

Programming Motors and Timers in NQC

Name: Solutions

Part I –Command Identification

Directions: Briefly describe what each of the following statements does.

Example: OnFwd(OUT_A + OUT_C) – Motors A and C move forward (Power 7)

- 1) Wait(300); Wait 300 hundredths of a second (3 seconds)
- 2) OnRev(OUT_A); Turns a Motor in Port A on and in the reverse direction
- 3) SetPower(OUT_A + OUT_B, 5); Sets Ports A and B to power level 5
- 4) SetDirection (OUT_A, OUT_TOGGLE); Toggles the direction of the motor in Port A (changes to opposite direction)
- 5) task main () {...} Starts and Ends Program (must be included for program to run)
- 6) Float (OUT_A + OUT_C); Brings devices in Ports A and C to a brake stop
- 7) SetOutput (OUT_A + OUT_C, OUT_ON); Turns devices in Ports A and C on
- 8) Off(OUT_A); Cuts off power to port A

Part II – Explaining Programs

Directions: For each of the given programs, answer the questions that follow.

1)

```
task main()
{
    SetPower(OUT_A + OUT_C, 5);
    OnFwd(OUT_A);
    OnFwd(OUT_C);
    Wait(400);
}
```

a) Explain *exactly* what is going on in the program above. **Be specific** about power levels and ports.

Ports A and C are set to power level 5. Motors A and C moves forward at power level 5 for 4 seconds.

b) The program above is downloaded to the RCX. When the “Run” button is pressed, the robot begins to move, and doesn’t stop. Why does it keep moving? How should the program be modified so that the robot stops?

The robot continues to run because no command was written to stop power to ports A and C (the ports in which the motors were running). It must be modified by including a stop command, such as: Off(OUT_A + OUT_C);

c) Rewrite lines 5 and 6 of the program (shown below) as one statement.

```
OnFwd(OUT_A);  
OnFwd(OUT_C);
```

OnFwd(OUT_A + OUT_C);

2)

```
// A lamp is connected to Port B  
  
task main()  
{  
    SetPower(OUT_A, 2);  
    OnFwd(OUT_A+OUT_C);  
    On(OUT_1);  
    Wait(Random(100));  
    Off(OUT_B);  
}
```

a) Explain *exactly* what is going on in the program above. **Be specific** about power levels and ports.

Port A is set to power level 2. Motor A runs forward at power level 2 and motor C runs forward at power level 7. At the same time that the motors go on, port 1 is turned on (which is impossible, because port 1 is an input). After a random amount of time (max random time = 100 hundredths of a second), power is cut off to port B.

b) What is wrong with the port assignment of the lamp?

The lamp is connected to port B, but in the program port 1 is turned off, and port B (which is never turned on) is turned off. The lamp can’t be connected to Port 1 because Port 1 is an input (reserved for sensors).

c) At what power level is motor C running? **7**

Directions: For each of the given programs, answer the questions that follow.

3)

```
task main()
{
    OnFwd(OUT_A);
    OnRev(OUT_C);
    Wait(800);
    OnFwd(OUT_C);
    Wait(300);
    Off(OUT_A+OUT_C);
}
```

a) Explain *exactly* what is going on in the program above. **Be specific** about power levels and ports.

Motor A moves forward and Motor C moves in reverse (both at power level 7) for 800 hundredths of a second (8 seconds). Then Motor C begins to move forward (Motor A is still moving forward) for 300 hundredths of a second (3 seconds). Then, power is turned off to Ports A and C.

4) For the following program, insert appropriate comments next to each of the double slashes.

```
// A lamp is connected to Port B

task main()
{
    SetPower(OUT_A+OUT_C, 3); // Ports A and C are set to power level 3
    SetPower(OUT_B, 2); // Port B is set to power level 2
    OnFwd(OUT_A+OUT_C); // Motors A and C begin to move forward
    Wait(Random(400)); // For a random time (max = 4 sec)
    On(OUT_B); // Lamp in Port B is turned on
    Wait(150); // Wait 1.5 seconds
    SetPower(OUT_A+OUT_C, 7); // Ports A and C are set to power level 7
    OnRev(OUT_C); OnFwd(OUT_A); // Motor C goes reverse, Motor A goes forward
    Wait(100); // Wait 1 second
    Off(OUT_A + OUT_B + OUT_C); // Ports A, B, and C turn off
}
```

5) When attempting to compile the following program, 8 errors were detected. Identify, circle, and correct each of the errors.

```
task main()  
(  
  SetPWR(OUT_A + OUT_C, 5);  
  
  OnFwd(OUT_A + OUT_D);  
  
  Wait(300A);      B or C  
  
  OnReverse(OUT_A);  
  
  WaitFor(85);  
  
  Off(OUT_A, OUT_C);  
)
```