A Guide to Writing-Up Vehicles for the /tg/ GURPS Vehicle Collection

How You Can Contribute

You don't need to do every step in this guide. If you only write a description, that is still a big help. In fact, it's the most helpful thing you can do. Stats are useful, but the numbers need to be checked before being added to the collection, so I will still need to do the work you did again. Writing good descriptions and finding good information sources are the most difficult part of writing-up these vehicles.

Choosing a Vehicle

For this collection, we are looking for real, mass-produced vehicles. Fictional vehicles, custom builds, prototypes and designs which never went into production will probably be in volume 2 if we ever get round to it. The only exception is vehicles which are significant but every one is unique, like some ships.

A good choice of vehicle is an iconic example of it's class which was produced in large numbers for a long time and might be encountered in many different contexts. It isn't always possible to meet all of these criteria, or possibly any of them but it's something to aim for.

Vehicles which are especially needed for the project (at the time of writing) are civilian vehicles, notably cars (except economy cars), motorcycles, emergency response vehicles (such as fire engines), construction equipment (diggers, cranes, bulldozers, etcetera) and ships and boats of all kinds.

It's better to be specific in exactly what model of the vehicle you are describing. There are often significant differences between models.

The Description

This is in many ways the most important part of the write-up and is both the easiest (no math, no rules knowledge required) and hardest (requires actual creative thought).

There is no one way to write a good description, but the following points might be helpful:

- The reader should have some idea of what the vehicle looks like.
- There should be enough context to understand what purpose the vehicle serves and who would use it.
- Any unusual features should be noted, especially equipment which wouldn't be considered normal for a vehicle of it's type.

Try to make your description between one and two hundred words if possible.

The Research

Some facts about the vehicle will be needed to researched in order to build them under the GURPS rules.

It's worth noting that including your research notes along with any vehicle you submit is incredibly helpful. Stats need to be double-checked, so I will have to do the research myself before including them in the collection if I don't have the real world information. Links to the sources you find are very helpful.

Also, checking multiple sources is often a good idea. False information does get published sometimes.

Units

GURPS uses US units. This is important to bear in mind because there are several types of gallon and ton in use. If you aren't sure which is being used, see if there is a metric equivalent.

Years Produced / Available

It's usually easy enough to find out when a vehicle first became available (but note that we need the year it was first available to customers, not when the first prototype was made or they started building it). Finding out when it stopped being available is harder, sometimes impossible.

Empty Weight

This number is rarely given except for aircraft. For land vehicles it can be approximated with curb weight less the weight of fuel. Often you will have to estimate it by looking at loaded weight or displacement and trying to account for everything that is onboard.

Maximum / Total Weight

This might be the maximum allowed vehicle weight for a land vehicle, maximum takeoff weight for an aircraft or displacement for a ship. Sometimes this will be the only weight listed and everything else will need to be estimated from it.

Fuel Tank Capacity

This is a useful number to have even if you have a 'range' figure from elsewhere. It lets you calculate how much weight to take away from the curb weight to get empty weight and is very significant for calculating how much aircraft can carry (some aircraft have fuel tanks so large that they can barely fly with minimum crew when they are full, so their normal performance will need to be estimated with half-empty tanks). It also gives you a basis for deciding if range figures are realistic.

Reputation

Less concrete than the other items on this list, but helpful for determining Hnd/SR and HT scores. Does the vehicle have a reputation for good or bad handling, is it prone to rollovers, is it considered tough or unreliable?

Top Speed

This is often one of the simplest facts to find out about a vehicle. Published figures are probably with less stuff onboard than GURPS assumes, but don't try to adjust for that: previous entries have all been done from standard top-speed figures and it's better to stay consistent.

Acceleration

Not absolutely necessary (it can be estimated from other figures), but helpful. For vehicles with a top speed of 75-200 miles per hour the 0-60 mph figure is a good basis.

Power

Total engine power. Most of the time this will be in kilowatts or horsepower, but sometimes it will be expressed as pounds of thrust or newtons.

Size

What is the vehicle's longest dimension? Usually this will be length, but for some aircraft it will be wingspan. If the vehicle has parts which stick out (like a tank's gun or a helicopters rotor) does the length include that? How big is the main body of the vehicle?

Seating and Crew Numbers

A simple number, but not always an obvious one. This is what Occupancy is usually based on, but for vehicles with long-term occupancy, beds and workstations might be better figures to work with. If possible, note how many people onboard are crew and what their jobs are (not necessary for a car with just a driver).

Armour and Hull Thickness

For any vehicle which has significant protection, try to find out as much detail as you can about the thickness, materials and weight of the armour. For civilian vehicles this is usually irrelevant and impossible to find anyway, but it is worth trying to find it for ships.

Range and Mileage

Military vehicles and aircraft will often have a range listed. Others are more likely to give you a number for how far you can expect to get for a given amount of fuel (usually expressed as miles per gallon or litres per 100 km). Often the numbers will not correspond exactly with what GURPS uses for range, but we can generally make an estimate.

Cost

This should be the manufacturer's recommended selling price for a new vehicle. It is important to note what year the price is for, as inflation needs to be taken into account. Prices often vary, so multiple sources and different years is ideal. Often this will be difficult or impossible to find, especially for specialised vehicles.

Converting to GURPS

Start off with the vehicle's name (the official one from it's manufacturer or it's military designation if it is a military vehicle) followed by it's country of origin (the country of origin of the company which made it if there is some ambiguity) and the years it was available.

If you are unsure about any details or are using guesswork, it's helpful to note this.

Tech Level

Basically, when the vehicle was built. 1730-1880 is TL 5, 1880-1940 is TL 6, 1940-1980 is TL 7 and anything after 1980 is TL 8. Use common sense to decide ambiguous cases; for example a wooden boat built

in 1900 but using only technology which was available in 1800 is probably TL 5 or even lower. An advanced jet fighter from 1978 is probably TL 8.

ST/HP

This is calculated from empty weight. Try to get as close to empty weight as possible, account for fuel weight and remember that 'tons' are an ambiguous unit.

The formula is:

```
(a^(1/3))*4
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Where a is the empty weight in pounds.

That is you take the cube root of the empty weight and multiply it by four. Setting up a spreadsheet to do these calculations will help a lot.

Hnd/SR

There doesn't seem to be a formula for handling these. Best we can do is to find a similar vehicle and estimate from there. Unusually good or bad handling characteristics might be relevant, but be conservative.

HT

Again, there is no formula. 11 seems to be average. 10 is bad, 12 is good. High performance vehicles might get -1 to that.

Move

This is split into Acceleration and Top Speed.

Acceleration can be calculated from 0-60 mph (or 0-100 kmph) times if you have them (but bear in mind that they may not be representative for vehicles which can barely get above that speed; the figure should be close to peak acceleration).

The formula to convert a 0-60 mph time to GURPS move (yards per second per second):

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29.33/b
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...where b is the 0-60 mph time (in seconds).

For 0-100 kph:

```
30.38/c
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...where c is the 0-100 kph time (in seconds).

If you don't have an acceleration time or you don't think it is suitable, you can use power and weight to work it out. Use the total loaded weight for these calculations.

For a land vehicle the formula I use is:

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((d^0.6)/(e^0.7))*3.5
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...where d is the engine's power (in kW) and e is the vehicles loaded weight (in short tons).

My formula was based on guesswork and trial-and-error trying to fit available data to known figures. It seems to work OK, but there is no real physics model supporting it.

You can also try:

```
((d/e)^0.5)*0.39
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...which is derived from the formula in GURPS Vehicles.

or

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((d*e*400000)^0.5)/(e*2000)
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...which is based on a formula I found online and seems to give OK results but I don't really understand.

Again a spreadsheet will be very useful. If all three formulas roughly agree, it's probably right. If only the middle one disagrees, go with the others. If they are all over the place, you might need to make a judgement call.

For air, water and space vehicles, it's actually pretty easy to judge peak acceleration if you know the thrust. The formula is:

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(f/g)*10
```

Where f is the thrust (in pounds) and g is the vehicle's loaded weight (also in pounds).

The hard part is figuring out the thrust if we don't have it. Estimates based on the old Vehicles book:

For paddle wheels, about 8 lbs. per kW of power.

For screw propellers in water, about 10-15 lbs. per kW of power.

For aerial propellers, about 2.5-3.5 lbs. per kW of power.

For ducted fans about 4 lbs. per kW of power.

For helicopter rotors, about 1.6 lbs. per kW of power.

Top speed is usually just a matter of converting to the right units. Remember that GURPS move is in yards per second.

For a wheeled vehicle which isn't four-wheel drive there should probably be a * after Move to indicate that it is 'road bound' (exactly what qualifies is a judgement call).

Loaded Weight

This is simply the loaded weight in short tons. Include 0.1 tons for each crewman or passenger, 1 ton per 200 cubic feet of cargo space (unless cargo weight are specified), don't forget the fuel weight and remember to use the right units and this shouldn't be an issue.

Load

The total weight of cargo and passengers. This doesn't include fuel. I don't think it includes ammunition (except bombs and external hardpoint loads)… to keep consistent, assume it doesn't.

Size Modifier

Simply look up the vehicle's largest dimension on the Size/Speed/Range table. Remember that boxy objects (cars and trucks) get +1 SM and if the size is between two values use the higher one.

Occupancy

The first number is crew, the second are passengers. I count vehicle commanders, radio operators, gunners and loaders as crew, but stewards as passengers (as they don't do anything with the vehicle itself). For long-term occupancy vehicles, I think the numbers should include all shifts (so three or four times the number needed to operate the vehicle at any one time).

Sometimes it isn't clear how many people can fit into a seat, for example the back seat of a small car can fit three people, but they will be pretty cramped if they are all large adults. The Basic Set says that they should be in 'reasonable comfort', so I generally go with such small seats counting as two spaces.

DR

If you've got good figures for armour thickess, now is the time to use them.

Rolled Homogenous Armour (RHA) is DR 70 per inch. If you've got figures for RHA equivalent, you can use this rather than real thickness.

Other steels are from 50-90 DR per inch, but usually close to 70.

Aluminium is around DR 25 per inch.

Armour-grade titanium alloys are about DR 55 per inch.

Best composite materials possible are about DR 90 per inch.

Kevlar is around DR 25 per inch.

Fibreglass and most plastics are maybe 5-10 per inch?

Wood is possibly 1-5 per inch?

Alternatively, if you have a weight of armour you can estimate DR from that if you know roughly the area that is covered. I estimate that most armour is 0.3 to 0.7 lbs. per square foot per point of DR.

After you have the DR from thickness, add 0-4 points for general protection from structure, etc.

Try to keep DR as simple as possible. If you are giving more than 4-5 different values you are probably over-complicating it. Remember that armour values given are only ever an average and every vehicle has weak points, angle of impact matters, etc. so you will never get a perfect representation of the real values.

Civilian vehicles should just be given DR 3-8 depending on how tough they seem. DR 4 is the norm.

Range

If you don't have a number for range (or if you want to double check it) you can estimate it from fuel consumption. If several fuel consumption figures are given (for city driving and highway driving, for example) use an average.

To convert miles per gallon into range, simply multiply that by fuel tank capacity in gallons (but make sure that both figures use the same type of gallon).

To convert litres per 100 km into range in miles use this formula:

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(h/i)*62.14
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...where h is fuel tank capacity (in litres) and i is litres per 100 km.

If you have no idea what fuel consumption should be you can estimate it based on engine power. Most

engines use 0.4 to 0.8 gallons of fuel per hour per kilowatt. Use that to work out how many hours you can run it for on your fuel tank and multiply that time by a 'cruising speed' of 60-80% of maximum speed (lower end for ground vehicles, higher for air vehicles). Remember that Move is in yards per second not miles per hour and adjust your figures accordingly.

Cost

This is the price for a new vehicle in GURPS dollars. GURPS dollars are roughly equivalent to US dollars in 2005, so you will need to convert and adjust for inflation. This is quite complicated, but fortunately there is a website which does it for you:

www.measuringworth.com

It even has historical exchange rates so you can convert from any currency it has data for.

Things get a bit difficult when dealing with places like the USSR where currency wasn't actually worth it's official value. For those you need to find a couple of goods you can compare prices on and get a rough idea. The 'vodka standard' of $6 GURPS for 500 ml of vodka seems to be good enough for our purposes.

Cost gets a bit hazy with things like military vehicles, because 'unit cost' often includes significant research costs. That's if you can even find a cost figure at all. Basically, make do with what you can find and explain it in the notes if you are making a lot of judgement calls.

Locations

Simply look at page 463 of the Basic Set and write down the ones which are on the vehicle. Remember to add 'r' to anything retractable. The difference between G and g is something of a judgement call. If there is a turret, try to find out how quickly it can rotate if possible.

Stall Speed and Runway Length

Stall Speed is usually listed for aircraft. Just remember that it is in yards per second.

Runway Length is for a sea-level takeoff or landing, whichever is longer (usually takeoff).

If you don't know required runway length you can estimate it from Stall Speed and Acceleration:

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(j^2)/(k*2)
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...where j is stall speed (in yards per second) and k is your basic move (or acceleration in yards per second per second).

Maximum Altitude

I don't know how to estimate this, but most aircraft seem to list it. Sometimes as 'operational ceiling' or something.

Draft

I just realised that I failed to include this in my write-ups. Oh dear.

If it isn't listed you can estimate it as:

```
(m^(1/3))*0.08
```

...where m is the vehicle's loaded weight (which is the same thing as displacement) in pounds.

Adjust the above formula by up to 20% in either direction for general hull shape (slimmer, more hydrodynamic hulls tend to have larger draft). Remember that draft is measured in feet.