MARKETPLACE

Advertisements for the next issue must reach the Editor by the 17th April 1995. Ads should be either hand printed or typed on a separate page. Note: no verbal or phone ads will be accepted. Remember to include your name, address and phone number. There is no charge for ads but the NZVRS is not responsible for transactions between members. Address ads to;
Ian Sangster 75 Anawhata Road Piha R.D.1. New Lynn. 1232. New Zealand

AVAILABLE

Approximately thirty radios including cathedrals, battery sets and tool box models plus horn and moving iron speakers etc. Please send for a list or phone me on 07-8688804.
Murray Hall. 802 Rolleston Street Thames.

Catalogue of vintage radio goodies including high voltage electrolytics (450V, 350V) and poly. capacitors (630V), dial lamps, dial cord, transformer rewinds & bobbins, resistors, knob reproductions, valve repairs, specials and more. Send an international reply coupon for my October 1994 catalogue.
Brian Smith 12 Mansfield St. Rockhampton 4700 Queensland Australia.

Heathkit IM28 VTVM with manual, needs slight re-alignment, otherwise in new condition. $30. Fourteen new Steatite (porcelain) octal valve sockets in packets, $2 each. Plus freight.
Bill Lambie Ph. 5678840 Avalon.

Several cathedral radios for exchange ONLY. Require Philco 50 or Brunswick. Other types considered. Send for list of available swaps if you have something in the cathedral line to barter with. Dave McLaren. 25 Aotea St. Dunedin. Ph.4550693 collect.

AVO vintage all wave test oscillator in mint original condition, ex-navy oscilliscope, grey, yellow in superb order with extra cathode ray tube, offers or trade. Ultimate 1936 BAU mantel, ex-Bill Farmer chassis, mint condition $160. Excellent discounts for club members at Early Sounds Vintage Radio, Queens Arcade Auckland City. Ph. 3661344 bus. or 4192033 a/h

Service manuals for Barlow-Wadley receivers XCR-30 Mk 2 $5 including postage.
Des Wright. 3 Tamatea Drive Snells Beach 1240. Ph.09-4256068.

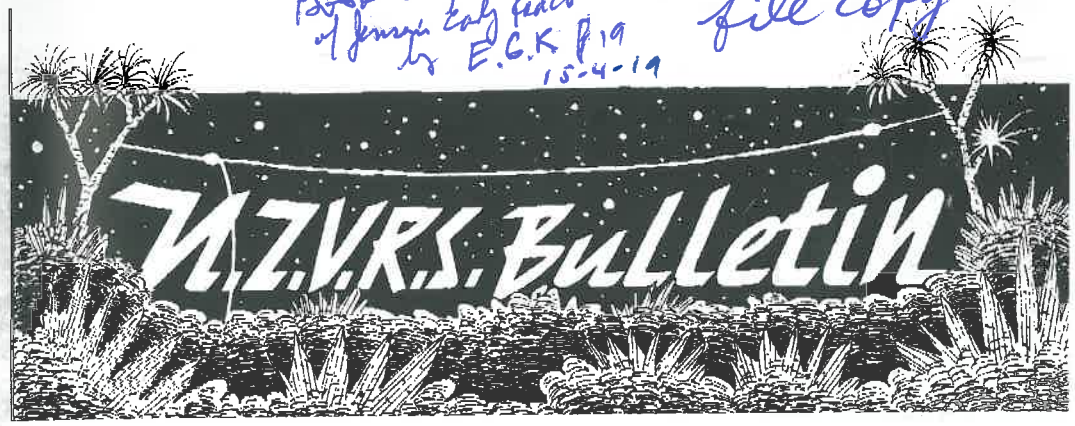
Atwater Kent 30 battery set, early type, offers. Zenith 5S127 horizontal wood table set as p.180 MGA, swap for interesting NZ radio, Pacific or similar. Ekco PB199 motor drive horizontal wooden mantel radio, looks like the PB189 on p194 More Golden Age $70. Philco upright 37-61 cabinet $10. Ian Sangster address in ad heading, ph.09-8149597.

Repairs to vintage radios done to any stage as required
Peter Walsham 14 Willowbrook Pukekohe. Ph.09-2384520 home 09-2389223 work.

Replica grille fretwork for Atwater Kent 165 cathedral $45 plus P & P.
Bob Cook 3/475 Blockhouse Bay Rd. Blockhouse Bay Auckland. Ph. 09-6266241.

Goodmans 12" speaker in good order, reasonable offers. Valves 15 6B7's, 6 6U7's, 6 6K7's. Plus new boxed one 807, one 6D6, one 80 and one Marconi 944 ARP3 (Canada).
Harold Ault. c/- Postal Services Kawhia. Ph. 8710767.

Book Reviews of Jennys Early Radios by E.C.K. p.19 15-4-19 file copy



NEW ZEALAND VINTAGE RADIO SOCIETY
Vol.15 No.4 **February 1995**

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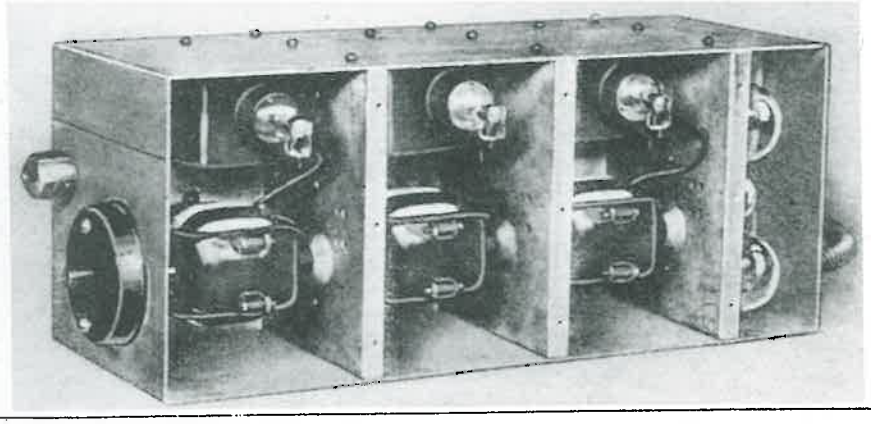

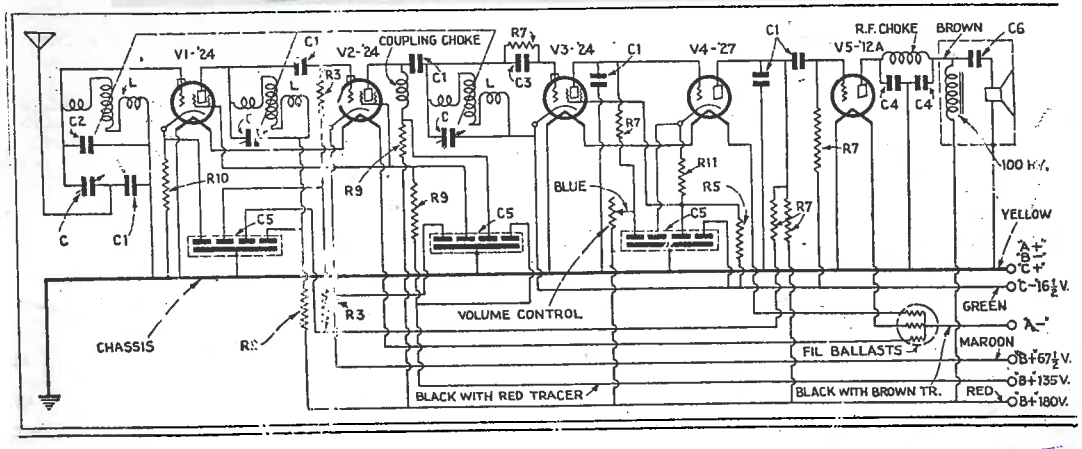

Delco model 3002 car radio (1930). Note the use of variometer tuning.

Delco Remy (1929) uses 2 x 24, '27, 112A Det 1st AF 112A output

NEW ZEALAND VINTAGE RADIO SOCIETY

A non-profit organization devoted to the preservation of early radio equipment and associated historical information.

PRESIDENT; Murray Stevenson
62 Canal Road.
Avondale Auckland.
Phone 09-8280858

SECRETARY; Mark Thomson
7 Danbury Drive
Torbay Auckland 1310
Phone 09-4738388

TREASURER; Bryan Marsh
20 Rimu Road
Mangere Bridge Auckland 1701.
Phone 09-6367712

MEETINGS; Regular Auckland of the NZVRS are held on the third Monday of each month at 7.30pm.
VENUE; Meeting room of the Dominion Road Methodist Church (at the rear of the Church) 426 Dominion Road Mt Eden.
AUCTION SALES of vintage items are held quarterly in the months of March, June, September and December at that month's club meeting.
AUCKLAND MEETINGS CALENDAR

X see P.13.

See the new Secretary's Diary column
WELLINGTON AREA MEETINGS
Monthly meeting are held at the Tireti Hall, Te Pene Ave. Titahi Bay at 1pm on the first Sunday of every month. For further details contact Neville Grubner at 2 Peckham Grove Linden Wellington Phone 2326806.
CHRISTCHURCH AREA Contact Russ McKee at 39 Halliwell Ave Christchurch for meeting details Ph. 3525778

THE NZVRS BULLETIN is published quarterly in the months of February, May, August and November. Contributions from members are always welcome and should be sent to the Editor. Opinions expressed by writers are not necessarily those of the society.
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BACK NUMBERS OF THE NZVRS BULLETIN; Most issues are still available, though some of the earlier issues are now out of print. Price is $1 each for numbers up to volume 10 and $2 for issues from volume 10 onwards. Postage is extra. Cheques to be made out to NZVRS. Order from John Stokes at the above address.

NZVRS LIBRARY; Members are reminded that our NZVRS library contains a good selection of books plus magazines and newsletters of several overseas societies. A list of publications is available from our librarian: Clarry Schollum
34 Pentland Ave. Mt. Eden
Auckland. Phone 09-6307011.
WAIKATO AREA MEETINGS are held regularly, contact Murray Hall 802 Rolleston St. Thames.
Ph. 07-8688804.

LETTERS TO THE EDITOR

In the November 1994 Bulletin I wrote an article regarding a mystery radio, a set which I was unable to find any information about.

Since the article Bob Cook, Ian Sangster and I attended a Waikato Area meeting of the NZVRS at Frits Willimsen's residence in Te Rapa. Among Frits' large, well presented collection was a radio which appeared to be very similar to my mystery radio. Upon removing the chassis from the cabinet we were able to establish "beyond reasonable doubt" that my mystery set and Frits' were made by the same company. Inside the bottom panel of Frits' console cabinet was a label bearing the name of Universe Electric Company of Chicago USA. The label in my cabinet had disappeared. I found it rather unusual that the name plate attached to the cabinet floor rather than the chassis. Both sets have serial numbers on an aluminium plate on top of the chassis.

[out]
It will now be interesting to find who handled these "Universe" radios as I am led to believe that part of another one has turned up in Invercargill.

E.J.(Ned) Matich

(cabinet only)

SECRETARY'S DIARY

A new column debuting this month is "From the Sectretary's Diary". This column is being started to serve as a "Bulletin Board" by way of prior announcement of upcoming events; for example topics for discussion at upcoming meetings, swap meets, garage sales, out of town meetings etc. etc. The successs of this column is reliant largely on your input; so all items for inclusion to the secretary at the address in the front of the Bulletin two weeks prior to advertising cut off date.

NOTICES FROM TREASURER

Bryan Marsh thanks all members who sent cards and enquired about his health via 'phone calls etc. And a special thanks to those who found time to pay him a visit during four spells in hospital from October 2nd. until December 29th. 1994.

SUBSCRIPTIONS 1995-96

A renewal form is enclosed with this Bulletin. Subscription rates remain the same as last year. Due to fluctuations in the exchange rate would overseas members please ensure that your remittance covers the stated amount.

NZVRS MEMBERSHIP LIST

These are available from the Treasurer by way of a stamped addressed business size envelope. Note: Any member who does not wish to have his name published should advise the NZVRS Treasurer as soon as possible.

THE EVOLUTION OF THE CAR RADIO

by John W. Stokes

A Personal Introduction

There it sat on the bench, a black box about the size of our Clough-Brengle signal generator. "What's this?" I wondered aloud. "A car radio" someone answered. It was, not surprisingly, the first car radio I'd ever seen because very few people had in those far off days. So, not only was it the first I had seen, but it was also the first ever to be seen in our service department.

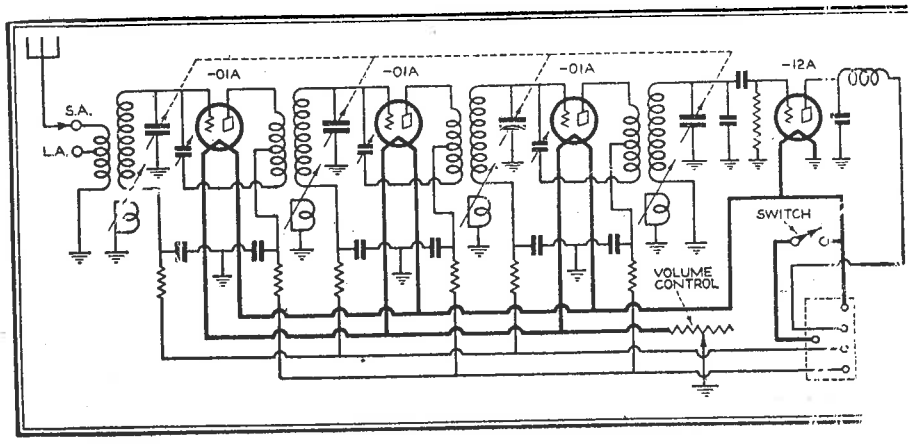
The attached job card bore the terse inscription 'Not going', and as everyone else seemed to be busily engaged I was given the job of tackling the black box. Before a start could be made it was necessary to borrow a 6-volt car battery from the battery workshop which was located two doors down the road in Rutland Street; quite a step, counting two flights of rather steep stairs on the way back. Previously we had no need of a battery in the service department as the first Courtenay vibrator sets were still some two years away, and we didn't handle Delco car radios until 1938.

After removing the top and bottom covers from the set, a Philco model 10, and hooking up the battery I found all the valves lighting up but no other signs of life, the set was completely dead. No HT. The first thing to be determined was not only where it had gone to but how it got there in the first place. Fortunately one of our trusty Rider's volumes supplied the answer. Vol. 4-56 Philco revealed all. It appeared that some sort of buzzer provided an interrupted current to the primary of a small step-up transformer which in turn provided a 'sort of AC' to be rectified by a type 84 FW indirectly-heated rectifier. So far, so good, but why wasn't the buzzer buzzing? That vital component was housed in a large cylindrical die-cast container made in two longitudinal halves held together by four 6-32 screws. It was obviously made to be opened up for servicing, but when opened what a sight met my eyes. The case wasn't the only part held together by screws, the unit itself was too. And someone had got at it! The radio's owner had completely dismantled the whole thing and lost dozens of tiny mica washers and spacers in the process.

A new, and very expensive replacement vibrator was obtained from Charles Begg & Co which, when fitted to the set, restored normal operation. So ended my first experience of car radio servicing. And now it's time for a bit of history.

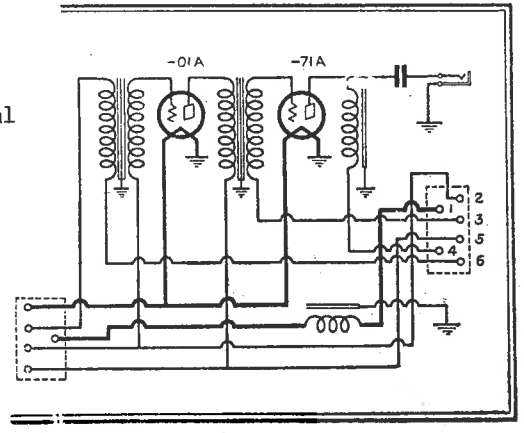
A Beginning

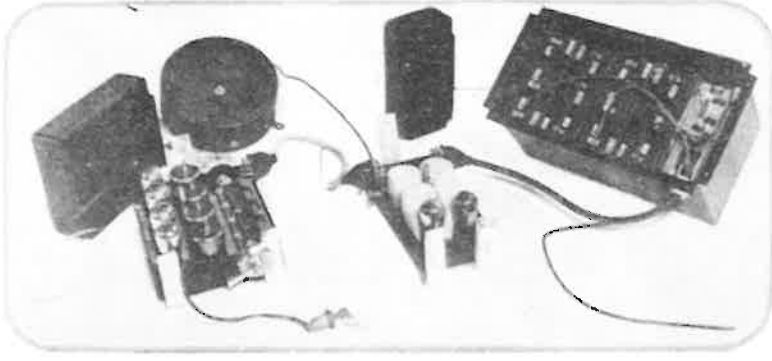
Unlike applications in other areas of transportation, sea and air, where radio's first use had been one of communication, it was purely as a means of entertainment that radio had first been used in motor cars. However, it was not long before the proven practicability of receiving radio transmissions in moving vehicles suggested other non-entertainment applications. So it was, that by 1933 police cars in some American cities were being equipped with specialised radio receivers to enable the occupants to receive orders from headquarters while the cars were in motion. Initially, the state of the art permitted only reception and several years were



Battery Set or Car Radio?

Circuit diagram of the original (pre-Philco) 1930 Transitone car radio. Note neutralised triode RF stages.





An exposed view of the Transitone auto-radio receiver installations showing the two receiver units with their covers, the battery box and loud speaker

to pass before mobile transceivers were developed to the stage where two-way communication became commonplace. The rest is now history, and today hardly a motor vehicle exists that is without a radio of some sort.

In view of the way in which in-car entertainment has for so long been an accepted part of motoring, it may be of interest to recall that in the very early days there was some resistance to the idea of having a radio under the control of the driver while the car was in motion. It was feared that 'tuning in' and even 'listening in' might prove to be a distraction, but in practice it was soon found that any such fears were groundless. In spite of this, when push button tuning was introduced it was often advertised as being a safety feature because it did not require the driver to take his eyes off the road when tuning in.

Made in USA

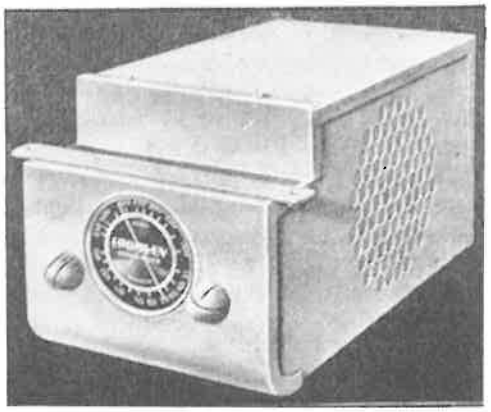
Not surprisingly, given the high per capita ownership of both motor cars and home radios in the USA, it was in that country where the first car radios appeared. Although attempts had been made from the 1920s onwards to use battery-operated portables in moving cars results were far from satisfactory and it was probably this fact which gave rise to the idea of constructing receivers intended specifically for use in automobiles. By 1930 several manufacturers had such sets in production, among them were: Automatic, American Bosch, Continental*, Crosley, Delco, National*, Motorola, Pilot, Silver Marshal, United States Radio & Television Co. (Those name marked with an asterisk indicate kitsets only)

Technical Details

At the time when these first car radios appeared they were, perforce, designed around existing types of valves which were never intended for such application. A typical set of the period used two type 24A screengrid TRF stages followed by another 24A as detector, with a 201A or 112A first AF feeding a 112A or 171A in the output stage. However, once the car radio came to be taken seriously, it was not long before special types of valves having 6.3-volt heaters and fitted with smaller (S-12) bulbs became available. It was the development of these special valves that really put the car radio on its feet, and incidentally led to the figure of 6.3 volts becoming a world wide standard for AC valves as well.

The first three 6.3-volt valves, types 36, 37, 38 were released in late in 1931 and were in general use in 1932. At the same time a short lived range of similar types having a heater current rating of 0.4 amps also appeared.
Apart from RCA Victor's model M-30 superhet produced in 1931, all other manufacturers had to be content with producing TRF models until RCA licensed the use of superhet patents. From that time on it was superhets only.

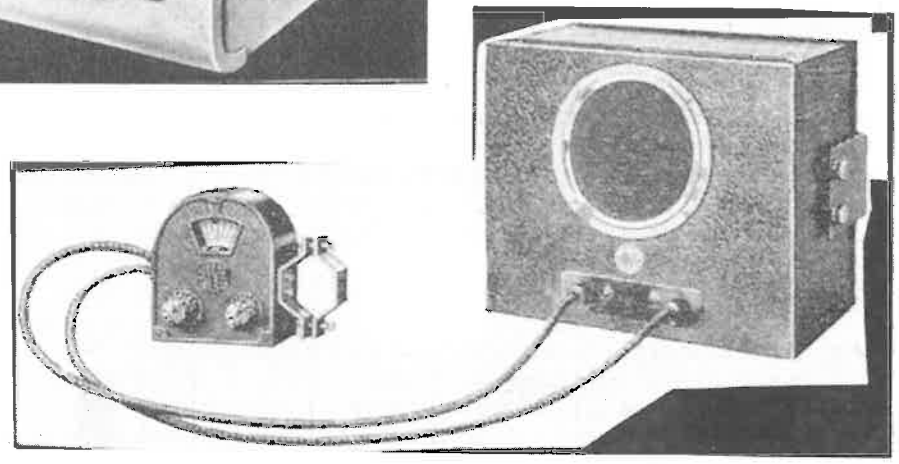
Initially, all makes of car radios were fitted with moving-iron 'magnetic' cone speakers, but by 1933 these had been completely superseded by moving-coil 'dynamic' types. In October, 1931 the Motorola model 5T71 became the first car radio to be fitted with an EM speaker having its field coil energised directly from the vehicle's 6-volt battery, thus setting an industry trend which was followed for over a decade. Nowadays, it might be wondered why it took so long for permanent magnet speakers to become accepted in the USA and the answer to this lies in the speaker manufacturers' inability to provide them. There were exceptions: RCA's very first car radio, the model M-30, actually did use a PM speaker, but subsequent models had EM

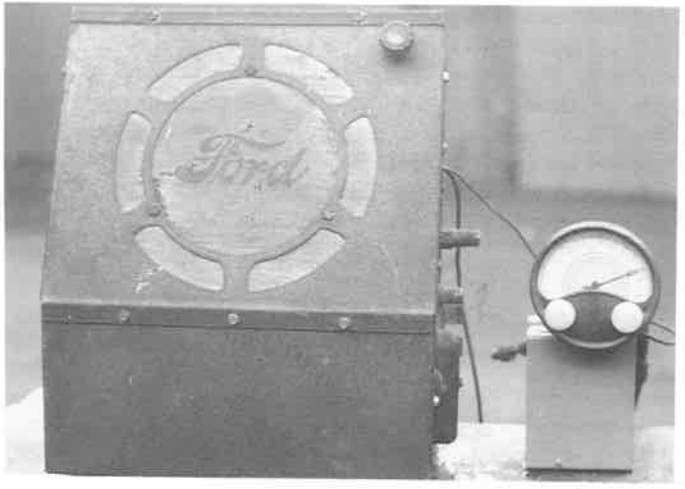


Left: Crosley "Fiver Roamio" Model A157 (1937)

Below: AWA Radiola 74 (1934)

Bottom: Ford Philco FT6 (1935)





types. The only other manufacturer known to have fitted PM speakers in pre-war days was American Bosch who used PM speakers of an advanced design made by Cinaudagraph. With advances in magnet technology resulting in smaller and more efficient magnets it was not long before EM speakers, whether in auto or home radios, became a thing of the past.

Power Supplies

It was in the matter of power supplies that car radios exhibited their greatest difference from AC operated sets. For the first three years all makes used standard dry B batteries, either three or four 45-volt blocks, for their HT supply, with valve filament/heaters being supplied directly from the 6-volt car battery. As in the case of battery operated home receivers, the high running cost of HT battery replacements soon spurred the search for a satisfactory substitute. There were two courses open; one was to use a vibratory interrupter, a sort of magnetic switch, to feed a pulsed current taken from the car battery into the primary of a small step-up transformer which when rectified and filtered provided the receiver's HT supply.

The best known and most widely used of such devices was the Mallory "Elkonode" which was initially available only in half-wave form using a Raytheon type BR half-wave gaseous rectifier. This was the arrangement used in 1932 by Motorola but it proved to be unreliable in service and in 1933 was superseded by a full-wave arrangement using a synchronous (self-rectifying) vibrator. In 1934 came what was to become the standard configuration used in the industry, a full-wave non-synchronous vibrator and a thermionic valve rectifier, an arrangement that continued in use as long as valve type car radios remained in production. At the same time, some manufacturers, notably United Motors, continued to use synchronous vibrators throughout the 1930s in most of their models.

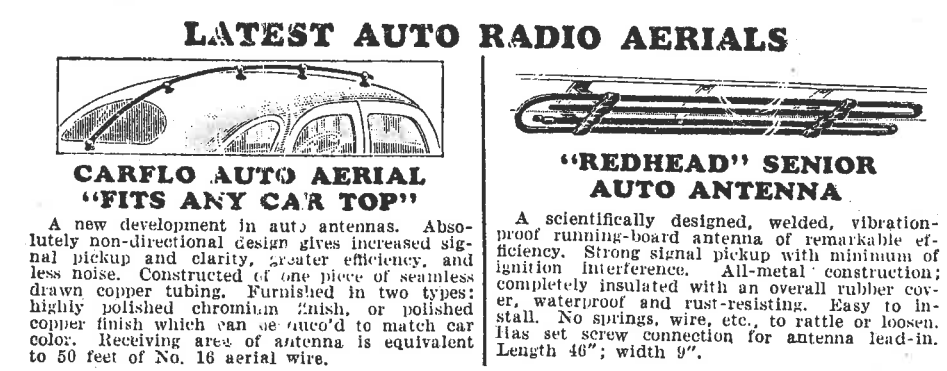
The second system of obtaining HT from the car battery was to use a motor-generator (commonly known as a genemotor or dynamotor in the USA), but because of their higher cost and greater bulk, by comparison with a vibrator supply they were seldom used for car radio work. However, due to their greater reliability and longer life, they were widely used in other land mobile applications as well as in aircraft service.

A rather surprising development, in view of the past history of the species, was the introduction by Raytheon in 1936 of a new gaseous rectifier, type OZ4. In its original form it had an MT8 metal shell of the same size as used on the type 6C5 triode, but in 1938 a diminutive glass version, octal based in a T7 bulb, largely replaced the metal type. The OZ4G was used by such well known firms as Delco, Motorola and United Motors in the late 1930s and continuing through until the late 1940s.

Aerials

The first car aerials consisted of nothing more than a piece of insulated wire slung underneath the vehicle and from this developed a factory made article intended to be mounted just below the car's running boards. Probably the most widely used aerial during the early 1930s was a piece of copper mesh fastened directly under the fabric roof top and because of the increasing interest in auto radios many car manufacturers began equipping their vehicles with factory installed roof aerials as standard practice.

But as it happened, two developments in car body styling soon rendered both these types of aerials unusable. From about 1936 the introduction of the all steel car body did away with the former fabric roof top, and at much the same time running boards began to disappear. These two changes resulted in the use of metal rods as aerials which were originally mounted above the car roof on standoff insulators supported by rubber suction cups. At much the same time, vertically mounted telescopic rods came into use which, in modified form, remained the standard type of car aerial ever after.



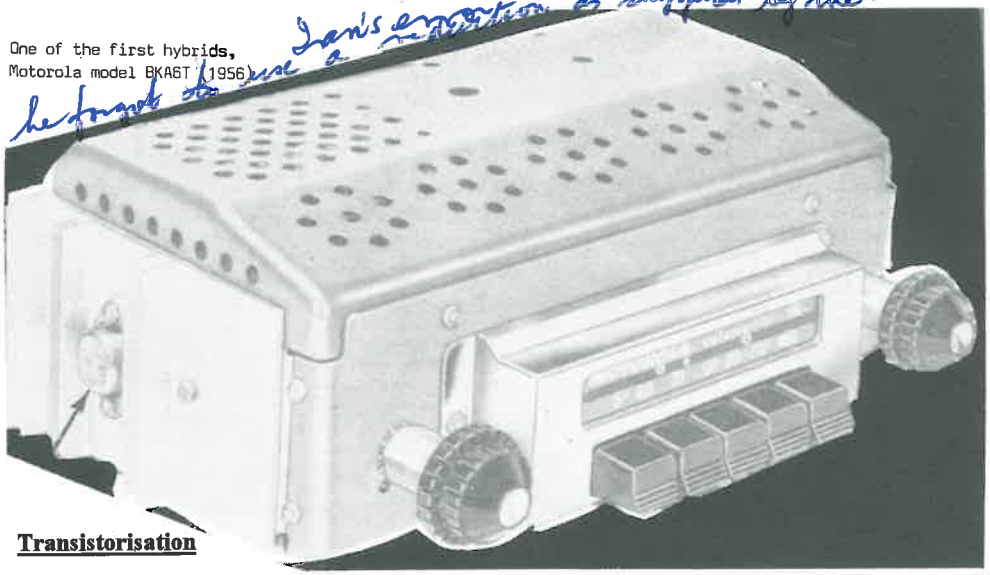
What They Looked Like

For much of the first decade, most car radios continued to be made in the original form with a separate control head and speaker, but by 1935 it was becoming increasingly common to find the speaker being mounted in the same metal box as the set itself. From here it was but a step to eliminate the control head with its flexible cables and mount the tuning and volume controls directly on the set. Thus arose the single unit set, one of the first examples being Crosley's model 4A1 of 1934. Other manufacturers were somewhat slower in bringing out similar models and not until 1937 did they become commonplace.

By 1935 car manufacturers were beginning to make provision for the so called customised radio installations by providing space for the control head to be mounted behind the dash*, a first step towards putting everything up in this position. But before this happened, some manufacturers were attempting to give their sets more eye appeal by using chrome plated speaker grilles or by using flock spraying as a cabinet finish.

The next development was the introduction of single unit models intended to be located high up behind the dash where everything was out of sight. This style of set called for a degree of cooperation between radio manufacturer and car manufacturer as the resultant radio effectively became part of the car. One of the earliest examples of this development was the United Motors model 98534 (made by RCA) intended for installation in the 1937 Buick. Other General Motors cars of the same year, such as Chevrolet and Pontiac, also had provision for the fitting up of similar single unit receivers. One advantage of this design was that it placed the speaker much higher up nearer to ear level. These single unit models set the pattern for future developments resulting in all American cars having provision for behind-the-dash radios.

* The term dash as used here indicates the instrument panel.



One of the first hybrids, Motorola model BKA6T (1956)

Transistorisation

Paradoxically, the introduction of transistorised car radios could be accomplished only by the production of a completely new range of special valves capable of a satisfactory performance when operating from a nominal plate supply voltage of 12.6 volts. Because, at the time, in 1956, available transistors were limited to audio frequency applications, valves had to be used in the earlier stages of a receiver. So it was that the first transistorised car radios made use of a single transistor in the output stage in conjunction with four or five of the new valves in an otherwise conventional superhet circuit. This arrangement did away with the need for the usual vibrator HT power supply and resulted in what was known as a 'hybrid' model.

Just for the record, one American manufacturer adopted a completely different approach to hybridisation by using standard high voltage valves with their plate supply provided by a solid

state power oscillator with its output stepped up and rectified by a type 12X4 valve! How about that?

At the time all this was -going on, such was the pace of development that by 1957 the first all-transistor car radios had appeared in the USA

The N Z Scene

Although it is generally accepted that no car radios were made in New Zealand before World War 2, it appears that there was one sold under the name 'Sonomatic' which could qualify, though precise details are lacking at the time of writing. The first post-war sets, made by the two man team of Benson and Wills, were in production by the end of 1946. About a year later, with the addition of a third partner, the firm became Benson, Wills & Walker, and in 1949 the name was changed to Autocrat Radio Ltd.

The first 'Autocrat' (1948)

Largely to eliminate the awkward flexible control shafts needed between control head and receiver, Autocrat car radios were constructed with the entire front end in one small unit while the output stage, speaker and power supply were in a separate larger unit. This style of construction was also adopted by several other NZ manufacturers, though the single unit models were not long in making their appearance.

Because of their degree of specialisation, Autocrat became the leading manufacturer of car radios, indeed, until 1963 they had made nothing else. The only other manufacturer to seriously challenge Autocrat's dominant position was Pye Ltd, though due to the comparatively late establishment of their NZ operation, did not produce any car radios until 1955.

Both Autocrat and Pye produced their first hybrid transistorised models in 1957, shortly after such sets had appeared in the USA. By 1961 these two firms had their first all transistor models on the market, though in the case of Autocrat, they were of Japanese design, following that firm's tie up with Sanyo.

Mention can now be made of a different sort of hybrid, a car radio that could double as a portable, or a portable that could double as a car radio. In 1960 Ultimate brought out a set in the latter category, their model RDR 'Auto Portable', claiming it to be the first such set in Australasia. A year later Autocrat had their Japanese designed model PCR3 on the market. Prior to this. in 1954, Autocrat had produced an unusual dual purpose receiver, their model PCR54, capable of use in either home or car, but it was not really successful.

One of Akrad's first hybrids, model TCR83. It was sold under both Clipper and Pye labels. (1957)

Of the four largest home radio manufacturers, Collier & Beale, Philips, Radio Corp and Radio Ltd, only Philips made any serious efforts to go after car radio business; the other three, after a brief dalliance with valve operated models, 'gave it away'. At one time or another, the three main car radio manufacturers, Autocrat, Philips and Pye all made so-called 'custom built' models for NZ car assemblers; Autocrat turned out sets under the Ford label while both Philips and Pye made certain models for General Motors. Apart from that, the firm of Spedding Ltd briefly marketed sets during the early 1960s under the name 'National'. Here, it should be noted, this firm had no connection with Japanese National, and for whatever reason soon ceased handling radios. A late entrant was the firm of La Wood Television Ltd who produced a range of car radios during the late1960s and early 1970s. After a gap of some five years, the name Ultimate reappeared when certain Pye models were also marketed under the name.

From this time on it was all down hill. The removal of import control left the market wide open to Japanese and, later, Korean imports, which eventually led to the cessation, of NZ manufacture.

Other Countries

By comparison with its position in the United States, the car radio received much slower acceptance in other parts of the world, and not until after World War 2 did ownership became commonplace. This early lack of interest on the part of car owners, was matched by the lack of interest shown by established home radio manufacturers, many of whom steered clear of any involvement in this aspect of the industry.

Of all countries outside the U.S. Australia seems to have been the only one to pay much attention to car radio as by 1934 no less that eight different firms had sets in production. Even so, some of the largest home radio manufacturers, such as STC and Stromberg-Carlson never entered this specialised field.

In Great Britain, it is not surprising to find that the first car radios seen in that country were of American origin, being imported in 1932 by Philco's recently established British operation. The first British car radios were produced in 1934 by E K Cole Ltd, a firm which remained the only major pre-war British manufacturer. Although Philips had produced their first car radio in 1934, it was not until 1936 that any were sold in the U.K. Two of the largest home radio manufacturers, HMV and Pye, did not produce car radios until after WW2.

first "Meronephone" car radio "Wireless Magazine" Oct 1935 p.223 (held in "Misc English Circuits" Blank folder)

The first "HMV" car radio. A joint effort between EMI and Smith's Motor Accessories, it was sold under the name 'Radiomobile'. (1948)

SECRETARY'S DIARY

February 20th	March 12th	March 20th
Battery sets	Waikato group @ C. Hollis	AGM & auction
April 17th	May 15th	June 19th
Plugs & batteries	Midget sets	Auction

OBITUARY NOTICE

D.A.(DES) LEONARD

Des had been a member of NZVRS since 1982, I can first remember him sitting next to Mark Maloney at our auction nights gradually disappearing behind a pile of newly acquired "gems". He began as an apprentice with Sam Mandeno and was later in Farmers Service Department, I can recall him telling me of the visit there of Mr. Bell, carefully shepherded by the service manager. The ever impertinent Des asked, "Excuse me Mr. Bell, do you think it would be too much trouble to get your assembly folk to place the lock washer between the pot and the chassis not under the nut, and save us from having to resolder the wires when inevitably the pot loosens, turns and the wire break off." Rest in peace Des.

We know who wrote this silly

AK Model 112

DESIGN AND PERFORMANCE IN 1934

Part II

Reg Motion

This two part article covers an attempt to assess the design and electrical performance of a 1934 top-of-the-range model as it left the factory. An Atwater Kent model 112 was fully restored and measured using methods in common use today. Part 1 described the set and its restoration together with the design of the IF section and its electrical performance. This part completes the article.

AUDIO FREQUENCY DESIGN

Readers may wonder at the use of four audio frequency stages but in effect there are only three, the pentode section of the type 2B7 being used for tone compensation only. Figure 3 shows the circuitry of this and the succeeding triode stage. Note the 100mH air core inductor and 7nF capacitor which form a peaking circuit resonating at 5.9kHz in the plate circuit of the 2B7: also the 1100 ohm resistor and 30nF capacitor forming a low frequency lift circuit in the same plate circuit. The peaking circuit is only switched in on position 1 of the tone and selectivity control otherwise it is damped completely with an 1100 ohm resistor switched across it. Note also that in positions 3 and 4 of the tone and selectivity switch a 10nF capacitor shunts the type 56 plate load to cut the high frequency response while, in position 4, a 65kohm resistor shunts the grid circuit of the type 56 to cut the low frequency response.

AUDIO FREQUENCY RESPONSE MEASUREMENTS

The curves shown in figure 4 are plots of the audio frequency response in the various positions of the tone and selectivity switch. For these tests an audio generator was coupled in at the top of the volume control and the final output transformer was terminated in a 2.5 ohm load. While the measured responses are as would be expected for positions 2,3 and 4 of the tone and selectivity switch the response in position 1 (high fidelity) is way off the mark.

One would expect the peaking circuit to give a lift of about 7 to 10dB at 6kHz thus compensating for the 6dB dropoff in sideband level caused by the IF response plus perhaps a little more to allow for lowered speaker efficiency at the higher audio frequencies, but the measured 27dB is far too great. Listening to the set in operation confirms this point as there is obvious ringing in the audio output.
I am still puzzled as to why this is so in an otherwise well designed set. The only conclusion I have been able to reach is that there is a damping resistor missing from the circuit diagram. With a 10kohm damping resistor across the peaking circuit the 11 dB of lift then given results in a clear sharp sound output and until I know more this resistor will remain. The measured

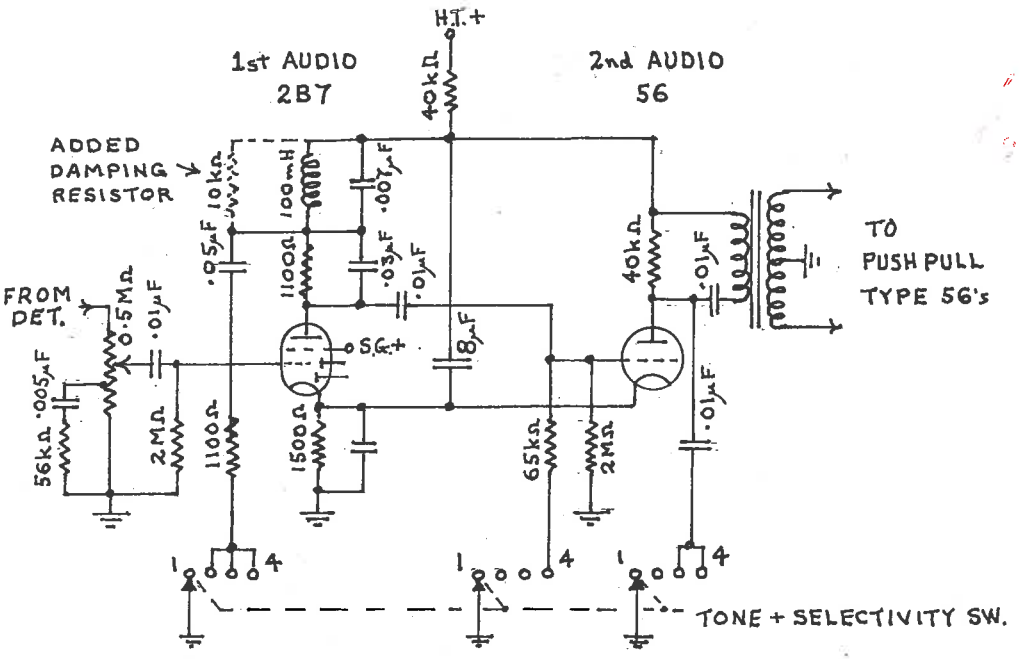


FIGURE 3. TONE CONTROL CIRCUITRY

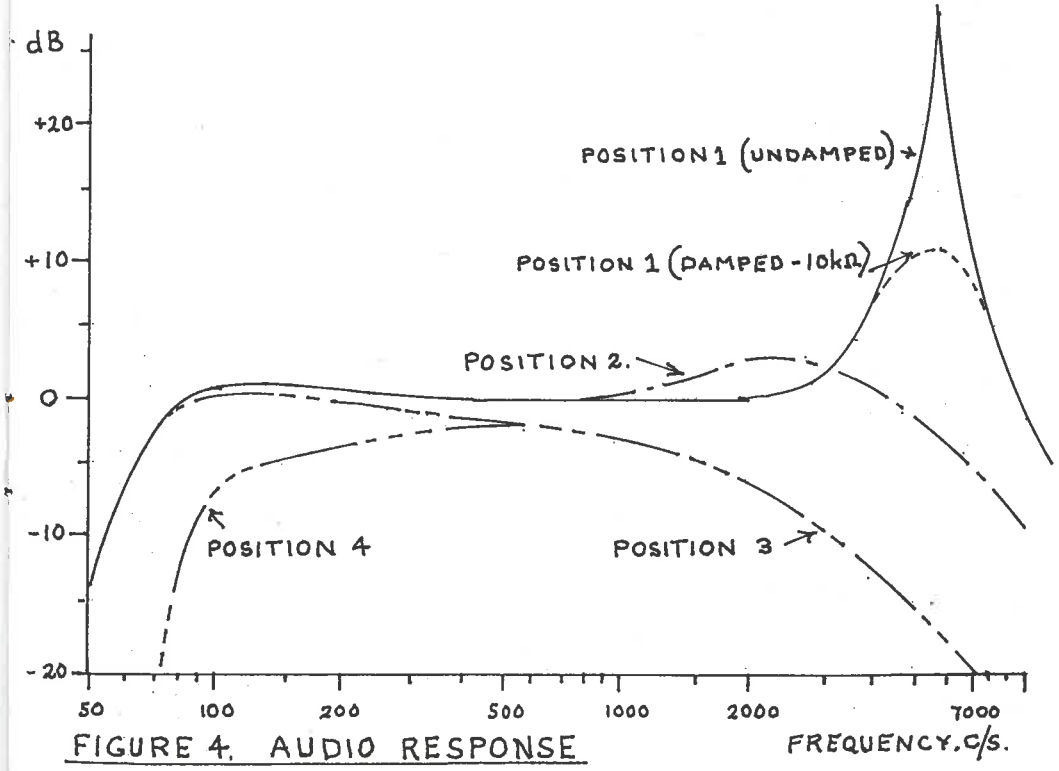


FIGURE 4. AUDIO RESPONSE

audio response with the 10kohm damping resistor in place is as shown by the dashed line in figure 2.

Perhaps a reader of this article may be able to throw some light on the peaking circuit mystery. I would appreciate knowing the real story.

AUDIO FREQUENCY DISTORTION

Distortion of the audio frequency signal is another aspect of fidelity. The use of pushpull triode output stages was the best that could be done to minimise distortion when the AK112 was designed (Mr. Black of negative feedback fame published his first paper on the subject in 1934).

With the set audio output terminated in a 2.5 ohm load the measured total harmonic distortion plus noise (THD+N) was as follows:

Freq.	Power W	THD+ N	Freq.	Power W.	THD+ N	Freq.	Power W.	THD+ N
100Hz	3.6	6%	400Hz	3.6	2.2%	2kHz	3.6	8%
100Hz	6.4	10%	400Hz	6.4%	11%	2kHz	6.4	12%

These results are reasonable for a design which theory predicts should give about 4 to 6 Watts output. Unfortunately I could not measure individual harmonics levels. However I did arrange listening tests using a number of observers of different age and sex. Performance of the AK112 audio frequency end was judged against the performance of a modern hi-fi assembly operated in monaural mode. The AK112 and the hi-fi were fed in turn with a range of quality audio signals from tape, record and tuner covering light orchestral, popular vocal and spoken pieces. Overall performance of the AK112 on music was judged by the panel to be only slightly inferior to the hi-fi system which has a great deal less than 1% total harmonic distortion. Interestingly the AK112 was preferred by some observers on spoken items.

SENSITIVITY

A receiver's ability to receive weak signals is measured in terms of the number of microvolts of signal required at the antenna terminals to produce an intelligible audio output. For this purpose an RF signal modulated 30% with a 400Hz tone is coupled via a dummy antenna network to the antenna terminals of the set. This RF signal is then adjusted in level to give a 10dB difference in the set audio output when the signal modulation is switched on and off. The actual level of the RF signal is then the receiver sensitivity figure (A test of this nature is much easier to carry out than it is to describe!).

Sensitivity measurements gave the following results:

BC kHz	sens. µV	**SW1.**	sens.	**SW2.**	sens.	**SW3.**	sens.
600	2.4	1500	5.0	4000	18	10000	20
1000	3.0	2500	2.0	7000	10	15000	23
1500	5.5	4000	13	10000	9.0	18000	25

Performance on the medium wave broadcast band and lower shortwave band is excellent but there is a marked drop off in performance on the two higher frequency bands. I think I could have improved the latter with a little pruning of the inductances and the fixed padder capacitors but this did not fall within the objective of attempting to determine the performance of the set at birth. Performance on the highest frequency band is particularly sensitive to the intercomponent wiring of the tuned circuits and I may not have rewired these with exactly the same lengths and dispositions of the connections as were used originally.

While the performance figures given above for the higher frequency bands are not up to communication receiver standard they are typical if not better than normal domestic receiver standard.

RADIO FREQUENCY DESIGN

Design of the set front end follows the best practices of the time. The RF stage is controlled by AVC (as also is the first IF). All RF coils are adequately sized to minimise RF losses and are separately shielded to reduce intercoupling as well as direct pickup . Use of a separate oscillator valve reduces pulling effects on the higher frequencies.

I was puzzled by the use of the 2.5V filament valves until I read an article by Peter Lankshear on the National HRO. Peter stated there that National used the 2.5V series in the 1934 HRO as their RF performance was quieter than the 6.3V equivalents.

One point in the RF design still intrigues me; why did Atwater Kent use the variable mu type 58 for the first detector rather than the sharp cutoff type 57?. It does not seem reasonable to assume that they economised on valve types in this top-of-the line model.

MECHANICAL DESIGN

The robust 14 gauge steel chassis and dial plate together with other solidly built components ensures mechanical and electrical stability although it does little for those handlers who have back problems!

Changing the dial scale with the wavechange switch to expose only the scale for the selected band eliminates errors in reading the dial while the use of a two speed dial drive greatly simplifies tuning of the higher frequency stations. Both of these points must have delighted the tyro in those days when receiving overseas broadcasts was a novelty to be enjoyed..

CONCLUSION

My overall impression of Atwater Kent model 112 now that I have completed and tested it is one of admiration. The electrical performance and ease of operation of this 60 year old veteran is as good as, if not better than, the best of todays sets while, as a piece of furniture, the cabinet lends grace to any living room which is more than can be said for the square black boxes that house todays hi-fi equipment.

ACKNOWLEDGEMENTS

I gratefully acknowledge the assistance of John Stokes with supply of circuit diagrams and service data, George Askey who provided some of the parts for the shadowmeter and Craig Warner who sent me details of shadow meter construction.

BOOKS NOW AVAILABLE

All three titles of the well known books on vintage radio by John W. Stokes are now available and may be ordered from the sources indicated below. New Zealand prices are quoted. Postage in Australia $8.50

The Golden Age of Radio in the Home 162 pages, hard cover $38 plus postage.

More Golden Age of Radio 203 pages, hard cover $55 plus postage $11.10

North Island orders to: J.W. Stokes, 281-C Hillsborough Rd, Mt. Roskill Auckland 4.
Ph.09-6256615
South Island orders to: Craig Printing Co. P.O. Box 99 Invercargill Ph.03-2187029.
Fax 03-2184811

70 Years of Radio Tubes and Valves 249 pages, soft cover $46 plus postage.
Order only from: J.W.Stokes, 281-C Hillsborough Rd., Mt Roskill Auckland 1004.
Note: This book is not stocked by Craigs. 2029 ← omitted in error
Australian orders for all three titles: Resurrection Radio, P.O. Box Prahan Victoria.
Ph. 03-5104486 fax 03-5295639.

Notice to owners of Stokes' "*70 Years of Radio Tubes and Valves*"

A comprehensive eight page **alpha-numeric index** listing all the tubes and valves mentioned in the text of this book is now available from:
N.Z. price is $3.50, post free
Australian price is $4.80 per Air Mail

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Mt. Roskil, Auckland 1004
New Zealand Phone 09-6256615

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1995 IS 1980 ✓

BOOK REVIEW

In Marconi's Footsteps 1894 to 1920 EARLY RADIO

by Peter R. Jensen **Kangaroo Press Pty. Ltd, N.S.W. Australia 1994**

What an incredible age we live in - space programmes, men on the moon, world-wide radio communication, cell phones, navigation systems, television and broadcasting.....

But isn't it sad that, as we enter the second century of wireless, the people providing these wireless-dependent services or for that matter, the users of them, are doing virtually nothing to celebrate the occasion or to pay homage to those great men who contributed to the invention of wireless - Hertz, Lodge, Rutherford, Branley, Righi, and of course Guglielmo Marconi himself.

Peter Jensen, however, must be congratulated for the timely release of his 170-page book in which he explains the experiments conducted by those masters in the generation and detection of electromagnetic waves.

Peter Jensen's recent pilgrimage to Villa Grifone, the old country residence of the Marconi family in Pontecchio, near Bologna in Northern Italy, has obviously given him inspiration when he is describing the young Guglielmo Marconi's remarkable experiments of 1894/95. Perhaps the author sensed the presence of Marconi, as I did myself when making the same pilgrimage fifteen years ago. [i.e. 1980]

Marconi's arrival in England in 1896 and his extensive experiments and demonstrations there, and also in Ireland and at sea, are well covered in this book. The momentous occasion of spanning the Atlantic with wireless, in 1901, is also dealt with in this book.

This publication is well illustrated and includes material unlikely to have been published elsewhere. The author is well known for his ability to construct replicas of early wireless equipment: details of some of his items appear in the latter section of his book.

This book offers much information on the invention of wireless and its development and uses up to 1920. Anyone with a serious interest in early wireless will want to have it on the bookshelf.

In 1906 Professor Mazzetto, in making reference to the early study of electromagnetic waves, including their detection, writes:
"..... Nothing was now wanting but the man who could, and would, dedicate himself to the complete solution of the problem: a man gifted with a powerful genius and of prodigious activity. This man was Marconi."

Reviewed by Eric Kirby
ZL1AMG

OBITUARY NOTICE
W.B.(BILL) UPTON & K.E.(KEITH) JACKSON

Both members passed away on the 23rd of June 1994, they were both residents of Ashburton.

1995 IS 1980

Erla or Allied - that is the Question

This article is a joint venture between Ray Knowles and Graeme Lea in an attempt to find out more about two very similar sets that are in their collections.

Graeme has a large console set that has cabinet measurements of 42" high x 37" wide and 20" deep. The chassis is quite large and deep with provision for 11 valves as per the enclosed circuit with the chassis installed dial-up under the lift-up lid. The control knobs are all hexagonal wooden ones with the function etched into the front surface.

According to Ray his particular set was identified by John Stokes some 10 years ago as a Sentinel made by Erla and by strange coincidence uses a cabinet, 12" speaker and 8.5" dial as that shown in the photograph and diagrams supplied by Graeme.

Graeme acquired his particular set about 5 years ago from the antique shop at Ngaere near Stratford and was informed at the time of purchase that it had originally come from around the Dannevirke/Palmerston North area which is where Ray's set was found. Graeme's set has been identified as one made by Allied Radio Corp. and has the identifying number 76A stamped on the chassis and this marking matches the circuit diagram - at this point of time Graeme has no idea as to what Ray's chassis is marked with - It is only hoped that the markings are the same!

What both Ray and Graeme want to do is explore is the possibility that there are more of these particular sets out there, and, more important to the exercise, they hope that there might be an ex-serviceman out there amongst the NZVRS membership that may have actually worked on the odd sets with AFC. Ray has commented that any sets with AFC are unusual and are worth investigating further. One disappointing aspect is that on both sets the original IF cans have been replaced with later general purpose units.

If any member has information that would be of assistance could they please contact either:

Ray Knowles 507 Wellwood St. Hastings	or	Graeme Lea 73 Wallace Place New Plymouth

NEW MEMBERS

P.N.Shaw. Invercargill R.D.Densley. Auckland S.J.Treadaway. Whitianga

BULLETIN MAILING LABELS

Thanks go Graeme Lea of New Plymouth for the updating and printing. Any alterations please advise the Treasurer on your subscription renewal form.

The Allied set with its lid open to display the dial.

LIBRARY ADDITIONS

Thanks to Peter Lankshear, a quantity of books and other publications, ex the Broadcasting Service, have been donated to the NZVRS. These will be added to the NZVRS library and their titles will be added to the library list in due course.

The NZVRS has purchased a Atwater Kent service manual and parts list for addition to the library.

WANTED

Two black knobs for Bell General 6MA/308. Columbus 5A chassis (any condition). Philco 201 cabinet in any colour. Circuit and two purple coloured knobs for AWA Radiola 452PZ. One green and three white domed early Bell Colt knobs. Columbus MC7 car radio, TLC no problem if intact, see p118 more Golden Age.
Des Smith. 156 Rangitoto Road Papatoetoe 1701. ph 09-2783541.

Philips Superinductance sets, cabinets, chassis and Philips operational manuals and sales material. E.Carson. 1/297 Port Hacking Rd. Miranda N.S.W. Australia 2228.

Ekco SW86 knob and metal grille ring. Zenith transformer. AK 90 valve cover.
L.B.Hartley 814 Rangiora St. Hastings. Ph. 06-8763643.

Gulbransen A1 telephone dial mantel or console radios and knob for an A1, centre oblong with broad/sharp readings. Zenith 5S-129 black/white dial and needle. Any information or literature on Edison radios. Grahame Lindsey Ph. 09-366-1344 bus. 09-4192033 res.

AK80 chassis, going or in restorable order. Have shutter dial Zenith batt set to trade for this.
Carl Wilson. c/o Parkside Dairy 85 Miller St. Invercargill. Ph.03-2160095

For Philips 2510 receiver: Tuning capacitor, drive and drum assembly; also valve box.
Peter Lankshear, 292 Racecourse Rd. Invercargill. Ph.03-2175515.

Radios wanted, RCA 121, AWA Radiolettes, Radiolas etc. Do you have any sets for sale? Cabinets wanted, Atwater Kent 808, 708, Lyric S7, RCA R28. Chassis wanted, AK 206 or complete set, Airline 62-13Y (cathedral). Parts wanted AWA Radiolettes, Radiolas chassis or any parts at all. AK caps for coil shields, output trans. plus covers. Valve shields wanted for HMV R37, Philco 90, Echophone S-5 and Atwater Kents. Valves wanted, working 25B8 and any blue Arcturus.
Bob Cook. 3/ 475 Blockhouse Bay Road. Blockhouse Bay Auckland. ph. 6266241.

Colonial escutcheon for 36A cathedral, the one on the cover of More Golden Age, or loan of the same to enable a copy to be made. Volume 3 of Harmsworth's Wireless Encyclopedia.
Ian Sangster address in ad heading. Ph. 09-8149597.

STC 1935 model 68 with cabinet, working or not.
Mick Edwards. 6 Melody Lane Otahuhu Auckland. Ph.09-2767573.

3 brown knobs and 2 white claw feet for AWA model 38 Radiolette (G.A. p.152). Speaker for Atwater Kent 84 (Golden Voice) cathedral. Airzone Radiostar or Mullard 550 bakelite cabinet and chassis condition of fancy speaker grille immaterial. Speaker for Apex Gloritone 66Py (likely to be a Utah). Three valve shields for Echophone S3 or S5 cathedral. Glass dial cover 100mm x 100mm for 1935 Champion. Dial pointer and four circular wooden knobs with brass inserts for 1935 Gulbransen 7J or 7G. Canadian Rogers 680 chassis 8 valve 1930 TRF. 6" Majestic G2 speaker. Chassis speaker and knobs for Jackson Bell 25 "Peter Pan" midget 1931/32General and for General Electric K50 cathedral (like RCA R28)
Mark Thomson 7 Danbury Drive Torbay Auckland 1310. Ph/fax 09-4738388.

WANTED

Valves, all types, new and used, boxed and loose and AVO valve testers. Also RCA or similar receiving and transmitting valve handbooks etc.
Ross Chatwin. 94 Vale Rd. St. Heliers Auckland 5. Ph. 5753355.

Copies of the Lamphouse Annual, crystal sets and Hikers One.
John Cooper. PO box 41 Whitianga. Ph. 07-8665003 evenings.

Stewart Warner R146X chassis and speaker, this is the horizontal mantel set with the rounded end to the cabinet. Frits Willemsen. 42 Challinor St. Pukete. Hamilton. Ph. 8493580.

Two gramophone needle receptacles, one for new needles and one for used, to suit an Atwater Kent 75, condition immaterial.
Graham Lea 73 Wallace Place New Plymouth. Ph. 06-7585344.

Valves; two E452T, two E424, one C443, one 1805, and a loudspeaker for a Philips 730. Brown bakelite monogrammed knob for a Courtenay radio. Two pole three position Yaxley type (rotary) and single pole three position switches with not less than one inch spindle.Jack Riddle. East Takaka RD1 Takaka.

HMV 626 World Tourer radio dial glass or complete chassis.
Ian Densley. 19 Miro Road Mangere Bridge Auckland. Ph. 09-6342841.

National HRO coil units covering the following frequency ranges 1.7 to 4 mHz, 3.5 to 7.3 mHz and 14 to 30 mHz or rf coil only for the 14-30.
Des Wright. 3 Tamatea Drive Snells Beach Warkworth. 1490. Ph. 4526068.

Radio News 1937 Jan., Sept. and Feb. Short Wave magazine Jan. 1966, April 1968, May and Dec. 1969 and Feb and March 1971. *Soul of Amber* and *Communication Through the Ages* by Alfred Still.
E.Hakanson. 17 Williamson Ave Grey Lynn Auckland 1002. Ph. 3766059 evenings.

Borrow or buy instruction manual for Taylor Instruments 88B multimeter, workshop manuals for army 48 set and BC221T. Still searching for No.19 Mk. III US or Canadian set power supply and variometer.
Denny Burrage. 11 Bannister Place Avondale Auckland 7. Ph. 09-6279780.

Escutcheon (R.H. tuning window) for RCA R28, Zenith model L (sideways tuning gang) chassis and still need Majestic valve shields (19 holes on top). Can exchange or buy.
Dave McLaren. 25 Aotea St. Dunedin. Ph. 4550693 collect.

Columbus 27M knob, dark brown bakelite, 30mm diameter, ship emblem.
Des Wright. 3 Tamatea Drive Snells Beach 1240. Ph. 09-4256068.

Philco 37-60 chassis and knobs. Leader LAG26 audio signal generator.
Peter Walsham 14 Willowbrook Pukekohe. Ph. 09-2384520 home, 09-2389223 work.