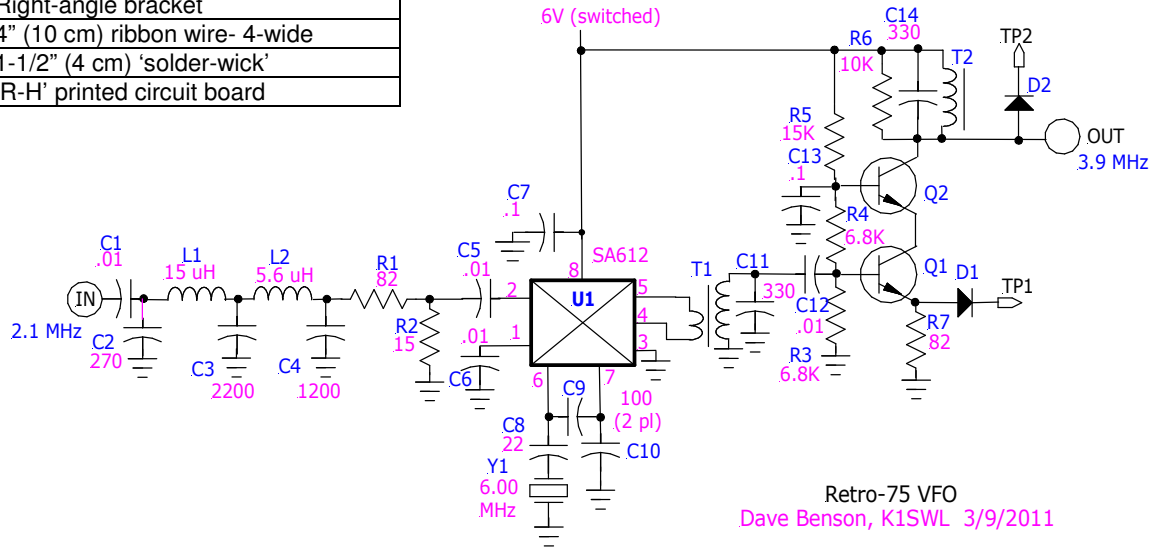
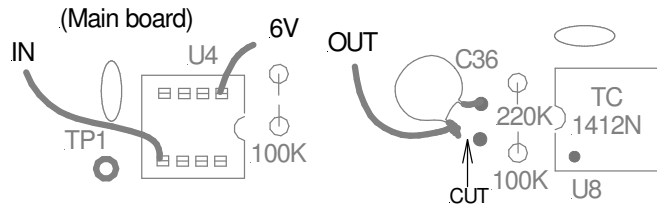
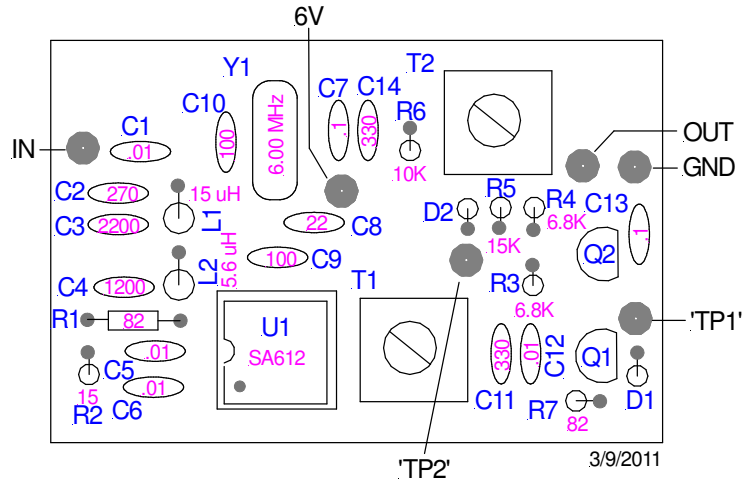


## The 'Retro-Helper' A VFO add-on for the Retro-75 AM transceiver

### Parts List

QTY	Description
1	5.6 uH RF Choke (grn/blue/gold)
1	15 uF RF Choke (brn/grn/blk)
2	IF transformer
1	15 ohm resistor (brn/grn/black)
2	82 ohm resistor (gry/red/black)
2	6.8K resistor (blu/grey/red)
2	10K resistor (brn/blk/orange)
1	15K resistor (brn/grn/orange)
4	4-40x1/4" screw
4	4-40 nut
1	8-pin IC socket
2	1N4148 diode
2	2N4401 transistor
1	SA612AN (DIP) IC
1	6.00 MHz crystal
2	100 pF NPO disk ('101' or '101J')
1	22 pF NPO disk ('22' or 22J)
1	270 pF disk ('271' or '271J')
2	330 pF disk ('331' or '331J')
1	1200 pF mono cap ('122/K1J')
1	2200 pF mono cap ('222/K1J')
4	.01 uF disk ('103M')
2	.1 uF mono cap ('104')
2	Right-angle bracket
1	4" (10 cm) ribbon wire- 4-wide
1	1-1/2" (4 cm) 'solder-wick'
1	'R-H' printed circuit board



### Description:

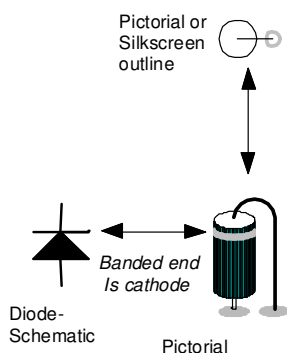
The R-H receives a 2+ MHz signal from pin 5 of the Retro's frequency test IC socket. Because this signal is non-sinusoidal, it contains plenty of unwanted harmonic content. L1, L2 and C2-C4 provide low-pass filtering for this signal and also transform its 1.5K source impedance to 100 ohms. The signal level across R2 is approximately 150 mV p-p. Higher levels are achievable, but at the expense of output spectral purity. The components at U1's pins 6 and 7 form a Colpitts oscillator internal to the IC. Its operating frequency slightly above 6.00 MHz matches the center of the Retro's IF filter response curve. The output of U1 is fed differentially to T1. T1 provide both an impedance transformation and a measure of frequency selectivity. A cascode amplifier (Q1 and Q2) provides voltage amplification. T2 provides additional frequency selectivity. The resistances across T1 (R3/R4) and T2 (R6) load

those tuned circuits and are a compromise between spectral purity and output amplitude flatness over the Retro's tuning range. The output of the R-H is roughly 6V p-p at 3.8xx MHz. As tested at the Retro-75's output connector, spurs were down -48dBc and the strongest harmonic (2<sup>nd</sup>) is at -46 dBc. These values comply with FCC and International requirements for Spurious Emissions.

## Assembly:

-Assembly order is non-critical. Components install on the silkscreened side of the board.

- With the exception of R1, inductors and resistors are bent 'hairpin' fashion for upright mounting. Caution: do not bend the inductor leads sharply where they exit the case- provide a gentle bend radius. These components may be installed without regard to 'polarity'. **Save excess wire leads from L1 and L2 for later use.**



- Bend the leads for diodes D1 and D2 with the banded end of the diode body oriented as shown at left. Install on the board, matching the installed orientation to that shown on the pictorial drawing.

-When installing the socket for U1, ensure that all leads protrude through to the bottom before starting soldering. Use a fingertip (or tape) atop the socket when soldering the first several leads. This keeps the socket well-seated. Solder remaining socket leads.

-Installation orientation is critical for U1, Q1 and Q2. Make sure these parts are oriented correctly before applying power. Install U1 in the socket with the dot or notch oriented as shown. If none, IC markings read 'upright'.

## Hookup:

Separate the supplied insulated wire and connect wires to the pads labeled 'IN', 'OUT' and '6V'. *Bringing the leads out from the underside of the board results in a neater installation and shorter lead lengths.*

Install the two angle brackets on the R-H board with the protrusions facing down- secure with 4-40 hardware.

Place the two remaining 4-40 screws facing outward through the mounting bracket holes. Using fingertip pressure on the two screws to hold them in place, mate the protruding screws to the two holes on the rear wall of the Retro enclosure. Secure with the two remaining nuts on the outside of the Retro enclosure. *There's room for a small screwdriver underneath the R-H board to tighten the screws down.*

Strip the hookup wire end of the 'IN' wire, wind several turns around a leftover inductor lead, solder and trim the inductor lead length to 1/8" (3 mm). Plug this wire in the U4 socket at the **pin 5** position.

Repeat for the '6V' wire and plug it into the U4 socket at the **pin 1** position.

Connect the length of solder wick to **ground** on the power connector immediately to the right of the R-H board. Trim length as needed and solder the second end to the point labeled 'GND'(ground) on the R-H Pictorial.

Snip the lower (frontmost) of Retro-75 capacitor C36. Lift the free end of this capacitor into the air, and wire the 'OUT' wire from the R-H to this capacitor. *This replaces the Retro's crystal oscillator with the R-H output.* (illus. below)

## Alignment:

- **Remove Retro-75 U8 (TC1412) from its socket**

Use a multimeter set to DC VOLTS for these two steps.

Set the Retro-75 tuning pot to midscale, and with a dummy load connected, switch to Transmit., adjust **T1** for maximum indication at **TP1** (See pictorial) **Expected reading: 0.55V**

Repeat, adjusting **T2** for max. DC voltage at TP2 (See pictorial) **Expected reading: 9-10V**

{Alignment is complete.} (**Replace U8**)

