

Imagine for a moment the difficulties involved in landing a rocket on the moon with a strictly limited fuel supply. You're coming down tail-first, freefalling toward a hard rock surface. You'll have to ignite your rockets to slow your descent; but if you burn too much too soon, you'll run out of fuel 100 feet up, and then you'll have nothing to look forward to but cold eternal moon dust coming faster every second. The object, clearly, is to space your burns just right so that you will alight on the moon's surface with no downward velocity.

The game starts off with the rocket descending at a velocity of 50 feet/second from a height of 500 feet. The velocity and altitude are shown in a combined display as -50.0500, the altitude appearing to the right of the decimal point and the velocity to the left, with a negative sign on the velocity to indicate downward motion. Then the remaining fuel is displayed and a rocket fire count down begins '3'', '2'', '1'', '0'', Exactly at zero you may key in a fuel burn. You only have one second, so be ready. A zero burn, which is very common, is accomplished by doing nothing. However, if you miss the one second 'fire window'' and then try to key in a burn, your engine will die and you will have to restart by pressing **B**. This automatically uses 5 fuel units and gives no thrust. After a burn the sequence is repeated unless:

- 1. You have successfully landed—flashing zeros.
- 2. You have smashed into the lunar surface—flashing crash velocity.

You must take care, however, not to burn more fuel than you have; for if you do you will free-fall to your doom! The final velocity shown will be your inpact velocity (generally rather high). You have 60 units of fuel initially.

Equations:

We don't want to get too specific, because that would spoil the fun of the game; but rest assured that the program is solidly based on some old friends from Newtonian physics:

$$x = x_0 + v_0 t + \frac{1}{2} a t^2$$
 $v = v_0 + a t$ $v^2 = v_0^2 + 2a x$

where x, v, a, and t are distance, velocity, acceleration, and time.

Remarks:

Only integer values for fuel burn are allowed.

R/S can be used to stop *Moon Rocket Lander* at any time.

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	Load side 1.			
2	Assume manual control.		A	"V.ALT"
				"FUEL"
				"3"
				"2"
				"1"
3	Key in burn*.	BURN		"V.ALT"
				"FUEL"
				"3"
				"2"
				"1"
4	Go to step 3 until you land			
	(flashing zeros) or crash (flash-			
	ing impact velocity).			
5	If you survived last landing			
	attempt, go to step 2 for			
	another try.			
	*If you miss the burn window and			
	flameout, press B for a new			
	engine start.		B	