

TUTORIAL FOR NOVICES III

What is a sports car rally? Well, one description is to say that it is an organized opportunity to drive your sports car around the countryside. Not too accurate a description in a day and age where more people show up in sport utility vehicles than in sports cars. Since most rallies are competitive events, another way of defining a rally would be to say that it is a way to compete in your car without speeding. Another would be to say that it is a way to compete with minimal risk of damage to your car.

As soon as the word “compete” enters into the definition it becomes necessary to develop a means to discriminate between competitors; i.e. there has to be a method of keeping score! This tutorial will only discuss scoring methods that involve some element of skill on the part of the competitors. I have broken these methods into two categories: 1) based on time error, and 2) based on finding objects/information along the course.

Of course, if you have never participated in a rally before, you are at a disadvantage competing against those of us who have. Therefore, we have a class for beginners called the Novice class. You are allowed to compete in this class until you win a rally, or until you feel like you are ready to move up (you are allowed to remain a novice for your entire first season). There are three more competitive classes to move up through. They are Class C which uses only pencil and paper to make calculations and is restricted to the stock odometer in the stock location, plus any time piece to keep themselves on time. Next is Class B which enhances the paper and pencil with any type of calculator (but not a computer), again with the stock odometer and any timepiece. Finally is Class A which allows computers, any type of odometers, etc. It’s essentially the unlimited class. (Rallies which do not use “time” as a means of scoring use the classes Novice and Experienced, where “Experienced” includes classes A through C.)

So, why might you want to participate in sports car rallies? Because it might take you to parts of the country that you didn’t even know existed. It will usually take you over roads that allow you to have fun driving your car in a way that you can’t experience driving on interstates and city streets. But most importantly, rallying hones many skills of value in driving and life, as well as offering an extremely challenging form of competition which pits you as firmly against yourself as against other competitors. Among these skills are:

1. The power of observation, as in finding landmarks and signs.
2. The ability to make rapid and accurate decisions using logic and your observations.
3. The ability to handle multiple pieces of information at the same time.
4. Finally, it requires that you learn to discipline yourself to work for a very precise and achievable goal.

The purpose of this tutorial is to provide the beginning rallyist with the fundamental rules and practices that are needed to successfully complete the event. It is divided into three parts:

1. Before the start.
2. Staying on course.
3. Staying on time.

BEFORE THE START

Before the start? Wait a minute! I've never been near a rally before. What can I do before the rally to be prepared?

Use the time between registration and the drivers meeting effectively. Read this section of the tutorial, follow its instructions, and follow them exactly as written because running a rally is a lot like running a computer program.

1. In order to stay on course, you have to understand the concept of the rally. "Concept" refers to the rules for staying on course and on time. These rules are explicitly stated in the General Instructions which you were given when you registered. Take the time to read the part of the General Instructions that explain the course following rules in particular, and then come back to the tutorial.
2. Having determined the concept of the rally, go to the section in the "Staying on Course" part of this tutorial that explains the processes that relate to this concept.
3. Make a list of questions that include anything that you do not understand. Ask them during the drivers meeting - ALL OF THEM, if somebody else doesn't. And speak up if you do not understand the answer that is given. Remember, the only stupid question is the one that does not get asked. Invariably it is the one that gets you lost.
4. Learn the basic arithmetic required to calculate your Odometer Correction Factor and how to calculate your odometer mileage that correlates with an Official Mileage. Depending on the concept, these calculations may be necessary for you to stay on course. In any case, they will be useful as a confirmation that you are doing things correctly.
5. Set your watch to the Official Time of Day (usually this will be the National Institute of Standards and Technology radio station WWV). If you decide to try to stay on time, note that the rally is scored in hundredths of a minute, and not the seconds that most watches display. There is a conversion table in the Appendix to this tutorial. If you are running "Seat of the Pants," learn how to use the odometer correction factor to calculate the corrected speedometer reading to stay on time.
6. Fill in your scorecard. Your names and your competition class are important!
7. Spend any remaining time reviewing the above and increasing your comprehension of the concept.
8. Before the next event, spend some time arranging your competitive work area (the cars cockpit) to improve your ability to communicate with each other, and keep track of the details. Consider setting up a mechanism for posting the course following priorities where the driver can read them at any time. Consider setting up a mechanism for posting the numbered route instructions (NRI's) so that they can be read by the driver at any time. Get a selection of different colored hi-lighters for marking important information on the NRI's.

STAYING ON COURSE

You can not win if you do not finish. You probably will not finish if you do not stay on course. Therefore, the most important thing for you to concentrate on in your first rally is Staying On Course. In order to stay on course you have to properly apply the Course Following Rules for the particular event. We are going to study several different concepts for organizing a rally and attempt to explain them clearly so that you have fun following the course.

Most rallies have a defined course which means that there is only one correct way to follow the course. Later we will describe a concept where the competitors get to choose their own course.

DEFINED COURSE RALLYS (Touring type or Course type)

How do defined course rallies work? The defined course rally uses a set of Numbered Route Instructions (NRI), Special Instructions, and General Instructions that direct the competitor from a known location A to some unknown location B. In fact, most rallies have more than one unknown location B. When you find the first location B, it becomes the location A for the next unknown location B, and so on until you complete the entire course. Each course section A-B is called a “leg” which is a term borrowed from sailing where a boat sets out on a compass heading at point A, continues to a point B where it sets a new heading. Each heading defines a leg. (Airplanes do the same thing, but sailing was first.) In general, sports car rallies define the endpoints of legs as “Controls.” “Open Controls” are a place where every competitor stops and gets a new start time for the next leg. This promotes safety because it means that the competitor does not carry an error into the next leg (usually being late) and therefore he doesn’t have to speed through the next leg in an effort to get back on time. It also makes it easier for the organizers to score the event. “Closed Controls” are locations that are generally hidden from view and are used where there is no safe place to stop.

TOURING RALLYS

Touring rallies are the simplest from a route following standpoint. They are required to give you an instruction for **every** intersection or action that you are required to perform. In August, the touring rally used 126 NRI’s for a 125 mile route, an average of about 1 mile between instructions. They may be scored by finding various landmarks along the route and answering questions about them, or they may be scored on time error, or they may be scored on a combination of both.

COURSE RALLYS

Course rallies, on the other hand, are the most difficult from a route following standpoint. Course rallies generally provide you with a minimum number of NRI’s. Course rallies rely on General and Special Instructions for the apparent lack of instructions. The November course rally used 43 NRI’s for an 80 mile route, an average of nearly two miles between instructions. However, there was one location where the separation between NRI’s was seven and a half miles, a real confidence tester also called a sweat leg. Course rallies may be scored by finding various landmarks along the route and answering questions about them, or they may be scored on time error, or they may be scored on a combination of both.

NON-DEFINED COURSE RALLYS (Map type)

How do non-defined course rallies work? On a Map rally the competitor is given a map of an area with a number of locations marked. You are generally given a list of questions that you can only answer by going to the locations. Scoring is usually by some combination of correct answers and minimum total miles driven. It is up to you to determine the actual route that you use. This type of rally will not be discussed further in this tutorial because there isn't a whole lot more to say.

INSTRUCTIONS

Instructions are meant to LEAD, not to MISLEAD. However, depending on the concept of the rally, they may be intended to challenge you (sometimes challenge you a great deal). You have to follow them exactly to get to the end (computer programmers should understand this). This means that you have to pay attention to the definitions of the words (see the Glossary for specific rally terms) that are commonly used in the instructions and be observant along the course to see the referenced objects so that you execute instructions at the intended location. I saw a bumper sticker once that said "Discover America, Get Lost On A Rally." We do not want you to get lost on a rally. That is why this document has been written. We want you to get started correctly. So here are the different categories of instructions:

GENERAL INSTRUCTIONS

These are instructions that establish the rules of the rally in two important matters: how the rally will be scored and how to stay on course if the numbered route instructions or special instructions do not apply at any particular location along the course. Sometimes, as in course (trap) rallies, they may even take precedence over the numbered route instructions. You absolutely have to understand the General Instructions and their relationship with the Numbered Route Instructions. Ask questions at the novice meeting!

NUMBERED ROUTE INSTRUCTIONS

Numbered Route Instructions (NRI's) are the printed sheet of directions that you use, along with the General Instructions, to follow the course. There are several points that you need to keep in mind.

1. Numbered route instructions must be executed in ascending numerical order. It isn't nice, and I think that it borders on misleading, but rallymasters have been known to deliberately put in an instruction that is out of sequence - such as the NRI's [25. L,] [27. R,] and [26. L.]
2. Only one numbered route instruction can be executed at any point on the course. Put another way, the higher numbered instruction must be executed at a higher mileage than the lower numbered instruction. Still another way of stating this is that two successive numbered instructions can not be executed at the same location or mileage. However, note that conditions could exist that would cause you to go in a circle and come back to the "same" location at a higher Official Mileage before executing another instruction. In this situation, you could legitimately execute two successive instructions

at the same “RXR” or even at the same landmark.

3. Numbered route instructions must be read critically. Just as the phrases “The dog bit Johnny” and “Johnny bit the dog” convey totally different meanings, the syntax of an NRI may have equally serious ramifications to your ability to remain on the correct route.

Example 1: Do the NRI [L. after Smith Road] and the NRI [L. after “Smith Road”] mean the same thing? You have to understand that the first refers to the physical object Smith Road, so you have to pass it by and turn left at the next opportunity. The second refers to a sign that identifies Smith Road (words contained in quotation marks refer to text on a sign), so depending on which side of Smith Road the sign appears on will determine whether you turn on Smith Road or the next opportunity.

Example 2: Do the NRI [L. after “No Peddling”] and the NRI [L. after “No Pedaling”] mean the same thing? Absolutely not! Spelling on signs must be exact. You may laugh, but this combination of signs used to occur going into some little burg over in Henry County. It got a lot of people.

Example 3: Do the NRI [R. at stop] and the NRI [R. at “Stop”] mean the same thing? As in example 1, they may or may not. The first instruction tells you to turn right at an intersection where you have to come to a stop. The second tells you to turn right after a sign that has the word “stop” on it. This could be a sign that says “Stop Ahead” or “Last stop for gas.” It is not unusual when entering towns on state highways to encounter a situation where there is an opportunity to turn between a “Stop Ahead” and the actual location of the stop.

Example 4: A specific example of reading signs critically is to anticipate the use of signs in a non-conventional manner. A standard highway sign is the double headed arrow “<—>” to mark a T intersection. It is usually put on the far side of the crossing road and you see it as you approach from the base of the T. However, it is parallel to your direction of travel if you are going across the top of the T and can be used as a reference sign telling you to take the side road. Subtle!

The above does not constitute a listing of all of the examples where the syntax of an instruction can cause you to get off the intended route, but these are the most commonly occurring. These are called traps, better known as “gotchas!”

SPECIAL INSTRUCTIONS

These are instructions that are given as part of the data at an open control. Special Instructions remain in effect until the next open control, at which point they automatically cancel. It is recommended that these instructions NOT be essential for finding the next open control because it is always possible that novice rallyists may miss the control where they are imposed, and therefore they will also miss the subsequent control. However, properly used, they may cause you to take a different course with a consequent different passage time than the competitors who miss them and still arrive at the same control, or at least some control.

Just another form of “gotcha!”

COMPOUND INSTRUCTIONS

Compound direction instructions are a particularly subtle and nasty form of trap. These instructions place more than one course following instruction on a single line. As with other instructions, these multiple requirements need to be executed at different mileages. If the General Instructions do not clearly state whether this type of instruction is used or not, ASK at the driver’s meeting. The way to ask is “Does this rally use compound direction instructions?” The rallymaster will answer “Yes” or “No.”

An example of a compound direction instruction is the NRI [Bear R.] which means that you “bear” (a turn of less than 90 degrees) and at the next opportunity you turn right. If the “bear” is to the left, you may recognize that you are dealing with a compound instruction, but if the bear is to the right it may slip right past you. On the other hand, you might pass the left opportunity and go on looking for an opportunity to “bear R.” Either way, it is another of those dreaded “gotchas!”

Another form of compound instruction is the NRI [R. CAST 32] which means that you turn right and at the same location change your average speed to 32 mph. Almost all timed rallies use this form of instruction. That is why the word “direction” is in the suggested question.

OVERLAPPING INSTRUCTIONS

Note the definitions of General Instructions and Special Instructions. General Instructions apply from the beginning to the end of the rally; i.e. they overlap all of the NRI’s. Special Instructions apply from one control to the next control; i.e. they overlap all of the NRI’s in that leg.

The direction following components of NRI’s are not allowed to overlap each other; i.e. it is necessary to execute all parts of an instruction before you start on the next NRI. This requirement can be utilized in some diabolical traps. CASTS are not direction following components, so they are allowed to overlap.

An example of this occurred on the November rally in which NRI [31. R. CAST 15 for 3/4 mile and then resume 33] created an overlap when you entered Control # 5 seven hundredths of a mile after executing the right turn. I tried to give a hint that you had not completed instruction 31 yet by NOT including a “next instruction” on the critique. However, I would have been technically correct in telling you that the “next instruction: 32” which probably would have caused many of you to think that you had completed instruction 31. This was a timing trap since Control # 6 was just down the road. Being really diabolical would have been to have Control # 6 inside the overlap.

REDUNDANT INSTRUCTIONS

Redundancy is a situation where an NRI instructs you to do the same thing that you should do anyway because a general or special instruction would take you the same direction.

Normal practice in rallying is to prohibit redundant instructions. In other words, if you find a location where this occurs, you execute the action of the general instruction and continue looking for a place to execute the NRI. There is one exception to this rule: where the NRI has an official mileage (OM) to the left of the instruction. The exception occurs because you must always execute such an NRI at (± 0.1) the indicated mileage. Example: On the November rally there was an NRI [13.43 16. L.] which you were required to execute somewhere between 13.33 and 13.53 miles. This instruction was included to ensure that all competitors went the correct direction because there was a road that went sort of straight ahead, but that really intersected only slightly after you started to turn left which placed it under the general instruction to proceed straight ahead (to finish the turn that you had already begun). Novices could easily have made a mistake here and the redundancy was used for clarification.

In order to make a turn at the exact mileage specified, it is necessary to have your odometer correction factor which is discussed under the heading “Odometer Calibration Zone” in the Section “Staying On Time.”

EVENT LOG (See form “Event _____”)

Creation of an event log is probably the most crucial factor in staying on course, and is absolutely the critical factor in getting back on course if you make a mistake, i.e. get lost. This particular form is one that a friend and I developed to guide us through ALL of the calculations to stay on time as well as on course. Novices do NOT need to use all of the columns, or even this form. If you do use this form, the critical data goes in columns one and three.

At **every** intersection, enter in column one the reason that you took the action. Examples would be that you executed NRI #, or that you executed a “Straight,” etc. Enter in column three your indicated odometer mileage estimated to the nearest hundredth of a mile.

That is all there is to it. If you get lost, you turn around and backtrack. Make sure that as you cross off each action in reverse that you note your indicated odometer mileage so that you can eliminate your off-course mileage.

When confronted with an official mileage that references some previous point on the course, you can refer to the log to get that mileage, and add the corrected incremental mileage to it to get your desired indicated odometer mileage. Relatively simple.

COURSE FOLLOWING

Remember that Course rallies are the most difficult from a route following standpoint. Course rallies generally provide you with a minimum number of NRI's. Course rallies rely on General and Special Instructions for the apparent lack of instructions.

As stated, General and/or Special Instructions can be substituted for NRI's. How this is done?

1. General instructions are rules that always apply and therefore should not need to be stated repeatedly. An example from everyday life is the requirement that you have to stop for a red

light. A more subtle example is the allowance to turn right at a red light except when posted otherwise. In the context of rallying, General Instructions are rules that apply for the duration of the rally route.

2. Special Instructions are exactly the same except that they only apply for a limited portion of the rally route.

So how do General Instructions and/or Special Instructions replace NRI's? The answer is through a concept called the Main Road Determinant. So what are Main Road Determinants?

MAIN ROAD DETERMINANTS (MRDs)

The basic concept here is that there is a rule or rules that enable you to determine a main road that you are to remain on until a NRI instructs you to leave it. The General Instructions for a Course Rally will state one or more methods of determining the main road at an intersection and an order (priority) for invoking the methods and the NRI's. A number of commonly invoked MRDs are described in the following paragraphs. Only spend time studying the ones that apply to this rally, and note that they are probably not presented here in the priority order that applies to this rally!

STRAIGHT AHEAD

The main road is always the road that is most directly ahead; i.e. it requires the least input from the steering wheel although it may require some input. An example might be an intersection where the road you are on intersects the second road at an angle that deviates significantly from 90 degrees, and does not cross the second road; i.e. a slant T.

LEFT AT [T] or RIGHT AT [T]

At an intersection that has the shape of a [T,] the main road always goes in the direction indicated. Note that an intersection can only be considered a [T] if the road you are on ends and you are required to choose between left and right.

In many cases, this MRD only applies if the turns to the left and right are substantially the same, but not always. An example would be a lazy [T] where the turn to the left is approximately 60 degrees and the turn to the right is approximately 120 degrees and the MRD is Left at T. You have to know if lazy [T's] count as true [T's] under the MRD, or if they count as Straight Ahead. You will note in this example that your actions would be opposite depending on the definitions. ASK QUESTIONS!!

PAVEMENT

The main road is the paved option. This one should be relatively easy to understand.

PROTECTION

The main road is the single road leaving the intersection that does not have a stop or yield sign, excluding the road on which you entered the intersection (don't turn around). This requires you to be able to identify protection signs by their shape. This should not be too hard because this is a standard requirement for obtaining a drivers licence. For some reason this is hard for novices to understand, particularly at an intersection where you are required to stop.

PAINTED LINES ON PAVEMENT

The main road is the one that has lines that are a continuation of the lines on the road you are on. Again, this should be pretty easy to understand.

BLACK ARROWS ON A YELLOW BACKGROUND

The main road goes in the direction of the arrow. Again, this should be pretty easy to understand.

PRIORITIES

So you have read the General Instructions and the relevant parts of this tutorial. How do you put it all together in a coherent procedure that enables you to stay on course? The answer is that you have to train yourself to utilize the priorities at **every** intersection. So how do you do that?

The answer is to post the priorities where the driver can read them easily. Then go down the list in order at every intersection. Act on the first one that applies.

Example: The November rally established the following priority order:

1. Right at T unless the numbered route instruction (NRI) specifically says [Left at T] or [L. at T] (Intersections where the angles obviously deviate from a right angle are not considered T's and priorities 2 through 4 become operative)
2. Execute a special instruction.
3. Execute the numbered route instruction (NRI) if the conditions have been met.
4. As straight ahead as possible.

As you approach each intersection, ask yourself "Am I approaching a T?" If the answer is no, go to priority 2.

If the answer is yes, ask yourself if it is really a T? If the answer is no, go to priority 2.

If the answer is yes, ask yourself if the NRI says [Left at T] or [L. At T]. If the answer is yes, execute the NRI. If the answer is no, execute priority 1.

If you did not execute priority 1 or an NRI, ask yourself if there are any special instructions in effect. If the answer is yes, ask yourself if it applies. If the answer is yes, execute priority 2. If the answer is no, go to priority 3.

Ask yourself whether the conditions of the NRI have been met. If the answer is yes, execute priority 3.

If the answer is no, ask yourself if there is an opportunity to proceed in a generally straight ahead direction. If the answer is yes, execute priority 4.

If the answer is no, proceed to the next section to recover from an off course excursion.

The above is a verbal illustration a process which in computer programming is called a flow chart. It is necessary for you to develop an appropriate flow chart for each rally that you run based on the criteria of that events General Instructions (course following priorities).

RECOVERING FROM AN OFF-COURSE EXCURSION

If you have been keeping a log this should not be too painful. If you have not been keeping a log it may be very painful. See the section on keeping an Event Log.

Turn around in a safe manner, note your mileage, and proceed back the way that you came. At each intersection refer to your log to determine what you did coming out (for instance, if you turned right at T, you will now have to make a left). Continue in this manner until you reach a point where you are sure that you were on course. Are you really sure? If yes, then turn around and try the course again.

OTHER HELPFUL COMMENTS ABOUT STAYING ON COURSE

It is important that you read ahead at least one instruction so that you do not get caught by something similar to the following example.

The search for the conditions of the next instruction begins at the instant that you complete the current instruction. It is great fun to give you NRI's like [32. R], [33. R after third "40"] and have the first "40" less than a car length from the execution point for instruction 32. The navigator is busy writing down the execution mileage for 32 and the driver is busy reading instruction 33. There is a high probability that both miss the first sign. This only works if the rallymaster closes the trap using the fourth "40" because that is where most of the cars are going to turn.

The previous paragraph emphasized that you have to be looking for the conditions of the next NRI as soon as the current NRI is complete. You have to know when an NRI is complete, which is technically easy for the simple instruction [R].

A more difficult example of knowing when the current instruction is complete occurs with the use of the terms Onto, On, or Follow in an NRI.

ONTO

This is the ultimate nasty! This instruction is invoked by use of the word [onto] and a name or number for the new road in the NRI. (For example: Onto State Road 36)

[Onto] has the effect of imposing a NEW and temporary MRD at the first priority level. (i.e.: Get on this road and stay on it until I tell you to get off).

This new MRD remains in effect until:

1. YOU HAVE OVER-RIDDEN one of the General MRD's (at which point you can start looking for the next NRI) and
2. YOU EXECUTE the next NRI (i.e.: only an NRI can take you off the named road - not one of the General MRD's - because you don't go back to them until you get OFF of the ONTO), or
3. the road ends.

So, the completion point of the instruction (point at which you can start looking for the next instruction) is when you have violated one of the General MRD's.

Understand that? I didn't think so. Before introducing some examples that demonstrate the principles, let me emphasize that this is where you are likely to make use of your Event Log!

Example 1: The General Instructions have two MRD's; first to turn right at a "T" and second to proceed as straight ahead as possible. You encounter an NRI that instructs you to turn [R. Onto 1100N]. You do so and shortly come to a "T." You notice that on your left about 50 feet away there is a road that continues on the same compass heading that you are on, and that it is named 1100N. Because the "onto" overrode the General Instruction MRD's, you turn left at the "T" and immediately turn right to remain on 1100N. This is crucial because this condition occurs very frequently on county roads.

Example 2: This one is from the Sept. 99 rally: There were MRD's for "T" intersections and also for straight ahead. On the second leg of the rally you executed an NRI [L.] which happened to put you on State Road 267. At the next intersection, SR267 turned right, and the conditions of the next NRI had not been fulfilled. Therefore, you invoked the MRD to go straight ahead and leave SR267. Eventually you came to another control that happened to be at the same location as the previous one. You left that control executing the same sequence of instructions as on the second leg, except that this time the NRI was [L. onto SR267]. Do you understand that this time you turn right to stay on SR267 instead of proceeding straight?

ON

Sometimes used in the same manner as “Onto.” If the General Instructions do not clarify the use of this term, ASK! It could be important.

FOLLOW

Means the same as “Onto” but I think it is a little more intuitive for novices. This is because the NRI [L. and follow SR267] seems more like a specific instruction.

Stay alert. Run your own rally. In particular, do not pay attention to other rally cars that you see going across your route, or worse, going the other way. You are probably both on course, just at different places in the instruction sequence. (That just happens to be another way that a rallymaster can play with your mind.)

And finally, NEVER attempt to second guess the rallymaster. Do exactly what the printed instructions tell you to do. No more, no less.

STAYING ON TIME

An old saying in the sport of rallying is “A driver can only lose a rally, the navigator has the power to either win it or to lose it.” This emphasizes the critical role that the navigator plays as the person who does the mathematical calculations necessary to be on time. So let’s discuss the reasons for, and the methods of, doing these calculations.

By using the forms “Common Data and Calculations” and “Event _____” we will learn how to stay on time. These are not copyrighted, so keep at least one clean copy of each and copy to your hearts content for use on future events. It is your instructor’s opinion that these forms are legal in Class C. They are paper after all, so if you add no more than a pencil or pen, you technically meet the definition as given in the rules.

The first form is titled “Common Data and Calculations.” The purpose of this form is to provide all of the necessary formulas that you will need to run a rally. You do not need to remember them, although eventually you just will if you run many events. If you run events only occasionally, this form will be your lifesaver.

GENERIC TIME CALCULATIONS

The first question from most novices is: Why do I have to do any calculations? We go back to that first definition of a rally; i.e. to go from point A to point B and be exactly on time when we do not know either where point B is, or what route we are taking to get there. To be on time, we have to know what time we start (1), what speed we run (2), and how far it is (3). The rallymaster gives you the first two inputs, and it becomes your task to measure the third. The general equation for the end time is: Arrival time at “B” equals Start time at “A” plus the distance from “A” to “B” times speed expressed as minutes per mile, or mathematically;

$$t_B = t_A + (M_B - M_A)(m/M)$$

There is a new concept introduced here; i.e. expressing speed, which we are given as miles per hour, in a different form known as minutes per mile. This is just an algebraic rearrangement. Thirty miles per hour is the same as thirty miles per sixty minutes.

$$30 \text{ Miles/hour} = 30 \text{ Miles}/60 \text{ minutes} = 1 \text{ Mile}/2 \text{ minutes}$$

Flip this over and you have the term (m/M) in the equation. The problem for you is that this equation is only true, in general, for the rallymaster’s car. Normally, your $(M_B - M_A)$ will be different than his, and therefore, so will your calculated value for t_B . This means that you have failed to arrive exactly on time, and you incur a penalty. So how do you keep from getting penalized?

You have to calculate your Odometer Correction Factor as described below so that you are using Official Miles in your calculations.

ODOMETER CALIBRATION ZONE

Any event that is scored on the basis of time, or which uses mileages as part of the NRI's, begins with a leg identified as the Odometer Check Zone (OCZ). This is a precisely defined point "A" to point "B" where the rallymaster tells you his $(M_B - M_A)$. It would be fortunate if you got the same mileage measurement as the rallymaster for the odometer check zone, but it would be pretty much an accident. Differences in tire construction, tire pressure, tire size, wheel size, and how worn each of your tires are will contribute to the resulting measurement. Thank goodness there is a simple mathematical constant "CF" (Correction Factor) which relates your measured mileage to the rallymasters' measured mileage. It is a vital component of every calculation that you will make. So how do you figure it out? See form "Common Data and Calculations"

1. Start by entering your beginning odometer reading on the indicated line to the nearest hundredth of a mile (guess, you can not be off more than 5 hundredths; half a tenth). Most cars have a trip odometer, and most people zero it at the beginning of the odometer check zone. This may not be the most accurate way to run however, because many trip odometers do not start registering immediately after being reset. I have seen them take as much as a whole tenth of a mile, but a couple of hundredths is common. (Cars equipped with electronic odometers have a different problem. They do zero instantly, but you can not estimate hundredths of a mile very accurately because you can't see a "rolling odometer".) Many events will officially zero at the beginning of each leg. Rallymasters that zero at every control can introduce a significant error in their own measurements if they are not aware of their odometer's actual performance, which then compounds with the errors in the competitors' odometers. Therefore, it is best to zero before you get to the start line so that you have a non zero entry on this line of the form.
2. Enter your indicated mileage at the end of the odometer check zone on the indicated line. Do the subtraction to get your actual traveled mileage.

There are two ways to calculate the Correction Factor (CF). The method shown on this form is the preferred method if you are intending to do TIME calculations because you can multiply the time factor by it and then directly multiply by your indicated incremental mileages to get the interval time. This way you only do the multiplication once for each CAST (Change Average Speed To). In fact, you can get most of these calculations done at the end of the Odometer Check Zone. This form of the Correction Factor (CF) is obtained by dividing the rallymasters' stated mileage by your mileage as shown by the formula. You can check the accuracy of the formula using logic. If you run more miles than the rallymaster, then the factor has to be less than one, so that when it is multiplied times your mileage it will equal the rallymasters' mileage, which is what the formula says.

The second method may be more advantageous for novices who are **only** intending to use it to stay on course. This method inverts the formula; i.e. divide your mileage by the rallymasters' mileage. Now, if an NRI references an official mileage, multiply that mileage by this form of the CF to directly get the mileage that you will read on your odometer when you get to the location to execute the NRI. Be careful here. Sometimes the official mileage will be stated from some previous instruction rather than from the beginning of the leg or rally. To get this correct, you have to have an event log. You need to understand that if the mileage appears to the left of the NRI number, it is a cumulative

mileage from the most recent official zero (If there is a significant probability that competitors may bypass one or more controls, then this is another reason for rallymasters to not zero at controls). If the mileage appears as part of the NRI, it is an incremental mileage from the previous, or referenced, NRI.

CORRECTED TIME CALCULATIONS

There are two ways that you can use the correction factor to arrive at the correct time at point “B.”

1. The simplest to understand is to multiply each measured increment of mileage times the correction factor to get the rallymasters’ mileage. This restates the generalized equation as:

$$t_B = t_A + [(CF)(M_B - M_A)](m/M)$$

The problem with this is that you have to specifically apply the correction factor every time that you make a calculation, which is cumbersome at best.

2. The second method is to associate the correction factor with the speed factor so that you only do the multiplication when you change speed. This restates the generalized equation as:

$$t_B = t_A + (M_B - M_A)[(CF)(m/M)]$$

This second method is the one that is used in the forms that are attached to this document. So let’s go to the forms and explain how it works.

On the Common Data form you are given a blank table that you can fill in. Most rally route instructions include a term CAST followed by a number as a part of occasional individual instructions. The term CAST is an acronym for “Change Average Speed To” the number which follows (CAST 33 means to change your average speed to 33 miles per hour, for instance). This means that you can anticipate the changes and calculate your new minutes per mile in advance. (Many of us start the rally as soon as we are handed the route instructions, drive the maximum legal speed to the end of the odometer check zone, and use the extra time to do as many of these advance calculations as possible.) If the navigator has taken advantage of the drive time, the first two columns are filled in by the time you get to the end point of the check zone, and he can start calculating immediately.

The formulas given on the form are for the square bracketed term in the equation above. You can get by quite nicely if you only fill in the next two columns. Column 3 is your corrected speed in miles per hour and is useful for the driver. It enables him to do a better job of staying close to the correct time. Column 4 is the minutes per your indicated miles. It means that all you have to do is one simple subtraction and one simple multiplication to get the incremental time for that incremental mileage.

Now let's go on to the "Event _____" form and use all of this data. Use of the first and third columns have already been described under the heading of Event Log in the Staying On Course section.

When you get good at being a navigator, you will learn to glance at the clock and enter that reading in column two. (Initially, the advice is to only make a serious effort to do this at the timing line of controls. That is so that you can compare the time you noted with the time that the control gives you. This could be important. They are human too, and occasionally mistakes happen...usually when another team follows you into the control and is faster getting out of their car than you are and checks in before you.)

If you look closely at the Event Log form, you will notice the prompts for the calculations are included in the first three lines. Column four is $(M_B - M_A)$. Column five is minutes per (your) mile. The entry in this column usually repeats for several lines, so it should start to become obvious why we suggest that you include CF as an integral part of this term. Column six is the product of columns four and five. The form prompts you to add this number to the preceding number in column seven and enter the result in the next blank space in column seven. (If you got a number in column two, you can subtract column seven from column two to determine your error at that particular point on the course. Again, novices should not worry too much about this. Even at controls this may not be very relevant because you may have been off course without knowing it. If that happens, you will have an error that does not show up in the difference between columns two and seven. More about that when we cover the scorecard that you carry with you.)

ADVANCED "ON TIME" METHODS

Return to Common Data form and the table for a moment. Column five will become useful for Class B rallyists because they are trying to stay closer to perfect time. This factor will make it easier for them to check how early or late they are by giving them a half mile increment. Really good Class B rallyists may even want to try column six which gives them an increment for every two tenths of a mile. Note that to do this the driver has to be aware of the odometer and call out the marks at the appropriate intervals. Doing this reduces his ability to watch the course for the landmarks and signs referenced in the instructions, so do not attempt this until you get really good. (An additional caveat is that if the driver misses a mark, the navigator is automatically off by the time increment.) For the record, the team using column six will be updating calculations every 14 seconds at a CAST of 50, and every 24 seconds at a CAST of 30. That is often!!!

TSD SCORING

The last form that you need to work with is the Official Scorecard that is issued to every team at the beginning of the event. This is the only form that gets turned in. For that reason, it is critically important that you enter your car number, your class, and your names. How about doing that right now, before you forget.

Start filling out the scoring portion by entering your start time in the column marked leg 1. Note that it goes on the second line. This is because most of us are most accustomed to doing subtraction with the smaller number under the larger. It is logical to expect that the end time (i.e. point "B") will be higher than the start time, so it goes on the first line. The end time is entered on your scorecard by

the control crew at an “open control.” The control crew will also enter your start time for the next leg. Pay attention to what gets entered. I once competed in a rally where the crew gave everybody an out time that was five minutes greater than their in time (usually it is about two or three minutes). The next check point was only a bit over one minute down the road (but nicely out of sight) and there were a number of inattentive teams that arrived before they were supposed to have left the previous control. This struck me as a delightfully devious trap because we got a zero on the leg. I probably would have had a different opinion if I had gotten caught. It was perfectly legal. There was nothing misleading.

So the control team has entered your end time. You should check that time against the time that you wrote down on the log for your actual arrival time (column two)(You did remember to look, right?). If there is a significant difference, you should verify your watch against the control watch. If that does not explain the error, you should ask if there is any chance that they wrote down the wrong time on your card. You might have to ask for a new out time because this might take more time than you were given, and there is no point starting the next leg in the hole.

CRITIQUE SLIPS

Each control will give you a piece of paper called a “critique slip” that will give you several critical pieces of information. The most important is to identify the next numbered route instruction that you are expected to execute. You might question why this would be given, or why it would be important if you think that you are on course. You may have bought one of the rallymasters’ traps and actually be out of the correct sequence without being aware of it. The next most important information may consist of several items. One may be the imposition of new special instructions. Very common is to throw in a CAST, which if you do not do it will guarantee a significant error at the next control. Finally, there will be the details of the previous leg including the Official Time that you need to enter on line four of the scorecard, and a detailed description of any traps included in the leg and their expected impact on your score.

If you have time before you start the next leg, there are two subtractions that can be done on the scorecard. Line one minus line two gives your actual drive time on line three. Line three minus line four gives your error in minutes. We don’t care whether you are early (negative difference) or late (positive difference). Error is absolute. You get a one point penalty for every hundredth of a minute error, so multiply line five by 100 and enter the result on line six.

If you did something naughty coming into the control, the crew might assess a special penalty and enter that on line seven. These penalties generally fall into two categories: safety issues and timing issues. A safety issue could be speeding into the checkpoint which might endanger other competitors. A timing issue might be running fast and stopping ahead of the control until it is time to arrive. The latter is considered to not be in the spirit of the sport, and always has the potential of creating a safety hazard with other cars having to pass to get into the control. All possible penalties will be fully explained in the event’s general instructions. If it does not say anything about them, then there are none for the event.

Finally, enter the sum of lines six and seven on line eight. This is your score for the leg. Zero is the perfect score and the ideal that we all strive for. Class A rallyists generally run in the 0 - 2 points range unless they buy a trap. Class B rallyists generally run in the 5 -25 point range with occasional

zeros. Class C rallyists usually run higher numbers, but there are some who will challenge the B numbers seriously. When you start getting down into the lower numbers for your class you are ready to jump into a higher class, or even try the Divisional and National series events.