

MAA37245S Velocity Meter



**The Velocity Meter
Is ready to start taking
Readings anytime by
Pressing the CE/C Key**

Manufactured exclusive for General Motors Corporation by:

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Features

1. Battery operated
2. Powers up in Test Velocity mode
3. Reads velocity in both directions
4. 5 Adjustable HI/LO Velocity limit Profiles for Overspeed
5. Menu for customizing limits and timers
6. Adjustable Sensor Power Down Timer
7. Adjustable Display/Overspeed Power Down Timer
8. Adjustable Velocity Meter Power Down Timer
9. Ability to normalize velocity calculation for sensor variation.



Sensors power-up and display shows

VELOCITY

METER/SEC :-----

The Meter is waiting for trip of either the top or bottom sensor. Battery consumption is at maximum draw while sensors are enabled.

Operation

Place the Velocity Meter in the desired position to measure velocity. Press the **CE/C** button to power the unit on. The unit is now ready for testing velocity. The Sensors will power off after the Sensor Power Off timer has expired and will power back on if any key is pressed. The Display will power off after the Display Power Off timer has expired and will power back on if any key is pressed. And the Velocity Meter will power off after the Power Off timer has expired. Any key press or velocity reading will reset the Power Off timers. If the Velocity Meter is waiting for the other sensor the Sensors and Display will remain on until the Power Off timer has expired.

When the Velocity Meter powers up, it defaults to the selected profile.



Starting a test

Place the Velocity Meter in the desired position to measure velocity. Press the **CE/C** button to power the unit on. The unit is now ready for testing velocity.

Once one of the sensors is triggered the display will show **WAITING FOR OTHER SENSOR** until the other sensor is tripped or the **CE/C** is pressed. the latter canceling velocity test. Pressing any other key has no effect. If the other sensor is not tripped the Velocity Meter will power off after the Power Off

timer has expired. Once the other sensor has tripped the velocity in METER/SEC will be displayed.



Using the Menus

Pressing and holding the **ENT** key for 3 seconds will enter the Menu with the first selection:

SELECT PROFILE



Pressing the **DOWN ARROW** key will go to the next menu item.

MODIFY PROFILE



Pressing the **DOWN ARROW** key again will go to the next menu item.

SENSOR OFF TIME



Pressing the **DOWN ARROW** key again will go to the next menu item.

DISPLAY OFF TIME



Pressing the **DOWN ARROW** key again will go to the next menu item.

POWER OFF TIME



Pressing the **DOWN ARROW** key again will go to the next menu item.

GM MAA372455

SW X.XX HW X.XX



Pressing the **DOWN ARROW** key again will go to the next menu item.

NORMALIZED

FACTOR XXX



Selecting Profile

Pressing the **ENT** button for 3 seconds will enter the menu with the first item **SELECT PROFILE**. Pressing the **ENT** button again will display

USE PROFILE # X

H: X.XX L: X.XX



The display shows the set limits for the highest velocity "**H:**" that will turn on the **Overspeed LED** if the measured velocity is above this value. And the set limits for the lowest velocity "**L:**" that will turn on the **Overspeed LED** if the measured velocity is below this value.



Pressing the **UP ARROW** key will increment the profile number scrolling up through the available profiles and pressing the **DOWN ARROW** key will decrement the profile number scrolling down through the available profiles. Pressing the **ENT** key will save the profile to use and the Sensors power-up begin to test velocity using the selected profile. Pressing the **CE/C** key will Cancel **USE PROFILE** and return to the **SELECT PROFILE** menu.

Modify Profile

Pressing the **ENT** button for 3 seconds will enter the menu with the first item **SELECT PROFILE**. Press the **DOWN ARROW** key until **MODIFY PROFILE** is on the display.

MODIFY PROFILE



Pressing the **ENT** will enter the EDIT PROFILE mode.



Pressing the **UP ARROW** key will increment the profile number scrolling up through the available profiles to modify and pressing the **DOWN ARROW** key will decrement the profile number scrolling down through the available profiles to modify.



Pressing **ENT** on the desired profile will allow you to change the **HI** and **LO** limits used to turn on the **Overspeed** LED. Pressing the **CE/C** key will cancel and return to the **MODIFY PROFILE** display. The first menu item is:

MODIFY HI LIMIT



The second menu item is:

MODIFY LO LIMIT



Pressing the **ENT** key when **MODIFY HI LIMIT** is on the display will enter the edit **HI LIMIT** mode.



Pressing the **UP ARROW** key will increment the **HI LIMIT** velocity and pressing the **DOWN ARROW** key will decrement the **HI LIMIT** velocity but not past the set **LO LIMIT** +0.10 Meters/Second. Pressing the **ENT** key will save the new value and return to the **MODIFY HI LIMIT** menu. Pressing the **CE/C** key will cancel the modification and return to the **MODIFY HI LIMIT** display.

Pressing the **ENT** key when **MODIFY LO LIMIT** is on the display will enter the edit **LO LIMIT** mode.



Pressing the **UP ARROW** key will increment the **LO LIMIT** velocity but not past the set **HI LIMIT** -0.10 Meters/Second. Pressing the **DOWN ARROW** key will decrement the **LO LIMIT** velocity. Pressing the **ENT** key will save the new value and return to the **MODIFY LO LIMIT** menu. Pressing the **CE/C** key will cancel the modification and return to the **MODIFY LO LIMIT** display.

Pressing the **CE/C** key when either **MODIFY HI LIMIT** or **MODIFY LO LIMIT** is on the display will Cancel the modification and return to the **EDIT PROFILE** display.

Modify SENSOR OFF TIME

Pressing the **ENT** button for 3 seconds will enter the menu with the first item **SELECT PROFILE**. Press the **DOWN ARROW** key until **SENSOR OFF TIME** is on the display.



Pressing the **ENT** key when **SENSOR OFF TIME** is on the display will enter the edit **SENSOR OFF TIME** mode.



Pressing the **UP ARROW** key will increment the time in increments of 1 second and pressing the **DOWN ARROW** key will decrement the time in increments of 1 second. Pressing the **ENT** key will save the new value and return to the **SENSOR OFF TIME** menu.

Pressing the **CE/C** key will cancel the modification and return to the **SENSOR OFF TIME** menu.

Modify DISPLAY OFF TIME

Pressing the **ENT** button for 3 seconds will enter the menu with the first item **SELECT PROFILE**. Press the **DOWN ARROW** key until **DISPLAY OFF TIME** is on the display.



Pressing the **ENT** key when **DISPLAY OFF TIME** is on the display will enter the edit **DISPLAY OFF TIME** mode.



Pressing the **UP ARROW** key will increment the time in increments of 1 second and pressing the **DOWN ARROW** key will decrement the time in increments of 1 second. Pressing the **ENT** key will save the new value and return to the **DISPLAY OFF TIME** menu.

Pressing the **CE/C** key will cancel the modification and return to the **DISPLAY OFF TIME** menu.

Modify POWER OFF TIME

Pressing the **ENT** button for 3 seconds will enter the menu with the first item **SELECT PROFILE**. Press the **DOWN ARROW** key until **POWER OFF TIME** is on the display.



Pressing the **ENT** key when **POWER OFF TIME** is on the display will enter the edit POWER OFF TIME mode.



Pressing the **UP ARROW** key will increment the time in increments of 10 seconds and pressing the **DOWN ARROW** key will decrement the time in increments of 10 seconds. Pressing the **ENT** key will save the new value and return to the **POWER OFF**

TIME menu. Pressing the **CE/C** key will cancel the modification and return to the **POWER OFF TIME** menu.

Viewing the Tool Number and Revision Levels

Pressing the **ENT** button for 3 seconds will enter the menu with the first item **SELECT PROFILE**. Press the **DOWN ARROW** key until **GM MAA37245S** is on the display.



The **SW**: is the version level of the software installed on the Velocity Meter and the **HW**: is the version level of the Printed Circuit Board in the Velocity Meter.

Viewing the Normalization Factor

Pressing the **ENT** button for 3 seconds will enter the menu with the first item **SELECT PROFILE**. Press the **DOWN ARROW** key until **NORMALIZED** is on the display.



The **FACTOR** is the number used in calculating the velocity. This is used to remove the dimensional tolerances between the top and bottom sensors.

Using the check fixture and a little theory

This unit, like all others, is timing the velocity of the door edge as it goes by the sensors. The product people determine, based the weight and length of the door, this velocity.

Now that we've shown that this unit measures velocity based on the TIME it take for the door to pass its sensors, let's talk about the inappropriately name **CALIBRATION FIXTURE**, it should be called a **CALIBRATION CHECKING FIXTURE**. The 'heartbeat' of this unit is a 10.000Mhz crystal, the microprocessor divides this down and counts the pulses. The crystal does not change frequency, ignoring infinitesimally small changes due to temperature, its either oscillating at its correct frequency, or it's not working.

If you tape a scale to the coupon and start a test on the meter, you can determine how many millimeters down before the first sensor trips. The second sensor will trip 30mm after (fixed spacing). Because we all remember our high school physics class, we know,

Velocity = $\sqrt{2 * g * s}$, where g=acceleration of gravity, s=distance

g is generally accepted to be 9.80665 m/s², (but actually varies depending on location), s is whatever you measured, but is generally about 25mm if move all the way to the top.

If we determine our start velocity as sqrt of $(2 * 9.80665 * 25 / 1000)$, remembering to convert mm-> meters, we get a start velocity of .7002 meters per second and then sqrt of $(2 * 9.80665 * (25 + 30) / 1000)$ for an end velocity of 1.0386 meters per second, which averages out to 0.869 meters per second. Now in reality, this is a non-linear equation so for more accuracy you could

add more samples between 25 → 55 millimeters, or take the integral.

The first one should be more than enough accuracy for verifying the tool. The velocity readings when using the Fixture should be in the range of 1.00 M/S + or - .05 M/S.



A cord on the pull-pin usually helps give a consistent, clean release of coupon.

Adjusting the LOCATOR BRACKET

This unit has an adjustable locator on the bottom of the meter. Using a Phillips screwdriver, loosen the two screws and slide the bracket in or out as needed. When finished, gently tighten the two Phillips screws but DO NOT OVER TIGHTEN!



Warranty:

This meter has a 90 day warrantee against faulty material or workmanship the date of delivery.

Optional Swivel Suction Cup Mount

This unit has an optional swivel suction cup mount that can be used for lift gates to mount the meter on non-magnetic surfaces. Place the suction cup with the lever in the up position on the desired mounting surface then press the lever down to set the suction cup. Loosen the knob between the two swivel shafts to allow free movement of the 3 joints. Move the meter into the desired position and tighten the knob between the two swivel shafts to lock all 3 joints. Only tighten as much as needed.

DO NOT OVER TIGHTEN!

Swivel Suction Cup Mount T-28256



Optional Tray Mounts

This unit has an optional tray mount that can be used for non magnetic applications where the magnets in the meter will not work. Place the meter in the tray and hold against the side of the vehicle. The Rubber Feet are to help keep the meter from slipping while taking readings.

Rubber Foot Tray T-28256-1



The suction cup tray is NOT to be used to hold the Velocity Meter without holding it in place. The suction cups may fail to hold the meter in place and only helps prevent the meter from slipping while taking readings.

Suction Cup Tray T-28256-2

