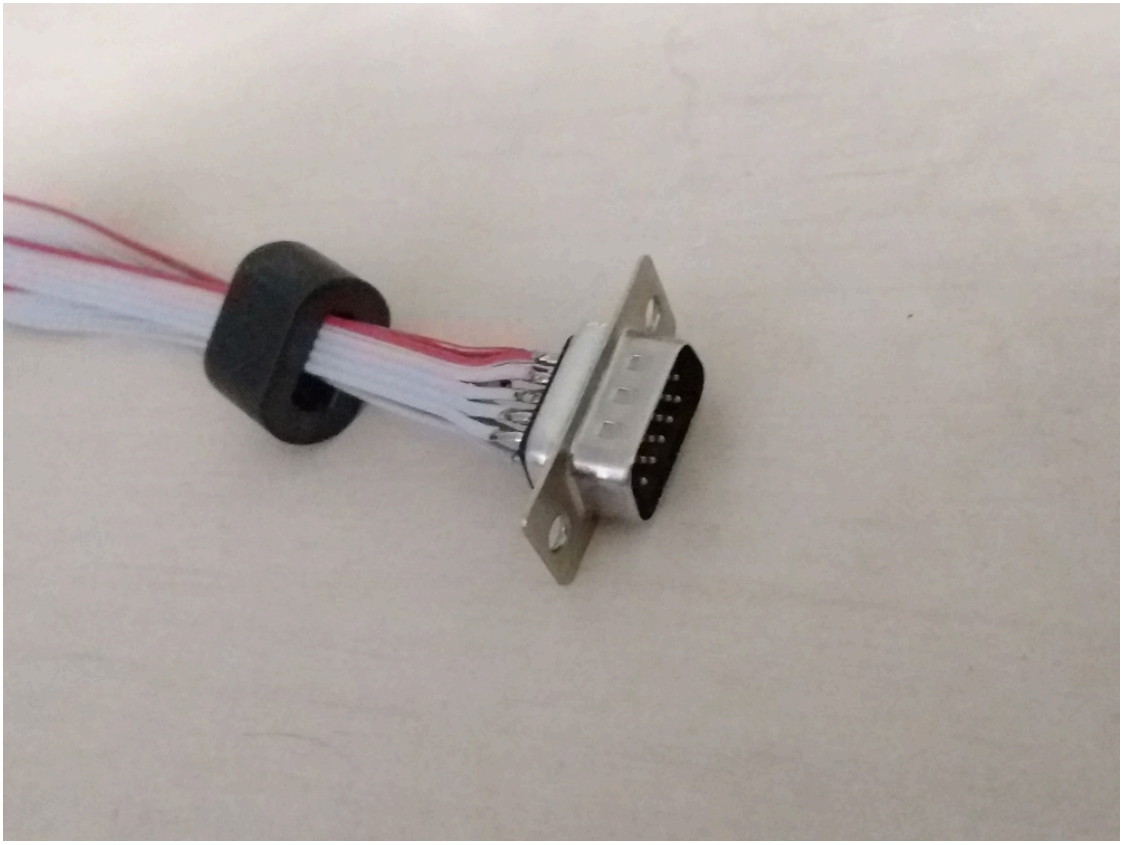
HFPU-100, The Amplifier for Odyssey-2

admin Без рубрики Сен, 03, 2018 No Comments

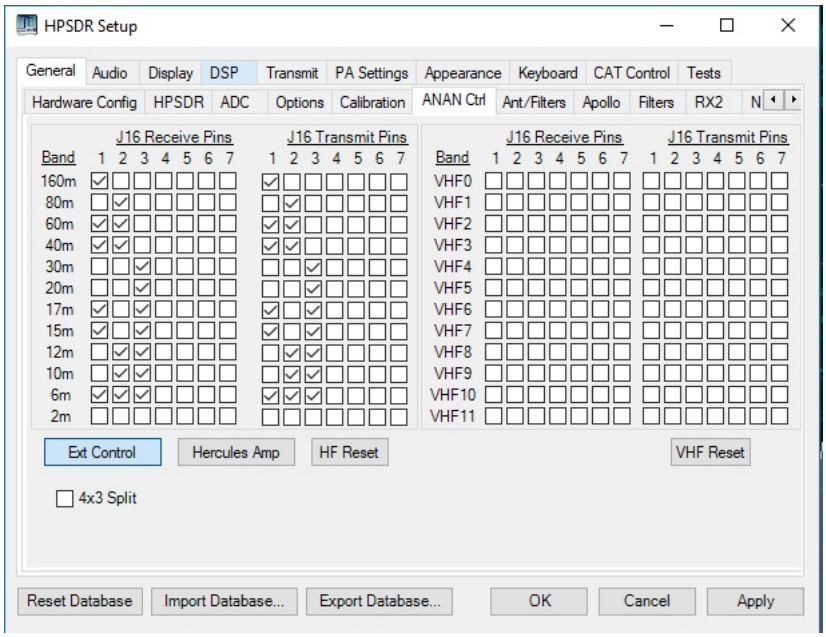
This device is designed for use with the Odyssey-2 transceiver and offers all the necessary functionality for full-fledged work on the air.

The amplifier is placed in the case of 1455R1601 Hammond, the same as for the Odyssey transceiver, with an external heatsink installed on top with active cooling. Initially, it was planned to receive 100 watts of output power from the amplifier, but later, given the compromise of some solutions, it was decided to limit 50 watts. The main limiting factors were applied relays with a maximum current of 1 Amp contacts and the low-pass filters with small size cores that can overheat. In the current configuration, the amplifier is capable of delivering up to 70 watts if necessary and after installing an appropriate output transformer 100-120 watts and more.

The control connector is exactly the same as on the transceiver's card, so to connect it just make a cable with DB-15-M connectors with one-to-one soldering.

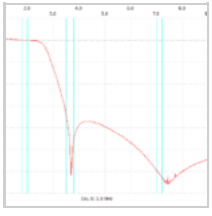


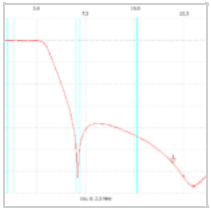
The control is performed on the UserOut pins, the serial data bus remains free and can be used to control other devices. The control code is very simple, it is the same for receiving and transmission modes, only 3 lines are used. Table settings on the photo:

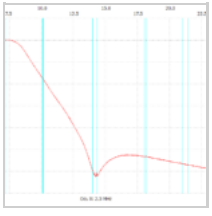


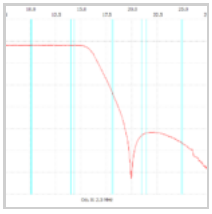
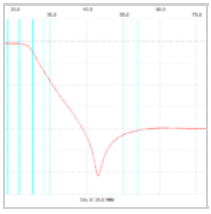
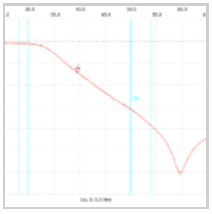
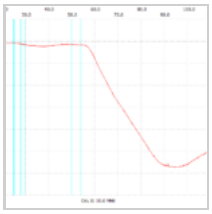
During the transmission, 7 low-pass filters are switching, during receiving, the signal from the antenna also passes through them and additionally through 6 HPFs, which forms octave bandpass filters with a continuous overlap of receive frequencies up to 60 MHz.

Characteristics of LPF on the photo:

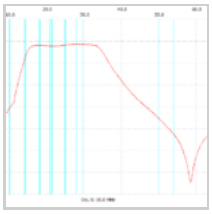
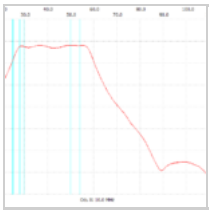
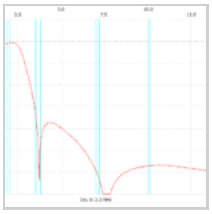
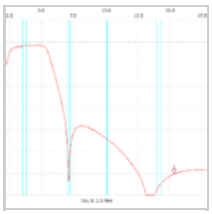
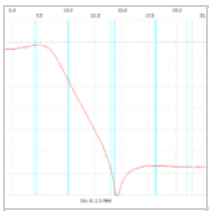
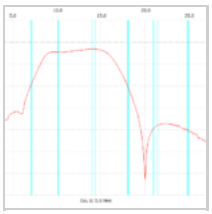
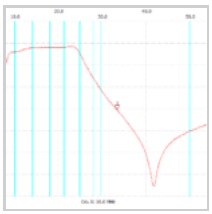






Characteristics of receiving bandpass filters, formed by LPF and HPF:

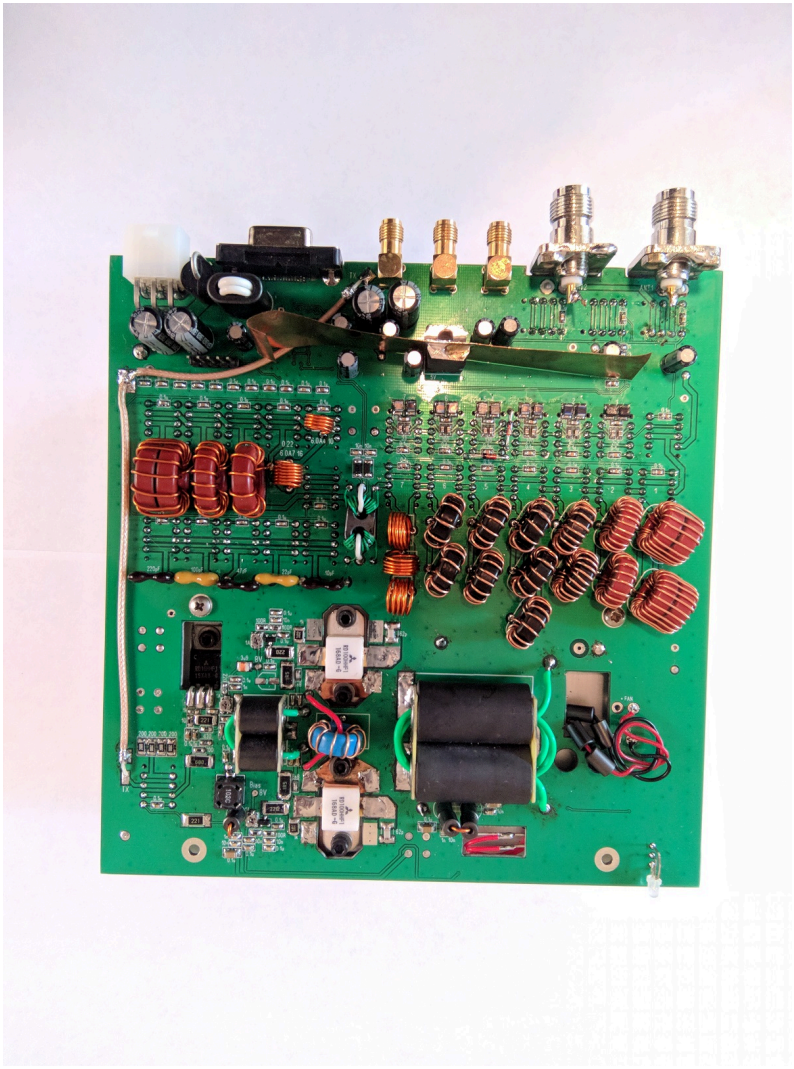








The commutation scheme used here makes it very easy to perform a direct signal passage without filtering, it is enough to set the control code «0».

The amplifier has a built-in VNA bridge, which makes it easy to measure the characteristics of connected antennas in VNA-analyzer programs without the need for physical re-commutation. To use it, you must connect the VNA connector to the corresponding transceiver's connector. The control signal on the control connector must also be present during the measurement in order to the VNA bridge is connected to the antenna.

The amplifier allows you to connect two different antennas simultaneously and use them to work on different bands. It is also possible to operate antennas as receiving and transmitting on the same band.

Amplifier board:



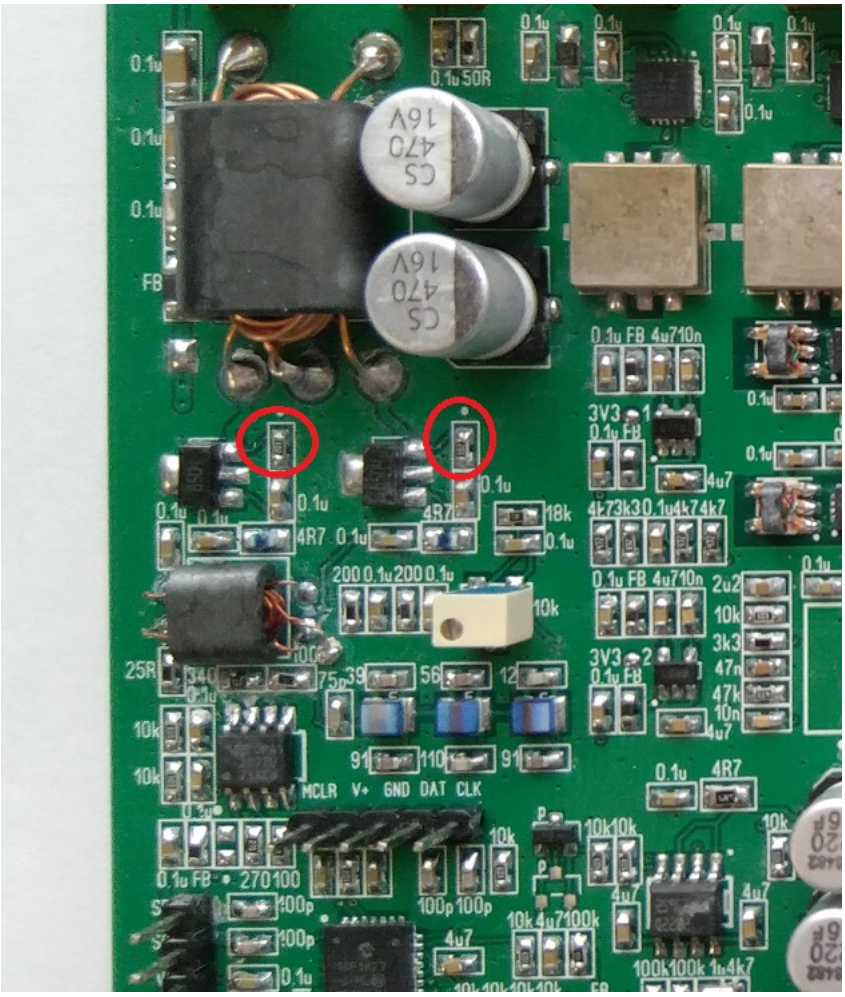
The amplifier also includes a small autotuner for matching the resistances of the real load, which often differs from the required 50 ohms. This is quite a compromise device, because due to space limitations, a small number of components could be placed. For example, an autotuner can connect a maximum inductance of 4 µH with a step of 0.1 and a maximum capacitance of 400 pF in steps of 10. For frequency bands below 7 MHz, this will allow matching impedances only slightly different from the nominal value, but on HF bands tunes a feeder with SWR 10 and more. A clever algorithm used in an autotuner can take anywhere from 0.1 to 2 seconds to set up. In normal operation of the amplifier during transmission, the autotuner generates a protection signal if the output power exceeds 15 watts and the VSWR of the feeder is more than 3, this allows you to quickly disconnect the amplifier in case of emergency situations, for example, an accidental break in the feeder.

On the front panel of the amplifier there is only an LED that glows green in normal operation or red when the overheating protection is activated:

Here are the main characteristics and capabilities of the amplifier:

Rated supply voltage 12-14 Volts
Current consumption with an output power 50 Watts — 7 Ampers
Sensitivity at an output power of 50 watts — 1.7 Volts RMS
Antenna Connectors Type — TNC
Smooth linear fan speed control
overheat protection
Protection from high SWR in load

Since the amplifier has a high sensitivity, it is necessary to reduce the output power of the Odyssey board. To do this, replace the feedback resistors of the output transistors from 1 kilo to 200 Ohms and reduce their idle current to 80 mA (for both)



This modification will allow better control of the power level and will favorably affect the heating of the transceiver board during operation.

« The Bootloader 2.0 for odyssey-2