Application Notes for User Friendly Programmable Clock
Used as a Triggering Mechanism

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Executive Summary:

There are various external clocks with programmable timers; most of them range from regular alarm clocks to water sprinklers to home-automated oven cooking. This document will explore the uses of timer triggering for operating systems, one in particular for “Solar Powered Connect-on-Demand Internet” for schools in Tanzania. Most of these programmable timers/alarms are very user friendly. Instead of users rigorously inputting confusing lines of code, they simply push buttons and the time is set.

Keywords:

Clock, programmable alarm, triggering mechanism

Introduction:

This document will demonstrate the process of how programming a simple alarm can be achieved. This programmable alarm will be used to delineate a cut off time, or curfew in which the internet systems will shut down in the rural schools in Tanzania. The alarm will be programmed to power down the internet router, until an internet request is made. Once an internet request is made the alarm will be overridden and the internet system will continue to service the user until an idle period of approximately fifteen minutes has elapsed, then the internet system will power down again via the microcontroller. The idea of “user friendly” will also be taken into consideration.

For this application, the device to be used will be an alarm clock. Simple to program and the user may set the curfew for the internet system in Tanzania as he/she may please. One main advantage of this is that it conserves power. Shutting down a system when it is not used will certainly reduce power consumption and therefore achieve more efficiency.

Objective:

The main focus for the alarm clock will be programming it to desired times and describing how this external timer will be able to interface with other peripherals.
For these instructions, the use of the Phillips MAGNAVOX AJ3080 clock will be a candidate.

To begin, a diagram of the clock is shown below.

Figure 1: Basic AJ3080 Diagram and Button Assignments

1 Figure taken from http://www.manualsonline.com/search.html?m=&d=&q=aj&p=3
Figure 2: Button Assignments

2 Figure taken from http://www.manualsonline.com/search.html?m=&d=&q=aj&p=3
For basic implementation, only the buzzer for the alarm will be used. Once the user has familiarized themselves with the button controls, setting the time, and programming the alarm is imperative.

Setting Up the Time:

In order to set up the clock the user must:

1. Rotate the CLOCK control to the TIME SET position.

2. For a desired hour, press Hr repeatedly until desired hour is obtained. The values will vary between 1 and 12 in increasing order. There will be a light on the top left hand corner of the display that will light up if the user is using PM. This turns on and off with every other cycle of 12 hours.

3. For minutes, press Min repeatedly until desired minutes are obtained. Then release. The values will vary between :00 and :59 in increasing order.

4. Once time is set, rotate the CLOCK control to the RUN position. This will prevent any accidental time adjustments.

Programming the Alarm:

This procedure will allow for the user to program the alarm as desired.

1. In the same way to program the clock, rotate the CLOCK control to the ALARM option.

2. Exactly the same way to program the clock, press the Hr button to vary the numbers from 1-12 until the desired hour is selected.

3. Next, after selecting the hour, to select the minute, press the Min button. Repeatedly press this until desired minute is obtained.

4. Once the changes are made and alarm time is decided, next rotate the CLOCK control dial to run. Now the alarm is programmed into the clock.
Setting the Alarm:

Even though the alarm is programmed, the alarm is still not set. The following steps will guide the user to set the alarm.

1. Referring to figure 1, switch 10, this is the ALARM switch. Simply set the ALARM to Buzzer.

2. To turn off the alarm, simply adjust the ALARM switch to the OFF position.

Modifications:

Certain modifications have been made for the programmable alarm. Normally once the alarm is set, and the alarm goes off, a buzzer will sound from the speaker. For this modification to adequately use the alarm as a triggering mechanism, the speaker is removed. Once the speaker is removed, the wires will be attached to the PIC18F4520 microcontroller. Subsequently, when the alarm is programmed and set, the alarm will send a signal to the microcontroller in the form of a HI/LO and trigger a shut off for the internet system.

Conclusion:

Overall, there are other methods to program something as simple. Unfortunately, some are more tedious than others that include a user defined assembler code. In order to bypass code implementing, buttons and dials serve as an excellent form of “user friendly” user defined time programming. However, there are still some issues to bear in mind as the modifications advance. Changes will be made to this document accordingly.