

Digital Engine Tachometer

SE-2500

Instruction Manual (Basic Operations)

Thank you for your selection of the SE-2500 Digital Engine Tachometer.
To ensure the performance of the SE-2500, please read this manual thoroughly.

WARNING and CAUTION

In this document precautions are classified into two categories: **WARNING** and **CAUTION**. This depends on the degree of danger or damage possible if the precaution is ignored and the product is used incorrectly.

	WARNING	This symbol is used to indicate precautions where there is a risk of death or serious personal injury to the operator if the product is handled incorrectly.
	CAUTION	This symbol is used to indicate precautions where there is a risk of some personal injury to the operator or only material damage to the product if the product is handled incorrectly.

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Omission of Issuance of Certificate
This product has been tested under strict inspections for correct operation before shipment. Please note that the issuance of certificate is omitted.

- Warranty**
- This product is covered by a warranty for a period of one year from the date of delivery.
 - This warranty covers free-of-charge repair during the warranty period for defects occurred while the product is used under correct operating conditions according to descriptions in this manual and notices on the unit label.
 - For free-of-charge repair during the warranty period, contact your dealer or your nearest Ono Sokki sales office nearby.
 - Even during the warranty period, the following failures will be handled on a fee basis.
 - Failures or damages occurring through misuse, misoperation, repairing without ONO SOKKI'S approval.
 - Failures or damages occurring through mishandling (dropping) during transportation after purchase.
 - Failures or damages occurring by an Act of God (fires, earthquakes, flooding, and lightning), environmental disruption, or abnormal voltage.
 - Replenishment of expendable supplies, spare parts, and accessories.

This guarantee covers only the performance of the product itself only. All inconvenience by the trouble of this product is not included. *Outer appearance and specifications are subject to change without prior notice.
HOME PAGE: <http://www.onosokki.co.jp/English/english.htm>

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Observe the Following Points before Use

WARNING

Perform measurement using enough caution with the rotating section of the engine.
When you use the supplied external sensor and AC adapter (option), be careful not to allow the cables to be caught by the rotating section of the engine.

Perform measurement using enough caution with the high-temperature section of the engine.

CAUTION

Do not contact the equipment with the high-temperature section of the engine.
Since the equipment does not have sufficient heat resistance, be careful not to contact it with the high-temperature section (such as the exhaust pipe) of the engine.

Do not contact the equipment with the ignition coil.

Contacting the equipment with the ignition coil may cause malfunction or failure.

If there are two or more ignition coils, measurement is not possible.

Exact measurement may not be possible if the ignition system (distributor, high-tension cord, spark plug, etc.) of the engine is defective.

Do not apply voltage to the external sensor input terminal of the equipment.

Be sure to use the AC adapter (PB-7080:option) dedicated for the equipment.

Using other adapters may cause failure.

Do not expose the equipment to rapid temperature change.

Do not move the equipment from a hot place to a cold place or vice versa. This is a risk of condensation inside the equipment which may cause failure.

Do not get water, oil, dust, or other foreign materials inside the equipment.

Avoid using the equipment on locations exposed to water or oil or locations which are very humid or dusty.

CAUTION

Do not drop the product or apply excessive shock to it.

Since this product incorporates high-precision electronic parts, be careful not to drop it or apply excessive shock to it.

Wipe dirt off using a dry cloth or a cloth dampened with neutral detergent and squeezed firmly. Do not use volatile oils (thinner, benzene, etc.) or alcohols.

Overview

1. Overview

The SE-2500 Digital Engine Tachometer is a non-contacting type handheld engine tachometer with a built-in battery and integrated detecting element, measurement section, and display. It makes it possible to measure the rotational speed of a gasoline engine in units of 1 r/min or 0.01 r/s simply by bringing it close to the ignition coil of the engine.

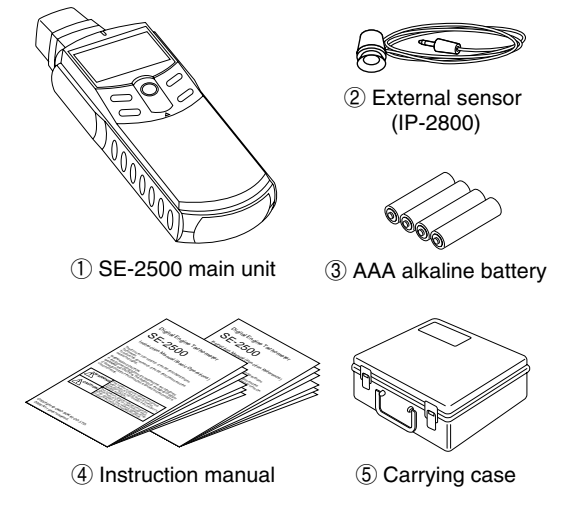
2. Features

- The non-contacting type makes measurement simple and safe.
- Can measure exact rotational speed in units of 1 r/min or 0.01 r/s.
- The use of the supplied external sensor (IP-2800) enables remote measurement.
- The backlight function enables display check even in a dark place.
- The memory function allows measurement results to be checked.
- The rotational speed of a diesel engine can also be measured by using the VP-201 external sensor (option).
- AAA batteries or AC adapter (PB-7080:option) can be used as power supply.

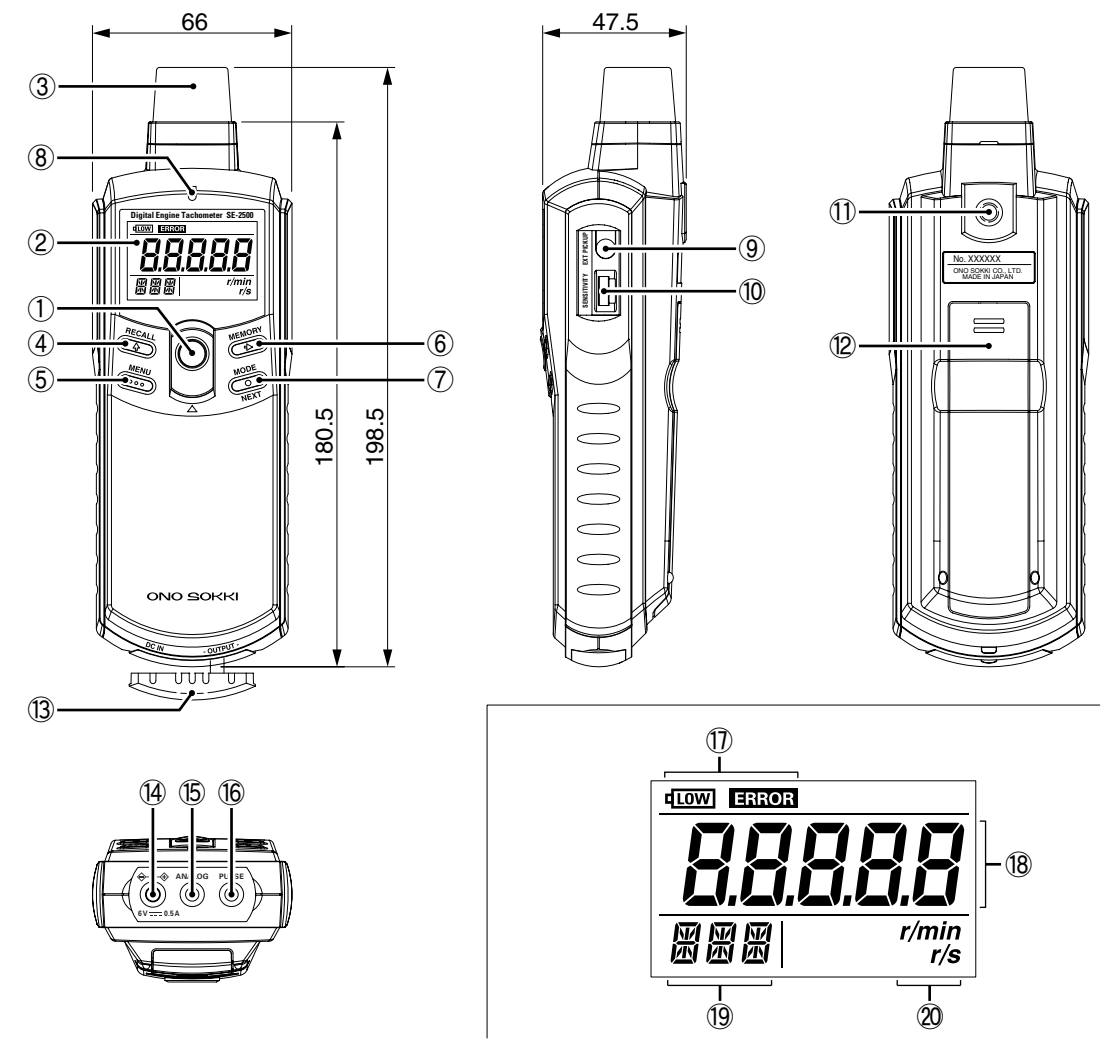
3. Product Configuration

When you unpack the unit, make sure that you have all the following:

- Main unit (SE-2500)x1
- External sensor (IP-2800)x1
- AAA alkaline batteryx4
- Instruction manualx2
- Carrying casex1



Name and Function of Each Section



- ① Power switch
Turns the power ON or OFF.
- ② Display
Displays the measurement value and various settings.
- ③ Detecting head
Brought close to the ignition coil of the engine to detect the rotational signal (leakage flux).
- ④ RECALL & switch
Used for memory recall during measurement and numerical input in the setup mode.
- ⑤ MENU switch
Used to switch between the measurement mode and the parameter setup mode.
- ⑥ MEMORY & switch
Used for memory storing during measurement and numerical digit shift in the setup mode.
- ⑦ MODE & NEXT switch
Used for item selection in the setup mode.
- ⑧ Indicator (input signal indicator)
While the detecting circuit is detecting the rotational signal (leakage flux), this LED indicator is lit.
- ⑨ EXT PICKUP
This input terminal is used when the external sensor is used. The usable external sensor is the supplied IP-2800 or VP-201 (option).
- ⑩ SENSITIVITY (sensitivity adjustment knob)
This knob is used to adjust the signal level.
- ⑪ Tripod mounting hole
This screw hole is used to mount a tripod.
- ⑫ Battery cover
- ⑬ Connector cover
Cover of the DC power input and analogue/pulse output connectors.
- ⑭ DC power input
Input connector for connecting the dedicated AC adapter. (When the dedicated AC adapter and batteries are used together, the AC adapter is given priority.)
- ⑮ Analog output
Connect a recorder, etc. to this terminal using the AX-501 cord (option).
- ⑯ Pulse output
Connect an FFT analyzer, etc. to this terminal using the AX-501 cord (option).
- ⑰ CONDITION display
Displays LOW battery and errors.
- ⑱ MAIN display
Displays measurement values, selections, settings, etc.
- ⑲ SUB display
Displays the memory address, setup items, etc.
- ⑳ UNIT display
Displays various measurement units.

Before Use

1. Power Supply

The SE-2500 operates on four AAA batteries or PB-7080 AC adapter (option).

If the batteries are consumed and the LOW mark "LOW" appears, replace them with new ones. Be sure to replace all the four batteries at one time.

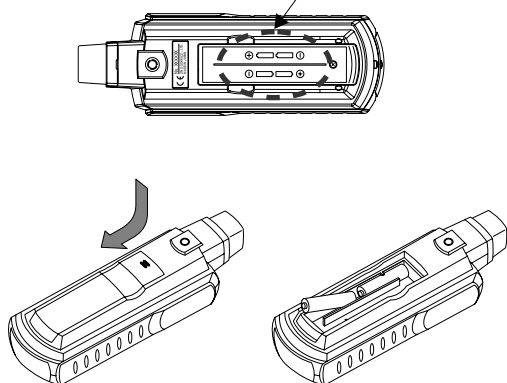
Battery replacement procedure

While pushing lightly the two (anti-slip) slots of the battery cover with your finger, slide it to remove.

Put batteries properly in the battery compartment with the correct polarity (+/-).

Shut the battery cover.

Battery polarity display



2. Measurement

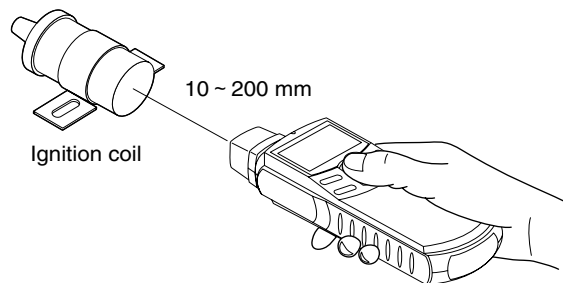
Turn ON the power switch.

Set the number of cylinders of the engine under measurement. (Refer to Function Reference/Functions and Operations/2. Function of Each Switch/ Setting the number of cylinders.)

Set the measurement unit. (Refer to Function Reference/Functions and Operations/2. Function of Each Switch/ Setting the measurement unit.)

Bring the detecting head close to the ignition coil.

When the indicator starts blinking and you bring the detecting head closer, it blinks at fixed intervals. Since the blinking rate increases as the rotational speed increases, it seems to be lit. This position is the measurement position. The rough standard distance from the ignition coil to the measurement position is 10 to 200 mm.



Perform measurement so that the axis of the main unit almost agrees with that of the ignition coil.

If measurement is not stable, adjust SENSITIVITY (sensitivity adjustment knob) on the right-side-face to stabilize the sensitivity.

3. Measurement Using External Sensor

【In case of IP-2800】

Plug the IP-2800 into the external sensor input terminal of the SE-2500.

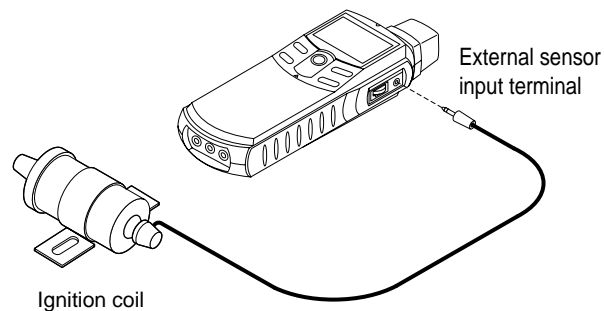
Make the sensor section of the IP-2800 absorb to the ignition coil to attach it.

Turn the power ON.

Set the number of cylinders of the engine under measurement. (Refer to Function Reference/Functions and Operations/2. Function of Each Switch/ Setting the number of cylinders.)

Set the measurement unit. (Refer to Function Reference/Functions and Operations/2. Function of Each Switch/ Setting the measurement unit.)

Measurement is ready.



4. Notes on Measurement

Perform measurement under the condition that there are no obstacles between the SE-2500 and the ignition coil.

If there is an obstacle between the SE-2500 and the ignition coil, the rotational signal is interrupted disabling exact measurement.

Perform measurement being careful not to contact the SE-2500 with the ignition coil.

If you contact accidentally and irregular display is made, turn OFF the power and then back ON.

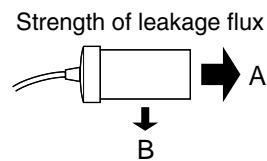
Do not bring close magnetized objects during measurement.

The SE-2500 picks up the leakage flux generated from the ignition coil. Therefore, if there is a magnetized object near the SE-2500, exact measurement may be disturbed.

The measurement range of the SE-2500 is 20000 r/min (maximum). Use it within this measurement range.

Observe the measurement direction.

With the open magnetic path type ignition coil (mainly tubular type), the density of flux generation is large at section A and small at section B because of the structure. Since the SE-2500 detects leakage flux, it is suitable for measurement from the direction of A.



Since the closed magnetic path type ignition coil (not tubular type) has complicated leakage flux, the display may become unstable depending on the measurement direction. In this case, perform measurement at a position where the display is stabilized, separating slightly the SE-2500 from the ignition coil.

Specifications

1. Measurement Section

Applicable engine : Gasoline engine
2-cycle (1, 2, 3 or 4 cylinders)
4-cycle (1, 2, 3, 4, 5, 6, 8, 10 or 12 cylinders)
Calculation method : Periodic calculation method
Measurement interval : 1s + 1-period interval of input signal or less
Measurement unit : r/min, r/s
Measurement range :

2-cycle	4-cycle	Rotational Speed Range
-	1 cylinder	120 ~ 20000 r/min
1 cylinder	2 cylinders	120 ~ 20000 r/min
-	3 cylinders	120 ~ 20000 r/min
2 cylinders	4 cylinders	120 ~ 20000 r/min
-	5 cylinders	120 ~ 20000 r/min
3 cylinders	6 cylinders	120 ~ 15000 r/min
4 cylinders	8 cylinders	120 ~ 12000 r/min
-	10 cylinders	120 ~ 10000 r/min
-	12 cylinders	120 ~ 8000 r/min

* In the case of r/s, the range is obtained by dividing the above r/min value by 60.

Measurement accuracy:

Display value (*1) x (± 0.02%) ± 1 count

(*1) The display value is the count value without the decimal point.

Measurement error function:

If the measurement value exceeds the display range or specified upper-limit rotational speed, the error mark "ERROR" is displayed.

Sensitivity adjustment:

Adjusted with the rotary knob on the right-hand side of the main unit.

2. Detecting Section

Detection method : Electromagnetic induction system

Detection distance : 10 to 200 mm

Non-measuring target : Ignition coil

Notes on measurement :

- a) If there are two or more ignition coils, measurement is not possible.
- b) Measurement is not possible for engines with abnormal ignition system.
- c) Normal measurement may be disturbed depending on the engine type.

3. Display Section

Number of display digits : 5 digits

Character height : 10.2 mm

Display unit : 7-segment LCD with back light

Refresh time : 1 ± 0.2s

4. Measurement Mode

Memory function:

Up to 20 measurement values can be memorized each time the Memory switch is pressed. Since these values are stored in non-volatile memory, they are retained even after you turn OFF the power.

5. Analog Output Section

【REVO】

Output contents : Output for the rotational speed display value.

Voltage range : 0 to F.S./0 to 1V

Conversion system : 10-bit D/A conversion

Linearity : ± 1% of F.S.

Output refresh time : 50 ms + 1-period interval of input signal or less

Temperature stability : ± 0.05% of F.S./ (ZERO & SPAN)

Setup error : ± 0.5% of F.S. (adjustment setup error at the time of shipment, ZERO & SPAN)

Load resistance : 100k or more

Output connector : Super-mini jack (2.5)

【SIG】

Output contents : Analog output for monitoring after shaping the waveform of the sensor signal (before pulse waveform conversion)

Load resistance : 100kΩ or more

Output connector : Super-mini jack (É2.5-/common to REVO output)

6. Pulse Output Section

Output timing : 1-pulse output at each signal detection

Output voltage : Hi level: 4.5V or higher

Lo level: 0.5V or lower

Output logic : Positive logic pulse

Load resistance : 100k or more

Output connector : Super-mini jack (2.5)

7. General Specifications

Power supply : Four AAA batteries or dedicated AC adapter

Continuous operation time : About 32 hours (back light OFF)
About 8 hours (back light ON)

(Alkaline batteries used at 20)

Battery LOW display : Lights up at about 4.5V.

Operating temperature range : 0 to +40

Storage temperature range : -10 to +50

Operating humidity range : +35 to +85%RH (without condensation)

Storage humidity range : +35 to +85%RH (without condensation)

Mass : About 250g (main unit only, batteries not included)

Dimensions : 198.5 x 66.0 x 47.5mm (main unit only)

Options

AX-501: Output cable (Modification requires for CE-marking)

PB-7080: AC adapter (TAS2901-Y-O-ONO; KAGA COMPONENTS)

IN; 100-240VAC 50/60Hz, OUT; 6VDC 2A

VP-201: External sensor

Sensor dedicated for 4-cylinder gasoline and 4-cylinder diesel engines

Storage

The storage temperature range of the SE-2500 is -10 to +50 . When you store it, avoid locations where the temperature is extremely high or low or the humidity is high. Store it in a place which is well-ventilated and not exposed to direct sunlight. If you do not use it for a prolonged period of time, be sure to remove the batteries to prevent accidents caused by battery leakage, etc.