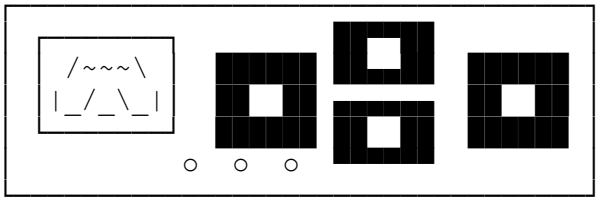
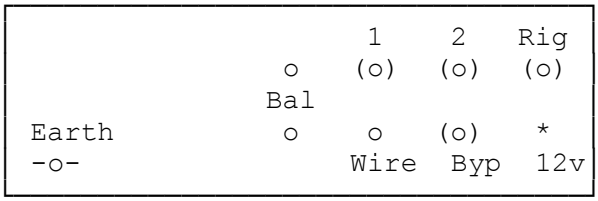
HF ATU and SWR Bridge VC300LP_QT-1

By G8MNY (Updated Dec 17)
(8 Bit ASCII graphics use code page 437 or 850, Terminal Font)
I have reverse engineered this from an old VECTRONICS ATU Model VC300LP(PreMFJ) which has a 48 turn sliding contact high Q ferrite L. But it looks the same as the VC-300DPL, & also the Canadian AEA's QT-1 model, but they only have a 12 tap L switch & large lossy air inductor!

F R O N T



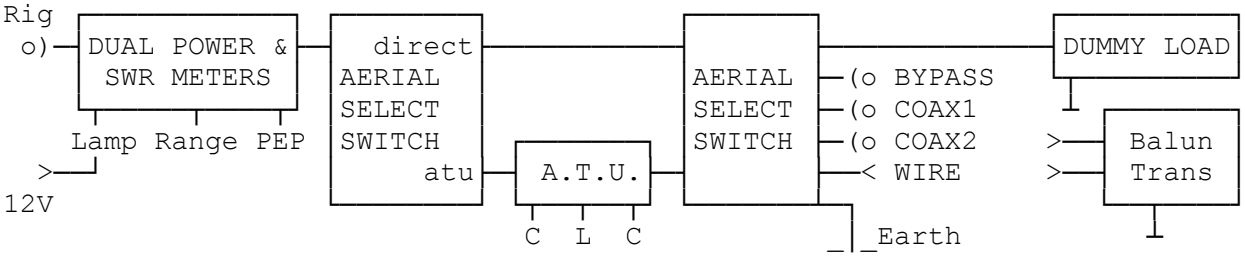
R E A R



It is a small cheaply made unit, but it does have many advantages as there is a lot in the one box.

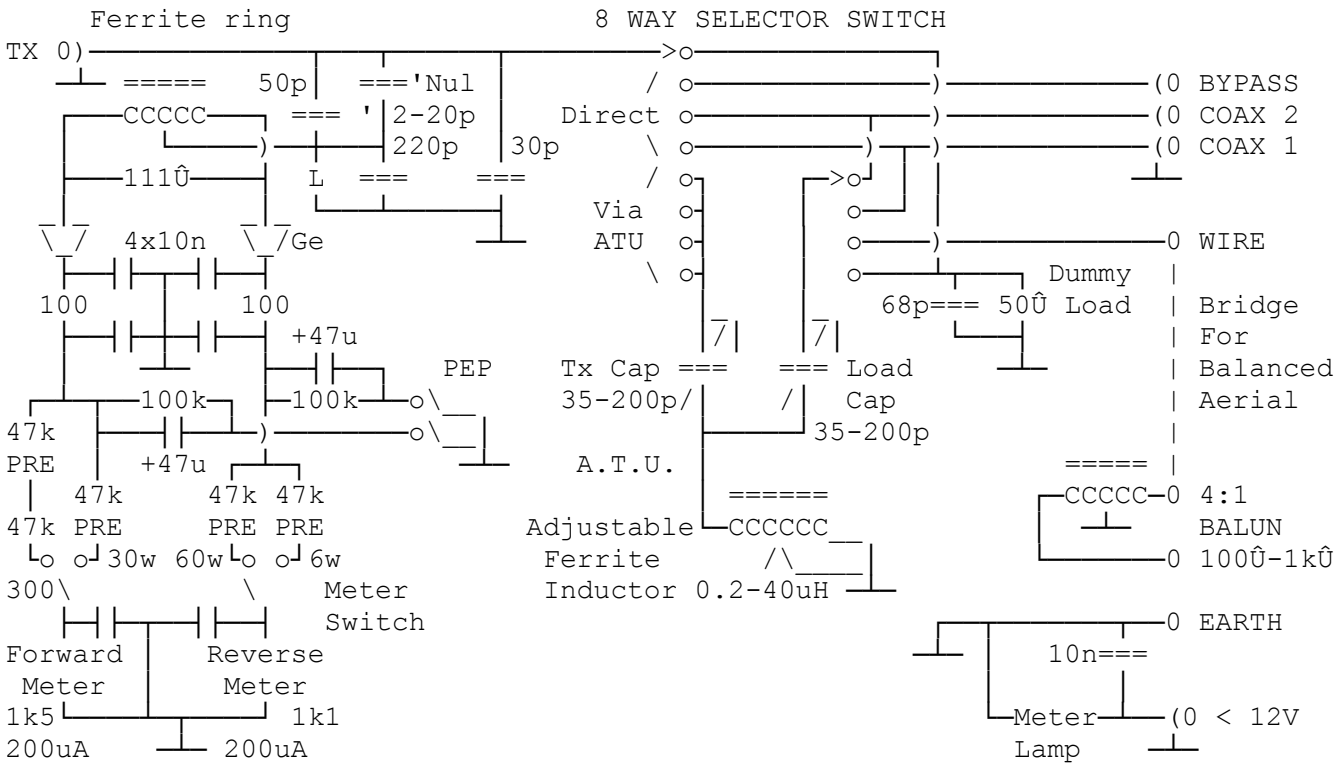
Aerial Tuning Units are also called Aerial Matching Units. But the best aerial is one that is already "tuned by design" (cutting) & a good match (tap point)!

BLOCK DIAGRAM



FEATURES
- 8 Position Switch:- 4 Aerial Choices, Bypass, Coax 1, Coax 2, & Wire.
- 4 Option with ATU:- 3 Aerials & 1 Dummy load for pre tuning.
- 300W max. (150W @ 1.8MHz) SSB ATU Rating. 4:1 Max SWR @ 300W.
- ATU is "T" Type, 48 tapped ferrite inductor, 2 tuning Caps (1000V rating).
- 30W & 300W Forward scale cross needle power meter.
- 6W & 60W Reverse power scales, for increased SWR sensitivity.
- Average & PEP meter modes. (PEP poor design)
- Built in dummy Load (50W cont, Max 10 seconds @ 300W?).
- 4:1 BALUN option for balanced aerials (link from wire ant)
- 12V Meter scale Lamp & on/off switch.
- Size 10.2 x 9.4 x 3.5" or 257 x 85 x 197mm, weight 3.4LBs

CIRCUIT
The SWR bridge is quite conventional. The PEP mode with large 47uF is not effective, an active system is really needed for true PEP!



CONSTRUCTION
It uses thick 2 U part aluminium case, thick open wire for all internal connections & the impedance is then tamed by the addition of extra caps to ground. (e.g. 68pF across the internal load & 30pF after the SWR Bridge.)

The toroid ferrite inductor has a sliding contact over 48 separated turns on a moulded former, some similar models just have 12 taps to a switch.

A single PCB provides for all the component mounting except the main switch, ATU components, & dummy load. All earths are to the local chassis with locking washers.

The SWR bridge circuit has a few added components to ensure accuracy over the whole HF frequency range.

TUNING UP
If doing this on someones operating frequency, DO QSY 3kHz first! The best tuning method is to use the ATU into the dummy load first at low power (between 10 & 30W) & pre-tune it, set the ATU with both Cs @ 50% & adjust the L tap for initial minimum SWR. Then tweak (rock too & throw) both the Cs for a perfect 1:1 match. This can take time as they are interdependant, & their combined capacitance tunes the L for the frequency used. On a 50Û source & load the Cs should end up being equal in value. After that, switch to the aerial & re-tweak just the Cs for 1:1, they will no longer be equal on a non 50Û load!

LOW POWER is the kindest tuning method for the ATU & also for minimum QRM. A very briefly re-tweaking of Cs only at full power may be an advantage as the meters are more sensitive to reflected SWR, with more power.

Both the output select switch & the ATU variable L, should not be changed if there is any great power flowing, as the contacts could be damaged with arcing!

IN USE

The ferrite balun & tapped ATU inductor can suffer saturation losses if used in-appropriately. But in general there is much less loss with a ferrite cored device, than the much bigger air spaced equivalents, as there is many times less wire needed & associated copper loss. Typically power loss is only 5% (0.2dB) @ 100W (100W in 95W out) on any band at any SWR (due to the "T" type ATU's high Q) which is quite low for a combined ATU & SWR bridge.

If the random wire aerial won't tune up to give 1:1 SWR then try a different length wire (shorter or longer by a metre or so) or add a series cap (200pF) or L (20 turns 3cm dia) can help.

The "T" type ATU is easy to use, but is not so good at removing Tx harmonics as the Ò (pi) type. But it does an excellent job of protecting the Rx from static & strong signals on lower bands (e.g. removing MW Broadcast signals as it is >-18dB for each frequency halving.)

MODS

1/ The black knobs on black background are not that visible, I have painted white lines on mine, so I can easily see their directions in low light.

2/ I blackened the dummy load & the aluminium plate it is on, with spray mat black, & used heat compound between that & box bottom. This all improves the load's dissipation, so more power for longer is possable, or less chance or burning it out!

3/ The cross needle meter needed damping as it is, is very swingy, see my Meter damping/speed up bulletin for corrective action.

See also my Tech buls on "HF ATU & SWR Bridge MFJ-904H", "Palstar AT1500CV ATU" "Drake WH7 QRO HF SWR Bridge", "A Homebrew HF SWR Bridge", "PEP Meter modification", "Meter Damping & Speed Up" & "QRP SWR Bridge".

Why don't U send an interesting bul?

73 De John, G8MNY @ GB7CIP