AT-502 and AT-515 Automatic Remote Controlled Antenna Tuners

The 200 and 1500W versions from hamware.de are put through their paces.

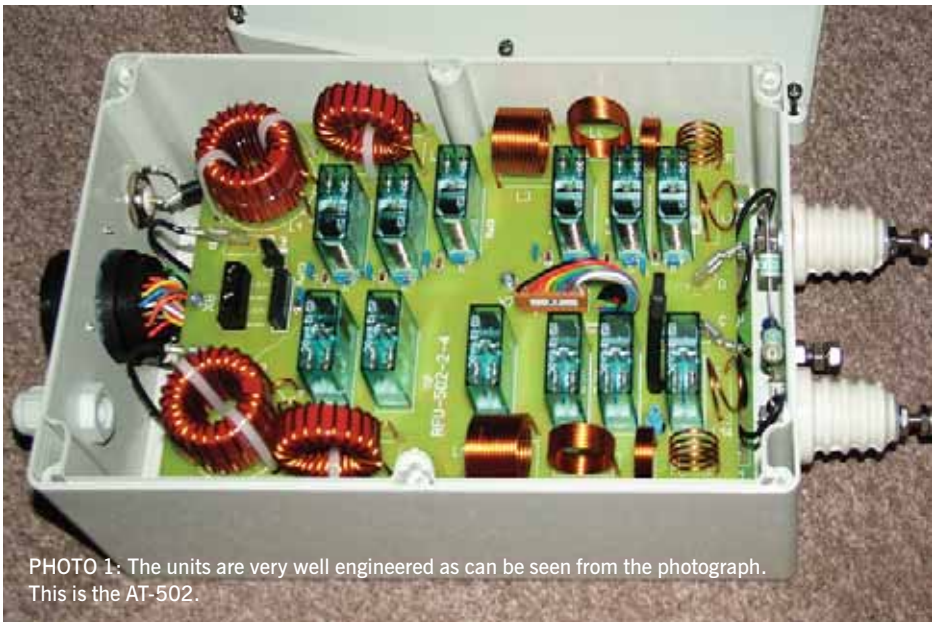

PHOTO 1: The units are very well engineered as can be seen from the photograph. This is the AT-502.

AUTOMATIC ATUs. Having your ATU situated out at the tower and remotely controlled from the shack seems to be the way to go these days. However, I still have and use my old SPC Transmatch that I made about 35 years ago! Obviously there is no comparison, but looking at the lower power version of these ATU's from Hamware, the AT-502, there are no variable capacitors and no large inductors that we old timers would associate with an ATU. Both units, the AT-502 and 515, are very well engineered as can be seen from the photographs, **Photo 1** and **Photo 2**. Unfortunately, the engineering is reflected in the pricing but, on the premise that you get what you pay for, these two units, or even just one of them, would probably be a very nice addition to a well equipped shack.

DESCRIPTION. Both units are similar in design, each matching circuit is a remotely tuned balanced pi circuit. The lower power unit, the AT-502, shown in Photo 1, is designed to handle both balanced and unbalanced HF antennas, with an internal jumper making the desired selection. Although this jumper is inside the main ATU housing, it can be remotely controlled by an additional unit, the ASU-502 Antenna Switch. This unit can also switch between two different antennas, enabling the user to have complete automatic control of two different antennas. The amateur bands are divided into two banks of 85 programmable memory locations, user selectable. The AT-502 can handle 200 watts of CW or SSB and can be either fully automatic or manually controlled.

The control unit, shown in **Photo 3**, contains the tuning controls, TRX, L and ANT, plus memory bank and antenna selection, automatic or manual selection and a display that indicates the memory bank in use, the frequency range as well as the span and the tuner settings. The controller requires a DC supply of 13.8V at 1.5A, the connector for which is on the rear panel along with the RF probe connector, the DB25 plug for the tuner control cable and the memory erase button. The RF probe supplies the input frequency to the controller and connects to the output of the transceiver, with as short a lead as possible. The output side of the probe connects to an SWR bridge that, in turn, connects to the tuner. The tuner input is an N-type with a small amount of thread and this was found to be very difficult to match with an N-type connector. There are two large ceramic feed through insulators for connection of the balanced feeders. For unbalanced antennas the jumper has to be changed and the ground connection, or counterpoise, made to the insulator marked with a black dot. The shielded 25 conductor 27-gauge control cable is connected to the female weatherproof AMP connector and has a length of approximately 90ft. If a longer lead is required, then the cable will require larger wire diameters. The tuner itself is contained in a weather-protected UV resistant case.

The high power version, the AT-515, shown in Photo 2, can handle 1500 watts of SSB or CW and can also be used in manual or automatic mode. The matching circuit is again a remotely tuned balanced pi circuit and there is a balun at the input of the tuner. The output capacitor in this unit is a stepper motor controlled, high voltage, air-spaced variable capacitor. The amateur bands are divided into 85 programmable memory locations. It is in a much larger weather-protected case and uses a 24 conductor control cable with the same limitations as with the AT-502 regarding the length of the cable. The input connector, again an N-type, has a longer thread and is much easier to connect. It would have been a good idea to have a similar connector on the AT-502. There are two 2.5kA lightning arrestors on the output.

The controller is very similar to the AT-502 controller, with all essential controls the same, but no antenna switch. However, it is powered by its own supply of 15V DC at 1.5A and 36V DC at 0.5A. Connections are again the same as with the AT-502 as described previously.

IN USE. Follow the installation instructions closely and you should have no problem at all as it is fairly straightforward to install and tune. A very comprehensive manual is supplied with each tuner so it would be worth reading before trying, as always. Once installed, refer to the list of programmed memory cells in the manual. The read-out on the controller will show two lines. The top line will show the frequency and spread and the bottom line shows three readings, T, L and A. (TRX, L and ANT) The TRX control switches the input capacitors in 256 steps of 17pF and the number shown is one of the 256 steps. L values are switched in 64 steps of exponentially increasing inductance, again

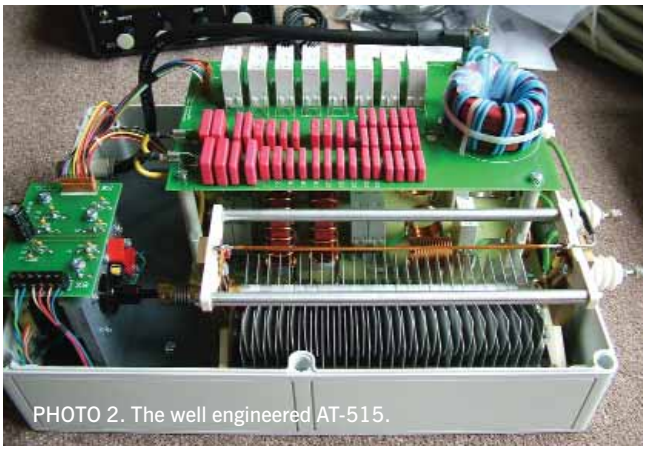
PHOTO 2. The well engineered AT-515.

PHOTO 3: The control unit.

256 steps. The output capacitors are switched with the ANT control in 256 steps of 1.8pF each, so the figure here reflects the value. On the AT-515, the T selector is the same. The L values are selectable in 31 steps from 0.2μH to 35μH and the A control causes the output capacitor to turn 0.9° per step.

The controls TRX, L and ANT are, in fact, rotary encoders, but can be viewed as C1, L and C2, as in a conventional pi network tuner. They are merely controlling the relays in the ATU to switch remotely the components normally controlled manually in a conventional ATU. In order to make the tuners automatic, the memory locations all have to be programmed. Assuming you have something like a centre fed doublet, it should be possible to tune it for all bands. This will take time, so be prepared for that. Looking at the list and assuming you are starting on 20m, with the mode switch in manual, turn the memory selection switch to the indicated location "14000 + 30k". Setting the transmitter to 14015kHz, (half the span of the memory location) set the TRX control to 15 and the ANT control to 10. Start tuning with the L control and tune for minimum SWR. You will find that it is very similar to a conventional tuner when setting up, so be prepared to juggle with the controls, using low power. Once you have tuned the antenna for minimum reflected power, then press the momentary switch Mem In.

You will have to go through the complete page and follow those steps each time. You can check to see if you have been successful by putting the memory switch to memory and switching from manual to automatic. When changing bands or frequencies the ATU should follow. It is a tedious process but there is no easy way. Don't forget to press Mem In after each tuning process. Make sure that you are programming the correct antenna in the AT-502 with the antenna selector switch and also check to see if you have selected the correct position for the balanced/unbalanced jumper.

I always tune using quite low power, no more than 20 – 30 watts. When using the AT-515 and a power amplifier, always tune the amplifier up first into a dummy load. Then tune the ATU, using the exciter only, into the correct memory location. Then, switching the linear into circuit should be fine. I ran a linear through the AT-515 just like this and there were no problems at all. It is after all rated to 1500W so will handle the UK limit with ease.

AT-502 SPECIFICATION

RF Unit

Frequency Range:	Amateur bands within 1.8-30MHz
RF Power:	100W tuning, 200W SSB/CW when tuned
Matching Circuit:	Balanced pi with unbalanced input. Unbalanced antenna mode: unbalanced pi
Reactance Control:	Input capacitance = 256 steps of 17pF each. Inductance = 64 steps increasing exponential. Output capacitance = 256 steps of 1.8pF each
Lightning protection:	2.5kV, 10kA
Over voltage Protection:	2.5kV
Dimensions	9.8 x 3.6 x 6.3in

Control Unit

Antenna Matching Memory:	Two banks of 85 memory locations
Frequency Span per Memory Location:	1.8MHz – 20kHz. 3.5, 7. 10.1 & 14MHz – 30kHz, 18MHz – 40kHz, 21 & 24.9MHz – 50kHz, 28MHz – 100kHz.
Power requirement:	13.8V DC max 1.5A

AT-515 SPECIFICATION

RF Unit

Frequency Range:	Amateur bands 1.8-30MHz
RF Power:	1500W SSB/CW when tuned
Matching Circuit:	Balanced pi filter
Reactance Control:	Input capacitance = 256 steps of 17pF each. Inductance = 31 steps increasing from 0.2 H to 35 H. Variable output capacitor = 400pF tuned by stepper motor with 200 steps of 0.9° each
Lightning Arrestor:	2-Electrode Arrester, 2.5kA
Dimensions:	14 x 10 x 6.5in

Controller

Antenna Matching memories	85, automatic or manual selectable
Automatic mode:	Frequency dependant selection of the memory allocations.
Frequency is sensed by RF probe.	
Power requirement:	15V DC, 1.5A and 36V dc, 0.5A

USER COMMENTS. I found both units performed flawlessly, although tedious to set up. I did find that 160 metres was difficult to tune and I feel that 17pF steps in C1 might be a bit too coarse. The only real complaint was the N-type connector on the AT-502. Proper connection is difficult to make to this connector due to the limited thread. The high power version did not have this problem.

I am not a fan of automatic tuners, having been through all the stages of building loads of different manual tuners in the past, but I guess I should try to move into the 21st Century! However, I don't think I shall be parting with my homebrew transmatch just yet, especially when looking at the pricing on these units. Conversely, for an avid DXer or contester who might require instant band changing, then these are obviously ideal. The AT-502 is around £500 and the ASU switch is around £190. The AT-515 – if you are sitting down – is over £1200. This situation might be getting worse with the way the exchange rate is going!

My thanks to hamware.de for the loan of the equipment.