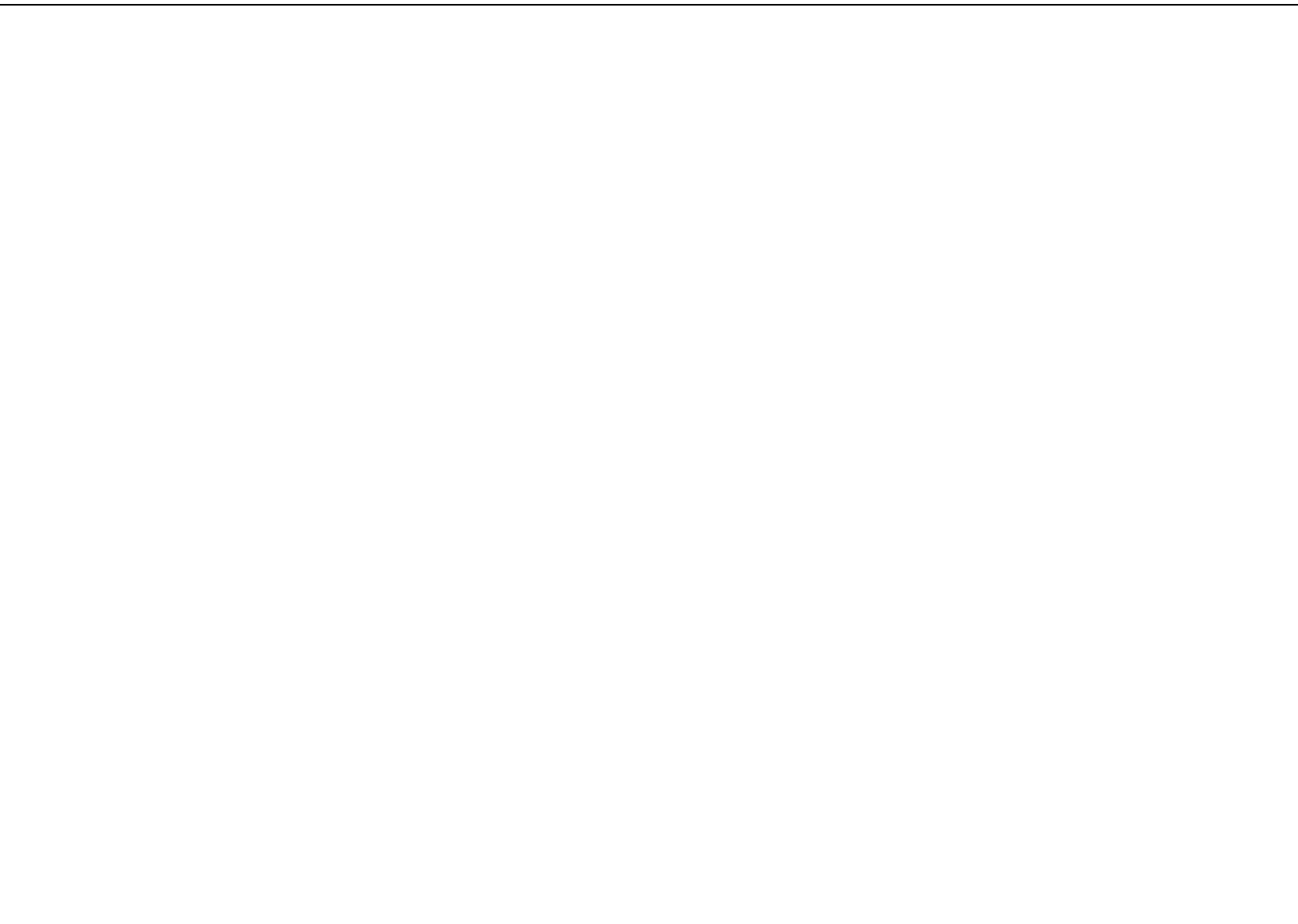

Air Sampler Controller Software

By: Kosta Grammatis



```

<!-- Program:      The Balloon Project Air Sampler controller
<!-- Author:      Kosta Grammatis
<!-- Date:        September 05, 2006
<!-- Version:     7.0.0

<!--This program uses the Phidgets API to control an air sampler. ----->
<!--It's abilities include: Monitor Individual IO on the Phidgets ----->
<!--board. Collect data about the air sampler (rotations of screw), -->
<!--Automatically collect air samples after set intervals of time, ----->
<!--calibrate and manually take samples, and display collected data. -->

<HTML>
<HEAD>
<TITLE>Balloon Project Air Sampler Controller</TITLE>

<OBJECT CLASSID="clsid:50484944-4745-5453-3000-000000000003"
ID=InterfaceKit1>
</OBJECT>

<script language="vbscript">

//number of rotations of the lead screw.
dim sens
sens = 0

//value that either adds or subtracts one from the x axis for rotations of the lead screw
dim change
change = 1

//Sample number (actual hole: a,b,c,d)
dim sample
sample = A

//increment the drum? yes or no.
increment = false

//what rownumber is the drum on?
rownumber = 0

//is it the last sample of the row?
dim endsample
endsample = false

dim drumstop
drumstop = 2

dim formatrownumber

//sensor exchange number
dim sens2

//number of rotations of the lead screw per sample
dim rotconstant
rotconstant = 7

//errorstate
dim errorstate
errorstate = false

dim placecheck
placecheck = false

dim numofsamples
numofsamples = 0

dim timererrorstate
timererrorstate = false

dim mininputval
dim mininputvaladj
dim sampleinputval

//placeholder variable
dim i
i = 0

dim timersec
timersec = -1000

```

```

dim multcheck

dim globaltimer
dim globaltimervar

dim Calibratetimer

dim pausetimer

dim samplepausetimer

dim error

dim mytime
dim myhour
dim myminute
dim mysecond
dim balloontime

dim TMyTime
dim TMyHour
dim TMyMinute

dim mynow

dim NextSampleTime

InterfaceKit1.Open(False)
//Just to confirm that the library is installed and PhidgetInterfacekit is an object
If Not IsObject(InterfaceKit1) Then
    MsgBox "quiting"
    Stop
End If

//Just to confirm that the PhidgetInterfacekit is attached
If Not InterfaceKit1.IsAttached Then
    MsgBox "No Interface Kit attached"
    document.write "Please attach a Phidget Interface kit and refresh"
End If

//Zero all output states on phidgets board

InterfaceKit1.OutputState(0) = "False"
InterfaceKit1.OutputState(1) = "False"
InterfaceKit1.OutputState(2) = "False"
InterfaceKit1.OutputState(3) = "False"
InterfaceKit1.OutputState(4) = "False"
InterfaceKit1.OutputState(5) = "False"
InterfaceKit1.OutputState(6) = "False"
InterfaceKit1.OutputState(7) = "False"

//Routine for responding to the OnInputChange event INDEX2
Sub InterfaceKit1_OnInputChange(ByVal Index2, NewState)
    If NewState Then
        mytable.rows(Index2).cells(1).innerText = "On"
        datatable.rows("0").cells(0).innerText = "Active Input: " & index2
    //stop rotations after 1 Y count (drumstop attribs: 3 = count drum, 2 = zero drum)
        If index2 = drumstop Then
            InterfaceKit1.OutputState(6) = "False"
        End If
    //sub routine for X COUNT
        If index2 = 5 Then
            sens = change + sens
            datatable.rows("2").cells(0).innerText = "Rotations: " & sens
        //26 rotations and then the x axis stops moving, sets to count from 26 to 0
        //change = whether 1 is added or subtracted from lead screw
            If sens >= rotconstant * 4 Then
                change = -1
                InterfaceKit1.OutputState(0) = "False"
            End if
        End if
    End if

    //x zero set switch triggered, stop. Set rotation count to zero
    if index2 = 4 then
        InterfaceKit1.OutputState(1) = "False"
    End if
End Sub

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        sens = 0
        change = 1
        datatable.rows("2").cells(0).innerText = "Rotations: " & sens
    End if
Else
    mytable.rows(Index2).cells(1).innerText = "Off"
End if
End Sub

//When a check box is clicked the Output is changed
Sub OutputState(Index)
If InterfaceKit1.OutputState(Index) = "False" Then
    InterfaceKit1.OutputState(Index) = "True"
    datatable.rows("1").cells(0).innerText = "Active Output: " & index
Else
    InterfaceKit1.OutputState(Index) = "False"
    datatable.rows("1").cells(0).innerText = "Last Output: " & index
End if

//defines whether 1 should be added or subtracted from the number of rotations of the lead screw
If index = 0 then
    change = 1
Else
    change = -1
end if
End sub

<!--This code is the run function of the air sampler -->
<!--RUN ONLY AFTER SAMPLER IS CALIBRATED. It takes -->
<!--an actual air sample each time the button is pressed-->

//////////
Sub takesample
mynow = now
//puts piercer in the right place
//Checks to see which hole the piercer is above 1-5
//each case designates the number of rotations of the lead screw

select case sens
case 0
//take air sample
sample = "A"
sampletable.rows(rownumber).cells(1).innerText = Now
call Takeasample

case rotconstant
//take air sample
sample = "B"
sampletable.rows(rownumber).cells(2).innerText = Now
call Takeasample

case rotconstant * 2
//take air sample
sample = "C"
sampletable.rows(rownumber).cells(3).innerText = Now
call Takeasample

case rotconstant * 3
//take air sample
sample = "D"
sampletable.rows(rownumber).cells(4).innerText = Now
call Takeasample

case rotconstant * 4
//take air sample
//go home
//increment sampler
sample = "E"
sampletable.rows(rownumber).cells(5).innerText = Now
endsample = true
call takeasample

case else
//out of calibration, error

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samplerdata.rows("0").cells(7).innerText = "Out of Calibration"
end select
end sub

<!------->
<!--TakeaSample turns on the various valves and lowers sampler. -->
<!--A two second delay is set by SamplePauseTimer then ResumeSampling is called-->
<!------->
sub TakeaSample
//turn on piercer valve
InterfaceKit1.OutputState(4) = "True"

//piercer down
InterfaceKit1.OutputState(5) = "True"

//check air pressure
samplerdata.rows("0").cells(7).innerText = "Taking Air Sample"

//idTimer sets a delay of 2 seconds.
//After delay is completed the code calls the sub "PausedSection"

SamplePauseTimer = window.setTimeout("ResumeSampling", 2000, "VBScript")
end sub

<!------->
<!--ResumeSampling retracts the piercer and turns off valves only-->
<!--if the pressure sensor detects pressure. Else returns error.-->
<!--if the last sample of a row is taken the sampler rotates drum-->
<!------->
sub ResumeSampling
//clears SamplePauseTimer
window.clearTimeout(SamplePauseTimer)
if index2 = 7 then
//turn on aux. air to relive pressure
InterfaceKit1.OutputState(2) = "True"
//bring piercer back up
InterfaceKit1.OutputState(5) = "False"
//turn piercer valve off UNNECESARY?
InterfaceKit1.OutputState(4) = "False"
samplerdata.rows("0").cells(7).innerText = "Done sampling."
else
//Send piercer back up, error state. No pressure.

InterfaceKit1.OutputState(2) = "True"
InterfaceKit1.OutputState(5) = "False"
samplerdata.rows("0").cells(7).innerText = "Pressure Sensor error."
end if

//check to see if this is the last sample to be taken
if endsample = true then
//moves piercer back to zero
samplerdata.rows("0").cells(5).innerText = rownumber + 1 & sample
samplerdata.rows("0").cells(7).innerText = "sending piercer home"
InterfaceKit1.OutputState(1) = "True"

//increments drum 1 row
Rownumber = rownumber + 1
drumstop = 3
sampletable.rows(rownumber).cells(0).innerText = rownumber + 1
samplerdata.rows("0").cells(7).innerText = "Sample drum indexed to row " & rownumber + 1
& "."
InterfaceKit1.OutputState(6) = "True"
InterfaceKit1.OutputState(2) = "False"
endsample = false
//call whatTime after 28 second delay
timersec = timersec + 28000
EndSampleTimer = window.setTimeout("whatTime", 28000, "VBScript")

else
//move piercer forward 5 rotations
sens2 = sens
sens2 = sens + rotconstant
call movepiercer
end if
end sub

<!------->
<!--MovePiercer moves the piercer to the next sample location-->
<!------->
sub movepiercer()

```

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error = 1
if sens < sens2 then
    datasens = sens2 - sens
    InterfaceKit1.OutputState(0) = "True"
    InterfaceKit1.OutputState(1) = "False"
    samplerdata.rows("0").cells(7).innerText = "Moving piercer to next sample " & datasens
    pausetimer = window.setTimeout("movepiercer", 100, "VBScript")
else
    samplerdata.rows("0").cells(5).innerText = rownumber + 1 & sample
    InterfaceKit1.OutputState(0) = "False"
    InterfaceKit1.OutputState(2) = "False"
    samplerdata.rows("0").cells(7).innerText = "Sample Taken."
    timersec = timersec + 8000
    call whatTime
end if
end sub

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<!------->
<!--SampleZero sets the piercer and the drum to zero.----->
<!------->

```

```

Sub Samplerzero
error = 2
//sets sample drum to zero
//drumstop 2 means that the drum is set to stop when it trips the zero set switch
drumstop = 2
InterfaceKit1.OutputState(6) = "True"

```

```

//Sets piercer to zero
sens = 0
samplerdata.rows("0").cells(7).innerText = "Calibrating piercer"
InterfaceKit1.OutputState(0) = "True"
InterfaceKit1.OutputState(1) = "False"
CalibrateTimer = window.setTimeout("ResumeCalibrating", 2000, "VBScript")
End sub

```

```

Sub ResumeCalibrating
//clears idTimer
window.clearTimeout(Calibratetimer)
samplerdata.rows("0").cells(7).innerText = "Setting drum to zero"
sens = 0
InterfaceKit1.OutputState(0) = "False"
InterfaceKit1.OutputState(1) = "True"
end sub

```

```

<!------->
<!--The Abort_Button, when clicked checks to see what the current-->
<!--error state the sampler could be in. Each error state is set-->
<!--by a particular sub (calibration, timer, sampling..)----->
<!------->

```

```

function AbortButton_onclick()
select case error
case 1
    samplerdata.rows("0").cells(7).innerText = "Sampling Aborted! Recalibrate."
case 2
    samplerdata.rows("0").cells(7).innerText = "Calibration aborted! Recalibrate."
case 3
    samplerdata.rows("0").cells(7).innerText = "Timer aborted."
    TimerTable.rows("2").cells(0).innerText = "Timer Aborted."
    TimerTable.rows("0").cells(0).innerText = ""
    TimerTable.rows("3").cells(0).innerText = ""
case else
    samplerdata.rows("0").cells(7).innerText = "Aborted!"
end select
error = 0
window.clearTimeout(GlobalTimer)
window.clearTimeout(Calibratetimer)
window.clearTimeout(Pausetimer)
InterfaceKit1.OutputState(0) = "False"
InterfaceKit1.OutputState(1) = "False"
InterfaceKit1.OutputState(2) = "False"
InterfaceKit1.OutputState(3) = "False"
InterfaceKit1.OutputState(4) = "False"
InterfaceKit1.OutputState(5) = "False"
InterfaceKit1.OutputState(6) = "False"
InterfaceKit1.OutputState(7) = "False"
end function

```

```

<!------->
<!--TimerButton_onclick checks to see if all inputs are filled----->
<!--out correctly.  If the fields pass, it calls GlobalTimerExecute-->
<!------->
function TimerButton_onclick()

//document.form1.SamplesInput.disabled(disabled)
//document.form1.MinInput.disabled(disabled)

//check to see if all inputs are filled
If (Len(document.form1.samplesinput.value) = 0) or (Len(document.form1.mininput.value) = 0) Then
    TimerTable.rows("2").cells(0).innerText = "Please enter a number."
else
    //check to see if all inputs are numerical
    If (Not(IsNumeric(document.form1.samplesinput.value))) or
    (Not(IsNumeric(document.form1.mininput.value)))Then
        TimerTable.rows("2").cells(0).innerText = "Not numeric."
    else
        //check to see if number of sample input data is appropriate
        If (document.form1.samplesinput.value < 1) or (document.form1.samplesinput.value > 100) then
            TimerTable.rows("2").cells(0).innerText = "# of Samples cannot be < 1 or > 100."
        else
            //Check to see that the minimum input for Min is met
            if (document.form1.MinInput.value < .15) then
                TimerTable.rows("2").cells(0).innerText = "Interval is too short."
            Else
                MinInputVal = document.form1.MinInput.value
                NumOfSamples = document.form1.samplesinput.value
                MinInputVal = MinInputVal * 60000
                //gets current system time
                mynow = now
                //turns mininputval into a hour, minute, second time.
                Mytime = TimeSerial(0, 0, mininputval/1000)

                call whatTime
            End If
        End If
    End if
End if
end function

sub GlobalTimerExecute
error = 3
timersec = timersec + 1000
//displays current balloon time
balloontime = now
if NumOfSamples = 0 then
    TimerTable.rows("0").cells(0).innerText = ""
    TimerTable.rows("2").cells(0).innerText = "Automated Sampling Complete."
else
    if MinInputVal - timersec = 0 then
        //window.clearTimeout(GlobalTimer)
        timersec = 0
        NumofSamples = NumofSamples - 1
        TimerTable.rows("0").cells(0).innerText = "Taking Sample!"
        TimerTable.rows("2").cells(0).innerText = "Samples Remaining: " & numofsamples
        TimerTable.rows("3").cells(0).innerText = ""

        call takesample
    Else
        TimerTable.rows("2").cells(0).innerText = "Next Sample: " & NextSampleTime
        TimerTable.rows("0").cells(0).innerText = "Balloon time: " & balloontime
        TimerTable.rows("3").cells(0).innerText = "Samples Remaining: " & numofsamples
        GlobalTimer = window.setTimeout("GlobalTimerExecute", 1000, "VBScript")
    End if
End If
end sub

Sub whatTime
window.clearTimeout(EndSampleTimer)
mysecond = second(mynow) + second(mytime)
myminute = minute(mynow) + minute(mytime)

```

```
myhour = hour(mynow) + hour(mytime)
NextSampleTime = timeserial(myhour, myminute, mysecond)
```

```
call globaltimerexecute
end sub
```

```
//////////
```

```
</script>
```

```
</HEAD>
```

```
<body>
```

```
<form name = "form1">
```

```
<!--Header row is a separate table to keep the row numbers easy-->
```

```
<table style="font-size: 11pt; font-family: Arial">
```

```
<tr align = "center">
```

```
<td width="100">Type of Input</td>
```

```
<td width="40">Status</td>
```

```
<td width="10"> </td>
```

```
<td width="60">On/Off</td>
```

```
<td width="100">Digital Output</td></tr>
```

```
</table>
```

```
<!--TABLE FOR INPUTS AND OUTPUTS-->
```

```
<table style="width: 600px">
```

```
<td style="width: 844px; height: 187px;">
```

```
<table id="mytable" style="background-color: lavender; font-size: 10pt; font-family: Arial;">
```

```
<tr id="0" align = "center" >
```

```
<td width="100" style="height: 22px">
```

```
<td>
```

```
<td width="40" style="height: 22px">
```

```
Off</td>
```

```
<td BGCOLOR="blue" width="10" style="height: 22px"> </td>
```

```
<td width="60" style="height: 22px">0 <input type="checkbox" onclick="OutputState(0)"></td>
```

```
<td style="height: 22px">+X</td>
```

```
</tr>
```

```
<tr id="1" align = "center">
```

```
<td></td>
```

```
<td>Off</td>
```

```
<td BGCOLOR="blue"> </td>
```

```
<td>1 <input type="checkbox" onclick="OutputState(1)"></td>
```

```
<td>-X</td>
```

```
</tr>
```

```
<tr id="2" align = "center">
```

```
<td>Y Zero</td><td>Off</td>
```

```
<td BGCOLOR="blue"> </td>
```

```
<td>2 <input type="checkbox" onclick="OutputState(2)"></td>
```

```
<td>Aux Valve</td>
```

```
</tr>
```

```
<tr id="3" align = "center">
```

```
<td>Y Count</td>
```

```
<td>Off</td><td BGCOLOR="blue"> </td>
```

```
<td>3 <input type="checkbox" onclick="OutputState(3)"></td>
```

```
</tr>
```

```
<tr id="4" align = "center">
```

```
<td style="height: 22px">X Zero</td>
```

```
<td style="height: 22px">Off</td><td BGCOLOR="blue"> </td>
```

```
<td style="height: 22px">4 <input type="checkbox" onclick="OutputState(4)"></td>
```

```
<td style="height: 22px">Piercer Valve</td>
```

```
</tr>
```

```
<tr id="5" align = "center">
```

```
<td>X Sensor</td><td>Off</td>
```

```
<td BGCOLOR="blue"> </td>
```

```
<td>5 <input type="checkbox" onclick="OutputState(5)"></td>
```

```
<td>Piercer Down</td>
```

```
</tr>
```

```
<tr id="6" align = "center">
```

```
<td></td>
```

```
<td>Off</td>
```

```
<td BGCOLOR="blue"> </td>
```

```
<td>6 <input type="checkbox" onclick="OutputState(6)"></td>
```

```
<td>Rotate</td>
```

```
</tr>
```

```
<tr id="7" align = "center">
```

```
<td>Pressure Sens</td>
```

```
<td>Off</td><td BGCOLOR="blue"> </td>
```

```
<td>7 <input type="checkbox" onclick="OutputState(7)"></td>
```

```

        <td>Compressor (aux)</td>
    </tr>
</table>
<!--MINI DATA TABLE. -->
<td style="width: 456px; height: 187px;">
    <table id="datatable" style="width: 72px; height: 56px; font-size: 7pt; font-family: Arial;
background-color: thistle; position: relative; top: -14px; left: 0px;">
        <tr id="0">
            <td style="width: 83px; height: 10px;">Active Input:</td>
        </tr>
        <tr id="1">
            <td style="width: 83px; height: 10px;">Active Output:</td>
        </tr>
        <tr id="2">
            <td style="width: 83px; height: 8px;">Rotations:</td>
        </tr>
    </table>
<!---TIMER TABLE-->
    <table id="timertable" style="width: 160px; height: 64px; border-right: black thin solid; border-
top: black thin solid; border-left: black thin solid; border-bottom: black thin solid;">
        <tr id="0">
            <td style="width: 400px; font-size: 7pt; vertical-align: middle; color: black; font-family:
Arial; text-align: center; height: 0px;" colspan="3" >
        </tr>
        <tr id="Tr1">
            <td style="width: 31px; height: 29px; vertical-align: middle; text-align: center;"
rowspan="2" >
                <input id="TimerButton" style="height: 24px; font-family: 'Arial Narrow'; font-weight:
normal; font-size: 9pt; left: 376px; color: black; top: 144px; width: 40px;" type="button" value= Run
/></td>
                <td style="width: 19px; height: 26px; text-align: left">
                    <input name="MinInput" style="width: 40px; height: 24px" type="text" /></td>
                <td style="height: 26px; width: 357px; font-size: 8pt; vertical-align: middle; font-family:
Arial; text-align: center;">
                    Interval<br />
                    (in Minutes)
                </td>
            </tr>
            <tr id="1">
                <td style="height: 24px; width: 19px;" colspan="" rowspan="">
                    <input name="SamplesInput" style="width: 40px; left: 416px; top: 121px; height: 24px;"
type="text" maxlength="4" /></td>
                <td style="height: 24px; width: 357px; font-size: 8pt; vertical-align: middle; font-family:
Arial; text-align: center;">
                    Samples<br />
                    to take</td>
            </tr>
            <tr id="2">
                <td style="width: 400px; font-size: 7pt; vertical-align: middle; color: Black; font-family:
Arial; text-align: center; height: 0px;" colspan="3" ></td>
            </tr>
            <tr id="3">
                <td style="width: 400px; font-size: 7pt; vertical-align: middle; color: black; font-family:
Arial; text-align: center; height: 0px;" colspan="3" ></td>
            </tr>
        </table>
        <input id="AbortButton" style="height: 24px; font-family: 'Arial Narrow'; font-weight: normal;
font-size: 9pt; left: 472px; color: black; position: absolute; top: 56px; width: 32px;" type="button"
value= abort />
</table>
<!--SAMPLER DATA TABLE includes: take sample, zero sampler-->
<table id="samplerdata" style="font-size: 9pt; font-family: Arial">
<tr id="0">
    <td><b>Sample:</b></td>
    <td style="width: 34px"><input type="checkbox" onclick= "takesample"></td>

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    <td><b>Zero:</b></td>
    <td style="width: 35px"><input type="checkbox" onclick= "Samplerzero"></td>
    <td style="width: 75px"><b>Last sample:</b></td>
    <td style="width: 15px"></td>
    <td style="width: 6px"></td>
    <td style="width: 217px; color: red;"></td>
</tr>
</table>

```

```

<!--SAMPLER TIME AND DATE / ROW AND COLUMN TABLE-->
<table border = "2" id="TABLE1" style="font-weight: bold; font-size: 8pt; font-family: Arial; text-align: center">
<tr>
    <td width = "50">Row </td>
    <td width = "80">Sample A</td>
    <td width = "80">Sample B</td>
    <td width = "80">Sample C</td>
    <td width = "80">Sample D</td>
    <td width = "80">Sample E</td>
</tr>
</table>

```

```

<table border = "2" id="samplerable" style="font-size: 7pt; font-family: Arial; height: 8px; text-align: center">
<tr id="0">
    <td width = "50" style="height: 10px">1</td>
    <td width = "80" style="height: 10px"></td>
    <td width = "80" style="height: 10px"></td>
    <td width = "80" style="height: 10px"></td>
    <td width = "80" style="height: 10px"></td>
    <td width = "80" style="height: 10px"></td>
</tr>
<tr id="1">
    <td width = "50" style="height: 0px"></td>
    <td width = "80" style="height: 0px"></td>
    <td width = "80" style="height: 0px"></td>
    <td width = "80" style="height: 0px"></td>
    <td width = "80" style="height: 0px"></td>
    <td width = "80" style="height: 0px"></td>
</tr>
<tr id="2">
    <td width = "50" style="height: 0px"></td>
    <td width = "80" style="height: 0px"></td>
    <td width = "80" style="height: 0px"></td>
    <td width = "80" style="height: 0px"></td>
    <td width = "80" style="height: 0px"></td>
    <td width = "80" style="height: 0px"></td>
</tr>
<tr id="3">
    <td width = "50" style="height: 0px"></td>
    <td width = "80" style="height: 0px"></td>
    <td width = "80" style="height: 0px"></td>
    <td width = "80" style="height: 0px"></td>
    <td width = "80" style="height: 0px"></td>
    <td width = "80" style="height: 0px"></td>
</tr>
<tr id="4">
    <td width = "50" style="height: 0px"></td>
    <td width = "80" style="height: 0px"></td>
    <td width = "80" style="height: 0px"></td>
    <td width = "80" style="height: 0px"></td>
    <td width = "80" style="height: 0px"></td>
    <td width = "80" style="height: 0px"></td>
</tr>
<tr id="5">
    <td width = "50" style="height: 0px"></td>
    <td width = "80" style="height: 0px"></td>
    <td width = "80" style="height: 0px"></td>
    <td width = "80" style="height: 0px"></td>
    <td width = "80" style="height: 0px"></td>
    <td width = "80" style="height: 0px"></td>
</tr>
<tr id="6">
    <td width = "50" style="height: 0px"></td>
    <td width = "80" style="height: 0px"></td>
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    <td width = "80" style="height: 0px"></td>
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</tr>
<tr id="7">

```



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</tr>
</table>
</form>
</BODY>
</HTML>
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