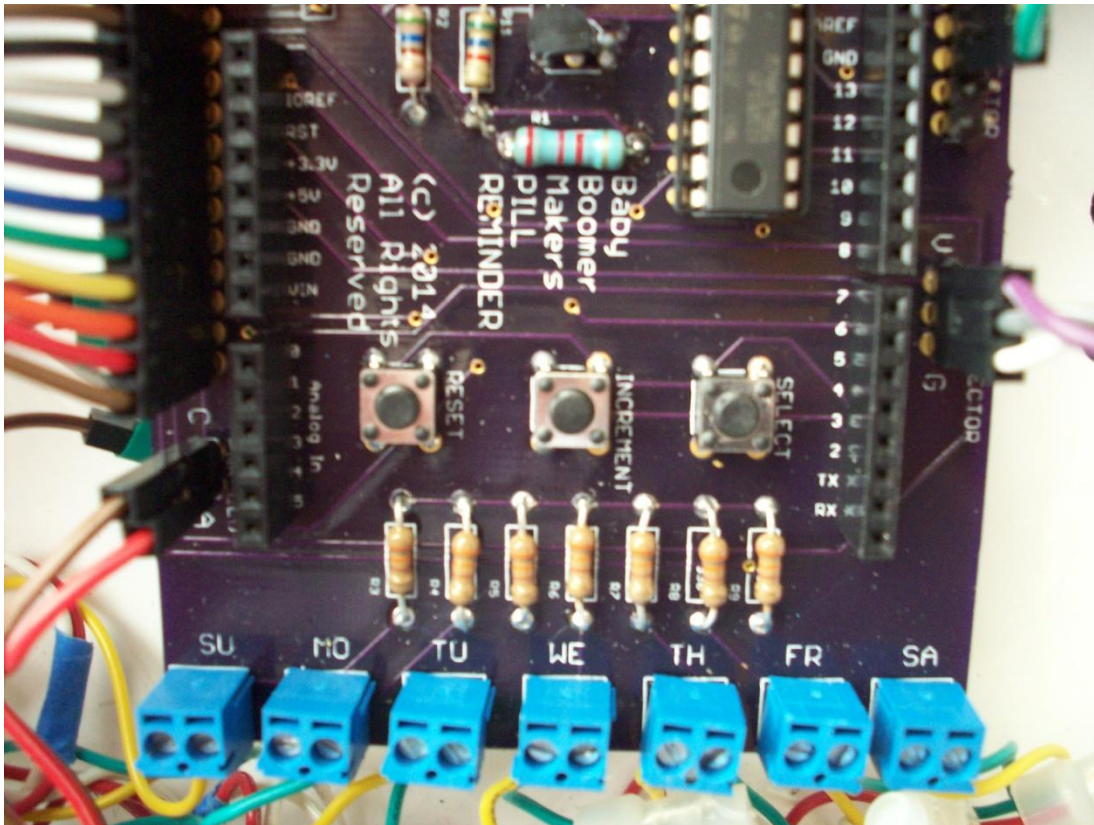


Figure 5-3. Pushbutton Switches.

Once the cover is open, the Caregiver may reset the Pill Reminder by pressing the RESET pushbutton switch (leftmost pushbutton). Resetting the unit in this manner has exactly the same effect as unplugging the power, except that the unit always remains powered and the previous time setting should be maintained regardless of the state of the internal backup battery.

*Note that the Caregiver should be sure to replace the top cover and re-engage the cover open latches so that the User does not have inadvertent access to the pushbutton switches.*

After resetting the Pill Reminder, the Caregiver should observe the self test to ensure that all of the LEDs are working properly and should never leave the unit without ensuring that the date, day and time are displayed properly on the LCD display after the Calibration and Self Test period is finished (approximately 10 seconds). Please refer to section 2 for details.

### **5.3 Setting the Date and Time.**

The battery backed clock in the Pill Reminder is highly accurate and the battery should last more than 5 years. The Pill Reminder can automatically adjust for daylight savings time and for leap year; therefore, the date and time should need to be set only very infrequently. When it is necessary to change the date-time, the Caregiver is responsible to do so.

The Pill Reminder requires good timekeeping to ensure that the User takes the correct pills at the correct days and times. The Pill Reminder has therefore been designed to prevent inadvertent changing of the date-time, in two ways:

- Access to the pushbuttons for setting date and time requires the latched cover of the Pill Reminder to be opened.
- The Pill Reminder's date-time can only be changed immediately after the unit is reset. Date-time setting can only be initiated during the 10 second Calibration and Self Test interval immediately following a device reset. One date-time changing is initiated, the Caregiver can take as long as necessary to set the date and time. Once the date and time is set, any remaining Calibration and Self Test time will be executed before the Pill Reminder enters normal operation. Once the Pill Reminder is in normal operation, it must be reset to change the date-time. Resetting the Pill Reminder is described in section 5.2, above.

In order to set the date and time, The Pill Reminder cover must be opened so that the three pushbuttons may be accessed, as described in section 5.2, above. The Pill Reminder must first be reset, as also described in section 5.2. Once the Pill Reminder is reset, it enters the Calibration and Self Test mode, as described in section 2 of this document. At anytime during the Calibration and Self Test sequence, pressing the SELECT pushbutton (rightmost, in figure 5-3), suspends Calibration and Self Test and enters time setting mode. In time setting mode, the SELECT pushbutton advances the item to be set to the next item on the list and the

INCREMENT pushbutton (middle, in figure 5-3) increments that function to the next sequential value. The Caregiver may use SELECT to cycle through the functions as many times as desired. The Caregiver may also press RESET at any time to reset the date-time to the previously stored values. The date and time values set by the Caregiver are only stored into the Pill Reminder when the Caregiver presses INCREMENT at the appropriate prompt, as described below.

The following is the list of date and time setting functions that are displayed, in order, with each depression of the SELECT pushbutton. The function and its present value are displayed on the LCD:

- Daylight Saving: Immediately upon pressing SELECT during a device reset, the LCD displays “Daylight Saving:” on the first line and the selection value on the second line. The default value for the selection is “automatic DST”, as shown in figure 5-4:



Figure 5-4: Daylight Saving.

Automatic DST applies US daylight savings time rules to the current time throughout the year. Pressing INCREMENT changes the second line to “no DST”, and pressing INCREMENT again changes it back to “automatic DST”. The Caregiver uses INCREMENT to make the proper selection for the User’s locale (whether or not daylight savings time is observed there), and then presses SELECT to advance to “Year:”

- Year: When “Year:” is displayed on the first line of the LCD, the year is shown on the second line. The default year is “2014”, as shown in figure 5-5.



Figure 5-5. Year.

The Caregiver may press the INCREMENT button to advance the year forward one year, e.g. to 2015, 2016, etc. If the Caregiver advances the year too far ahead, s/he needs to press RESET to return to the default of 2014. After setting the year, the Caregiver presses SELECT to advance to “Month:”

- Month: When “Month:” is displayed on the first line of the LCD, the second line shows the month. The default month is “January”, as shown in figure 5-6.





Figure 5-6. Month.

The Caregiver may press the INCREMENT button to advance the month forward, e.g. to February, March, etc. After December, the Month display will recycle back through January. After setting the month, the Caregiver presses SELECT to advance to “Day:”

- Day: When “Day:” is displayed on the first line of the LCD, the second line shows the day of the month. The default day is “1”, as shown in figure 5-7.



Figure 5-7. Day.

The Caregiver may press the INCREMENT button to advance the day forward, e.g. to 2, 3, etc. The Day will advance to 31 and then recycle back to 1. If the day is set higher than the number of days in the month, the actual day set in the Pill Reminder will be adjusted accordingly into the subsequent month; i.e. setting day 31 in April will result in an actual date set in the unit of May 1. After setting the day, the Caregiver presses SELECT to advance to “Hour:”.

- Hour: When “Hour:” is displayed on the first line of the LCD, the second line shows the hour on a 12 hour cycle (1 – 12). The default hour is “1”, as shown in figure 5-8.



Figure 5-8. Hour.

The Caregiver may press the INCREMENT button to advance the hour forward, e.g. to 2, 3, etc. The Hour will advance to 12 and then recycle back to 1. After setting the hour, the Caregiver presses SELECT to advance to “Minute:”.

- Minute: When “Minute:” is displayed on the first line of the LCD, the second line shows the minute on a 60 minute cycle (0 – 59). The default minute is “0”, as shown in figure 5-9.





Figure 5-9. Minute.

The Caregiver may press the INCREMENT button to advance the minute forward, e.g. to 1, 2, 3, etc. The Minute will advance to 59 and then recycle back to 0. After setting the minute, the Caregiver presses SELECT to advance to “AM/PM:”.

- AM/PM: When “AM/PM:” is displayed on the first line of the LCD, the second line shows the value. The default value is “AM”, as shown in figure 5-10.



Figure 5-10. AM/PM.

The Caregiver may press the INCREMENT button to advance to PM and then again to AM, etc.. After setting the AM/PM value, the Caregiver presses SELECT to advance to time setting.

- Time Setting: The LCD will display the options to set the time into the Pill Reminder or to recycle back to “Daylight Saving:” as shown in figure 5-11.



Figure 5-11. Setting the Date-Time.

At this point in the date time setting sequence, the Caregiver had made his/her selections but these selections have not been set within the Pill Reminder. With the LCD display showing figure 5-11, the Caregiver may press INCREMENT to set the selected date and time into the unit. At this point, the Pill Reminder will complete any of the Calibration time remaining and then enter normal operation, showing the date, day of week, and currently set time on the LCD display. If the Caregiver wishes to review and possibly alter his/her selections before storing them into the unit, s/he may press SELECT, which will recycle the LCD display back to “Daylight Saving:”. It is necessary to cycle through SELECT to this step once again in order to press INCREMENT to set the selected date and time into the unit and return it to normal operation.

*Note: Pressing RESET at any time during the date-time setting cycle will return the Pill Reminder to the reset state and, after the 10 second calibration period, the Pill Reminder will display the current date and time based upon whatever was previously set in the unit. Therefore, the Caregiver can abort date-time setting without changing the previously time by pressing RESET before pressing INCREMENT at the point shown in figure 5-11.*

#### **5.4 Testing the Pill Reminder.**

The Caregiver should, on a weekly basis, test the Pill Reminder for proper operation. In order to do this, the Caregiver should reset the unit, as described in section 5.2, above. The Caregiver should observe the Calibration and Self Test, paying particular attention to seeing that the LEDs light in sequence: Sunday AM, Sunday PM, Monday AM, Monday PM, etc. to make sure that all of the LEDs light up properly.

It does not matter which method the Caregiver uses to reset the unit – disconnect the power or open the cover and press the RESET pushbutton. However, when the Caregiver resets the unit in order to test it out, it is advisable for the Caregiver to stand on the side or in back of the unit so as to not trip the proximity sensor.

The proximity sensor may be tested by setting the date-time to any time that the Pill Reminder will light up an LED (i.e. any time between 6 am and noon, or between 6 pm and midnight). After the unit calibrates, the Caregiver can test the proximity sensor by moving in front of the unit. Tripping the proximity sensor will cause the lit LED to blink for approximately 4 seconds.

If the Caregiver set the date-time to test the proximity sensor, s/he must set the time properly before leaving the User's facility. See section 5.3 for details. The Caregiver must always ensure that the Pill Reminder has the correct date and time set internally.

After intentionally tripping the proximity sensor, the Caregiver should once again reset the Pill Reminder and then get at least 5 feet away from the front of the unit within about 5 seconds of reset. This will ensure that the proximity sensor is armed for the next appearance of the User. In any event, the proximity sensor will automatically rearm the next time period that an LED is lit.

## **6 Specifications.**

AC Power: 110 – 240 VAC, 50/60 Hz, 0.15 amp.

DC Power (power jack): 9 VDC at 0.65 amp.

Length: 10.75”

Width: 7.5”

Height (cover closed): 3.0” max.

Timekeeping Battery Life: 5 years, minimum

Replacement Battery: CR1632, 3 volt lithium coin cell