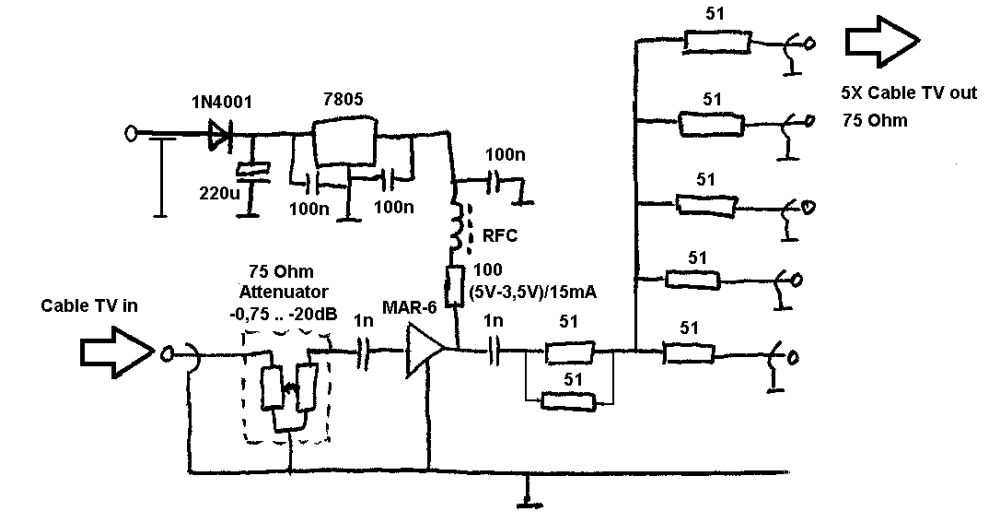
Cable-TV distribution amplifier

Description of the design

Here you will find the design of a cable TV distribution amplifier. Normally, the cable TV signal is strong enough to be split for 2 TV sets using a passive splitter. I wanted to have 5 outlets in my home, so I made a distribution amplifier. This amplifier boosts the TV cable signal with 18dB before the signal is split into 5. The design is based around a MAR-6 MMIC. This Integrated Circuit amplifies DC to 2GHz with about 18dB, uses only 15mA and costs around 4,5 Euro.

The circuit is built on a piece of double sided circuit board with one trace cut out with a sharp hobby knife. It is housed in a standard metal housing, that holds the 6 F-connectors for the HF. A 7805 is used to stabilise the electrical power.

The circuit



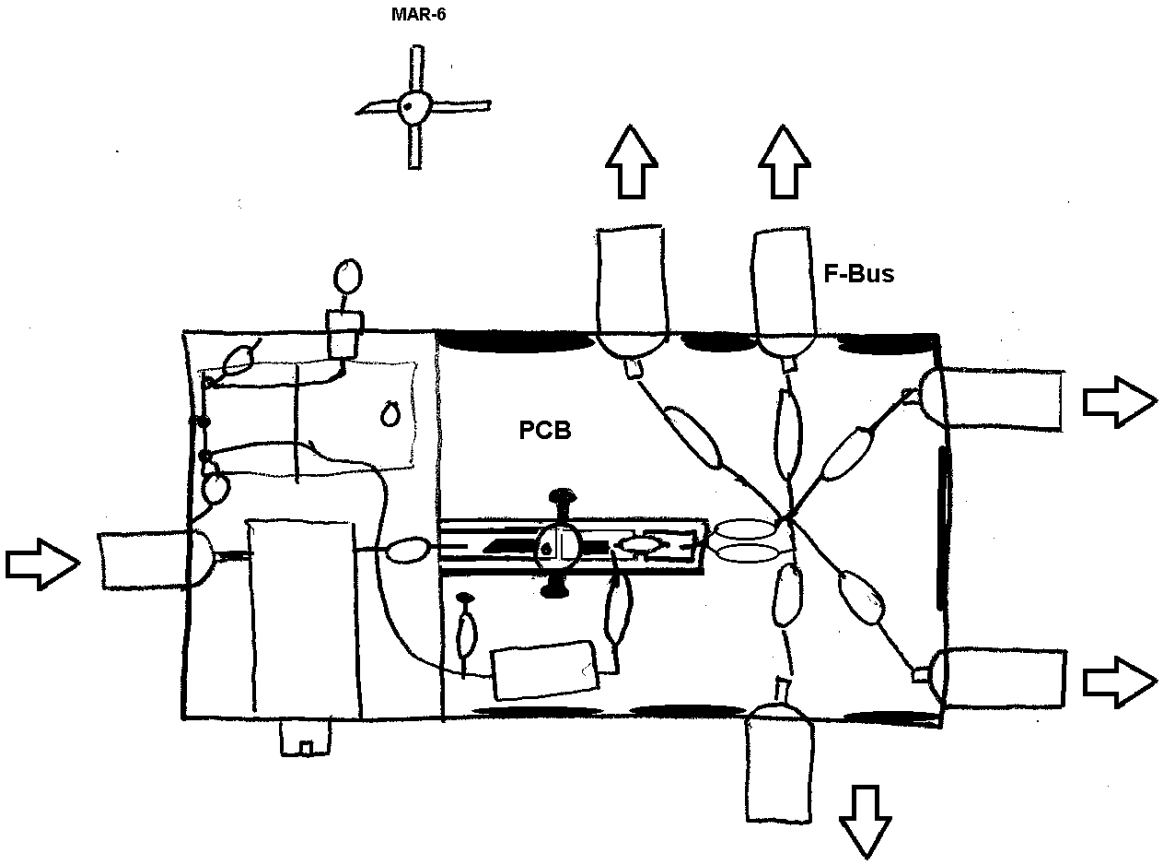
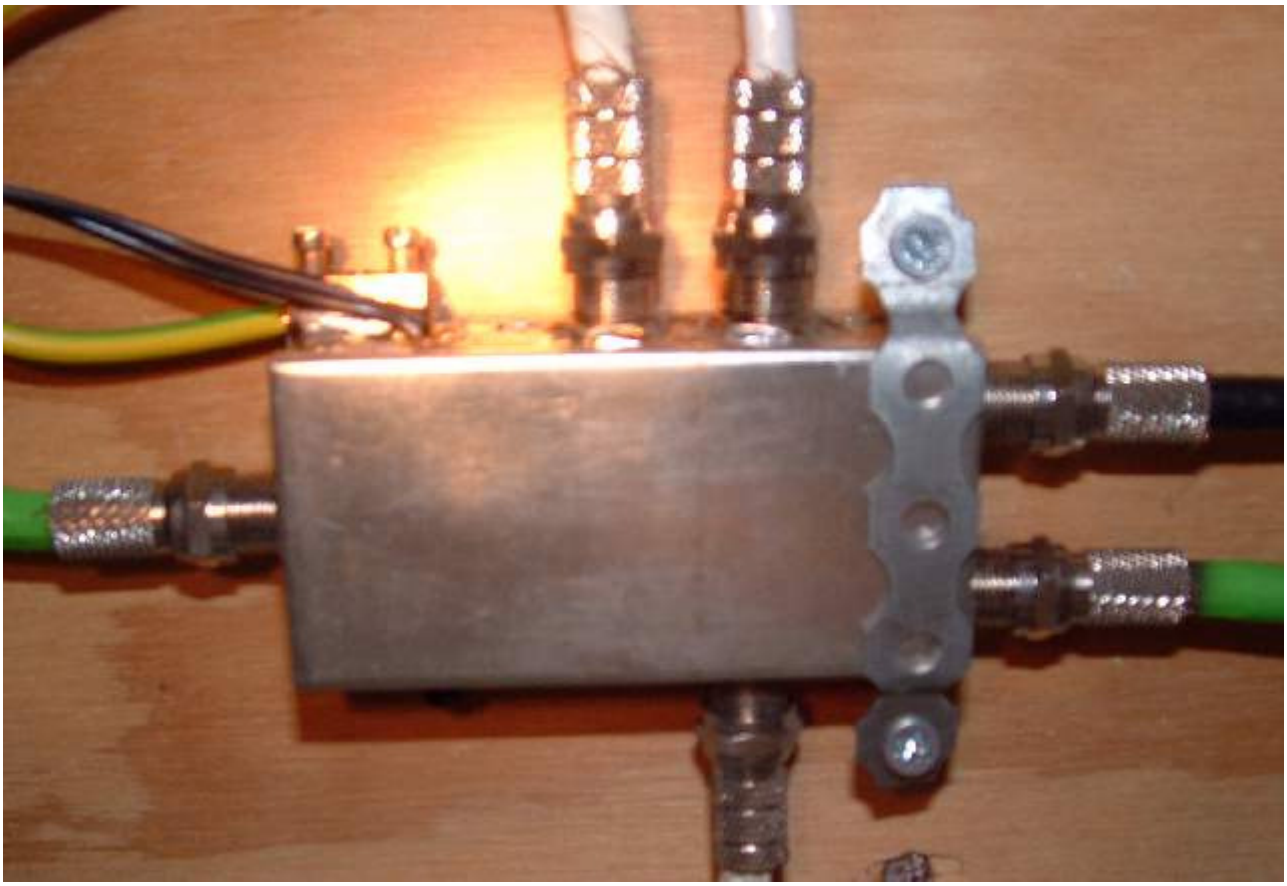


Diagram revision 1 (Changed the passive output splitter to better terminate the MAR-6)



The finished and installed amplifier

The electrical power (8..30 VDC - 50mA) enters the housing via a (1n) feedthrough-Capacitor. A single diode protects the circuit from reverse polarity voltage. A 7805 soldered to the housing (GND) stabilises the voltage at 5 Volt. Two 100nF capacitors prevent the generation of spurious signals and noise by the 7805

The HF signal enters via a F-connector. An optional attenuator (0,75 - 20 dB) gives the ability to decrease the signal strength in case you should experience interference by intermodulation products. In my situation, I ended up adjusting the attenuator at the maximum level…

After the attenuator, the signal passes through a 1nF capacitor to block DC voltages and goes into the MAR-6. The input to the MAR-6 is indicated by a dot on the body and a chamfer to the input leg.

Power is supplied to the output of the MAR-6 through a 100 Ohm resistor and a 6 hole ferrite choke (1uH). DC current will be about 15mA (3,5 Volt DC at the output of the MAR-6). Another 1 nF capacitor blocks DC and only HF signal is sent to a passive resistor splitter, made from 51 ohm carbon film resistors. Input impedance is 50 Ohm for the MAR-6. Output impedance will be a little less than 75 Ohm. The splitter is build as a 'spider web' floating over the circuit board. Each output is has a female F-connector. All F-connectors are soldered directly to the housing.

After closing the lid of the housing, the circuit should be reasonably immune to the 5 x 1.5 kW Digitenne (DVB-T) transmitters built less than 3 kilometre from my house L

Safety ground

I placed the amplifier right where the cable enters our house, and routed coax to all outlets. The housing is connected to safety-ground with a copper wire.

Power supply

For power supply, I use a non stabilised adapter. Unloaded, the output is 8,5 Volt DC, just enough for the 7805 to do its job.

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