1. <u>PURPOSE:</u>

This document describes the process followed to update a Tonewinder unit with the Gaussmeter kit.
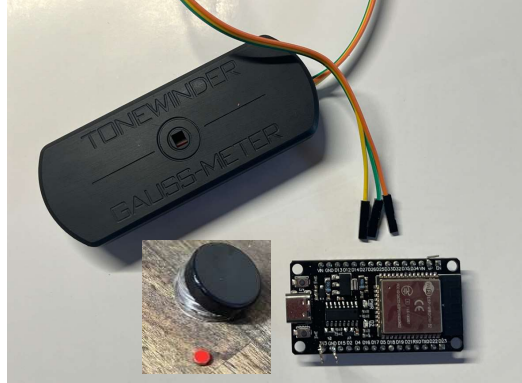

Figure 1: Picture of the Gaussmeter Kit

2. <u>SCOPE:</u>

This upgrade kit can be installed in every existing version of Tonewinder:

Figure 2: Tonewinder 1.0 (No serial number)

Figure 3: Tonewinder 1.1 (S/N from 001 to 030)

Figure 4: Tonewinder 1.2 (Serial number from 031)

3. <u>GAUSSMETER UPGRADE KIT PARTS:</u>

The Gaussmeter upgrade kit contains:

- Gaussmeter holder, which includes a powerful hall sensor installed in a little PCB, and wires to connect it to the new microcontroller. Also includes 2xM2.5 screws to install it.
- Microcontroller ESP32 with three special pins to connect the new sensor, loaded with the new software version (10.0).
- Neodymium magnet to calibrate the sensor once it's installed. This magnet is provided with the exact measure in gauss (Usually 1200 Gs) and polarity that it has.

4. <u>SOFTWARE VERSION:</u>

For proper functioning of the Gaussmeter, you need to have these software versions:

- **Microcontroller ESP32 Software: 10.0 or higher.**
  This version is already installed in the Microcontroller that is supplied with the kit.
- **Touch Screen HMI Software: 10.4 or higher.**
  After installing the new microcontroller you need to update the touchscreen software version to 10.4.

You can download both versions of software ESP32 and HMI from our website, www.tonewinder.es .

5. <u>BACKUP OF THE SLOT MEMORIES:</u>

If you have a low quantity of slot memories that you want to move to the new Microcontroller, you can do it simply by downloading each memory to the computer, and when the new microcontroller is installed you will be able to upload these memories.

If you have a large number of memories and you want to keep them in the new microcontroller, the best way to do it is:

- Update your current Microcontroller installed in your unit to the new software version.
- Run the flasher application that you can find on our website (see FC_09_ESP_Memory_Flasher). This application will make a backup of your actual microcontroller in your computer, including the current software version and memories.
- After that, you can recover this backup file in the new microcontroller using the same application.

After this process, the new microcontroller will be loaded with the new software and also with your presets.

6. INSTALL THE KIT:

Here are the steps to follow to install this new kit:

- **STEP 1:** switch off the unit and remove the four screws of the top cover. Then remove the top cover from the winder and place it on the bench.

Figure 5: Remove the top screws from the front and rear cover (x4).

- **STEP 2:** Use a 3 mm metal drill to make 3 holes in the top cover according to the next drawing (A 1:1 template is provided with this procedure).
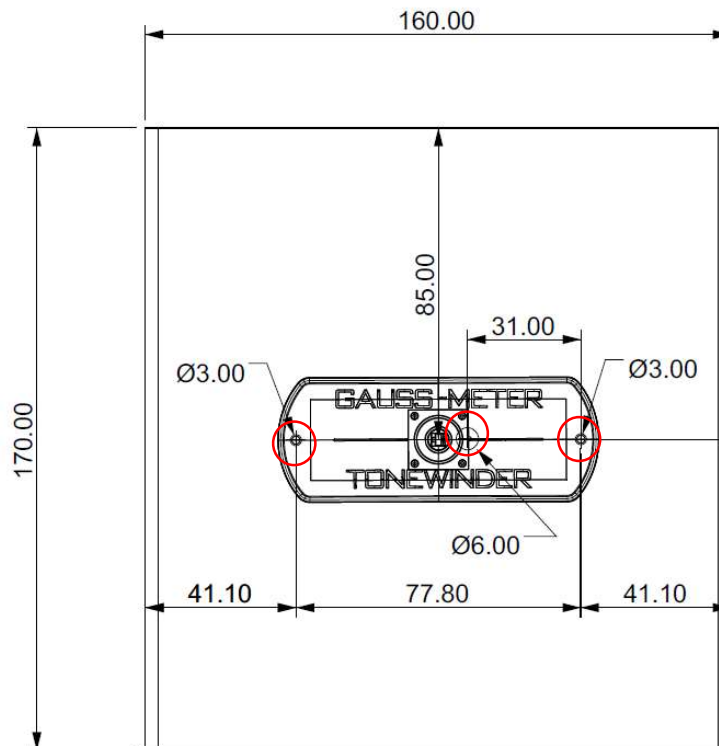

Figure 6: Template to drill the holes.

- **STEP 3:** Use a 6 mm metal drill to enlarge only the central hole. Then smooth the edge of the holes with a bigger metal drill (8 or 10 mm) or using a knife-rounded file.

- **STEP 4:** Install the Gaussmeter in the top cover using the 2xM2.5mm screws.
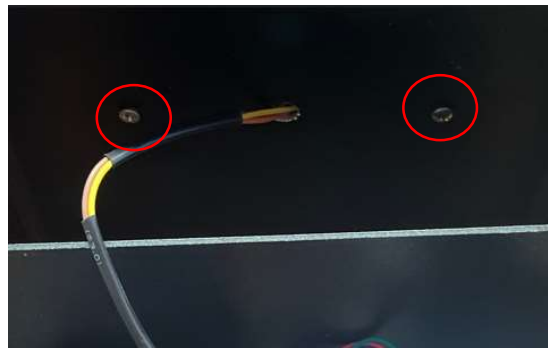

Figure 7: Install M2.5 screws.

- **STEP 5:** Exchange the Microcontroller ESP32 with the new one, with the special connectors installed. If your current ESP32 is touching the rear cover, unscrew just a little the other screws located in the rear cover to facilitate the removal of the old ESP32.
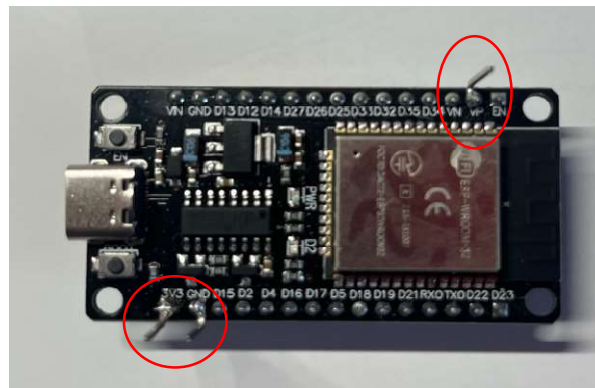

Figure 8: New ESP32 with special connectors installed.

- **STEP 6:** approach the top cover to the winder and connect the wires to the new ESP32. Take care that each wire (they are labeled on the PCB as: VIN, GND, and OUT) is connected to the appropriate pin.

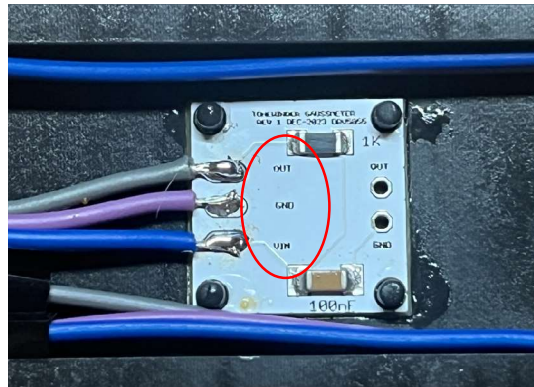| PCB CONNECTOR	ESP CONNECTOR
VIN	3V3
GND	GND
OUT	VP

Figure 9: wire labels on the PCB.

- **STEP 7:** Reinstall the top cover in its position and screw and tighten all the screws. You can skip this step and do at the end of the process.

- **STEP 8:** Download the appropriate touchscreen software (HMI 10.4) from the website (www.tonewinder.es), and save it onto a microSD card (less than 32 GB, and we recommend formatting (FAT32) the card before using it).
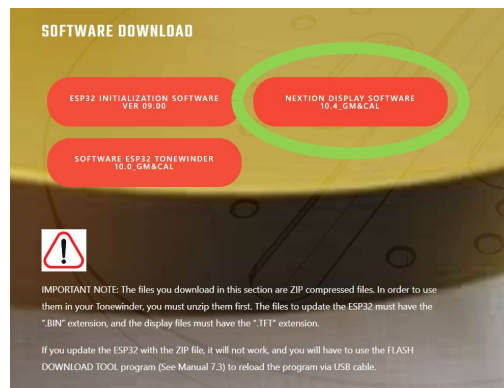

Figure 10: Click on the button to download the display software.

NOTE: unzip the downloaded file before uploading it to the card.

Then install the microSD card in the slot of the screen (see Operating manual).

Figure 11: Insert microSD card.

 Once the card is installed, switch on Tonewinder and wait to the software is fully installed and checked (it will take 1 or 2 minutes). Once, the software is installed, switch off the winder and remove the microSD card from the screen. Reboot twice.

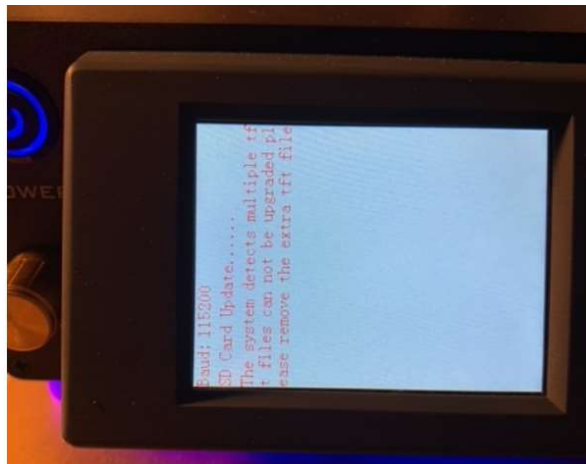**NOTE: if you receive this message (see below), your microSD card must be formatted:**

Figure 12: error during the upload.

- **STEP 9:** Switch on the winder and wait until the initializing process is finished, then press "START". In the MAIN MENU screen press "SETTINGS", and then press "Calibrate Hall Sensor", to calibrate the sensor of the Gaussmeter.
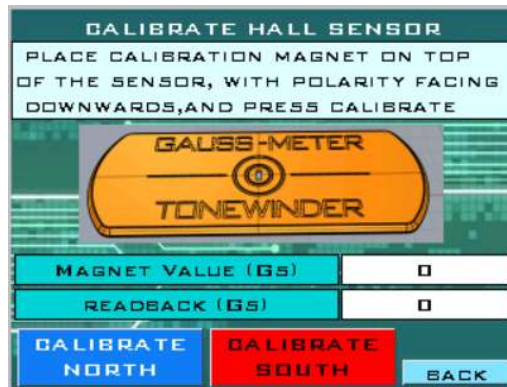
Figure 12+1: Calibration Page.

Place the magnet that is provided with the kit on the top of the Gaussmeter with the South polarity facing downwards,

Figure 14: Calibration magnet (south calibration).

then input the value of Gauss that is provided with the magnet on the "Magnet value (Gs)" field,
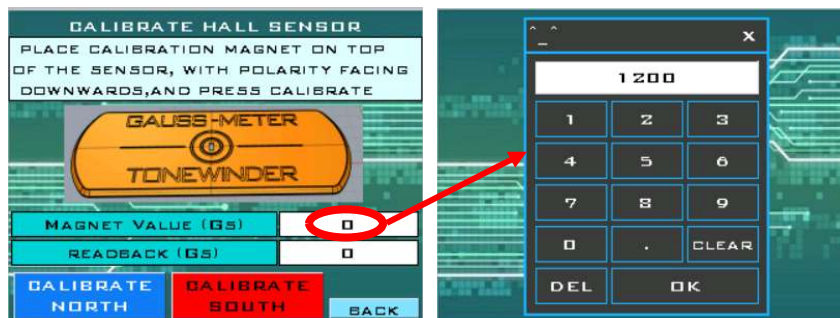

Figure 15: Input the magnet value.

and press "Calibrate South". Once the readback field shows you the value (it must be almost the same as the input value),
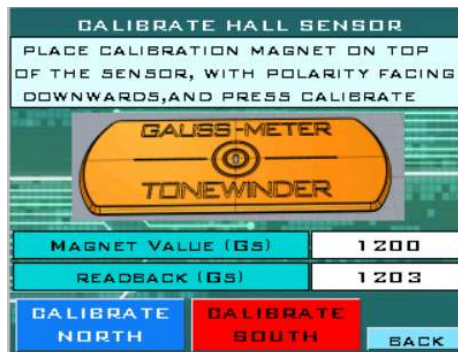
Figure 16: Readback after calibration.

let the instrument finish the calibration (the guide arms will move to the home position and then to the offset position. Then, reset the winder.

- **STEP 10:** Change the magnet with the North polarity facing downwards in the center of the Gaussmeter, and repeat the same process described in the previous step. Then remove the magnet from the Gaussmeter.

Figure 17: Calibration magnet (north calibration).

NOTE: if after the calibration, the readback is not the same as the input value, reset the winder and repeat the from the STEP 9.

- **STEP 11:** Reset the unit, from the "SETTINGS" menu, and when the initialization is finished, go to the MAIN MENU and press "GAUSSMETER" (take care that there isn't any magnet located on the sensor because when you press this button, Tonewinder makes an Autozero of the signal).
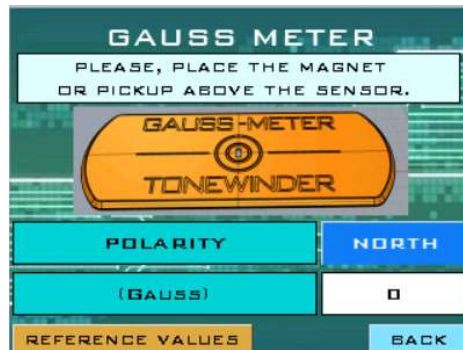
Figure 18: Gaussmeter page.

- **STEP 12:** Verify, using the magnet provided in the kit, that the measured value is correct in both polarities. Up to 5/10% variation is considered acceptable due to the magnet not being exactly in the same position.
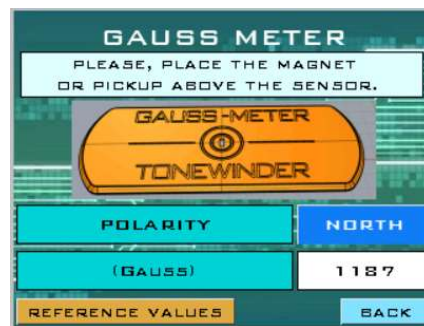

Figure 19: Magnet value verification.

NOTE: If the value is not correct, reset the unit and repeat from STEP 9.

Once the Gaussmeter is calibrated and verified, you can use it to measure your magnets. This hall sensor can work under a linear range of up to 2300/2500 Gs, in both polarities North and South, which is almost double the strongest magnets used for guitar pickups (excluding Neodymium magnets).

Figure 20: Examples of magnet measurements.

We recommend verifying the calibration magnet from time to time (once per month, for example), to check if the calibration is still fine. In case you have doubts about the readbacks of the magnets, you can recalibrate the sensor by repeating the procedure from **STEP 9**.

In addition, you can find some reference values of the most commonly used magnets:

COMMON REFERENCE
VALUES FOR MAGNETS

MAGNET	ROD	BAR
ALNICO 2	850-1000	530-580
ALNICO 3	630-670	450-490
ALNICO 4	750-790	600-690
ALNICO 5	900-1100	720-760
ALNICO 5 UN	N.A.	450-490
ALNICO 6	660-700	500-580
ALNICO 8	1400-1500	1200-1280
CERAMIC	1250-1400	1270-1350

NOTE: THESE VALUES SHOULD BE TAKEN AS APPROXIMATIONS TO 100% LOAD, AS THEY MAY VARY BY MANUFACTURER.

BACK

Figure 21: Common reference values for magnets.

7. <u>CONTACT FOR SUPPORTING:</u>

If you face any kind of problem during the installation of this kit, please contact us by email:

<p align="center">info@tonewinder.com</p>