In class exercises

Pin 12 - right wheel  Pin 13 - left wheel

1) Fill in the following table. You need two pieces of information:
   a) for the servo to run about 1s, the maximum counter is 41
   B) for a full rotation, the maximum counter is 96

<table>
<thead>
<tr>
<th>Counter Max</th>
<th>Pin13 left wheel</th>
<th>Pin12 right wheel</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>122</td>
<td>850</td>
<td>650</td>
<td></td>
</tr>
<tr>
<td>61</td>
<td>850</td>
<td>650</td>
<td></td>
</tr>
<tr>
<td>244</td>
<td>850</td>
<td>650</td>
<td></td>
</tr>
<tr>
<td></td>
<td>780</td>
<td>720</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>650</td>
<td>650</td>
<td></td>
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<tr>
<td>24</td>
<td>850</td>
<td>850</td>
<td></td>
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<tr>
<td></td>
<td>650</td>
<td>850</td>
<td></td>
</tr>
<tr>
<td></td>
<td>750</td>
<td>650</td>
<td></td>
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<tr>
<td></td>
<td>850</td>
<td>750</td>
<td></td>
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<tr>
<td></td>
<td>650</td>
<td>750</td>
<td></td>
</tr>
<tr>
<td></td>
<td>750</td>
<td>850</td>
<td></td>
</tr>
</tbody>
</table>

2) In the following program, about how long is the servo running? Which way are the wheels turning CW or CCW?
   FOR counter = 1 TO 41
       PULSOUT 13, 850
       PULSOUT 12, 650
       PAUSE 20
   NEXT

3) What is the following program telling the Boe-Bot to do?
   What are the initial PULSOUT values?
   What are the final PULSOUT values?

   FOR pulseCount = 1 TO 100
       PULSOUT 13, 750 + pulseCount
       PULSOUT 12, 750 - pulseCount.
       PAUSE 20 'Pause for 20 ms.
   NEXT
4) What is the following program telling the Boe-Bot to do?  
   What are the initial PULSOUT values?  
   What are the final PULSOUT values?  

   FOR pulseCount = 100 TO 1  
      PULSOUT 13, 750 + pulseCount  
      PULSOUT 12, 750 - pulseCount  
   NEXT

5) What is the following program telling the Boe-Bot to do?  
   What are the initial PULSOUT values?  
   What are the final PULSOUT values?  

   FOR pulseCount = 0 TO 30  
      PULSOUT 13, 750 + pulseCount  
      PULSOUT 12, 750 + pulseCount  
   NEXT

The manual says it’s an example of a quarter turn with ramping. Earlier the text said that a \( \frac{1}{4} \) turn used a maximum counter of 24. Why is it 30 here?

6) What happens if I change the FOR statement to FOR pulseCount = 30 TO 0?
Subroutines

7) What’s happening in the following program? Are the words “Forward:”, “Left:”, etc. just comments or do they serve a purpose? How long is each FOR loop running?

counter VAR Word
PAUSE 2000

GOSUB Forward
GOSUB Left
GOSUB Right
GOSUB Backward
END

Forward:
FOR counter = 1 TO 64
  PULSOUT 13, 850
  PULSOUT 12, 650
  PAUSE 20
NEXT
PAUSE 200
RETURN

Left:
FOR counter = 1 TO 24
  PULSOUT 13, 650
  PULSOUT 12, 650
  PAUSE 20
NEXT
PAUSE 200
RETURN

Right:
FOR counter = 1 TO 24
  PULSOUT 13, 850
  PULSOUT 12, 850
  PAUSE 20
NEXT
PAUSE 200
RETURN

Backward:
FOR counter = 1 TO 64
  PULSOUT 13, 650
  PULSOUT 12, 850
  PAUSE 20
NEXT
RETURN
Problems posed at the end of the chapter (p. 137)

Questions
1. What direction does the left wheel have to turn to make the Boe-Bot go forward? What direction does the right wheel have to turn?

2. When the Boe-Bot pivots to the left, what are the right and left wheels doing? What PBASIC commands do you need to make the Boe-Bot pivot left?

3. If your Boe-Bot veers slightly to the left when you are running a program to make it go straight ahead, how do you correct this? What command needs to be adjusted and what kind of adjustment should you make?

4. If your Boe-Bot travels 11 in/s, how many pulses will it take to make it travel 36 inches?

5. What’s the relationship between a FOR…NEXT loop’s Counter argument and the PULSOUT command’s Duration argument that makes ramping possible?

Exercises
1. Write a routine that makes the Boe-Bot back up for 350 pulses.

2. Let’s say that you tested your servos and discovered that it takes 48 pulses to make a 180° turn with right-rotate. With this information, write routines to make the Boe-Bot perform 30, 45, and 60 degree turns.

3. Write a routine that makes the Boe-Bot go straight forward, then ramp in and out of a pivoting turn, and then continue straight forward.