



# The receiver

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*This article reviews the major trends and developments which have taken place in the design of wireless receivers, from the crystal set of the 1920s to the arrival in the 1960s of cheap transistorised radios, manufactured in the Far East.*

*In the early days of sound broadcasting, a domestic wireless manufacturing industry evolved in many of the developed countries of the world. Thus, although this article relates mainly to British-made wireless sets, it is acknowledged that similar receivers were made in other countries.*

## 1. Introduction

The introduction of regular sound broadcasting services in the early 1920s gave rise to the birth of a wireless manufacturing industry in many developed countries of the time. Companies were formed to supply receivers to an enthusiastic public which was eager to tune into the new programmes.

Although wireless soon found its way into the homes of many people, the technical developments which led to these first broadcasts had not occurred overnight. Prior to the First World War (1914 - 1918), radio communication had already begun to find widespread use for maritime, military and other official purposes, in the form of “wireless telegraphy” - *Morse code* messages sent out over the air-waves by spark transmitters.

The first attempts at a working system of wireless telegraphy were made more than a hundred years ago in the laboratories of professional scientists such as Edouard Branly, Heinrich Hertz and Oliver Lodge. But it was a young and untrained Italian, Guglielmo Marconi, who had the foresight to see the significance of these experiments. While experimenting at his family home near Bologna in 1895, Marconi introduced some ideas of his own to develop the world’s first practical system of wireless communication, free from the constraints of the laboratory.

In what was, perhaps, one of the biggest missed opportunities in modern history - paralleled in more recent times, one could say, by the Decca Record Company not signing The Beatles in 1962 - the Ministry of Posts & Telegraphs in Italy failed to recognise the importance of what Marconi was offering them; when he sought their support, they literally sent him packing!

Undaunted, and seeking to develop and protect his “invention” elsewhere, the 21-year-old Marconi arrived in England where he had strong family connections. He brought with him his wireless transmitting and receiving apparatus (*Fig. 1*) and,

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Figure 1  
Guglielmo Marconi  
with the equipment  
he brought with him  
to England in 1896.

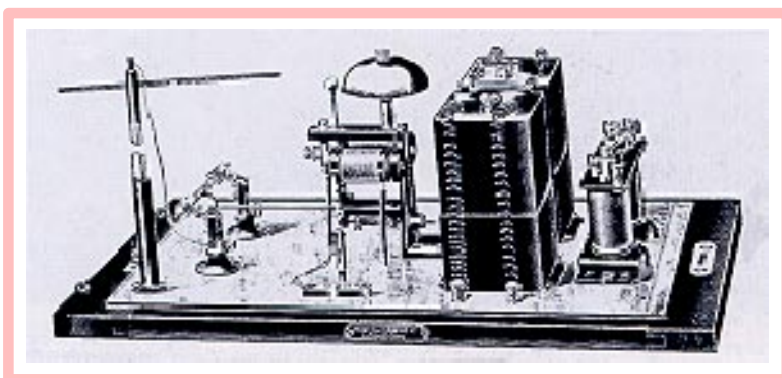
within a few months, filed a patent for “*improvements in transmitting electrical impulses and signals and in apparatus therefore*” - the first patent of its kind in the world.

Initially working closely with the British Post Office, who gave him much needed help and encouragement at a very crucial stage, Marconi's first experimental wireless signals travelled just a few kilometres. However by the winter of 1901, with experience behind him and a system that had reached some sort of perfection, he was able to transmit telegraphy (the Morse letter “S”) across the Atlantic Ocean to St. John's in Newfoundland, Canada, from a transmitting station installed at Poldhu in Cornwall, England. As the demand grew for his system, he had formed the Marconi Wireless Telegraph & Signal Company whose factory produced both transmitting and receiving

equipment on a commercial scale for coastal land stations and ships at sea, and also for the armed services.

During the early part of this century, other wireless manufacturers around the world also began to set up factories to exploit this new market, which soon included a small but growing number of amateur enthusiasts who were keen on experimentation. They formed themselves into local wireless clubs and made their own wireless transmitters and receivers, either from the component parts or bought as complete wireless construction kits from firms such as A.W. Gamage Ltd. of London. A typical ready-made Gamage receiver of this period was the *Atlantic*, made by Ward & Goldstone of Manchester, which used a *coherer* as its detector (*Fig. 2*). Priced at £6, this wireless set represented about a month's good wages. However, one of the delights of owning it was being able to listen for the first time to the new Morse time-signals sent from the Eiffel Tower transmitting station in Paris, which allowed listeners to set their watches and clocks accurately.

Figure 2  
The *Atlantic* receiver  
made by Ward &  
Goldstone in 1910.



Around this time, a handful of experiments were conducted into the transmission of speech (wireless telephony), notably the attempt in 1906 by R.A. Fessenden to broadcast programmes of music and speech at Brant Rock, Massachusetts. However, with the equipment and technology then available, speech transmission was not really practicable until the thermionic valve, invented by



Fleming in 1904, had been fully developed some years later.

During the First World War, there was an urgent need to supply the opposing armies with wireless equipment and also to carry out research into improving the existing equipment. One of the greatest developments of this time was an amplifying valve known as the French or “R” valve. By 1917, this thermionic valve was in general use in telephony receivers and transmitters, allowing spoken instructions to be communicated where before these had been sent by Morse telegraphy.

One good example is the *Aircraft Receiver Mk. III*, manufactured in 1917 by the Automatic Telephone Manufacturing Company (*Fig. 3*). This telephony receiver used three “R” valves and was fitted as standard in British aircraft during the closing months of the war. The photograph also shows the matching remote control tuner unit - *Tuner Aircraft Mk. III (Receiver Control)*.

Immediately after the war, the Marconi Company began to experiment with high-power telephony transmitters and, in 1919, succeeded in transmitting the voice of their engineer, W.T. Ditcham, across the Atlantic. Other wireless equipment manufacturers soon began to set up experimental wireless telephony stations and had the idea to manufacture wireless receivers as well, so that ordinary people could listen in to their transmissions. Hence, a separate wireless manufacturing industry began to emerge which, in anticipation of future broadcasting developments, concentrated on making receivers specifically for home entertainment and not for any military or professional uses.

## 2. The 1920s

By 1920, there was a considerable band of amateur wireless enthusiasts around the world. They already had a fairly good choice of wireless telephony stations to tune into, although the programmes were rather sporadic and often unannounced. One of the best-known stations of the time in Europe was PCGG in the Hague, the Netherlands, which broadcast music concerts (known to English listeners as the Hague or Dutch Concerts). Another important transmission of the period took place on 15 June 1920 from the Marconi transmitter in Chelmsford; listeners heard the famous opera singer, Dame Nellie Melba, perform a special concert which captured their imagination and firmly established the idea of wireless as an entertainment.

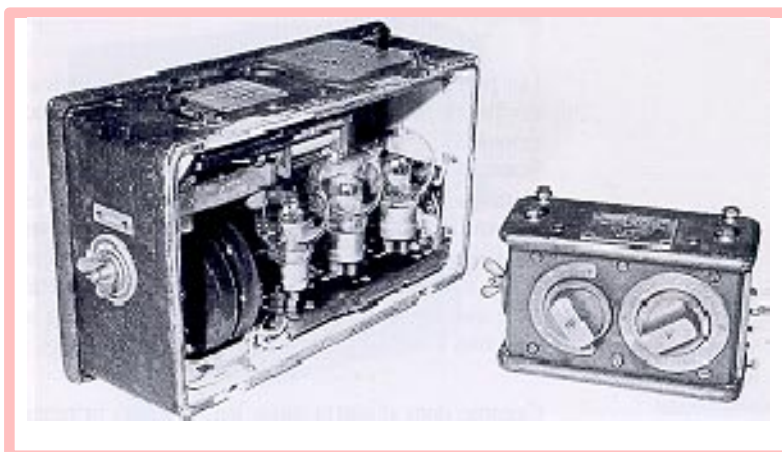


Figure 3  
Aircraft Receiver  
Mk. III (*left*) and  
Tuner Aircraft Mk. III  
(Receiver Control),  
from 1917.

Interest in the new medium continued to grow and broadcasting companies began to form in many countries. For example, on 18 October 1922, the British Broadcasting Company was formed. It was, in essence, a commercial company - made up of over three hundred British manufacturers and dealers in wireless - which produced equipment (receivers, loudspeakers and accessories such as valves and batteries etc.), and which also provided the broadcast programmes. The BBC's first local station, call-sign *2LO*, opened in London on 14 November 1922. It transmitted on the medium-wave band to an audience of just 18 000 people who had taken out the new Broadcast Receiving Licence at a cost of 10/- (£0.50).

The simplest form of receiver at the time was a crystal set which used a mineral crystal, commonly *galena*, as a detector. The received signals were



Figure 4  
A pair of headphones  
from the 1920s.



unamplified by the crystal set and, although fairly weak, could be picked up if the set was used within about a 16 km radius of a transmitting station. Like today's Sony *Walkman*, the crystal set was designed for personal listening only, through a single pair of headphones (*Fig. 4*). It would not work with a loudspeaker, without the additional expense of purchasing an amplifier. However, a cheaper, tried and tested method of amplification was readily available - placing the headphones inside a deep fruit bowl did seem to make the sound louder!

For the better-off person, buying a battery valve receiver meant improved sound quality with the ability to drive a loudspeaker, thus making it possible for the whole family to gather round and listen in together. Batteries (known in those days as "accumulators") had to be recharged about once a fortnight. In Britain, the local garage could usually oblige at a cost of six-pence (£0.025) and demand for this service was such that many enterprising garage owners began "battery rounds".

Listeners were spoilt for choice of equipment that they could buy; for example, in Britain alone, over

500 different receiver models were available to choose from, ranging from the cheapest crystal set at 7/6d (£0.375) to a top range multi-valve receiver at £65 or more. Both types of receiver needed to be connected to an outdoor aerial - usually a large cumbersome affair, consisting of 30 m of wire strung up between two masts, or hung from a convenient chimney or tree, with another wire going from the earth terminal of the set to a good connection with the ground. In all, over 100 m of wire were used in the aerial, the earth, the component connections, the tuning coils etc. - a fact which led to a number of music-hall jokes about it being a *wireless* hobby!

Alongside the commercially-manufactured sets, there was a tremendous interest in home construction, with receivers being made on the kitchen table from kits of parts, or from plans printed in the various wireless magazines such as, in Britain, *Wireless World* and *Popular Wireless*. The components, as well as ready-made sets, were available from wireless shops in practically every main street in the country. In the photograph of a central London wireless shop (*Fig. 5*), horn loudspeakers predominate while there are plenty of components

Figure 5  
A scene from a central London wireless shop in 1924.





in the showcases, and magazines on the counter to guide the home-constructor..

At this period in the development of wireless, it was most unusual for station names to appear on tuning dials. Stations moved their wavelengths fairly frequently and there was always a new station starting up somewhere.

*Fig. 6* shows the panel of a 5-valve battery-powered receiver made by W.R.H. Tingey in 1922, some years before the technology of “single-knob tuning” was to arrive! This receiver just bristles with controls - 13 knobs, 5 switches and 14 terminals. The dials are marked in degrees, and the settings of each control for each particular station had to be carefully noted down in a log-book for future reference.

At the time, the BBC’s policy was to install several low-power medium-wave transmitting stations around the country; by the end of 1924, some 21 stations had opened. However, during that year, the idea had developed that the entire country could be served by a single high-power long-wave station which would carry a national programme to supplement the local stations.

To test the idea, an experimental transmitter was erected at Chelmsford near London and, after a series of successful experimental broadcasts, the station was transferred to a permanent centrally-located site at Daventry in Northamptonshire. On Monday 27 July 1925, it opened on 1600 metres using the famous call-sign 5XX. An editorial in the BBC’s weekly magazine, *Radio Times*, estimated that one million listeners, scattered across most of the country, could pick up the new station on a crystal set.

Around this time, however, the popularity of crystal sets began to wain while the sales of battery valve receivers, with their better sound quality and loudspeaker reception, started to increase. Interest began to develop in outdoor battery portables which housed all the essential parts - an aerial, the receiver, batteries and a loudspeaker - all contained within a suitcase-type of cabinet.

*Fig. 7* shows the *Chakophone Junior Four* “suitcase” battery portable which was made by the Eagle Engineering Company in 1929. Its walnut cabinet housed a 4-valve receiver together with the associated high-tension (HT) and low-tension (LT) batteries, a frame aerial and a moving-iron cone loudspeaker. It was so completely self-contained that, not only was it able to be used in any room of the house, but it could also be taken on

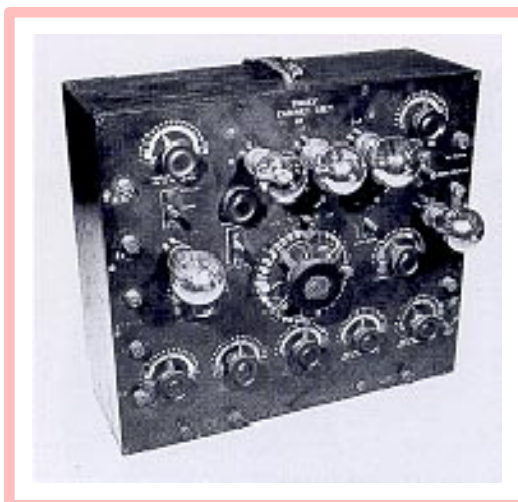


Figure 6  
A 5-valve  
battery-powered  
receiver made by  
W.R.H. Tingey  
in 1922.

picnics or on motor outings in the country - a real novelty at that time.

In 1926, an important development occurred in Britain with the introduction of the first AC-mains-operated receiver, the Gambrell *Baby Grand* which is shown in *Fig. 8*. The domestic electricity supply at this time was in a chaotic situation, with several hundred small locally-based electricity companies using a variety of non-standard voltages, both AC and DC. Millions of older houses, particularly those in rural areas, were not even connected to the mains electricity but, for those that were, the mains receiver was to be a

Figure 7  
The *Chakophone Junior Four*  
“suitcase” battery  
portable, made in  
1929 by the Eagle  
Engineering  
Company.

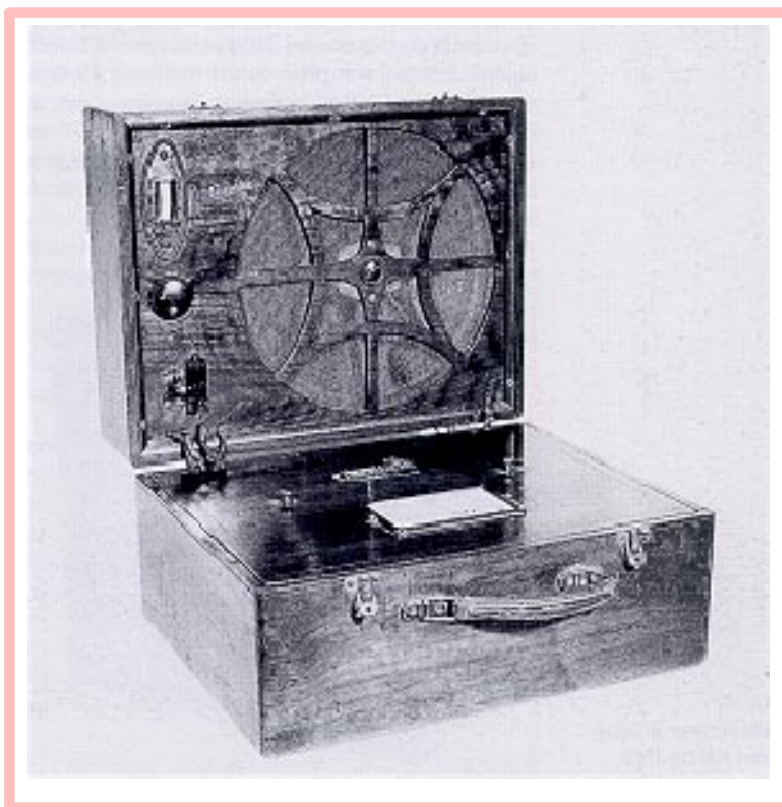




Figure 8  
The *Baby Grand*  
AC-mains table  
model, made by  
Gambrell Brothers  
Ltd. in 1926.

considerable advance as it dispensed with the need of batteries and the great inconvenience of having to recharge them. By the mid-1930s, mains receivers were universal, thanks in part to the building of national power transmission systems.

The first public airing of the Gambrell *Baby Grand* was at a new national wireless exhibition held at Olympia in London, from 4 to 18 September 1926. Soon known as “Radiolympia”, this exhibition immediately established itself as *the* venue for launching the latest models of wireless receivers, and the traditional beginning of “the wireless season”. One notable design trend seen at this first Radiolympia was the overall simplification of the

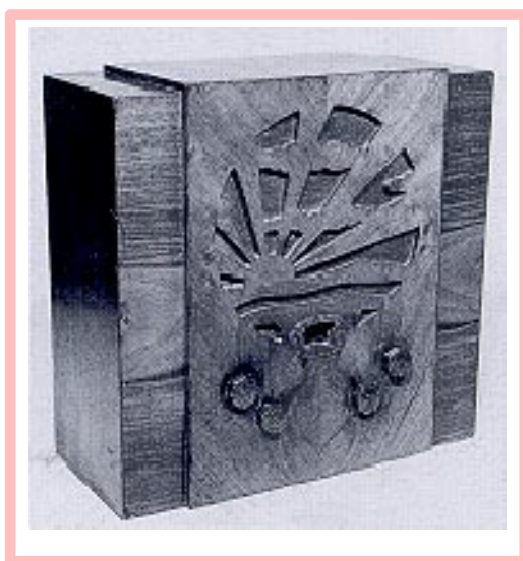


Figure 9  
The *Model K* 2-valve  
mains table receiver,  
made by Pye Radio  
Ltd. in 1932.

controls exhibited on most receivers – compare the Gambrell *Baby Grand* with the 1922 Tingey 5-valve receiver shown in *Fig. 6!*

More broadcasting schemes took shape towards the end of the 1920s. While the National Programme from 5XX in Britain continued, a “sister” high-power medium-wave transmitter at Daventry (call-sign 5GB) was brought into service on 27 August 1927, to carry out experimental broadcasts to the Midlands region of England. Together, 5GB and 5XX made up the world’s first twin-wave transmitting station which radiated different and contrasting national and regional programmes.

Experimental transmissions also began that year from a short-wave station at Chelmsford (call-sign G5SW). It had been set up to test the viability of a broadcasting service to the far-off British Colonies and Dominions. As these tests could also be picked up at home, several manufacturers started to produce shortwave-only receivers and by the time regular shortwave broadcasting began (1932 in the case of the BBC’s *Empire Service*), this part of the industry was already well established.

By the end of the 1920s (at a time when nearly 3 million broadcast receiving licences had been issued in the UK), the two types of receiver which had really established the wireless industry just a few years before – the crystal set, and the valve receiver with its separate batteries and external loudspeaker – had become things of the past. The mains receiver (*Fig. 9*) and the outdoor battery portable, with everything self-contained within an attractive cabinet, would lead the field right through the 1930s and beyond.

### 3. The 1930s

In the early part of the 1930s, the spread of national power distribution systems helped to establish firmly the mains-powered receiver which soon evolved into that handsome piece of wood furniture that people called “the wireless”.

As a material, wood was strong and often beautifully grained. It was easy to cut and assemble into a box shape and, therefore, was highly suitable for making not only wireless cabinets but also the cabinets for a new sector of the industry – radiograms. Following the introduction of electric gramophone pickups and turntables in 1928, many leading wireless manufacturers had begun, by the early 1930s, to produce impressive floor-standing radiogram versions of their principal wireless sets. These console radiograms, epitome

mised by their often magnificent and monolithic mahogany or walnut cabinets - which housed a mains radio, an electric turntable with auto-changer and perhaps several large loudspeakers - soon displaced the old wind-up gramophone from the living rooms of the nation's more affluent people and became one of the great status symbols of the 1930s - a favourite among retirement presents for company directors!

For those listeners not in a position to afford a radiogram, almost all wireless sets now came with "gramophone" terminals at the back. To these could be connected an add-on electric turntable, or simply an ordinary wind-up gramophone fitted with an electric pickup, both of which could make use of the receiver as an auxiliary amplifier.

Besides wood, another new material soon found use in the wireless cabinet-making industry - the phenolic plastic called *Bakelite*. While it had been employed in a small way for making wireless cabinets since the end of the 1920s, it was only during the 1930s that Bakelite came into its own in this field. Lending itself perfectly to mass-production techniques, it became the favourite among many wireless manufacturers, especially E.K. Cole Ltd. who exploited its fine moulding properties and sometimes came up with exciting and innovative design shapes.

The example shown in *Fig. 10* was designed by the architect Wells Coates and was the first in a range of Ekco radios which were housed in a moulded round-shaped Bakelite cabinet, until 1947. The design was no more than novel at the time but, today, enthusiasm for it has reached fever pitch amongst certain wireless collectors, antique dealers and design museums.

By the mid-1930s, listening-in had become more of an international activity. Receivers were capable of tuning into most, if not all, of the 200 or so broadcasting stations now scattered around Europe. Very high-power stations began to appear, perhaps one of the best examples being the commercial station *Radio Luxembourg* which began broadcasting transnationally to Europe on the medium- and long-wave bands in 1933. It is well remembered by the older generation for its light entertainment shows, interspersed with advertisements for stockings or cigarettes etc., or trying to persuade parents to give their children *Ovaltine* before they went to bed!

With so many stations on the air - including, from 1936, the BBC's new television service from Alexandra Palace, the sound from which could be



Figure 10  
An Ekco Model  
AD65 with moulded  
Bakelite cabinet,  
made by E.K. Cole  
Ltd. in 1934.

picked up by some wireless receivers of this time - accurate tuning became very important. To find a station, listeners no longer had to refer to a station log and then find the correct setting for the controls, as they had done in the 1920s. By now, most wireless sets had dials fully marked with station names and the listener simply had to move the tuning pointer to the appropriate station. As an aid to tuning, visual tuning indicators started to become a feature of many new sets - chief among these was the magic-eye tuning indicator which was able to show visually and with pin-point accuracy when the required station was tuned in fully.

Another innovation occurred in 1938, when push-button tuning became very popular with receiver manufacturers for the first time (*Fig. 11*). Pre-tuned by the wireless retailer, or by the customer at home, several favourite stations could be selected literally at the push of a button, which made life a lot easier than searching manually for the right station. More sophisticated methods employed small electric motors which swept the pointer around the dial in either direction. There were a few technical problems with some of the push-button mechanisms, particularly on some of the cheaper sets, but in general these sets were liked by the public and became *the* type to buy.

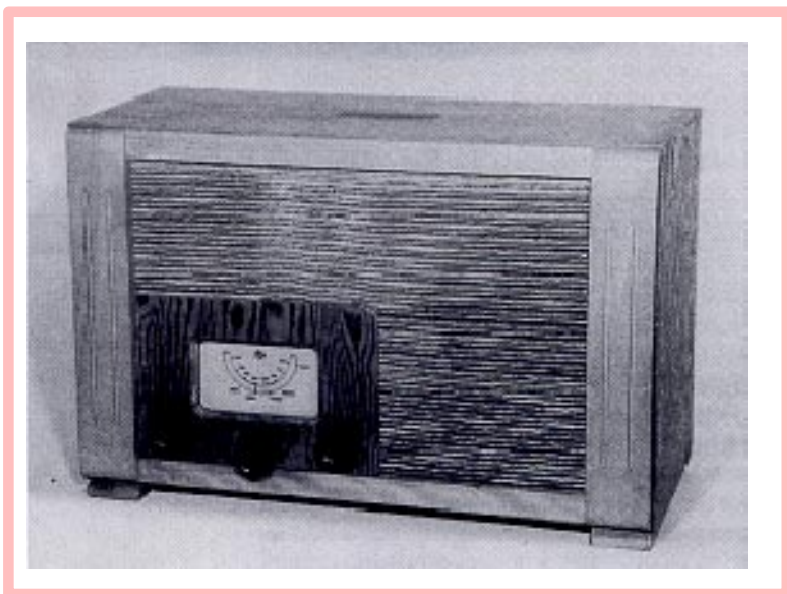


Figure 11 (top)  
The *Bush PB 51* table receiver, made in 1938, was one of the first to use push-button tuning.

Figure 12 (bottom)  
The battery version of the British wartime civilian receiver, the *Utility Set*, made in 1944.

As the decade drew to a close, it seemed likely that war was about to break out in Europe. This was exploited by some wireless manufacturers who, in the summer of 1939, began to offer outdoor battery portables to wartime officials and owners of air-raid shelters. Radiolympia opened as usual and everyone was looking forward to the expected Autumn sales boom when, on 1 September, Germany invaded Poland.

With black-out regulations coming into force and civilian evacuation plans getting under way, Radiolympia was forced to close prematurely. On

the same day, the BBC made immediate changes to its wavelength and service structure, introducing a single combined programme on the medium-wave band, with all its transmitters synchronised to radiate the same wavelength - a move designed to prevent enemy aircraft from using the transmitters as navigation beacons.

#### 4. The 1940s

By now, more and more wireless factories had to give over their time and output to essential war work and, hence, the domestic wireless manufacturing industry all but ground to a halt. Very few new sets appeared on the market and the supplies of valves, batteries and other components, useful for keeping the existing sets going, were severely curtailed. By 1942, there were thousands of sets awaiting repair, simply because either the spares or the repairmen (drafted into the military forces) were unavailable.

Help in a small way came from the USA which sent shipments of valves and receivers, but the British Government decided to ask its own wireless industry to produce a cheap standard receiver. Manufactured by a consortium of over forty British manufacturers, the so-called *Utility Set* became available in 1944, in both a mains and a battery version (Fig. 12), and ensured that the public were at least kept informed and entertained.

Very soon after the war had ended in 1945, wireless sets started to come off the production line again, as manufacturers gradually began to get back to peacetime production. The structure of the wireless industry, its technology and production methods had changed dramatically since 1939, when it was principally concerned with the production of relatively-simple wireless receivers for the home. Following wartime research and development, the industry was now more skilled and better equipped in the modern and intricate technology of electronic engineering, and had earned the modern title of the *Radio Industry* - the word "wireless", in professional and official circles at least, was thought of as being rather archaic and inappropriate!

One of the new types of set to emerge soon after the war was known as the *second set*. It was a small, compact radio which was ideal for placing in a kitchen or bedroom, to supplement the "house" radio which was usually kept in the lounge. The neat size of many of the new receivers was a direct result of developments in circuit miniaturisation. In particular, the introduction of the all-glass miniature valve - developed in the US during the



war and quickly introduced into British sets as the *B7G* - helped to shrink the size of the chassis needed in both mains and portable sets.

On 1 October 1947, the first post-war National Radio Exhibition opened at Olympia. It did much to re-establish the prestige of the domestic Radio Industry, with over 170 principal exhibitors showing an impressive line-up of radios and electronics to an audience starved of a national radio exhibition since 1939. Among new developments, many sets had “fly-wheel” tuning in which a heavy fly-wheel was fitted to the shaft of the tuning control knob and if this was spun, the inertia of the fly-wheel then carried it on. This made it quick and easy to pass from one end of the tuning scale to the other - actually, the innovation itself seemed to pass just as quickly, for it only lasted a season or two!

In America, the world’s first transistor was developed at Bell Telephone Laboratories. Describing it as an “amplifying crystal”, the British magazine *Wireless World* thought that “*the transistor could usefully take the place of valves*” - a prophecy which was to come true by the mid-1960s.

## 5. The 1950s

The radiogram market was given a boost by the introduction, in June 1950, of the first 33 1/3 rpm microgroove long-playing record, which gave greater playing time and better sound quality compared with scratchy old 78s!

A big radio event of the 1950s was undoubtedly the start of VHF/FM broadcasting. This instantly gave impetus to the creation of a new market in VHF/FM receivers, tuners and radiograms, bought mainly by enthusiasts in search of better-quality broadcast listening.

Apart from the odd acknowledgement to female listeners (notably a pair of ladies’ headphones brought out by Sterling in 1922!), the radio industry had largely ignored women as potential customers. However that all changed in the early 1950s with a flood of receivers specifically designed for and aimed at the female buyer. These sets were invariably petite, pastel in colour and often resembled a ladies handbag. They bore such non-aggressive names as “Sky Princess” and “Lady Margaret”. The Vidor company’s *Lady Margaret* battery portable (*Fig. 13*) was housed in a wooden case, covered in scarlet and silver-grey “lizard skin”. The lid contained a frame aerial although, by this time, miniature ferrite-rod aerials



◀ Figure 13  
The *Lady Margaret* battery portable, made principally for female listeners by the Vidor company in 1954.



▼ Figure 14  
The *Bush TR82B* transistor radio of 1959, aimed mainly at the teenage market.



Figure 15  
The Pam Model 10  
transistor portable,  
made in 1956.



were being introduced. The set was switched on and off simply by raising and lowering the lid.

This attention to the female listener lasted only a few years before the industry turned to another lucrative market - teenagers! (Fig. 14).

By the mid-1950s there started a great movement towards mergers and takeovers; many established smaller companies like McMichael and Cossor were progressively taken over by larger ones. By 1962, only five major groups dominated the industry in the UK and it was the same story in other European countries. (see Section 6.).

Following the development of transistors in the USA, semiconductor devices began to be employed in electronic circuits by the mid-1950s. Their introduction heralded the era of true miniaturisation, high reliability and low power consumption, and they soon turned up in every field of electronics, eventually displacing the thermionic valve which had reigned supreme for several decades. The Americans launched their first transistor radio set in 1954 and the Japanese in 1955.

The first British transistor radio to come on the market was the 8-transistor *Pam Model 710* in 1956 (Fig. 15). Although designed at Pye's research laboratories at Cambridge, the *Model 710* was actually released through a Pye subsidiary - Pam Radio & Television Ltd. - because, being rather uncertain of the radio's commercial viability, the parent company was unwilling to risk its own reputation on such an untried innovation. Priced at £31/10/1d (£31.50), it was an expensive investment for the listening public, but sufficient numbers were sold and Pye decided to bring out their own modified version (*Model 123BQ*) early the following year. Several other manufacturers now began gingerly to enter this new field but, of the British companies, only Perdio decided to specialise in producing transistor sets to the exclusion of all other types of receiver.

At this stage in its development, the transistor was still generally incapable of equalling the performance of the valve, especially at high frequencies, and was only really suited to handle relatively low powers. Because of this, some transistor radios of this period were in fact hybrids, with valves in the HF and the IF stages, and transistors only in the output stages. As the new decade approached, public interest continued to grow in transistor portables and, with mass-production getting underway, their overall cost gradually dropped and their sales increased, especially in the summer months. However, at the same time, a few small pocket-size transistor radios were beginning to find their way into Europe from the Far East - the trickle becoming a flood which continued well into the 1960s and which eventually threatened to kill off the domestic radio industries of Europe.

## 6. The 1960s

According to a survey published in the September 1960 issue of the British magazine *Wireless &*



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Mr. Hill has written and published several books and articles on the subject and runs his own communications museum next to his home in Devon, England. Each year, he presents the National Vintage Communications Fair at the NEC in Birmingham.



*Electrical Trader*, about 70% of British households boasted a television receiver and, up until then, sales had accounted for four-fifths of the industry's turnover. But with the television market now approaching saturation point in western Europe, the consumer electronics industry fell into a general slump and many firms found themselves in financial difficulty - a situation not helped of course by growing imports of cheap, pocket-size transistor radios from Japan and Hong Kong.

These small transistorised sets appealed immediately to the buying public, especially to the new "pop generation" of teenagers. This was not only because of their handy size, styling and comparative cheapness, but also because they exhibited new and attractive packaging ideas and usually came with several individually-wrapped accessories such as an earpiece, batteries and a carrying case. By 1961, with very few exceptions, every new portable model was a transistorised set; one of the very last valve portables to be manufactured in Britain was the Ever Ready *Sky Captain* in a year which saw over 160 different transistor models released onto the market.

Transistor radios made in Europe were generally larger in comparison to their Far East rivals (*Fig. 16*) and were also very much more expensive to produce. Faced with this competition, and coupled with the slump in sales and an overstretching in television investment, several companies - large and small (including Perdio) - fell by the wayside or were taken over by one of the major groups.

By the mid-1960s, many European manufacturers of portable radios had given up trying to cope with Far East competition, or had simply capitulated and commissioned their own sets from there - for example, radios carrying the Pye brand (a name famous in British receiver manufacturing since the early 1920s) were made in Hong Kong for the first time in 1964. Radio had certainly become a secondary part of the industry - displaced by television as the centre of home entertainment, and now simply a useful provider of background music and background company.

In many European countries, the 1960s saw the introduction of regular FM broadcasts in stereo. Again, the introduction of a new service gave impetus to manufacturers, worldwide, who were quick to produce quality stereo radios and tuners for this new "Hi-Fi" market.



Figure 16  
An Ekco Model PT352 pocket transistor (left) and one of its smaller Japanese rivals, the New Voice Transistor 6, both made in 1961.

Development in the field of transistors had by now led to the introduction of the integrated circuit. This did not necessarily mean that every radio which used ICs became the size of a matchbox or smaller; where sound quality was important, the size of the finished radio depended on the size of the loudspeaker and the case in which it was contained.

## 7. The 1970s and 80s

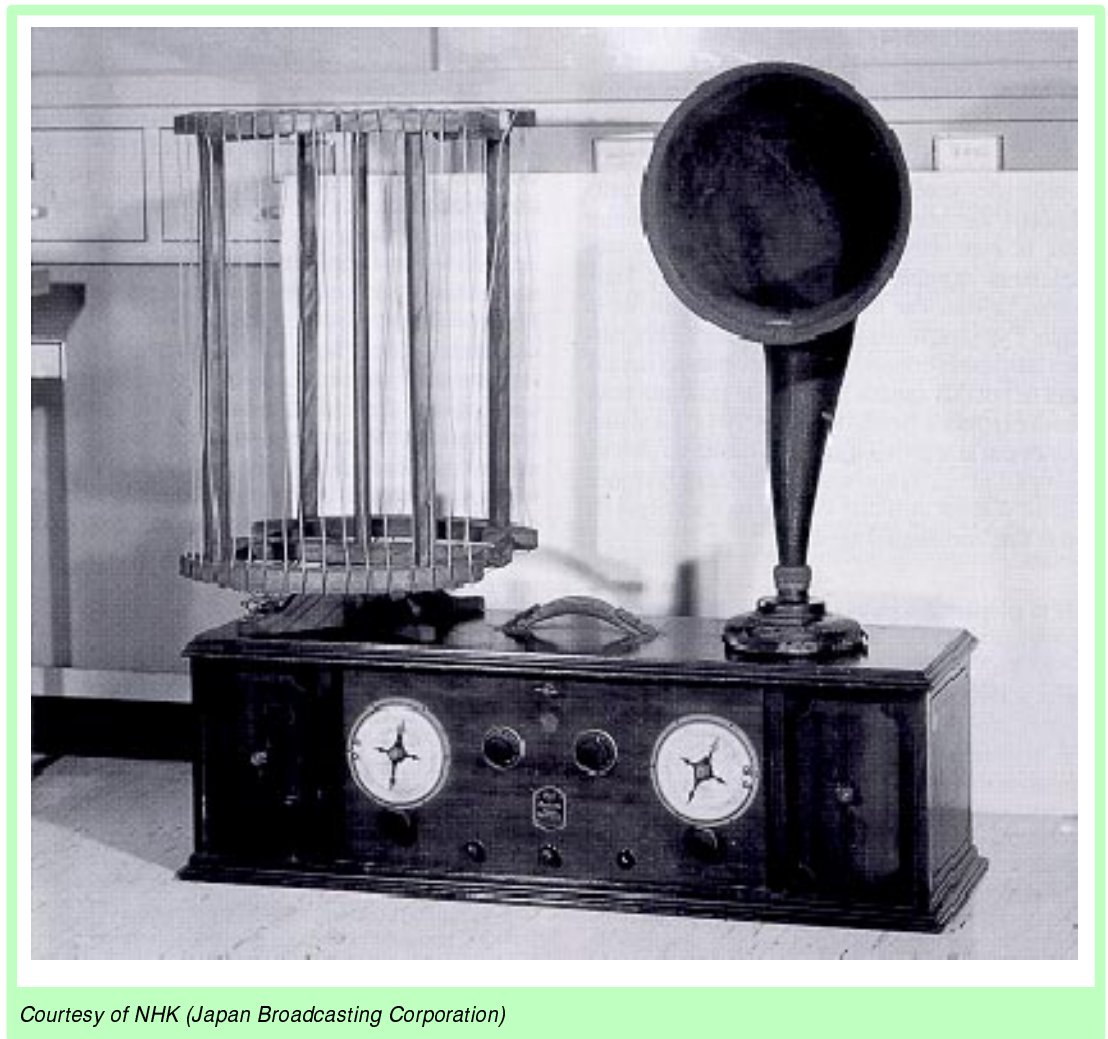
Radiograms had continued to be impressive throughout the 1950s and 1960s but, from the early 1970s, fashions and public taste changed and there was no longer a call for such grand and opulent pieces of furniture. For the hi-fi enthusiast and ordinary listener alike, there were "audio separates" (stereo systems built up of separately-housed units) and, for teenagers and students, compact "music centres" (comprising a stereo radio, record player and cassette tape deck mounted on a wooden plinth under a smoked perspex cover, with little loudspeakers which could fit tidily onto a bedsit bookshelf).

After decades of valuable service to the radio and electronics industries, the valve had by the mid-1970s all but ceased being used in any form of electronic equipment. However, since the mid-1980s, there has been a dramatic resurgence in its use in specialist hi-fi amplifiers and tuners. While it doesn't seem likely that valves will ever appear again in an ordinary domestic radio, this renewed interest is a fitting tribute to a component that was first produced at the beginning of this century.



The most popular Japanese crystal set in 1925.

*Courtesy of NHK (Japan Broadcasting Corporation)*



An RCA 6-valve superheterodyne receiver from 1924.

*Courtesy of NHK (Japan Broadcasting Corporation)*