



## Calculate Miles Per Hour for a Commando gearbox

This article will assist you in determining your speed (MPH) for a given RPM or the RPM for a given speed and a selected gear (1 through 4) for the Commando (AMC) gearbox.

**The Commando gearbox ratios are :**

- 1st gear is 2.56 to 1
- 2nd gear is 1.70 to 1
- 3rd gear is 1.21 to 1
- 4th gear is 1 to 1

It is easiest to start the calculations for fourth gear since it is a 1 to 1 ratio. At the end of this article we will show how to calculate the speed for the other gears. If you are using this article to calculate the speed for a gearbox that does not have a gear ratio of 1 to 1, assume the 1 to 1 ratio and convert to your actual ratios as we do for the other Commando gears.

**Nomenclature :**

- ES -- The engine sprocket, in teeth (normally part # 06-4681, 26T).
- CS -- The clutch sprocket in teeth (normally part # 06-2482, 57T).
- GS -- The gearbox sprocket in teeth (countershaft sprocket).
- RS -- The rear wheel sprocket in teeth (normally 42T for a stock Commando).
- WD -- The rear wheel diameter in inches (not the rim size, but with tire mounted).
- P -- The value for Pie (3.1416).
- RPM -- Engine Revolutions per Minute.
- MPH -- Miles Per Hour.
- Constants in the first formula -- 12 (to convert inches to feet), 60 (to convert minutes to hours), 5280 (to convert feet to miles).

**The formula :**

$$\text{MPH} = \text{ES/CS} \times \text{GS/RS} \times (\text{P} \times \text{WD})/12 \times (\text{RPM} \times 60)/5280$$

Or simplified some :

$$\text{MPH} = \text{ES/CS} \times \text{GS/RS} \times (\text{P} \times \text{WD} \times 60)/63360 \times \text{RPM}$$

### Examples :

$$\text{ES} = 26 \text{ and } \text{CS} = 57 \text{ or } 26/57 = .4561$$

$$\text{GS} = 19 \text{ and } \text{RS} = 42 \text{ or } 19/42 = .4524$$

$$\text{WD} = 25.5 \spadesuit \text{ so } (3.1416 \times 25.5 \times 60)/63360 = .0759$$

$$\text{.Therefore at 7000 rpm } .4561 \times .4524 \times .0759 \times 7000 = 109.63\text{mph}$$

If you just change the GS from 19T to 20T, at 7000rpm your speed would be :

$$.4561 \times 20/42 \times .0759 \times 7000 = 115.40\text{mph}$$

Setting the RPM at constant 6500 and WD at 25.5 $\spadesuit$  you can calculate a constant for [(P x WD x 60)/63360 x RPM] of 493.35: Leaving the ES at 26 and the CS at 57 we further simplify the formula to :

$$\text{MPH} = .4561 \times \text{GS/RS} \times 225.02 \text{ or } \text{MPH} = \text{GS/RS} \times 225.02$$

By changing your gearbox or rear sprocket, you can calculate what your speed will be at 6500rpm.

On the other hand, if you want find the RPM at 65mph for a particular gearbox sprocket the formula would be:

$$\text{RPM} = \text{MPH} / (\text{ES/CS} \times \text{GS/RS} \times (\text{P} \times \text{WD} \times 60)/63360)$$

Leaving everything the same as in the first example and we want to cruise at 65mph our formula is :

$$\text{RPM} = 65 / (.4561 \times .4524 \times .0759) = 4,140\text{rpm}$$

a 20T gearbox sprocket drops our RPM to 3,939rpm.

You can calculate the speeds at each gear by dividing the 4th speed by the gear ratio.

Taking the first answer of 109.63 at 7000rpm, that gearing would produce a top speed in 1st gear at 7000 (109.63 / 2.56) of 42.82mph.

The gearing in the second example or 115.40mph at 7000rpm will give at 7000rpm the following:

$$1\text{st} \text{ -- } 2.56 \text{ to } 1 = 45.08\text{mph}$$

$$2\text{nd} \text{ -- } 1.70 \text{ to } 1 = 67.88\text{mph}$$

$$3\text{rd} \text{ -- } 1.21 \text{ to } 1 = 95.37\text{mph}$$

$$4\text{th} \text{ -- } 1.00 \text{ to } 1 = 115.40\text{mph}$$

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