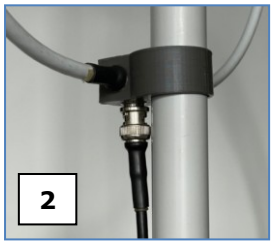
New versions of MLA-S

In PE-AR 8/2022 magazine Lada OK1LO described prototype version of magnetic loop antenna MLA-S (RT). Since it's been more than half a year, and since I got some ideas for practical improvements to this antenna, its development has progressed a bit further. Moreover, based on the comments, a completely new type was made - MLA-S (RT/R), which also has an integrated rotator, see PE-AR 12/2022. Beforementioned MLA-S (RT) also has several useful improvements thanks to recommendations from the HAM community. I think that these upgrades are worth another article directly from their author.

MLA-S (RT/QRP/AB) and improved MLA-S (RT)

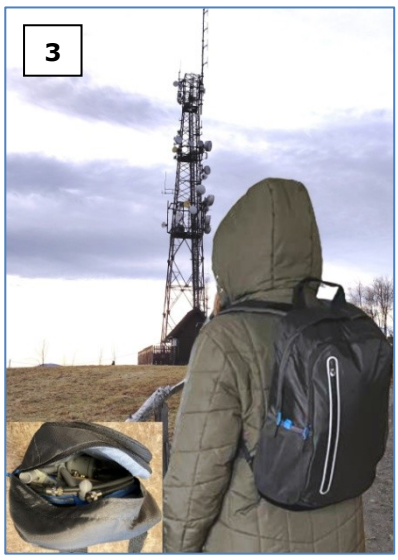
are magnetic loop antennas with MLA SMART architecture, where RT stands for remote tuning (MT – manual tuning QRP reflects the fact that the MLA is designed for use with power up to 5 W (depending on the band, up to a maximum of 10 W). Its added utility is the fact that the new version of MLA-S (RT/QRP/AB) works on AB - all bands, i.e. on all HF bands, including WARC and CB. From 3.5 MHz up to 29 MHz. There are not many commercial types of magnetic loop antennas that operate on all HF bands so an article about its existence might inspire some home-made verification, that MLAs work despite the skepticism of DX-men, this is to the delight of us oddballs who try to make QSOs with QRP using the antenna in their living room. The difference between the two antennas in headline is that the MLA-S (RT) is usable with up to 5x more power, however it lacks the 3.5 MHz band, see Technical data section below. This is not such a tragedy, because the efficiency of such a small antenna on the 3.5 MHz band is very low and the antenna is on this band probably only usable for digital modes (FT8).



Mechanical design

Both the MLA-S (RT/QRP/AB) and the MLA-S (RT), see **Fig. 1**, are designed in a similar way as previous hand-tuned models, such as the MLA-S (light QRP). These MLAs consist of a plastic pipe and its 70 mm diameter plug, which is fitted with two female PL coaxial connectors into which AIRCELL 7 coaxial cable with a length of 235 cm is plugged. This forms the base loop of the MLA with a diameter of approx. 75 cm. At the bottom of the antenna there is an integrated aluminum flange with ¼" thread, which allows the antenna to be easily attached to most tripods.

Loop center post consists of a 25 mm diameter wiring pipe, which can be divided into two parts for easier transportation, each part has approximately 33 cm in length. For both MLA models from headline, the tuning knob has been removed as the manual tuning is replaced by internal DC micromotor. Power for the motor is supplied from CB4M-U controller via a JACK connector on one side and a DC plug connector on the other side.



In addition to the coaxial cable, a thin cable must be run to the antenna with JACK/DC plug connectors. This 4 m long cable is included in the MLA packaging. Small mechanical mounting parts are made on a 3D printer. Coupling is done using the FCL (Faraday Coupling Loop) which is also an accessory of the antenna. It is made of 7 mm coaxial cable. MLA HF input/output is fitted with a BNC connector, see **Fig. 2**. Disassembled MLA-S (RT/QRP/AB) and MLA-S (RT) can be transported in a backpack, which has many pockets for additional accessories including the TRX, battery, laptop, etc., see **Fig. 3**.

Switching bands

The broadband capability of the highly selective MLA SMART antenna is both a feature of its EUIPO "patented" concept, albeit with the necessary manual JUMPER J1. In the case of the MLA-S (RT/QRP/AB), even by two jumpers, J1 and J2, which have the following states:

JUMPER 1: ON, OFF, C-ON. The ON state means shorting the terminals with red jumper, OFF state means the terminals are empty, the C-ON state means that the blue capacitor jumper is inserted into the terminals, see **Fig. 4**.

JUMPER 2: ON, OFF.

At first sight it might seem complicated, but in fact the switching of bands is very simple; we work with two external jumpers for the J1 terminals. You can store the jumpers in a simple holder, which is part of the MLA center post, see **Fig. 5**. Jumper 2 is embedded into the side of the antenna. The layout of the bands is shown in the table, see **Fig. 6**.

From 14 MHz to 28 MHz, tuning is continuous - no band switching with jumpers is required.

Remote tuning

Compared to other antennas from BTV/LOOPER SYSTEMS production electric motor driving the air variable capacitor is not controlled by PWM using CB4M units. Simpler system is used, where fast and slow tuning is done by changing the voltage. In this specific case by switching the voltage of four AA NiMH cells.

The main advantage of the new CB4M-U control box is the integrated battery power supply, which is a key component to eliminating the QRM that slowly began causing problems with the original CB4M model designed ten years ago. Linear adapters have been continuously replaced by smaller and lighter 12 volt switching power supplies, which cause an incredible increase in noise on HF bands. Choosing a power adapter became a nightmare when producing the MLA-T and MLA-C remotely tuned antennas. The CB4M-U control box simultaneously solves two problems, MLA remote tuning and the aforementioned QRM problems. Buttons in the photo **Fig. 7** control the electric motor movement, motor speed is set by the switch.

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J1	J2	MHz
RED	on	3,5 – 5,3
BLUE	on	7 – 10
off	off	14 - 28

Antenna use

Both the MLA-S (RT/QRP/AB) and the MLA-S (RT) were never designed to be permanent base antennas, which can be used outside in any weather. They are made to be mainly used on trips, portable or during SOTA activities. Of course, you can also use them inside your home in case you have limited space, it won't be ideal, but it will work if there is no other option. Their main advantage is portability and quick assembly process. This type of antennas generates primarily close magnetic field, because of that transmitted signals can travel through walls without major losses.

It should be noted, that the efficiency of magnetic loop antennas is a function of loop diameter and wavelength. In other words, on the 80 m band we have to count with the loss of several S against a full-size dipole, located at an adequate height above the ground. However, when compared to other substitute antennas, this difference is reduced. On higher bands, the MLAs may even appear to be a better antenna than, for example, a wire antenna at a low height above the ground. It is confirmed from operational practice that using a room antenna, a lot of beautiful DX QSOs can be made on 10m and 20m, even with QRP power.

Technical data

MLA-S (RT/QRP/AB)
Loop diameter: 75 cm
Total height: 80 cm
Weight: 1,0 kg
Bands: 3,5-5,3-7-10-14-18-21-24-CB-28
Usable power: 5 W

MLA-S (RT)
Loop diameter: 75 cm
Total height: 80 cm
Weight: 1,0 kg
Bands: 5,3-7-10-14-18-21-24-CB-28
Usable power: 30 W

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