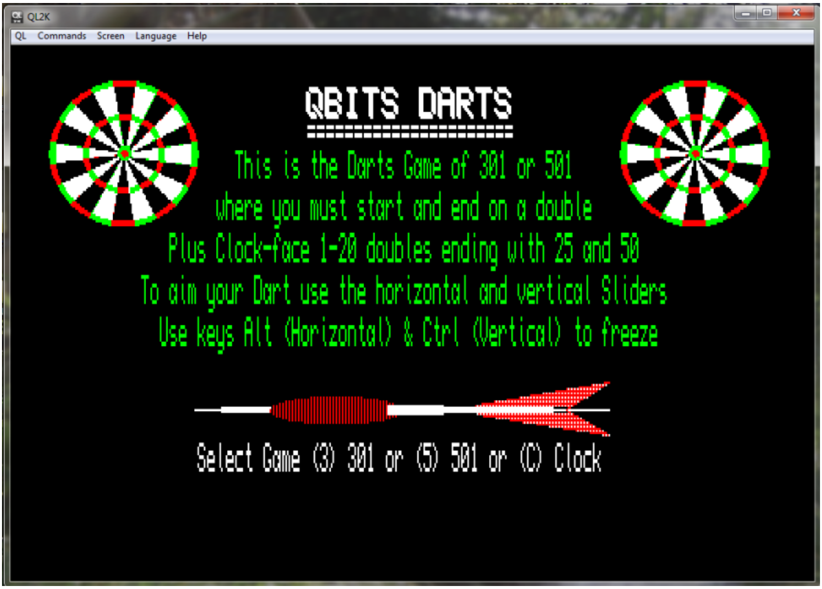
# Sinclair QL retro gaming



QBITS DARTS

This is the Darts Game of 301 or 501
where you must start and end on a double
Plus Clock-face 1-20 doubles ending with 25 and 50
To aim your Dart use the horizontal and vertical Sliders
Use keys Alt (Horizontal) & Ctrl (Vertical) to freeze

Select Game (3) 301 or (5) 501 or (C) Clock

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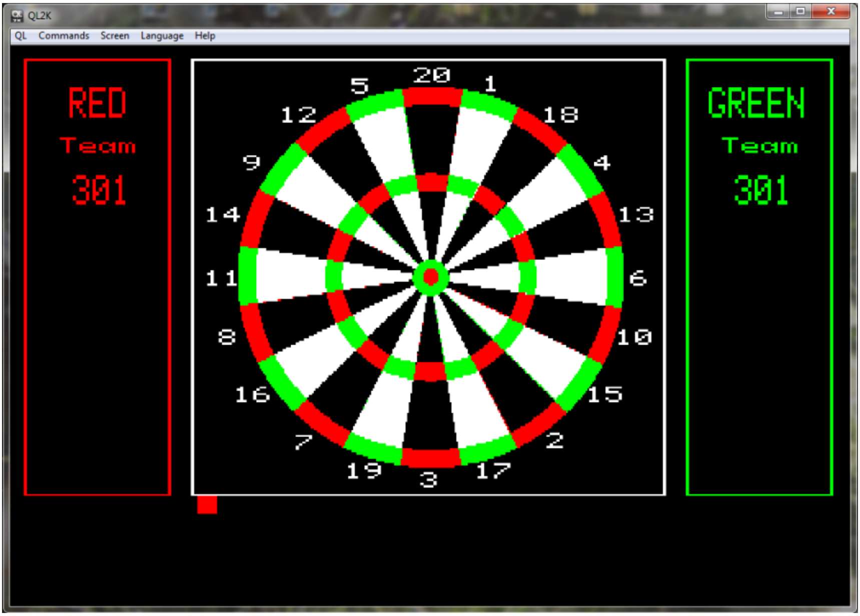


For the most recent updates I have use the QL2K emulator. I have also tried the Dart Game on the SMSQmultor (colours set to QL mode) and it appears to work OK.

## QL Emulators

There are several available for the original QL as well as its later spin offs. You can download these and run them on PC's, Desktops Laptops and Tablets under the Windows, Mac or Linux operating systems. Then there are the additional ROM's and toolkit extensions and an extensive number of useful programs all with plenty of helpful documentation available.

Check out Dilwyn's web site below for downloads, helpful information and links to other suppliers of QL software and documentation.

**http://www.dilwyn.me.uk/** **Updated: 07.09.2015**

## QBITS Darts

Maths generally I was not half bad at, but Trigonometry always gave me nightmares. So when I set out on this project in the nineteen eighties I knew for me it was going to be problematic. If you going to write a computer simulation of the game of darts a dart board has to be the starting point.

So starting with this Dartboard, it has twenty segments numbered one to twenty with sub-section on each for scoring doubles and trebles plus the centre bull's-eyes with an outer ring of 25 points and an inner circle of 50 points. Looking back over some of my rough calculations for the QBITS Game revealed a surprising reality.

Yes the Dartboard is a circle divided up into segments of 360 degrees. Yet another way to look at this is that the circumference is divided up into sections as well. My early calculations reminded me that a circle's circumference is **2πr**, and using division of **π** would make the task of calculating the Dartboard segments a lot simpler with QL Graphics.

## QBITS Darts Concepts

The most common of Dart board Games is no doubt 301, where two people or teams compete. You must start out and finish on a double. So that was my primary aim, to give more options it was simple to add 501. Then to be a little more ambitious perhaps add the Clock game where you have to throw a double for each number 1 to 20 in sequence and then finish with the 25 and a bull's eye 50.

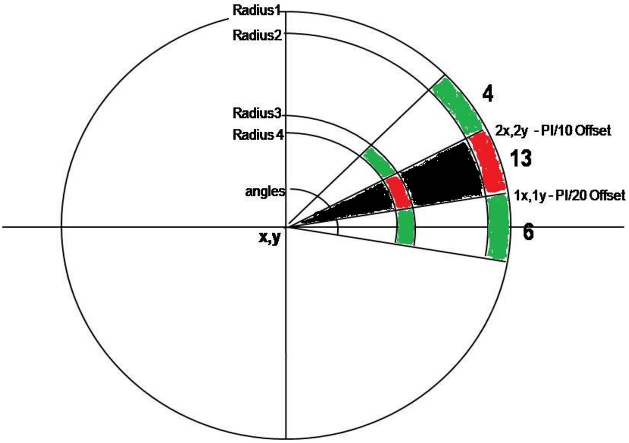
The main calculations would be drawing the board itself and then the positioning of a dart throw and what score it might generate. This had to take into account the doubles and trebles it could produce.

## QBITS Dartboard

Starting with the centre of a circle gives the primary coordinates x,y, then the sides of the segment requires two straight lines so a LINE  from x,y TO 1x,1y and another LINE from x,y TO 2x,2y between then is drawn the ARC 1x,1y To 2x,2y and its radial angle. The cleaver bit is calculating where to draw the LINE and what the angle of ARC is.

Splitting the dartboard circle into quadrants, with zero degrees set in the east., north as 90 degrees, west 180 degrees and so on, the first segment of our Dartboard would number **6** which is half above and half below the horizontal zero line.

**2πr,** being the circles circumference **πr** is half or zero to 180 degrees. Divide **π** by 10 this gives 18 degrees. Therefore the segment **6** is 9 degrees above and 9 degrees below the horizontal. So if we start at zero add **π/20** this provides an Offset to begin our drawing of the Dartboard segments.  We add **π/10** to this to give our second offset. These are angles, which with the radius COS and SIN we can calculate 1x,1y and 2x,2y coordinates.



Using the FILL and INK commands we can draw a coloured segment and by reducing the radius and change of colour create the Double and Treble section of a dartboard segment. By adding multiples of **π/10** to the angle we progress around the board. Last but not least a couple of FILLed CIRCLES for the 25 and 50 at the centre.

## QBITS Dartboard Numbers

I worked out a rough position using pixel coordinates and fine tunes it mostly by trial error. This built up an array of individual number and there x,y coordinates for use with the CURSOR command. Then it was simple to store them as DATA Array for use with a FOR loop.

## QBITS Darts Throw

Here I use a form of slider for the user to judge the horizontal and then the vertical position over the Dartboard. The output from this would give an dx,dy coordinate for the Dart position with respect to the Dartboard centre coordinates x,y. The dart radius dr is calculated using Pythagoras theorem and the angle da with ACOS.

```
dr=SQRT((dy-y)^2+(dx-x)^2)      dr (dart radius)

da=ACOS((dx-x)/dr)              da (segment angle)
```

Working out the equivalent segment and then identifying which number was taking the angle adding the first Offset and dividing this by **$\pi/10$.** The only problem with it is the angle reduces once passed 180 degrees, to cater for this I add a **$\pi$** and subtract the angle from **$\pi$.** Using the INTeger of the segment identified it is simply a FOR loop to read through a list until the right number is reached.

As for the Double and Treble or centre circles these can be checked against the radius values set up for the dartboard.

```
306 DATA 6,13,4,18,1,20,5,12,9,14,11,8,16,7,19,3,17,2,15,10,6,25,50

308 DEFine PROCedure dnum
309 RESTORE 306
310 IF dy<y:da=PI+(PI-da)
311 dt=INT((da+PI/20)/(PI/10))+1          dt (dart throw)
312 FOR seg=1 TO dt:READ num
313 dm=1                                  dm (dart score multiplier)
314 IF dr>r1   THEN dm=0                  outside of board
315 IF dr<=r1  AND dr>r2:dm=2             doubles
316 IF dr<=r3  AND dr>r4:dm=3             trebles
317 IF dr<=c1 :num=25                     25 points  (c1 - radius)
318 IF dr<c2   :num=25:dm=2               50 points  (c2 –radius)
319 END DEFine
```

## QBITS Darts Intro

The intro screen states a simple review of the options available and a means by which a choice can be made. The graphics were an add on, the arrow a simple use of CIRCLE, LINE, FILL and INK commands. Having the Procedures in place to draw the Dartboard just required a window resizing and positioning.

## QBITS Darts Options

For the 301 and 501 options Red and Green teams, or players, can play against each other, the first to finish is the winner. The Clock-face option is for a single player to complete in as few throws as possible.

## QBITS Darts End of Game

At End of Game the board is scrolled up with results displayed, which includes the number of Darts thrown to finish. Other consideration were to add a top scorer sheet and I may add that later.

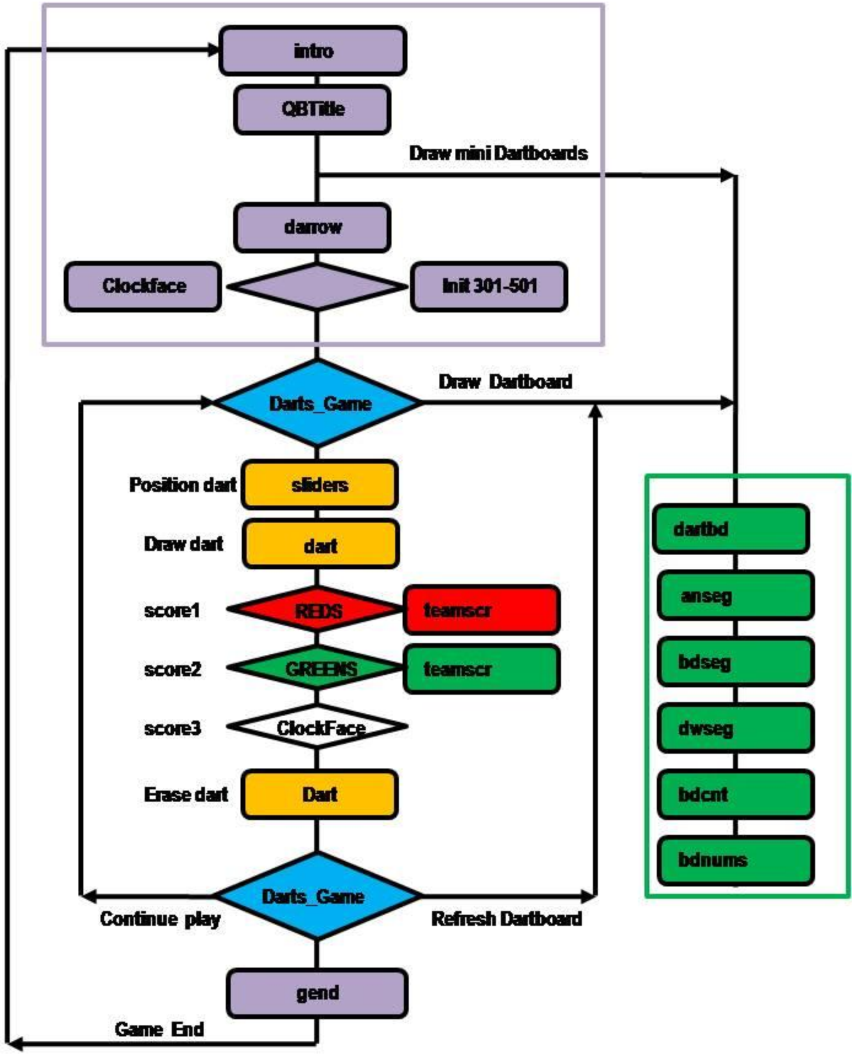
## QBITS Darts Performance

Running with the QL2K and SMSQemulaor’s the drawing and redrawing of the Dartboard etc is acceptable. In the original concept there was a consideration to redraw only the segment where Darts had been thrown. However, this would also require the segments either side of the number thrown, especially if near the centre. If the coverage was wide spread then nine segments or almost half the board would need redrawing.

The nearest I can judge the speed on a basic QL would be running QBITS Darts on the Qemulator with original QL settings - the speed is not great. If you have the opportunity to compile the program this would no doubt help.

For the Game in play there are some adjustments that can be made such as the slider speed (sp) - see the opening lines of the programming code.

## QBITS Darts Flowchart



```
100 REMark QBDarts (QBITS 01 2017)
101 :
102 DIM str$(6,60),dxy(6), clk(22)
103 sp=1:REMark sp 0-1-2-3 etc changes Sliders speed
104 MODE 4:intro

106 DEFine PROCedure intro
107 ch=1:WINDOW#ch,512,256,0,0:PAPER#ch,0:CLS#ch
108 WINDOW#ch,480,208,16,8
109 INK#ch,7:QBTitle:INK#ch,4
110 str$(1)="          This is the Darts Game of 301 or 501"
111 str$(2)="        where you must start and end on a double"
112 str$(3)="   Plus Clock-face 1-20 doubles ending with 25 and 50"
113 str$(4)="To aim your Dart use the horizontal and vertical Sliders"
114 str$(5)="  Use keys Alt (Horizontal) & Ctrl (Vertical) to freeze"
115 str$(6)="      Select Game (3) 301 or (5) 501 or (C) Clock"
116 FOR lp=1 TO 5:AT#ch,lp+1,11:PRINT str$(lp)
117 INK#ch,7:AT#ch,9,11:PRINT str$(6)
118 WINDOW#ch,120,80,18,12:dartbd:WINDOW#ch,120,80,382,12:dartbd
119 WINDOW#ch,480,208,16,8:darrow:pcol=0
120 REPeat key
121  k=CODE(INKEY$(-1))
122  IF k=51:score1=301:score=301:score2=301:EXIT key
123  IF k=53:score1=501:score=501:score2=501:EXIT key
124  IF k=67 OR k=99   :pcol=7:EXIT key
125 END REPeat key
126 ch=1:CLS#ch
127 IF pcol=7:Clockface:ELSE init
128 Darts_Game
129 END DEFine

131 DEFine PROCedure gend
132 ch=3:PAUSE 20
133 FOR up=1 TO 50:SCROLL#ch,-4:PAUSE 1
134 CLS#4:CLS#5:ch=1:INK#ch,7:QBTitle
135 IF pcol=2:shots=shot1:win$='  REDS  ':mes$='Winning Team'
136 IF pcol=4:shots=shot2:win$=' GREENS ':mes$='Winning Team'
137 IF pcol=7:shots=shot3:win$='Complete':mes$=' Clock-face '
138 CSIZE#ch,2,1:INK#ch,pcol
139 CURSOR#ch,164,60 :PRINT#ch,mes$
140 CURSOR#ch,188,90 :PRINT#ch,win$
141 CSIZE#ch,1,0:INK#ch,7
142 CURSOR#ch,136,130:PRINT#ch,'Number of Darts thrown ';shots
143 PAUSE 500:intro
144 END DEFine
```

```
146 DEFine PROCedure QBTitle
147 OVER#ch,1
148 CSIZE#ch,2,1:CURSOR#ch,170,10:PRINT "QBITS DARTS"
149 CSIZE#ch,2,1:CURSOR#ch,171,11:PRINT "QBITS DARTS"
150 CSIZE#ch,0,1:CURSOR#ch,172,24:PRINT "====================="
151 OVER#ch,0
152 END DEFine

154 DEFine PROCedure init
155 ch=3:OPEN#ch,scr_290x200a110x6:BORDER#ch,1,7
156 ch=4:OPEN#ch,scr_90x200a8x6   :BORDER#ch,1,2
157 CSIZE#ch,2,1:INK#ch,2:CURSOR#ch,24,10:PRINT#ch,"RED"
158 CSIZE#ch,2,0:CURSOR#ch,18,34:PRINT#ch,"Team"
159 ch=5:OPEN#ch,scr_90x200a412x6 :BORDER#ch,1,4
160 CSIZE#ch,2,1:INK#ch,4:CURSOR#ch,10,10:PRINT#ch,"GREEN"
161 CSIZE#ch,2,0:CURSOR#ch,18,34:PRINT#ch,"Team"
162 teamscr:pcol=2
163 END DEFine

165 DEFine PROCedure Clockface
166 ch=3:OPEN#ch,scr_290x200a110x6:BORDER#ch,1,7
167 ch=4:OPEN#ch,scr_90x200a8x6   :BORDER#ch,1,7
168 CSIZE#ch,2,0:INK#ch,7:CURSOR#ch,6,10:PRINT#ch,'Single'
169 INK#ch,2:FOR n=1 TO 9:clk(n)=n:AT#ch,n+2,2:PRINT#ch,n
170 clk(10)=10:AT#ch,12,1:PRINT#ch,10
171 clk(21)=25:AT#ch,14,1:PRINT#ch,25:INK#ch,7
172 ch=5:OPEN#ch,scr_90x200a412x6 :BORDER#ch,1,7
173 CSIZE#ch,2,0:INK#ch,7:CURSOR#ch,6,10:PRINT#ch,'Player'
174 INK#ch,4:FOR n=11 TO 20:clk(n)=n:AT#ch,n-8,1:PRINT#ch,n
175 clk(22)=50:AT#ch,14,1:PRINT#ch,50:INK#ch,7
176 END DEFine

178 DEFine PROCedure darrow
179 FILL#ch,1:INK#ch,7:LINE#ch,36,20 TO 60,21 TO 60,19 TO 36,20:FILL#ch,0
180 FILL#ch,1:INK#ch,144:CIRCLE#ch,68,19.5,15,.2,PI/2:FILL#ch,0
181 FILL#ch,1:INK#ch,7:LINE#ch,80,19 TO 80,21 TO 130,20 TO 80,19:FILL#ch,0
182 FILL#ch,1:INK#ch,42:LINE#ch,100,21 TO 130,26 TO 120,20 TO 130,14 TO
100,19:FILL#ch,0
183 END DEFine
```

```
185 DEFine PROCedure Darts_Game
186 dp1=0:shot1=0:dp2=0:shot2=0:dp3=0:shot3=0:cn=1
187 ch=3:SCALE#ch,100,0,0:dartbd:bdnums
188 REPeat Darts
189 FOR p=1 TO 6 STEP 2
190   sliders:dxy(p)=dx:dxy(p+1)=dy
191   IF pcol=2
192     dp1=num*dm:shot1=shot1+1
193     IF score1=score AND dm<>2:dp1=0
194     IF score1-dp1=0 AND dm=2:gend:RETurn
195     IF score1-dp1<=1 OR score1<dp1:dp1=0:EXIT p
196     score1=score1-dp1:teamscr
197   END IF
198   IF pcol=4
199     dp2=num*dm:shot2=shot2+1
200     IF score2=score AND dm<>2:dp2=0
201     IF score2-dp2=0 AND dm=2:gend:RETurn
202     IF score2-dp2<=1 OR score2<dp2:dp2=0:EXIT p
203     score2=score2-dp2:teamscr
204   END IF
205   IF pcol=7
206    IF dm=2 AND num=clk(cn)
207       IF cn> 0 AND cn<11:ch=4:AT#ch,cn+2,4:PRINT#ch,num
208       IF cn>10 AND cn<21:ch=5:AT#ch,cn-8,4:PRINT#ch,num
209       cn=cn+1
210    END IF
211    IF cn=21 AND clk(cn)=num   :cn=cn+1:ch=4:AT#ch,14,4:PRINT#ch,num
212    IF cn=22 AND clk(cn)=num*dm:cn=cn+1:ch=5:AT#ch,14,4:PRINT#ch,num*dm
213    shot3=shot3+1:IF cn=23:gend:RETurn
214   END IF
215 END FOR p
216 ch=3:PAUSE 20
217 FOR n=1 TO 6 STEP 2
218   dx=dxy(n):dy=dxy(n+1):dc=0:dart
219 END FOR n
220 dartbd:bdnums:dp1=0:dp2=0:dp3=0
221 IF pcol<>7:pcol=6-pcol:ELSE pcol=7
222 END REPeat Darts
223 END DEFine
```

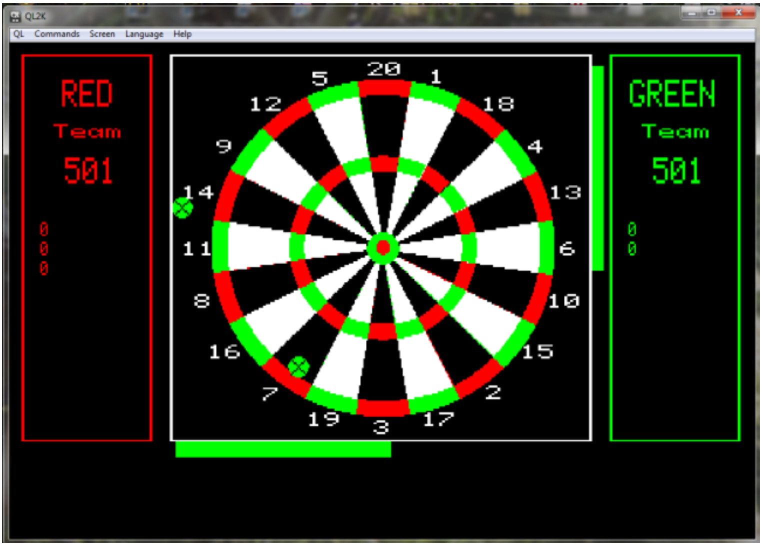
Teams (payers) **RED** & **GREEN** for 301 &501 Games

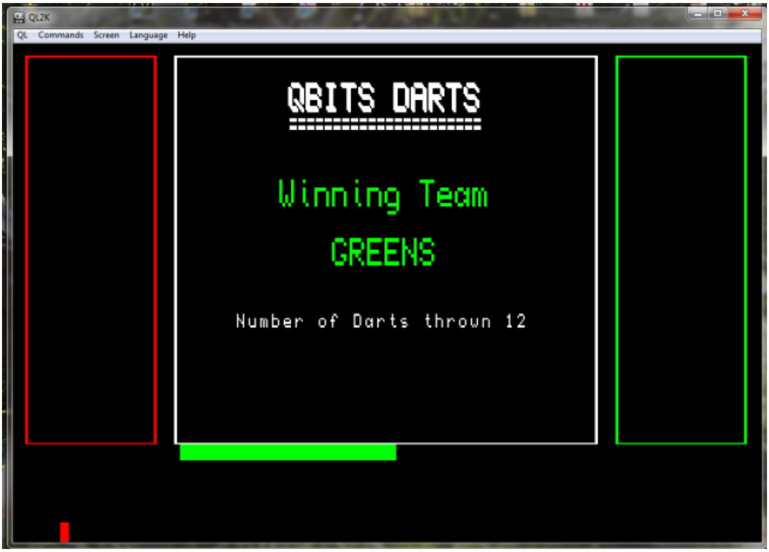
White  Clock game for single player

```
225 DEFine PROCedure dartbd
226 x=54:y=50:an=PI/20:dx=0:dy=0
227 FOR f=1 TO 10
228  c1=2:c2=0:anseg:bdseg
229  c1=4:c2=7:anseg:bdseg
230 END FOR f
231 bdcnt
232 END DEFine

234 DEFine PROCedure anseg
235 x1=COS(an):y1=SIN(an)
236 an=an+PI/10
237 x2=COS(an):y2=SIN(an)
238 END DEFine

240 DEFine PROCedure bdseg
241 r=44:c=c1:dwseg
242 r=40:c=c2:dwseg
243 r=24:c=c1:dwseg
244 r=20:c=c2:dwseg
245 END DEFine

247 DEFine PROCedure bdcnt
248 INK#ch,4:FILL#ch,1:CIRCLE#ch,x,y,4  :FILL#ch,0
249 INK#ch,2:FILL#ch,1:CIRCLE#ch,x,y,1.7:FILL#ch,0
250 END DEFine

252 DEFine PROCedure dwseg
253 FILL#ch,1:INK#ch,c
254 ARC#ch,x+x1*r,y+y1*r TO x+x2*r,y+y2*r,PI/10
255 LINE#ch TO x,y:LINE#ch TO x+x1*r,y+y1*r
256 FILL#ch,0
257 END DEFine

259 REMark Board numbers,x,y coordinates
260 DATA 1,174,6,18,210,20,4,242,42,13,256,66,6,264,95
261 DATA 10,255,122,15,237,148,2,213,169,17,169,183,3,136,187
262 DATA 19,90,183,7,60,170,16,22,148,8,13,122,11,4,95
263 DATA 14,4,66,9,28,42,12,50,20,5,94,7,20,132,2

265 DEFine PROCedure bdnums
266 RESTORE 260
267 ch=3:OVER#ch,1:CSIZE#ch,2,0:INK#ch,7
268 FOR n=1 TO 20
269  READ num,nx,ny:CURSOR#ch,nx,ny:PRINT#ch,num
270 END FOR n
271 OVER#ch,0
272 END DEFine
```

```
274 DEFine PROCedure sliders
275 ch=1:BLOCK#ch,8,196,86,0,0:BLOCK#ch,8,196,384,0,0
276 BLOCK#ch,284,8,98,198,0
277 REPeat lp_x
278  FOR a=0 TO 282 STEP 4
279   BLOCK#ch,a,8,98,198,pcol:PAUSE sp
280   IF KEYROW(7)=4:EXIT lp_x
281  END FOR a
282  FOR a=282 TO 0 STEP -4
283   BLOCK#ch,282-a,8,a+98,198,0:PAUSE sp
284   IF KEYROW(7)=4:EXIT lp_x
285  END FOR a
286 END REPeat lp_x
287 dx=(a*.383)
288 IF pcol=2:xp=86:ELSE xp=384
289 REPeat lp_y
290  FOR a=4 TO 192 STEP 2
291   BLOCK#ch,8,a,xp,4,pcol:PAUSE sp
292   IF KEYROW(7)=2:EXIT lp_y
293  END FOR a
294  FOR a=192 TO 4 STEP -2
295   BLOCK#ch,8,192-a,xp,a+4,0:PAUSE sp
296   IF KEYROW(7)=2:EXIT lp_y
297  END FOR a
298 END REPeat lp_y
299 dy=100-(a*.521)
300 BLOCK#ch,282,8,98,198,0:BLOCK#ch,8,192,xp,4,0
301 dy=100-(a*.521)
302 dr=SQRT((dy-50)^2+(dx-54)^2)
303 da=ACOS((dx-54)/dr)
304 dc=pcol:dart:dnum
305 END DEFine

307 DEFine PROCedure dart
308 ch=3:INK#ch,dc
309 BEEP 50,200,20,500,8
310 FILL#ch,1:CIRCLE#ch,dx,dy,2.5:FILL#ch,0
311 INK#ch,0
312 LINE#ch,dx-2,dy-2 TO dx+2,dy+2
313 LINE#ch,dx-2,dy+2 TO dx+2,dy-2
314 END DEFine
```

```
316 REMark Dartboard numbers / segment
317 DATA 6,13,4,18,1,20,5,12,9,14,11,8,16,7,19,3,17,2,15,10,6

319 DEFine PROCedure dnum
320 RESTORE 317
321 IF dy<50:da=PI+(PI-da)
322 dt=INT((da+PI/20)/(PI/10))+1
323 FOR seg=1 TO dt:READ num
324 dm=1
325 IF dr>44 THEN dm=0
326 IF dr<=44 AND dr>40:dm=2
327 IF dr<=24 AND dr>20:dm=3
328 IF dr<=4 :num=25
329 IF dr<1.7:num=25:dm=2
330 END DEFine

332 DEFine PROCedure teamscr
333 ch=4:CSIZE#ch,2,1:INK#ch,2
334 CURSOR#ch,14,50:CLS#ch,4:PRINT#ch," ";score1;" "
335 IF pcol=2:CSIZE#ch,1,0:CURSOR#ch,10,80+p*5:PRINT#ch,dp1;' ':CLS#ch,2
336 ch=5:CSIZE#ch,2,1:INK#ch,4
337 CURSOR#ch,14,50:CLS#ch,4:PRINT#ch," ";score2;" "
338 IF pcol=4:CSIZE#ch,1,0:CURSOR#ch,10,80+p*5:PRINT#ch,dp2;' ':CLS#ch,2
339 END DEFine
```



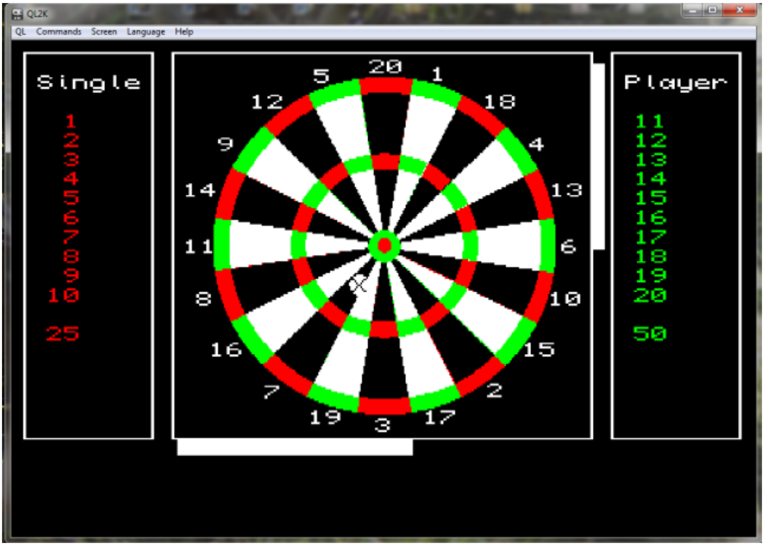


QBITS DARTS

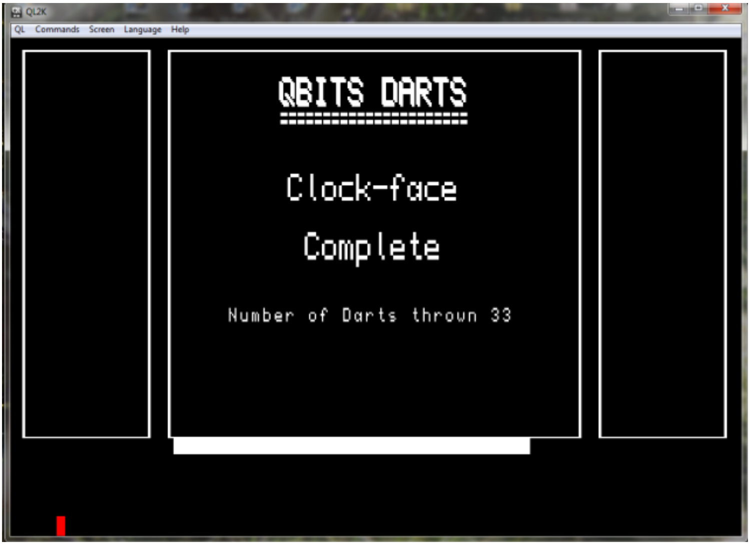
Winning Team

GREENS

Number of Darts thrown 12



```
Single        Player
  1             11
  2             12
  3             13
  4             14
  5             15
  6             16
  7             17
  8             18
  9             19
 10             20

 25             50
```



```
QBITS DARTS
===========

Clock-face

Complete

Number of Darts thrown 33
```

## QBDarts

Having obtained a copy of **QBDarts** SuperBASIC code and loaded it into a recognised QL device. Use the QDOS command LRUN, as shown:-

**LRUN flp1_QBDarts**

Follow the instructions on the intro screen and all being well you will soon be playing a game of simulated darts...

## Notes on QL2K emulator

Both the **QLAY & QL2K emulators** use an application tool to create a QDOS directory file and append or delete files in it. Creating a new qlay.dir file first open a Windows **Command Prompt** (Win 7 Press Start button in *search programs and files* box type **command prompt:** Win 10 in *ask me anything* box type **command prompt**.)

Activate the command prompt window then navigate with DOS commands to the drive and Windows File Directory folder that holds your QL Files.

i.e C:\>**chdir** H:\QL\FDIR\WIN1_ H:\QLFDIR\WIN1_>dir

This will list the files as a DOS directory. This needs to also contain a copy of **QLAYT-86.EXE or QLAY-X64.EXE** downloaded with **QLAY** or **QL2K**

At the DOS prompt now enter this command: -

i.e. H:\QL\FDIR\WIN1_>**qlayt-x64.exe –c qlay.dir**

This should create a directory file qlay.dir to which you can now append files. For example:-

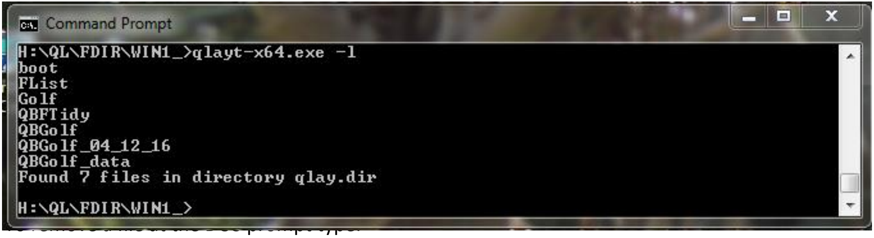
i.e. H:\QL\FDIR\WIN1_>**qlayt-x64.exe –i Boot**

This will append the File named ‘**Boot**’ to the qlay.dir .

Once you have appended your files you can use the following command to list them:-

i.e. H:\QL\FDIR\WIN1_> **qlayt-x64.exe –l**

A list of files should now be shown contained within the qlay.dir



```
H:\QL\FDIR\WIN1_>qlayt-x64.exe -l
boot
FList
Golf
QBFTidy
QBGolf
QBGolf_04_12_16
QBGolf_data
Found 7 files in directory qlay.dir

H:\QL\FDIR\WIN1_>
```

To remove a file at the DOS prompt type:-

i.e. H:\QL\FDIR\WIN1_>**qlayt-x64.exe -r Golf**

This will remove the File named ‘**Golf**’ from the qlay.dir .

Running the **QL2K emulator** the files listed in WIN1_ should now be readable by the QDOS DIR command; however these files will not be loadable or run if not compatible with the QDOS operating system you have. This even applies to QL software that does not work with or only works with certain versions of QL ROM’s or with added Toolkit extensions.