Regularity Master
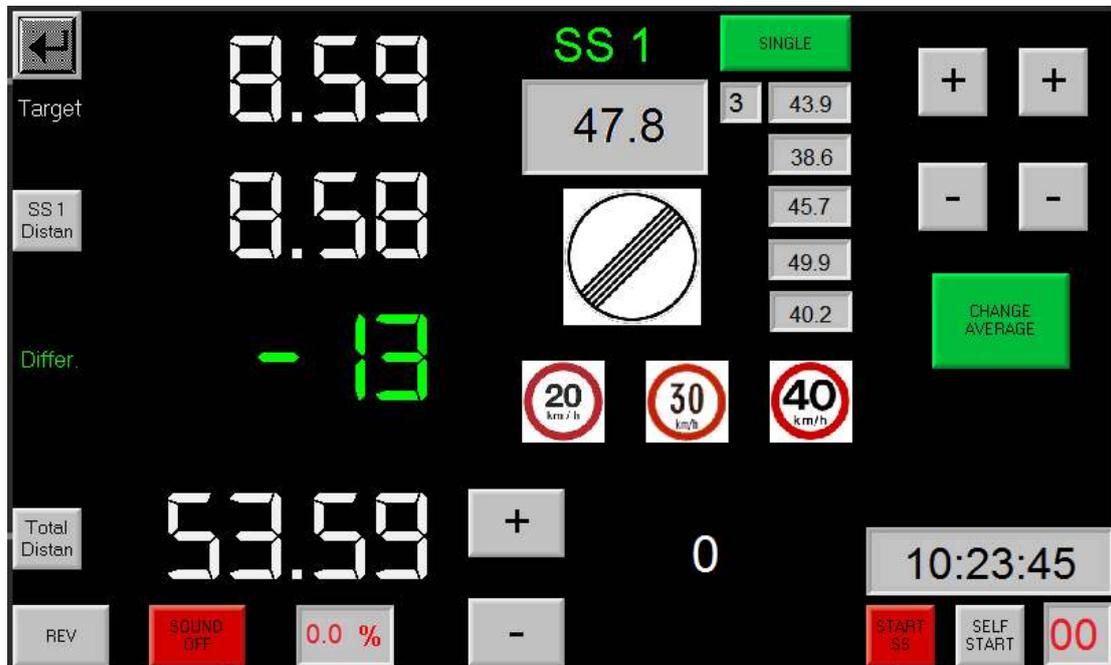
Regularity Master 70

User's Manual

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General characteristics:

Regularity Master 70 is a 3 in 1 instrument designed for use in Regularity rallies, combining a high accuracy multiple odometer with an electronic speed table and a real time clock.

All control parameters are displayed via a 7.0" touch screen, through which, the operator (co-driver), may also change the values of various parameters, without need of any additional keyboard.
However, an optional remote control is offered, through which, by the use of buttons - switches, certain basic parameters may be changed, such as:

a) Prepare next average speed.
b) Change average speed.
c) Add - subtract meters to the odometers.

Regularity Master 70 is offered as a ready to install device.

It requires a 12V DC power supply (1A min), but it is also available (upon request) for operation with 6 or 24V DC.

Output voltage to the pulse sensors, is 24V DC in any case, so adequate sensors must be used (most of the sensors found in the market function without problem).

Regularity Master 70 may be connected with two pulse sensors of various types (inductive, optical, magnetic), with either two or three wires, PNP or dry contact type. Each sensor can be calibrated separately.

If two sensors are connected, the odometer functions by calculating the mean value of the two signals. If a dysfunction is observed to one of the two sensors, then automatically the odometer ignore the faulty sensor and functions based only on the other one. In any case, operator can also manually select which sensor to be used.

Wiring:

Power supply is done through the red (+) and black (-) wires.
A 1A safety fused is found on the red wire.

Four additional wires are used for connecting the two sensors.

Brown (+24V DC)
White (0V DC)
Green (left sensor signal)
Yellow (right sensor signal)

For 2-wire sensors, we use the brown wire for supply and the green(left) or yellow(right) for the returned signal.

For 3-wire sensors, we use the brown and white wires for supply and the green(left) or yellow(right) for the returned signal.

Commissioning:

If power is connected to the device, we only need to push the On-Off switch, in order to operate.

In any case, if the sensor wires are not connected, protect them in order to avoid a short circuit that could damage device's power supply unit.

Functional description:

Home screen:

When we power on the instrument, the following screen appears:

By pressing on any button (grey areas), we can select one of the following screens - operations.

SS 1: Special Stage 1 overview screen.
SS 2: Special Stage 2 overview screen.

Multi SS: SS1 & SS2 simultaneous overview screen.

SS 1 LIST: Screen for setting average speeds of SS1.
SS 2 LIST: Screen for setting average speeds of SS1.

SS 1 sisa: Special Stage 1 overview screen when time - distance is given.
SS 2 sisa: Special Stage 2 overview screen when time - distance is given.

**LEG**: Total leg overview screen.

Configuration: Basic configuration screen and calibration.

By pressing on the **time indication**, a screen for setting up the time appears.

1. Time set-up

The instrument is equipped with a Real Time Clock, which can be synchronized with the race's clock. This is particularly useful for special stages with self start.
Through the initial screen, by pressing on the time indication, next page appears:
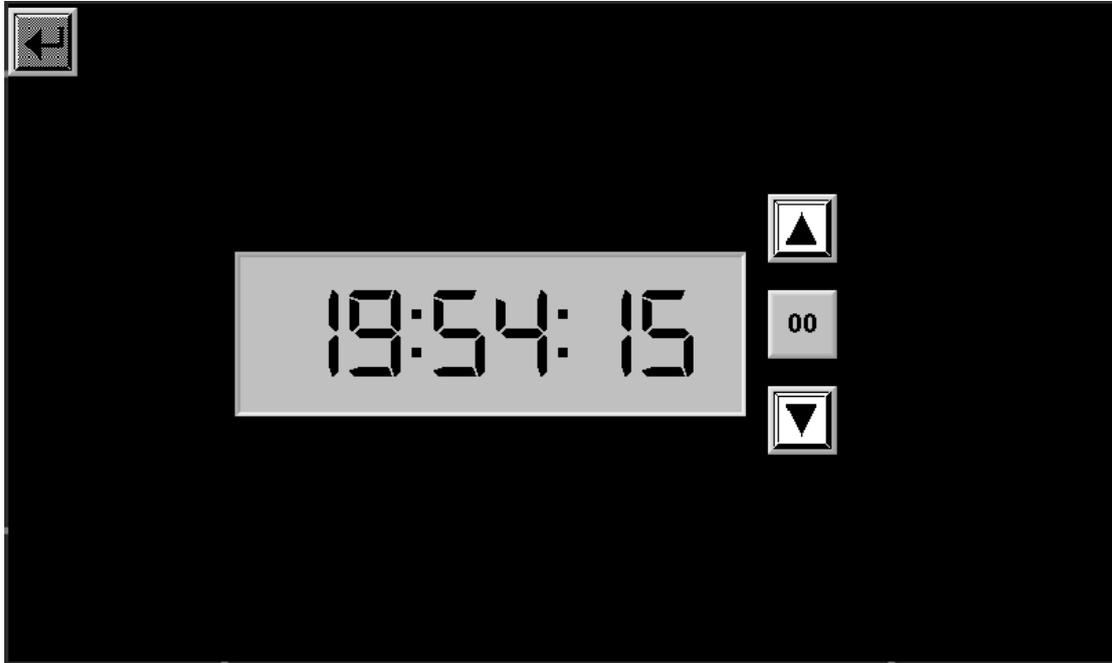
By pressing the ▲ button, time is increased by 1 second and by pressing the ▼ button, time is decreased by 1 second.

By pressing the 00 button, seconds become 0, and minutes go to the closest minute. (In the a.m. example, minutes would become 14, but if seconds were e.g. 41, minutes would become 55).

By pressing on the time indication, a new window appears where we can fully set the time, and save it by pressing the Enter button.

By pressing the ⮐ button, we return to initial screen.

2. Calibration - basic settings

Through the initial screen, by pressing on Configuration button, next page appears:

On this page, we can select which sensor(s) to be used for the odometer and to calibrate the instrument for each sensor independently.

Sensors are called LS (left) and RS (right), but they can be connected as we like (e.g. front and back, or in case of only one sensor this can be connected either as left or right).

By pressing on [✓] button we can select if the relative sensor is used or not. The green sign means that the sensor is used, when the red sign [✗] means that the relative sensor is not used and then the instrument is not taking its signal to consideration.

In case we have selected the use of 2 sensors, the instrument calculates distances by the mean value of the two measurements.
If it detects a large deviation between the 2 measurements, for a time frame of more than 10 seconds, it is not showing anymore the mean value, but the measurement with the higher value.

If you notice sudden changes on the distances measurements, that means that one of the sensors is defective now and then. You can then consult the calibration page, in order to understand which sensor is defective, and set it Off.

In order to calibrate the instrument, we follow the following procedure:
We fill in to both left and right sensors, the Calibration distance in meters, in the a.m. example is 2000.

Once on the start line of the calibration route, we press the 00 button, and then the pulses and measured distance indications become 0 for both sensors.

We drive as close as possible to the ideal line, and by arriving on the end line and once we fully stop, we press the red Calibrate button for each sensor we want to calibrate.

Automatically then the instrument will calculate the ideal coefficient for each sensor, and this will appear on the relative indication. In fact this coefficient express the distance between two pulses, and it is calculated with 0,1 mm accuracy. (In the a.m. example, the coefficient 4345 means that the distance between two pulses is 434,5 mm).

In case that the measured distance is not exactly the same as the given one (as it happens in the a.m. example for left sensor), we can also set manually the relative coefficient, by pressing on it, and slightly increase or decrease it.

In the configuration page we can also set-up the following:

- Choose between two types of operation for the beeper:
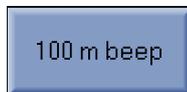
    100 m beep In this case a beep is produced every 100 m (e.g. at 23.10, 23.20, 23.30, etc) of ideal distance (Target), in order to make it easier to check the accordance between ideal distance and partial odometer.

    Fast / Slow beep In this case an interrupted sound is produced, when the difference between ideal and real distance, becomes greater than a certain limit, which is adjustable by the next two values
    Distance for TOO FAST beep 10 m   Distance for TOO SLOW beep -10 m

- Activate Freq OUT ON or deactivate Freq OUT OFF the operation of the extra driver's screen (if this is installed), which indicates the advance - retard. In case that such a screen is not installed, it is advised to deactivate this option, in order to protect the relative digital output.

- Adjust screen's backlight through the - & + buttons.

- Deactivate the Advance-Retard indication, for races where this is forbidden by the regulation.

By pressing the **Hide Avance-Retard** button for more than 3 seconds, the relative option is deactivated and then under the button a countdown timer appears which indicates the time till the automatic reactivation of that option (The automatic reactivation happens after 8 hours of instrument's operation).

In this way, scrutineer can deactivate at the beginning of the race the relative option, but also check at any moment if this is still deactivated, and for how long.

Please always consult your club's scrutineer, before you use RM-70, in order to be sure that you can use it without getting any penalty.

3. Single stage operation

RM70 can be used in several types of regularity rallies. It is ideal for rallies with frequent changes of average speed during a regularity stage, for races where we have simultaneous start of more than one regularity stage, with different average speed each and also for "stage in the stage" cases.

From the main page, we can select which special stage, we want to overview.

Hereafter we present the SS 1, but SS 2 has the same functionality.

By pressing SS 1 button, the next page appears:
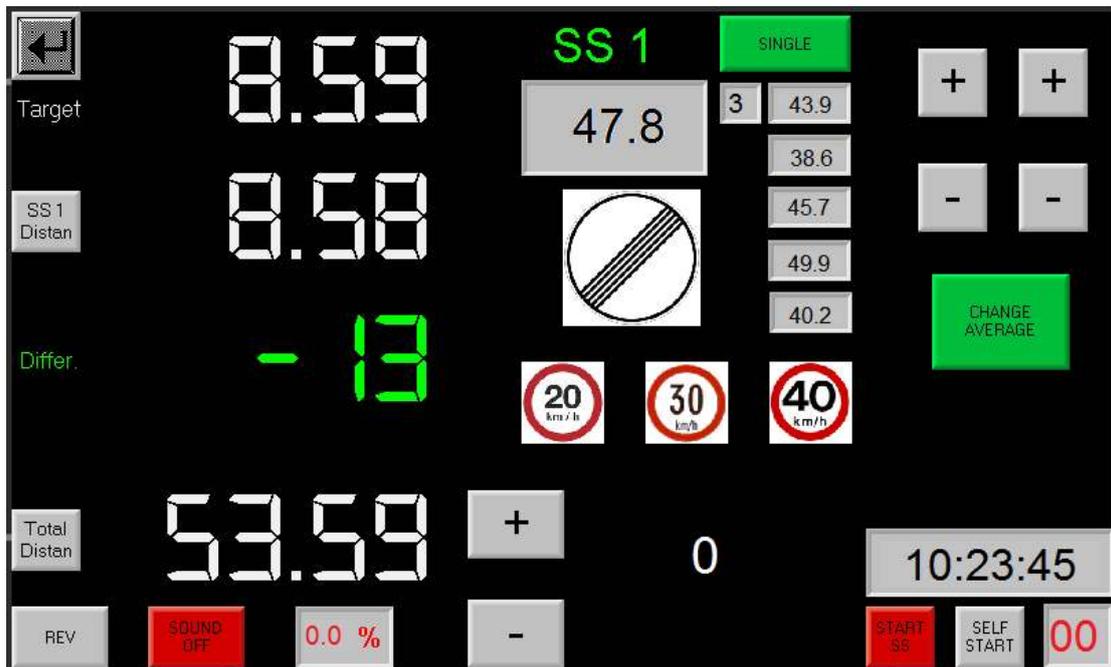
Target indication, is the ideal distance, based on the selected average.

SS 1 distance is the real distance we have run, since the start of the special stage.

By comparing those 2 figures, we realize if we are too fast or too slow.

By pressing on SS 1 dist button, we reset the partial odometer to 0 **(Attention, there is no delay, reset happens immediately).**

By pressing on the odometer indication, a new page appears, where we can manually set and save a new value for the partial odometer:
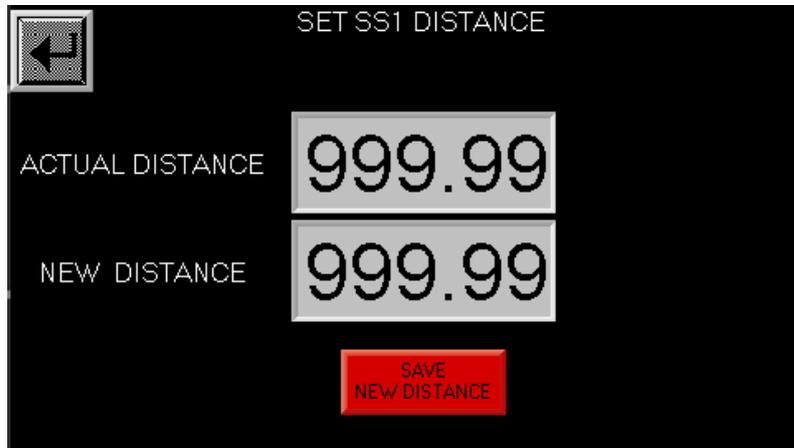

Differ: This indication shows the difference between the real distance (partial odometer), and the target (ideal distance). This value appears with green digits and it is expressed in meters.


A negative value means that we miss some meters, so we are slow and we have to accelerate, when positive value means we are fast and we have to decelerate. Ideally we have to show continuously 0.

The a.m. indication, can be deactivated through a special button in configuration page. (see page 7 of the manual)

Total dist indication is the total odometer and this is common for both SS1 and SS2.
By pressing on Total dist for ~3 seconds, we reset the total odometer to 0.
By pressing on the odometer indication, a new page appears, where we can manually set and save a new value for the total odometer:
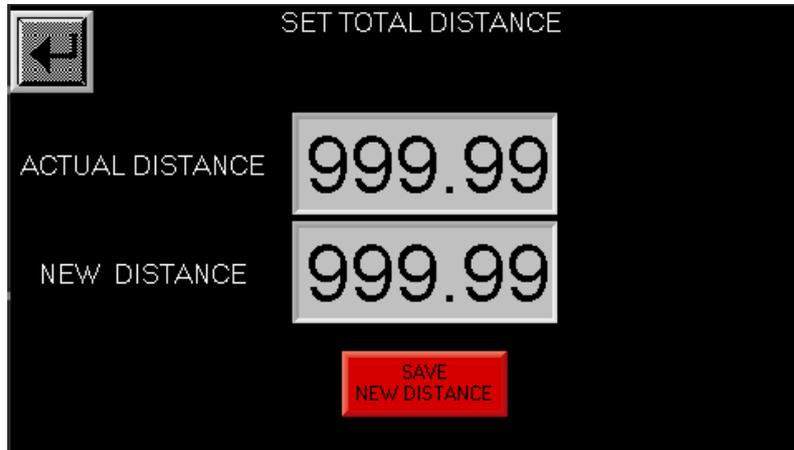
The **+ / -** buttons, are used in order to add or subtract 10 meters to the total and partial odometer as well. Some models offer an external switch for this operation as well.

Πλήκτρο για αντίστροφη
πορεία (countdown)

Συντελεστής διόρθωσης για
κλέψιμο μέτρων
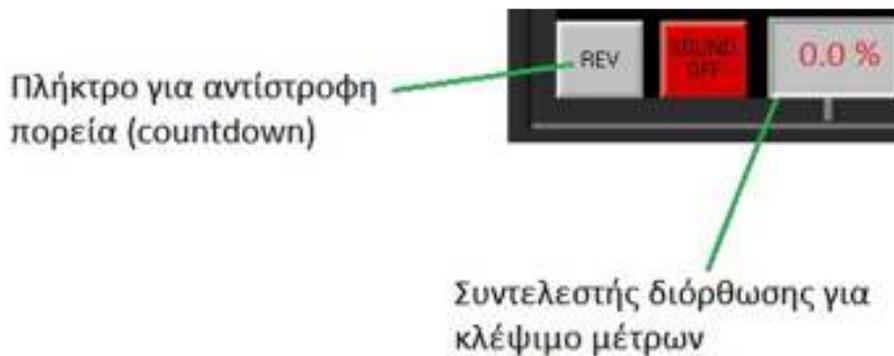
The **REV** (reverse) button, is used in case we want to subtract meters from the odometers during a certain track (e.g. in case we take a wrong direction, we press on REV when we start the reverse direction and we re-press on it , to deactivate it, when we are back on the point from which we continue on the right direction). Of course if this point has a known distance, (right on a box of the road book) we can always set this distance manually, as described before.

The **SOUND OFF / SOUND ON** button, is used to select if the beep sound (every 100 m) or the advance - retard signal will be heard or not.

The **correction factor (0,0%)** is used in case that we realize that we have a systematic error on our measured distances, during a stage. If e.g. we realize that every 2 km we have to add 10 m, in order to match the odometer indication with the roadbook marks, we can set a correction coefficient of 0,5%, which acts like a multiplier (1,05) over our calibration coefficients. In that way, we can easily make a provisionary correction, without changing our calibration coefficients.

Typical example of using the correction factor are cases of very "tight" roads, where we can not drive on the ideal line, and though our odometer "writes" systematically less meters. Other case is when we have loss of pressure on a tire, and then the relative sensor "writes" more meters (in this case a negative correction factor has to be used).

The red **START SS** button is used for manual start of a regularity stage, and it is mostly used for stages where a marshal gives the GO signal . By pressing it, the partial odometer (SS dist) is reset to 0 and the ideal distance (Target) as well. At the same time, the value of NEXT AVG is moved to actual AVG, and based on it the computer starts calculating the ideal distance. **Attention, this button acts immediately, (without any delay), as this is useful in case of "Flying Start". So special care should be taken to not be pressed by mistake, during a stage, as indications will be reset to 0!!!!**

The **SELF START**, button, is mostly used in case that we have to make a self start (without a marshal) at a certain known time. In this case, at max 59 seconds before the start time, we press the SELF START button, which becomes green and then, once the race clock seconds indication, matches with the relative setting of seconds (red figure on the bottom right corner), the stage is starting, exactly the same way as described above. The SELF START option is deactivated then automatically, and the relative button becomes gray again.

In the above example, time is 12:34:45, and the seconds settings for self start is set to 30, which means that if we press the SELF START button, the stage will automatically start once the clock shows 12:35:30.

On the top right corner of the screen, we have the following indications:

Actual Average Speed, which is the speed at which we have to drive.

Next Average Speed. In this tab, we can fill in the next average speed, in order to be ready for change, at the right moment. The next average, moves to the actual average, just by pressing the external green button.

In case that, via the **SINGLE/LIST** button, we have selected the LIST option, then another 4 next averages appear, as they have been set up on page SS 1 LIST. At the same time, an index appears between the actual and the next average, which indicates, which one is the immediately next average, (2nd, 3rd, 4th etc).

In case that the SINGLE option is selected, then only one next average appears.

In both cases, the next average can be adjusted, either by pressing on it and setting a new value, either via the touch buttons (+- 1km/h και +- 0,1km/h).

In case of use of the LIST option, all next average speeds can be adjusted from this screen , by pressing on them, and setting a new value. This can be very useful, in case that a mistake occurred when we set up the relative list.

In case that during a change of an average, we make a mistake, (either changing earlier, either setting wrong new average), this can be corrected, by pressing on the tab of the actual average, when next page appears:
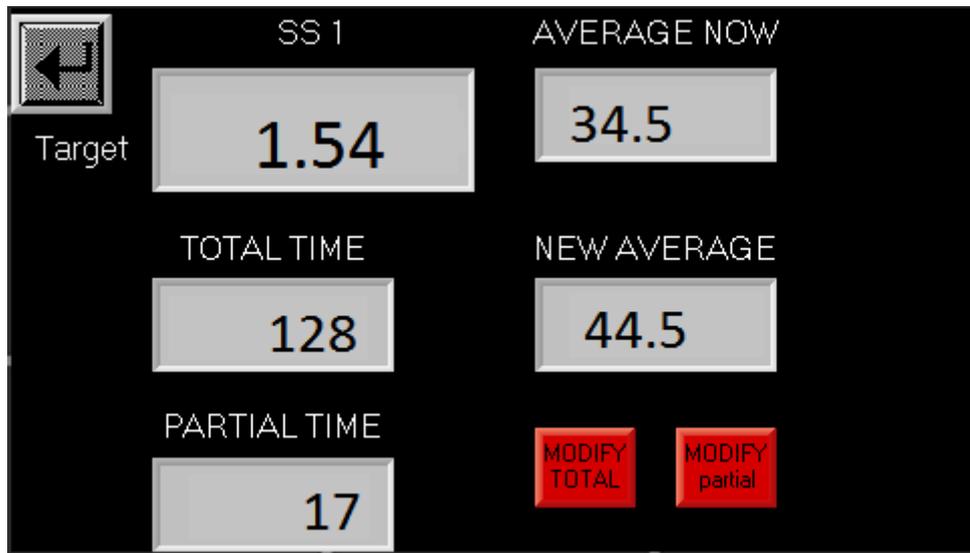

In this example, we see that the current average is 34,5 km/h and that this has been set 17 seconds before. Just under it, we can set the new, right, average, 44,5 km/h.

By pressing the **MODIFY partial** button, the computer recalculates the ideal distance, considering that during the 17 last seconds, we should have driven with 44,5 instead of 34,5 km/h and of course saves that new average to the actual average. In this example, the Target distance will then change from 1,54 to 2,03~2,04.

By pressing the **MODIFY TOTAL** button, the computer recalculates the ideal distance, considering that we should have driven with the new average, during all the stage (means all the 128 seconds since the start of the stage). In this example, the Target distance will then change from 1,54 to 1,58.

This option (MODIFY TOTAL), can also be used in case of simultaneous start of two stages with different average speeds, if the second stage has no average spped changes, till the point that the first stage ends.

Another advanced option of RM70, is the possibility of using pre-set speed limits.
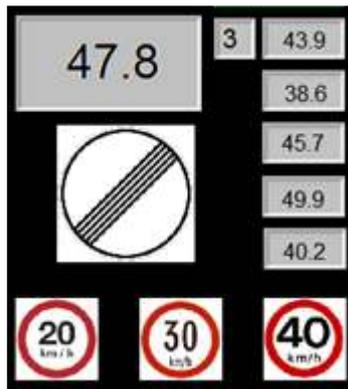
In the above example, the actual average is set to 47,8 and no speed limit is set, so the computer calculates the ideal distance, based on this actual average. By pressing any of the 3 pre-set speed limits, this appear under the actual average:
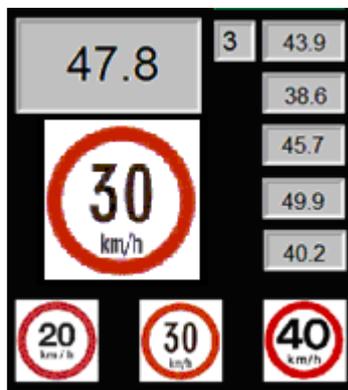
Once this happens, the computer than calculates the ideal distance based on that speed limit (30 in our example). By pressing on the big sign, the speed limit is removed, and then the computer continues using the actual average value, for calculating the ideal distance

This option can be useful in case that speed changes are requested, based on speed limit signs, which means that we do not know the next average, till we see the relative sign.

4. Multi SS operation

In order to better understand the Multi SS option, we will first describe an example of simultaneous start stages.

In some rallies, it is asked to start 2 special stages at the same moment, but with different average speed and different finish line each.
That means, that till the finish line of the first stage (shorter one), we have to drive by following the averages given for it, and once we finish the first stage, we have to adapt our speed, in order to bring our partial odometer in accordance with the ideal distance that occurs by following the average speeds of the second (longer one) special stage.

Let's consider an example, where we have to start simultaneously SS A and SS B as following:

	Avg. Speeds Of SS A	Avg. Speeds Of SS B	Distance	
START	45,5	42,7	0,00	
First change	47,2	44,8	2,50	
Second change	49,9	---	4,50	
Finish SS A		49,0	6,00	
Finish SS B			8,00	

According to the above table, we have to drive till km 6,00, where SS A finishes, by following the averages given for SS A, which means that if we follow the instructions, we will drive as following:

Time	Average speed	Distance
197,80 sec	45,5 km/h	2.500 m
152,55 sec	47,2 km/h	2.000 m
108,22 sec	49,9 km/h	1.500 m
458,57 sec		**6.000 m**

which means that we will drive the 6,00 km in 458,57 seconds.

Let's imagine a second "theoretical" car, which follows the averages of SS B and making the relative changes at the same time with us. At the moment we finish SS A, it should have run the following:

Time	Average speed	Distance
197,80 sec	42,7 km/h	2.346,1 m
152,55 sec	44,8 km/h	1.898,4 m
108,22 sec	44,8 km/h	1.346,7 m
458,57 sec		**5.591,2 m**

which means that at the moment that we finish SS A, it should have done 5.591,2 m, makes ~409 m less than us.

So, once we finish SS A, our ideal distance is then the one calculated before, which means that we have an advance of 409 m.

We have then to adapt our speed, in order to bring our odometer in accordance with the new ideal distance, and of course then to continue driving with the right given average till km 8,00, where SS B finishes.

That means, that at the moment we pass at km 6,00, we have to change the average on our electronic speed table to 49,0 and brake till our partial odometer shows ~0,41 km less than our electronic speed table indication and then continue driving at 49,0km/h, in order to keep this 0,41 difference, till km 8,00, where SS B finishes.

We realize that these calculations are very difficult to be executed during a race, and besides that, some times it is just impossible, as we miss some information (e.g. we do not know at which exact distance we have to change our average, as this is given as a mark on the road)

For these cases, RM70 offers the Multi SS function, which is nothing more than the simultaneous use of SS 1 and SS 2 in one page.

By pressing on Multi SS button, the next page appears:
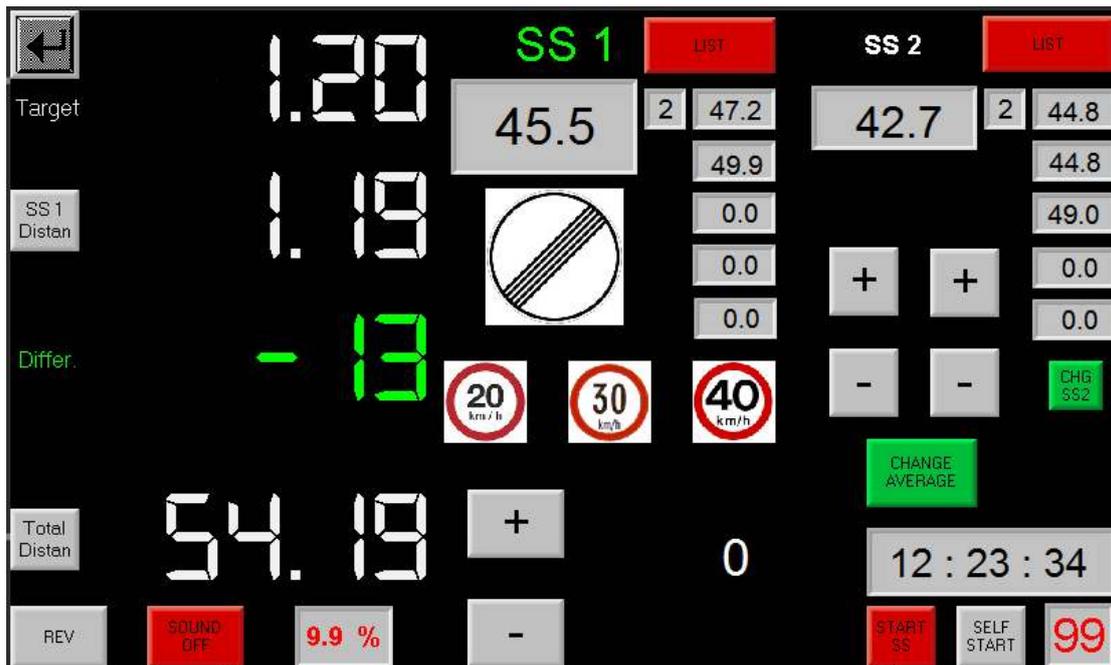
Most of the buttons and indications, are the same as seen on page SS1. The main difference is that now SS2 averages appear as well, and that, if the button CHG SS2 is activated (green), then when we change average on SS1 average of SS2 changes as well.

In the previous example, we see that at km 4,50 SS1 average must change from 47,2 to 49,9, when SS2 average has not to change and stay at 44,8.

To face such a situation, we can either, as in the above screen, set twice the same average (44,8) at SS2, either remember to deactivate the CHG SS2 button, before that change point, and then no need for setting twice the same average on SS2 list.

Once we cross SS1 finish line, we only have to press on the SS2 indication, and then the following page appears:

We now watch SS2, and so the Target indication shows the ideal distance based on SS2 averages, and we see that our real distance (partial odometer), is much higher, so we have to break till our partial odometer indication matches with the Target distance, (the difference become 0) and then keep driving at 49,0 km/h.

We can of course select separately for SS 1 and SS 2 if we will use the averages' list, or the single average option.

Special care is needed for the use (or not) of the CHG SS1 and CHG SS2 buttons, in order to avoid a change of average on the wrong moment.

In every case, changing the average is done by pressing the green CHANGE AVERAGE button on the screen, or by external button if a remote control is installed.

5. Time - distance operation

In case of rallies, where our data are the SS distance and the ideal time, we can use the two relative pages.

By pressing the **SS 1 SISA** button, next page appears:
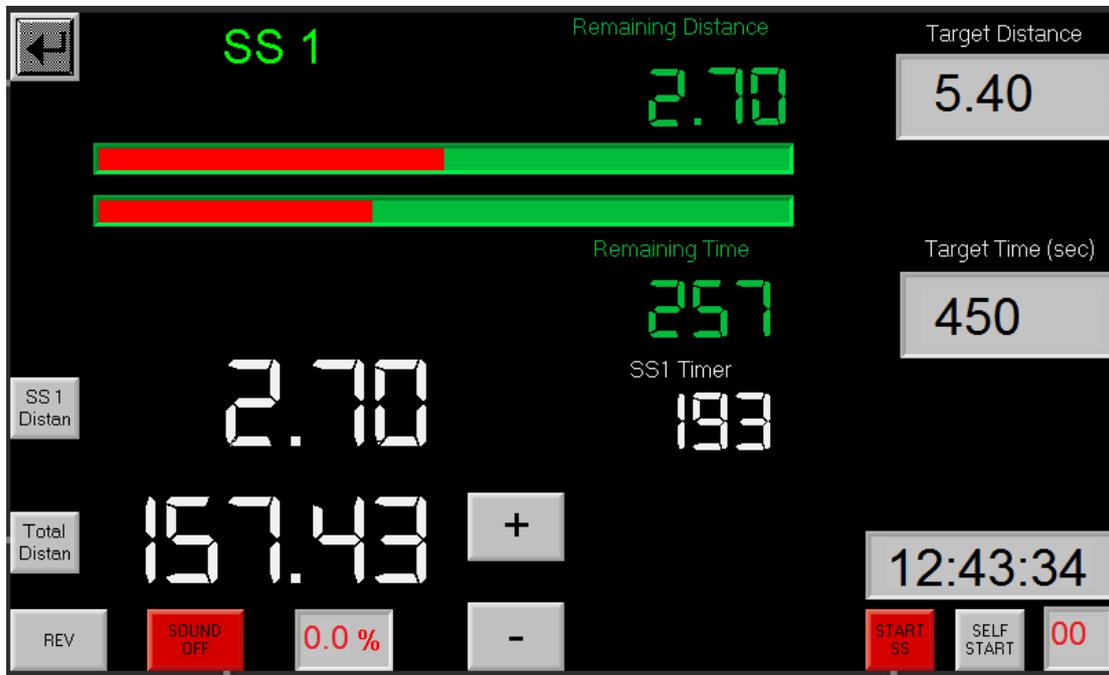
Partial and total odometer indications are the same as seen in previous pages.

On the right side of the page we have now two tabs, where we can fill in the Target distance(in km) and the Target Time (in seconds).
These target values can be filled in or corrected, even after the start of the stage.

We can see the time since the start of the stage (193 in our example) and the remaining time (257). We can also see the remaining distance (2.70 in our example)

The two bar-graphs show the percentages of the distance and time giving us an easy to understand image of our position. If the distance bar is more filled than the time bar, that means we are in advance and we have to slow down, when if the time bar is more filled, that means we are in retard and we must accelerate.

When we are at the last 10% of our total time, we can press on the bar graphs, and get a zoom on that last part, in order to be able to compare more accurately the two graphs. During the last 5 seconds a sound signal also exists (1 beep every second).

In case that we have a simultaneous finish with flying start of next stage, when we pass in front of the time marshal, we press the START SS button, in order to reset the partial odometer and the timer, and then we can change the Target distance and time, according to the data of the new stage.

6. List of average speeds

We have already mentioned that, on both SS 1 and SS 2, we can either use a list of preset average speeds, either use the single option and prepare manually the next average.

If we want to use the List option, we have first to prepare the relative list. This is done by pressing SS 1 List button for the SS 1 and SS 2 List button for the SS 2.

By pressing the **SS 1 List** button, the next page appears:


In this page we can prepare the average speeds that we will have to use during SS 1 We can preset maximum 20 consecutives average speeds.

In case that we also know the exact point where an average has to change, we can also fill in the relative tab in the distance column (Distance in km, with reference point the start of the stage). If we do so, then once the cadencer (ideal distance), reaches that value, then the average will automatically change, by this filled in the right tab. If we prefer to change averages manually, then we have to set the distance tabs to 0.

Attention: Once we prepare the list with average speeds, then we have to load it to the relative special stage, by visiting the relative page (SS 1 or SS 2) and reselecting the LIST option.

7. LEG Operation

By pressing the **LEG** button, next page appears:
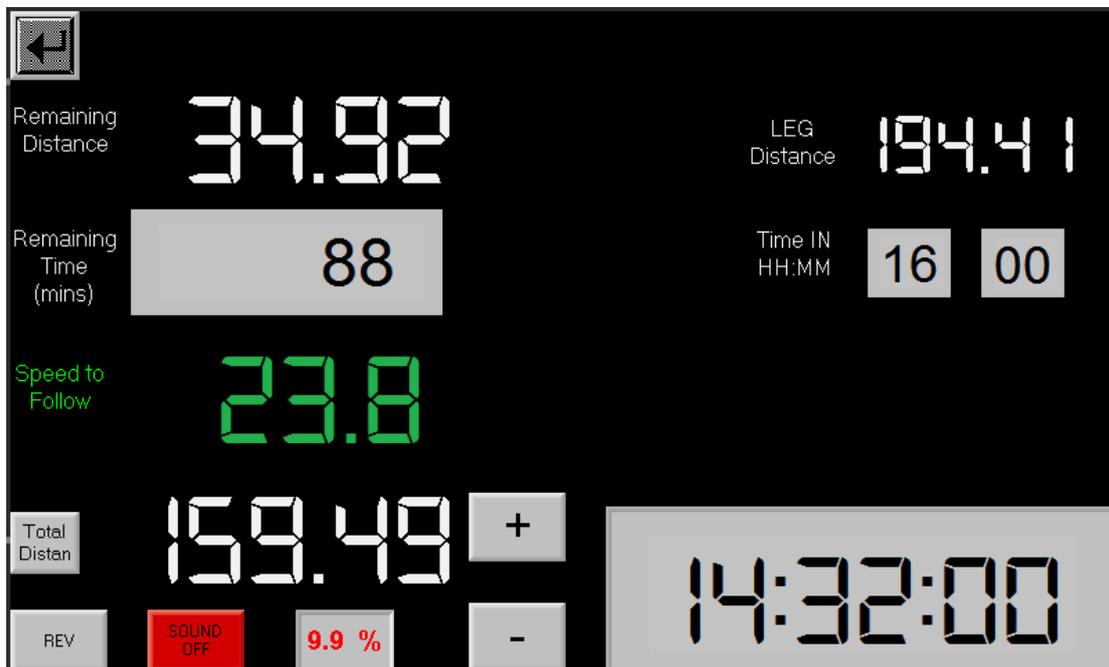
In this page we can set the total LEG distance (TC to TC) and the requested Time in.

RM70, calculates then - based on the total odometer - the remaining distance and remaining time, (based on the real time clock with minute accuracy).

It calculates also and proposes the average speed to follow, in order to be on time on the next TC, giving us an idea of the rhythm we have to keep.

Regularity Master

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