Resources

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Contact Information

Geek Clock User Manual

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Binary Alarm Clock User Manual

Iowa State University
College of Engineering
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Replacing Parts

Due to the construction of the Geek Clock, parts can not be easily replaced by the consumer. Only the 9V battery can be replaced by the user. This is located on the back of the clock as shown on page 7 of this document. If a part malfunctions and needs to be replaced please send the Geek Clock back to the manufacturer where it can be properly fixed.

Ordering Replacement Parts

For the true geeks that feel they can fix malfunctioned parts themselves replacement parts are available. Replacement parts for the clock can be ordered through Digi-Key at www.digikey.com

To get the parts list please send your name, proof of purchase, and parts to be replaced to:

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Frequently Asked Questions

Q: Will my alarm go off if the power is out?
A: Yes, as long as the backup battery is still functioning.

Q: Can I shut off the digital display?
A: Yes, but only if you are a true geek!

Q: Can I shut off the LED display?
A: No, the LED display is only off during battery backup. The LED is to help teach binary.

Q: How do I know if the battery is set?
A: If the battery is set properly then the second notification LED will be on.

Setting and Using the Alarm

The alarm can be set by following these simple instructions.

In order to set the alarm the alarm switch on the right back side of the clock must be flipped to the on position. Then press the red alarm button located most right on top of the clock. The current alarm time will appear on the digital display. Use this display to read the time when setting the alarm. While pressing the alarm button push the up or down buttons to adjust the desired time. These are located to the left of the alarm button.

The up and down buttons cycle through time in minutes. For a quicker setting push and hold down on the up or down button and it will cycle faster. Release to slow it down. Once you have the alarm set to the desired time, release the alarm button. If the alarm was set properly, the second notification LED by the digital display will be on. Make sure to set the correct time depending on your hour time format.

When the alarm is going off hitting any button will snooze the alarm for 10 minutes. To turn off the alarm the alarm switch in the back must be turned off.

Setting the Time

To set the clock the same directions should be followed as setting the alarm, but instead of pushing the alarm button, push the clock button located on top of the clock. This will hold the LEDs to their current state until the clock button is released. Thus the digital screen should be used while setting the clock. If you move to a separate time zone, you must update your clock on your own.

Setting a Time Format

The Geek clock has two different time formats that it can be displayed in: 24-hour or 12-hour format. To change between the two different settings simply toggle the time format switch located on the back left of the clock.

Useful Definitions

AC/DC rectifier – an electronic device that converts alternating current to direct current.

Binary – a number system using a base of 2 consisting of on/off, high/low, or ones and zeros used by almost all computer systems.

Daylight saving time (DST) – the time is which clocks are set exactly one hour ahead of standard time in order to provide more daylight during late spring, summer, and fall.

Fourteen possible calendar years – There are only fourteen possible calendar years supported that include all of the leap years and DST.

Geek - *slang* – a term to describe a person with good computer skills, an interest in technology, and firm knowledge of the sciences…usually accompanied with an almost complete social ineptitude.

Light-emitting diodes (LED) – a type of diode that emits light when it is subjected to a flow of current. LEDs may have different colors depending on the material used.

Liquid-crystal displays (LCD) - two thin sheets of plastic filled with individual cells of ionic liquid crystal capable of being manipulated by a current.

Twelve-hour format – the standard hourly display of analog and digital clocks which a separate indication for AM or PM. e.g. 12:34 pm

Twenty-four hour format – (a.k.a. military time, universal time) – the hourly display of clocks without a separate indication for AM or PM that increments hours upon reaching noon based on 24 hours. e.g. 23:45 equals 11:45 pm.

Intended Uses

This object is a clock meant to display time primarily in binary with LED's. It provides other functionalities that are closely associated with a geek personality.

It is also intended to help individuals learn binary by using the secondary display of the digital readout of the binary.

This clock can also be used as a standard alarm clock as well. It will sound at a designated time by the intended user.

Intended Users

The intended user(s) are those who know binary code and fit the geek persona.

It can also be used by those who would like to learn binary through a practical application.

This should not be used by children due to certain dangers such as small parts and electrical components.

Operating Environment

The operating environment is limited to indoor places.

The environment should be able to supply the appropriate power needed through a regular wall outlet.

It should not be used in areas that contain a lot of moisture such as the bathroom or pool room for danger of electrical parts.

It should not be in an area that it could potentially be dropped in a sink such as a kitchen or laundry room.

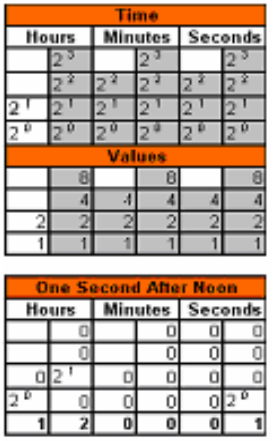
It should be limited to places such as bedrooms, home offices, and in the work office.

2. Date

The date is represented with the green LEDs on the left side of the front cover. This reads in 6 columns from left to right, month, day, year. A diagram of the LED binary values is to the right. The columns in the gray are summed together when calculating the date and a zero means the LED is off. Also shown is an example and the diagram is shown on page 6.

3. Time

The time is represented with the red LEDs on the right side of the front cover. This reads in 6 columns, like the date, from left to right hours, minutes, seconds. A diagram of the LED binary values is to the right. The columns in the gray are summed together when calculating the time and a zero means the LED is off. Also shown is an example and the diagram is shown on page 7.



Digital (LCD Screen)

This is the secondary display for the clock. This is a two line multi-character display. It shows the date on the first line colons separating the month, day and year. The time is the second line, colons separating the hour, minutes, and seconds.

The digital display also has the ability to be turned off by the user if

Reading the Displays

There are two displays for the Geek Clock. The primary display is binary format utilizing LEDs. The secondary display is a digital display meant for people to learn to use binary. The instructions on how to read each display are listed in this section.

Binary (LEDs)

The primary display for the clock is in binary format. This display contains three parts: the day of the week, date, and time all in LEDs. This display will go out while the battery is running on battery backup. This display will also hold its position when the clock is being set.

1. Day of the week

This is represented with 3 LEDS. The LEDs from left to right represents the position placement in binary of 2^0, 2^1, 2^2 .The table below shows the calculation of the binary corresponding to the numerical value for the day of the week. The 1 in binary represents a lit up LED. Figures of the day of the week are shown on page 6.

Day of the week	Numerical value	Position Placement	Position Calculation	Binary
Sunday	1	$2^0+2^1+2^2$	$0+0+2^0$	100
Monday	2	$2^0+2^1+2^2$	$0+2^1+0$	010
Tuesday	3	$2^0+2^1+2^2$	2^0+2^1+0	110
Wednesday	4	$2^0+2^1+2^2$	$0+0+2^2$	001
Thursday	5	$2^0+2^1+2^2$	2^0+0+2^2	101
Friday	6	$2^0+2^1+2^2$	$0+2^1+2^2$	011
Saturday	7	$2^0+2^1+2^2$	$2^0+2^1+2^2$	111

Powering the clock

The clock should be powered from a standard American wall outlet. A surge protector power strip should be utilized to protect the device from power surges from the AC adapter.

The clock also contains a 9V battery for back up power if there is no power coming from the outlet. This should run for approximately six hours.

If the alarm is set, and a power failure occurs the back up battery will still sound the alarm at the designated time.

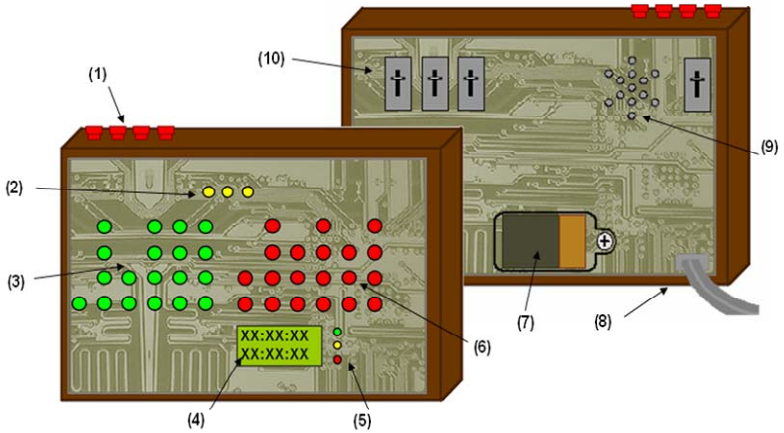
While running on back up the main display is shut down to conserve the battery. The battery indicator and digital display will be the only objects getting power from the battery.

Binary Example

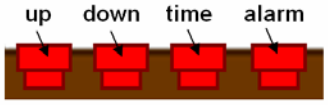
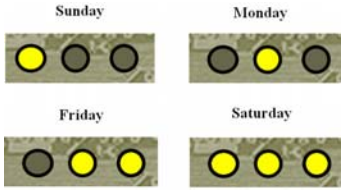
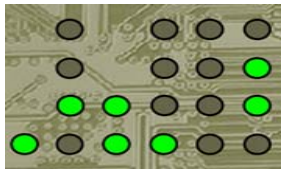
Binary is a number system using a base 2 to count. Any integer can be represented using this system. Binary is a string of 1's and 0's representing an on or off state for that position placement. If the position is at a 0 then it will not be counted into the numerical value. If it is a 1 then 2^n for the nth position is summed with other positions that have 1's to get the final numerical value. An example is shown below.

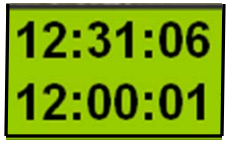
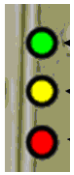
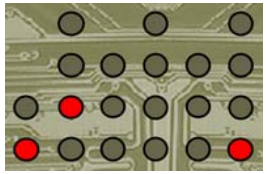
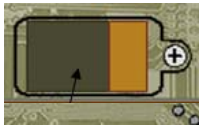
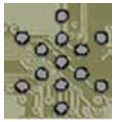
Binary Number	Position Placement	Position Calculation	Numerical Value
000000	$2^5\ 2^4\ 2^3\ 2^2\ 2^1\ 2^0$	$0+0+0+0+0+0$	$0+0+0+0+0+0 = 0$
111111	$2^5\ 2^4\ 2^3\ 2^2\ 2^1\ 2^0$	$2^5+2^4+2^3+2^2+2^1+2^0$	$32+16+8+4+2+1 = 63$
101010	$2^5\ 2^4\ 2^3\ 2^2\ 2^1\ 2^0$	$2^5+0+2^3+0+2^1+0$	$32+0+8+0+2+0 = 42$
010101	$2^5\ 2^4\ 2^3\ 2^2\ 2^1\ 2^0$	$0+2^4+0+2^2+0+2^0$	$0+16+0+4+0+1 = 21$

Clock layout



Functionality of Parts

1. Push buttons The push buttons are used to adjust the time, or alarm in either the up or down direction.	
2. Binary Display Day of Week LEDs These three LEDs display the day of the week in binary, Sunday being the first day of the week.	
3. Binary Display Date LEDs These LEDs display the date in month/day/year format. This display is not user settable. Example: 12/31/06	

4. Digital Display (secondary) This display, shows the time and the date (month/day/year). It is a multi-line/ multi-character display. The date is the top string and the time is the bottom	
5. Notification LEDs These LEDs, located next to the digital display, show if a certain function is on. They represent AM/PM indication, alarm set, and battery back up accordingly.	
6. Binary Display Time LEDs These LEDs display the time in 12 or 24-hour format. This is user settable. Example: one second after noon.	
7. Backup Battery This is a 9V battery that turns on when the AC power is not supplied.	
8. Power Cord A standard power cord to power the clock through a 120V AC wall outlet.	
9. Alarm Sound This is the location of the settable alarm sound.	
10. Toggle Switches The switches allow the user to switch on and off functions. On the back in order from left to right, the LCD screen, hour format, DST, and alarm can be toggled.