AN IF AMPLIFIER IN A SARDINE TIN with SMD & Conventional Parts

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Please note this article uses the now obsolete Plessey SL range but surplus TO3 SL devices are available from J. Birket, 25 The Strait, Lincoln, LN2 1JF. 01522 - 520767

The main philosophy of this project was to build an essential stage of Intermediate Frequency amplifier, a crystal filter and a product detector all assembled into a metallic box as small as a sardines tin. This "plug and play" module can be used for any QRP portable rig. Your fantasy is its only limit. By using few IC's and one mosfet, this stage performs as follows:

- more than 70 dB gain;
- more than 100 dB AGC range;
- SSB of 50 dB at 1.5 Khz (depending on the quality of xtals)
- manual RF-Gain control;
- meter output.

Inside the circuit

Figure 1 shows the electric diagram of the huddle. A mosfet has been chosen for the first amplification. Manual RF-Gain can be achieved applying a voltage from 0V to 4V to Gate 2. The high-impedance input allows any adaptation to the front-end. The Drain resistor determines the input loading impedance of the filter. An identical impedance must be "seen" by the filter at its output. This is performed by Rx plus the input impedance of the next IF amplifier.

The filter is the "well-known" ladder [1] made of four computer crystals at the frequency of 8 Mhz. Experimental adjustements have allowed us to reach a good performance.

Two "evergreen" SL612 (or SL1612) by Plessey, [2] make a clean amplification of 60 dB. The voltage at their pin 7 controls the gain in a range of 70 dB (for each stage). The "S" meter can be placed here (via a proper resistor) in order to display the AGC voltage, directly proportional to the strength of the received signal.

The SSB is detected - injecting an external BFO - by the NE602 which has itself an additional gain of about 18 dB.

An essential active filter has been made with an op-amp (the low-noise NE5534) meanwhile the SL621 generates the AGC voltage [3]. The AGC dynamic range is setted by VR1. The attack and decay times are set by the capacitors C31,C32 and C33. Details are shown in our circuit for an hold-time of 1 second.

Mounting the board

The assembling of this board requires a minimum of patience. Fig. 3 & 4 show the layout of the board from the solder and the component side.

The 8-pin DIL socket allows us to mount two different kinds of IC. The DIL series (SL1612 and SL1621) can be placed as usual but the SL6xx (in TO5 can) is inserted as shown in fig. 5. The choice of tulip sockets is imperative!.

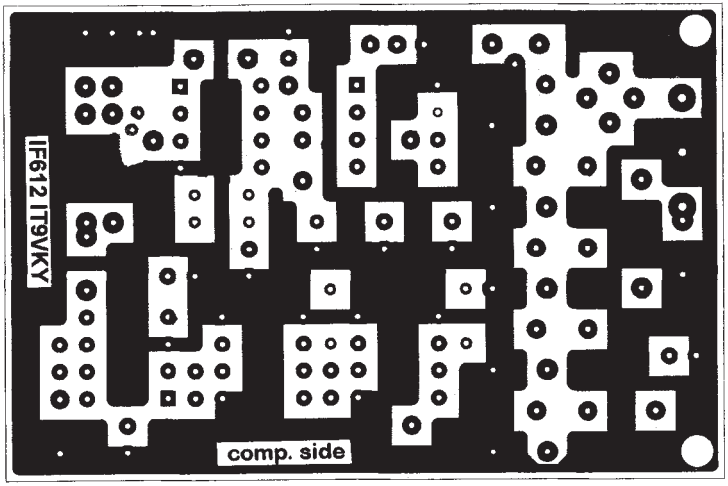
The board must be enclosed in a tin (of sardines, empty please!) for shielding. The input and the BFO can be fed by using a piece of UT-141. Feed-through capacitors are employed for all the remaining lines.

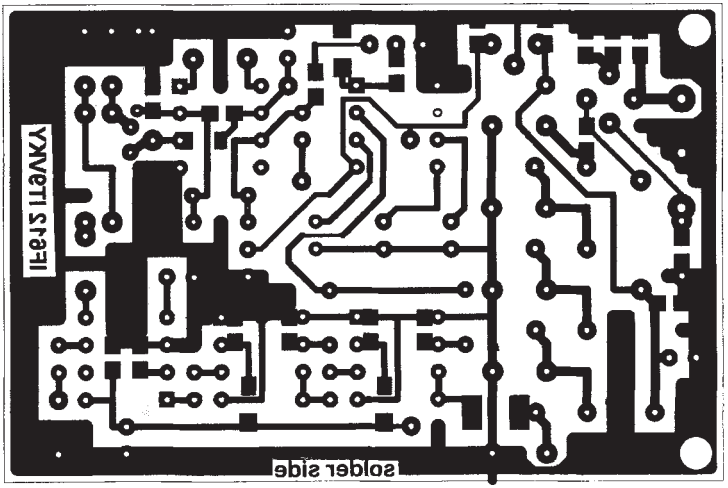
The capacitors in the xtal-filter make a detuning of a couple of KHz. An apposite VXO circuit must be inserted for LSB, USB or CW detection; we preferred to enclose it in another ST with the SSB exciter (we'll see later).

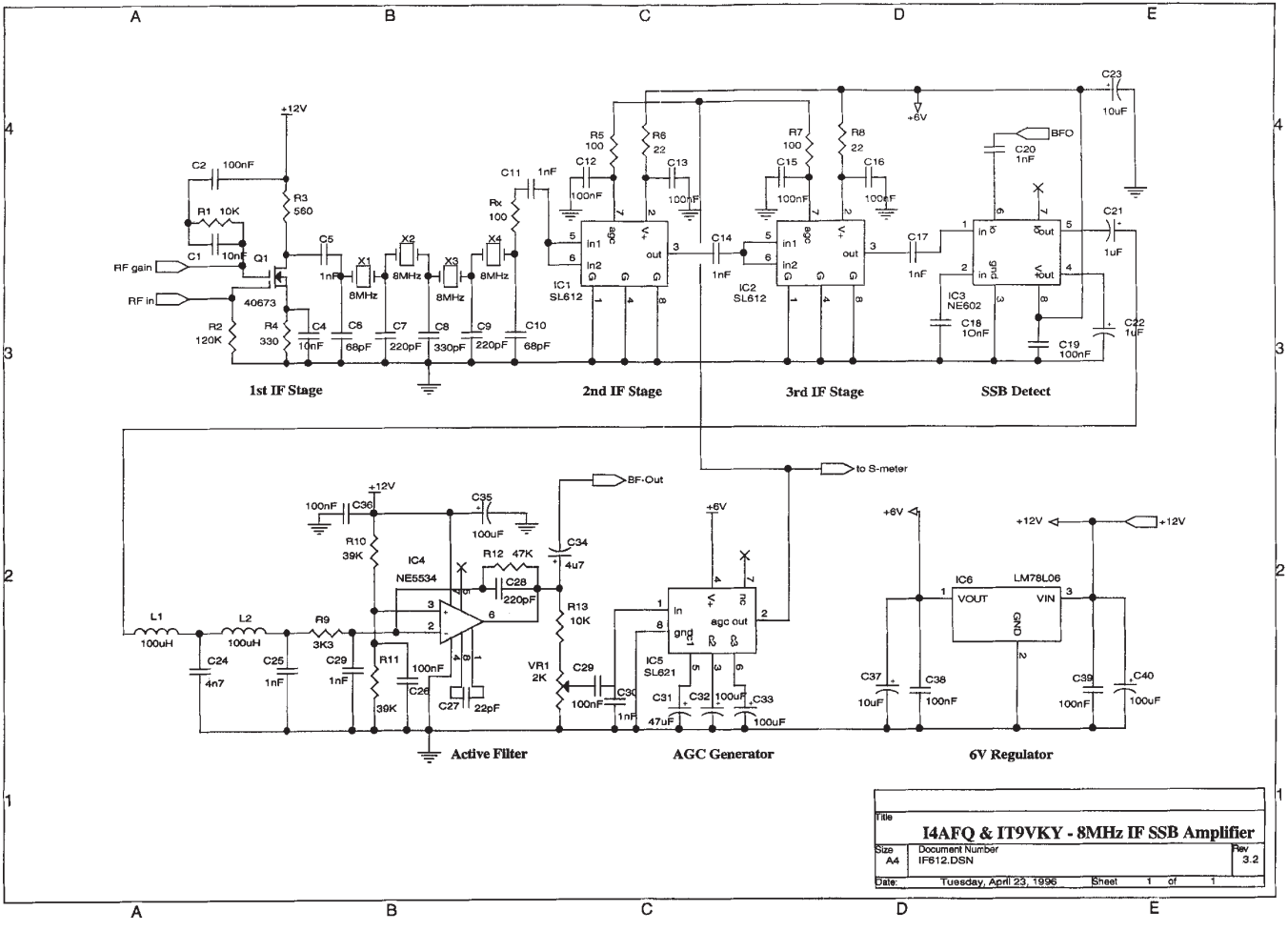
This board has no secrets. Once mounted, it should work at the first attempt. VR1 is the only trimmer to be set (as said before) for the AGC action: the ear is enough, the oscilloscope is fine!.

Troubles?
For any problem, or for download diagrams, PCB drawings or news, it is possible to reach us by Internet at the following E-mail address:
emartin@alpha4.ct.astro.it (web page is under construction - http://w3.ct.astro.it/emartin/qrp/qrp.html)

References
[1] **W. HAYWARD (W7ZOI)** *"A unified approach to the design of Crystal Ladder Filters"*- QST, May 1982 and *"Designing and building simple Crystal Filters"* - QST, Jul. 1987
[2], [3] **PLESSEY SEMICONDUCTORS** - *SL600 Series Communication Circuits Databook*






1st IF Stage
2nd IF Stage
3rd IF Stage
SSB Detect
Active Filter
AGC Generator
6V Regulator
I4AFQ & IT9VKY - 8MHz IF SSB Amplifier
IF612.DSN
Tuesday, April 23, 1996

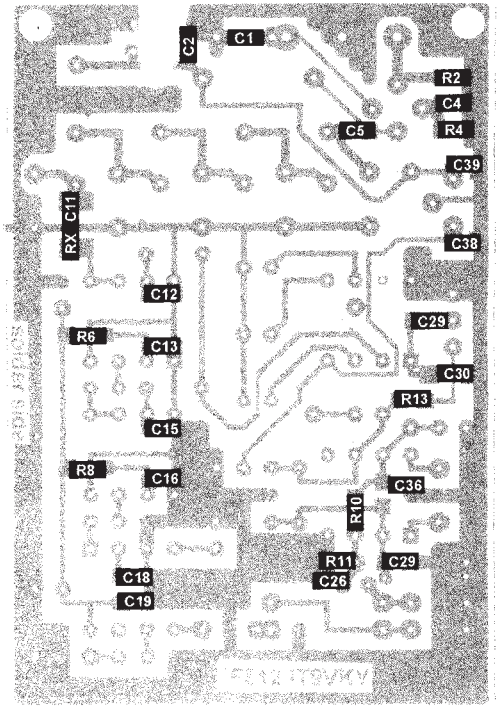


Fig. 3 SMD Layout
on solder side

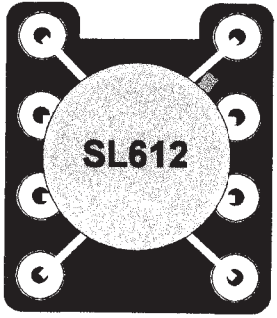


Fig. 5: Placing a TO3 IC in a DIL socket

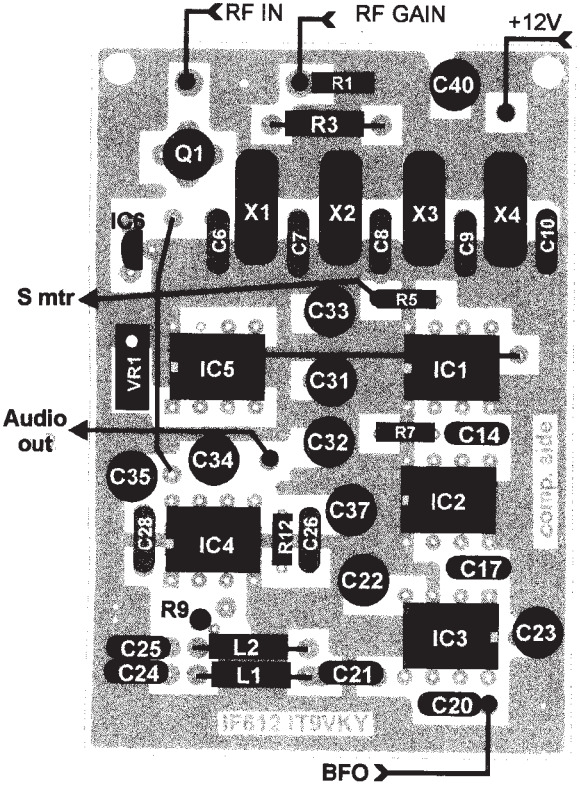


Fig. 4 IC & discrete layout
on component side