



NEW ZEALAND VINTAGE RADIO SOCIETY INC.

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Radio

In the

Days of

Adolf Hitler

And the

Third Reich

Technische Betriebsanleitung
für den
Volks-empfänger
VE 301

ENKREIS ZWEIROHREN-EMPFÄNGER
TYPE VE 301W FÜR WECHSELSTROM
TYPE VE 301G FÜR GLEICHSTROM
TYPE VE 301B FÜR BATTERIEANSCHLUSS

Antennen-Anschlußbuchsen (2x) für
Endschluß
Verstärker
Rückkopplung

VE 301

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Antennenkopplung

FROM THE EDITOR

At the suggestion of John Walker and with the kind permission of the Editor we reproduce a particularly interesting article recently published in Electronics World. Written by Jeremy Stevens, this article covers the history of domestic radio developments in Germany during the Hitler years and describes the author's restoration work on one of the "Folks Receivers" of that time.

Don Beswick has contributed an explanation of the intricacies involved in getting the oscillator to track with the RF input tuned circuits in a superhet. John Walker continues with details of one of his communications receivers and, inspired by our recent cover photo of the broadcasting tower on Mt Victoria Gordon Cooper reminisces on early Civil Aviation days in Wellington. My own contribution is an article on a signal generator which set a high standard from the 1930s through to the 50s.

An update of our journal index is included. It is appreciated that a full index is carried on our website but not every reader has the means of access to that listing.

Note that as the journal now comes to you in a clear plastic cover the Traditional "Marketplace" has been taken off the rear cover page.

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CONTENTS

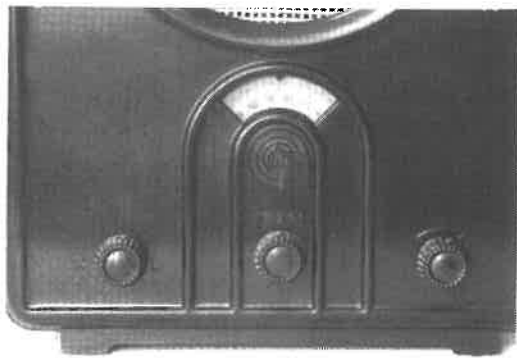
Editorial	3
With the Collectors - Frank Stretch	4
German Propaganda Receivers	5
Columbus model 15	9
Superhet Tuning	10
Index - Vols 20-24	14
Taranaki Meeting - Aug 2003	19
The Radione R-3	20
Signal Generators - part 2	21
Fifty Years Ago in Wellington	26
Letters to the Editor	29
From the Library	30
Marketplace	31

German Propaganda Receivers of the Third Reich

This two part article, originally appeared in Electronics World of August 2003 and is reprinted with permission.

Comparing a valve radio receiver from the 40s to something from the present day you could be forgiven for wondering how on earth it worked at all. The designers in those days were a lot more innovative than you might think. Jeremy Stevens explains.

the technology is stable and there is nothing new to learn other than to refresh one's memory of some of electronics' first principles. I first became aware of the German People's Radio (Volksempfänger) when an old friend of mine contacted me, he having been given a DKE38 to repair. The owner, a former soldier, brought it back to England after the war and I subsequently carried out some research on the subject for my friend and as a result developed an interest in these receivers. It was on a visit to the Techno-Classica exhibition in Essen, Germany, where I was browsing for classic car spares that I came across a pair of Volksempfänger for sale on one of the memorabilia stalls. Volksempfänger are particularly conspicuous when on sale in Germany because the German eagle and swastika emblem is always covered (as dictated by law); this, paradoxically, draws attention to these receivers. Somewhat rashly I decided to make an offer for a VE301 and after some negotiation I became its owner.



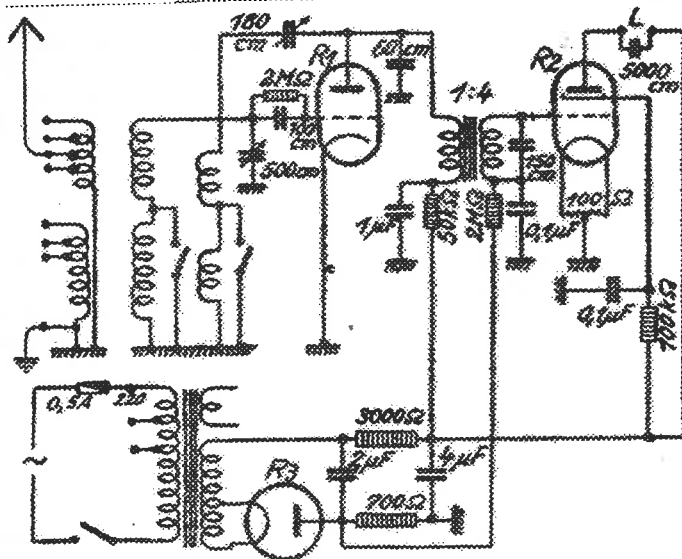
Dial, controls and insignia on VE301

mapping the field strength of the main transmitters throughout Germany. This work established that reception of national stations could be achieved using a simple TRF receiver. Thus the concept of the Volksempfänger, a mass-produced cheap radio receiver for the reception of German State propaganda, was born.

When as a child I first started dabbling in electronics during the 1960s, valves were ubiquitous in television sets and in the process of being displaced in radio receiver applications.. Undoubtedly I broke up a number of potential antiques as valve radio receivers had virtually no value at that time. I have more recently started collecting interesting examples of radio history and restoring them for daily use - much to the chagrin of my wife. Dealing with valves again instead of microprocessors can be therapeutic:

Historical Background

In January 1933 Hitler assumed the office of Chancellor of Germany. By March 1933 the first propaganda broadcasts had commenced having been organised by the Minister of Interior, Frick and SA member Hadamowsky. (After the war Frick was found guilty of war crimes at the Nuremberg trials and subsequently hanged). In April 1933 engineers from the Heinrich Hertz Institute under Prof. Leithauser commenced



In keeping with the limited sensitivity necessary to make reception of stations outside Germany difficult, the TRF design comprised just two stages, a first stage detector with reaction followed by an audio output stage as shown above. The electrical circuit design of the receiver was by Otto Griesing. His design used a triode first stage detector (REN904) and transformer coupling to the output valve (RES 164). A RGN354 half wave rectifier provided the HT supply. Its anode was returned to chassis via a 700.ohm resistor in order to provide back-bias for the directly heated output valve. The loudspeaker was a high impedance balanced- armature type directly driven from the output valve anode, thus negating the need for an output transformer. There were a number of aerial sockets connected to tags on the coupling coil, three for long wave and four for medium wave plus earth. The desired tap was selected in combination with adjustments to the tuning and reaction controls facilitating optimum coupling in line with the desired listening level and selectivity. The use of Litz wire in the RF coils was deemed sufficiently important to be mentioned in the technical description on the first page of the handbook..

Walter Maria Kersting (1889-1970) designed an emblem for the receiver comprising a silhouette of an eagle's head superimposed over five concentric rings, like ripples in a pool of water. The pace of development of this project was astonishingly fast, the VE301 was announced at the Berlin Radio Fair held in late August 1933. With typical German attention to detail the model number had a special significance as it commemorated the date that Hitler became Chancellor, 30 January 1933. A pre-production run of 100,000 units was prepared for sale at the exhibition, priced at RM76 and all the receivers were rapidly sold. Over the next few years and up to the outbreak of war, the price was to fall further. The sets were made in vast numbers and several variants were produced by a number of different manufacturers from 1933 to 1945. When war started in 1939 the larger radio manufacturers ceased domestic radio production, manufacturing military equipment instead. Limited production of Volksempfänger continued only in small companies. At this time it also became illegal to listen to foreign stations. This heinous crime was categorised as "moral self mutilation" and, if convicted, the minimum term of imprisonment was 5 years. The maximum penalty was death!



Advertising Poster

AC and AC/DC sets were only available with Bakelite cases. Battery and DC only sets were supplied in wooden cases. The stark rectangular lines of the Bakelite case in particular reflected the architecture of the time.

The original VE301W was an AC only set (suffix "W" stands for "Wechselstrom" i.e. "AC") and was produced up to about 1938. It had a distinctive round speaker aperture, centrally placed arched feature with a sector cut out to reveal a linearly engraved tuning scale (photo on page 5) and multiple aerial sockets on the left side of the case. Kersting's eagle emblem took pride of place in the centre of the arch. This receiver featured on a poster with the caption: "Ganz Deutschland hört den Führer mit dem Volksempfänger" - "All Germany hears the Leader with the people's radio". In 1938 the "Reichsadler" replaced the eagle emblem. The Reichsadler was an eagle with outstretched wings and talons grasping a swastika, that familiar symbol of the Third Reich and ultimate evil.

The VE301G was a DC set (suffix "G" stands for "Gleichstrom" i.e. "DC"). Whilst this retained the central arched tuning scale, the case was in wood with the front vertical edges rounded; The speaker aperture was square and divided with two closely spaced horizontal bars to leave the major part of the aperture at the bottom. The primary difference on this receiver was that the rectifier and mains transformer had been dispensed with. The valves were indirectly heated types REN1821 and RENS1823d. The heaters were wired in series with a dropper resistor and drew 180mA.

The two versions of the battery receiver, VE301B & VE301B2, also used the wooden case. The former used two REO34 triodes and a RES174d output valve. The latter used different valves (two KC1 triodes for detector and first stage audio amplifier and a KL1 pentode output valve. In both cases the 2V heaters were powered from an external lead-acid accumulator). Both sets were introduced in 1933 and the "B2" version lasted until 1938 but the "B" version was discontinued in 1934.

In 1935 the AC/DC version, VE301GW was launched. The mains transformer was replaced by a dropper resistor and the valve line up changed to VCI, VLI and VYI. These valves had 55V, 50mA heaters. In 1931 the VE301Wn was launched. The suffix "n" stood for neu or new. A front panel control to vary the aerial coupling and bandwidth was introduced to accompany the reaction control. This replaced the multiple aerial sockets - employed for the same purpose in earlier models. The first stage detector valve was changed from a triode to an AF7 pentode and the transformer coupling to the output valve replaced by a simple RC network.

In 1938 the VE301WnDyn was launched and represented the end of development as the model continued unchanged in production until 1944. There was also an AC/DC version (VE301dynGW) that used the same V series valves as in earlier models. The Bakelite case was changed substantially as it now incorporated a rectangular loudspeaker aperture with traditional illuminated glass tuning scale. This scale was calibrated in kHz for both MW & L W bands. A conventional moving coil loudspeaker with energised field replaced the balanced armature unit. The output transformer and ballast resistor (28k) were also carried on the loudspeaker frame. The rectifier was changed to a double diode (RGN1064), but was still used in half wave configuration with both anodes wired in parallel. None of the front panel controls were identified on this model (in common with the earlier wooden cased DC battery versions). The three aerial coupling taps and earth connection were at the rear of the set. Kersting's single eagle emblem was replaced by a pair of Third Reich eagles moulded into the case at each end of the tuning scale. In March 1938 German troops were welcomed into Austria as the two countries united under The Anschluss and the names of Austrian stations joined the exclusively German Reich stations on the tuning scale.

Also in 1938 a smaller, cheaper, receiver was introduced, the DKE38. The DKE38 model name is short for "Deutsche Klein Empfänger (19)38". This receiver was available in AC/DC and battery variants. Also available in a Bakelite or wooden case, it was cheaper than the VE301 and featured a high impedance balanced armature loudspeaker and simple Bakelite tuning knob with engraved linear scale acting directly on the tuning capacitor. Capable of receiving MW and LW stations, an ingenious band switching method was employed, activated when the circular tuning dial was rotated past its 180° end position. The scale engraving was repeated in two colours, white for MW and red for LW. Volume and selectivity adjustment was by means of a front panel adjustable aerial coupling control as in the VE301Dyn. The version of the DKE38 for mains operation had just two valves with 55V heaters, a rectifier type VY2 and triode-pentode, type VCL11. It was nicknamed "Goebbels-Schnauze" - literally "Goebbels Snout or Mouthpiece" thus underlining the receivers' intended use as a propaganda instrument of the Third Reich. Small changes to the circuit design, primarily in the power supply, were made to the DKE38 in 1940 and 1944. There were two more propaganda receivers; a portable known as the "Deutsche Olympia" and a workplace set without an internal loudspeaker. The Olympia had the model designations DO36 & DO37 indicating the model years of 1936 & 1937 respectively. The Deutsche Arbeitsfront Empfänger had the model designation DAF1011 and dated from 1935. As with the VE301, the model number had a special significance as it commemorated 10 November 1933 when an address by Hitler to workers in a Siemens factory was broadcast. Although a TRF design, the DAF1011 had both a RF stage and extra audio amplification to provide sufficient power for driving multiple external loudspeakers.

Photographs of the VE301W, VE301Dyn, DKE38 and DAF1011 are published in *Bakelite Radios - Robert Hawe.-1996*.

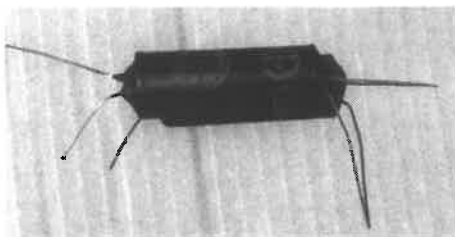
Initial Examination

At the time of purchase I was only able to ascertain that my VE301 receiver was complete, that the case was undamaged and that the manufacturer was Philips. Although clean, everything appeared original including the valves, mains lead and plug. The rubber wiring to the loudspeaker and loudspeaker mounted scale lamp was in a terminal state of decay. The valve line-up was as follows: Rectifier RGN1064, Output pentode (directly heated) RES164, (L416D) and RF detector pentode AFL. The valves were all made by Valvo and had 4V heaters. All the valves carried a warning that they were only to be used in a VE301 receiver!

Removal of the chassis was a little difficult because the control knob grub-screws had seized. They were freed by a judicious application of easing-oil. On AC/DC sets these screws are a potential source of electric shock as they can become live if the mains connections are reversed. The same can be true of the AC only sets if there is a fault in the insulation of the mains circuit. When the chassis was eventually removed the set's excellent overall condition was confirmed, only one repair was evident and that was the replacement of a smoothing capacitor. The replacement (dated 1946) has clearly failed as the pitch encapsulation had run out of the case.

An initial check of all the passive components revealed that as might be expected all the resistors measured higher than their claimed values but not sufficiently high to warrant replacement. However, it was a different matter with the foil and electrolytic capacitors: all were leaky. I had assumed that as Philips made my receiver it dated from post. 1940, possibly 1942. However, the electrolytic capacitors gave a clue to the date of manufacture as all the original parts were dated October 1938. The capacitors were made by NSF and FRAKO and carried the emblem of the Third Reich (in common with just about every other major component in the receiver). Luckily, they were of a type of construction that rendered restoration possible. The capacitor element was housed in a cardboard tube sealed at the ends with pitch. It was a relatively easy matter to remove the complete element by placing the capacitor in an oven at 70°C for about half an hour to soften the pitch and then pushing on the end. Modern components are almost invariably smaller and can be placed inside the original case and sealed in place with the original pitch.

One of the capacitors was a multiple foil type, something I was not expecting to find. The single wound element was tapped giving values of 0.1uF+0.1uF+0.2uF with respect to a common ground terminal. It was slightly more challenging to squeeze modern replacements into this item.



Restored Multi-capacitor

Another surprise was the unit of capacitance printed on some of the smaller values manufactured by NSF, namely "cm". Some research revealed that "cm" was once used as the unit of capacitance! According to the Bosch Automotive Handbook $1\mu\text{F}=0.9\times 10^6\text{cm}$ and originates from the now defunct CGS system for electrostatic units where the Farad is defined as $9\times 10^6\text{cm}$. In other words a capacitor of value 1 cm is equivalent to 1.1pF. This apparent anomaly results from the attempt to define all units in terms of mass, length and time; only in the CGS system.

Part 2 continues with the author describing the operation of his own VK301 and the design of a preamp he constructed to allow use of a ferrite rod aerial - Ed

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