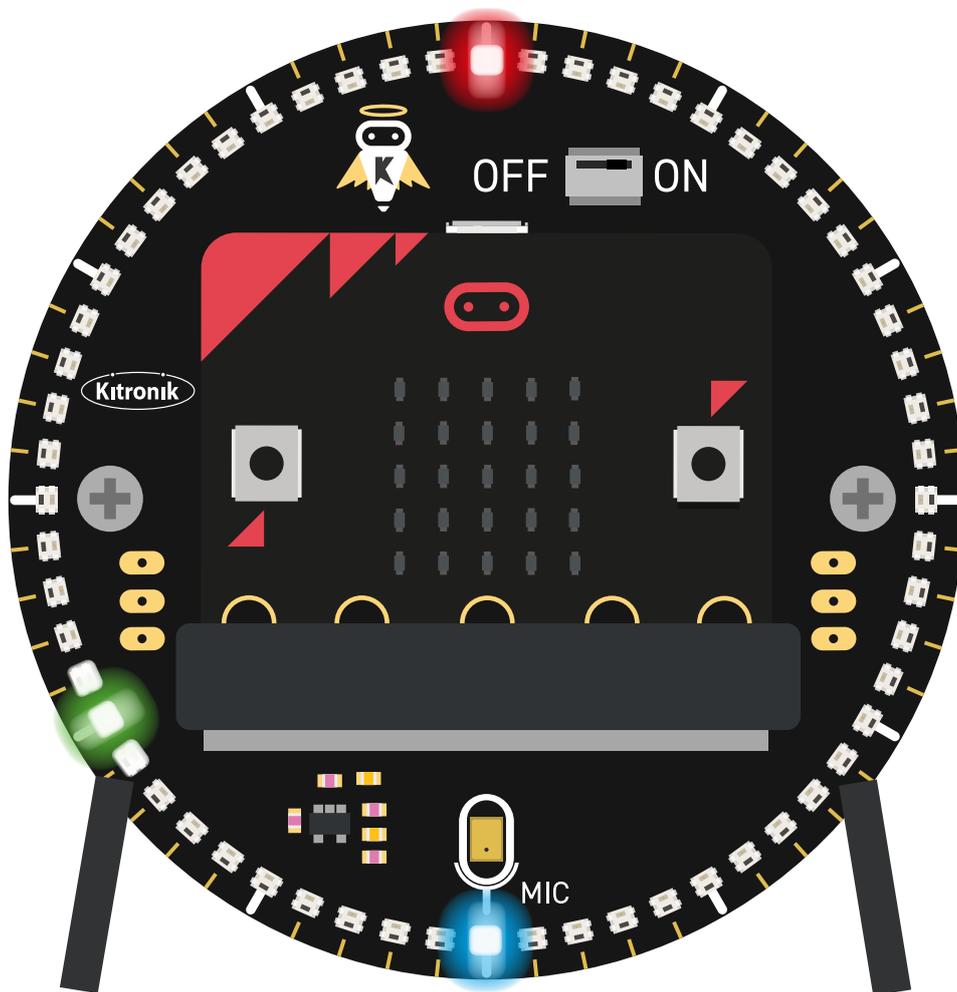


HALO HD ALARM CLOCK TUTORIAL

KITRONIK RESOURCES



INTRODUCTION

Learn how to set alarms and trigger events with the Halo HD.

If you have not done the 'Halo HD Basic Clock' and 'Halo HD Adjustable Clock' tutorials, it is recommended that you complete them first.

SETTING UP

EQUIPMENT REQUIRED:

- 1 x BBC micro:bit (www.kitronik.co.uk/5613),
- 1 x Halo HD - Alarm Clock Kit (www.kitronik.co.uk/5681)

ADDING IN CUSTOM MAKECODE BLOCKS:

We have made custom coding blocks especially for the Halo HD, which helps to make coding super simple within Microsoft MakeCode.

To add these blocks, follow the steps below:

STEP 1: Bring up the MakeCode Block Editor - (makecode.microbit.org).

STEP 2: Click 'New Project'.

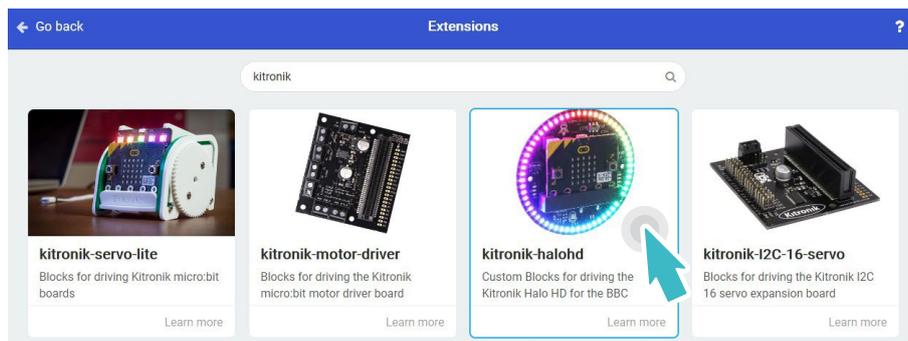
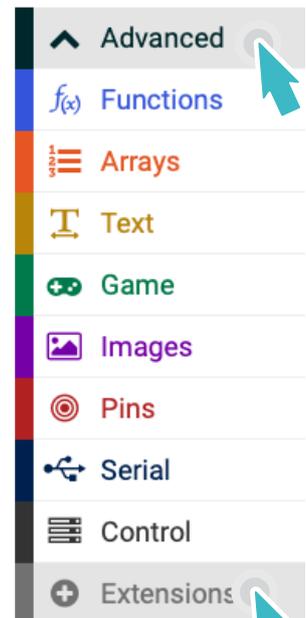


STEP 3: In the toolbox towards the left of the screen, select the 'Advanced' section. Additional block categories will appear below.

STEP 4: Select 'Extensions'.

STEP 5: In the pop up's search bar type 'Kitronik'.

STEP 6: Locate & select the 'kitronik-halohd' box.



THE TUTORIAL

RECREATE ADJUSTABLE CLOCK CODE

STEP 1: From the first two tutorials, we had the code for setting and displaying the time using the micro:bit button interface. Start by opening your program from the 'Adjustable Clock Tutorial' and familiarising yourself with it.

```

forever
  if setTimeMode = true then
    set minutes to Read minutes as Number
    set hours to Read hours as Number
    if hours ≥ 12 then
      change hours by -12
    while enterNewTime = false
      do
        if minutes > 59 then
          set minutes to 0
          change hours by 1
          if hours = 12 then
            set hours to 0
          haloDisplay clear
          haloDisplay set ZIP LED minutes to green
          haloDisplay set ZIP LED hours × 5 to blue
          haloDisplay show
          pause (ms) 1
        Set Time to hours hrs minutes mins 0 secs
        set enterNewTime to false
        set setTimeMode to false
      else
        haloDisplay clear
        haloDisplay set ZIP LED Read seconds for ZIP display to red
        haloDisplay set ZIP LED Read minutes for ZIP display to green
        haloDisplay set ZIP LED Read hours for ZIP display to blue
        haloDisplay show

on start
  set haloDisplay to to Halo HD with 60 ZIP LEDs
  set setTimeMode to false
  set enterNewTime to false

on button A+B pressed
  if setTimeMode = true then
    set enterNewTime to true
  else
    set setTimeMode to true

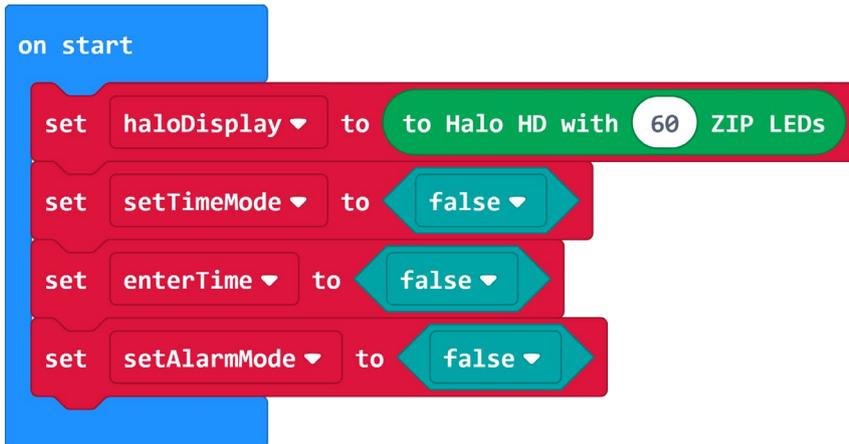
on button A pressed
  change minutes by 1

on button B pressed
  change minutes by 10
  
```

SETTING THE ALARM

STEP 1: The clock currently has two modes: "Display Time" and "Set Time".

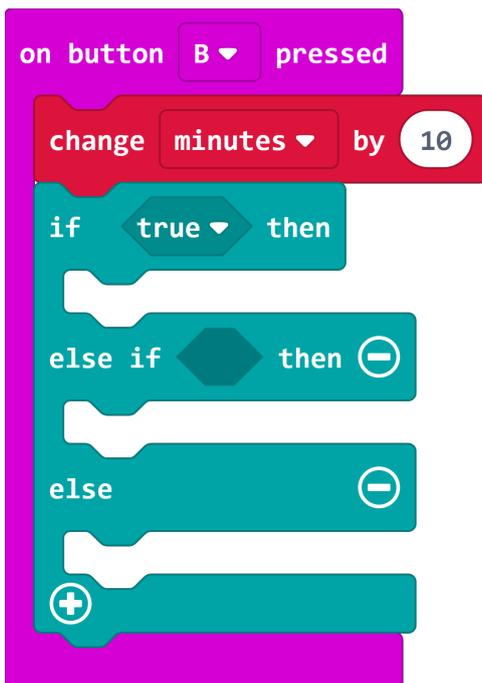
We need to add another mode, "Set Alarm", and to do this we need to create a new variable called 'setAlarmMode'. Add it to the 'on start' block and set it to 'false' using the block in the 'logic' section.



```
on start
  set haloDisplay to to Halo HD with 60 ZIP LEDs
  set setTimeMode to false
  set enterTime to false
  set setAlarmMode to false
```

STEP 2: Just like with the "Set Time" mode, the code needs to be told that we are in "Set Alarm" mode. All the button press combinations are already in use, so we'll need to be a bit clever...

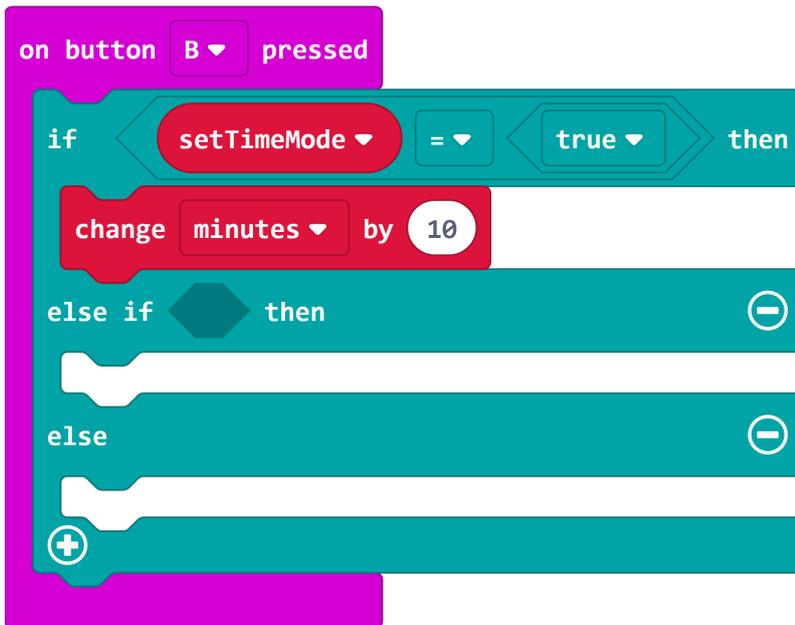
To start with, place an 'if else' statement in the 'on button B pressed' and click the '+' icon to add an 'else if' statement as well.



```
on button B pressed
  change minutes by 10
  if true then
  else if then -
  else -
  +
```

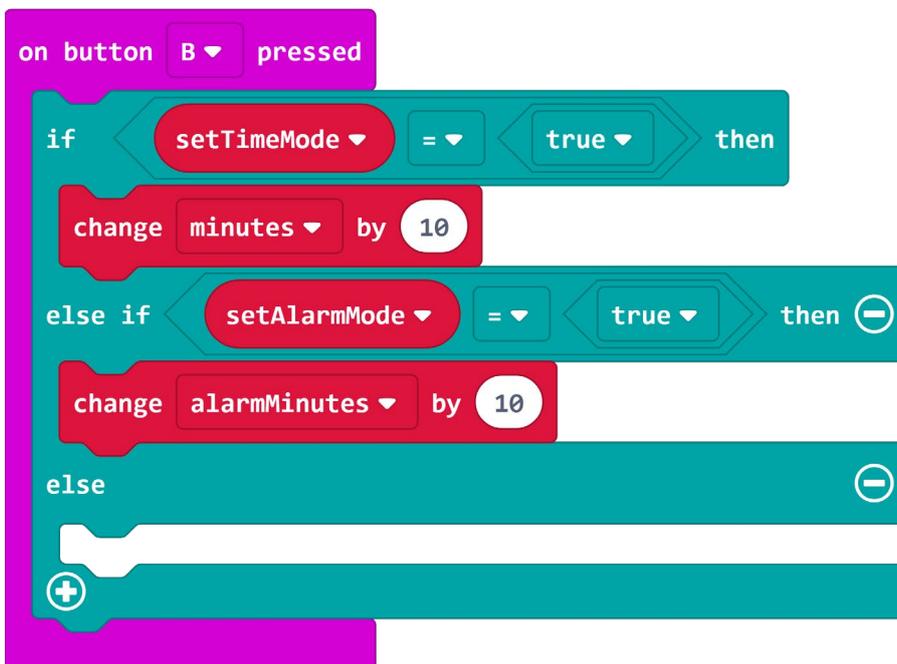
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STEP 3: Now we need some conditions in our 'if else' statement to enable pressing button 'B' to do different things in different modes. Firstly, we still want it to increment the minutes by 10 if we're setting the time, so put a check in the 'if' section to see if 'setTimeMode' is 'true', and move the 'change minutes by 10' block inside the 'if' section.



```
on button B pressed
  if setTimeMode = true then
    change minutes by 10
  else if
  else
```

STEP 4: Secondly, it makes sense for button 'B' to also change the minutes for the "Set Alarm" mode (we'll need a couple of new variables at this point: 'alarmMinutes' and 'alarmHours'). Next, put a check in the 'else if' section to see if 'setAlarmMode' is 'true' and add a 'change alarmMinutes by 10' block inside the 'else if' section.



```
on button B pressed
  if setTimeMode = true then
    change minutes by 10
  else if setAlarmMode = true then
    change alarmMinutes by 10
  else
```

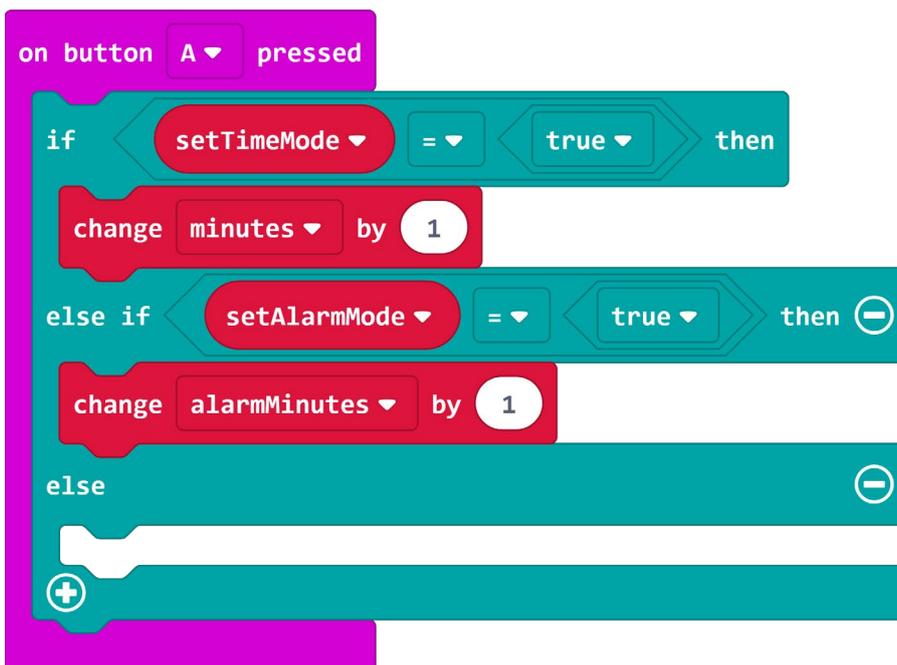
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STEP 5: Finally, we actually want to enter “Set Alarm” mode by pressing button ‘B’, so add a block setting ‘setAlarmMode’ to be ‘true’ inside the ‘else’ section.



```
on button B pressed
  if setTimeMode = true then
    change minutes by 10
  else if setAlarmMode = true then
    change alarmMinutes by 10
  else
    set setAlarmMode to true
```

STEP 6: Now see if you can make button ‘A’ change the minutes by 1 for both the “Set Time” and “Set Alarm” modes using a similar setup (but leave the ‘else’ section blank for now).



```
on button A pressed
  if setTimeMode = true then
    change minutes by 1
  else if setAlarmMode = true then
    change alarmMinutes by 1
  else
```

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STEP 7: Button 'B' can now be used to increment both 'minutes' and 'alarmMinutes' by 10 and enter "Set Alarm" mode, and button 'A' can be used to increment both 'minutes' and 'alarmMinutes' by 1. Once an alarm has been set, it will - at some point - go off, so we need a way to silence it.

Create another new variable called 'silenceAlarm'. We will use button 'A' to silence alarms, so add a block to the 'else' section setting the 'silenceAlarm' variable to be 'true'.

```

on button A pressed
  if setTimeMode = true then
    change minutes by 1
  else if setAlarmMode = true then
    change alarmMinutes by 1
  else
    set silenceAlarm to true
  
```

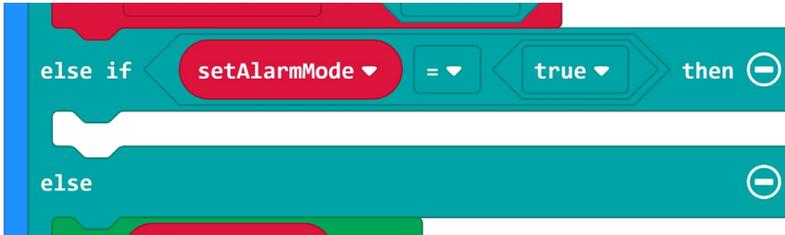
STEP 8: Our final change to the control button interface is to the 'on button A+B pressed' block. We will need to enter a time for both the "Set Time" and "Set Alarm" modes, so add a check to the 'if' statement to enable 'enterTime' to be set to 'true' if we are in "Set Time" mode **OR** "Set Alarm" mode.

```

on button A+B pressed
  if setTimeMode = true or setAlarmMode = true then
    set enterTime to true
  else
    set setTimeMode to true
  
```

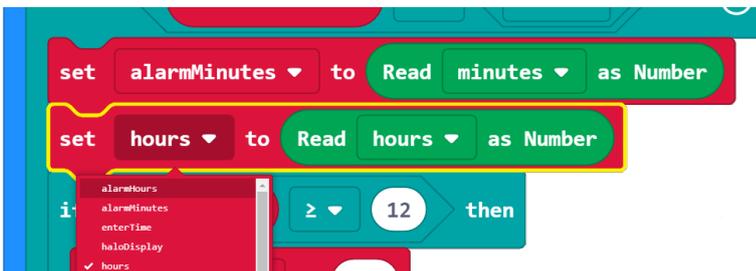
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STEP 9: The next stage is adding the functionality for a “Set Alarm” mode, which is actually quite simple. Going back to the ‘forever’ loop, we need to add an ‘else if’ section by pressing the ‘+’ icon, and put a check in the statement to see if we are in “Set Alarm” mode.



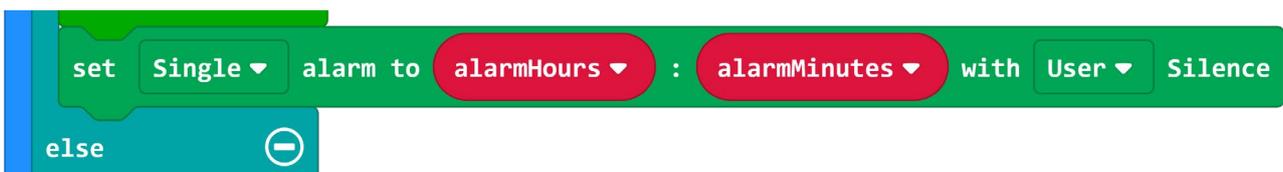
STEP 10: Then, copy all the code from the ‘if’ section and put in into the ‘else if’ section. We will make some changes in the next few steps to enable alarms to be set.

STEP 11: Go through the code we have just placed in the ‘else if’ section and replace all uses of the variable ‘minutes’ with ‘alarmMinutes’, and all uses of the variable ‘hours’ with ‘alarmHours’. This is easily done by changing the selection in the drop-down box.



STEP 12: Now that the variables have been changed, the only other differences between the two sections are after the ‘while’ loop. Remove the ‘Set Time’, ‘set enterTime to false’ and ‘set setTimeMode to false’ blocks.

STEP 13: Inside the Clock section of the Halo HD extension is the ‘set alarm’ block. Add this after the ‘while’ loop and insert the ‘alarmHours’ and ‘alarmMinutes’ variables into the appropriate slots. We want this alarm to only go off once, so set the alarm type to “Single” and to be “User” silenced.



STEP 14: Just like with the “Set Time” mode, we now need to set some variables to be ‘false’. Do this for: ‘silenceAlarm’, ‘enterTime’ and ‘setAlarmMode’.

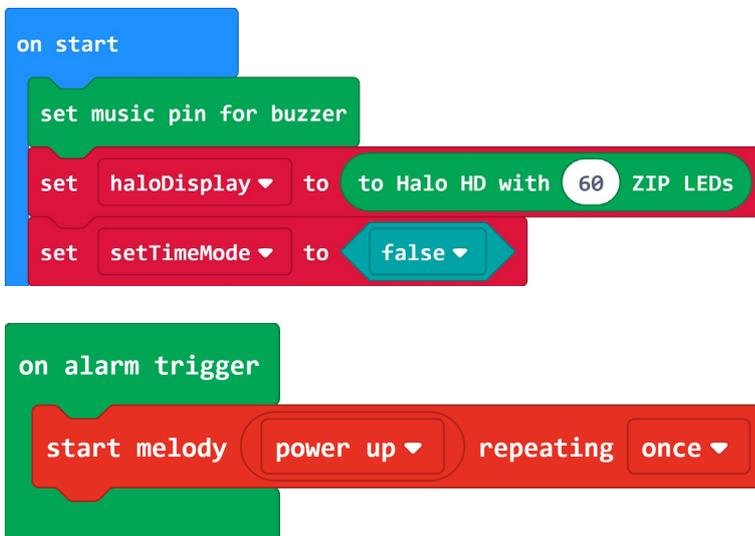
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TRIGGERING & TURNING OFF THE ALARM

STEP 1: We now have the ability to set an alarm at a particular hour and minute, but at the moment, nothing will happen when it goes off.

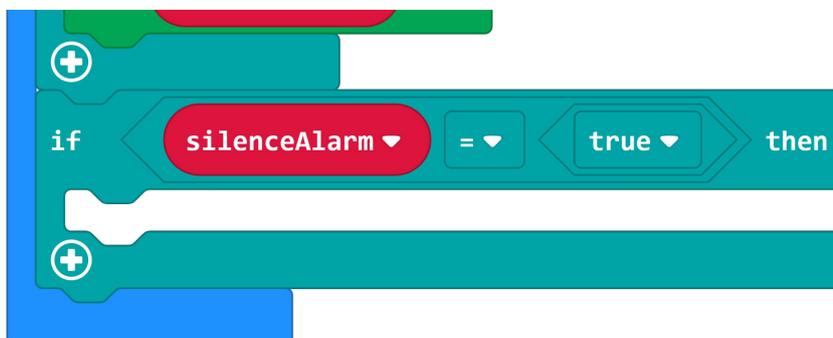
Add the 'on alarm trigger' block from inside the Clock section of the Halo HD extension. This block waits until the alarm goes off, and then runs any code which is put inside it. From the 'Music' section, add a 'start melody' block to run when the alarm triggers. Choose a tune from the drop-down list and have it repeat "once".

We also need to set up the music blocks to work on the Halo HD by adding the 'set pitch pin' block to the 'on start' block.



```
on start
  set music pin for buzzer
  set haloDisplay to to Halo HD with 60 ZIP LEDs
  set setTimeMode to false
on alarm trigger
  start melody power up repeating once
```

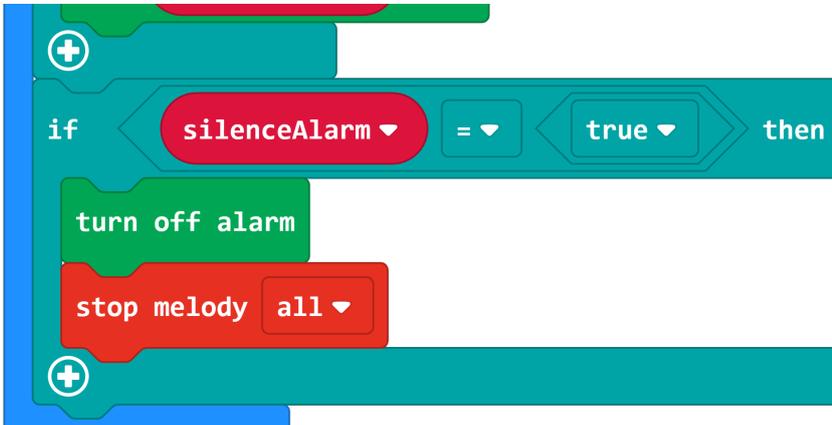
STEP 2: The final stage before our alarm clock is complete is to add the functionality to turn off the alarm. Start by placing an 'if' statement at the end of the 'forever' loop. The condition it needs to check for is if the 'silenceAlarm' variable is 'true'.



```
if silenceAlarm = true then
```

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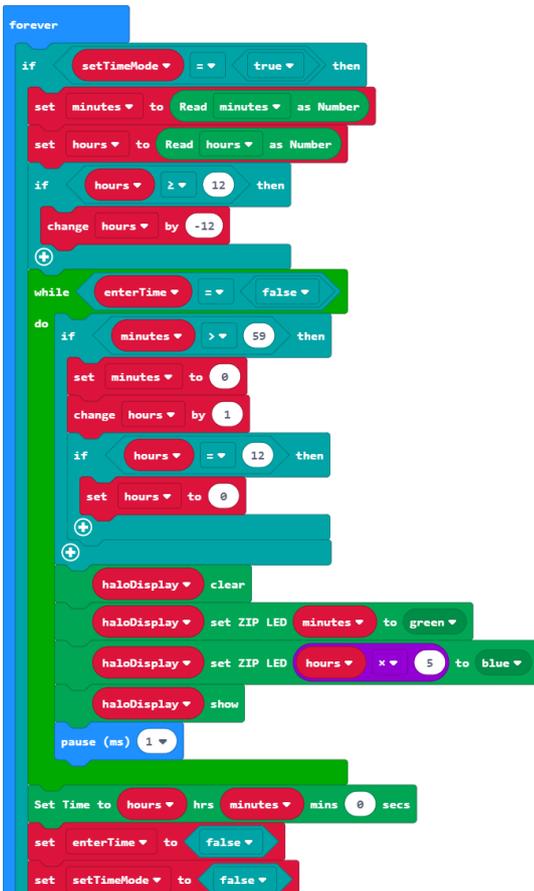
STEP 3: Now add the 'turn off alarm' block from the Clock section of the Halo HD extension inside the 'if' statement, followed by the 'stop melody all' block from the 'Music' section.



```

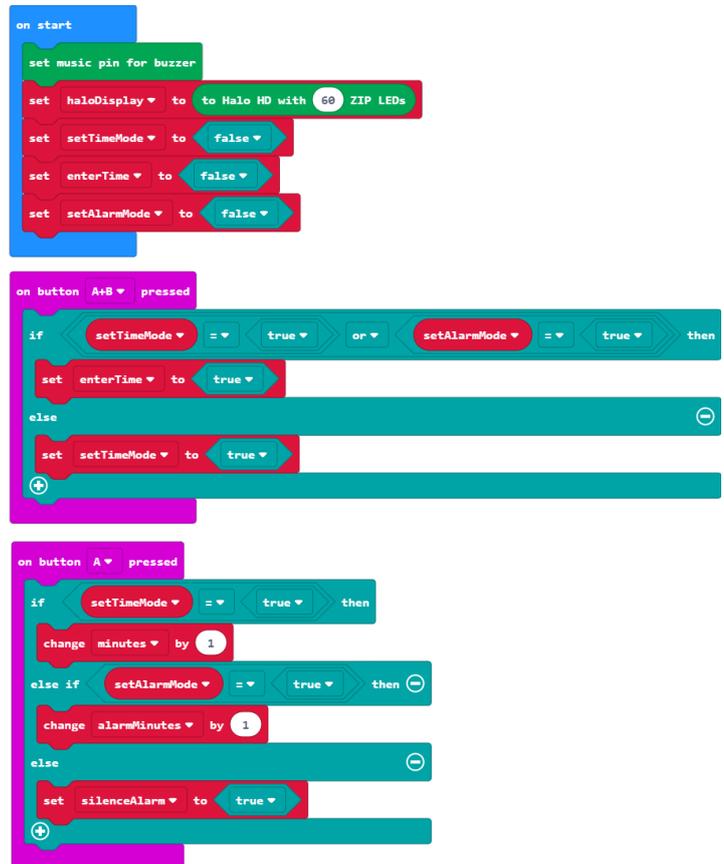
if [silenceAlarm] = [true] then
  turn off alarm
  stop melody all
  
```

STEP 4: Finally, click 'Download' and transfer your code to the Halo HD and try out setting and silencing some alarms. (The complete code is shown across the next two pages).



```

forever
  if [setTimeMode] = [true] then
    set minutes to [Read minutes] as Number
    set hours to [Read hours] as Number
    if [hours] >= [12] then
      change hours by [-12]
    while [enterTime] = [false]
      do
        if [minutes] > [59] then
          set minutes to [0]
          change hours by [1]
          if [hours] = [12] then
            set hours to [0]
          haloDisplay clear
          haloDisplay set ZIP LED [minutes] to green
          haloDisplay set ZIP LED [hours] x [5] to blue
          haloDisplay show
          pause (ms) [1]
        Set Time to [hours] hrs [minutes] mins [0] secs
        set enterTime to [false]
        set setTimeMode to [false]
  
```



```

on start
  set music pin for buzzer
  set haloDisplay to [to Halo HD with 60 ZIP LEDs]
  set setTimeMode to [false]
  set enterTime to [false]
  set setAlarmMode to [false]

on button [A+B] pressed
  if [setTimeMode] = [true] or [setAlarmMode] = [true] then
    set enterTime to [true]
  else
    set setTimeMode to [true]

on button [A] pressed
  if [setTimeMode] = [true] then
    change minutes by [1]
  else if [setAlarmMode] = [true] then
    change alarmMinutes by [1]
  else
    set silenceAlarm to [true]
  
```

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COMPLETE CODE CONTINUED...

```

else if setAlarmMode == true then
  set alarmMinutes to Read minutes as Number
  set alarmHours to Read hours as Number
  if alarmHours >= 12 then
    change alarmHours by -12
  while enterTime == false do
    if alarmMinutes > 59 then
      set alarmMinutes to 0
      change alarmHours by 1
      if alarmHours == 12 then
        set alarmHours to 0
      haloDisplay clear
      haloDisplay set ZIP LED alarmMinutes to green
      haloDisplay set ZIP LED alarmHours * 5 to blue
      haloDisplay show
      pause (ms) 1
    set Single alarm to alarmHours : alarmMinutes with User Silence
    set silenceAlarm to false
    set enterTime to false
    set setAlarmMode to false
  else
    haloDisplay clear
    haloDisplay set ZIP LED Read seconds for ZIP display to red
    haloDisplay set ZIP LED Read minutes for ZIP display to green
    haloDisplay set ZIP LED Read hours for ZIP display to blue
    haloDisplay show
  if silenceAlarm == true then
    turn off alarm
    stop melody all
  on alarm trigger
    start melody power up repeating once
  on button B pressed
    if setTimeMode == true then
      change minutes by 10
    else if setAlarmMode == true then
      change alarmMinutes by 10
    else
      set setAlarmMode to true
  
```

For any further queries or support, please visit the Kitronik website: www.kitronik.co.uk/5672

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