California Amplifier 31732 Downconverter

Retuning Modification

CalAmp 31732 designed to receive terrestrial television broadcasts in the Multipoint Microwave Distribution Service (or MMDS). The downconverter has enough gain and local oscillator stability to serve as a Down Converter for AO-40, by retunning the input BPF. Modification is easy or complex, depending upon owner's shack. If a wideband multimode receiver is available, like IC-706 or a scanner, there is no need to perform any modification more complex than the Built-in BandPass filter (BPF).

If only a 144MHz multimode receiver is available, then is necessary to change the crystal, in addition to retuning the BP filter.

BLOCK of 31732

The block diagram is shown in figure below:

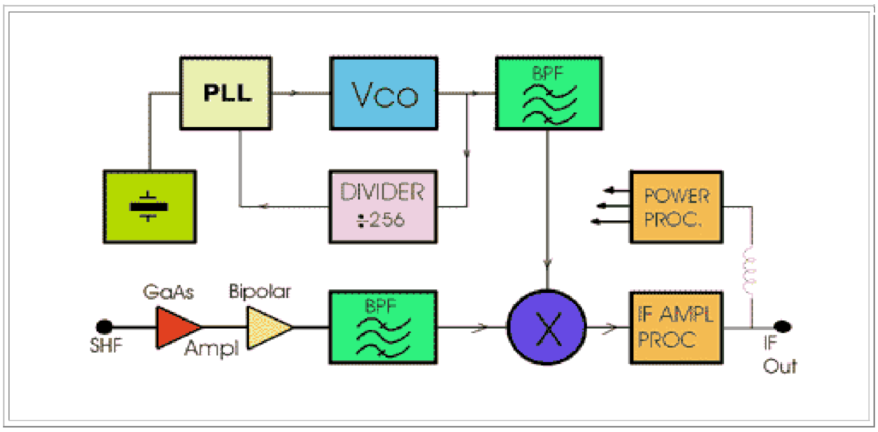

FIG.1

The PLL including four stages: PLL chip, reference Xtal oscillator, VCO operating over the appropriate range and a Prescaler to divide down the VCO output for comparison in the PLL IC with the reference frequency. The phase locked output of the VCO in the converter is normally 2278MHz. The whole PLL system divides this by a total of 256 to compare with the reference crystal. Therefore, to change the PLL frequency, we change the reference crystal and the IF output.

Modification

Unmodified the unit does not have enough sensitivity to receive signals from AO40 downlink on 2401 MHZ. That is possible by retuning the filter to work at 2400 MHz. Further work is required but provides superior results to that obtained by the use of teflon shim/tape, like the WC0Y method.

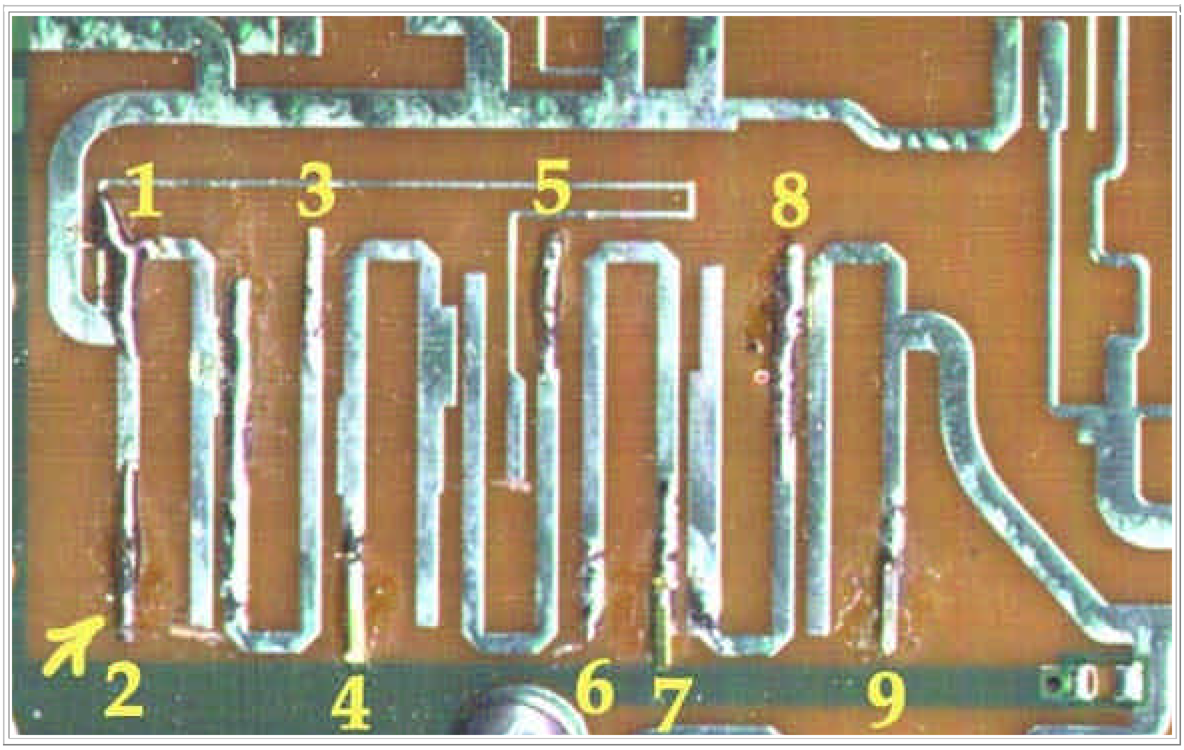

FIG.2

Fig.2 above shows the “modified” BPF from my 31732 (points 1-9). Using small pieces of copper or brass shim 0.001 or similar, it is possible to move the filter right into 2401 MHZ and obtain best performance. These are individually tinned, and waved over the existing stripline until an improvement can be obtained, whereupon they are soldered in place, repeating the whole excercise until no further improvement can be obtained. Many tabs and a fair amount of time and skill is required to obtain the best results. Working ones way from the output side of the filter to that of the input is the method to adopt when retuning this filter.

More complicated test equipment can of course be used instead. The basic idea is merely represented here, but the system outlined does produce good results.

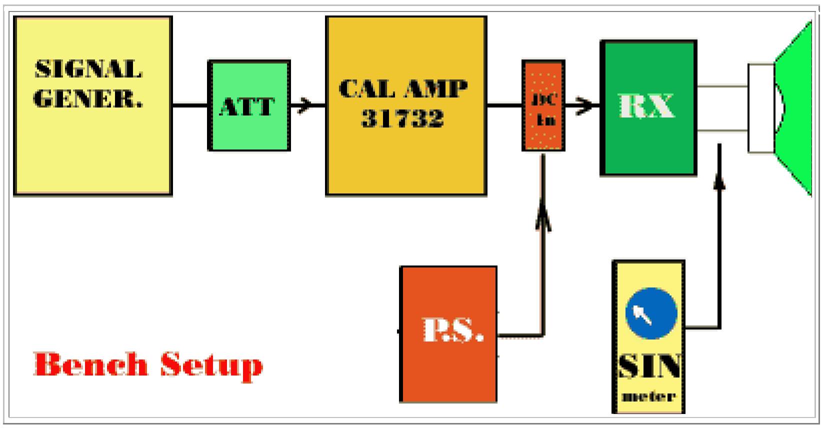

FIG.3

Fig.3 shows the “Bench setup”. You need a good quality “Signal Generator” (i.e HP) and probably an additional ATTenuator between Generator and 31732. Keep in mind, during retuning, the sensitivity of 31732 spectacularly increasing and sometimes the “built-in” ATTenuator is not enough. The 31732 following by a usual “DC insertion” unit, for Voltage feeding. A small Power Supply (PS) 18V / 0.5 A is enough.

After the DC insertion Unit is the Receiver with a SINAD meter connected into AF output.

Note that it is very important to not manually tune this filter for the highest S meter reading, the mixing process produces not only the wanted signal, but an image signal (which will be noise). Tuning for best S meter reading will allow more of the unwanted 'noise' to interfere with the wanted signal. Tuning the downconverter for best quieting and signal/noise (or SINAD) will improve matters considerably. Access to a SINAD meter is not so important if you have good ears, and can tell the difference in quieting. An oscilloscope connected to the receiver's output will aid manual retuning to some extent by examining the roughness of the modulation.

If only a 144 – 146 MHz SSB receiver is available, the local oscillator will need changing to 2256MHz (for satellite reception Xtal = 8.8125 MHZ). Thus we have:

2401 – 2256 = 145 MHZ (IF out)

For a local oscillator of 2256MHz no further adjustment to the LO circuitry is needed., other than the crystal change.

Local Oscillator Frequency = Xtal Freq. / 256

Crystal is in an HC49/u holder, 33pF load capacity fundamental, accuracy is 10ppm over -30 to +60 Celsius.

The received IF will then be available at 145 MHz. Once the crystal is changed, the operating frequency can be easily adjusted with a frequency counter by means of the trimmer adjacent to the crystal. Remembering that if measuring the frequency of the crystal oscillator, any error in trimming will be multiplied by 256 at the Local Oscillator frequency.