3,5 MHz DIRECTION FINDING RECEIVER

SUPERFOX 3,5MX

The SUPERFOX3,5MX direction finding receiver is a digital version of the successful receiver SUPERFOX3,5GX. The SUPERFOX direction finding receivers are modern sports equipment satisfying even most demanding requirements of top sportsmen. Their ergonomical solution results from the competitors' demands: low weight and small size, all receiver controllable by single hand even in full run, shock-resistant, waterproof house. The symmetrical antenna especially optimized for direction finding provides sharp direction pattern and high receiver sensitivity. The built-in timer announces coming end of the transmitting period. Digital synthesizer provides high frequency stability and low noise and allows saving up to 6 channels to the non-volatile memory and fast and easy switching between them.

The SUPERFOX receivers are used by many top competitors and their outstanding results prove the quality of the equipment.

FEATURES:

- ***Ergonomical solution – single hand controllable***
- ***High sensitivity***
- ***Optimized symmetrical antenna reaches the front-to-rear ratio 40 dB***
- ***Sensitivity control range 120 dB***
- ***1 min- or 30 sec timer announces the end of the transmitting period***
- ***Stable digital tuning with memory for up to 6 channels***
- ***Shock-resistant, waterproof house***
- ***Detachable whip antenna for easy transport and packing***
- ***Small size and lightweight***

BRIEF OPERATING INSTRUCTIONS:

1. CONTROLS:

FREQ button:	frequency tuning
GAIN button:	GAIN control
ANT button (silver):	switches between “eight” (button released) and “cardioid” (button pressed) pattern
VFO/MEM switch:	VFO: normal continuous tuning MEM: frequency "jumps" between stored channels center position enables fine frequency adjustment around the stored channel
TIMER/MEMORY WRITE switch:	TIMER announces the forthcoming end of the transmitting interval. The timer is automatically reset at switching the receiver on (by connecting the headphones). From now, clock is running regardless of the position of the timer enable switch. If set, you will hear a double beep 10 seconds before the end of every minute or 30 seconds. This gives you enough time to get the last bearing and you need not to waste time with checking your watches. If the accumulator gets weak, there is only one beep. OFF: announcement disabled (clock keeps running) MEMORY WRITE: in VFO mode stores the current frequency

Threaded hole on the top side of the receiver is the terminal for the whip antenna. Two threaded

holes on the bottom side of the receiver (35 mm spacing) are for mounting the compass holder.
Optional:
COMPASS button (blue): see the FINDER09 operation description below.

2. RECEIVER ASSEMBLY

Mount the whip antenna to the terminal on the top side of the receiver.

3. MEMORY OPERATION:

VFO mode: normal continuous tuning.

Memory write: in the VFO mode tune to the tx frequency and then turn the TIMER switch to the MEMORY WRITE position. You will hear short beep in the headphones (number of dots indicates the channel number). The memory content remains stored even when the receiver is switched off.

MEMORY mode: when turning the FREQ button, the receiver moves to the closest stored channel ("jumps between marks"). The frequency change is indicated by short beep in the headphones. If no channel is stored, you will hear warning beep while switching to the MEM mode.

In the center position of the switch the frequency jumps between mark like at the MEM mode. In addition around the mark (+- one div) the frequency is fine adjusted (max. +- 600 Hz) for the case when transmitters are not exactly on the same frequency.

Memory erase: turn the FREQ button fully counterclockwise (CLEAR) and make MEMORY WRITE.

4. ACCUMULATOR:

The receiver is equipped with a built-in Li-Pol accumulator, which lasts for approximately 10 hours of operation (fully charged). The accumulator status is indicated after switching on in the headphones:

▬ ▬ fully charged, ▬ 80%, ▪ ▪ ▪ 60%, ▪ ▪ 40%, ▪ 20%

Charging: Use the N40 charger. The yellow light indicates charging in progress, it goes out at the end of charging (the charger terminates charging automatically). Keep the receiver charged (i.e. charge it after the activity) - you lenghten the accumulator lifespan.

> *Note: when the accumulator is fully charged, the charger does not even start charging. As new accumulators have higher voltage, you have to discharge it at least by 40% or so. Conclusion: after the competition connect the charger. If yellow indicator in the connector turns on, let the receiver being charged, otherwise disconnect the charger and try next time (there is certainly enough energy for several competitions in the accumulator).*

5. WHIP ANTENNA ADJUSTMENT

The direction pattern of whip and ferrite antenna combined asks for exact ratio between voltages from each antenna. While the voltage from ferrite antenna does not depend to the height above ground, the voltage from whip antenna depends on it. Therefore you can get optimum direction pattern only within about 50 cm tolerance of the given height above ground.

Of course, the maximum/minimum can be easily recognized in any height above ground. However, if you trim your antenna according to your personal height, you will reach excellent front-to-rear ratio (some 40 dB!).

Trimming procedure:

- Install the ARDF transmitter, set it to continuous operation at the center of the 3,5 MHz band.
- Stay some 70 m away from the transmitter, away from fences, electric wires, etc.
- Tune the receiver, push and hold the antenna button and aim the receiver front panel towards the transmitter (minimum of the "cardioid" antenna pattern).

- Move the receiver up and down. You should see a minimum of the signal at certain height above ground.
- If the minimum is at the level you normally hold the receiver, everything is OK. If the minimum appears lower than you want, you shall shorten the whip (this is probably your situation). If the minimum appears higher than wanted, you shall lenghten the whip.
- Trim the whip by short pieces (5 mm) until the minimum moves to the wanted height above ground.

  Note: in close vicinity of the transmitter (<10 m) the ratio mentioned above changes again (magnetic and electric components of the RF field increase differently close to the antenna) - very close of the transmitter the whip appears as it should be even shorter. Nevertheless, from such short distance you usually can see a flag and it is better to have an optimum direction pattern through the rest (>95%) of the competition.

6. INCREASING WATERPROOFNESS

The back cover of the receiver is sealed with a silicone glue inside. If you open the receiver (for exchanging the battery or drying the receiver), please remember to seal it again (at least with Scotch tape from outside) after closing the cover back.

7. ELECTRONIC COMPASS MODULE OPERATION (optional)

The FINDER09 allows the competitor to keep stored direction exactly even after the end of the transmission period.

The FINDER09 is controlled by the blue button on the right side of the receiver. When you short click the button, the current direction is stored into memory and this is indicated by a short trill in your headphonest. When you push and hold the button, you activate tracing mode and according to the current direction you will hear a tone in your headphones (in addition to the normal received signals from the band).

If the receiver is aimed to the stored direction or up to 20° to the left, you will hear low pitch in your headphones (833 Hz), if the receiver is aimed up to 20° to the right from the stored direction, you will hear high pitch (1250 Hz). At the exact direction the pitch just changes. Out of the +-20° range no tone can be heard in the headphones.

The direction remains stored in the memory until you store another one by clicking the button (even if you release the button). If you turn off the receiver, the memory content is lost.

Using the compass: Let us assume that you are running towards the transmitter. Before the end of transmitting period (see above: the timer) aim the receiver to the desired direction and click the compass button. After the end of transmitting period, you simply continue to run in full speed and from time to time check the direction by pressing and holding the compass button. The main advantage is that you need not to slow down or stop to check the magnetic compass or even look at the receiver.

At highest GAIN setting (over 6) the compass module produces some interference while in operation. This cannot be avoided but you will find that the receiver is sensitive enough anyway and normally you will use lower GAIN settings.

When you operate the compass (storing or tracing), keep the receiver vertical (vertical whip antenna). The measured azimuth is sensitive to a receiver tilt which will cause the azimuth error up to the tilt angle (depending to a tilt direction).

Note: the FINDER09 compass does not use a tilt-compensated sensor because it needs for calculation the direction of the gravity vector (towards the center of Earth), which is normally measured by the accelerometer sensor. This works fine in steady conditions but running competitor adds his current (very variable) acceleration to the gravity vector which makes the measurement unreliable.

SPECIFICATIONS

Receiver system:	double conversion superheterodyne
Antenna:	symmetrical ferrite + phased whip
Main lobe minimum width:	10° / -3 dB
Front to rear ratio:	> 40 dB
Mode:	A1A
Frequency coverage:	3,49 ... 3,66 MHz
IF bandwidth:	1kHz@-3dB, 4 kHz@-60 dB
Unwanted sideband rejection:	>45 dB
Frequency stability:	<20 ppm
Sensitivity at GAIN switch positions:	7 -135 dBm
	6 -120 dBm
(audio output 100mV,	5 -105 dBm
distances valid for	4 -90 dBm (1 km)
3W transmitters)	3 -75 dBm (300 m)
	2 -60 dBm (100 m)
	1 -40 dBm (30 m)
	0 -20 dBm (10 m)
Headphones impedance:	> 4 ohms
Timer:	10 sec prior to the end of transmitting period (30 or 60 s)
Supply:	built-in LiPol accumulator 7,4 V/ 500 mAh
Consumption (typ.):	35-50 mA
Operation period :	min. 10 hours
Compass bearing influence:	max. ± 2° (compass mounted according to the picture)
Covering:	IP63
Dimensions:	100 (W) x 180(H) x 30 (D) mm
Weight:	300 g
Operating temperature range:	-10 ... + 60°C
Storage temperature range:	-20 ... + 60°C

SUPPLIED ACCESSORIES

- whip antenna
- instruction manual

OPTIONS

- electronic compass module FINDER09
- headphones SL28
- accumulator charger N40
- accumulator tester T840
- compass holder

ok2bwn RADIO SPORTS EQUIPMENT

Jiří Mareček, OK2BWN, CZ-664 01 Bílovice nad Svitavou, Obřanská 593
phone +420 602531222, e-mail: marecek@ok2bwn.cz
http://www.ok2bwn.cz

