



BASE RADIO EQUIPMENT

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User Manual

Short wave transceiver

"ULEYMA"

Made in Russia

Uleyma-80

This transceiver is designated for simplex communications in SSB or digital modes on one fixed frequency.

BASIC SPECIFICATONS

Frequency band, kHz	3600...3900
Number of channels	1
Type of modulation	J3E
Frequency tuning	Fixed frequency
Frequency stability, Hz	Less than +/- 20
Carrier suppression, dB	More than 50
Audio frequency bandwidth, Hz	300- 3600
Unwanted sideband suppression, dB	More than 50
Receiver sensitivity, μ V (at 10 dB signal/noise ratio)	0,8
Audio output power, mW (at 32 Ω load)	5
Receiver nonlinear distortion ratio, %	less than 0.1
Standard transmitter output power at 50 Ω load, W	4
Transmitter second harmonic suppression, dB	More than 40
Other spurious emissions suppression, dB	More than 60
Normal power supply voltage, V	12.6 DC
Acceptable power supply voltage deviations, V	+2-2
Current drain, receive standby (at 12.6 V), mA	30
Current drain, transmission at normal output power (at 12.6 V), mA	700
VOX threshold level	from 1.5V
Level of output audio frequency signal (????)	
Operating temperatures range, C	-20+45
IP rating	IP 54
Dimensions, mm	138X67X19
Weight, kg	
Transceiver	0.15
Battery	0.36
antenna	0.24
Comfortable operating temperature range, C	from +5 to +40
Power supply connector	DS-313A external Ø3.5 mm, internal Ø1.3 mm
Antenna connector	SMA
Audio connector	Ø3.5 mm, 4 bands (third from the tip is GND)
Digital connector	The same as audio

Warning about amateur radio license requirement

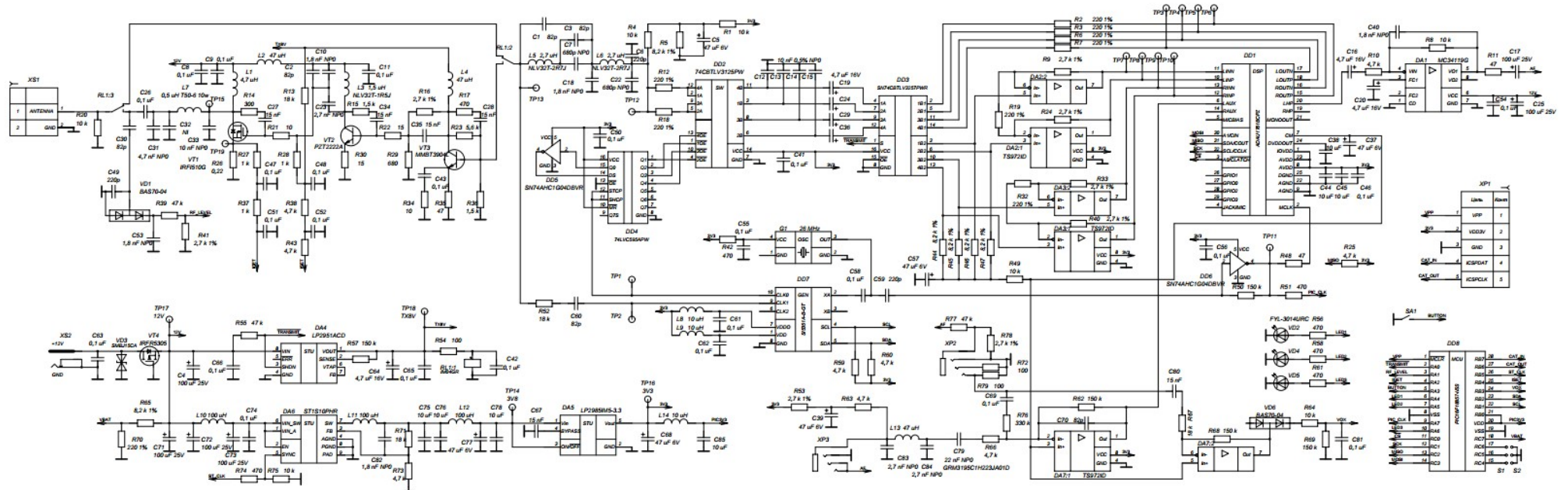
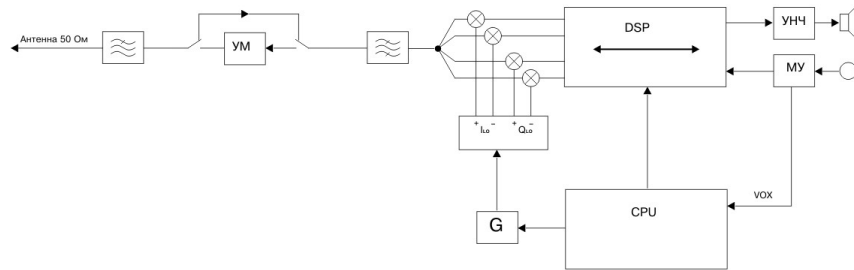
Transceiver "Uleyma-80" operates in the short wave band and according to the international and government regulations transmission require state registration of this electronic equipment. Operation (transmission) in the short wave band requires valid amateur radio service (ham radio) license for an operator or commercial radio service license. Violation of this requirement will result in a fine and transceiver confiscation.

Proposed equipment usage

Transceiver "Uleyma-80" was designed for simplex communication (no frequency tuning is required) at the distances 150-200 km during the day time in the field or at the base station, for example in a tent camp, forest shack or during a temporary brake.

It has to be emphasized that this transceiver is NOT designated for communication during the rescue missions. Major purposes of this equipment are voice or digital communications in a stationary conditions (no motion).

Block diagram



Connections diagram (photo)



Antenna erection

An antenna - is like a road for radio communications. If it is a good one you will ride fast and easy, while you will be tired and slow on a bad one. This is why one has to pay maximum attention to antenna condition and installation.

Transceiver "Uleyma-80" is equipped with DKU-80.20 antenna which is nothing else but "shortened half-wave symmetric dipole". Here is a meaning of every word in this phrase:

- - "half-wave" means that electric length of antenna is half of the wavelength, which is about $80/2=40$ m;
- - "shortened", because it is not always convenient to use an antenna with length of every of two elements about 20 m, this is why it was shortened approximately twofold by application of inductances with special core. This left efficiency of the antenna almost the same as of a full length dipole, while convenience of installation was greatly improved;
- - "symmetric" -- because both elements of the antenna have the same length and a feed line is also made of two identical wires, in contrary to popular coaxial (non symmetric) cable;
- - "dipole" -- is the most popular and simple short wave antenna, which consists of two conducting elements.

In addition to electric part, the antenna includes three plastic plates (reels) used for compact storage of antenna elements and as ends/central insulators. Ropes are fixed to ends plates which can be used to hang the antenna between trees, while central plate is also equipped with a rope to lift it up.

Proper place has to be found before antenna installation. Elements of the antenna should not be entangled in branches during lifting, while the branches of bush or tree have to be high enough to ensure proper antenna height. Typically, one needs to find a tree with branches 3-6 meters high from the ground and use them to lift the central insulator using the appropriate rope. To the sides from this tree one would need two more fixation points 10-13 meter far from the central insulator. It is preferable to have no obstructing object between the central tree and ends fixation points.

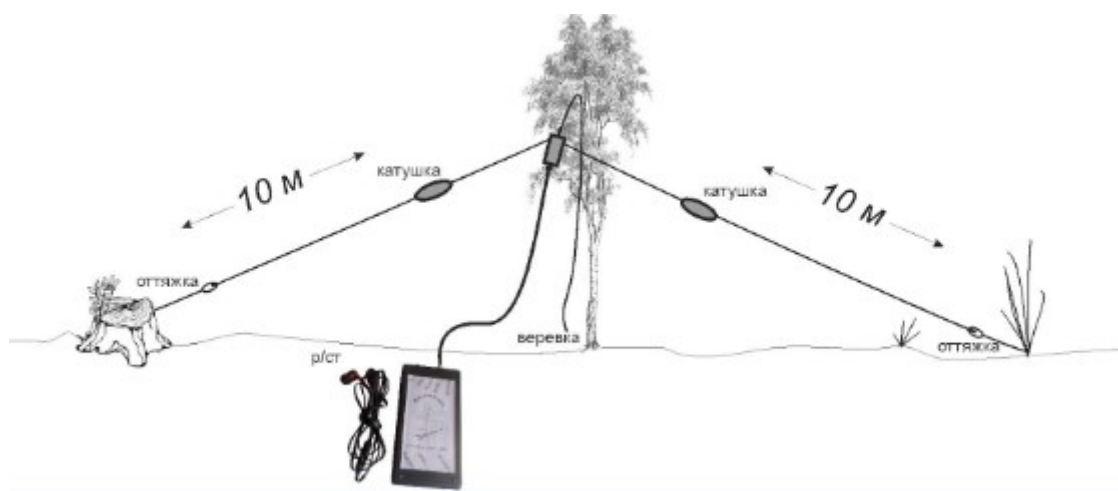
Here is an installation routine: unwind the rope from the central reel and put it on the ground in loops, so it is not entangles in anything. Use the supplied carbine to attach a steel mug, a wrench or something similar (please, don't use your car keys etc.!) to this rope. Now by

easy movement hang this rope on a branch. You should stand at the direction opposite to where the feed line will go.

You can detach the weight from the central rope (now hanging on the branch) and fix the central reel. Unwind the feed line from it and throw it in the direction of transceiver, straighten the feed line.

Now you should unwind the wire from the reels of the left and right element of the dipole to the directions of the elements ends fixing points. One should straighten the central part as well, positioning ropes and wires on the ground. Now we need to pass free ends of the antenna wire elements through the holes in the central plate and bind it to the central insulator mechanically by a knot. Splice the ends of dipole elements with the feed line ends (there has to be electric contact!).

Lift the central insulator by the rope fixed to it (approximately to the height of your head), straighten and tighten both dipole elements and fix the end ropes above your head. Pull the central insulator rope, straightening the elements of the dipole. Fix the rope. Connect another end of the feed line to the transceiver. Antenna is ready for operation!



Requirement to the place of installation.

If you are in the field, on a trail or in a distant forest shack, where there is nobody else and other sources of electricity (like gas/diesel generators or batteries with inverters) everything is easy.

Do not turn on other electrical devices and you will have no radio interference and you communications will be stable and clear.

If you are located in a village or share your camp with expedition, where usage of electrical equipment is inevitable, than you have to pay extra attention to the place of antenna installation. In ideal situation you should keep the distance 150-200 m from the sources of interference.

Concerning the idea of operation from the modern village house, it should be forfeited in order to avoid a disappointment.

Be assured that radio interference from your or neighbor house will cover the useful signal by the dense sheath of noise. "Uleyma-80" is a transceiver only for field conditions.

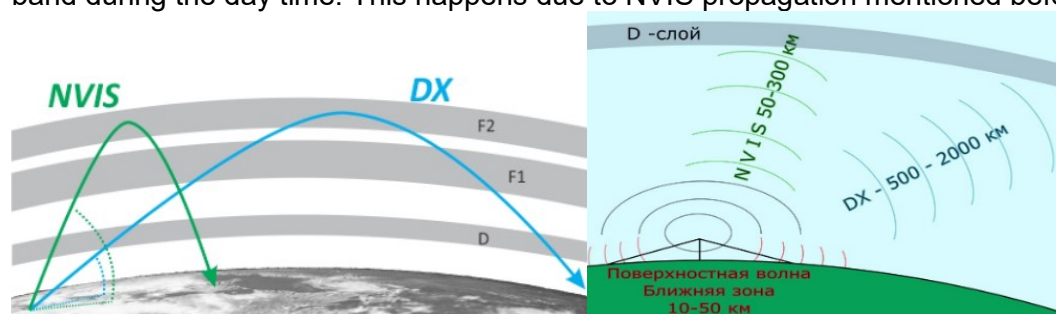
Distance of communications.

Typical radio communication distances can be split into 5 categories:

Close, up to 10 km. Demand for such communications usually appears when by some reason you cannot establish VHF or UHF connection. For example, if you have a dense forest or a hill between you and your peer. In such conditions short wave communications can be surprisingly easy and will not require large and efficient antennas. It will be the same during any time of day and will not depend on the time of year, because in such a case we have surface wave communication, which does not involve ionosphere. The only possible, although rare, source of problems are atmosphere statics during the Summer.

Medium, 10-60 km. It is practically impossible to establish VHF or UHF communication without efficient antenna equipment, like toll towers. At the same time even on short waves these distances can give you troubles. The reason for that is significant attenuation of the surface wave after 15-20 km, while the signal reflected from the ionosphere has not yet come into play. Nearly Vertical Incident Skywave (NVIS - reflection of nearly vertically propagating radio waves from ionosphere) has not been formed yet. At the same time, if efficient (especially full size) antennas are used even 5 W of power could be enough for the communications. Quality of the signal will depend more on the noise level at the receiving point.

Main 60-200 km, as these are the most reliable distances for radio communication on an 80 m band during the day time. This happens due to NVIS propagation mentioned before.



This type of propagation weakly depend on a season of the year. Probably, sometimes during the Winter, after the sunset there can be issues. While sun is above the horizon you can rely on "Uleyma-80".

All three categories have an advantage of low probability of interference with other stations during the day, especially if you are traveling in distant and not very densely inhabited regions, for example in Russia it would be beyond Ural mountains.

Distant 200-1000 km is possible during the night, especially in the winter time. You should not rely on the quality of such type of communication, as even in the case of strong and clear peer signal due to long distance propagation in the night time the probability of appearance of strong signal from another station on this frequency is quite high. We should emphasize that this is true for amateur radio version of the transceiver. In the case of commercial license this problem will be mostly eliminated.

Distant routes 300-500 km long will not be too occupied by interfering stations even during the winter nights if you are, for instance, in Siberia or Far East.

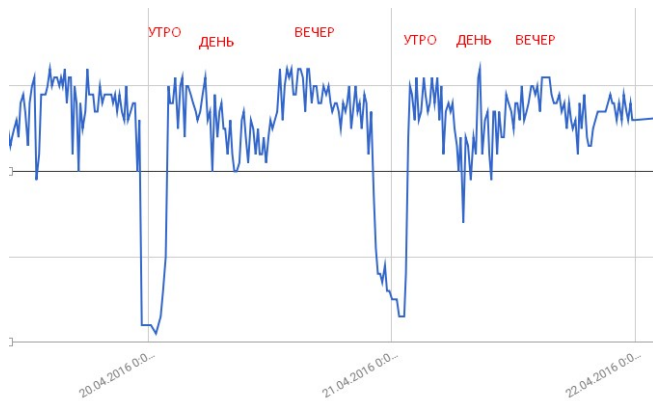
Super long range (DX) 1000 km and further. You should not be surprised by the fact that you can receive stations which are situated several thousand kilometers from you. At the same time, sometimes people will hear you operating "Uleyma-80" at such distances and this is really surprising! Although such events are pretty rare, this can happen during the middle of the winter at dawn, with the first ray of Sun.

Time for radio communication sessions on the 80 m band.

In the case when distance between transceivers is not more than 40 km, time of the radio contact is not important. When distances are 40-200 km time frames from 8am till 11am and from 5pm till 10pm are preferable in Summer time. During the Winter you could use any time from 10am till 6pm with slight probability of propagation degradation in the middle of the day.

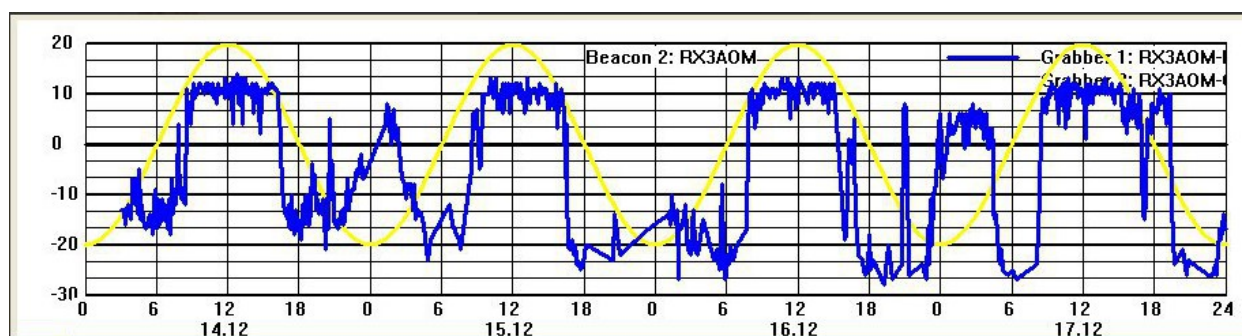
Important note about Sun activity for any distance of sky wave (ionospheric) propagation:

signal level is increasing significantly approximately half an hour before the sunrise and continues to stay high for about another half an hour after. The same with a sunset - your peer signal level will rise half an hours before the sunset and will stay on the similar level for about a half an hour afterwards. In the case of bad propagation, significant radio frequency interference or if you batteries are low designate this time for your radio communication sessions.



Typical plot of signal/noise ratio during the Summer day.

The same plot in the Winter:



Radio Frequency Interference

Here are typical sources of harmful radio frequency interference:

Other stations:



- high voltage power lines



- liquid fuel electricity generators with inverter-type converters;



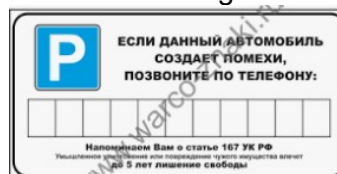
- AC voltage stabilizers;



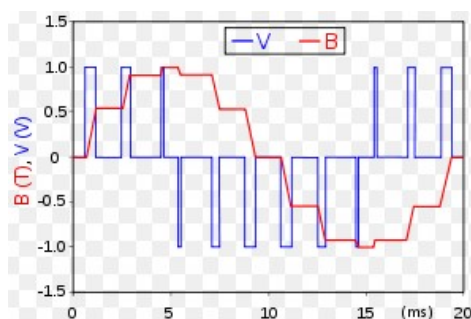
- switching voltage converters (inverters) and power regulators;



- electric motors and ignition systems of cars, bikes and other gas fueled vehicles;



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Switching power supplies, like cell phone and laptop (notebooks) chargers and any other electronic devices built without transformers with the usage of pulse-width modulation



- LED flashlights and floodlights as usually they have voltage converters mentioned before.

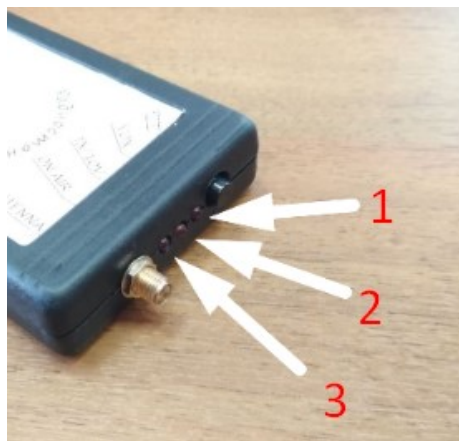
Usage of the transceiver

It was simplified up to the absolute minimum during the development. All you need to do is to connect headphones with a microphone (headset), antenna, and power supply (in this particular order) and your transceiver is ready to use. Put on headset and listen to the noise. Normally it has to be low level noise with some atmosphere statics, especially during the Summer. In the case when according to the sound and indicator LED (3) interference is absent, everything is good and you are ready to contact.

Press the PTT button (TX) and, continuing to hold, say in a normal voice keeping 10-15 cm distance from the microphone first 2-3 times your peer call sign and then 1-2 times yours call sign. After that say "Over" and release the PTT button (TX). Do not forget to release the button as in this case the transceiver will not switch to the receive mode. Never begin you contact from the word "Over" as you will continue to transmit and your peer will start transmitting as well, so you will not hear each other. "Uleyma-80" is a simplex transceiver, which means it can work only in transmission or receive modes but not both. After confirmation from your peer that your call was received you can adjust the volume level by the regulator on your headset. Exchange information about quality and level of signals using RS codes and

continue communication. Do not forget to say "Over" or "Roger" before the end of transmission. In the contrary to FM communications in SSB mode you will not hear standard click or other noise in the end of transmission. When you reply to your peer try to confirm reception of the information using words like "clear" or "OK". When you are concluding the contact do not forget to be sure that your peer really understood that this was you closing transmission and you are not going to stay in receive mode, that the transceiver will be turned off and you will not be on frequency before the next communication session. By the way. the time of the next communication session has to be agreed and confirmed. After that say "End of contact" or "End of work", switch to the receive mode and listen for 3-4 seconds, and only after you made sure that your peer is not transmitting turn of the power.

Indicator LEDs



They are located at the top side of the transceiver between PTT button (TX) and antenna socket (ANT). These red LEDs are illuminated at the following conditions:

1 -- steady light indicates that power is on and voltage is normal (not lower than 10.5 V);
1 -- blinking if the voltage is lower than 10.5 V;

2 -- steady light when in transmit mode (TX);

3 -- in receive mode (RX) it is illuminated when radio frequency (RF) noise or peer signal level exceeds S6 level (-91dBm);
3 -- in transmit mode (TX) blinking according to your voice if RF voltage at the antenna socket ANT is 7 V or higher.

Power Supply

Transceiver is equipped by Li-Ion battery of capacity 2500 mAh.

In order to protect the transceiver from occasional discharge or battery disintegration external only use was anticipated. In order to connect the battery all you need to do is insert the plug into socket 3 on the transceiver. If you observe a spark -- this is not a malfunction.



Do not forget to switch off the battery from the transceiver after communication session.

In the standby receive mode fully charged batter will last for about 3 days. In a transmission mode with 5% duty cycle (transceiver is transmitting 1:20 of time) fully charged battery will last from 1.5 to 2 days. It is always a good idea to have a spare fully charged battery.

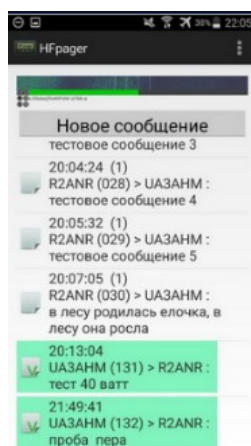
The transceiver can use any rechargeable or chemical (alkaline) battery providing voltage 12-14 V. For that the transceiver is equipped with separate cable with a plug which has to be connected to alternative source of power observing the polarity.

Transportation



Digital Connector

It is designed for connection of a smartphone or PC via a designated cable or cable interface. It allows to switch TX and RX modes of the transceiver using embedded VOX and exchange information in digital modes, for example, using HFpager or WinPager software for text messages or GPS coordinates transmission.



Accessories and Optional Equipment and their usage



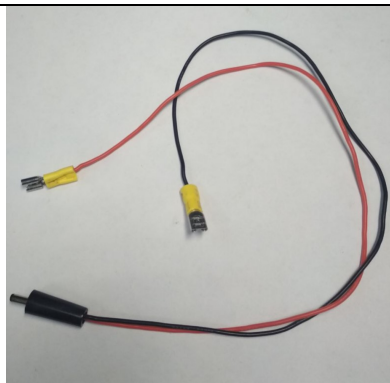
- microphone and headphones (headset);



- Shortened antenna;

- Full length antenna;

- Li-Ion battery, capacity 2500mAh



- alternative power supply cable
You can use this cable to connect the transceiver to the standard 12 V UPS battery



- external speaker, can be used instead of headset for more convenient transceiver usage



- splitter of audio input/output connector, required for connection of external speaker and microphone





- external microphone, can be connecter to the splitter if you use external speaker



- AC/DC power supply, AC 220 V, DC 16 V

- DC-DC voltage up converter MT3608

 <p>- packing case</p>	 <p>- audio cable 4x Ø3.5 mm for smartphone and PC connection</p>
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Troubleshooting table:

Quality Control record:

Transceiver "Uleyma-80" passed QC.

Serial number_A _____

Production date _____ **201_ year**

М.П.

Manufacturer warranty.

At the case of parts, components or the whole device malfunction during the warranty period manufacturer will replace them only based on the reclamation act written in the presence of manufacturer's representative. One side act will be considered valid only if the manufacturer will decline to provide a representative.

By the request of manufacturer the malfunctioning equipment (part or the whole device) hast to be sent by mail to the manufacturer's address. Postage expenses to the manufacturer are paid by the customer. Postage expenses for delivery of repaired equipment are paid by manufacturer.