South Jersey Region
Sports Car Club of America

How to Participate Well in TSD Road Rallies

By Jim Wakemen, Sr

Chapter 3: Calculating Your Leg Time during the Rally.

I. Introduction: I highly recommend that Stock Class competitor use the Gary Starr Rally Program. The Gary Starr Program permits Stock rallyists to know what their time should be every one tenth of mile throughout the entire control. Read the rest of this booklet before reading the Gary Starr Program. Gary has given me permission to publish his Program, so you can find it in Chapter 4. The address for the Gary Starr rally program is http://www.scca-lol.org/rally/roadrally/eztiming.pdf

II. Understanding How Rally Times are Calculated: The rally times are calculated by using factors for each speed given in a CAST. A factor is the amount of time needed to travel 1 mile at the given speed. Each speed factor is found by dividing 60 by the speed and rounding the quotient to 3 decimal places. Example: The factor for 34 mph is 60/ 34 = 1.765 (after rounding). That means it takes exactly 1.765 minutes to travel 1 mile at 34 mph. The table below also shows that it takes exactly 3.000 minutes to travel 1 mile at 20 mph and 1.875 minutes to travel 1 mile at 32 mph, etc.

Examples:

Speed	Factor
20	3.000
25	2.400
30	2.000
32	1.875
35	1.714
36	1.667
40	1.500
45	1.333

To determines the official time for a control, the rallymaster takes the distance traveled and multiples it by the factor of the CAST speed to get the time for each different CAST used during a control. Then he adds all the times for all the CASTs to get the official time. I use an Excel spread sheet to time my rallies. My mileages are in the 1000th of a mile. Printed below is an example. Note that pauses are also added in. The official time for this control is 14.71 minutes.

	Official mileage	Delta mileage	speed	factor	Elapsed time	pauses in Decimal	delta time	overall time
NRI								
r/s	0							0
53	0.822	0.822	30	2	1.644		1.644	1.644
54	1.504	0.682	25	2.4	1.6368		1.6368	3.2808
55	2.033	0.529	28	2.142857	1.133571		1.133571	4.414371
57	5.101	3.068	40	1.5	4.602	0.25	4.852	9.266371
58	6.706	1.605	32	1.875	3.009375	1.25	4.259375	13.52575
cp 7	7.3	0.594	30	2	1.188		1.188	14.71375

At this point you may be asking your self, “How can measuring using .1 mile intervals be as accurate as measuring in .001 mile intervals?” Well it can. To show you how close to the official time you can get using .1 mile intervals, I redid the chart above using mileages to the tenth as they would appear on your odometer. The official time calculated using .1 mile intervals is 14.70 compared to 14.71. The difference in the two calculations is .01 minutes, a score of 1 on the control.
The

NRI	Official Mileage	Delta Mileage	speed	factor	Elapsed Time	pauses in Decimal	delta time	overall time
r/s	0							0
53	0.8	0.8	30	2	1.6		1.6	1.6
54	1.5	0.7	25	2.4	1.68		1.68	3.28
55	2.0	0.5	28	2.143	1.0715		1.0715	4.3515
57	5.1	3.1	40	1.5	4.65	0.25	4.90	9.2515
58	6.7	1.6	32	1.875	3.00	1.25	4.25	13.5015
cp 7	7.3	0.6	30	2	1.2		1.2	14.7015

III. Matching the Rallymaster’s Time: The goal is to match the rallymaster’s perfect calculated time. The rally computers used in Equipped class adjust their mileage measurement exactly to the rallymaster mileage on the odometer calibration leg and then use the factors as shown above. In the 1950’s the rally competitors would adjust the air pressure in their tires so that their odometer reading would be the same as the official mileage. In Stock Class your odometer can’t be changed to match the official mileage, so the speed factors have to be adjusted. The odometer leg is where Stock Class entrants adjust their speed factors. This is a crucial procedure to getting the time correct. On the surface it looks like close is good enough but nothing could be further from the truth. Think about this, you drive the odo leg in 10.2 miles and the official mileage is 10.09. A little over .1 mile difference. That .1 mile difference is a score of 20 on the control at a CAST of 30. i.e .1 mile at 30 mph is calculated as above mileage times factor. (.1 * 2.000 = .20 for a score of 20).

Speed	Factor	Correction	Corrected Factor
20	3.000	.9892156	2.968
25	2.400	.9892156	2.374
30	2.000	.9892156	1.978
32	1.875	Etc.	1.855
35	1.714		1.696
36	1.667		1.649
40	1.500		1.484
45	1.333		1.319

A quick example of how the correction factor works is this. Suppose the first control is 10.09 miles at 30 mph. The official time will be 10.09 * 2.000 = 20.18 minutes. Your odo will read 10.2 miles. Using 10.2 * 2.000 = 10.40 minutes. An error of .22 and a score of 22. But since you are using corrected factors, you would do this: 10.2 * 1.978 = 20.1756. An error of .0044 minutes and a score of ZERO!

There is a large flaw in my discussion of correcting factors that must be addressed. The flaw is that it has been assume that the 10.2 mileage reading is 10.20 when in actuality it is some where from 10.20 up to 10.29. When my Navigator Mark Haas and I use the Gary Starr Program, the driver

estimated the 100th at the end of the Odo Leg. .01 mile is 52 feet 9.6 inches. Not much distance. I once owned a house that had a 50' front on the lot. You should pace off 50'. 17.5 paces at 3 feet per pace is 52 feet 6 inches. Most people take slightly less than 3' per pace, so go 19 paces. Look at it. Study it then use this to estimate .01 mile intervals. Another way is to have the driver watch the odometer so he/she gets used to seeing it click over. Then while ending the Odo Leg he/she should watch the odometer and estimate how close the next click is to happening. If the Odo is almost at 10.3 (lets say 10.29), then 10.09/10.29 = .9805636 and the corrected factor of 30 mph is 1.961 instead of 1.978. This difference will cause you an error of about .015 minute per mile or a score of 12 on an 8 mile leg.

IV. Using the Gary Starr System to its fullest potential: The system is a great system. Your goal should be to get scores of 0, 1 or 2 on each control. Buy a rally clock the times in 100th of a minute as opposed to seconds. Also, buy 2 10 digits single memory calculators. They are legal equipment in SCCA Stock Class. Below are 8 things that you should consider while using his system. The term **Hack** means a point at which the navigator compares his calculated time to the actual time of day and knows if the car is exactly on time, early and by how much or late and by how much. To take a Hack, the driver looks at the odo and tells the navigator, "Give me a Hack at 7.3" The navigator gets the time due at 7.3 miles. The driver says "Hack" when 7.3 flips up on the Odo. The Navigator hits the hold button on the clock and tells the driver how the car stands in relation to what is perfect time. Example:" You are down 5" meaning the car is .05 minute late at the Hack. Mark developed the habit of saying "Hack" when it was the TIME for the odo to flip to my requested mileage. Many times we would be both saying Hack at the same instant (meaning we were on exact time). In most cases, the navigator will not be able to see the odo. The driver must read the mileage to the navigator.

A. **Practice:** Before Mark and I went out on our first rally that we were going to use the Starr Program we practiced in two different ways. Mark studied the system and practiced on mock checkpoints. His practice included odo correction, set up to start a leg, mock traveling thru the leg, speed changes and pause times during the mock leg. The second way we practiced was by getting into my vehicle and running several controls of an old rally. If you don't have an old rally, drive out into the country and simulate a rally.
B. **Odo Correction:** OK, now you know the need to correct and how to correct your factors. At the end of the Odo Leg, both team members should get out a calculator and do official mileage/your odo reading. Agree on the 100th of a mile to be used. The Gary Starr method uses factors for each tenth of a mile so here is a quick and simple way to get the corrected factor for each tenth of a mile. **Agree on the decimal number that you got for correcting your mileage and both multiply it by 6 and store that number in their own calculator's memory. The navigator finds the first speed and both do: (MR divided by SPEED), and agreed on the corrected factor. The Navigator records it on his log sheet. Then both proceed to do all the corrected factors by doing (MR divided by SPEED) and the navigator records them on his log sheet.** You can go back to Section III of this booklet and use the information in the chart and this method. The corrected factor for 20 mph will be .2968 as a factor for a tenth of a mile Mark Haas developed this speed lined method for finding factors for tenths of miles. This doesn't take as long as you would think. Most rallies have less than 10 different speeds. The speeds are often repeated during a rally. You should be done in plenty of time. Also, the navigator should record the official mileage/ your odo reading decimal in case there is a new speed assigned at a control that has not been used in the RIs.
C. **Zero Tripometer at Each Restart:** Gary's system gives you the option of zeroing your odo or entering you odo reading. He uses the example of 36.4 miles. Here my dilemma with using the reading on the odo(in Garys example 36.4): It is really from 36.40 to 36.49. If you begin the leg and the odo flips to 36.5 in .05 mile and your CAST is 30 mph, you have an error of .10

minutes to start the control. I most definitely believe that zeroing your odometer at the start on the control is much more accurate (because a zeroed trip-odometer is really 0.00).

D. **Beginning a Control:** Since you are stopped at the start of each leg and must accelerate to the CAST it is difficult to be on time at the start of a Leg. Take a Hack at .3 mile and then again at .5 mile. Then more if you need them. Then takes Hacks every half mile thru the leg. When you think you are close to the control you can take Hacks every .1 mile.
E. **Turns and STOP signs:** Take a Hack as soon after turns and Stop Signs as possible. Slowing for turns and Stopping as required by law (haha) gets the car off time. Use as many Hacks as necessary to get back on time.
F. **Speed Changes:** The Starr Program requires the resetting of the calculator for a speed change. The calculator is zeroed out, and that information must be re-entered in the calculator. Mark made a log sheet to record that information so that he had it to re-enter. A lot of speed changes happen when turning. This is a double whammy. Take Hacks as soon as the navigator is ready. Take as many Hacks as necessary to get back on time. Mark was amazing at speed changes. He was ready for a Hack .2 mile after the speed change. MORE ON SPEED CHANGES: (Check back to this after reading the Program). At all speed changes, the navigator must change the speed factor in the memory to the new speed factor. To do this the current time-mile mileage has to be deleted. Example: 24.6870025 a time of 24.687 minutes at a mileage of 2.5. The navigator should record the 24.6870025 on the log sheet. Next enter the new speed factor and save it to the calculator's memory. Then re-enter the 24.6870025 into the calculator and begin by doing: (+ MR =) giving you 24.87500026. A time of 24.875 minutes at a mileage of 2.6.
G. **Manned Controls:** The Starr Program works great for manned controls. You should be able to get a Hack within .1 mile of the timing line. Adjust to the error or if on perfect time just drive the CAST speed to the timing line. Example: You Hack at 9.7 mile and are on time at 36 mph. The timing line is at 9.78 miles. The .08 mile difference will take .12 minutes to drive at 36 mph which is exactly the needed calculated time.
H. **Unmanned Controls also known as DIYC:** The System works great for DIYCs, but you need to help it out. Using the example from above: you hack at 9.7 miles and you are on time at 36 mph. The DIYC is at 9.78 miles. For a DIYC you slow down and stop at the timing line, thus taking more than .12 minutes from the Hack to the timing line. You have to adjust your time in because of this slowing and stopping. Additionally, you will not score well using a trip-odometer reading 9.7 when it is really 9.78. The Driver can maintain the CAST as long as possible and then the Navigator can put the clock on hold just after the car begins to stop. Also the driver should be watching the odo's flip to estimate the .01 mile as done with the odo check leg.

Conclusion: It takes practice and running rallies to master the Gary Starr System. The last 8 suggestions in the list above will lower, your average control score from 8 to 2. On an 8 control rally, which total score would you rather have, a 64 or a 16? Don't get discouraged. Try to improve each time you run a rally and before you know it a 4 on a control will be your worst score of the day!