

Testing Auto ATUs

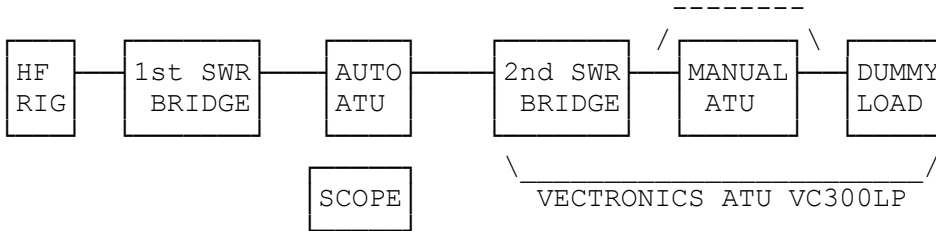
By G8MNY

(Updated Mar 17)

(8 Bit ASCII graphics use code page 437 or 850, Terminal Font)

If an auto ATU (matcher) misbehaves, here is my way to test it.

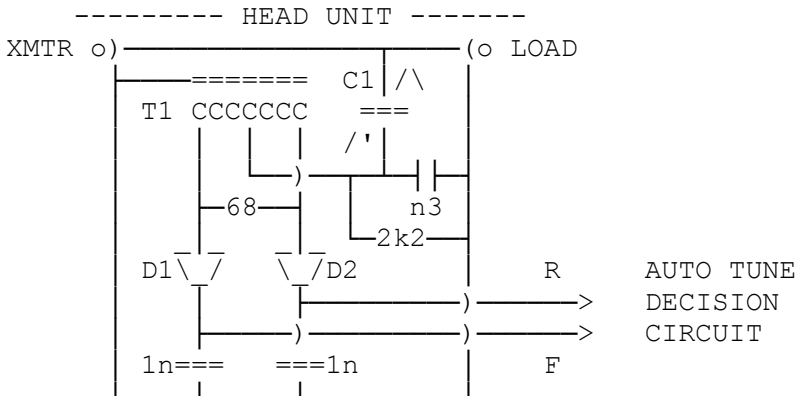
KIT NEEDED



With this set up test the performance & enables calibration to be done to ATU.

- 1/ With Manual ATU in through mode, measure the settled Rig seen 1st SWR bridge
Is it the same or better than 2nd SWR bridge. What is the power loss?
Repeat for all bands.
- 2/ Now do 1/ with manual ATU adjusted to give an SWR of 1.5:1 on 2nd SWR bridge
Does the Auto ATU settle & does the 1st SWR bridge always give a lower SWR?
- 3/ Now do 1/ with manual ATU adjusted to give an SWR of 3:1 on 2nd SWR bridge.
Does the Auto ATU settle & does the 1st SWR bridge always give a lower SWR?
- 4/ Now do 1/ with manual ATU adjusted to give an SWR of 6:1 on 2nd SWR bridge.
Does the Auto ATU settle & does the 1st SWR bridge always give lower SWR?
N.B. Many Auto ATUs can't do this!

TYPICAL SWR CIRCUIT



HOW BRIDGE WORKS

A short length of thick wire goes through the screened ferrite transformer T1 making a 1 turn primary, & the lead joins the XTMR & LOAD sockets together. A pick off voltage attenuator is formed with trimmer C1 & the 2 150pF caps. This RF voltage is fed to T1 secondary centre tap. Load current is transformed by T1 into a voltage across the 5W non-inductive 68Ω.

When the load is exactly 50Ω the diode D2 sees no RF as the voltage sample & the current sample are in opposition & cancel dependent on the calibration of the trimmer C1.

The 2k2 is needed to complete the DC meter circuit & will affect the lowest frequency calibration, as will the inductance value of T1.

BRIDGE CALIBRATION

As there are no meters, C1 is calibrated to give zero Reflected volts on a scope connected to D2, once an 1st SWR bridge sees a 1:1. Fine Tweeking of Manual ATU will achieve this as long as the Auto ATU does not go hunting again.

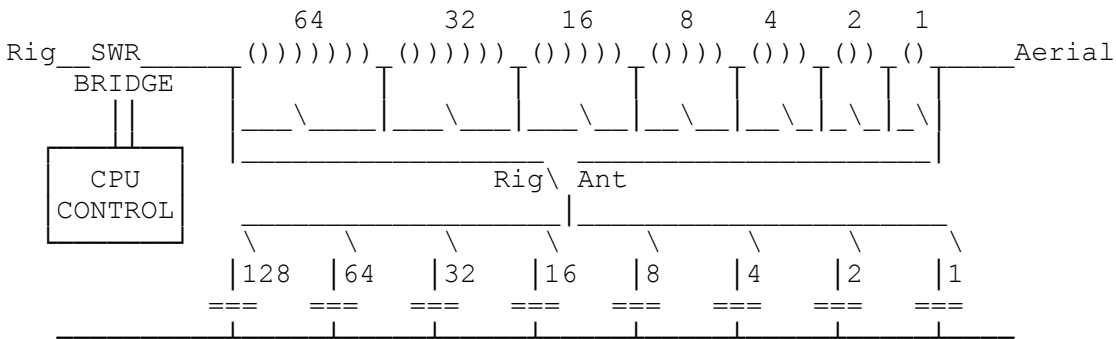
Doing this adjustment means the Auto ATU will now aim for a "1:1 as seen by the Rig" so giving a better matching result. (if it was out of adjustment.)

On one Auto ATU I tested, it always gave a poor SWR, there was not enough C1 range on the trimmer, so I added a small Tx grade C across it. QED.

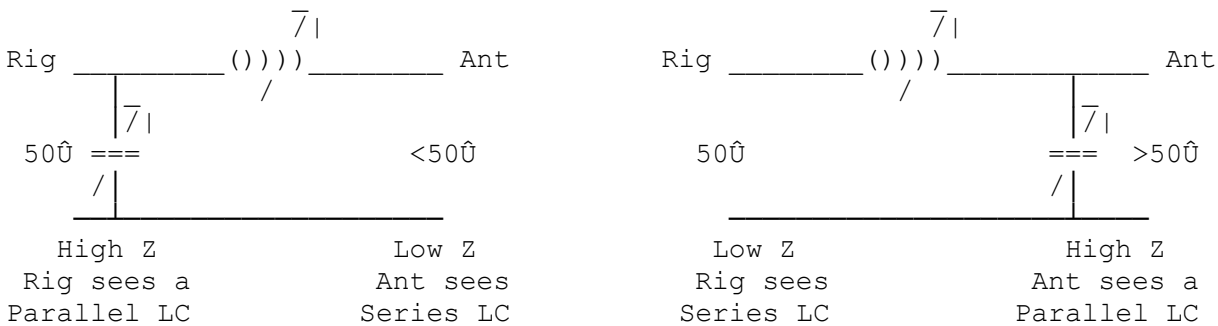
CONTINUOUS HUNTING

This can be a result of load out of the 3:1 range limit of most Auto ATU, or a faulty Binary step value in the L or C values. (poor relay contact?). Or too fine a target control loop gain (less than 1 step change).

INSIDE ATU



Here the 16 relays under CPU control, gives 65536 matching options, by selecting 1 of 128 binary step values of L, & 1 of 256 binary step values of C, & whether the C is needed on Rig side for Low Z aerials <50R, or Ant side for High Z aerials >50R.



MANUAL ATU COMPARISON

Most have 3 variables in T configuration, 2 caps & switched or roller coster L.

With time & care these can always give very fine adjustment down to 1:1, & with aerial loads worse than 10:1. Assuming 0.5deg shaft control, that can look more like 360x 360x 360 (46m options).

They also gives much better out of band filtering, with the Hi Q resonant circuit.

See also my Tech buls on "A Homebrew HF SWR Bridge", "PEP Meter modification", "QRP SWR Bridge", "Meter Damping & Speed Up" & "Palstar AT1500CV ATU", "HF ATU & SWR Bridge VC300LP/QT-1"

Why Don't U send an interesting bul?

73 de John, G8MNY @ GB7CIP