

The output amplifier is necessarily installed in its own shielded enclosure, since unwanted signal filtering is very critical. Besides the low-pass filter inside the harmonic mixer module (cutoff about 1.75GHz), two additional low-pass filters with cutoff frequencies of about 2.8GHz are installed before and after the INA10386 amplifier. To suppress higher-order responses of the microstrip circuits as well as enclosure cavity resonances, microwave absorber foam is also needed under the cover of the amplifier module.

The INA10386 MMIC requires DC decoupling capacitors on both the input and output. Since the harmonic converter is usually used at relatively wide SA resolution bandwidths (100kHz or more), the IF range can be limited to 100kHz on the lower end. Even in the latter case finding suitable coupling capacitors is not simple. The best results were found with a parallel connection of a low-loss, 100pF NPO 0805 size capacitor that is soldered on the PCB first. Then a lossy 100nF (Z5U ceramic) and larger (1206) capacitor is soldered across the smaller 100pF capacitor.

5. Power supply

Like the spectrum analyzer described in [4] or [5] or the companion tracking generator described in [6], the harmonic converter requires an unstabilized +12Vdc supply. The latter is stabilized to +8V with a 7808 regulator to supply the VCO and output amplifier. The 7808 regulator is wired exactly in the same way as in the spectrum analyzer or tracking generator. The harmonic converter usually remains on all of the time to minimize frequency drifts, so a turn-on switch is usually not required.



The BB833 (or BB857) varactors inside the wide-band VCO require much higher tuning voltages up to +30V. Further, the tuning voltage has to be well stabilized and filtered, to avoid frequency drifts and excessive phase noise. Both unwanted effects are further multiplied by the order of the harmonic inside a harmonic converter!

The tuning voltage supply is shown on Fig.8. The circuit includes a flyback DC/DC converter with the transistors BC308 and BD139. The rough voltage regulation provided by the two 18V zener diodes and BC548 feedback transistor is far from being sufficient for a tuning voltage. The resulting +37V is further stabilized down to +30V with a uA723 precision regulator. Due to the low current drain at +30V, no external transistors are required around the uA723. However, the uA723 still requires some feedback resistors to set the output voltage, over-current protection and a capacitor for frequency compensation.

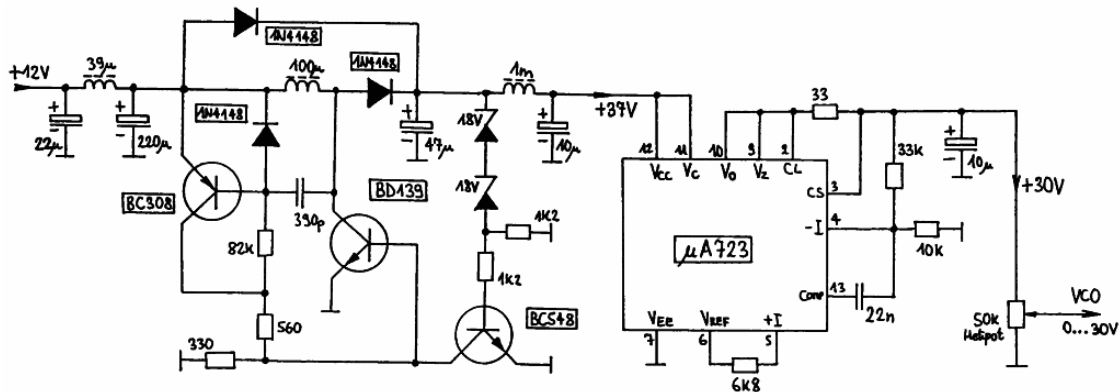


Fig.8 - Stabilized DC/DC converter.