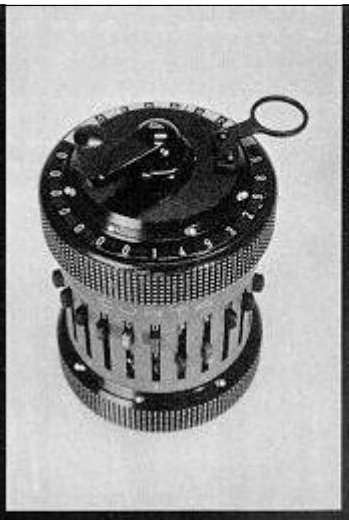
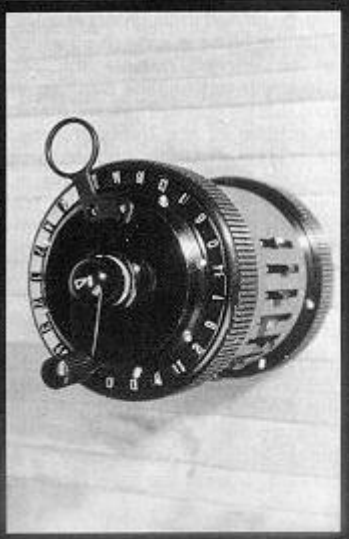
CURTA CALCULATOR

by Jim Bianchi





Photos by Tom Keener

The modern rally navigtor is faced with many factors to juggle in an often changing and challenging situation. Outside of route-following, of course, three of these factors are time, speed and distance. Of these three, the navigator has control over, or an acceptable means of measuring two: speed and time.

The mileage (distance) is something which is questionable due to the difference between the odometer used to lay out the rally, and the odometer used to run the event. Many methods — some simple, others overly complicated — have been devised to cope with this situation. Among them are systems using multiple timers, twin odometers, factor cards, slide rules and the like, often supplemented by the good old "pencil-and-paper" method.

While these systems may be useful in SCCA Class C and Class B types of rallys, one system which avoids the pitfalls of complexity to which the others fall prey is that involving the ubiquitous CURTA calculator.

The problem of compensating for the odometer is nicely taken care of by use of the "large" CURTA (model 11). This model has the capacity to show running time, theoretical (or rally) miles and the actual (or indicated) mileage.

The rally can be run with a minimum of equipment: a timer, reading in 1/100ths of a minute; an odometer reading, preferably, in 1/100ths of a mile; a set of factor cards giving the results of the equation "Minutes per Mile= 60/MPH" to four places for all the speeds that the rally will be run; and, of course, the CURTA itself.

Dual odometers are a nice touch especially in situations where recovery is being attempted from an off-course excursion, but they are not really necessary. Likewise two timers, again a nice touch at controls and speed change points, aren't really needed. In fact, a stopwatch is not really necessary: a good chrono with a 1/100ths minute reading bezel will do the job.

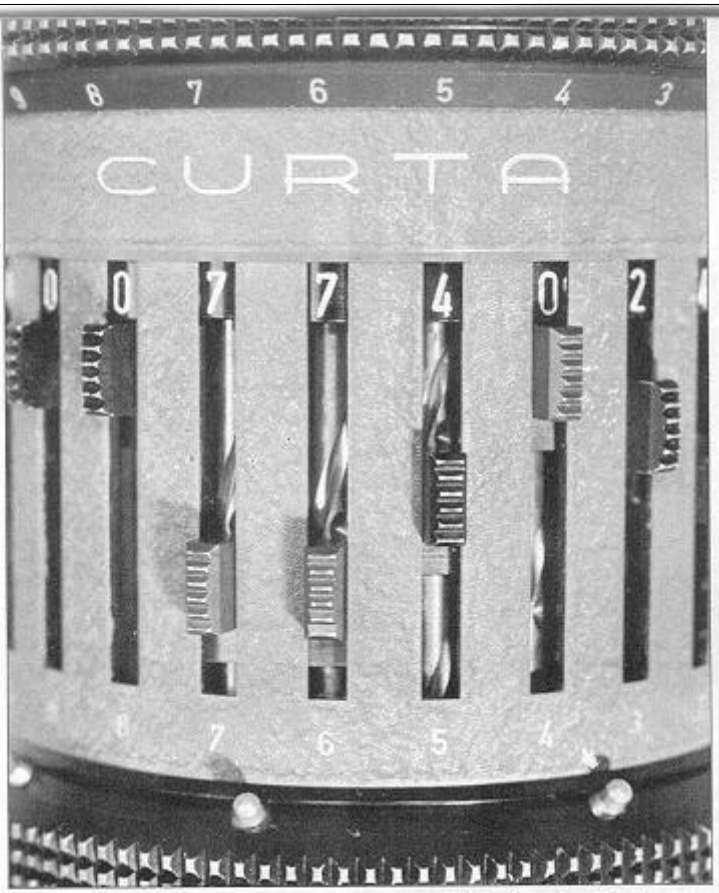
The CURTA is a decimal calculator. For this reason, it doesn't work too well with odd checks over ten miles.

The CURTA has a setting register, a counting register and an indicating register. Also inscribed on the front of the instrument are the digits 1 — 15, representing the carriage position. For most rally calculations, the carriage will be in either position number 4, 3, 2, or 1. In terms of rally miles (which are accumulated on the count register) these positions represent tens, units, tenths and hundredths of rally miles, respectively.

The decimal minutes-per-mile are inputed using the rightmost four places of the setting register (numbered, coincidently enough, 1 — 4). This results in digits 1 — 7 containing the time, expressed in decimal minutes, leaving digit number 8 to be used for the number of hours. (Since the number of minutes in each hour equals 60, this does not lend itself to decimal manipulation.)

The increased capacity of the larger CURTA model is large enough to allow simultaneous accumulation of both the indicated and the rally mileage, thereby negating the necessity for having factor cards and tables.

Since both indicated milages are displayed in relation to each other, along with the time for traversing



The businesslike design of the CURTA is pure: "form from function."

such a distance at the given average speed, it only becomes necessary to keep the vehicle 1) on course and 2) on time. The former can only be gained through experience, while the latter is something which can be learned outside the car.

In order to keep the two figures from interfering with each other in the middle of the indicating reg., the mileage should be kept to three figures when inputed. This figure, which is the number of miles traveled by the rally car in the ten-mile check distance, is put into the left-most three digits of setting reg. (those numbered 11, 10 & 9).

The initial per-mile factor should be set into the far right of the setting reg., and with the carriage position on 4, give the crank a turn to find out the time that you should arrive at the 10-mile point. Once this time has been noted, clear both registers, leaving the time factor in the setting register for use when the ten-mile point has been reached and the amount of indicated mileage has been noted and placed into the other end of the setting register. Once this figure has been determined and placed into the setting register, it should not be removed for the duration of the event. As previously stated, this factor should be in three figures: X.XX if the distance shown at the end of the ten-mile point is less than ten, XX.X if it isn't.

If the average speed changes at the ten-mile point, the new time factor can be cranked in after the old one is inputed.

The price of a new CURTA 11 is upwards of $185. While their use has been superseded among field engineers (the original market for which they were made) in favor of the newer hand-held electronic calculators, and their manufacture discontinued, they are still available new. However, used ones can be obtained for much much less than the asking price. Recently, I advertised to buy one in a small sports car club newspaper. Within a week, three of them were offered to me at prices ranging from $95. – $120. So they can be still had at a reasonable price. In my estimation, the extra cost of the CURTA II over the CURTA 1 is justified by the increased capacity of the larger machine and the ease with which it deals with the rally problem.

There remains a few more things to consider when navigating with the CURTA. These are: "pause" (add) times; speed changes; action at a checkpoint; and the inevitable off-course excursion.

The pause instruction is normally encountered in two ways: The instruction which states that you must pause for a specified amount of time at a specified location; and the instruction (usually a NOTE) which tells you to pause a certain amount of time at regularly given intervals (as: Pause 30 seconds at each "STOP" sign). The fact that the instruction reads "lose (or whatever). . ." is quite irrelevant. The net effect is to add to the running time for that leg. The only way you can "lose" running time is to increase the average speed.

With this in mind, the procedure is simplicity itself. It only becomes necessary to translate whatever time you have been istructed to pause into decimal minutes and add it to the accumulated running time in the indicator reg.

This can be done very easily by removing the time and distance factors from the slides and with the slides zero'd, give the crank a turn. This will increase the number in the count reg. by 1 (in whatever position the carriage is in). Then place the carriage reverse slide in the lower (subtract) position, place the time (in decimal minutes) to be added in the slides, and give the crank a whirl. This will have the effect of SUBTRACTING the extraneous 1 from the count register, while ADDING the time to the indicating register. (Don't forget to return the carriage reverse lever to

its normal position.)

When this maneuver is complete, insert again the mileage and speed factors into the setting register, and you will have the proper time, rally and indicated mileage once more. This procedure is used whenever an instruction isencountered which tells you to "lose," "pause" or "add" time.

Changes of average speed are obtained this way: At the action point, according to the rally mileage on the count register, change the slides to reflect the new minutes-per-mile figure of the average speed to be changed to. The position of the carriage is unimportant, except that it should be in position 1, 2, 3, or 4. Also, it is important to do this only when the action point (in terms of rally miles as given on the count register) has been reached.

Action at a checkpoint depends upon what technique the rally personnel are following. They can either have the time IN be the same as the time OUT or they can have the time out be later than the time in. How to handle this situation depends to a degree upon just how you are navigating the rally. If you are using a system which calls for treating the rally as just one leg (supercumulative) and are running on time-of-day instead of elapsed time, you can just add the time spent in the checkpoint to your calculations, much as you would a "pause" instruction.

If, however, you are running on a leg-to-leg basis, simply zero the registers (after making a written note of the information) and, keeping the mileage factor in the left-hand set of slides, insert the new average speed factor (if there is a new one), zero your timer (or pre-set the leaving time-of-day in the indicating register) and go!

If the checkpoint is run on the basis of the IN time being the same as the OUT time, just treat it as you would any delay in traffic: Try to make up the lost time as quickly as possible.

The off-course excursion presents a unique set of problems, as there are many ways of recovering from it. You can return to the point from which you went astray, using the same route; or you can rejoin the rally upstream a way, after taking a "short cut." This (the off-course excursion) is where dual odometers can make themselves worth the cost.

In the first case, when you realize you're definitely off course, switch to the other odo and record your mileage back to where you left the course. Assuming that the mileage on the first odometer agreed with that shown on the indicating register when the error was first discovered, you turned around and started back (switching on the other odo). Twice this mileage (shown on the second odo) subtracted from the rally mileage (on the count register) will put you back on course. The technique for this subtraction is to remove the mileage factor from the slides (leaving the time factor in) then, lifting the crank to subtract position, take out of the count register twice the mileage of this second odometer. This will result in the various registers showing: 1) the theoretical (rally) mileage (in the count register); and 2) the present odo reading (in the left portion of the indicating register) the time you should show on your watch. It only remains for you to make this time match "real time" before running into a control. Good luck.

> Reports of the demise of the Curta calculator at the hands of certain electronic computers may be premature. When used by a capable and proficient crew, the ol' pepper mill can still hold its own.

When recovering from this situation, don't try to remove twice the mileage from the indicated miles in the indicating register. This figure should reflect at all times the actual mileage as shown on your odo. As most odo's show a marked aversion to being turned backwards this should be self-evident. Also, the time is a figure that should not be tampered with in this situation. The theoretical time is based upon the rally miles as shown in the count register. It should operate in conjunction with these miles. It is up to the driver to keep the "real time" and the theoretical times in close synchronization.

The other situation encountered in an off-course excursion is the one rejoining the rally upstream a way at a point where you are unsure of the mileage between where you left the rally and where you rejoined it.

This problem calls for some good SOP work, some intelligent map reading, and not a little luck.

In this case, there is little that can be done with the CURTA, except to make an educated guess about how many of the rally miles have been lost by your little trek, possibly by obtaining a mileage check from a cooperative rally car found along the route, or by taking a time check on a known rally car sighted along the route that is known to have started behind you. It is in this dismal area that many rally teams fall down while others shine.

If you do manage to get some sort of a mileage check, you can zero the mileage factor slides and add or subtract from the count register until you have the "proper" rally mileage in it.

The thing to keep in mind is that the theoretical mileage as shown in the count register is that of the RM's car as he/she laid out the rally while that shown in the indicating register is the indicated (or actual) mileage and should agree with your odometer. The time is the variable to which you should always try to adhere.

About equipment: The scheme of navigation described here requires a minimum of equipment. While the initial outlay may be high — especially if you cannot obtain used items — it should pay for itself rapidly in terms of personal satisfaction as you grow more proficient at the rally game.

The only thing remaining is how to relate strange mileage distances to ten miles for use in the CURTA. This can be done by dividing the indicated (actual) distance by one-tenth of the check distance. For instance: The check distance is 15 miles. Divide the indicated mileage at the point by

1.5). This method should produce a close enough approximation to serve. Because the mileage used for the check distance gets larger, this system breaks down somewhat unless the information entered in the setting register is carried to three places (X.XXX). This will only interfere with the count of the elapsed hours, so if you expect the rally in which you are entering to be one in which the distance of the odometer check will require this type of manipulation and that it will run significantly over one hour, the navigator should make provisions for entering this information on the log sheet.

The method I use to account for hours is to zero the slides when it is noted that the minutes are reading over 60, subtract 60 from the minute column, zero the slides once again and, inserting a 1 in column 8, giving the crank a turn in the add position. This will restore the count register to its proper reading and will result in a 1 being added to column 8, indicating that the time is that many hours plus the following number of decimal minutes.

While this article was written for the beginner, it should be realized that the CURTA is a very flexible piece of equipment and lends itself to rally navigation in many ways.

CURTA MAINTENANCE: The CURTA is a precision instrument and, like all such, responds badly to poor treatment. Therefore, never attempt to remonstrate with your driverusing it as a blunt instrument. Far more satisfactory things exist for this purpose than the CURTA, which is easily damaged and jammed by the blood and bits of hair, flesh, etc., which oft-times are a by product of these outbursts.