HOW TO STAY ON TIME IN A TSD RALLY

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INTRODUCTION

The first rule of rallying is to stay on course. If you stay on course, you can find the finish. If you can find the finish, you can find the post-rally party.

The second rule of rallying is to stay on time. If you stay on time, you can *win* the rally, or at least place high enough to give you bragging rights at the post-rally party. This article discusses one method for staying on time, or at least close to it. There are many methods for staying on time, and this method represents only one of them. However, it is a simple method and therefore it is a good place to start to learn the art and science of staying on time in a TSD rally.

Now, if you like to run rallies without regard to speedometers or odometers or watches, we have no argument. Run the rally, have fun and good luck. We'll see you at the party. However, if you want to run a TSD rally in the way it is intended to be run, please read on.

THE BASIC FORMULA

"TSD" stands for "Time, Speed, Distance," and it refers to the fact that if you know two of these three variables, you can calculate the third one. This is the information you need to stay on time. The basic formula is:

$$\frac{\text{Distance in miles}}{\text{Time in seconds}} \times 3600 = \text{Speed in MPH}$$

For example:

$$\frac{\text{2 miles (D)}}{\text{240 seconds (T)}} \times 3600 = \text{30 MPH (S)}$$

It is also true that 3600 divided by any MPH = the number of seconds needed to travel one mile at that speed.

During a TSD rally, the rally team is required to maintain Assigned Speeds, at least part of the time. The team that stays closest to these Assigned Speeds over the course of the entire rally is usually the winner. Now you may say, "Simple! We just watch the speedometer and keep that needle on the Assigned Speed!" However, the Rally Route requires that you turn this way and that way, slowing down for curves, stopping for stop signs, and obeying traffic lights. All of this necessitates speeding up and slowing down. You will not be able to just keep a steady speed, so you will have to calculate how fast

you really did travel over a given portion of the Rally Route so that you can then speed up or slow down to try to match the "correct" speed.

To calculate your Speed, you will need Time and Distance. Again, you might think "No problem!" because most of us wear a watch that will tell us the Time, and most cars have an odometer that will tell us the Distance. However, in a rally, you don't always know, in advance, the Distance that you will travel at an Assigned Speed, or how much Time it will take. You get that information only *after* you have driven from one instruction to the next, and have measured the Time and Distance.

So therefore it appears that you have to run each piece of the rally to obtain the Time and Distance variables, then use our formula to see how close you were to the Assigned Speed for the section *that is now behind you*, then tear off on the next section, trying to speed up or slow down to compensate for how much you were off on the previous section.

Let's use an example. Let's say that a TSD section of a rally starts you off at 00.00 mileage and with an Assigned Speed of 30 MPH. You drive off, doing your best to maintain 30 MPH, and executing the Route Instructions flawlessly, until you see an instruction that requires you to change speeds. What you should do now is record your mileage (D=distance) and the time (T=time) that you have spent driving to the speed-change point. Assume you have gone 4.9 miles (D) and it has taken 10 minutes and 42 seconds (T). Convert the time to seconds (10 minutes x 60 seconds = 600 seconds + 42 seconds = 642 seconds). According to our formula, you then divide the miles traveled (D) by these seconds (T) to get "miles per second" (4.9 miles/642 seconds = 0.0076323 miles/sec), then multiply that by the number of seconds in an hour (3600) to get "miles per hour" (0.0076323 x 3600 = 27.48 MPH).

So you now see that you were slow, averaging 27.48 MPH rather than the assigned 30 MPH. According to our formula, you should have completed that section in 9 minutes and 48 seconds (588 seconds), but you took 10 minutes and 42 seconds (642 seconds). So, you need to speed-up during the next section to make up 54 seconds, and make it up as quickly as possible before you arrive at a checkpoint or passage control where you will be penalized for being early or late, and by the time you calculate this, you will be well into the next portion of the rally. And if there are many and/or frequent changes in the Assigned Speed, the navigator will likely always be behind, and you will likely be carrying large errors until you get to the next speed-change point where you can recalculate how you are doing. This is not the ideal way to run a rally. Fortunately there is a better way…

CONTINUOUS SPEED ADJUSTMENT

Since you don't always know in advance exactly how far the Rally Master is going to make you travel at each Assigned Speed, you need a way to keep recalculating your average speed and comparing it to the official Assigned Speed *as you go*, not just once it is all behind you. In this manner, you can go faster or slower to compensate for how badly you are missing the Assigned Speed, making speed adjustments as often as necessary. The Continuous Speed Adjustment method should allow you to stay close to the Assigned Speed at all times, and that is how rallies are won.

To accomplish Continuous Speed Adjustment, the rally team needs an odometer, a watch that shows time to the second (two will come in handy), and a chart showing MPH in "seconds per mile" (see below). The driver usually calls out the miles as they roll over on the odometer, and the navigator uses his running time piece and a table like the one below to determine their "seconds per mile rate." The navigator compares the time that it took to drive the last mile with the reference chart, and notes whether they are fast (took less seconds than they should have) or slow (took more seconds than they should have) over the mile just completed. Then, as the miles unfold, the navigator can continuously advise the driver, each mile, to speed up or slow down to maintain perfect speed. Since it is unlikely you will be off by more than a handful of seconds over the course of a single mile, this simple method allows you to stay reasonably close to the Assigned Speeds at all times.

For example, let's say that you begin a TSD section with an Assigned Speed of 30 MPH. By checking the chart you note that it should take 120 seconds, or 2 minutes and 0 seconds, to go one mile at 30 MPH. At the designated time, the driver begins the TSD section, accelerating to a speed that will render an average speed of 30 MPH. Since acceleration time must be considered, he may choose to leave a few seconds before the designated start time, and/or he may briefly accelerate past 30 MPH to a speed that will allow the "acceleration lag" to be made up before dropping back to maintain 30 MPH. As the odometer turns over at the end of one mile, the driver calls out, "Mile!" and the navigator notes the time it took to drive that mile. Let's say that in this case it was 2 minutes and 10 seconds. This indicates that they took 10 second more than they should have to complete the first mile – they are "10 seconds late." The navigator immediately calls out, "Ten seconds late!" and the driver then increases his speed to make up this time, hopefully within the next mile.

To continue our example, as the odometer turns over at the end of the second mile, the driver again calls out, “Mile!” and the navigator notes the time it took to drive that mile. Let’s say that in this case it was 1 minute and 53 seconds. This indicates that they made up 7 seconds, but they are still 3 seconds late overall. The navigator immediately calls out, “Three seconds late!” and the driver then adjusts his speed to make up this time, again, hopefully within the next mile. And so forth. In this way, the rallyists will know at the end of each mile how well they are doing at staying on time.

Now comes the hard part. The navigator must quickly make these calculations and advise the driver of the difference between “perfect time” and their time, AND must be prepared, at the end of each mile, to again calculate how well they have made-up (or increased) their speed error from the previous section, AND must help navigate, AND must frequently remind the driver of the next route instruction, AND must help look for signs and landmarks. No one said that it was easy.

It takes preparation. It takes teamwork. It takes practice. But that’s “the game” of rallying, and for those who take the trouble to learn and practice the game, the results can be very satisfying. Fun, even.

MPH	SEC/MILE	MPH	SEC/MILE	MPH	SEC/MILE	MPH	SEC/MILE	MPH	SEC/MILE
15	240.0	25	144.0	35	102.9	45	80.0	55	65.5
16	225.0	26	138.5	36	100.0	46	78.3	56	64.3
17	211.8	27	133.3	37	97.3	47	76.6	57	63.2
18	200.0	28	128.6	38	94.7	48	75.0	58	62.1
19	189.5	29	124.1	39	92.3	49	73.5	59	61.0
20	180.0	30	120.0	40	90.0	50	72.0	60	60.0
21	171.4	31	116.1	41	87.8	51	70.6	61	59.0
22	163.6	32	112.5	42	85.7	52	69.2	62	58.1
23	156.5	33	109.1	43	83.7	53	67.9	63	57.1
24	150.0	34	105.9	44	81.8	54	66.7	64	56.3

3600 divided by any MPH = number of seconds to travel one mile.
Speed in MPH = "Distance in miles” divided by "time in seconds” times 3600.

ODOMETER CALIBRATION

To make all of this worthwhile, you need to know how your odometer compares to the Rally Master's odometer. The official mileages and run-times for the rally are calculated using the Rally Master's odometer. Therefore you need to find out how the Rally Master's odometer and your odometer read over the same distance, so that you may compare them and calculate your "Odometer Correction Factor."

(It doesn't matter whose odometer is really more accurate. The Rally Master's odometer is the one used to measure the rally, and therefore it serves as a single common reference for everyone.)

To calculate your Odometer Correction Factor, we begin the rally with an "Odometer Check Section." This is a section of the rally with simple, straight-forward instructions (hopefully no challenges to your course-following ability), usually of at least 10 miles. At the end of the Odometer Check Section, you'll note your odometer reading and compare it to the Rally Master's odometer reading (which is provided in the Route Instructions). Then divide your mileage reading by the official mileage (the Rally Master's mileage) and the resulting figure is your Odometer Correction Factor.

You can use your Odometer Correction Factor to determine what your odometer will read for any given mileage in the Route Instructions (which of course were all measured with the Rally Master's odometer). For example, if the Odometer Check Section is stated to be 15.10 miles (which is what the Rally Master's odometer read over the distance), and your odometer reads 15.45 for the same distance, you divide 15.45 by 15.10 and you have a result of 1.0231788, which you may round off to 1.023.

You may then use this factor to "correct" the figures in the remaining Route Instructions by multiplying them by your Odometer Correction Factor. For example, if the Route Instructions state a distance of 8.76 miles, you multiply that figure by 1.023 and get a result of 8.96. Therefore, *your* odometer will read 8.96 at the same point where the Rally Master's odometer read 8.76.

Why do we care? There are several reasons. The most basic reason is because if we don't adjust ("correct") our odometer to that of the Rally Master, all of our calculations will be off by the amount that our odometer differs from the Rally Master's. All of our calculations will be in vain, or at least somewhat

inaccurate, if we use a reference different from the Rally Master's. And what may seem like a small difference can make all the difference.

Therefore you should be as exact as you can when calculating your Odometer Correction Factor. Even if you are just using your car's original odometer that reads in tenths only, you should interpolate fractions of a tenth as best you can; do not just round off to the nearest tenth! A little precision here can make a big difference out on the course.

For example, over the course of a rally covering, say, 100 miles, even a seemingly tiny difference between your odometer and the Rally Master's can result in a large error by the end of rally, if not corrected by applying the Odometer Correction Factor. Even if your odometer was only one half of one percent different from the Rally Master's, by the end of 100 miles you will be "one half mile off," and one half mile at an overall average speed for the 100 miles of, say, 40 MPH, is 45 seconds.. Arriving early or late at a timing control by 45 seconds means a penalty of 45 points! Add to that the penalty points that you will have received at the intermediate timing controls, and you will likely not be competing for the top spots in a rally if you do not correct and eliminate such unnecessary penalties.

Bear in mind that this is only a basic introduction to staying on time in a TSD rally, and it represents only one method for doing so. However, as a place to start it is not bad, and as you develop confidence and skill in the basics, you can add or modify your method to increase your accuracy. Good luck!

You may wish to clip the table on the next page and tape it to your dashboard or clipboard.

MPH	SEC/MILE	MPH	SEC/MILE	MPH	SEC/MILE	MPH	SEC/MILE	MPH	SEC/MILE
15	240.0	25	144.0	35	102.9	45	80.0	55	65.5
16	225.0	26	138.5	36	100.0	46	78.3	56	64.3
17	211.8	27	133.3	37	97.3	47	76.6	57	63.2
18	200.0	28	128.6	38	94.7	48	75.0	58	62.1
19	189.5	29	124.1	39	92.3	49	73.5	59	61.0
20	180.0	30	120.0	40	90.0	50	72.0	60	60.0
21	171.4	31	116.1	41	87.8	51	70.6	61	59.0
22	163.6	32	112.5	42	85.7	52	69.2	62	58.1
23	156.5	33	109.1	43	83.7	53	67.9	63	57.1
24	150.0	34	105.9	44	81.8	54	66.7	64	56.3