

Unit 1: Skill Builder 1 - Moving Forward
Goals:

You will write a program on the calculator to control the two motors on Rover. You are challenged to spin the motors fast, slow, clockwise and counter clockwise. Next, try to control the motors to drive in a straight line. As the final challenge, you will drive a distance and then stop as close as possible to a target without touching it.

1. Use the MOTORS command to control clockwise and counterclockwise speed for each wheel
2. Use the MOTORS command to drive a straight path
3. Use the FORWARD command to drive a straight path for a given distance.

Background:

Rover will move forward when a TI BASIC program sends the command named RV FORWARD from the calculator to the TI-Innovator Hub connected to Rover. When the Hub interprets the command, it turns on Rover's motors. The longer the motors are turned on, the further Rover goes. When the motors spin slowly, Rover goes a short distance in a given amount of time. If the motors spin quickly, Rover goes a greater distance in the same amount of time. The distance Rover travels in a given amount of time is called **speed**. The speed of rover can be calculated by dividing the distance traveled by the amount of time. While automobile speed is calculated in miles per hour, Rover speed is in meters per second.

Rover Command	Example	Behavior
RV.MOTOR.L CW/CCW <i>power</i> TIME	RV.MOTOR.L CCW 255 **** TIME 10	Left motor spins fast counter clockwise for 10 seconds
RV.MOTOR.R CW/CCW <i>power</i> TIME	RV.MOTOR.R CW 75 TIME 5	Right motor spins slow clockwise for 5 seconds
RV.MOTORS <i>side</i> direction <i>power</i> <i>side</i> direction <i>power</i> TIME	RV.MOTORS LEFT CCW 200 RIGHT CW 200 TIME 10	RV moves forward for 10 seconds
RV FORWARD <i>distance</i> <i>unit</i>	RV FORWARD 1.2 M	Go forward 1.2 M at default speed of .20 M/S **
RV FORWARD <i>distance</i> <i>unit</i> SPEED <i>speed</i> <i>unit</i>	RV FORWARD 1.5 M SPEED 0.18 M/S	Go forward 1.5 M at a speed of .18 M/S**
RV FORWARD <i>distance</i> <i>unit</i> TIME <i>time</i>	RV FORWARD 1.7 M TIME 10.6	Go forward 1.7 M in a time of 10.6 sec.
RV FORWARD <i>speed</i> <i>unit</i> TIME <i>time</i>	RV FORWARD 0.23 M/S TIME 5.3	Go forward at a speed of .23 M/S** in a time of 5.3 sec.
RV BACKWARD <i>distance</i> <i>unit</i>	RV BACKWARD 0.75 M	Go backward .75 M at default speed of .20 M/S **

* The above commands are not the only usages of FORWARD, for a complete list please reference the user's guide.

** The speed of the Rover will vary from the stated values depending on the floor surface. Some surfaces cause Rover to move more slowly. If accuracy is important, the speed should be measured by a method similar to the one in this activity.

*** The BACKWARD command works just like the FORWARD command except travel is in the opposite direction.

**** The Power setting for the motors is 0(still) to 255(fastest).

Challenges:

Challenge 1: You will use the MOTORS command to control the power sent to wheel. You will use the TIME parameter to control how long the wheel receives the power. For this challenge, the goal is to watch the wheels move, not move the rover. You should remove the calculator from the Rover and place Rover on its back ensuring the calculator is still plugged into Rover and the Rover's power switch is set to "ON".

- Task 1: Write a program named **c1** that makes the left wheel spin slowly clockwise for 5 seconds.
- Task 2: Now modify your program to make it spin faster and then in the opposite direction. Try to make it turn for a longer time. Try the other wheel.

Challenge 2: Write a program named **c2** to make the Rover drive a straight path down the lane that is setup in your classroom. Use the MOTORS command to drive a straight line. Do you think you could backup down the lane?

Challenge 3: Write a program named **c3** to drive your Rover straight down the challenge lane and make it stop as close to the final target as possible without making contact. You will use the TIME command and predict how long it will take your Rover to reach the mark.

- Can your Rover be the closest?
- Can you reach the target in 5 seconds?