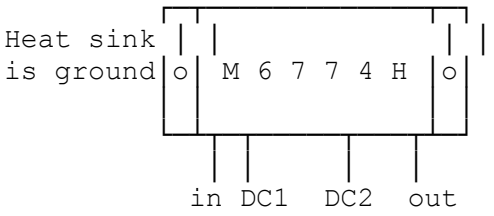
2M 65W PA with 2x M6774H

By G8MNY (Updated Dec 09)
(8 Bit ASCII graphics use code page 437 or 850, Terminal Font)

My local club had a source of these Class C VHF PA blocks. The specification for them is a max of 500mW drive for 33W out on 12.5V, but the H type is 150-175MHz! So their usefulness on 2m was not known, although some 2m kit was reported to use them.

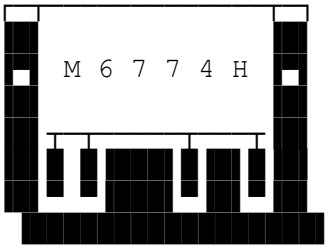


I tested one on a heat sink with just coax connected & it produced 33W, so all looked good.

DC1 powers the 1st low current stage,
DC2 @ 8A Max for full output.

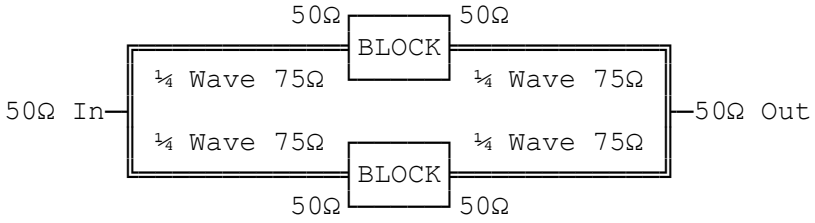
A 1.5W handheld can do more drive than that, so I used 2 of them to make a 2m PA out of junk bits.

A PCB (double sided) was cut to fit over the heat plate & under the screws & connection wires, to provide connection pads, through links were put in to. An old 900MHz phone PA casting was used as heat sink & case.



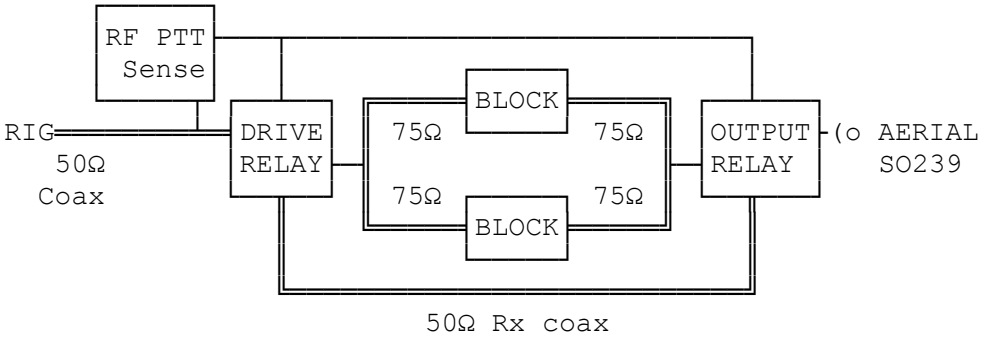
2 PA MATCHING PRINCIPLE
Assuming the PA blocks are identical in power level, gains, & signal phases (time delay). Then there are a couple of ways to connect them, I have used the simplest using just coax.

To match the 2 PA blocks to the 50Ω input & output, 4x 1/4 wave 75Ω coaxes are needed to make the connections. Each 75Ω 1/4 wave transforms the 50Ω to approx 100Ω & 2 of these paralleled up give 50Ω again.

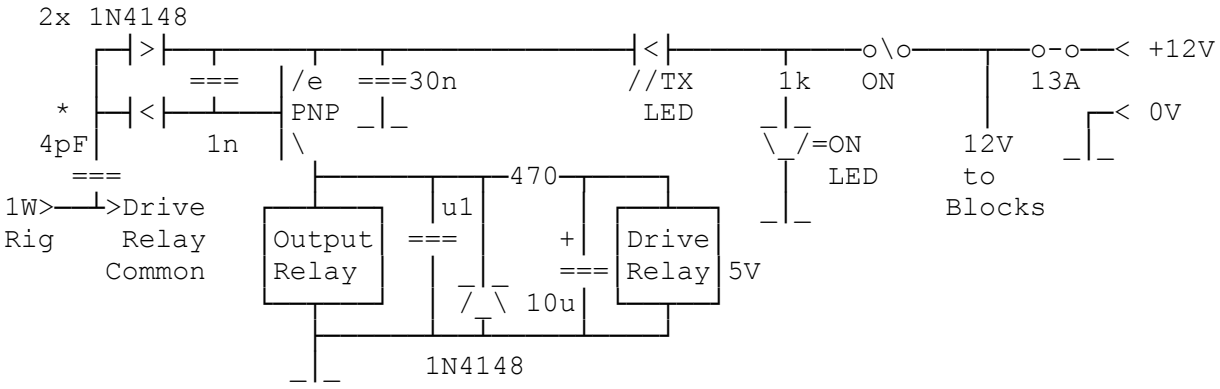


I measured the velocity factor of a good length of the 75Ω coax (0.6 - 0.90 the speed of light depending on the type of coax) with an open circuit teed on a signal generator & scope/(Detector) & adjusted the frequency to give a null which was 22MHz for my length. This meant I needed 22/145 times this length to get the same @ 2m (46cm for my white foam filled coax).

PA SCHEMATIC



CIRCUITS



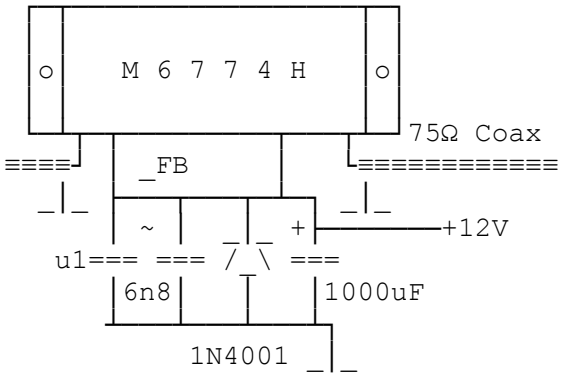
A tiny amount of drive RF current is fed through the 4pF to voltage doubler to turn on the PNP (* I tried different values & this worked with my PNP & relay load @ low drive power OK). The 2 change over relays are both plastic encapsulated ones, the drive one is a smaller 5V DIL type, they are both held in place with a local earth tag soldered to the coil connection & the coaxes ground there too.

The RF detector & relay drive PNP transistor are mounted UGLY fashion around the drive relay.

To stop the output relay operating when RF power is present, I delayed the driver relay by about 1/100 second, with the 470 & 10uF. I checked the drive relay operated on low RF power 100mW & low voltage of 11V OK, even with the series Tx LED!

The diode across the relays stop back EMF from damaging the PNP, the u1 cap across the output relay coil reduced VHF RF pickup on the wiring when 65W is on the contacts.

For each block

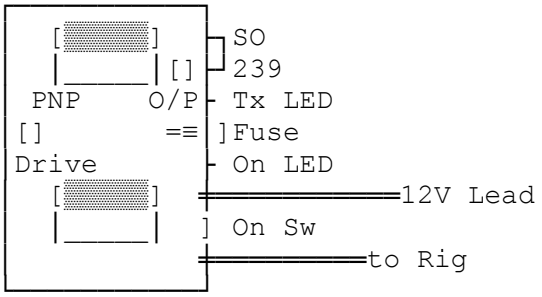


Power filtering capacitors are applied to each module keeping the leads short for good VHF practice. A ferrite bead is used to feed DC1.

The 1N4001 is only there in case of power rail reversal & 2 of them should be able to blow the 13A fuse.

LAYOUT
Fitting in all the coax is the main problem with this design, as my finned blackened dye cast box was is only 18 x 13 x 3cm.

Heat conductive past is put under the modules & the temperature remains quite cool for short overs.



RESULT
With 13.8V & just over 1W drive output was a good 68W, 13A drawn & with 200mW about 50W needing only 10A.

Harmonics from these modules are quite low, I measured them at >-30dBc (near the limit of my test gear @ VHF), but an added RF low pass filtering can be used if wanted. If the modules are misterminated of course anything can happen & as with many PAs loads of sprogies could result!

Through/Rx loss was 0.5dB with 1m of driver lead & BNC adaptor in circuit. A preamp could be fitted in the Rx path, but "not powered up" drive could blow it up unless extra switching is used.

See my tech buls. "RF Modules List", "Scope RF Trick", "Coax Traps", "Non relay instant RF Switching", "DC/RF Sensing PA Switching", & "2m Cavity Filter".

Why don't U send an interesting bul?

73 De John, G8MNY @ GB7CIP