Tonewinder V1.2 Lite
The Ultimate CNC Winder

Operating Manual

Revision 1.0 • April 2024

Original Operating Manual

The hardware descriptions in this manual revision refer to devices **Tonewinder V 1.2 Lite**.

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Contacting Us

There are several ways to contact us:

Ordering Information

For ordering information or sales support for **Tonewinder OE** products, contact your local **Tonewinder OE** sales organization. For contact information, go to Contact Us at http://www.Tonewinder.es.

Technical Assistance

For technical support for **Tonewinder OE** products, contact your local **Tonewinder OE** support organization. For contact information, go to Contact Us at http://www.Tonewinder.es.

Contents

1 Using this Manual

This chapter provides information about this manual, the conventions used throughout the manual, and the reference documentation that is available in addition to this manual.

1.1 About this Manual:

This manual describes the functional features and operating principle of your **Tonewinder *V 1.2 Lite "The ultimate CNC winder"*** and provides instructions for installation, setup, start-up, shutdown, operation, maintenance, and troubleshooting.

The layout of this manual is designed to provide quick reference to the sections of interest to the user. To obtain a full understanding of your device, read this manual thoroughly.

This manual also contains safety messages, precautionary statements, and special notices that can prevent personal injury, damage to the device, or loss of data when followed properly.

Note the following:

• The **Tonewinder** configuration may vary; therefore, not all descriptions necessarily apply to your particular device.

• If some detail applies to only one model or variant, the model or variant is identified by name.

• Illustrations in this manual are provided for basic understanding. They can vary from the actual model of the device or component. However, this does not influence the descriptions. No claims can be derived from the illustrations in this manual.

1.2 Conventions:

This section describes the conventions that are used throughout this manual.

1.2.1 Safety Messages:

The safety messages and precautionary statements in this manual appear as follows:

• Safety messages or precautionary statements that apply to the entire manual and all procedures in this manual are grouped in the Safety chapter.

- Safety messages or precautionary statements that apply to an entire section or multiple procedures in a section appear at the beginning of the section to which they apply.

- Safety messages that apply to only a particular section or procedure appear in the section or procedure to which they apply. They appear different from the main flow of text.

Safety messages are often preceded by an alert symbol and/or alert word. The alert word appears in uppercase letters and bold type.

Make sure that you understand and follow all safety messages presented in this manual.

1.2.2 Special Notices and Informational Notes:

Special notices and informational notes in this manual appear different from the main text flow. They appear in boxes and a note label identifies them. The label text appears in uppercase letters and bold type.

NOTICE Highlights information necessary to prevent damage to the device or invalid test results.

TIP Highlights information of general interest or helpful information that can make a task easier or optimize the device's performance.

1.2.3 Typographical Conventions:

These typographical conventions apply to the descriptions in this manual:

Data Input and Output

- The following appears in **bold** type:
  - ◆ Input that you enter by the keyboard or that you select with the mouse
  - ◆ Buttons that you click on the screen
  - ◆ Commands that you enter by the keyboard
  - ◆ Names of, for example, dialog boxes, properties, and parameters

- For brevity, long expressions and paths appear in the condensed form, for example: Click **START > MAIN MENU > NEW BOBBIN**

References and Messages

- References to additional documentation appear *italicized*.

- Messages that appear on the screen are identified by quotation marks.

Viewpoint

If not otherwise stated, the expressions *left* and *right* in this manual always refer to the viewpoint of a person who is facing the device from the front.

Particularly Important Words

Particularly important words in the main flow of text appear in **bold** or *italicized*.

Electronic Manual Version (PDF)

The electronic version (PDF) of the manual contains numerous links that you can click to go to other locations within the manual. These include:

- Table of contents entries

- Index entries

- Cross-references (in orange text), for example, to sections and figures

2 Safety

This chapter provides general and specific safety information and informs about the intended use of the device.

2.1 Safety Symbols and Signal Words:

2.1.1 Safety Symbols and Signal Words in This Manual:

This manual contains safety messages to prevent injury to the persons using the device. The safety symbols and signal words in this manual include the following:

Always be aware of the safety information. Do not proceed until you have fully understood the information and consider the consequences of what you are doing.

CAUTION Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

WARNING Indicates a hazardous situation that, if not avoided, could result in serious injury.

2.1.2 Observing this Manual:

Observe the following:

- Before installing or operating the device, read this manual carefully to become familiar with the winder and this manual. The manual contains important information about user safety as well as the use and care of the device.

- Always keep the manual near the device for quick reference.

- Save this manual and pass it on to any subsequent user.

Read, understand, and comply with all safety messages and precautionary statements presented in this manual.

2.1.3 Safety Symbols on the Device:

The table lists the safety symbols that can appear on the device or labels affixed to the device. Follow the safety notices in this manual to prevent the risk of operator injury or damage to the device.

Symbol	Description
⚠	Indicates a potential hazard. Refer to this manual to avoid the risk of personal injury and/or to prevent damage to the device.
O ——	The power supply is off. The Power supply is on
~	Indicates alternating current.
⏚	Indicates a terminal for protective grounding.
⏚	Indicates a terminal for functional grounding

2.2 Intended Use:

The device is designed for use in the manufacture of musical instrument pickup coils.

The device is for use by qualified personnel only.

2.3 Safety Precautions:

2.3.1 General Safety Information:

All users must observe the general safety information presented in this section and all specific safety messages and precautionary statements elsewhere in this manual during all phases of installation, operation, troubleshooting, maintenance, shutdown, and transport of the device.

> If the device is used in a manner not specified by **Tonewinder OE**, the protection provided by the device could be impaired. Observe the following:
>
> - Operate the device only within its technical specifications.
>
> - Use only the replacement parts and additional components, options, and peripherals specifically authorized and qualified for the device by **Tonewinder OE**.
>
> - Perform only the procedures that are described in this operating manual and supporting documents for the device. Follow all instructions step by step and use the tools recommended for the procedure.
>
> - Open the enclosure of the device and other components only if specifically instructed to do so in this manual.
>
> - **Tonewinder OE** cannot be held liable for any damage, material or otherwise, resulting from inappropriate or improper device use. If there is any question regarding appropriate usage, contact **Tonewinder OE** before proceeding.

Safety Standard

This device is a Safety Class I instrument (provided with a terminal for protective grounding). The device has been manufactured and tested according to international safety standards.

2.3.2 Qualification of the Personnel:

Observe the information below on the proper qualification of the personnel repairing the device.

⚠️ **Repairs**

Only skilled personnel are permitted to repair the device and to establish the electrical connections according to the appropriate regulations**. Tonewinder OE** recommends always having service personnel certified by **Tonewinder OE** perform the repairs.

2.3.4 Electrical Safety Precautions:

⚠️ **WARNING— Electric Shock or Damage to the Device**

High voltages are present inside the device that could cause a electric shock or damage to the device.

- Do not make any changes to the electrical or grounding connections.
- If you suspect any kind of electrical damage, disconnect the power cord and contact **Tonewinder OE** Technical Support for assistance.
- Do not open the housing or remove protective panels unless specifically instructed to do so in this manual.
- Do not place liquid reservoirs directly upon the device. Liquid might leak into the device and come into contact with electronic components causing a short circuit.

2.4 Compliance Information:

Tonewinder OE performs complete testing and evaluation of its products to ensure full compliance with applicable domestic and international regulations. When the device is delivered to you, it meets all pertinent electromagnetic compatibility (EMC) and safety standards as described in this manual.

Changes that you make to the device may void compliance with one or more of these EMC and safety standards. Changes to the device include replacing a part or adding components, options, or peripherals not specifically authorized and qualified for the product by **Tonewinder OE**. To ensure continued compliance with EMC and safety standards, replacement parts and additional components, options, and peripherals must be ordered from **Tonewinder OE** or one of its authorized representatives.

The device has been shipped from the manufacturing site in a safe condition.

3 Device Overview

This chapter introduces you to the device and its main components.

3.1 Device Features:

The device comprises the following main features:

- **User-friendly Pickup winder** for musical instruments, **totally autonomous**, works without the need for a computer connection.

- Winding speed may reach **1500 r.p.m**.. Nevertheless, we do recommend not to exceed 1,000 r.p.m.

- Compatible with **any wire gauge**. Tonewinder has been specially tested with wires from AWG38 to AWG45.

- Only for working under **Manual winding mode,** with additional manual speed control.

- This model **can be upgraded in the field to Tonewinder 1.2 R2**, just by installing a Lite-R2 Upgrade Kit.

- There is a **tachymetric sensor** that holds the winding in case of motor blocking.

- All settings and controls are made with the 2,8-inch touchscreen so **there is no need for a PC connection**.

- **Software upgrades can be made via Wi-Fi** (Only Microcontroller). Touch Screen must be upgraded with a microSD card.

- Tonewinder incorporates an **accurate magnetic field meter** (Gaussmeter), to evaluate the charge level of the magnets.

- Tonewinder also includes a **Pickup Calculator**, to help you design your windings.

- There is a **library of iconic pickups**, where you can see the essential parameters, including the winding diagram, and you can apply this data to your projects.

- The software includes an **Interactive Help**. By clicking on any parameter, you will get a more detailed explanation.

- Tonewinder incorporates **troubleshooting and maintenance sections.**

3.2 Operating Principle:

Tonewinder 1.2 Lite is designed for winding up instrument pickups, generally guitars and basses but it can be used for other purposes (electric coils, etc.). Its main function is to be able to wind up musical instrument pickups, doing it with the accuracy that a CNC offers you, the advantage of which is to control at all times:

- Speed of rotation of the bobbin

The wire guidance is done manually by adjusting the winding limits with two stops.

The following picture shows the interior components of **Tonewinder 1.2 Lite**, and illustrates how the device operates:
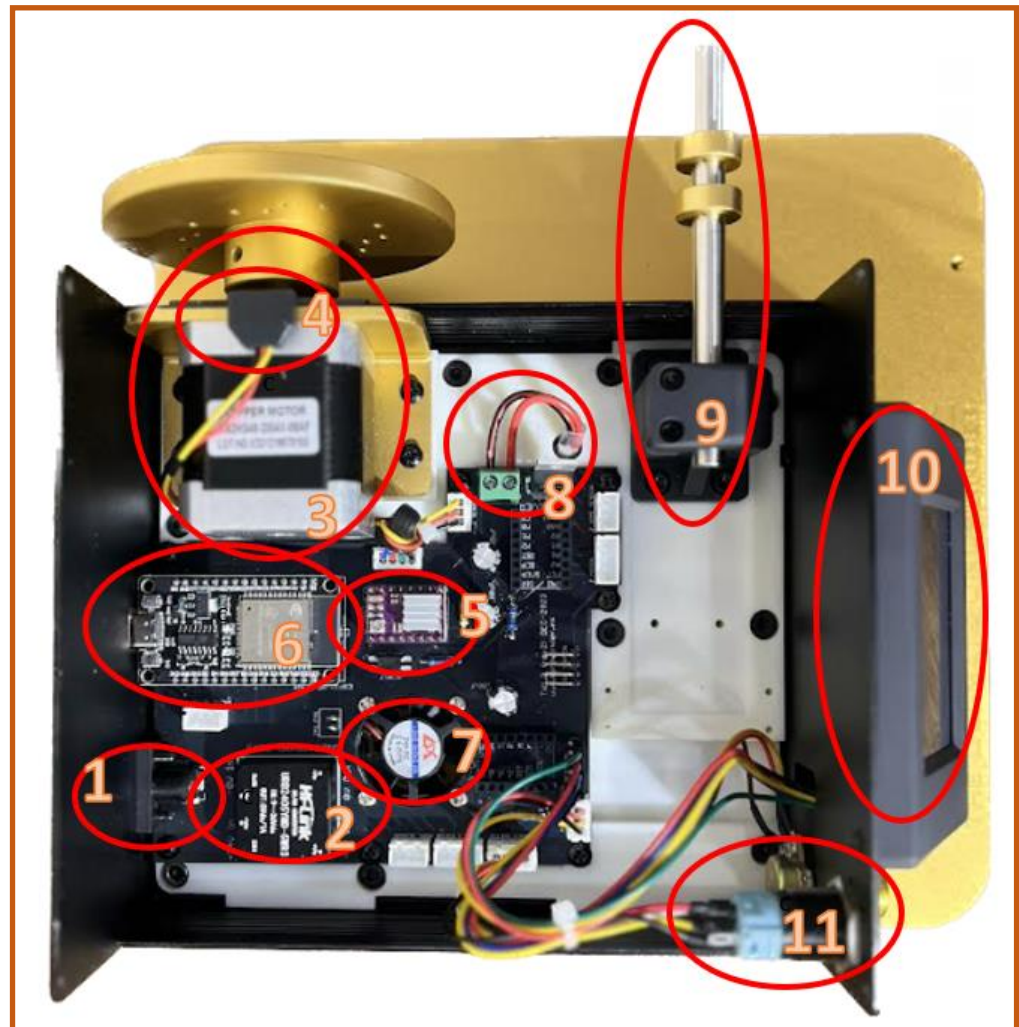
*Figure 1: Inside view of **Tonewinder V1.2 Lite***

No.	Description	No.	Description
1	Main power 24V entrance	9	Wire support Rod
2	Power supply 5v	10	Touch screen 2.8"
3	Step Motor Y – Nema 17	11	Main power switch and knob
4	Tachometer sensor		
5	Driver DRV8825 motor Y		
6	Microcontroller ESP32		
7	Cooling fan		
8	Cosmetic Ligth power control		

3.3 External Components:

On the front-right, the device provides easy access to the user-accessible components:

*Figure 2: Front-right side view of the device (here: **Tonewinder 1.2 Lite**)*

No.	Description
1	Power button
2	Control knob (factor)
3	Touch screen 2.8"
4	Gaussmeter sensor
5	Touchscreen pen stick
6	Wire support Rod (w/stops)
7	Plate to install the coils

3.4 Touch Screen Display (HMI):

ToneWinder has a 2,8-inch Nextion Enhanced touchscreen with high sensitivity and precision. A touchscreen pen stick is attached in a convenient holder.

3.5 Coils Plate:

The cylindrical plate to fix the coils is machined in aluminum, with a gold anodized finish. It has 2.5 metric threads to house any available coil in the market. It also has a central thread to be able to fix the simple coils, using a fixing piece.

Figure 3: Plate to install the coils

Grooves are made in the holding plate to house the pickup eyelets, so they can be perfectly seated on the plate.
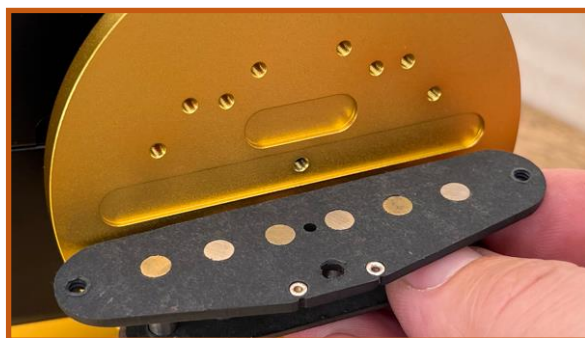
Figure 4: Coil plate insertions

3.7 Software Operation:

Tonewinder is designed to be operated from the integrated touchscreen display, without using a computer. The software provides complete instrument control.

Two software packs are running inside **Tonewinder**. The software running in the ESP32 microcontroller that can be upgraded via Wi-Fi or USB cable. The touchscreen software can be upgraded only via a Micro-SD card.

Figure 5: ESP32 Software update screen

The very last version of both software packages is available for download on the **Tonewinder** website: http://www.Tonewinder.es.

4 Unpacking

This chapter provides information for unpacking the device and informs you about the scope of delivery.

4.1 Unpacking:

Damaged Packaging, Defective on Arrival

Inspect the shipping container for signs of external damage and, after unpacking, inspect the device for any signs of mechanical damage that might have occurred during shipment.

If you suspect that the device may have been damaged during shipment, immediately notify the incoming carrier and **Tonewinder OE** about the damage. Shipping insurance will compensate for the damage only if reported immediately.

4.2 Scope of Delivery:

Tonewinder is delivered without hard case, but if you want you can order it with a protective case:

Figure 6: Hardcase view (optional)

In addition to Tonewinder, the following items are also included in the delivery:

Figure 7: Accessories in Tonewinder 1.2 Lite

No.	Name	Function
1	External Adaptor/Power Supply 24 Vdc/1 A	Supply energy from the power wall socket to the winder. Works with 110vac and 230 vac.
2	Adapter for single coils	Fix the single coils (magnets protruding) to the plate. Two sizes.
3	Lifter for humbucker bobbins	The part that lifts the humbucker coil when a cable is soldered to the wire at the start of the coil.
4	Calibration Magnet	Magnet to calibrate the Gaussmeter. Usually 1200 Gs.
5	Allen Key Set	Set of different Allen keys.
6	HB Bobbin screws	For fixing the humbucker coil to the plate.
7	Single Coil Screw	For fixing the single coil to the plate.
8	Lint-free cleaning cloth	Lint-free cleaning cloth

5 Installation

This chapter specifies the requirements for the installation site and describes how to set up, install, and configure the device.

5.1 Installing the device:

The device is installed and set up by the buyer and must follow the steps below.

1. Pay attention to the safety guidelines and observe all site requirements. For the safety guidelines when installing the device.

2. Set up the device hardware.

3. Turn on the device.

5.2 Site Requirements:

The operating environment is important to ensure the optimal performance of the device. This section provides important requirements for the installation site. Note the following:

5.3.1 Workbench:

For dimensions and weight of the device, see chapter 9 Specifications.

Provide a sturdy workbench of a height that ensures convenient access to the interior of each device in the system. The workbench must stand in a secure and level position that is free of vibrations. The bench top must be dry and clean.

Allow sufficient free space on the sides and on the rear of the system for electrical connections and proper air circulation. Allow at least 15 cm of clearance on the rear, at least 20 cm of clearance on each side, and at least 30 cm of clearance above the top.

Make sure that the power switch and power cord can be easily reached at any time.

5.3.2 Power Considerations:

The power supply of the device has wide-ranging capability, accepting any line voltage in the range specified for the device.

CAUTION—Electric Shock or Damage to the Device

- Connecting the device to a line voltage higher or lower than specified could result in personal injury or damage to the device. Therefore, connect the device to the specified line voltage only.

- Do not use defective multiple sockets or extension cords, as they could result in personal injury or damage to the device.

- After the power to the device is turned off, the device is still energized as long as the power cord is connected. Repair work on the device while the device is connected to power could lead to personal injury. Therefore, always unplug the power cord before starting repair work inside the device. If you were instructed to remove any covers or panels, do not connect the power cord to the device while the cover or panels are removed.

5.3.3 Power Cord:

The power cords are designed to match the wall socket requirements of the country in which they are used. The end of the power cords that plug into the power socket on the device is identical for all power cords. The end of the power cords that plug into the wall socket is different.

WARNING—Electric Shock or Damage to the Device

- Never use a power cord other than the power cords provided by **Tonewinder OE** for the device.

- Only use a power cord that is designed for the country in which you use the device.

- Do not use defective multiple sockets or extension cords, as they could result in personal injury or damage to the device.

- In case of emergency, it must be possible to reach the power cord easily at any time to disconnect the device from the power line.

5.3.4 Condensation:

> **NOTICE** Condensation in the device can damage the electronics. Therefore, when using, shipping, or storing the device, avoid or minimize conditions that can lead to a build-up of condensation in the device. For example, avoid significant or fast changes in environmental conditions. If you suspect that condensation is present, allow the device to warm up to room temperature. This may take several hours. Wait until the condensation is gone completely before connecting the device to the power line.

5.3.5 Operating Conditions:

When operating the device, make sure that the installation site meets these general environmental and operating conditions:

Temperature

Temperature fluctuations can affect the performance of the device. Avoid locations with significant changes in temperature and strong air drafts. For example, do not place the device in direct sunlight, near heating or cooling sources, or under an air duct.

Humidity

The relative humidity of the operating environment is important for the performance of the device. Operate the device in the specified humidity range, with no condensation.

When the humidity is too high, condensation may occur, causing damage to the electronic components in the device. When the humidity is too low, static electricity may accumulate and discharge, shortening the life of the electronic components.

Vibration

Vibrations may affect the performance of the device. Therefore, the installation site should be free of vibrations. Avoid placing the device in locations where vibrations are caused by other instruments.

5.4 Setting Up the Hardware:

Tonewinder comes fully tested, calibrated, and ready to use. You just need to connect the mains cable and switch it ON.

5.5 Turning On Tonewinder:

1. Turn on the device with its main power switch.

2. Wait until the device completes the following sequence of events after power-up:

   ♦ *Self-test diagnostics*

   The device runs a series of internal tests. During these self-diagnostics, all of the main components are checked.

Figure 8: Start-up screen

If an error is detected during the self-test, the device is not ready for work. For further information, see chapter 8 Troubleshooting.

If **Tonewinder** initializes correctly, it will automatically jump to the start screen, where you can see which software versions are installed on your unit.

Figure 9: Start-up screen after initialization process

6 Operation

This chapter describes the elements of device control, and provides information for routine operation and for shutdown.

6.1 Introduction to this Chapter:

The information in this chapter assumes that the initial setup of the device has been completed. If this is not the case, refer to the instructions in the Chapter 5 before proceeding.

6.2 Touch Screen Display:

The role of the keys depends on the screen presented. These keys are called *general* keys.

General Soft Key Functions

Depending on the screen, general soft key functions are available:

Soft key	Description
Back	To come back to the previous screen
Main	To go directly to the Main Menu
Reset	To reset the device, and come back to the initial screen

6.3 Terminology:

Please find below a concise description of the parameters utilized in the **Tonewinder** software, along with their recommended values. A warning message will be displayed if any parameter exceeds these predefined limits. For further assistance, you can access the contextual help screen by simply tapping on the corresponding parameter icon.
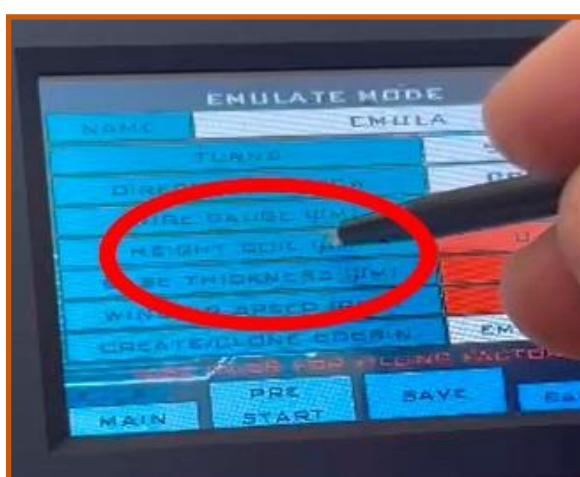

Figure 10: Contextual help access

Parameter	Description	Range
Max Speed	Max speed that Tonewinder can operate	Up to 1500 RPM
Initial turns	Number of turns that the device runs at extra low speed.	<20 turns
Manual mode	Mode where you need to distribute the wire manually, during the winding.	n.a.
CW	The direction of rotation of the plate clockwise	n.a.
CCW	The direction of rotation of the plate counterclockwise	n.a.
Winding speed	Speed used to winder the bobbin	[50, 1500] rpm

6.3.1 Interactive help:

Clicking with the stick pen on the parameter name you will see a comprehensive description of the selected parameter/variable.
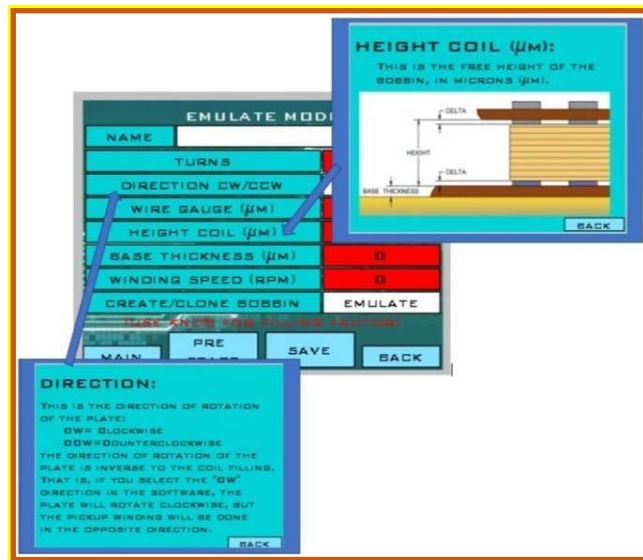

Figure 11: Interactive Help Screens

6.4 Preparing Tonewinder for Operation:

This section gives information on any additional steps that are required to prepare the device for operation and wind up a bobbin.

6.4.1 Setting up the wire:

Before Operating **Tonewinder** *for each bobbin, setting up the wire.*

Prepare **Tonewinder** for winding a bobbin, follow the next steps to set up the wire properly (You may find your own way to do this):

1. Fix the pickup to the plate firmly and make sure it rests completely flat against the aluminum plate (using the fixing screws), then fix the wire with adhesive tape to the winding plate having in mind to let distance enough to later make the soldering or necessary connections (If it is not already soldered to the pickup).
2. Place the cooper wire between two stops.
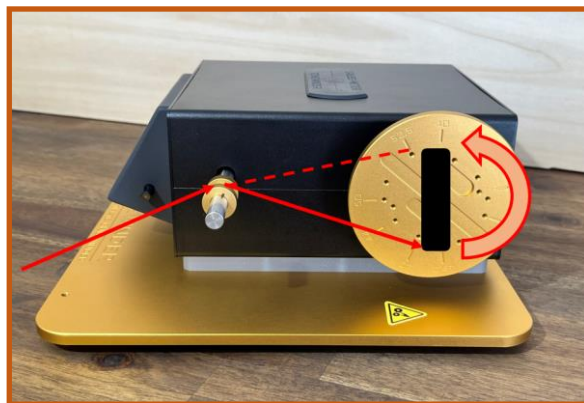

Figure 12: Wire Support Rod

Figure 12+1: Wire scheme. Right side view.

NOTE: Please keep in mind that the direction of rotation of the plate is inverse to the coil filling. That is, if you select the "**CW"** direction in the software, the plate will rotate clockwise, but the pickup winding will be done in the opposite direction.

6.5 Operating with Tonewinder:

Operating **Tonewinder** is very simple. Everything is managed through the program loaded on the ESP32 microcontroller and the Nextion touch screen (or HMI, Human Machine Interface), without the need to be connected to a PC.

Figure 14: Initial screen

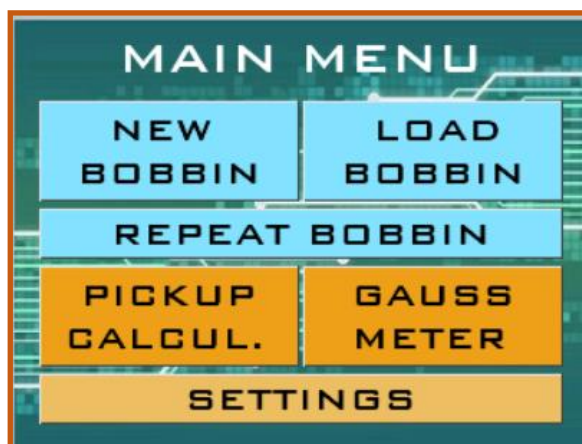After switching ON the winder, pushing **"START"**, the "**MAIN MENU"** is shown. The options you may select are:

*Figure 15: "**MAIN MENU"** screen*

Next we will review "**MAIN MENU**" options.

6.5.1 Create a "NEW BOBBIN":

You can create a new bobbin from scratch. There is only one available winding mode:

*Figure 16: "**NEW BOBBIN**" screen*

In addition, you can also use one of the presets listed in the "Iconic Pickup Wizard" section.

6.5.1.1 Manual mode:

Within this menu you can also make a manual winding of a pickup, selecting the total number of turns, the maximum winding speed, and the direction of rotation:
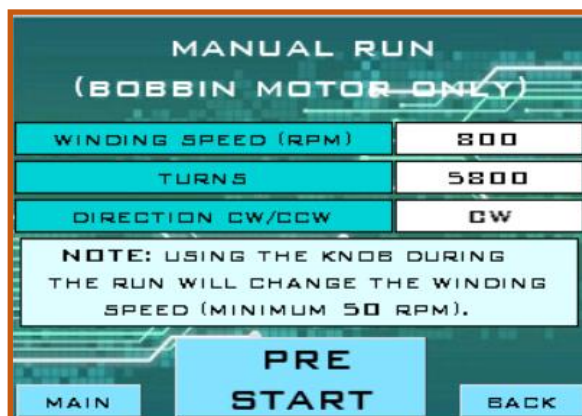

*Figure 17: "**MANUAL RUN**" screen*

Winding speed can be continuously varied, by activating the potentiometer, between 50 r.p.m. and the selected speed chosen in previous screen.

During the run, some values are shown, like the target and actual turns, the remaining time, and the estimated RPM. Since the rotation speed is measured by the hall sensor, and it averages the measurements taken, when you modify the speed with the knob it takes a few seconds to update the correct speed value.

*Figure 18: "**MANUAL RUN**" screen*

6.5.1.2 Iconic Pickup Wizard Section:

In this section, you have access to a library of some of the most famous pickups of all time. To access this library, inside the "MAIN MENU", click on the button at the bottom left:

*Figure 19: "**ICONIC PICKUPS WIZARD**" access*

NOTE: All the information in this section is a compilation of the most popular pickups and is intended to be helpful. It is possible that some specifications or dimensions may not exactly match the original. If you are going to use the presets in this section, you should check the coil and wire diameter before using them.
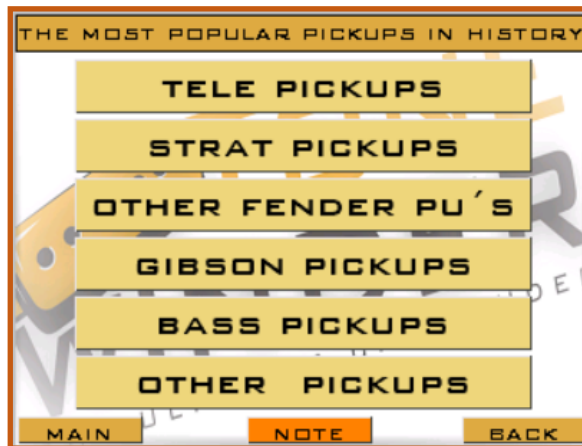

*Figure 20: "**ICONIC PICKUPS WIZARD**" screen*

This library has different categories, depending on the pickup you want to make. For example, if you go to the "STRAT PICKUPS" section:
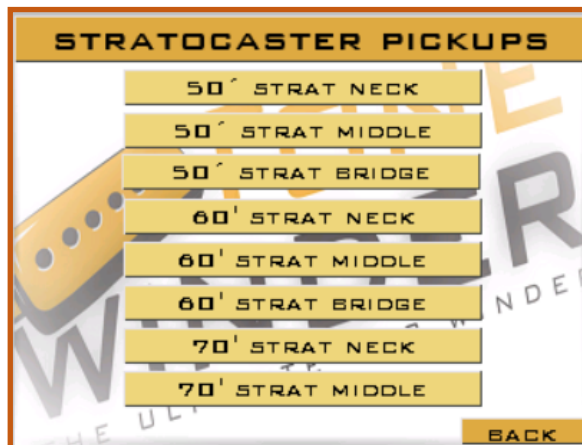

*Figure 21: "**STRATOCASTER PICKUPS**" menu*

If you select one of the pickups, for example, "60' STRAT NECK", a new screen will appear with a picture of this pickup and its basic construction parameters:

*Figure 22: "**60' STRAT NECK**" screen*

In addition, we will have access to a useful construction diagram (by clicking "VIEW SCHEME"), which will indicate the direction of rotation of the wire and the plate, as well as the distribution of the pick-up output cables.
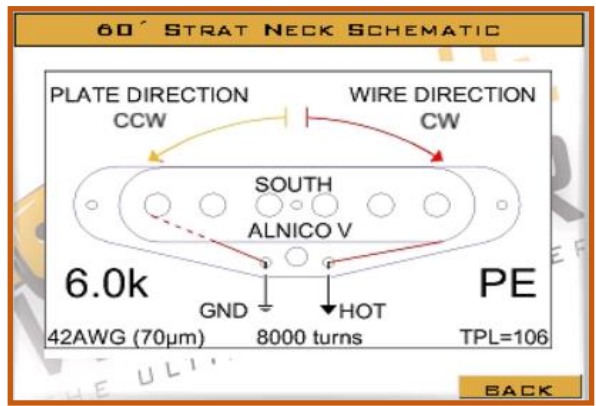

*Figure 23: "**60' STRAT NECK SCHEMATIC**" screen*

This information is also available for humbucker pickups, such as the famous PAF:
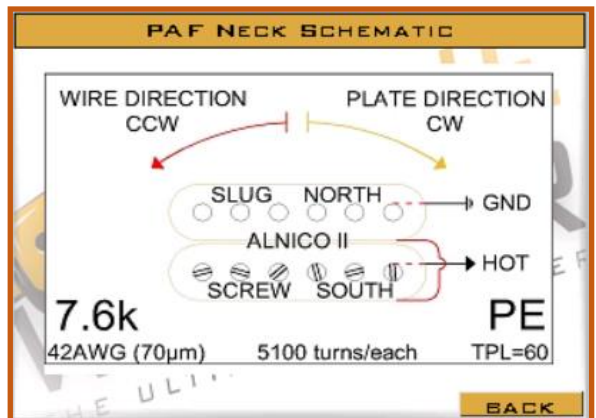
*Figure 24: "**PAF NECK SCHEMATIC**" screen*

6.5.2 Load Bobbin:

In this menu you can load the parameters of both a coil stored in memory by "**DEFAULT**", and a previously saved coil:

*Figure 25: "**LOAD BOBBIN**" screen*

There is 1 coil saved by default and space to store up to 59 new coils, spread out over 5 pages. Once the data is saved, it remains stored in the SPIFFS memory of the ESP32. Via Wi-Fi, you can download these memories to a PC, to later reload them in **Tonewinder**.

6.5.3 Repeat Bobbin:

By choosing this option you may repeat the last winded coil.

*Figure 26: "**REPEAT BOBBIN**" button*

You may also use **SAVE** from this screen.
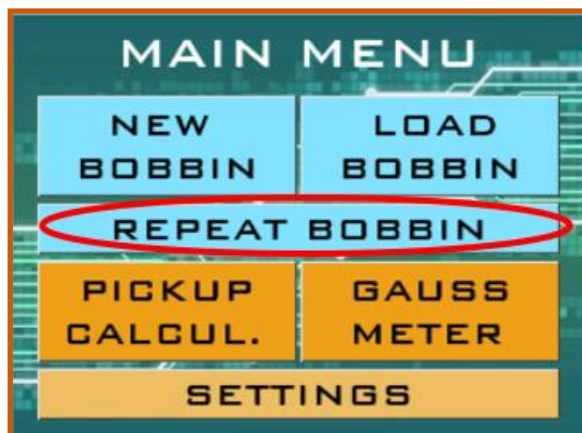
6.5.4 Pickup Calculator:

In this new software version (from 10.4), a pickup calculator has been implemented which allows you to calculate very accurately the number of turns needed to achieve a given pickup resistance, taking into account the geometry of the bobbin, the type of wire used and the winding conditions. It also calculates the outer dimensions of the coil to avoid exceeding the physical limits of the coil.
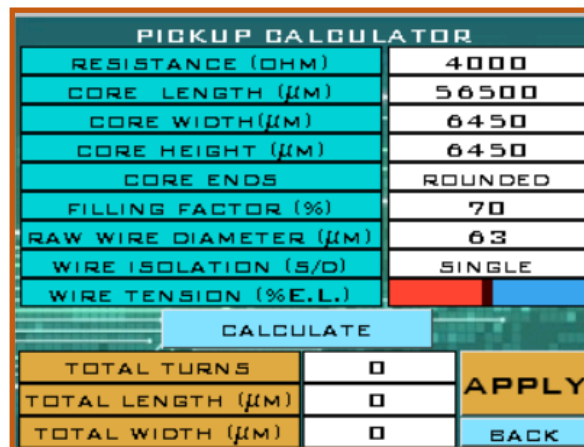
*Figure 27: "**PICKUP CALCULATOR**" screen*

By entering the internal measurements of the bobbin, the geometry at the ends, the type of wire used, the filling factor, and the percentage of tension of the wire with respect to its elastic limit, the program returns the estimated number of turns to achieve this resistance, as well as the external measurements of the winding once it is finished.

NOTE: note that this value depends on other factors such as the internal dimensions of the bobbin core, the type of wire used, the winding strategy and the filling factor of the bobbin. For this reason, this calculation should be understood as a guideline value.
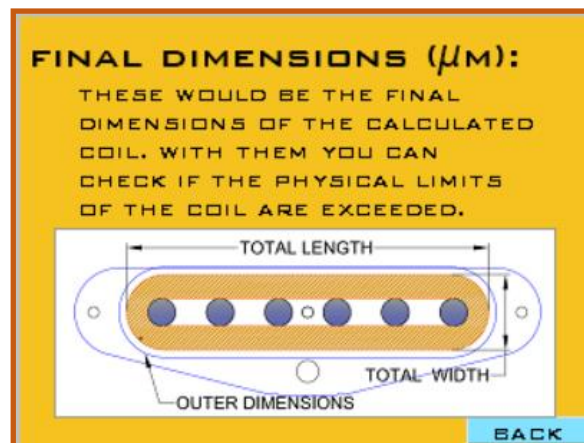
Figure 28: Final dimension diagram

Once this value is calculated you can apply to a real winding program (only constant mode) just clicking in the "**APPLY**" button.

Also, remember that you can access to the interactive help for each parameter just by clicking on the parameter name field.

Figure 29: Some interactive help screens

6.5.5 Gaussmeter:

This new version of **Tonewinder** incorporates a powerful and useful magnetic field meter (Gaussmeter), to be able to evaluate the charge of the magnets of your bar or rod magnets.

Figure 29: Gaussmeter operation

The linear range of this device is about ±2300/2500 Gs, which covers by far the usual values for pickup magnets, usually below ±1300/1500 Gs.

It can also be calibrated using the calibration and verification magnet supplied with the winder.

6.5.5.1 Gaussmeter Operation:

The operation of the Gaussmeter is very simple, just place the magnet just above the hall sensor, and Tonewinder will show you the polarity of that side of the magnet, and the value of the magnetic field, measured in units of Gauss (Gs).

NOTE: Please note that the magnet should not be on top of the sensor when you enter this screen, as Tonewinder will be auto-zeroing the sensor at this point, so there should be no magnetic field on the sensor. If you have entered the page with the magnet on top of the sensor, exit the screen, remove the magnet, and re-enter the screen.
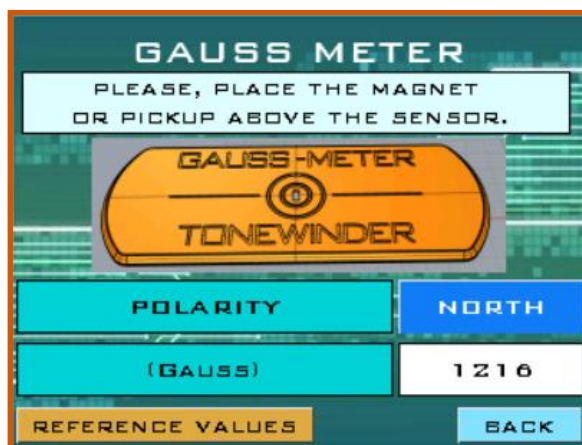
*Figure 30: "**Gaussmeter**" screen*

A verification and calibration magnet is supplied with your Tonewinder unit, with the value of the magnetic field in both polarities.

Figure 31: Verification/calibration magnet

You can use it from time to time to check that the sensor is measuring correctly. If the measurements are not correct, the sensor must be recalibrated. Up to 5/10% variation is considered acceptable due to the magnet not being exactly in the same position.

This new tool also incorporates a table with the most common reference values for the different types of magnets used for pickups. This section can be accessed by clicking on the reference values button.

Figure 32: Common reference values for magnets

6.5.5.2 Gaussmeter Calibration:

All units come calibrated with the appropriate magnet, but if you are not getting good magnetic field readings or have doubts that it is working correctly, you can calibrate the sensor with a simple procedure explained below.

To calibrate this device, you have to access from "MAIN MENU>SETTINGS>GAUSSMETER CALIBRATION", and you will access to this screen:
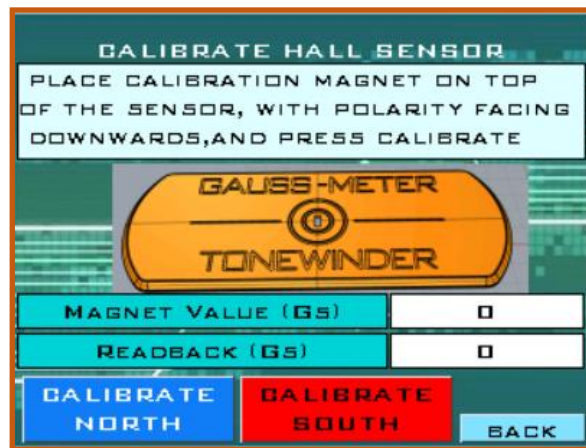
*Figure 33: "**Calibrate Gaussmeter**" screen*

And follow next steps:

- **STEP 1:** 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.

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

Figure 34: Calibration magnet (south calibration).

then input the value of Gauss that is provided with the magnet on the "Magnet value (Gs)" field,
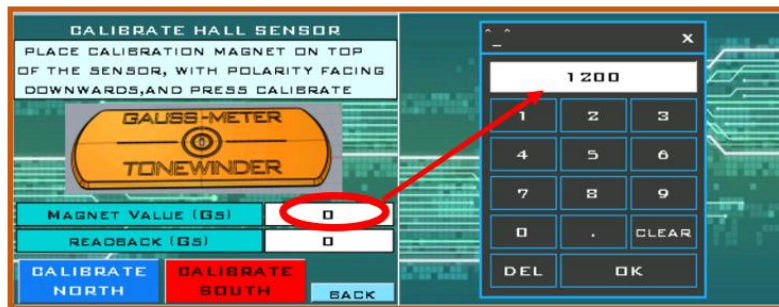
Figure 35: Input the magnet value.

and press "Calibrate South". Once the readback field shows you the value (it must be almost the same as the input value),
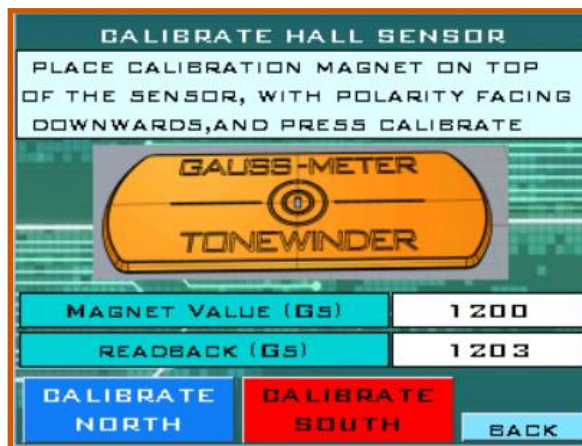
Figure 36: Readback after calibration.

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 2:** 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 37: 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 1.

- **STEP 3:** 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 is any magnet located on the sensor because when you press this button, Tonewinder makes an Autozero of the signal).
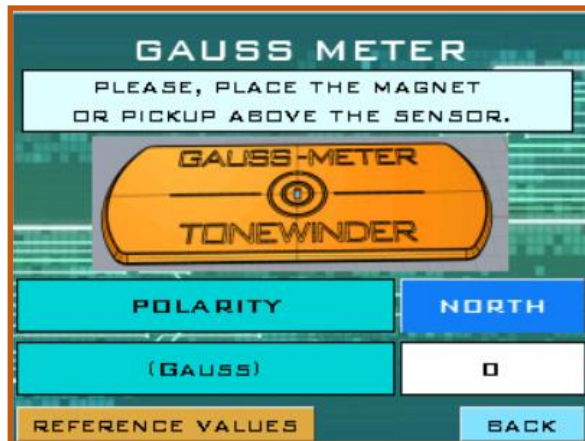
Figure 38: Gaussmeter screen.

- **STEP 4:** 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.
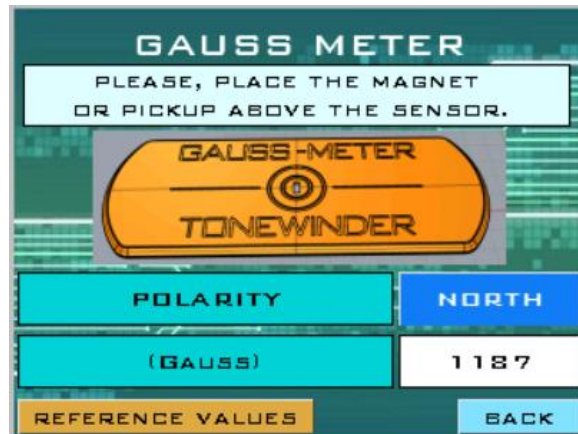
Figure 39: Magnet value verification.

NOTE: If the value is not correct, reset the unit and repeat from STEP 1.

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).

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 1**.

6.5.6 Settings:

In this section you can adjust the main parameters of the winder, it also allows you to calibrate Gaussmeter (see section <u>6.5.5.2 Calibrate Gausmeter</u>), access to Maintenance and Troubleshooting sections, update the ESP32 microcontroller software, through a Wi-Fi network, and reset the device.
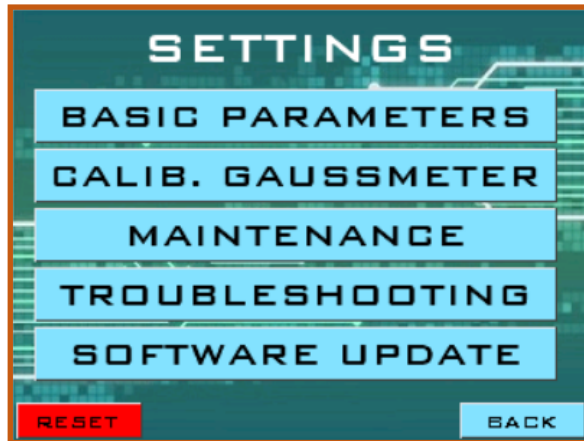
*Figure 40: "**SETTINGS**" screen*

6.5.6.1 Basic Parameters:

In the Basic parameters screen you have these parameters:
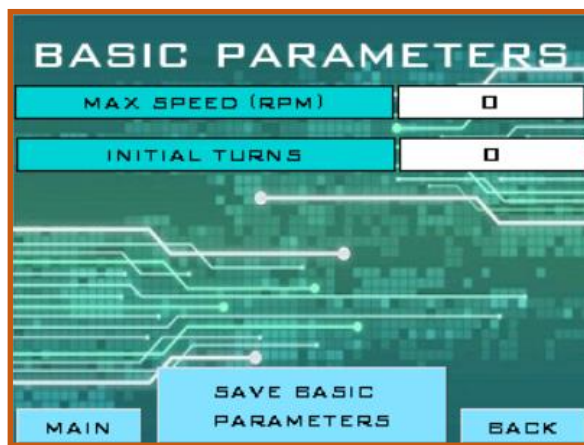
*Figure 41: "**BASIC PARAMETERS**" screen*

- **Max Speed**: allows you to limit the maximum winding speed, to avoid that we can mistakenly select a very high coil speed, the system limits the speed to this value. Don't exceed 1500 RPM.
- **Initial Tuns**: Number of initial turns that the system will perform, to accommodate the thread in the coil, before starting the winding. The default value is 5 turns.

Once you have set or modified any parameter you must click on "**SAVE BASIC PARAMETERS"** to permanently store it.

6.5.6.2 Calibrate Gaussmeter:

See section 6.5.5.2 Calibrate Gausmeter.

6.5.6.3 Maintenance:

This section describes all the maintenance work that you need to carry out on your unit to ensure its correct operation. All these works are also covered in section *"7.1 Routine and Preventive Maintenance"* of this operating manual.
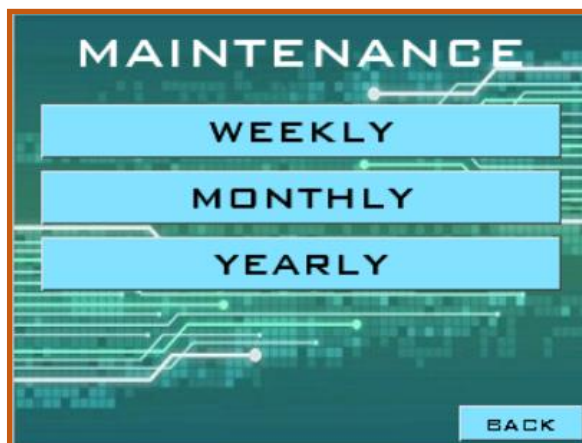
*Figure 42: "**Maintenance"** screen*

By clicking on each button you have access to the maintenance works of each period, including descriptive pictures.

6.5.6.4 Troubleshooting (related only to windings performance):

Only problems related to pick-up winding are covered in this section. Problems related to the operation of the unit are covered in the *"8. Troubleshooting"* section.

6.5.6.5 Software Update (and Upload/Download files):

From the "**SETTINGS**" screen you can also update the microcontroller software via Wi-Fi 2.5G network (No 5G compatibility). To do this, press on the button "**Soft. Update**"and the following screen will shown up :
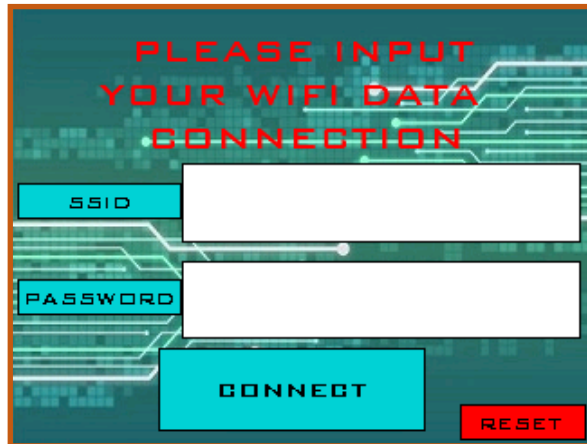
*Figure 43: "**WI-FI CONNECTION"** screen*

Pressing on each of the fields will open the keyboard to be able to enter both, the name of the *Wi-Fi* to which you want to connect and the access password. Be aware of case discrimination.
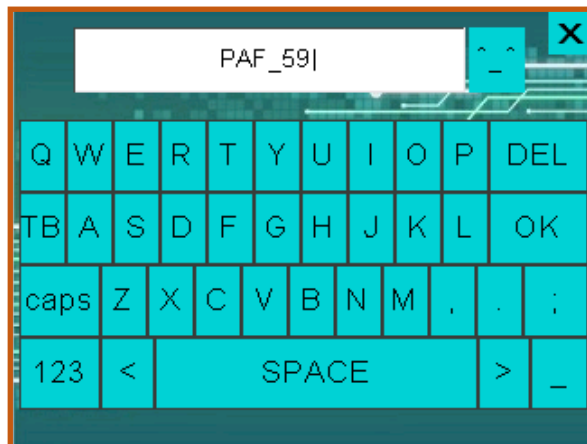
*Figure 44: **QWERTY** keyboard screen*

Once the fields have been properly filled in, by pressing the "**CONNECT**" button the device will show the next screen where you can open the communication to connect with the **Wi-Fi** network, showing you the IP address that you have to write in your browser to connect with **Tonewinder**.

If the winder cannot connect with the router in 25 seconds, it will return to "**SETTINGS**" screen. If this happens, please check the **SSID** name, **password,** and also distance to the router.

When the next screen shows up, **Tonewinder** has managed to establish a connection with the router and show up on the screen the **IP** address that we have to use in the browser of our PC to establish a connection with the **Tonewinder** web server.

*Figure 45: "**SOFTWARE UPDATE**" screen*

Note: It is possible that under certain circumstances (especially distance from **Tonewinder** to the transmitter of the **Wi-fi** network) **Tonewinder** does not connect to the network. If the problem persists, it is recommended to move the device closer to the **Wi-Fi** transmitter, and if this is not possible,

> **WARNING— Electric Shock or Damage to the Device**
>
> High voltages are present inside the device that could cause an electric shock or damage to the device.

 you can temporarily remove the top cover of the equipment, removing the four screws from the corners, during the update process.

Once we have typed in the IP address in our browser, and "**enter**" is pressed,
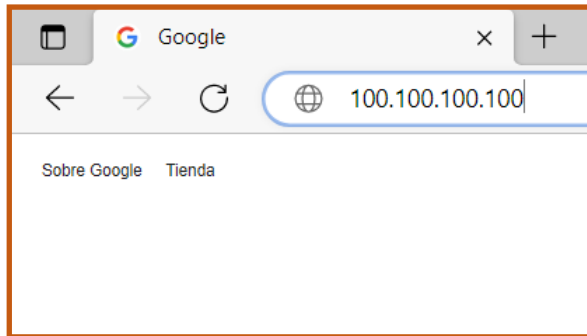
Figure 46: IP address in your navigator

Then, we have to push the connection blue button in the **Tonewinder** screen.

Figure 47: Press Connection button

Next screen will be shown.
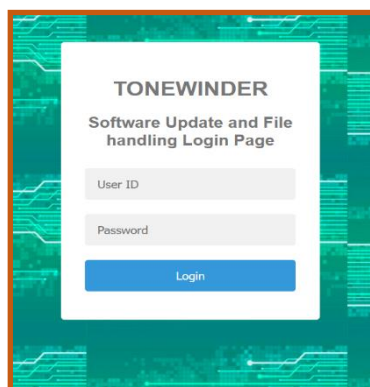
Figure 48: **Tonewinder** *Access screen*

This is the access screen to the **Tonewinder** web server menu. In the "**User ID**" field we must type: **admin** (all lowercase), in the "**password**" field we should type: **tonewinder** (all lowercase). This "*password*" does not provide

security on the internet, so it must be used exclusively in a private environment. Once you enter "U**ser ID**" and "**Password**" we will access the screen **Tonewinder Server**
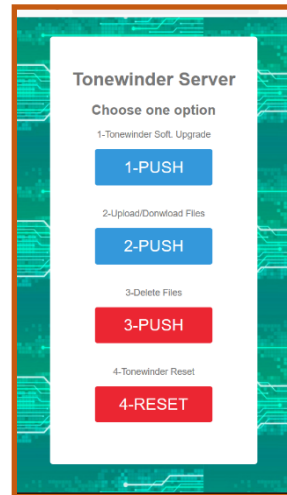
Figure 49: **Tonewinder***server*

Tonewinder Server Options Menu:

1. Update **Tonewinder software.**
2. Upload/Download files from/to a PC.
3. Erase files from **Tonewinder memory.**
4. Reset **Tonewinder.**

By selecting "1. **Tonewinder Soft. Upgrade"**, we must make sure to choose one of the files with .bin extension. This step is crucial because in case of uploading a wrong file **Tonewinder** would be inoperative. You can download the latest version compatible with your **Tonewinder** on http://www.Tonewinder.es the correct files are:

Tonewinder_Inicializer.ino.bin, this program prepares the winder to allocate the working program. This file is only necessary if you are configuring **Tonewinder** from Scratch. If you just want to upgrade a working **Tonewinder**, the only needed file is the **Tonewinder_xx.bin**, this is the working program. You can download the latest version compatible with your **Tonewinder** on http://www.Tonewinder.es
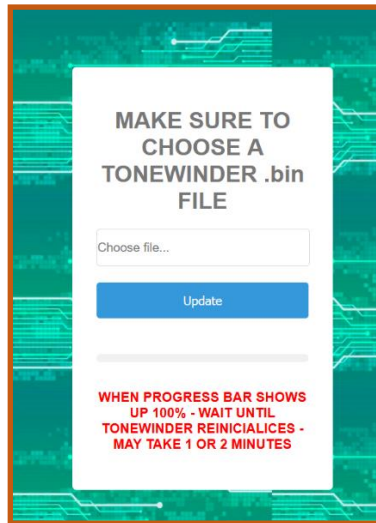
Figure 50: Select a software update

Once the file is selected, press the "**UPDATE**" button. The blue Progress bar will advance. Once 100% is complete, we wait for **Tonewinder** to reboot (it may take less than a few minutes).
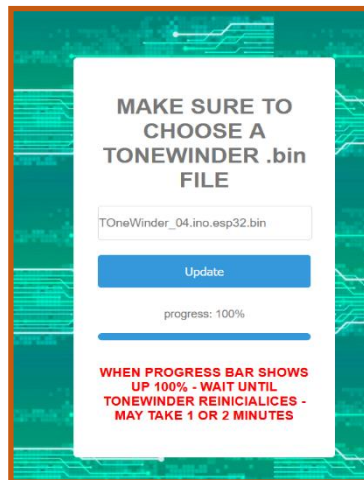
Figure 51: New software updated

When **Tonewinder** restarts, it will be disconnected from the router untill we follow the connecting steps.

NOTE: If the updated file is **ToneWinder_Inicializer.ino.esp32.bin** we have to wait for the screen "FORMATING" is gone to…

Figure 52: Formating Screen

…write again **SSID** and **Password** in the *"WI-FI CONNECTION"* screen to connect to our **Wi-Fi** router.

If we select "**2- Upload / Download Files"** the screen will appear that will allow us to download the files from **Tonewinder** to the download folder on our PC by selecting the file and pressing "**enter**", the download will start.

Figure 53: File list overview

After files **1-59.txt** and **CloneArrayxx.txt** are downloaded, it is recommended to move them from the downloads folder to a folder identified with the file name, such as "**PAF 2022-11-21**".

Through "**Upload file**" we can upload files previously downloaded to the PC back to **Tonewinder**. When selecting the files we will see the progress

monitor advance and through the "**Refresh**" button we will see the list of files updated.

It is important to decide in advance where we want to locate the files uploaded to **Tonewinder**. If we want to store the file in a free memory position or in one already occupied, in this case, the old file will be deleted.

If our file "**1.txt"** that we have named "**Tele 2022-22-17"** we rename it as "**3.txt"**, once uploaded to **Tonewinder** will be shown as : "**Tele 2022-22-17"** , in the memory position 3.

*Figure 54: "**LOAD BOBBIN"** screen*

If the file we are uploading is a **CLONE file (i.e. 1.txt)**, then we need to upload also the corresponding **CloneArra1.txt** to same memory position (as we have renamed "**1.txt"** to "**3.txt"** we have to rename "**CloneArray1.txt"** to "**CloneArray3.txt**" and then upload it to **Tonewinder**.

The option "**3- Delete Files"** give us the posibility to delete files from the **Tonewinder** memory.
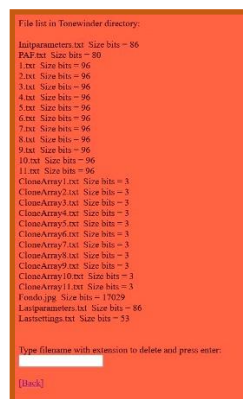
Figure 55: Delete File Overview

To delete a file we have to write the full name including the extension and the press "**enter**". If the file has been properly erased, a confirmation screen will be shown.
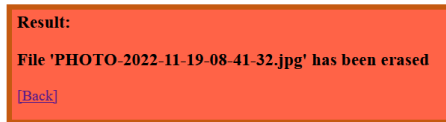
Figure 56: Message after deleting a file

We can only delete user files, or files that we have previously uploaded to memory. System files cannot be erased with this tool.

Option **4- RESET**. Reinitialices **Tonewinder** and disconect it from the router.

NOTE: IT IS IMPORTANT TO CLOSE ALL BROWSER SCREENS UPON COMPLETION.

6.5.6.6 Backup/Restore the software:

This procedure describes the process followed to make a Mirror_Copy of your Tonewinder processor, store it on a Windows OS-based PC, and upload it back to a Tonewinder.

This Mirror_Copy of your Tonewinder processor contains a copy of the memory including the current software version, plus all the custom programs, basic settings, and calibration data as OFFSET VALUE or GAUSSMETER CALIBRATION DATA.

Figure 57: Start screen with software versions

Figure 58: Custom files screen

Note: HMI touchscreen software is not copied.

You can make a copy of all your files and software to be able to upload it again in case of file corruption, accidental deletion of important files, or transfer of your preferred files to another Tonewinder.

- **Installing the files in your HD:**
    1. Download the "**ESP Flash Tools**" from our website, www.tonewinder.es.
    2. Extract all the files to a temporary folder on your hard disk.
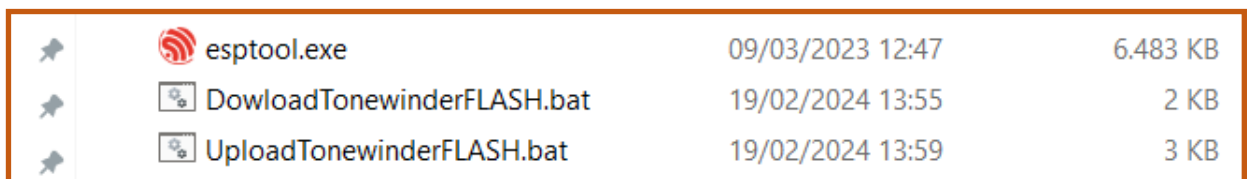
Figure 59: ESP32 Memory flashing files

- **Create/Backup a Mirror Copy of your Tonewinder Memory (DownloadTonewinderFLASH. Bat file):**

    1. Switch OFF the Tonerwinder and disconnect it from the mains.

2. Connect a USB cable between the Tonewinder rear USB slot and one of your Windows PC USB connectors. Take note of the COM number of this connection.

   - *If you do not know it, please go to Windows Configuration Bluetooth and Devices, Devices, then connect your USB cable between Tonewinder and your PC USB sockets, you should see a message showing "USB-Serial CH340 (COMx)". Take note of the COM number to write it in the next step.*

3. Make sure the files **esptool.exe** and **DownloadTonewinderFLASH.bat** , are present in the directory.
4. Execute the file DowloadTonewinderFLASH.bat (by double-clicking on the file) and follow the steps suggested on the screen.
   You will be asked to press "ENTER" several times and to enter the COM number of your USB connection. For example: COM5
5. If no errors are shown on the screen, the process will end and a new file will be created in the current directory : **tonewinderMemory_FLASH.bin**
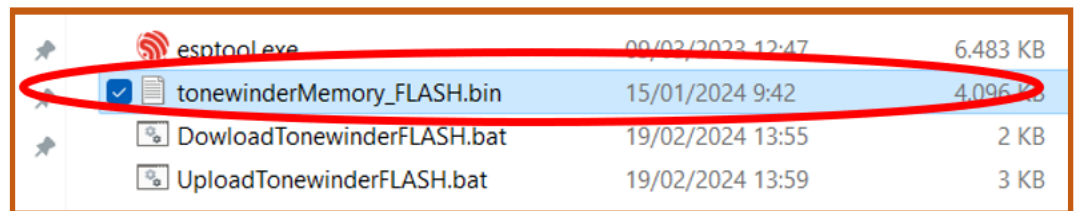
Figure 60: ESP32 Memory flashing files

6. This file is a binary copy of your Tonewinder memory, that you can store to be used later for backup or to clone your Tonewinder memory to other Tonewinder units.
7. Remember to disconnect the USB cable before switching On the Tonewinder again.

- ## Upload/Recover a Mirror Copy to your Tonewinder Memory (UploadTonewinderFLASH):

   1. **WARNING. By following this procedure all existing files in Tonewinder will be overwritten**
   2. Switch OFF the Tonerwinder and disconnect it from mains.

3. Connect a USB cable between the Tonewinder rear USB slot and one of your Windows PC USB connectors. Take note of the COM number of this connection.

   - *If you do not know it, please go to Windows Configuration Bluetooth and Devices, Devices, then connect your USB cable between Tonewinder and your PC USB sockets, you should see a message showing "USB-Serial CH340 (COMx)". Take note of the COM number to write it in the next step.*

4. Make sure the files **esptool.exe**, **tonewinderMemory_FLASH.bin,** and **UploadTonewinderFLASH.bat**, are present in the same directory.
5. Execute the file UploadTonewinderFLASH.bat (by double-clicking on the file) and follow the steps suggested on the screen.
   You will be asked to press "ENTER" several times and to enter the COM number of your USB connection. For example: COM5
6. If no errors are shown on the screen, the process will end and your Tonewinder will be updated with the content of the file: **tonewinderMemory_FLASH.bin**
7. Remember to disconnect the USB cable before switching On the Tonewinder again.

- ## Contents of BAT files:

   BAT files are one of those "bad reputation files" as they may contain malicious instructions that may create troubles in your system or even worse, stolen valuable information about you, your accounts, or the information contained in your system.

   The 2 BAT files used in the process of Flashing ESP32 Memory :

   UploadTonewinderFLASH.bat

   DownloadTonewinderFLASH.bat

   Are editable text files, that you may open with a simple right-mouse click, and choose "edit with".

We have created these two files to simplify the process of memory copy, but they just use the internal commands of the file created by EXPRESSIVE SYSTEMS sptool.exe

You can inspect the files, or even edit them (we do not take any responsibility for that) to your convenience.

• **Text file "DownloadTonewinderFLASH.bat":**

```
@echo off
echo A copy of your tonewinder memory will be stored in the current directory
echo under the name tonewinderMemory_FLASH.bin This file will have all the
echo System files plus your customer files. It is a "mirror copy" of your device.
echo ---------------------------------------------------------------------------------------------------
echo Make sure program esptool.exe is present in this directory
echo and that you have full rights to copy and save files.
echo If errors are shown on the screen, try to create a temporary directory from
\Documents or
echo one of your HD. Move this DownloadTonewinderFLASH.bat file and
esptool.exe there and run the bat file
echo ---------------------------------------------------------------------------------------------------
echo ---------------------------------------------------------------------------------------------------
echo WARNING-WARNING-WARNING Tonewinder must be switched OFF before
connecting it to the PC
echo AND MUST BE OFF DURING ALL THE PROCESS. ONCE FINISHED DISCONNECT
THE RS232/USB CABLE
echo ---------------------------------------------------------------------------------------------------
echo Please be prepared to introduce the COMx (COM3, COM5...) where you are
connecting the USB cable
echo from Tonewinder. If you do not know it, please go to Windows Configuration
echo Bluetooth and Devices, Devices, then connect your USB cable between
Tonewinder and
echo your PC USB sockets, you should see a message showing "USB-Serial CH340
(COMx)".
echo Take note of the COM number to write it in the next step.
pause
set /p dl=Enter drive letter (example COM5) and push "intro":
echo once the download starts and 100%% is reached wait until the program asks
you to press a key to exit
pause
.\esptool.exe    --port    %dl%    --baud    921600    read_flash    0    0x400000
%~d0%~p0\tonewinderMemory_FLASH.bin
echo If no errors are shown, a mirror copy of your Tonewinder memory has been
successfully saved in %~d0%~p0
pause
```

exit

- **Text file UploadTonewinderFLASH.bat:**

```
@echo off
echo This program will upload the file tonewinderMemory_FLASH.bin to
your tonewinder.
echo Make sure program esptool.exe and file
tonewinderMemory_FLASH.bin are present in this directory
echo This file has all the system files plus your customer files as they were
when the file was
echo downloaded from Tonewinder. It is a "mirror copy" of your device at
the time it was downloaded.
echo WARNING-WARNING-WARNING All current files in Tonewinder will
be ERASED.
echo If errors are shown on screen, try to create a temporary directory
from \Documents or
echo one of your HD. Move this UploadTonewinderFLASH.bat file,
tonewinderMemory_FLASH.bin,
echo and esptool.exe there and run the bat file.
echo ------------------------------------------------------------------------------------------
---------
echo ------------------------------------------------------------------------------------------
---------
echo WARNING-WARNING-WARNING Tonewinder must be switched OFF
before to connect it to the PC
echo AND MUST BE OFF DURING ALL THE PROCESS. ONCE FINISHED
DISCONET THE RS232/USB CABLE
echo ------------------------------------------------------------------------------------------
---------
echo Please be prepared to introduce the COMx (COM3, COM5...) where
you are connecting the USB cable
echo from Tonewinder. If you do not know it, please go to Windows
Configuration
echo Bluetooth and Devices, Devices, then connect your USB cable
between Tonewinder and
echo your PC USB sockets, you should see a message showing "USB-Serial
CH340 (COMx)".
echo Take note of the COM number to write it in the next step.
pause
```

```
set /p dl=Enter drive letter (example COM5) and push "intro":
echo once the upload starts and 100%% is reached wait until program ask
you to press a key to exit.
echo press "intro"
pause

.\esptool.exe --chip esp32 --port %dl% --baud 921600  --before
default_reset --after hard_reset write_flash  -z --flash_mode dio --
flash_freq 80m --flash_size 4MB 0x0
%~d0%~p0\tonewinderMemory_FLASH.bin

echo If no errors shown, Tonewinder has been updated with backup file
tonewinderMemory_FLASH.bin.
pause
exit
```

6.5.6.7 Touch Screen Software Update:
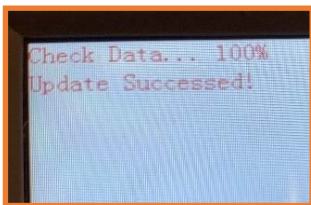
The touchscreen software update is performed using a **microSD**, **max 32Gb**, card through the slit located under the screen. **Only a Windows OS can be used to save and update this software**.

Download the updated version of the **Nextion software** program in the download section of http://tonewinder.es.

NOTE: the downloaded file is compressed (zip), and you must decompress it before use it. The extension of this file is .tft.

Copy the program to an empty **microSD** card. With **Tonewinder** turned off, insert the **microSD** card into the ready-made socket under the display (**Contacts facing to you**). Make sure the card has been adjusted correctly (you will feel a soft resistance when the card is seated, making a final click). Then operate the **Tonewinder** power switch.

The guide arm will be moved first to the starting position and then to the zero position. This movement is normal.

The update screen should show the progress of the program load and, after a few seconds, the screen will show the successfully updated status.

Remove the **microSD** card by pushing it lightly and then remove it completely.

NOTE: if you receive this message (see below), your microSD card must be formatted as FAT32 (fast), only under Windows OS
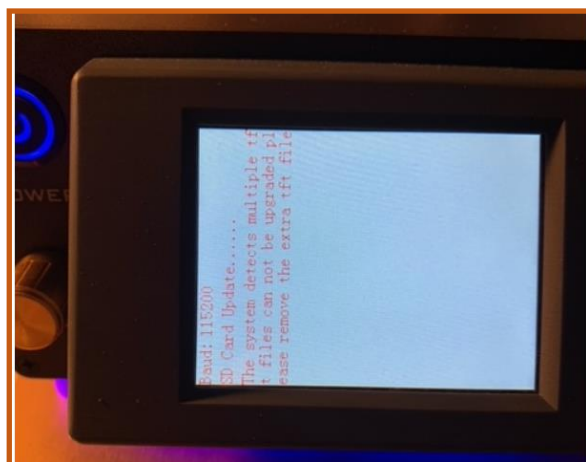

Figure 61: error during the upload.

6.6 File System Operation:

Tonewinder uses different files for its operation, some of these files are for the exclusive use of the winder itself such as system files, and others are configurable by the user to define the winding parameters or the name of the files, among others.

All of these files are used in the volatile memory of the **Tonewinder** and in the permanent memory **SPIFFS. (S) erial (P) eripheral (I) nterface (F) lash (F) ile (S) ystem.**
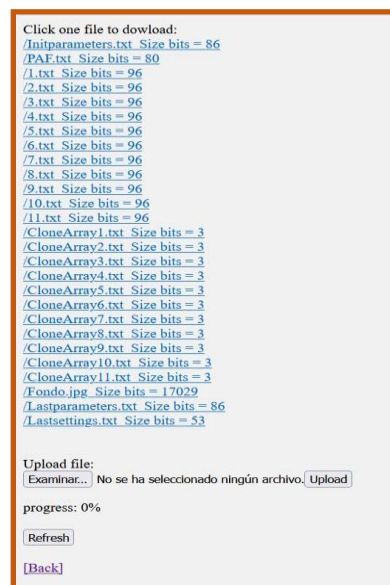
Figure 62: Tonewinder File list

We can work with **Tonewinder** without worrying about the structure of the file system, but it is important to understand it if we want to export files to an external PC, and / or manipulate them thus making the file storage capacity practically unlimited and also increase the possibilities of customization of the windings.

6.6.1 System files:

Those are files for the exclusive use of **Tonewinder** that should not be modified or deleted, since any of these actions could cause the unforeseen operation of **Tonewinder** or even a breakdown. Winding files, system parameters, winding data, and image parameter files.

Winding parameter files:

The structure of the winding parameter files is as follows. These are data files separated by commas and ending with a "/0". These files meet the parameters of csv files, but *Tonewinder* uses the txt extension for these files. They have 30 positions + "/0" and their content corresponds to the following parameters:

1. Coil rotation direction
2. Number of coil turns
3. Winding coil width
4. Filling factor %
5. Wire gauge
6. Support thickness
7. Winding speed RPM
8. Winding mode (Continuous, Random, Table, Manual, Emulation, or Cloning)
9. Random mode fill factor change interval
10. Minimum fill factor in random mode
11. Maximum fill factor in random mode
12. First stage laps in Table mode and pre and post-random turns in random mode.
13. First stage filling factor
14. First stage winding mode
15 - 17 idem (12. to 14.) second stage
18 - 20 idem (12. to 14.) third stage
21 – 23 idem (12. to 14.) fourth stage
24 – 26 idem (12. to 14.) fifth stage
27 - 29. idem (12. to 14.) sixth stage
30. File Name

Winding parameter file types:

1. Winding files with preset parameters (**DEFAULT**):
   • PAF.txt

Shown in **Tonewinder** screen with its name followed by the (**DEFAULT**) tag.

2. The **Initparameters.txt** and **Lastparameters.txt** files, with the same structure as the previous ones, but where initialization parameters for the winding and last winded coil parameters are stored respectively.

(The **Lastparameters.txt** file cannot be used for manual winding mode. The parameters of the manual winding mode speed and number of turns are stored in **Lastparameters.txt** but the rest of the parameters are not stored) (**NOTE**: Repeat coil cannot be used when the manual winding mode has been used in the last coil).

System parameters files:

Tonewinder use the file Lastsettings.txt to store parameters as:

- Maximum winding speed
- Number of initial turns
- DELTA
- OFFSET
- Wire tension sensor auto-hold enable/disable
- SSID WIFI
- PASSWORD WIFI
- Min. Wire Tension set value
- Max. WirebTension set value
- Ligth enable/disable switch
- GasussmeterCalibration factors

NOTE: SSID and **PASSWORD** are relative to the **Tonewinder** connection to **Wi-Fi** router.

System parameter files structure is the same as the winding parameter files, but it has only the 10 fields, already mentioned +"/0":

Winding data files:

The **EmulateArraySPIFFS.txt** file contains the winding data of the last winded coil using **EMULATE** winding mode, it is only stored in SPIFFS memory when such data has not been yet stored in a **CLONE** file type. It is a temporary system file and the data it contains could be corrupted, so if you intend to use such data, you should do it with caution. This file does not contain information except in the case of winding in **CLONE** mode.

Image files:

This is just a picture, Fondo.jpg, contains information for the web server background and is an optional file that can be removed to save SPIFFS memory space.

6.6.2 User Files:

There are two types of user files, the first one is exactly the same as the System winding parameters files, but all parameters are user configurable, those are the files **1.txt** to **59.txt**.

```
0,1000,10200,100,75,1500,800.00,2,0,10,100,500,90,2,6000,50,2,500,90,2,0,50,0,0,50,0,0,50,0,2022-11-10
```

*In this example we have a Table Winding file and its 30 parameters fields with the given name **2022-11-10**.*

The second file type is an attached file to the winding parameters file (Separate file but must be copied next to), which contains winding data generated during EMULATE winding mode and used exclusively in **CLONE COIL** winding mode. These are the files **CloneArray1.txt** to **CloneArray11.txt**. They only contain winding information in two fields, time from winding start in milliseconds, and wire positioning motor speed. The file stores a maximum of 4000 information points with a frequency of approximately 3.8 times per second. So the maximum storage time could be set between 16 and 17 minutes. If we exceed the winding time beyond 17 minutes, and the 4000 memory positions are filled, the subsequent data will not be stored. These files are empty for any winding mode other than **CLONE MODE**.

```
0,0
```

*This is the data contained in a **CloneArrayXXX.txt** for any file other tan **CLONE MODE**. Empty file with only 0, 0.*

Below an example of the partial contend of a **CloneArrayXXX.txt** file with winding data. Time and X motor speed coma separated data. The number of data depends of the winding time (Max 4000 points).

```
380,91
632,96
888,99
1147,101
1401,102
1666,101
1923,100
2183,105
2439,97
2706,103
2962,101
3222,95
3478,97
3746,207
3996,365
4264,425
4520,435
4788,514
5042,611
5303,722
5558,880
5826,1103
6083,1284
6342,1555
6599,1992
6866,2000
7122,2000
7382,1973
```

6.6.3 Storage memory:

Tonewinder has 59 memory positions available to store user files. The memory position gives the name of the corresponding file. But it is only possible to save Clonearray files in the first 23 positions, due to a memory limitation. When we create a new file, or modify an existing one, when saving it, the file acquires the name of the memory position where we save it and then this deletes the file that was previously in that memory position, if there was any.

That is, if we create a new file with the name "**Tele 2022-11-17**" (Maximum 20 characters for the name) and we save it in memory position number 3, the file will be stored with the name "**3.txt**" and will contain in its data, as a parameter no. 30, the name "**Tele 2022-11-17**" (which we will see on the **Tonewinder®** screen in memory position no. 3)

*Figure 63: "**LOAD BOBBIN**" screen*

The amount of SPIFFS available memory for user files is about 1.3 Mb. Enough to store 59 user files (**1.txt** to **59.txt**.), and 23 Clonearray data files (**CloneArray1.txt** to **CloneArray23.txt**). Clonearray data files are not available for Lite version.

7 Maintenance and Service

This chapter describes the routine maintenance and the service procedures that the user may perform.

7.1 Routine and Preventive Maintenance:

Tonewinder is designed to be trouble-free if properly maintained.

7.1.1 Weekly maintenance:

Lubricate felt discs in wire guide arm and wire stabilizer with oil. (Not applicable for Lite version).

Figure 64: Lubricating wire tension felts

7.1.2 Monthly maintenance:

Clean and lubricate pulleys with oil. (Not applicable for Lite version).

Figure 65: Lubricating pulleys

7.1.3 Yearly maintenance:

Clean and grease the guide arm screw, then move it back and forth several times (Not applicable for Lite version). Lubricate motor bearings with oil.
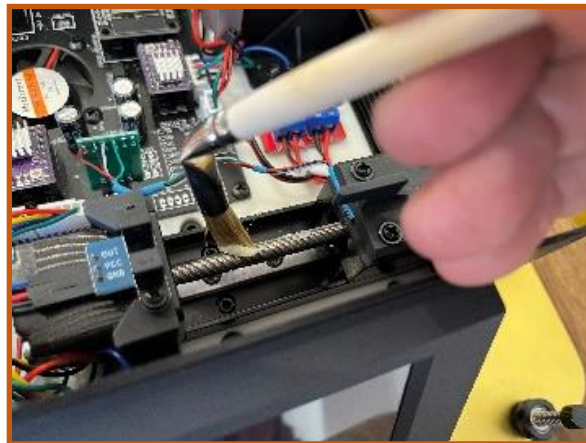

Figure 66: Lubricating wire arm guider screw with grease

7.2 Reload Software procedure (from scratch):

If connection between **Tonewinder** and Wifi router is posible, reload software according to section 6.5.4.3 Software Update and Upload/Download files.

Only if connection between **Tonewinder** and Wifi router **is not possible**, you can still upload the software by means of a USB/USB cable.

Plug the USB cable in the ESP32 board connector in the back cover (2).

Figure 67: Back panel with USB-C and 24V power inlet connectors

1. On a PC with Windows download and install the program **flash_download_tool_xxx.exe** (download). There will also be the drivers you eventually need if your PC does not find a new Serial Port Connection when connecting the USB. (Retain the COM number for posterior use)
2. Start the program **flash_download_tool_xxx.exe** and select:
   a. ChipType   : **ESP32**
   b. Workmode : **Developer Mode**
3. Find the bin file to upload and select it, then write the memory address as indicated below. Type in or select the COM port (previously noted) and the port speed (speed **921.600** baud).
   (ToneWinder_Inicializer.ino.esp32.bin): **0x10000**
   Select the check box on the left of the file name.
4. If not already selected, click on the SPI SPEED and SPI MODE as shown in the image below.
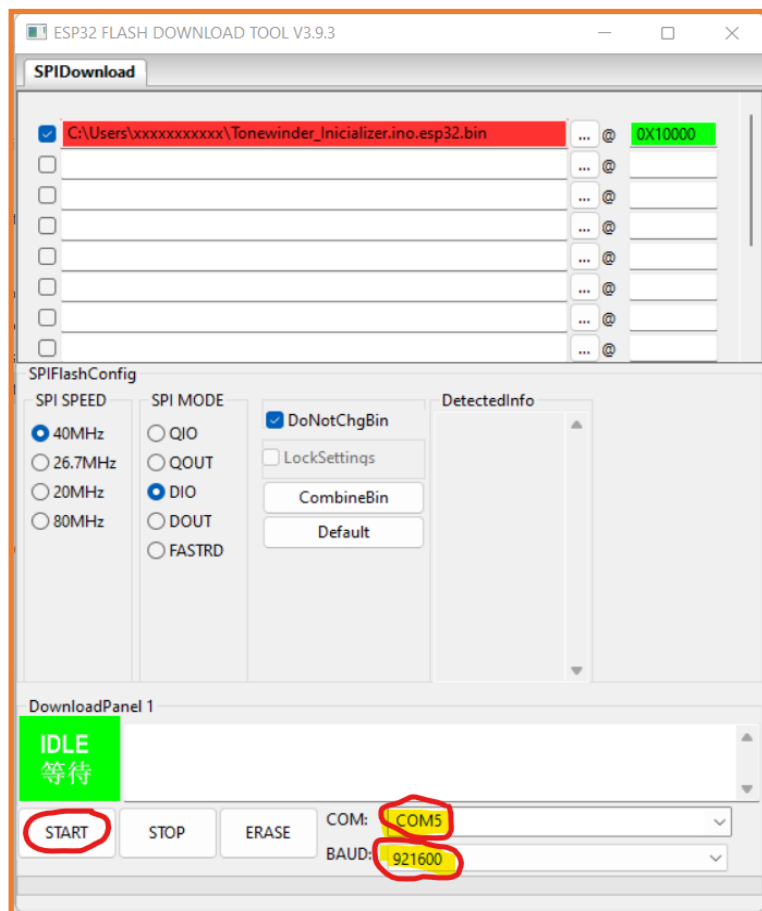5. Push **START**

Figure 68: ESP32 Flash program

In case the last uploaded program was Initializer, once successfully uploaded, Tonewinder will reinitiate, will format the system and will automatically show the Wi-Fi connection screen (may take a couple of minutes).

From this point, we can continue uploading .bin files by means of the USB or we can introduce the Wi-Fi router SSID and Password, and then we can continue the upload via the web server (recommended procedure).

8 Troubleshooting

This chapter is a guide to troubleshooting issues that may arise during operation of the device.

8.1 General Information about Troubleshooting:

Tonewinder has been designed with robustness in mind, to provide fully satisfactory and reliable operation. Both its mechanical components and the control program have been exhaustively tested for reliability, however, it is possible that some component deteriorates or suffers wear and it needs to be replaced, or that the control program is corrupted due to unexpected electric phenomena. In both cases we have solutions. We have spare parts for any of the components, we have a repair service in our facilities and the control programs can be reloaded by yourself.

In the event of unexpected or anomalous operation, we must always first ensure that **Tonewinder** is connected to an appropriate electrical source (between 100V and 240V 50/60Hr)

The following features help you to identify and eliminate the source of problems that may arise during the operation of the device.

If you are unable to resolve a problem following the instructions given here or if you experience problems that are not covered in this section, contact **Tonewinder OE** Technical Support for assistance. See the contact information at the beginning of this manual.

To facilitate device identification, have the serial number and technical name available when communicating with **Tonewinder OE.**

8.2 Troubleshooting Check:

If a problem occurs with the device, the following troubleshooting check helps identifying and isolating the cause of the problem. Subsequent troubleshooting sections cover the problems in greater detail.

8.2.1 Problems related to power supply:

Symptom	Description and Remedial Action
Dark screen. Your unit doesn't ignite and no light is visible. **NOTE: The descriptions referring to the wire guide arm are not applicable to the Tonewinder 1.2 Lite version.**	• Check the Power supply cable, socket, and switch. 1. Check if there is power in the wall socket with a Multimeter. 2. Check if there is power in the power supply (a green LED must be on). You can check the 24 VDC in the plug. 3. Check that the plug of the power adapter is firmly connected to the winder. 4. Check that the power button is pressed down.

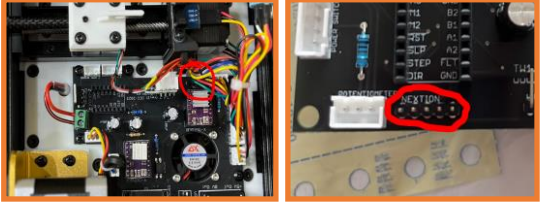|	

If the power supply is ok, the internal connections of the winder must be checked.
 	
NOTE: The descriptions referring to the wire guide arm are not applicable to the Tonewinder 1.2 Lite version.
	• Open the upper cover of the winder, by removing four M3 screws (two in the front cover, and two in the rear cover), and verify:
	1. Check if the internal power switch connector is properly connected. Disconnect and reconnect just in case.
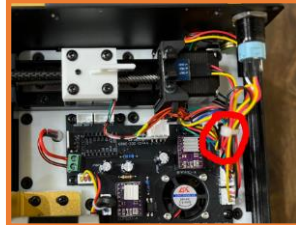	
	2. Verify if there are 24 vdc between pins 1 and 2 of the connector PCB. If this voltage is present, the problem may be a circuit breaker fault and must be replaced.
	
	3. If there are 24 VDC, check if this voltage is present in the terminal of the PCB connector. If is present, probably there is a failure in the PCB board, and must be replaced.
	
	4. If there is any voltage in this connector, but there were 24 vdc in the plug connector of the power adapter, there can be two possibilities:
	   a. There may be an internal short circuit on the PCB that makes this voltage disappear. In this case, disconnect all wire connectors from the PCB, and remove the motor controllers and the microcontroller. If the voltage is restored at the PCB connector, it means that one of these components is producing the short circuit, and you should reconnect them one by one to see which one is faulty.
	   b. The shortcut is present on the PCB by itself; therefore it must be replaced or repaired.

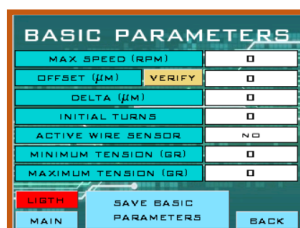## 8.2.2 Problems related to the initialization of the unit:

Symptom	Description and Remedial Action

The screen is On but the winder does not initialize. Your unit stays on this screen:
 	
NOTE: The descriptions referring to the wire guide arm are not applicable to the Tonewinder 1.2 Lite version.
	• If the guide arm moves when the winder is switched on, finishing the initialization process
	 1. Could be a failure in the software of the ESP, and must be reloaded,
	    a. If you have a backup of your ESP, you can use the procedure described in the section "6.5.6.6 Backup/Restore the software".
	    b. If you don't have any backup file, you can use the procedure described in the section "7.2 Reload Software procedure (from scratch)", to reload the software to your ESP.
	
	 2. Could be a connection failure in the touch screen connector. To check this, open the top cover of the winder and check if the wires of the connector are well fixed. Disconnect and reconnect just in case:
	
	 3. It may be that the ESP microcontroller is defective or is not working properly. In this case, it should be replaced.
	 4. It may be that the HMI Touch Screen is defective or is not working properly. In this case, it should be replaced.
	
	• If the guide arm doesn't move when the winder is switched on, finishing the initialization process.
	 1. Could be a failure in the software of the ESP, and must be reloaded.
	 2. If you have recently exchanged the microcontroller, check that it is fitted correctly.
	 3. Check that the home sensor is working properly. To do this, remove the top cover of your unit:
	    a. Place an opaque object in the center of the sensor and if a red LED on the bottom of the sensor does not light up, the sensor connections, both on the PCB and on the sensor itself, need to be checked.
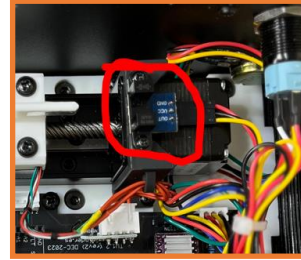
b. if when activating the home sensor, the red led under the sensor lights up, and the winding initializes correctly, jumping to the start page, there may be a problem in the stepper motor that moves the arm, or in the driver.

c. Check the connection of X-motor on the PCB.

d. Swap the motor drivers (with the power off), and if the winder initializes correctly on start-up, the problem is the X-motor driver itself, and needs to be replaced.

NOTE: Only swap them to test them. Once this has been tested, return each driver to its place, as each one is set to a certain current depending on the motor it works with.
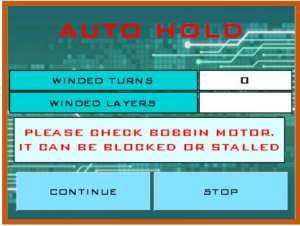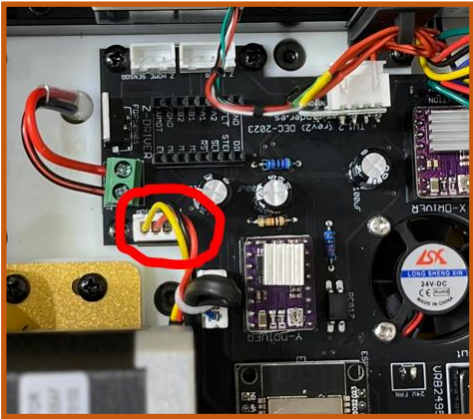
The screen is On and the winder initializes correctly, but basic paremeters are set in zero. **NOTE: The descriptions referring to the wire guide arm are not applicable to the Tonewinder 1.2 Lite version.**	• Could be a failure in the software of the ESP, and must be reloaded, 1. If you have a backup of your ESP, you can use the procedure described in the section "6.5.6.6 Backup/Restore the software". 2. If you don't have any backup file, you can use the procedure described in the section "7.2 Reload Software procedure (from scratch)", to reload the software to your ESP. 3. The shortcut is present on the PCB by itself; therefore it must be replaced or repaired. • If reloading the software does not solve the problem, try reloading the Initializer first.

8.2.3 Problems related to stops during operation:

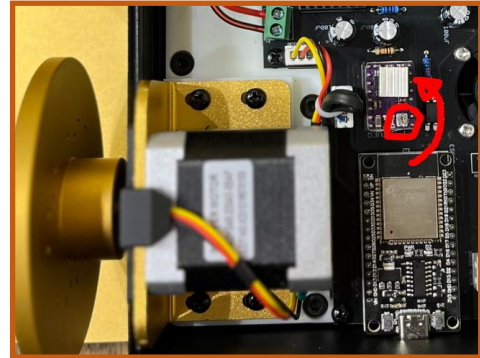| Symptom	Description and Remedial Action

The winder suddenly stops, the light blinks and the screen shows the message:
 	
NOTE: The descriptions referring to the wire guide arm are not applicable to the Tonewinder 1.2 Lite version.
	• Winding motor stalled or blocked by a foreign object (Traces of hair or winding wire coils obstructing the winding shaft or wire tension too high).
	• Open the top cover, and disconnect the Hall sensor of the Y-motor:
	
	   o If the problem is gone, the problem is the hall sensor itself. You can try to bring it a bit closer to the disc. If this does not solve the problem you will need to replace it.
	   o If the problem persists, the problem could be the driver or the motor by itself.
	• The problem may be a lack of current in the motor, for which you can increase the current by adjusting the mini-potentiometer on the driver just 5 or 10 degrees counterclockwise.

- Check that the max speed is set below 1500 RPM.

| The winder suddenly stops, the light blinks and the screen shows up the message | - Check the trigger limits for the wire tension. |

The winder suddenly stops, the light blinks and the screen shows up the message

And the wire is not broken.

NOTE: The descriptions referring to the wire guide arm are not applicable to the Tonewinder 1.2 Lite version.

- Check the trigger limits for the wire tension.

- Lubricate felt disc with oil (Tension Screw and Stabilizer).

- Check that the pulleys are turning without resistance. Lubricate just in case.

- Disable the auto-hold Wire Sensor by clicking on the black button (This change will be stored in Basic Parameters):

8.2.4 Software-related problems:

Symptom	Description and Remedial Action
The Winder makes strange noise, motors vibrating or moving too fast	Corrupted files • Switch OFF the winder for 10 seconds and test again • Reload the software
Reloading the ESP software	• If you have a backup of your ESP, you can use the procedure described in the section "6.5.6.6 Backup/Restore the software". • If you don't have any backup file, you can use the procedure described in the section "7.2 Reload Software procedure (from scratch)", to reload the software to your ESP. • If reloading the software does not solve the problem, try reloading the Initializer first.
Reloading the HMI software	• if you receive this message (see below), your microSD card must be formatted as FAT32 (fast), only under Windows OS • Make sure that your micro SD Card is less than 32 Gb.

8.2.5 Other problems:

If you face any kind of problem, please contact us by email:

<div align="center">

info@tonewinder.es

</div>

9 Specifications

This chapter provides the physical and performance specifications, including information about the materials used in **Tonewinder**.

9.1 Physical Specifications:

The physical specifications of the device are specified as follows:

Type	Specification
Device type	Tonewinder V 1.2 Lite
Microcontroller	ESP 32 Wroom Wi-Fi 240Ghz 512 Kb de SRAM
Motor Y Driver	DRV8825
StepMotor Y	Nema 17 (Resolution 0,045 degrees)
Work Voltages	5vdc and 24vdc
Tension Sensor	Max 300 gr
Touch Screen	*Nextion 2.8" Enhanced*
Max Speed	*1,500 r.p.m.*
Max power	*100w*
Range of use	Indoor use only
Ambient temperature	15 – 35 °C
Ambient humidity	12 - 80% relative humidity (non-condensing)
Power requirements	100 – 240 V AC; 50/60 Hz, 100 VA
Overvoltage category	II
Emission sound pressure level	<70 dB(A), typically 54 dB(A)
Dimensions (Height x width x depth)	110x225x238 mm
Weight	Approx. 2.3 kg