

"PEPPERMILL" OPERATIONS

(15 Place Curta)

A Rallyists Guide for the Use and Operation of a Curta Calculator

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SECTION I - GENERAL

The Curta enables you to run an entire rally using only one watch and to negotiate any number of speed changes without resetting your odometer. Completely flexible, the Curta allows you to calculate ahead, and, if the need should arise, to reconstruct all or part of your previous computations. If, for example, you discover that you have changed speed at the wrong point, you can make the necessary corrections in a few seconds. A log should be kept to aid in this reconstruction and for comparison to the official log should the need arise. A sample log appears in [Figure 1](#).

This is an introduction to the uses of the Curta calculator as a rally computer. The features used in this respect are as follows: 1) zero arm, 2) add, subtract crank, 3) factor input slides, 4) mileage and time readouts, 5) carriage movement (moving the decimal point), and 6) reverse function button (used for repetitive subtraction (division)). (See [figures 2 and 3](#).)

To set up the Curta for rallying, move the "buttons" located on the base and the top ring of the Curta to mark the decimal point placement. On the base one should be placed between columns 11 and 10 (this marks the official mileage decimal point placement); one under column 7 (this indicates the dead column between the official mileage

factor and the corrected minutes per mile factor); one between columns 4 and 3 (to mark the decimal placement in your corrected minutes per mile factor). On the top ring of the Curta two can be placed: above the time readout section (black) between columns 13 and 12 (this places the decimal in the official mileage); and two between columns 6 and 5 (this places the decimal in the time readout); above the mileage section (silver) between columns 2 and 3 from the left edge (Curta facing forward) (this places the decimal in the mileage readout). Tape may also be placed in these positions to give immediate visual identity and avoid later confusion. Tape could be placed over column 7 thus rendering it unusable. Tape on the top ring can be placed between the actual digits. After completing this operation you are prepared to use your Curta calculator for rallying. All features are further described in detail.

Zero Arm

The hinged arm you see on the top ring of the Curta is the zero arm. During normal operation the catch on the arm should be engaged with the pin on the top ring of the Curta. It is hinged solely for the purpose of allowing the Curta to be put in its case. To operate the zero arm lift the carriage with thumb and index finger of your left hand and with right index finger inserted in the ring turn the zero arm clockwise. As you will notice this zeros the time and mileage readouts. The arm has two rest stops which are at the division points between the two readouts. Mileage section is silver and time is black. Ordinarily, when zeroing, the arm should be left at the rest directly before the time readout (black).

Add, Subtract Crank

Its operation is quite simple and is directly responsible for the mileage. Starting at its rest stop, one complete turn (in the clockwise direction) will add one digit for whatever position the carriage is in. (If you are in the #2 position you will add 0.1 mile to the mileage.) When at its rest stop, if the crank is pulled up it will be in its subtract mode of operation. (Notice the red ring that appears where the handle enters the carriage.) Now one complete turn (in the clockwise direction) will cause the Curta to subtract one digit from whatever carriage position you are presently set for (i.e., if in the #1 position, 0.01 mile will be subtracted).

NOTE

When adding or subtracting the crank should be stopped at its rest. Should you happen to go past the rest in either operation, continue one complete turn; reverse the operation (add or subtract) and make one more complete turn. This will correct the error made in going past the rest stop.

Factor Input Slides

Located on the side of the Curta are the factor input slides. The factors set in this section are multiplied by whatever carriage position is set (i.e., 0.01, 0.1, 1.0, 10.0) and the answer reads out on the time readout.

Example: 1 complete turn in the #2 carriage position (0.1 mile) will cause the time readout for a factor of 2.000 to be 0.20 minute.

$$\begin{array}{r} 2.000 - \text{min/mile factor} \\ \times 0.1 - \text{mileage run} \\ \hline 0.2000 - \text{time elapsed} \end{array}$$

If you have a factor inserted, operation of the crank will add the mileage chosen and the time taken to run that mileage with your present factor. If you desire to just add or subtract mileage, your factor should be 0.000. Adding or subtracting time alone will be covered later.

Mileage and Time Readouts

These readouts are located on the outside ring of the carriage top. When the Curta is held or mounted in the proper position (with the factor input slides facing the operator) the time readout section (black) will be near and facing the operator. The mileage readout section (silver) will be on the far side and facing away (upside down). With some practice you will become accustomed to reading the mileage upside down and not have to turn the Curta.

Carriage Movement (Moving the Decimal Point)

All that is required to shift the decimal point is to lift the carriage and turn the arrow (on the side of the Curta) to correspond with the number on the carriage, designating digits of mileage (i.e., #1 - 0.01, #2 - 0.1, #3 - 1.0, #4 - 10.0).

Reverse Function Button

This button, located to the right of the factor input slides, governs normal operation and repetitive subtraction (division). Its uses are discussed in detail in later sections.

SECTION II - INITIAL SET UP

You are car number 9 in a rally starting at 10:00 AM EST; you have just completed running the odometer check of 11.54 miles. (Your odometer reads 11.36(5) miles.) You were allotted 30 minutes to run the check and you are now sitting at the end of said odometer check determining your out time, your correction factor and setting up the Curta to start leg #1.

[Figure 4.](#) shows the Curta ready to start leg #1.

Correction Factor

You may find your correction factor by working a pencil and paper solution or by using the division feature of the Curta which is described fully under the section entitled Repetitive Subtraction (Division).

To obtain your factor for correcting minutes per mile (this is also the factor used to obtain official mileage), divide official mileage by your odometer reading.

Official Miles	11.540
----- or $O \div Y$	----- = $11.540 \div 11.365 =$
Example:	
1.015(3)	
Your Odo Miles	11.365

To obtain your factor for correcting average speed, divide your odometer reading by official mileage.

Your Odo Miles	11.365
----- or $Y \div O$	----- = $11.365 \div 11.540 =$
Example:	
0.984(8)	
Official Miles	11.540

Inputting Time

If you were using a stop watch time would start from zero. If you prefer a conventional time piece to a stop watch you can preinsert your starting time and have your readings in clock time. This is accomplished as follows: your time out is 10:00.00 plus your car number plus time allotted for the odometer check. This total, as in the example, is 10:39.00 so 10:39 is the time out you want to enter in the time readout of the Curta. Both time and mileage readouts should be zeroed leaving the zero arm in its rest stop in front of the time readout. Since minutes are all that is desired and not the hour, the 10 is dropped and a 3 is inserted into column 5 of the factor input slides and a 9 in column 4. Put the carriage in the #3 position (units) and turn the crank one turn in the add position. Looking at the readouts you will notice you now have 39.00 minutes and 1.00 mile.

Inputting Mileage

If you are using a resettable odometer mileage would start from zero. If you are running a non-zeroable odometer you will want to feed your mileage into the mileage readout. Since you desire 11.54 miles you need only add to the 1.00 mile already registered. This is done by first setting all factor input slides at zero thereby allowing you to just add mileage and not time. Shift to the #4 position (10.00 miles) and make 1 turn. Mileage is now 11.00. Next shift to the #2 position (0.1 mile) and make 5 turns. Mileage is now 11.50. Finally shift to the #1 position (0.01 mile) and make 4 turns. Mileage is now 11.54. (Note time is still 39.00 minutes.)

Inputting Factors

It is assumed you will be using corrected minutes per mile factors obtained from a book such as Norman Cone's Corrected Minutes Per Mile Factors or Stimson's Rallye Factors (also corrected). (A sample of Cone's factors is shown in [figure 5](#).)

Insert the factor for your initial speed into the factor input slides (4 through 1).

Using a fifteen place Curta, it is only practical to correct your odometer mileage while running and to keep a record of not only Time and Odo Mileage, but also of Official Mileage. To do this, put the minutes per mile correction factor into the left side of the factor input slides (slides 11 through 8). Your Curta will now show official mileage and time in the time readout and your mileage in the mileage readout thus eliminating the necessity of correcting the official mileage to agree with your odometer. Mileage turns can now be identified effortlessly. At each open checkpoint you can clear your odometer mileage and/or time from the Curta and still retain overall official mileage. Lastly, run to the next tenth mile. (Six turns would be required in this case; mileage will be 11.60.) Then shift to the tenth mile position (#2). You are now set to rally checking every tenth mile with each turn of the crank. Normal operation is to check your time every tenth mile. (One-tenth mile is desired at speeds below 35 MPH; two-tenths mile usually at speeds above 35 MPH.)

Repetitive Subtraction (Division)

This capability will be found very handy (once mastered) in determining your correction factor if you are running a non-adjustable odometer such as a Halda or stock odometer. If you are running an adjustable odometer, no correction factor is necessary. Your correction factor is obtained by dividing your mileage into the rallymaster's mileage. If, for instance, your mileage is 11.36(5) for an 11.54 mile odometer check, your correction factor would be $11.54 \div 11.36(5) = 1.015(4)$.

You may find your correction factor by working a paper and pencil solution or by using the division feature of the Curta which works as follows:

1. Set carriage to position #5 (arrow on Curta points to 5 on carriage).
2. Set factor input slides for official mileage (11.54).
3. Turn crank 1 turn to enter official mileage.
4. Zero mileage readout only.
5. Set factor slides for your odometer mileage (11.36(5)).
6. Set the reverse function button "down".
7. Lift crank to the subtract position.
8. Crank until 9s appear on all digits to the left of the official mileage.
9. Reposition crank to the add position and make one more turn.

10. Move carriage to position #4 and repeat steps 7 - 9 moving the carriage one digit to the left each time until the correction factor appears in the mileage readout (1.0154)= 1.015.
11. Three decimal places in the correction factor (obtained by rounding) is sufficient; the above operation is completed at this point.

SECTION III - ON THE ROAD

Speed Changes

To affect a speed change record your odometer reading at the speed change point; crank the Curta to the exact hundredth mile at your present factor; then change to your new factor and start running new checks.

Example: After leaving the odometer check at 30 MPH (2.030 min/mile) you are instructed to change average speed to 35 MPH at the stop sign of instruction #12. The mileage at the stop sign is 12.73. Since you are in the tenths (#2) position, you make each complete turn until your mileage reads 12.70. When this occurs, shift to the hundredths position by lifting the carriage and placing it in the #1 position. Make three turns; mileage is now 12.73. Put your factor for 35 MPH (1.740 min/mile) in place of 2.030 on the factor input slides; run to the next tenth (7 turns) and move the carriage back to the #2 position. You have just completed your speed change (time and mileage are both cumulative) and you are ready to continue checks at your new speed every tenth mile.

Add (Pause) or Subtract (Gain) Times in a Free Zone

Add (or subtract) times are accomplished by first clearing the minutes per mile factor input slides and entering the add (or subtract) time in minutes and decimal parts of minutes on the factor input slides. The carriage is then placed in the units digit (#3 position) and one complete turn is made with the crank in the appropriate add (or subtract) position. What you have just done is added (or subtracted) one mile and added (or subtracted) the time inserted on the factor input slides. Since you did not want to actually add (or subtract) the mile, clear the factor input slides and lift the crank to subtract (for add times or down for subtract times) and make one more complete turn. You will note that you have subtracted (or added) the mileage leaving the add time (or subtract time) you desired to add (or subtract) and the original mileage. Reinststate your original factor and continue making time checks.

Subtract times are accomplished exactly the same as add times with the exception that the desired time to be subtracted is subtracted first.

NOTE

The mileage and time that appear on the Curta before starting to add or subtract time should be noted before the operation is begun to insure when you are finished the mileage is the same as when you started and the proper amount of time is showing on the Curta.

Add (Pause) or Subtract (Gain) Times Not in a Free Zone

Because a checkpoint may be encountered, this add (or subtract) time must be handled as a CAS.

Problem: CAS 25. Add 1 minute in next 0.5 mile. (This CAS is the same as adding 2 minutes in 1 mile).

First, consider that 25 MPH = 2.4 minutes per mile; adding 1.00 minute in 0.5 mile is the same as adding 2.00 minutes in 1.0 mile. The distance (0.5 mile) must be traversed in 1.20 + 1.00 minutes; therefore, 2.20 minutes is the travel time for this 0.5 mile. The minutes per mile factor for 1.00 mile is 4.40 minutes. $60 \div 4.4$ minutes is 13.6363 miles per hour; your CAS for this 0.5 mile distance.

Answer: CAS to 13.6(363) MPH for 0.5 mile; then revert to 25 MPH.

Subtract times are handled the same way as add times only the time is subtracted from the minutes per mile factor.

Transit Zones

Example: Instruction #13 states, "Begin transit zone of 1.25 miles; take 15 minutes to complete this TZ".

You want to: 1) add the TZ time to your overall time, 2) add 1.25 official miles, and 3) add ? your miles.

This is accomplished by: 1) zeroing the minutes per mile factor input slides, 2) cranking in 1.25 official miles, and 3) adding the TZ time as if it were an add time.

When no distance is given, you must complete the TZ distance to know how many miles to crank in. Then, 1) zero minutes per mile factor input slides, 2) crank in your miles, and 3) handle the TZ time as an add time.

Off Course

Inevitably, sooner or later, every rallyist goes off course; the Curta will cope readily. If you are using a non-reversible odometer, when you turn around to retrace your route to the place where you left the course, note your odometer mileage and crank it into the mileage readout of the Curta. Lift the add/subtract crank to the subtract position, and set the reverse function button "down". When you reach the place where you went astray, again crank your odometer reading into the mileage readout. Return the crank to add and the reverse function button to its original position. The effect of this "double-negative" procedure is to add distance and subtract time so that when you get back on course the time readout will show the time you should have been there in the first place and the correct official mileage and the mileage readout will show total mileage. Your only problem now will be to make up the lost time.

If you are using a reversible odometer, simply reverse it where you turn around and "subtract out" your mileage until you are again on course. Put the Curta in its subtract mode and "crank out" the extra distance. Remember to put both the odometer and the Curta back to the add position when you have finished this operation.

Checkpoints (Open)

When you cross the timing line, record your mileage and time to complete your log for that leg. At the reference marker, compare your official mileage on the Curta with that on the slip, and make any necessary corrections to the Curta. Compare your odometer with your mileage on the Curta and make corrections if necessary to your odometer. Clear the time readout to start the next leg from zero time. Insert your out time if you plan to run from a time-of-day watch. Remember to crank the Curta up to the reference mileage and time before starting the next leg.

Quick-Cranking the Curta

Five turns of the add/subtract crank are the most that need be made in any decimal position when cranking the Curta. For example, the Curta reads 11.66 and you want it to read 12.45; you could make 9 cranks in position #1 and 7 cranks in position #2 or you could make 1 subtract crank in position #1, 2 subtract cranks in position #2 and 1 add crank in position #3 or 12 less cranks to get the same result.