Yaesu FT818 TFT control CAT module

USER MANUAL

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1.Description

This control module manages a series of functions of the transceiver, sending and receiving data through the serial communication port. The system is housed in a single enclosure containing: an ESP32 microcontroller (MCU), a 4-inch touchscreen, an internal LiPo battery, and several additional circuits (ON/OFF control, battery charger, output for external tuner).

When the module is powered solely by the internal battery, it provides over 3 hours of continuous operation. This enables its use in portable activities.

The module includes a charge control system that allows it to be powered and have the battery charged simultaneously when connected to an external power source (standard USB-C charger).

The microcontroller simultaneously manages communication with both the transceiver and the 4-inch touchscreen. It also detects the status of the transceiver (on or off), battery parameters (voltage and charge percentage), and whether external power is connected.

Among the many configuration functions available on the Yaesu FT818 transceiver, the most commonly used and/or the most tedious to configure using the radio's built-in menu system have been selected. A single screen provides information on multiple configuration parameters, which will be discussed below.

01 3	5 7 9 S	+20 +40	PWR SWR ALC MOD				
VFO	MODE FM	IPO off	ATT off	NB off	AGC off	STEPS 5k	
<u></u>		10m	2	8.17	5.0	00	
PWR ANT CHG CHG Source % Bat 5W FRONT 6h off 4.0 Image: Chi and the second							
PND	MOI	IPO	AT	T	TUN	>>	



2. Usage Recommendations and General Warnings

Some of the functionalities included in the module are based on experimental features and have not been documented by the manufacturer. Some of these functions access and directly update data stored in the transceiver's EPROM. Although these features have been extensively tested, there is a possibility that in certain individual units—given the large number of FT818 units manufactured—unexpected effects may occur or some original EPROM parameters may become misaligned. For this reason

it is recommended to back up all EPROM memory parameters before using the module.

The operation of the module has only been verified with the FT818/FT818ND model. Using it with other transceiver models may lead to misconfigurations or unexpected results.

It should also be noted that the module and the transceiver communicate via a serial protocol. This type of communication is low-speed and involves a certain delay in both directions (module \rightarrow transceiver and transceiver \rightarrow module). These delays become more noticeable when updating parameters that involve activating internal relays in the transceiver.

In the case of detecting when the transceiver is turned on (if the module was already active with the transceiver off), the delay is minimal. However, when the module is active and the transceiver is turned off, the module may take a few seconds to detect that the transceiver has been turned off and to update the screen accordingly.



3.Installation

3.1 CONNECTIONS

The module includes the following elements:



The module is delivered pre-configured and with the internal battery installed. Making the connections is very simple:

You only need to connect the included ACC cable to the top ACC connector (1) and to the ACC connector on the FT818:



Since the cable has 90° angled connectors, they do not protrude and remain well protected.

The connections to the **BAND DATA (2)** and **ATU100 (3) outputs**, located on the left side, are optional.

The **BAND DATA output (2)** maintains the same characteristics as the original FT818 output (analog output with variable voltage depending on the selected band). You can use this output to control any accessory (filter, amplifier, antenna switch, etc.) that uses the voltage/band levels specified in the FT818 instruction manual.

The **ATU100 output (3)** allows activation of the TUNE function on an external antenna tuner such as the ATU100 or similar. This functionality is explained in detail in section 6, "Antenna Matching / Tuning Function," of this document.

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On the right side of the case, you'll find a USB Type-C connector, which is used to connect an external 5V power supply with a minimum of 1A. Next to it is the switch for turning the unit on or off.

WARNING! The USB-C input is used solely to power the device and is not directly connected to the microcontroller. This input must only be connected to a power supply that provides 5V / 1A (5W).

3.2 SERIAL PORT CONFIGURATION OF THE TRANSCEIVER

For the module to communicate with the transceiver, the serial communication port speed must be set to 38,400 bps. This parameter corresponds to menu item 14 on the transceiver (listed as 'CAT RATE'). To access it, press and hold the 'F' key for 1 second, then turn the 'SEL' knob until the text '14 CAT RATE' appears on the transceiver screen. The speed is selected by rotating the tuning dial, and the correct setting is:



To save the value, press the 'F' key again for one second.

4.On screen information



Touchscreen by Paul Stoffregen (2021) FT-817-TouchDisplay by Peter Jonas (2021) KA7OEI's blog and FT-817 pages www.tacotic.com (2025) - by Public Licence When the module is started, a splash screen appears for a few seconds, displaying information about the firmware version, acknowledgements, and license type (public use license). The latest version is 3.1, which is the currently supplied version.

After 7 seconds, the main working screen appears. Depending on the status of the transceiver, three possible display modes may appear.



×	s 7 9 S	-20	PN SN AL	VR VR .C OD		
VFO n/c	MODE n/c	IPO n/c	ATT n/c	NB n/c	AGC n/c	STEPS n/c
PWR n/c	ANT r/c	CHG II/c	CHG n/c	Sourc 3.9	e % Bat	
BND	MO	D IP	0	ATT	TUN	192

If the transceiver is OFF:

All status indicators show "n/c" (not connected), and no band, frequency, or lock/unlock information is displayed. The signal meter shows 0, and the Power (PWR), Standing Wave Ratio (SWR), Automatic Level Control (ALC), and Modulation (MOD) bars are not shown. The selection buttons are inactive, and a red rectangle (I) is displayed on the right to indicate that the transceiver is off.

The only two active indicators are those related to power: "Source" and "% Bat".

The "Source" indicator shows the battery voltage (if no external power is connected) or displays a plug icon (a plug icon (b) if an external power supply is connected.The "% Bat" label shows the battery charge percentage. If the bars are green, the battery is well charged; if orange, the battery is below half charge; and if red, the battery is low.

The system includes a PCM circuit to prevent full battery discharge. Before the voltage drops to a level that could damage the battery, the power supply is cut off and the device shuts down.



If the transceiver is **ON** and in **RECEIVE** mode:

The status labels will be active, showing the current configurations:

- **VFO** Indicates the selected VFO (A or B)
- MOD Indicates the selected modulation type
- **IPO** Indicates whether the intercept point optimization is enabled
- **ATT** Indicates whether the receiver input attenuation is enabled
- **NB** Indicates whether the IF noise blanker system is active
- AGC Indicates the automatic gain control mode (Off / Auto / Fast / Slow)
- STEPS Indicates the selected tuning step size
- PWR Indicates the selected output power level (6W / 5W / 2.5W / 1W)
- ANT Indicates the active antenna output (FRONT / REAR)
- CHR (1) Shows the programmed time when battery pack charging is enabled
- CHR (2) Indicates whether the transceiver's internal battery charging function is active



In addition to the label information, in the center area of the screen (from left to right) we find the lock/unlock indicator for the tuning dials. If a green lock icon () is displayed, the dials are unlocked. If a red lock icon () appears, the dials are locked.

The selected band is shown in the central area, and the tuned frequency is shown on the right side. When a frequency within an authorized transmit range is tuned, the frequency is displayed in **white**. If a band or frequency outside the permitted ranges is tuned, it appears in **red**:



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At the top of the screen is an analog indicator where the needle shows the received signal strength (S-Meter). The bar indicators (PWR, SWR, ALC, and MOD) are also shown but remain inactive, as they are only enabled in transmission (TX) mode.



It's important to note that these indicators only reflect data transmitted by the transceiver via the ACC communication port. There is no direct connection to or processing of RF signals. Therefore, some delay in value updates may occur, and resolution is limited by the transceiver's own system.



If the transceiver is **ON** and in **TRANSMIT** mode:

Instead of the signal indicator (S-Meter), a red square is displayed with the label "TX" in white. A timer inside this box shows the elapsed transmission time. The bar indicators (PWR, SWR, ALC, and MOD) are activated, displaying the output power level, standing wave ratio, gain control, and modulation level (when applicable).

5. Touch System: Buttons, Menus and More

The configuration buttons are organized into three pages. To switch from one page to the next, press the _____ button

On the first page, the following buttons are available:





All the parameters described in the previous section can be modified using the touchscreen capabilities. Depending on the parameter to be configured, the control method may vary (taps on the bottom menu buttons or directly on the central area of the screen). Additionally, based on the type of parameter (on/off functions, cyclic settings, or multiple options), the visual response on the screen will differ. We can group the controls into **three general systems** and **two specific ones** (frequency tuning and the TUNE function, which will be explained separately).

ON/OFF PARAMETERS

The first type refers to ON/OFF-type parameters. This group includes:

- IPO Enables/Disables Intercept Point Optimization
- **ATT** Enables/Disables the receiver input attenuation
- NB Enables/Disables the IF noise blanker system
- CHR (2) Enables/Disables internal battery pack charging
- Lock Enables/Disables frequency tuning dial lock

In these cases, the buttons (and the lock icon) act as switches. When pressed, the function is either activated (if it was off) or deactivated (if it was on). In addition to updating the label, the button itself changes color The first type refers to **ON/OFF-type parameters**. This group includes:

- IPO Enables/Disables Intercept Point Optimization
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- CHR (2) Enables/Disables internal battery pack charging
- Lock Enables/Disables frequency tuning dial lock

In these cases, the buttons (and the lock icon) act as switches. When pressed, the function is either activated (if it was off) or deactivated (if it was on). In addition to updating the label, the button itself changes color. (**Gray** when deactivated or **Red** when activated)

Example: IPO button behavior



If the IPO function is deactivated, the label under IPO shows "off" and the button in the bottom menu appears gray.

When the button is pressed, the function activates, the IPO label shows "ON," and the button turns red.



CYCLIC SELECTION PARAMETERS

The second type refers to **cyclic selection parameters**. In these cases, the buttons act as toggles. This group includes:

- VFO Switches between the two available VFOs (A/B)
- AGC Cycles through the automatic gain control modes (Off / Auto / Fast / Slow)
- STEPS Cycles through tuning step sizes based on modulation
- PWR Cycles through transmission power output levels (6W / 5W / 2.5W / 1W)
- CHR (1) Sets the timer for internal battery pack charging duration

When pressing the corresponding button, the parameter changes to the next possible value. The label updates to reflect the change, but the button remains **gray**.

Example: **AGC** button behavior.



VFO	MO	DE M	IPO off	ATT	NE of	AGC auto	STEPS 5k
6			10	n	29.	630.0	00
PWR 6W		T NT	CHG 6h	CHO	G Sou	rce % Bat	
VFO		NB	P	wR	ANT	AGC	>>

VFO	MODE	IPO off	ATT off	NB off	AGC fast	STEPS 5k
A		10m	1	29.6	30.0	00
PWR 6W	ANT	CHG 6h	CHG off	Source 3.8	e % Bat	
VFO	NB	PW	/R	ANT	AGC	>>

VFO A	MODE AM	IPC off	D AT	T NB f off	AGC slow	STEPS 5k
<u> </u>		1	Om	29.0	630.0	00
PWR 6W	ANT FRONT	CH 6h	G CH of	G Sour 3.8	ce % Bat	
VFO	NB		PWR	ANT	AGC	>>

Initial state: AGC = "off". Press the AGC button (found on the second menu page),

AGC switches to "auto" and the label updates. Press again,

AGC switches to "fast" and the label updates. Press again,

AGC switches to "slow" and the label updates. Press again,





AGC returns to initial state "off"

PARAMETERS WITH DIRECT SELECTION VIA POP-UP WINDOWS

A third group of configuration parameters includes those with a large number of possible options, which makes adjusting them by repeatedly pressing the same button tedious. This is, in fact, one of the main drawbacks of using the transceiver's own buttons. When you want to change the band or modulation type and they're not adjacent options, you need to press the same button many times.

The case of antenna selection from the transceiver itself is even worse. Depending on how the outputs are configured, switching from one band to another can easily send the RF signal to an antenna port with no load, which poses a risk to the final transistors' integrity.

To make configuration of these three parameters easier, three pop-up menus have been implemented. These are activated by pressing the corresponding buttons: **BAND**, **MOD**, and **ANT**.

All three function similarly, though perhaps the most illustrative example is the antenna configuration window.

If you press the **ANT** button (also found on the second menu page), the following appears



ANTENNA OUTPUT SELECTION WINDOW

At a glance, you can see which output is configured for each operating band and, at the same which output time. adiust antenna you want to use for each one. By tapping on the buttons for each band, you can toggle between **FRONT** (gray) or **REAR** (blue). When you tap "OK", the new configuration is applied. If you tap "CANCEL", the previous settings are retained.



For **modulation** or **band** selection, the system is simpler. If you press the **MOD** or **BAND** buttons, a pop-up window appears showing all available options:

- Options appear in gray
- The currently selected option appears in red
- Tapping any other option immediately activates the selected choice

160m 80m 60m 40m 30m 20m 17m 15m 5 12m 10m 6m BCR 5 F Air 2m UHF PHT BND MOD IPO ATT TUN >>

MODULATION SELECTION WINDOW

BAND SELECTION WINDOW



DIRECT FREQUENCY SELECTION

Finally, it is also possible to directly modify the desired tuning frequency.

To do this, simply tap the digit group (MHz, KHz, or Hz) of the frequency indicator you wish to change. The selected digits will be highlighted in red, and you can then use the tuning dials on the transceiver itself to adjust only the specific figures you want. Once the frequency is set, press the **OK** button to apply the new value, or **CANCEL** to discard the changes.



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If the new frequency belongs to a different band than the current one, the system will automatically switch to the corresponding band and update all previously assigned configuration parameters for that band (**BAND**, **MOD**, **STEPS**, and **ANT**).

6. Antenna Matching / Tuning Function (TUN)

The **TUN** button simplifies the process of antenna matching using an external tuner. This procedure involves activating the transmission mode (TX), and therefore, the following **warnings** must be considered

WARNINGS

- 1. The module does not include any built-in antenna tuner. An external tuner is required.
- 2. Before activating this function, ensure the antenna output of the transceiver is connected to the tuner, and the tuner is connected to the physical antenna.
- 3. Before activating this function, verify that the antenna output configuration of the transceiver for the selected band matches the physical connection used (either FRONT or REAR).
- 4. The TUN function cannot be used if the transceiver is set to split mode (SPL) for alternating dual-band operation. If SPL is enabled, it must first be deactivated, and you must ensure the transceiver is operating on the same band/frequency range for both transmission and reception.

FAILURE TO FOLLOW THESE WARNINGS MAY DAMAGE THE TRANSMITTER OUTPUT STAGE!

OPERATING PROCEDURE

When, while tuned to any allowed band and frequency, the **TUN** button is pressed, the module proceeds as follows:

- 1. Activates **PKT modulation type** to maintain a constant output power level.
- 2. Sets the **output power to 1W**, minimizing stress on the transmitter's output stage in case of a high standing wave ratio (SWR).
- 3. If the **ATU100 output** of the module is connected to an external automatic tuner (such as an ATU100 or similar), it will be triggered in **TUNE mode**. This functionality is explained in more detail in **Appendix A** of this document.

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4. The transceiver is switched to **TX mode**. The module will display the corresponding **TX** status indicators, and the **TUN** button will appear active (in red).



At this stage, you should proceed to tune the antenna tuner until the **lowest possible SWR value** is achieved. If a compatible **automatic antenna tuner** is connected to the module, it will have already been triggered in **TUNE mode**, and you only need to wait for the auto-tuning process to complete.

Once the antenna is tuned, press the **TUN** button again, and the module will execute the reverse process:

- 1. Disables **TX mode**. The module will now display the **RX state indicators**.
- 2. Restores the transceiver's original modulation type.
- 3. Restores the transceiver's previous output power setting.
- 4. The TUN button returns to its inactive state (in gray)



APPENDIX A

ACTIVATION OF AN EXTERNAL TUNER USING THE 'TUN' FUNCTION

In order for the module to activate the 'TUNE' mode of an external tuner (such as the ATU100 or similar), a simple modification must be made to the tuner to allow it to connect to the dedicated output of the module. Specifically, this output should be connected in parallel to the two terminals of the tuner's 'TUNE' button.

If there is space on the front panel (see attached image), a small hole can be made and a 2.5 mm female jack installed. If space is limited or a simpler installation is preferred, a thin coaxial cable (like those used in headphones) can be routed out and one end soldered directly to the button terminals.



ATU-100 tuner with 2.5 mm female mini jack installed



The core of the connector (or of the cable) should be connected to the point where the button is attached to the integrated circuit (IC) board, and the shield should be connected to the circuit ground. At the other end of the cable, a male mini jack should be soldered (core to center, shield to outer), which will be plugged into the module's dedicated output.





The circuit will look as shown in the following diagram:



When the 'TUN' function is executed from the module's menu, just before the transceiver enters TX mode, a signal is sent which, using an optocoupler, grounds the 'TUNE' pin on the tuner's circuit board. This activates the TUNER mode exactly as if the 'TUNE' button had been physically pressed.

ACCESS TO THE INTERNAL BATTERY AND THE UNIT'S PROGRAMMING PORT

To access the internal battery and the programming port, it is necessary to remove the bottom cover of the module by unscrewing the 4 screws that hold it in place.

Once the cover is removed, the battery will be visible. If it needs to be replaced, it must be of the exact same specification: **3.7V – 1100 mAh (model LP603449)**, and the polarity of the connector must be verified to match.





The programming port (micro USB) is located on the left side

