

Quiz Review – Motors and Timers

Quiz Format

- Part I – Identifying NQC commands
- Part II – Programs – Explaining and Questions
- Part III – Writing Programs

*Allowed to use reference pages of the NQC tutorial

Part I – Command Identification

- You must:
 - Explain the commands in detail (devices, ports, power level, directions, constants)
- May be given anywhere from 1-4 to lines

Examples

1) SetPower(OUT_B, 4);

On(OUT_B);

Port B turns on at power level 4

2) SetDirection(OUT_C, OUT_TOGGLE);

The direction of motor C is Toggled (goes opposite direction)

3) Float(OUT_A + OUT_C);

Ports A and C come to a float stop (brake stop)

4) Wait(Random(576));

Waits a random time (maximum value = 576, or 5.76 seconds))

5) OnFor(OUT_B, 700);

Port B turns on for 7 seconds

6) REVERSE_TIME *= 2;

Variable REVERSE_TIME is multiplied by 2

7) int SOMETHING;

Defines an integer called SOMETHING

8) #define SOMETHING 800

Defines a constant called SOMETHING (=800)

9) repeat(5)

```
{  
  OnRev(OUT_B);  
  Wait(200);  
}
```

Motor B runs in reverse for 2 seconds, (happens 5 times)

Part II – Explaining Programs

- You will be given programs to explain as well as questions to answer about those programs

Example

- For how long does Motor C run in reverse? **3+3+2 = 8 seconds**
- Is anything left running at the end?

What device? What port?

Lamp in Port B is left on

```
task main()  
{  
  OnRev(OUT_A + OUT_C);  
  Wait(300);  
  
  repeat (3)  
  {  
    OnFwd(OUT_A);  
    Wait(50);  
    Off(OUT_A);  
    Wait(50);  
  }  
  
  On(OUT_B);  
  Wait(200);  
  Off(OUT_C);  
}
```

Motors A and C move reverse at power level 7 for 3 seconds. The following task occurs 3 times: Motor A moves forward at power level 7 for .5 seconds, motor A move reverse at power level 7 for .5 seconds (all the while Motor C is still moving in reverse). Then, a lamp in port B is turned on at power level 7 for 2 seconds, and motor C is turned off.

Constants Program

```
#define number_of_loops 4

task main()
{OnFwd(OUT_A + OUT_C);
  Wait(100);

  repeat (number_of_loops)
  {Toggle(OUT_A + OUT_C);
    Wait(200);}

  Off(OUT_A + OUT_C);}
```

In what direction will motors A and C be moving 6 seconds into the program?

Consider the direction of the motors for each relevant time interval.

| Time Interval | Direction |
|---------------|-----------|
| 0-1 | Fwd |
| 1-3 | Rev |
| 3-5 | Fwd |
| 5-7 | Rev |

So at the 6-second mark, motors A and C are moving reverse.

Motors A and C move forward at power level for 1 second. The following task occurs four times: the direction of A and C is flipped every two seconds. Then, the motors turn off.

Variable Program

- What is the value of each variable at the end of this program?

```
int a; int b; int c; int d; int e;

task main()
{
    a = 3;
    b = a * 8;
    c = (b/6);

    repeat (3)
    {
        a += 3;
    }

    d = a + 3;

    c /=2;

    e = c + 4;
}
```

Initial Value of a = 3, in the repeat a becomes $3+3+3+3 = 12$

$b = a*8$ – because a equals 3 at the time, final value of $b = 3*8 = 24$

$c = (b/6) = (24/6) = 4$ – in the second to last line, c is divided by 2
final value of $c = 4/2 = 2$

$d = a + 3$ – because $a = 12$ at the time, $d = 15$

$e = c + 4$ – because $c = 2$ at the time, $e = 6$

Part III – Writing Programs

- You will be given a task along with some assumptions, and expected to write an NQC program that fulfills that task
 - Must give syntactical details (ie: ;)
 - Motor directions are assumed to be a standard Tankbot

Example

- Go reverse for 1 second, make a 180-degree turn, go forward for 2 seconds, make a 90-degree turn to the left, and stop.