

Relationship of TU Gear Ratio to Scale Speed

For tankers whom like to achieve the realism of the tanks' movement and speed, the scale speed could be an important element of the tanks' characteristics.

Because there is no clutch on the TU, it is not possible to achieve different variable speeds, at one constant motors' RPM.

One of the ways, is to define the scale speed, and tuned the TU to the gear ratio that relates close to the real tanks' speed, when the motors are running at maximum RPM.

How to calculate GEAR RATIO



Tam's Stock	IMPACT stock	IMPACT HOP UP 1	IMPACT HOP UP 2	IMPACT HOP UP 3
	Step 1	3.00	3.00	3.00
Step 1	4.80	Step 2	2.82353	2.823529
Step 2	1.4166666	Step 3	1.416667	1.230769
Step 3	1.875	Step 4	1.875	1.071429
Step 4	1.6	Step 5	1.60	1.875
Step 5	1.875	Step 6	1.875	1.6
Step 6	1.875	Step 7	1.875	1.875
Step 7	0.83333	Step 8	0.833333	1.875
Final GR	59.76538	105.4687	91.629	79.7663
				69.4853

Step 1. $30/10 = 3.00$

Step 2. $48/17 = 2.82353$

Step 3. $34/24 = 1.41667$

Step 4. $30/16 = 1.875$

Step 5. $32/20 = 1.60$

Step 6. $30/16 = 1.875$

Step 7. $30/16 = 1.875$

Step 8. $15/16 = 0.8333$

Final GR (gear ratio) = $3.00 \times 2.82353 \times 1.41667 \times 1.875 \times 1.60 \times 1.8875 \times 1.875 \times 0.8333$
 = **105.4678**

IMPACT HOP UP

Type 1

Gear #2 48/26

Gear #3 32/16

Type 2

Gear #2 48/28

Gear #3 30/16

Type 3

Gear #2 48/30

Gear #3 28/16

380 Motors used in the TU have 16,500 RPM at no load condition (for more detail information, refer http://www.mabuchi-motor.co.jp/cgi-bin/catalog/e_catalog.cgi?CAT_ID=rs_380sh).

Therefore, by calculating theoretically the resultant speeds of the TU, are also at no load condition.

The calculated scale speed will be slightly higher than actual scale speed, due to the factors:

1. Size of sprocket wheel
2. Traction of tracks and friction of all wheels.
3. Weight of the loaded tank
4. Terrain
5. many other conditions

There is approximately 4% tolerance in speed between the both calculated and actual scale speeds, depending on the above stated factors.

For example, based on Panther's sprocket wheel, IMPACT TU and metal tracks:

1. Tamiya's stock gearbox has a gear ratio of 59.77:1

The calculated model speed = 2.55 km/h

Or you can use the graph to plot out the model speed. This is a speed under no load condition.

But the actual tank running with the stock 59.77: 1, might have

The calculated model speed = $2.55 \text{ km/h} \times 96\% = 2.45 \text{ km/h}$

This could be the very true speed of the actual running model tank.

2. IMPACT stock TU has a gear ratio of 105.47:1

The calculated model speed = 1.45 km/h

Or you can use the graph to plot out the scale speed. This is a speed under no load condition.

But the actual tank running with the stock 105.47: 1, might have

The calculated model speed = $1.45 \text{ km/h} \times 96\% = 1.39 \text{ km/h}$

This could be the very true speed of the actual running model tank.

This tabulation is referencing from Panther's sprocket wheel, at 4.9cm diameter.

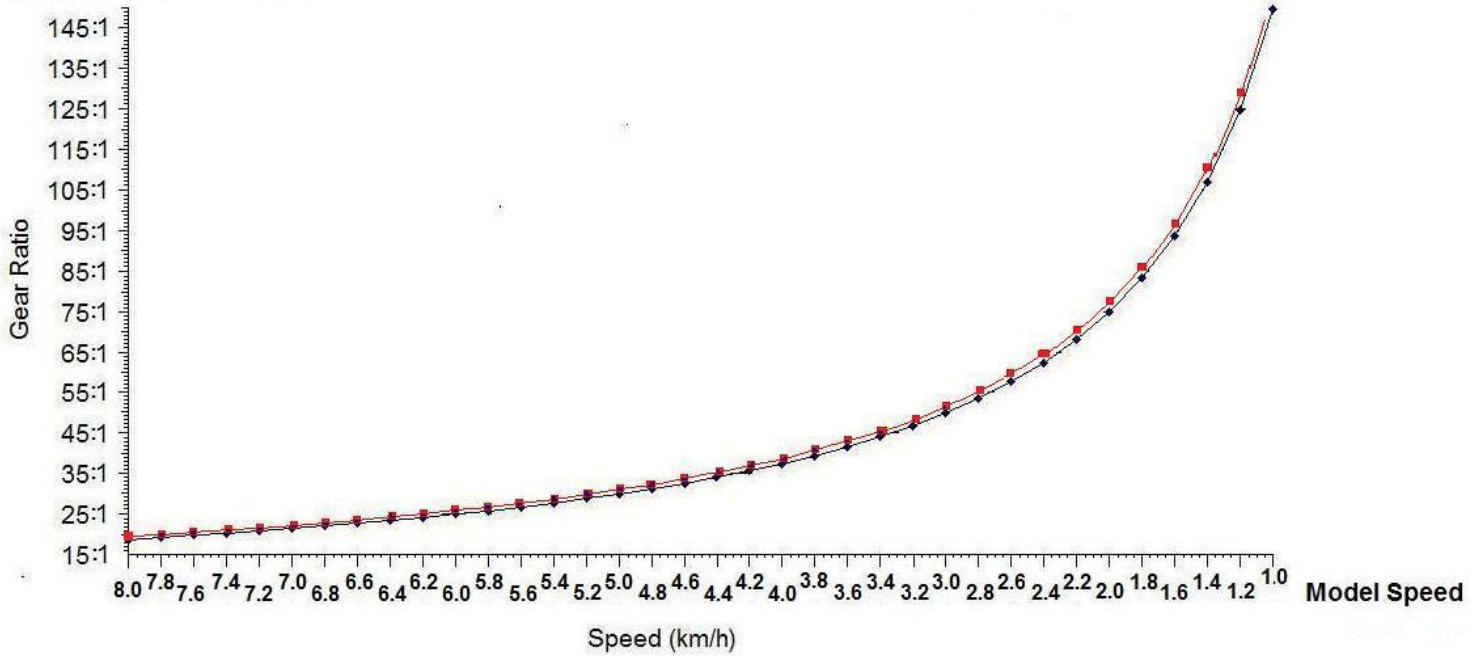
Speed to Gear Ration Relationship (16,500 RPM @ 8.4V)	
Model Speed (km/h)	Gear Ratio ("X" :1)
8.0	19.1
7.8	19.5
7.6	20.1
7.4	20.6
7.2	21.2
7.0	21.8
6.8	22.4
6.6	23.1
6.4	23.8
6.2	24.6
6.0	25.4
5.8	26.3
5.6	27.2
5.4	28.2
5.2	29.3
5.0	30.5
4.8	31.8
4.6	33.1
4.4	34.7
4.2	36.3
4.0	38.1
3.8	40.1
3.6	42.4
3.4	44.8
3.2	47.6
3.0	50.8
2.8	54.5
2.6	58.6
2.4	63.5
2.2	69.3
2.0	76.2
1.8	84.7
1.6	95.3
1.4	108.9
1.2	127.1
1.0	152.5

Speed to Gear Ration Relationship (16,200 RPM @ 7.4V)	
Model Speed (km/h)	Gear Ratio ("X" :1)
8.0	18.7
7.8	19.2
7.6	19.7
7.4	20.2
7.2	20.8
7.0	21.4
6.8	22.0
6.6	22.7
6.4	23.4
6.2	24.1
6.0	25.0
5.8	25.8
5.6	26.7
5.4	27.7
5.2	28.8
5.0	29.9
4.8	31.2
4.6	32.5
4.4	34.0
4.2	35.6
4.0	37.4
3.8	39.4
3.6	41.6
3.4	44.0
3.2	46.8
3.0	49.9
2.8	53.5
2.6	57.6
2.4	62.4
2.2	68.0
2.0	74.8
1.8	83.2
1.6	93.6
1.4	106.9
1.2	124.7
1.0	149.7

IMPACT
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SCALE SPEED

◆ 16,200 RPM @ 7.4V
■ 16,500 RPM @ 8.4V



Graph 1. Relationship between Gear Ratio and Model Speed

