THE EF98 - OC16 HYBRID RADIO.

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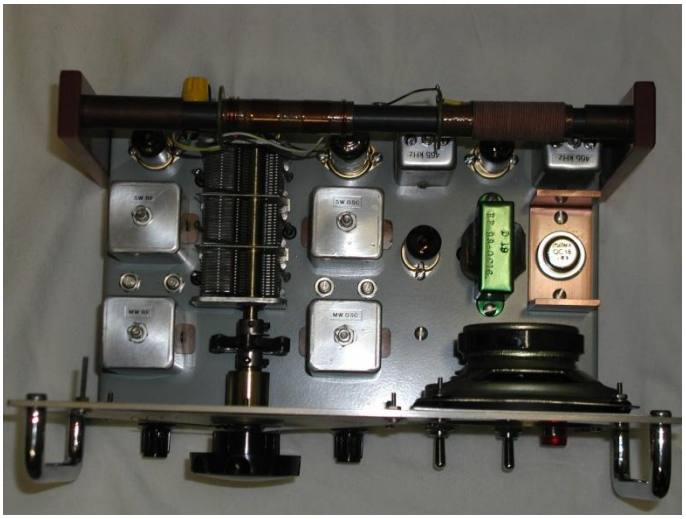
This brief article describes a radio crafted from low anode voltage valves and a germanium audio output transistor. The OC16 transistor was released by Philips in 1958 and was commercially successful, however it was superseded by other types in TO-3 cases which had better power handling capacity. The OC16, in a class A output stage, could deliver 2.5 watt of audio in a 14V system and 2.2 watts in a 7v system. In a push-pull 14v system a pair could deliver up to 9 watts.

The base input impedance of the OC16 is very low 3 or 4 ohms so if the base of the transistor was to be driven by a vacuum tube such as the EF98 there would need to be a transformer with a very large impedance ratio. Philips recommended a 23:1 ratio transformer or an impedance ratio of 529:1 with a primary DC resistance of < 200 ohms and a secondary DC resistance of < 1 ohm.

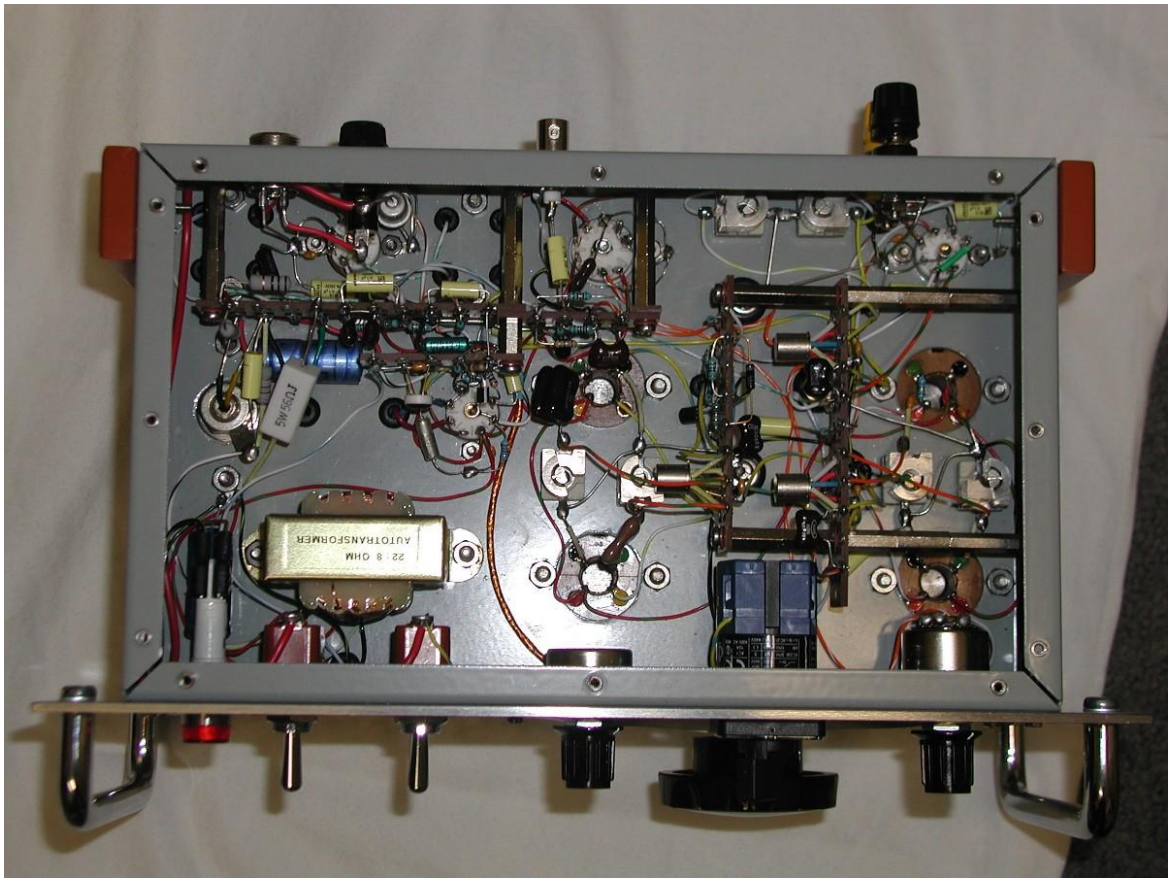
The input grid of the EF98 driver tube typically had a 10 meg resistor. So this audio circuit had one of the most spectacular impedance matching scenarios in electronics history for an audio amplifier. An input impedance of 10 Meg Ohms, an output impedance of 4 ohms, an input sensitivity of a volt or two peak to peak and an output power of two watts, all running from one 12V supply with one tube, one transistor and one matching transformer.

The radio shown in the photos below uses an EF 98 as a tuned RF stage, an ECH83 converter an EF98 RF stage and an EF98 audio driver and a single OC16 in class A. The frequency coverage is 550KHz to 1700KHz MW and 5.7MHz to 18.2 MHz shortwave. The triode section in the ECH83 was not wonderful as a local oscillator above 12MHz, so this was not used and a L/O was made instead with a single MPF102 junction FET. Each pair of tubes has their heaters in series so the heater supply is also 12V as is the HT supply to the tube anodes.

Some photos during construction:



The 23:1 ratio matching transformer was a genuine part made by Beacon Radio in NZ in the early 1960's. The aluminium clamp was anodised green later in the mid 1970's. The IF transformers are American Miller units. The coils in the larger cans were custom designed using high permeability mil spec cores and discarding the original windings.



The Chassis is machinery grey painted steel. The tube sockets are ceramic. The adjustment points/trimmers all project to the chassis top for easy alignment.

The band change is executed in the same manner as the Fetron radio. The switch itself is a rugged industrial motor switch and it controls three Teledyne RF relays to do the actual switching. The wire is all Teflon insulated ex submarine wire. The chassis bottom plate, not shown, is screwed to the chassis base with the aid of the 4-40 round nuts that were pressed into the chassis flange so that it can be removed many times with no wear on the threads. Self tapping screws are not as good in that respect.

The radio has a buffered local oscillator output. In this case the ferrite rod antenna is also used on the SW band and is quite successful up to 12MHz, above that an external antenna works better.

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