FoxRex 144

RigExpert

Made in the Ukraine

User's manual

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Technical Overview.

The FoxRex 144 is a modern direction finding receiver, with a level of functionality and user support far beyond most other ARDF receivers.

The receiver is a single-conversion Superhet with an IF of 10.7 MHz. It features crystal filter for good selectivity and a crystal-controlled PLL for frequency stability.

A 3-Element-Yagi antenna (Design WB2HOL) is integrated into the receiver.

A microprocessor controls the receive frequency and gain setting of the receiver. It communicates with you through several acoustic signals, a 2*8 LCD-display, a rotary encoder and a 3-position switch.

Besides controlling the receiver the processor supports you in several ways, e.g. by estimating the distance to the transmitter, displaying which fox is transmitting right now and how many seconds are left, and acoustical warnings N seconds before each fox turns off, when you get close to a fox or the battery voltage is low.

The various settings and options can be adjusted in two menus: the Main menu and the Settings menu. This manual describes in Detail all options in those two menus and, once everything is set, the Main Operating Mode. A quick overview of all Menus can be found at the end of this manual on page 24.

The operation of the FoxRex 144 is very similar to our 80m receiver FoxRex 3500.
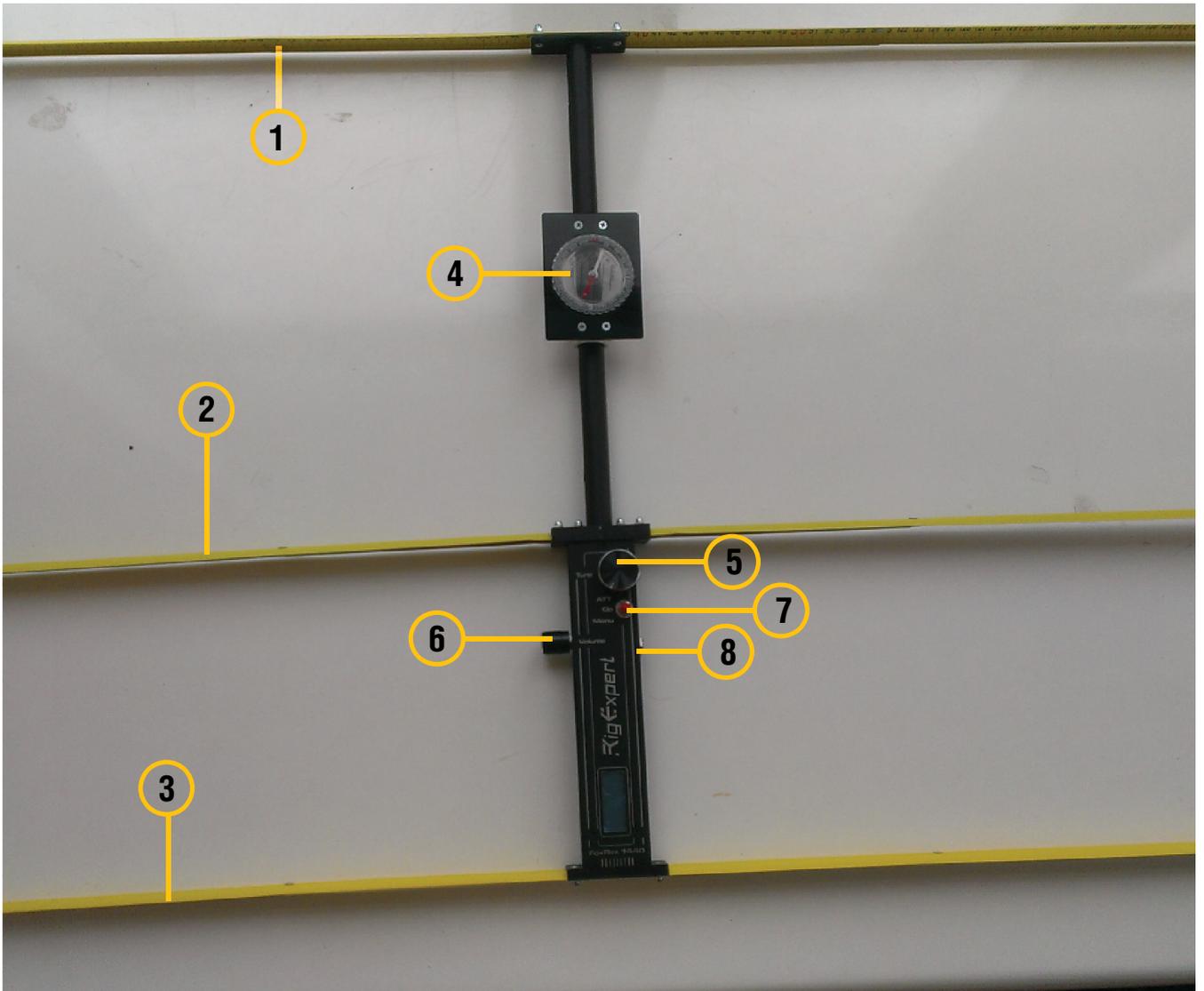
1. Director.
2. Active element.
3. Reflector.
4. Compass.
5. Rotary Encoder.

6. Audio Volume control.
7. Switch Attenuator - Operate- Menu.
8. Battery charger jack.

9. Battery charge indicator.
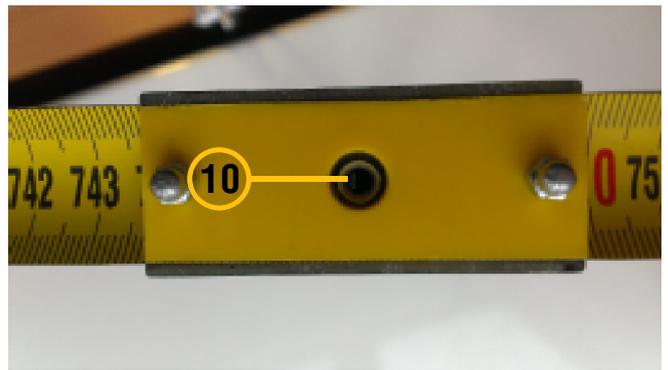
10. Headphones jack.

Specifications

1. Frequency range,		143,9-148,1 MHz
2. Sensitivity, S+N/N = 6dB,		0,1 uV
3. Selectivity	-3dB	14 kHz
	-40dB	46 kHz
	-70dB	70 kHz
4. Image rejection		45 dB min
5. Attenuator range		120 dB, in 5dB step
6. Modulation		Amplitude, A2A
7. Charger power supply voltage		12 V
8. Charge current		250 mA max
9. Battery life		30 hours min
10. Weight		530 g
11. Recommended Headphone		Dynamic 2 x 32 Ω or higher, 3.5 mm
12. Antenna		3-Element Yagi
13. Antenna Gain		7.4 dBi
14. Antenna Beamwidth, horizontal, - 3 dB		+/- 32°

Try it out!

Whether you are an experienced foxhunter or new to this sport: you will need a little time to get used to your new receiver. Go to a park or forest, set up a fox, play with your receiver while approaching the fox, and learn how it interacts with you. Have fun!

Charging the battery
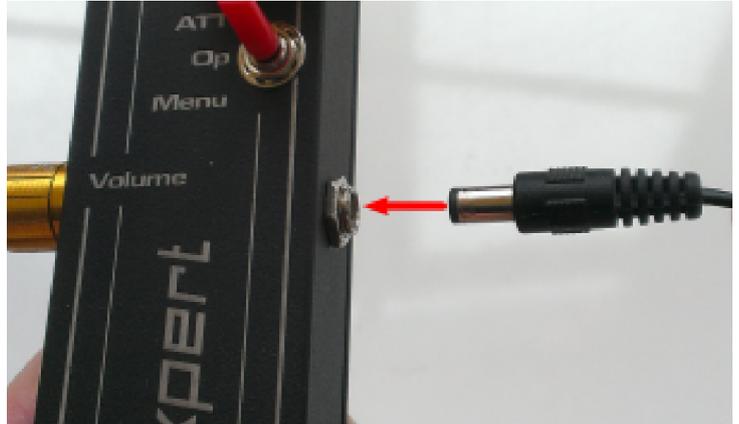
Before you start operating the device, connect a charger as shown in the figure and charge the battery. While charging, the indicator's light is steady and later starts blinking, then finally goes off. When the indicator starts blinking or goes off, the battery is charged, and the charger may be disconnected. The battery voltage is displayed when you enter the Main menu, see page 12. The voltage of the fully charged battery is about 8.4 Volts. The battery should be recharged when the voltage has fallen to 7.0 Volts (or anytime earlier). At 6.5 Volts the 'Low Battery Alarm' will sound every 10 Minutes. When it sounds for the first time, you will have enough power left for more than 2 hours of operation. At 6.0 Volts the Receiver will turn off.

Switching the receiver on/off

To turn the receiver on, insert the 3.5 mm headphone plug into the jack at the bottom of the receiver. It is recommended to turn on the receiver right at the start. At this moment the 'foxes' synchronization timer starts working and no further adjustment is required. To turn the receiver off, disconnect the headphones and push the Encoder for several seconds until the display goes off.
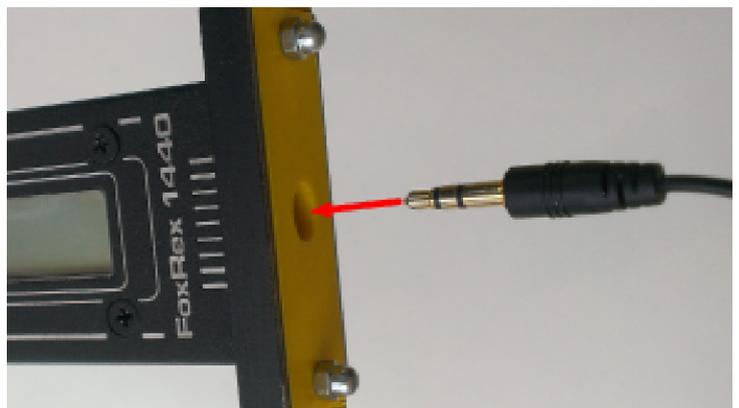
After power ON, a start text and software version information are briefly displayed on the screen. Then the receiver goes to the main operation mode. The start text can be changed to your name or callsign in the Calibration menu, see page 22.

1. Start text .

2. Software version.

Receiver's main operating mode

In the main operatin mode, if the number of "foxes" is greater than one and the number of operating frequencies is less than five, the current fox number, current frequency, time left for this fox, and estimated distance to this fox are shown on the display. The signal meter scale in the lower part of the display indicates the volume of the signal received.
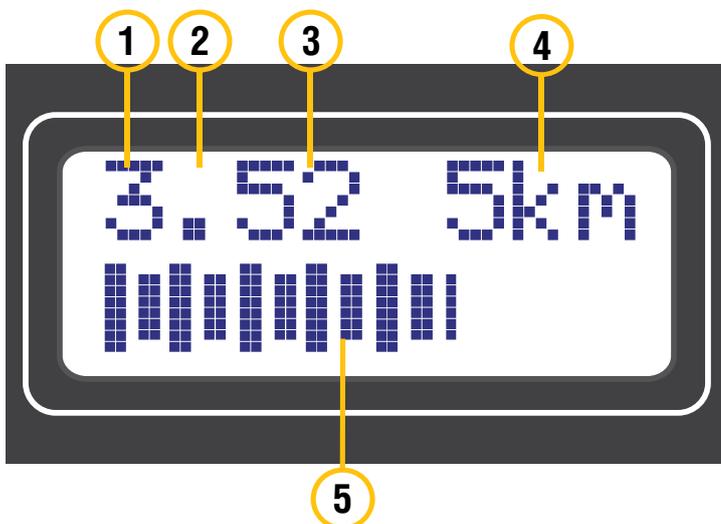
1. Number of the current fox.
2. Current frequency, number of dots 1-4.
3. Time left for current fox.
4. Estimated distance to the "fox" or attenuation, if the estimation is turned off. See page 15.
5. The received audible signal volume meter.

If "Foxoring" is selected in the "Number of foxes" menu, Page 18, the time from the start will be displayed instead of the current fox number and the time until the end of its cycle. If the number of operating frequencies is set to 5 or more, the current frequency number will be indicated by the number after the letter "F" in the lower left corner of the screen. The length of the scale of the signal level meter will decrease.
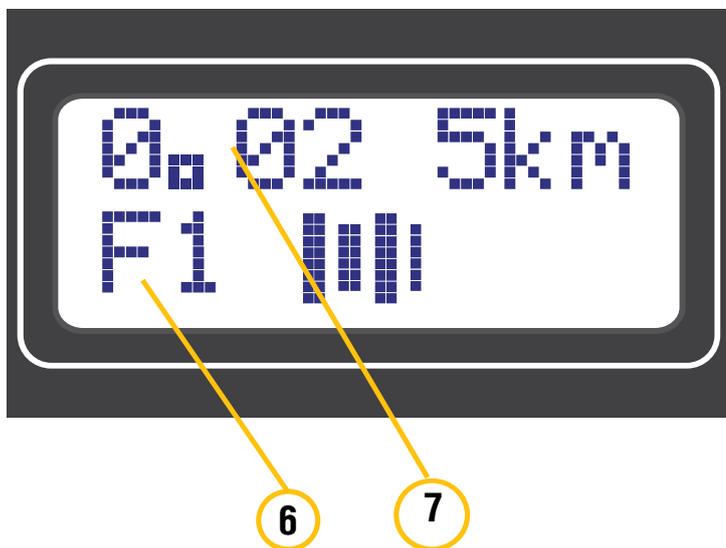
6. Current frequency.

7. Time from the start .

Switching frequencies

The receiver's memory can store up to 12 operating frequencies (only 2 are needed for Classic foxhunts). To switch to the next or previous frequency, press and turn the rotary encoder at least 2 steps. The number of the current frequency is indicated by the number of dots from 1 to 4. Frequency values are set in the receiver's main menu. See page 12. If the number of operating frequencies is set to 5 or more, then the frequency number currently used will be indicated by the number after the letter "F" in the lower left corner of the screen. In this case, the length of the signal volume meter scale will decrease. This mode is used for competitions in the "Chinese" style, where 10 "foxes" and the finish beacon work continuously and simultaneously on 11 different frequencies.

Automatic attenuator and volume control

The Volume control is set so that the audio volume is pleasant. It allows to adapt to more or less sensitive headphones, or transmitters with weak modulation. Other than that it is not used during the actual foxhunt, since the automatic attenuator will always keep the volume in the desired range. The receiver's automatic attenuator reduces the sensitivity in 5 dB steps when the S-Meter reaches full-scale. You hear a double-tone. When the signal gets weaker, you must open the attenuator manually by clicking the Switch to the Attenuator position one or several times, or by left-turning the Encoder. The distance estimation is based on the current attenuator setting. In special situations, e.g. interference by other strong signals, it can be necessary to turn off the automatic attenuator. It is turned off (and back on) by holding the Switch in the Attenuator position for several seconds. A star symbol will appear in the display. Now you have to set the attenuator manually by turning the Encoder.

1. Automatic attenuator ON .
2. Automatic attenuator OFF.
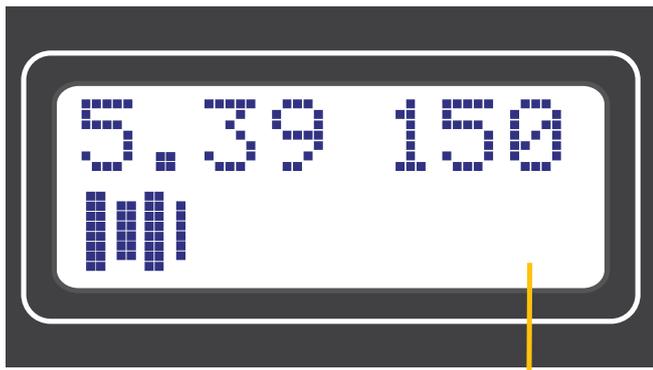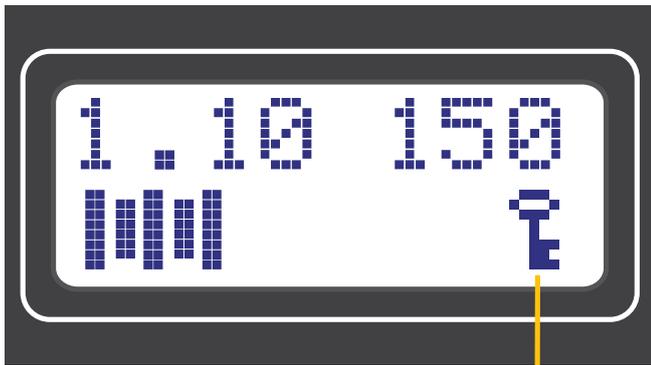
Locking the Receiver

By locking the receiver you can avoid the risk of accidentally getting into the depth of the menus described below in the heat of a hunt. Hold the Switch in the Attenuator position and push the Encoder for several seconds to lock and unlock. A key symbol in the display indicates the Locked state. When locked, all operations described above are still available, except turning off the automatic attenuator, and all operations described below are blocked.

1. No Lock.
2. Locked.

Main menu

To enter the main menu set the Switch to Menu. The current frequency, the runtime since power-on in the fomat h:mm, and the battery voltage in Volts are displayed for a few seconds. In the main menu you can set up your receiver's operating frequencies, or select one of three additional settings: Restart the clock at 0:00:00, synchronize the fox timer, or enter the setup menu. Select a menu item by turning the Encoder. To leave the main menu switch back to Operate.

1. The runtime since power-on.
2. The current frequency.
3. The battery voltage.
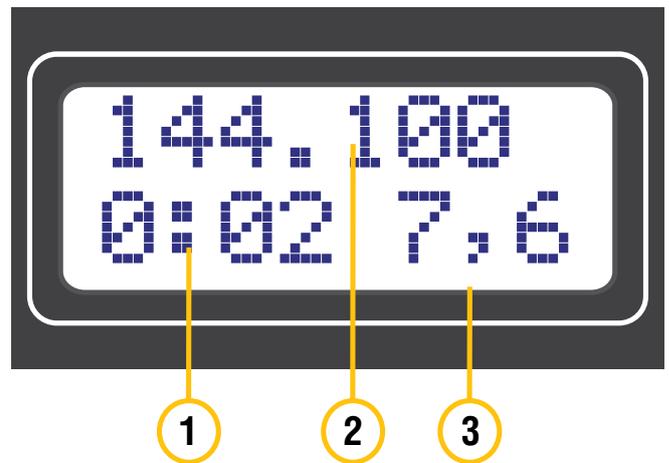
Frequency setup

To change the stored frequencies, select the 'Change' menu item and click the Encoder. Set the frequency in 10 kHz steps by turning the Encoder, in 1 kHz steps by pushing+turning. Click the Encoder to go to the next frequency. The number of frequencies is selected in the settings menu and can be from 1 to 12, see page 16.

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Restarting the clock

The receiver's internal clock counts the time since power-on. In most cases this will be at your start signal, and then the clock shows the elapsed time since your start. You can restart the clock to 0:00:00 by selecting the menu item 'ClkStart' and clicking the Encoder.

Resetting the fox timer

The fox timer reset mode is accessed by rotary the encoder until "TmrStart" appears. The bottom line shows the number of the current fox and the time left for this fox. By pressing briefly the rotary encoder at the moment the fox starts transmitting, the time is reset to the value of the fox's transmit time and the count down begins. Press and turn the rotary encoder to select the number of the current fox. The best way to synchronize the fox timer is to turn on the receiver exactly at the moment you start hunting and the first fox starts transmitting. In this case, no additional actions are required.

Enter the setup menu

To enter the setup menu, select the main menu item 'Setup-menu' and click the Encoder. To leave the menu, switch to Operate.
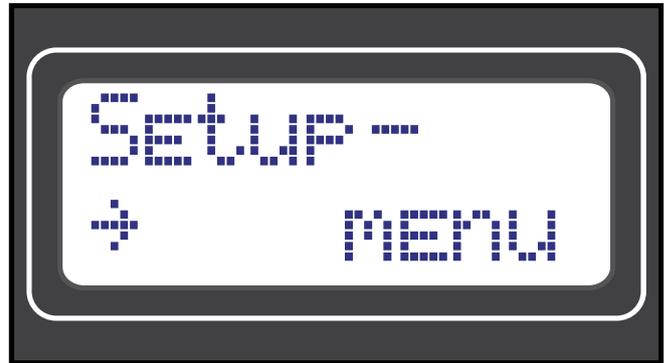
In the setup menu you can change the receiver's main operating parameters. They are: number of foxes, fox transmit time, fox output power, number of frequencies, end-of

transmission-warning time, Acoustic S-Meter mode, and proximity-to-fox-alarm. All settings in this menu should be done before you go to the start. Select a menu item by turning the Encoder. If the receiver is new for you, use the 'recommended settings'. To leave the setup menu switch to Operate.

Fox output power

The approximate fox output power is required for the distance estimation. Select menu item 'PFox' then push+turn the Encoder to set the power in 5 dB steps between 1.0 µW and 30W. In addition you can select 'dB only'. In this case the

PFox 3km
1.0 W

display shows the current attenuation in dB instead of the distance. This mode is not recommended for normal operation. The display shows the estimated distance in the upper right corner. If you know your distance to the fox, like in a 'model event', you can set 'PFox' so that you get the expected distance reading. Recommended setting: '1W'.

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Number of foxes

Select the menu item 'N Foxes' and push+turn the Encoder to select the number of foxes from 2 to 10 or 'Foxoring'. If foxoring is selected, the main display shows the clock instead of the fox timer. Recommended setting: '5' for Classic, 'Foxoring' for Chinese style and Foxoring.

Fox transmission period

The length of each foxes transmission depends on the type of contest. Select the menu item 'T Fox' and push+turn the Encoder to set the transmission period. There are two 'T Fox' menu items. In the first you can set the time in seconds from 1 to 99, and in the second in 20 msec steps (for really odd transmission periods). Recommended setting: '60,00s' for Classic, don't care for Foxoring and Chinese style.

Number of frequencies

To set the number of frequencies in use select menu item 'N Freq' and push+turn the Encoder to select 1 to 12. In addition there are two advanced modes. In mode '"12<>3"' push+turn the Encoder counter-clockwise switches between F1 and F2, while a push+turn the Encoder clockwise switches to F3. In mode '1x2 <>V3' in addition you can teach the receiver for each of the foxes, whether it is on F1 or F2. It will then switch back and forth automatically. These advanced modes can be used for the Czech style of fox hunting, where two sets of foxes transmit on two different frequencies and the homing beacon is on a third frequency. Don't use the advanced modes unless you are an experienced user. Recommended value for classical competitions is 2. For competitions in the Chinese style, where 10 foxes and the final beacon works continuously and simultaneously at different frequencies, the recommended value is 11.

End of transmission alarm

The receiver gives an acoustic warning N seconds before the end of transmission of each fox. To set this time select menu item 'T Alarm' and push+turn the Encoder to set the time from 1 to 30 seconds or 'Off'. Recommended setting: '12' Seconds for Classic, 'Off' for Chinese style and Foxoring.

Acoustic S-Meter

Push+turn the Encoder to select a threshold above which an additional tone signal is generated. If the received signal level exceeds the set threshold, a tone is generated, the frequency of which is higher the higher the level of the input signal. Switching the acoustic S-Meter on and off is done by clicking the Encoder in the main operating mode.

```
AcoustSM
over  2/8
```
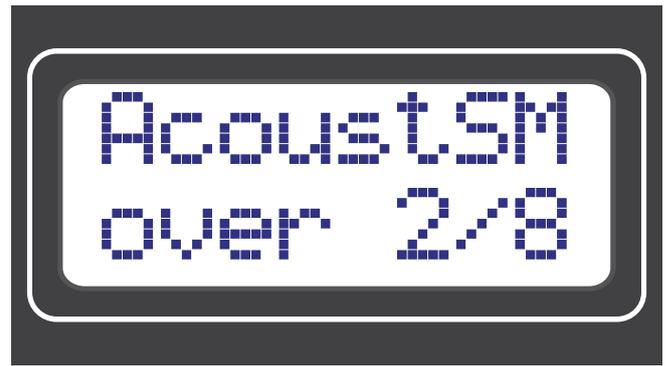
Proximity to fox alarm

This feature generates a tone signal when you get near a fox. A low beep will sound every 4 seconds when you reach the set distance. As the signal strength increases this will become a double and then triple beep. Select the menu item 'NearTone' and push+turn the Encoder to select the distance for the single/triple tone warning from 300m/70m to 30m/5m, or select 'Off'. Recommended setting: 'Off'.

```
NearTone
   Off
```

Warning: in the calibration menu, with just a few clicks, you can change or completely erase the factory calibration of the receiver. If you use calibration menu functions, please read the following instructions carefully!

In the calibration menu you can select the menu language, set the low battery alarm threshold, adjust the distance estimation, adjust the auto power off time, store the changed values to the EEPROM, and change the greeting message. In addition there are some menu items reserved for factory use only.

To start the calibration menu turn the receiver off, switch to Menu, and turn it on again while the Encoder is pushed. To exit the calibration menu switch to Operate. To make changes to calibration menu items permanent, you must go to 'SaveCal Values', see page 23.

Language

Select menu item 'Language/Sprache' and push+turn the Encoder to switch between English and German.

```
Language
English
```

```
Sprache
Deutsch
```

Reset to default settings

Factory use only! If you select the menu item 'EEPROM Reset' and click the Encoder, you will lose all calibration values and user settings! If you did by accident: switch to Operate, then turn off the receiver.

```
  EEPROM
  ÷ Reset
```

Battery voltmeter calibration

Select the menu item 'Cal VBat' to re-calibrate the battery voltage measurement. **It is recommended not to change the factory setting.**

```
Cal VBat
119  7.3V
```

Frequency calibration

Select the menu item 'CalF' and push+turn the Encoder to calibrate the receiver's frequency in 1 kHz steps. **It is recommended not to change the factory setting.**

```
CalF  +00
▐▌▌▌▌▐
```

Attenuator calibration

The factory uses the menu item 'Cal Att' to calibrate the attenuator in 25 steps of 5 dB each. This requires the proper test setup, and a precise signal generator. **It is recommended not to change the factory setting.**

```
Cal Att.
→ Start
```

Select frequency range

Factory use only! In this menu item, by briefly pressing the wheel of the encoder, you can select the desired frequency range for the receiver. The available values are 144-146 MHz, 144-148 MHz and 149-153 MHz.

```
F-Range
144-148→
```
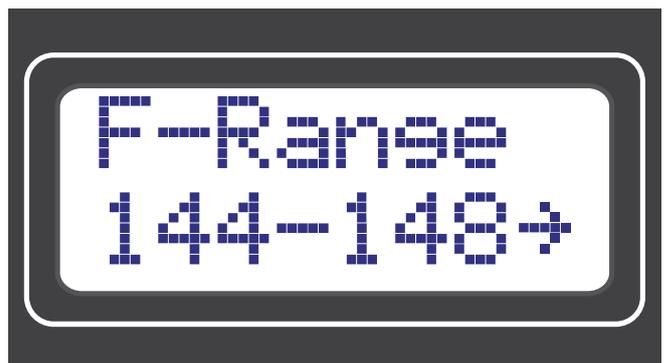
Low battery alarm threshold

The low battery alarm threshold can be adjusted by rotary the Encoder until the "BatAlarm" sign appears on the screen. Press and turn the rotary encoder to enter 6,5 V value (for Lithium-Polymer rechargeable battery).

```
BatAlarm
< 6,5 V
```

Distance estimation adjustment

If you have the feeling that the distance estimations are always too near or always too far, you can change the estimation by up to +/- 5 steps of 5 dB each. Select menu item 'Cal Dist' and push+turn the Encoder to adjust. Recommended setting: '+0'.

Change start text

You can change the text shown at power-on. Select menu item 'Change Name' and click the Encoder. The start name is shown, with the cursor on the leftmost character. Turn the Encoder to select a character, push+turn to change this character. Available characters are 0..9, A..Z, a..z, blank. All changes are stored directly, do not use 'Save Cal Values'.

Select PLL diagnosis signal

Factory use only! Must be set to "1".

Auto shutdown time

You can easily forget to turn off the receiver after unplugging the headphone. With this feature, the receiver will check at the set time after your last interaction with the Encoder or Switch, if a headphone is plugged. If not, the receiver will go off. Select menu item 'Auto Off' and push+turn the Encoder to set the time from 10 to 70 minutes, or to 0 for no auto-off. Recommended setting: '30 Min'.

Save calibration values

To make changes in the calibration menu (i.e. language, battery threshold, distance adjustment, shutdown time) permanent, go to the menu item 'Save Cal Values' and click the Encoder. **Never do this if you are not absolutely sure what you have changed!** If you are not sure, switch to Operate, turn the receiver off, and all changes are forgotten.

Exit from Calibration menu

To exit the calibration menu, you can shift Switch to "OPERATION".

Menu Overview (Software-Version FJRX24 V2.0)

Switch	Function	Display
Operate	< > Attenuator +/-5dB <*> Next Frequency # * Acoust. S-Meter On/Off a Reduce Attenuation A Auto-Attenuator On/Off	Fox-Timer Estimated Distance S-Meter Frequency # * = Auto-Attenuator Off
Menu	< > Select Menu Item	Frequency Clock (h:mm) Battery Voltage

Main Menu, Exit with Switch => Operate

Menu Item	Function	
Change Freq.	* Start ==>	< > Frequency +/- 10 kHz <*> Frequency +/- 1 kHz * Next Frequency #
Clk Start	* Restart Clock at 0:00	
Tmr Start	* Restart Fox Timer <*> Change current Fox #	
Setup Menu	* Start Setup Menu ==>	< > Select Menu Item

Setup Menu, Exit with Switch => Operate

Menu Item	Function
P Fox	<*> Fox output power 1 uW - 30 W, dB only
N Foxes	<*> 2..10, Foxoring
T Fox	<*> Fox transmit time 1..99 sec
T Fox ms	<*> Fox transmit time +/- 20 msec
N Freq.	<*> # of frequencies used 1..12, 12**A3, 1x2**A3
T Alarm	<*> Alarmtime 1 - 30 sec before end of transmission (0 = Off)
AcoustSM	<*> Acoustic S-Meter threshold 0-3/8
NearTone	<*> Proximity Warning for distances 300..30m, Off

Rotary Encoder

< > Turn <*> Push + Turn * Click

Switch to 'Attenuator'

a Click A Press>1sec

Calibration Menu	Start: Turn on RX while * and switch at Menu
Language	<*> Select Deutsch/English
EEPROM Reset	* Reset all Calibration and Setup values
Cal VBat	<*> Calibrate battery voltage measurement
CalF	<*> Adjust Frequency Offset +/- 0..9,9 kHz
Cal Att Start	* Calibrate Attenuator in 25 5dB-Steps
F-range	* Select frequency range, 144-148 MHz default
BatAlarm	<*> Adjust Battery Alarm Threshold 5,8..8,0 V
Cal Dist	<*> Adjust Distance Estimation –5..+5 (x 5 dB)
Change Name	* Change Start-Name
PLLMux	<*> Select PLL diagnosis signal
Auto Off	<*> Adjust Auto Power Off time 0-70 minutes (0=Off)
Save Cal Values	* Store calibration values to EEPROM

Caution: The calibration menu is for advanced users only. Incorrect settings can disrupt the normal operation of the receiver!

Functions available in the locked mode

Switch	Function	Display
Operate	< > Attenuator +/-5dB <*> Next Frequency # a Reduce Attenuation	Fox-Timer Estimated Distance S-Meter Frequency #
Menu	None	Frequency Clock (h:mm) Battery Voltage

Rotary Encoder
< > Turn <*> Push+Turn
Switch to 'Attenuator'
a Click A Press>1sec

Using the receiver

Preparation

Before the competition you must set up the receiver. Go to the setup menu and check all settings: number of foxes, fox transmit time and power, and the number of frequencies. Also check your settings of the end-of-transmission alarm, acoustical S-meter, and proximity warning. To participate in competitions in the "Chinese" style, where eleven transmitters operate continuously and simultaneously at different frequencies, set the number of "foxes" 1 (Foxoring) and the number of operating frequencies 11. In this case, the "fox" timer will turn off and the time from the start will be displayed. To return to the traditional, "European" style, set the number of "foxes" 5 and the number of frequencies 2 (for Classic foxhunts). By moving the Switch to the "Operation" position, save the settings. Go back to the main menu and set the correct frequencies. Make sure the frequency of the first fox is selected, not the beacon frequency. In an official competition you may have a model transmitter. If you do, use it to fine-tune the frequency. Position yourself in a known distance of 100 – 300 m from the transmitter. Turn the receiver to get the maximum signal strength. If the estimated distance in the display does not match the actual distance, go to 'P Fox' in the setup menu and adjust it until you get the desired distance reading. Now the receiver is ready and you can turn it off.

Going on the hunt

To correctly synchronize the fox timer and clock, turn on the receiver exactly at the start signal. To determine the location of the fox, turn the receiver in the horizontal plane to find the direction where the signal level is maximum. For clarification, you can use the acoustic S-meter, page 17. In the direction of the fox, an additional tone will be heard, the higher the more precisely the antenna is aimed at the transmitter. The display will show the approximate distance to the transmitter. At the beginning of the cycle of each "fox" it is recommended to briefly switch the "Attenuator-Operate-Menu" switch to the "Attenuator" position to to adjust the attenuator setting and distance reading from the previous "fox" to the new one.