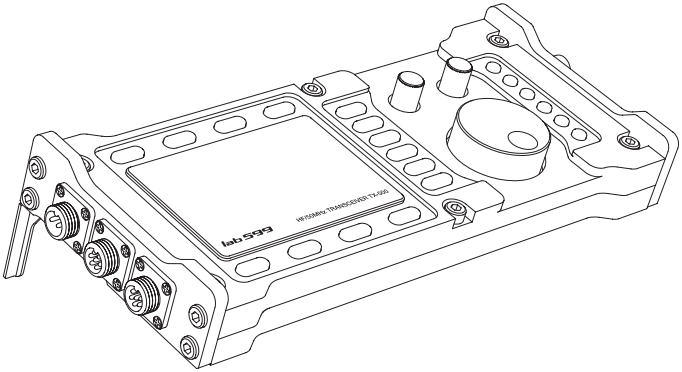
599 lab

DISCOVERY

HF/50MHz Transcever **TX-500**

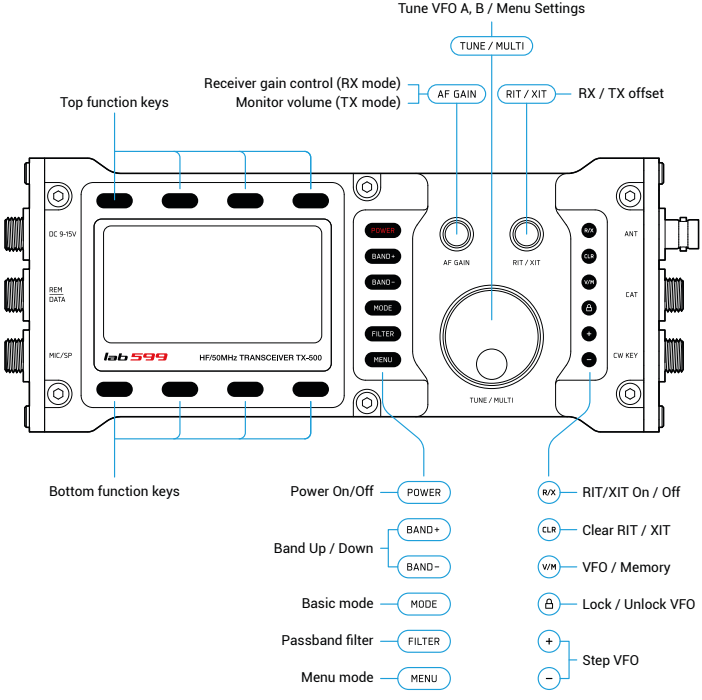


QUICK START GUIDE

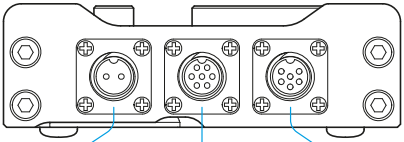
Controls end user interface

DEVICE BODY AND CONTROLS

Front view



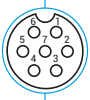
Left side



DC 9-15V
Power supply

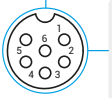
1 – GND
2 – DC IN (9-15V/3A max)

REM
DATA



1 – PTT IN
2 – PTT OUT
3 – AUDIO DATA OUT
4 – Q
5 – I
6 – AUDIO DATA IN
7 – GND

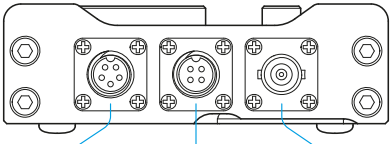
MIC/SP
Microphone / Speaker



1 – SPEAKER – *
2 – MIC IN
3 – PTT IN
4 – SPEAKER +
5 – MIC IN (V+) **
6 – GND

* Connect a speaker or headphones with the appropriate pins 1 & 4, SPEAKER (-) and SPEAKER (+). Do not connect a speaker to ground, pin 6.
** For connecting an external electret microphone that requires additional power supply.

Right side



CW KEY

1 – GND 3 – NC 5 – "–"
2 – "+" 4 – NC

CAT

1 – GND 3 – +3.3V IN ***
2 – RX 4 – TX

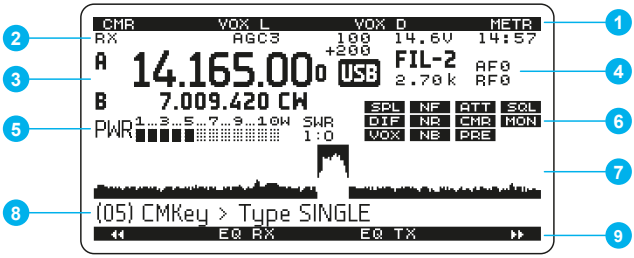
ANT

Antenna (50 Ohm)

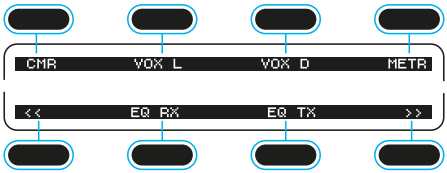
*** When connecting with a third-party USB adapter, make sure that an input voltage of 3.3V (10mA) is supplied to the pin.

USER INTERFACE

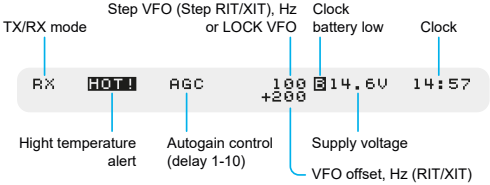
Main display



❶❾ — Function buttons

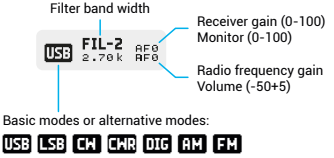


❷ — Information bar title



❸ — VFO A / B

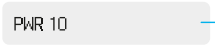
❹ — Info block 1



❺ — Graph bar

Receive mode:

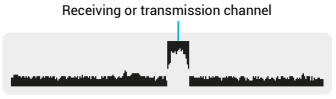
Transmit mode:



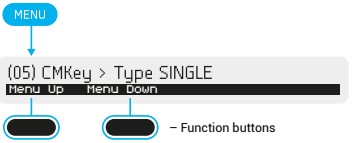
❻ — Info block 2

- NR – Noise reduction ON
- NB – Noise blanking ON
- NF – Notch filter ON
- ATT – Attenuator ON
- MON – Monitor ON
- VOX – VOX ON
- CMR – Speech compression ON
- PRE – Preamp ON
- SQL – Squelch ON
- SPL – Split mode effect ON
- DIF – Virtual intermediate frequency ON

❼ — Pan-adapter



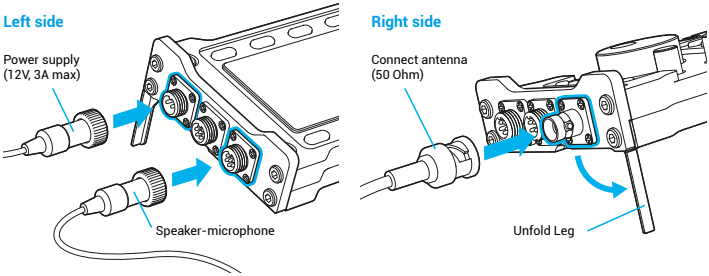
❽ — Menu



Basic Operations

GETTING STARTED

Before using the TX-500, you'll need to connect a power supply, speaker-microphone and an antenna, at minimum.



AF GAIN

AF GAIN — Controls receiver AF gain (volume).

USING THE MENU

The menu is used to tailor the transceiver to your operating preferences. To access the menu, push MENU until the any menu entry appears in the pan-adapter area. To change the value of a menu parameter, rotate ● **TUNE/MULTI** (large knob).To exit the menu, push MENU again.

TUNE / MULTI

BAND SELECTION

The TX-500 covers the 160-6 m amateur bands. Characteristics of each band are summarized below.

Band (m)	Rang (Mhz)	Best DX
160	1.8-2.0	☾
80	3.5-4.0	☾
60	~5.3-5.4	☾
40	7.0-7.3	☾
30	10.0-10.15	✹☾
20	14.0-14.35	✹☾

Band (m)	Rang (Mhz)	Best DX
17	18.068-18.168	✹
15	21.0-21.45	✹
12	24.89-24.99	✹
10	28.0-29.7	✹
6	50-54	✹☾

MODE SELECTION

Each mode is described briefly below. Later sections cover each mode in detail. Tap MODE one or more times to select USB (LSB), CW (CWR), DIG, AM or FM mode. Long push selects alternate modes, such as CW reverse (CWR). Also, long push returns normal mode.

- **SSB:** Single-Sideband modes are narrow-banded voice modes that conserves space in crowded band segments. They're the most popular modes overall, they are: LSB (lower-sideband) usually used in 160, 80 and 40 meters, while other bands use USB (upper-sideband).
- **CW:** Continuous Wave mode requires narrow bandwidth, providing a high signal-to-noise ratio which is ideal for low-power (QRP) use. It's also a popular mode for DXing and contests. CWR Continuous Wave Reverse is the alternate mode, and may reduce the level of interference (QRM).
- **AM:** Amplitude Modulation mode is characterised by good fidelity. It's much less power-efficient than SSB modes. You can easily find AM amateur stations in 160, 80, 40 and 10 meters.
- **FM:** Frequency Modulation mode is most often used for local communications, and can be found on 10 m and up.
- **DIG:** Digital Mode is usually used with a computer connected to the transceiver to send/receive data. Although SSB modes can also be used for this purpose, the TX-500's audio-based data modes (DIG) optimise settings for data rather that voice.

VFOS A AND B

The TX-500 provides two VFOs. Use of VFO B is optional. Each VFO has independent frequency, mode, and filter settings:

- **VFO A** normally controls both the receive and transmit frequency. Most contacts occur between stations tuned to about the same frequency.
- **VFO B** can serve as a holding register for a second frequency of interest, then swapped with VFO A as needed (see A<>B).
- **+ - Tuning rates**: Tapping + or − selects VFO tuning rate LSB, USB, DIG (10Hz, 100Hz, 1kHz, 2.5kHz, 5kHz), CW, CWR (1Hz, 10Hz, 100Hz, 1kHz, 2.5kHz), AM, FM (100Hz, 500Hz, 1kHz, 2.5kHz, 5kHz). SSB stations often align on 0.5 or 1.0kHz boundaries.
- **A->B To copy VFO A's frequency to VFO B**: Tap ⬬ → A▸B. Tapping also copies VFO A's mode and filter settings to VFO B as well.
- **B->A To copy VFO B's frequency to VFO A**: Tap ⬬ → B▸A. Tapping also copies VFO B's mode and filter settings to VFO A as well.
- **A<>B VFO A and B swap**: Tap ⬬ → A◂▸B to exchange VFO frequencies, modes, and all other settings.

RIT

Incremental Tuning, or receive incremental tuning, provides a means of adjusting the receive frequency without affecting your transmit frequency. This control is sometimes called a clarifier since it can be used to tune in SSB voice signals. But RIT can also be used in all modes, in the event that a station calls you slightly off-frequency. RIT and XIT use the tuning rate (1/10/100/200/300 Hz), taping ⊕ or ⊖.

XIT

XIT or transmit incremental tuning, adjusts the transmit frequency without affecting the receive frequency. RIT and XIT use the tuning rate (1/10/100/200/300 Hz), taping ⊕ or ⊖.

- **To use RIT or XIT**: First, tap R/X RIT (RX mode) or tap R/X XIT (TX mode).
  This turns on the "+0" on the display. Then adjust the offset using **RIT/XIT** knob.
- **To zero the RIT/XIT offset** tap CLR.

VFO LOCK/UNLOCK

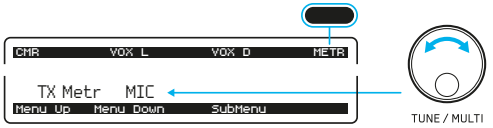
When the mode is activated, the inscription appears in the upper line of the display (Lock), frequency tuning is not possible. To deactivate the mode, press the button again.

TRANSMIT SETTINGS

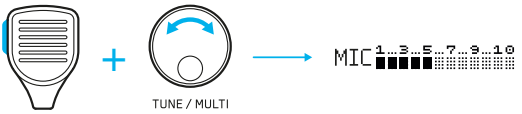
- **Voice Modes (SSB, AM, FM)**: Choose a mode: Tap MODE to select USB / LSB, AM or FM mode.
- **MON, Monitor**: Push → MON in the bottom line for MON on. Hold PTT to set the voice monitor level, rotate **AF GAIN** knob. High MON settings may result in audio clipping or distortion. Start with 3 to 5.

Do not use the hand speaker-mic at the same time as monitor MON function in voice modes (USB LSB AM FM) — there is a risk of audio coupling with a high noise distorting the real audio.

- **Adjust mic gain level:** Push METER and select MIC, rotating **TUNE/MULTI.**



While speaking into the mic, adjust MENU → 09 > Gain > MIC (mic gain).



While speaking, adjust mic gain for maximum 5-7 bars on a scale. Mic gain for the TX-500 mic is typically 3-7.

- **CMR Speech compression**: To use speech compression, tap → CMR in the top line. Adjust the level using the MENU → 16 > CMR Level or long push → CMR. High CMR settings may result in distortion. Start with 1 to 3.
- **POWER:** Set the power level (10-100%): tap POWER in the top line and rotate the knob **TUNE/MULTI**. *Do not use MIC gain to set power level.* Set mic gain to a fixed level as described above.
- **VOX**: Selects push-to-talk (PTT) or voice-operated (VOX) transmit (VOX icon on). VOX hold time is set with MENU → 14 VOX > MIC (time, ms). MENU → 13 VOX L (VOX level) should be set to trigger at normal speech level, but not in response to incidental noise. Start with low settings (80-90).
- **VOX Transmitter keying method**: The VOX switch selects either VOX or PTT keying for CW mode. Most operators use VOX, allowing the transmitter to be keyed immediately whenever a hand key or keyer paddle is used. Tap → VOX_LO in top line and rotate **TUNE/MULTI** or tap MENU → 14 > VOX > CW (time ms).
- **METR**: You can switch the transmit bar graph from MIC, ALC, PWR, SWR, PWR Num, SWR Num, by tapping → **METR** in the top line. Rotate **TUNE/MULTI** knob.
- **CW modes (CW, CWR)**: To swith modes tap MODE to select CW (CW normal). In some cases an interfering received signal can be eliminated by switching to CWR (CW reverse) using long push MODE.
- **CWPITH**: Set sidetone pitch using CWPITCH. The ideal pitch for most operators falls in the range of 600-700 Hz. The receiver's passband will be centered at the pitch you select. Tap → CWPITCH and rotate **TUNE/MULTI** or MENU → 02 > CW Pitch (Hz). Set sidetone volume using **AF GAIN** in TX mode, MONI ON.

RECEIVE SETTINGS

- **RF gain** is normally left at (-0). Reducing RF gain may be useful in some strong-signal conditions.
- **SQL**: Squelch is used to mute the receiver until a signal appears. The control adjusts the signal threshold required for squelch to "open," unmuting the receiver.
- **IF DSP**: Virtual Intermediate Frequency: Specifies the Mode of the Receiver.

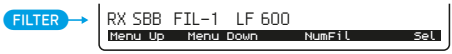
  ENABLE : This is the operating mode, utilizing all DSP features of the radio. This mode uses a virtual Intermediate Frequency, which is offset from the operating frequency by a few kHz. This is similar to 'homodyne' technology.

  DISABLE : When IF is disabled, the radio operates in simple Direct Digital Conversion mode, and has soft reduced performances.
- **FILTER**: DSP filter tuning functions (LF/HF) The (LF/HF) control is used to shape the TX-500's receive filter passband. In general, a narrow passband reduces interference (QRM) and noise (QRN), while a wider passband improves fidelity. In voice modes, CW and DIG modes long push FILTER selects low-cut (LF) and high-cut (HF) frequency. Pushing FILTER select number of filter (1-4)RX, (1-2)TX. These functions remove low- or high-pitched interfering signals. Reducing the width or shifting the passband may attenuate an interfering signal above or below the desired one.
- **PRE/ATT**: Preamp PRE and Attenuator ATT turns on the RF preamp. It should be used only when signals are very weak. Preamp gain can be set on a per-band basis. ATT turns on the 20-dB RF attenuator, which can protect the receiver from strong interfering signals.
- **NR**: Noise reduction removes random background noise (hiss or static). It has a characteristic "hollow" sound. Higher settings may attenuate weak signals. Tap → NR turns on noise reduction, holding → NR and displays its setting, which can be adjusted using the knob **TUNE/MULTI**. Tap return to exit the setting display. Tap → NR again to turn noise reduction off.
- **NB**: Noise blanking NB can eliminate repetitive noise such as that from power lines, appliances, and vehicle ignitions systems. The NB setting is adjusted in the same way as NR (see above).
- **NF** in SSB and AM modes, NF turns on auto-notch, which locates and suppresses one or more carriers automatically, Push → NF to enable or disable the Notch Filter.
- **TONE (Transmission tone)**: The transceiver will transmit a single tone. Pressing "Tone" → TONE again puts the transceiver in RX mode. A long press of TONE displays the selection mode NORMAL (1000 Hz) or DUAL (two tones of 1000 Hz and 2000 Hz). The transmission power is approximately 50%.

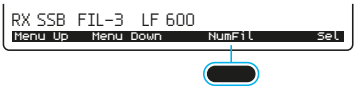
EXAMPLE **(RX) SSB FILTER ADJUSTMENT: (CHANGE FIL-3)**

Set FIL-3: Bandwidth: 2.4 kHz; Passband: 600Hz to 3kHz

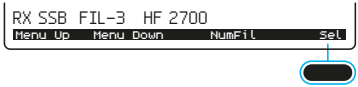
1. Long-Push FILTER to enter filter adjustment menu. The parameter to be adjusted is shown in the bottom line of the display.



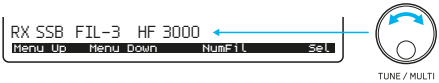
2. Push ● → NumFil until FIL-3 is selected (in the bottom line).



3. Push ● → Sel once to select "HF". The display might now look like this: "RX SSB FIL-3, HF2700 ". ('2700' might be any other value).



4. Rotate **TUNE/MULTI** to change 2700 to 3000
(notice the frequencies are in Hz, not in kHz).



5. Push FILTER to save changes and exit the filter adjustment menu.

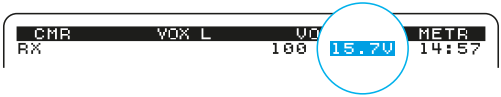
6. CHECK YOUR WORK: Push FILTER a few times until FIL-3 is selected. It should now display 2.40 k.

Protections

OVERVOLTAGE PROTECTION

When exceeding 15.0 volts, the transceiver won't allow switching to TX mode, (the voltage indicator on the display will become inverse) a significant excess (more than 16 volts) it can cause the protective fuse to burn out, as well as the failure of the transceiver! Use a power source or battery with a voltage of 9 to 15 volts and a current of at least 3 Amps.

ATTENTION! *Exceeding the supply voltage above 15 volts can damage the transceiver!*



REVERSE POLARITY PROTECTION

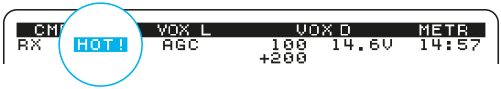
If you connected a minus voltage source or battery instead of a plus, the transceiver will not turn on. You must connect the external power supply correctly, please, see the pinout of the power connector in the section “Controls end user interface”.

OVERHEAT PROTECTION

The transceiver has an internal protection against the overheating of the output stage of the transmitter. If the TX continuous mode is too long, the output stage as well as the transceiver body can be heated up. If the limit value is exceeded (about 60 degrees Celsius), the transceiver won't allow switching to TX mode. After the temperature drops, the TX prohibition mode will turn off automatically.

ATTENTION! *During long-term TX mode (digital modes) do not block the air access to the rear cover of the transceiver, or reduce the power.*

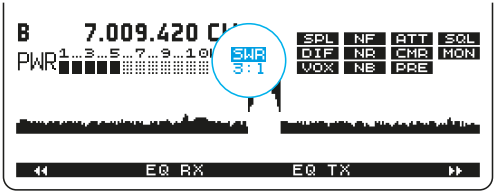
TIP: *Unfold both rear legs to increase the air flow convection.*



HIGH SWR PROTECTION

If the impedance of the antenna is different than 50 ohms and there is no antenna tuner connected, the SWR indicator on the display will show a value greater than 1.0. If the SWR value is 3.0 or more (the SWR indicator on the display will be inverse), the transceiver will automatically reduce the power output. If the value of SWR is greater than 3.0, then the output power will decrease more.

ATTENTION! *Use a tuned antenna with a wave impedance of 50 ohms, this is ideal (max output power), or use a matching device (automatic or manual tuner).*



Complete User Manual and Firmware Updates

You can download the latest version of the complete user manual and device firmware updates from the official Lab599 website: **lab599.com/downloads/**

FCC information

FOR CLASS B UNINTENTIONAL RADIATORS

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC INFORMATION

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

WARNING: MODIFICATION OF THIS DEVICE TO RECEIVE CELLULAR RADIOTELEPHONE SERVICE SIGNALS IS PROHIBITED UNDER FCC RULES AND FEDERAL LAW.

CAUTION: *Changes or modifications to this device, not expressly approved by Lab599 Inc., could void your authority to operate this device under FCC regulations.*

Amateur Radio Operation Only

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