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RADIO DESIGN

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During the 1890's a number of scientists in Europe and America were experimenting on the subject. Each of them had at his disposal the knowledge and experience of his own time, but it was the virtuoso of science, Guglielmo Marconi (1874-1937) who demonstrated the possibilities and future commercial use of wireless (radio) telegraphy. Marconi originated few new techniques but he was able to use what was already known and published.

In 1894, Marconi studied Hertz's contribution, built himself a transmitter and the following year in Bologna, Italy he sent a wave electric signal over a range of two kilometers. He went to England in 1896 where he obtained a patent for his system of transmitting and receiving signals by means of a transmitter and receiver. He then moved to Italy and in 1898 he was appointed to the position of Chief Engineer of the Italian Navy. In 1901 he demonstrated the transmission of signals across the Atlantic Ocean.

1. Introduction

In 1864, the English physicist James Clark Maxwell found by mathematical theory the existence of electromagnetic radiation and he showed that light consists of electromagnetic waves which travel at 300 million metres per second. Over twenty years later the German physicist, Heinrich Hertz (1857-94) confirmed Maxwell's theory by a series of experiments which he carried out between 1886 and 1889 at Karlsruhe.

During the 1890's a number of scientists in Europe and America were experimenting on the subject. Each contributed new knowledge and invention to the sum of understanding, but it was the virtually unknown scientist Guglielmo Marconi (1874-1937) who demonstrated the workable possibilities and future commercial and social scope of wireless (radio) telegraphy. Marconi originated few new techniques himself but he skilfully used what was already known and published.

In 1894, Marconi studied Hertz's contribution, built himself a transmitter and the following year in Bologna, succeeded in transmitting signals over a range of two kilometres. He went to England in 1896 where he continued to experiment and transmit, work which led to the historic transmission of the 12th December 1901 of three dots

(Morse code for 'S') across the Atlantic Ocean from Cornwall to Newfoundland. The invention in 1904 of the thermionic vacuum tube by Sir John Ambrose Fleming (1849-1945) was of vital importance in making possible the development of radio telephony. He designed the rectifying valve containing two electrodes (diode) which acted as a much more reliable detector of radio waves than devices which had been available previously. Two years later an American, Lee de Forest, improved the tube by adding a third electrode (so making it a triode) which would amplify and modulate as well as detect radio waves. This eventually made it possible to manufacture highly sensitive wireless receivers and to pick up radio telephone messages from a much greater distance than before. The stage was set for the advent of radio broadcasting.

The American, Reginald Fessenden (1866-1932), of Pittsburgh University first broadcast the human voice by means of radio waves in 1902. This was only over a distance of one mile but four years later he succeeded in broadcasting speech and music over 200 miles. Further experimental transmissions were made in Britain as well as the USA and wireless telephone sets were being manufactured but, before the first world war, radio telephony was thought of only as a medium for sending messages from individual to individual. During the war its military

communication potential was partially realized and utilized by several countries, but after 1918 the possibilities of broadcasting for entertainment and commercial purposes were dawning.

In 1922 the British Broadcasting Company, then a business enterprise, began to transmit programmes from London under the call sign 2LO. Expansion was rapid and wireless, as it was called until 1945, was taken up by the public with such enormous enthusiasm that by 1927 when the BBC was given its Royal charter, over two million licences for receiving sets had been issued by the post office and a new, high-powered transmitter had been set up at Daventry (opened 27th July 1925).

2. The 1920's - Origin of Radio

In the early 1920's most receivers were crystal sets often homemade to instructions published in the popular wireless magazines of the time. (Fig. 1 & 1A) The crystal set contained no source of energy; the power for the headphones came from the transmitter intercepted by the listeners aerial which, it was recommended should be as large and high as possible. Crystal receivers had a limited range, they needed frequent adjustment, interference was often troublesome and tall aerials were vulnerable to lightning.

At this time production and market structures were not dependant upon research into new forms, styling or graphics. The equipment was characterised by the image and form resulting from the purely technical necessities to be fulfilled. It is this functional approach which makes the styling of early models of radios, as much as any other early inventions, interesting and somewhat amusing to the eye of the modern consumer.

The first radio receivers had exposed valves (it was important to be able to control their ignition, never excessive, so as not to curtail their life span), batteries and speaker when used, separate from the main body containing the valves and tuning mechanisms. (Fig. 2 & 2A)

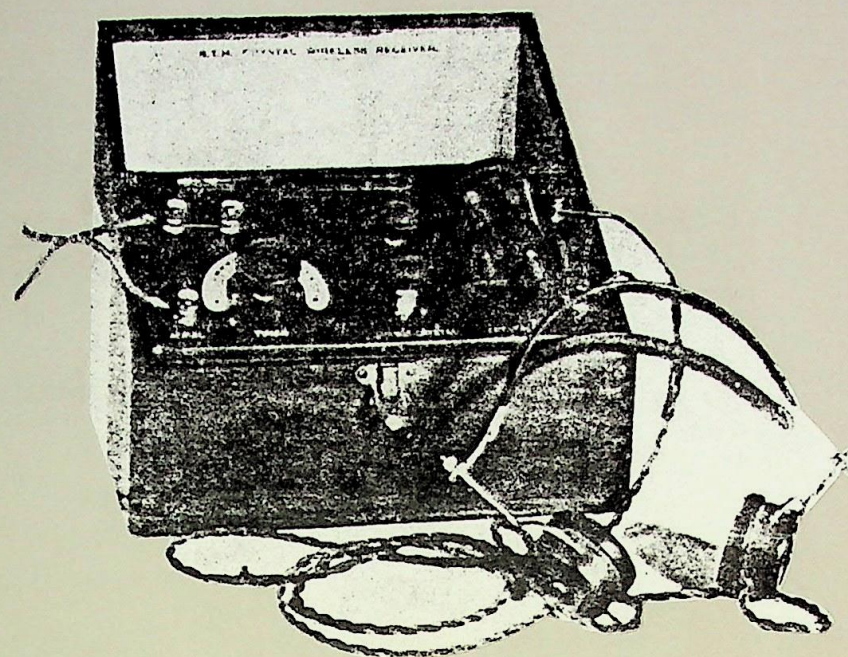


Fig. 1. Crystal set 1924-5 with headphones

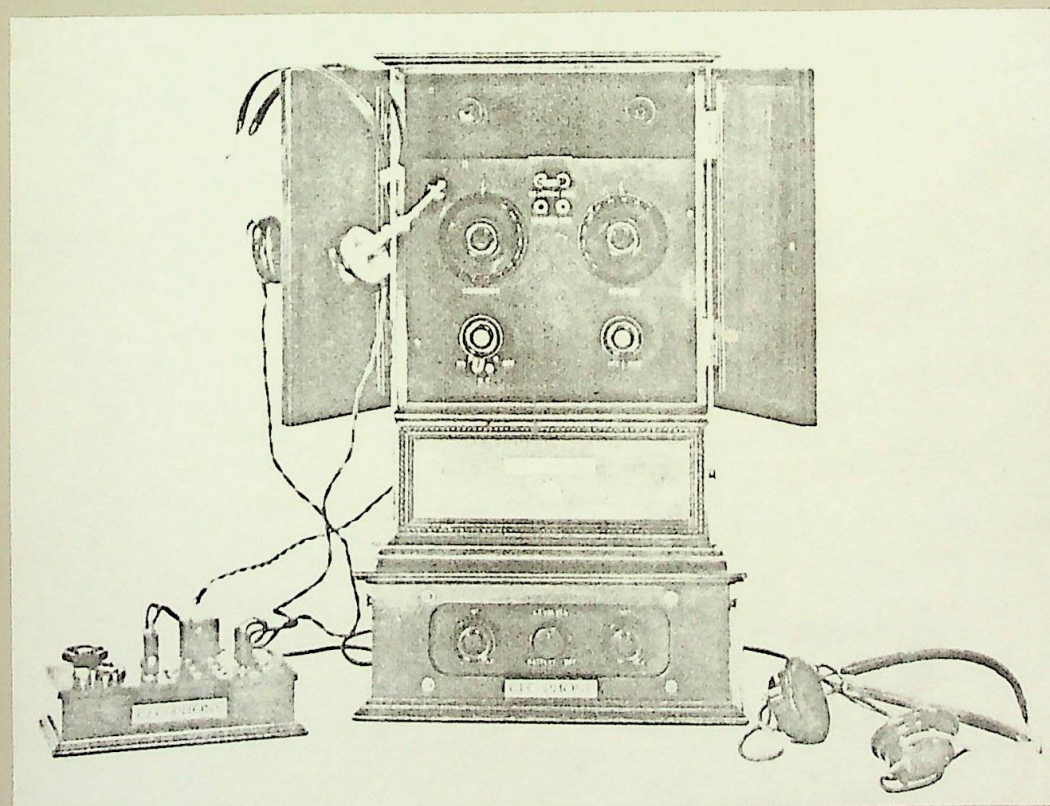


Fig. 1A. Gecophone Model BC 3200 crystal receiver, 1924

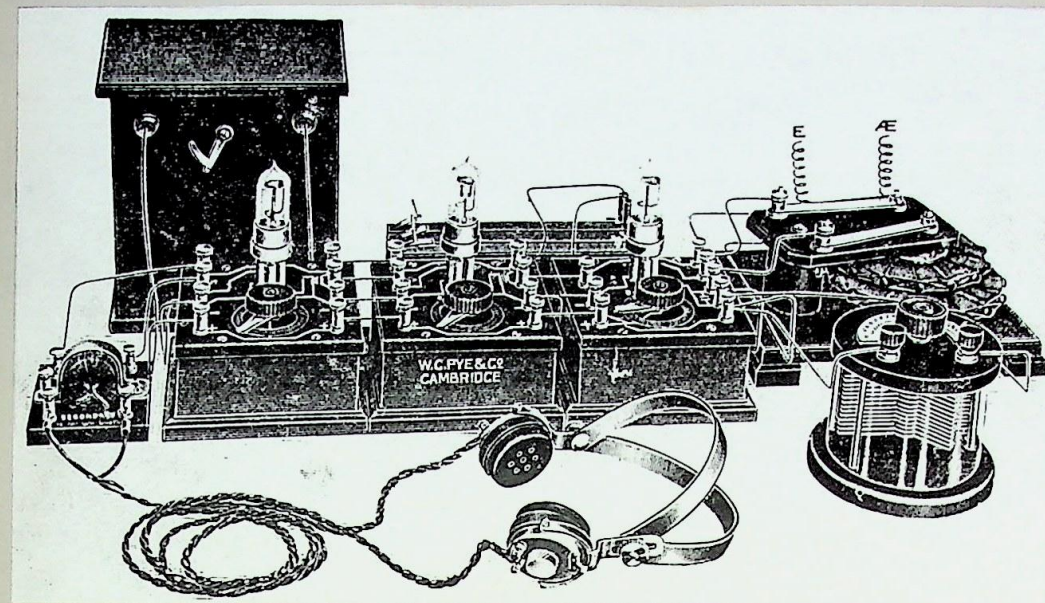


Fig. 2. Pye "Unit System", 1922

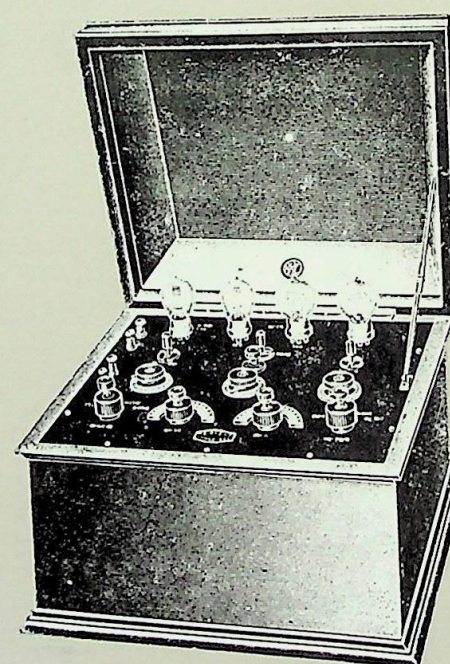


Fig. 2A. Pye 547, 1923

As these early receivers were unreliable and prone to faults, this exposed arrangement was functional for easy inspection and maintenance. (Fig. 3) The subdivision of the equipment into its basic parts had other technical advantages such as, valves could easily expel heat, and acoustic vibrations between the speaker and the chassis were eliminated and the controls were visible and convenient to use. The loudspeaker was introduced in 1923, which looked like those of the contemporary gramophone, it replaced the headphones and valve receivers gradually took over from crystal sets. (Fig. 4) The horn-shaped loudspeaker gave great acoustic advantage and made the maximum use of the feeble power available. By 1924 the New York made "Thermiodyne T F 6" still used the long outdoor aerial while the "De Forest superhet" radio had a compact indoor "frame" aerial which was directional and so could be twisted round to improve reception. (Fig. 5 & 5A) Also in 1924, Harold J Pye designed the first successful W G Pye & Co receivers, these being the 720, 730 & 740 series, the centre figure standing for the number of valves. (Fig. 6) All the 700 and the 800 series, which followed in 1925 were available with doors, or in a pedestal style cabinet. As with Pye radios, the cabinets of all valve sets available at the time consisted of a simple wooden box with a number of plugs for headphones or loudspeaker and aerial. Styling was achieved by simple detailing such as changing

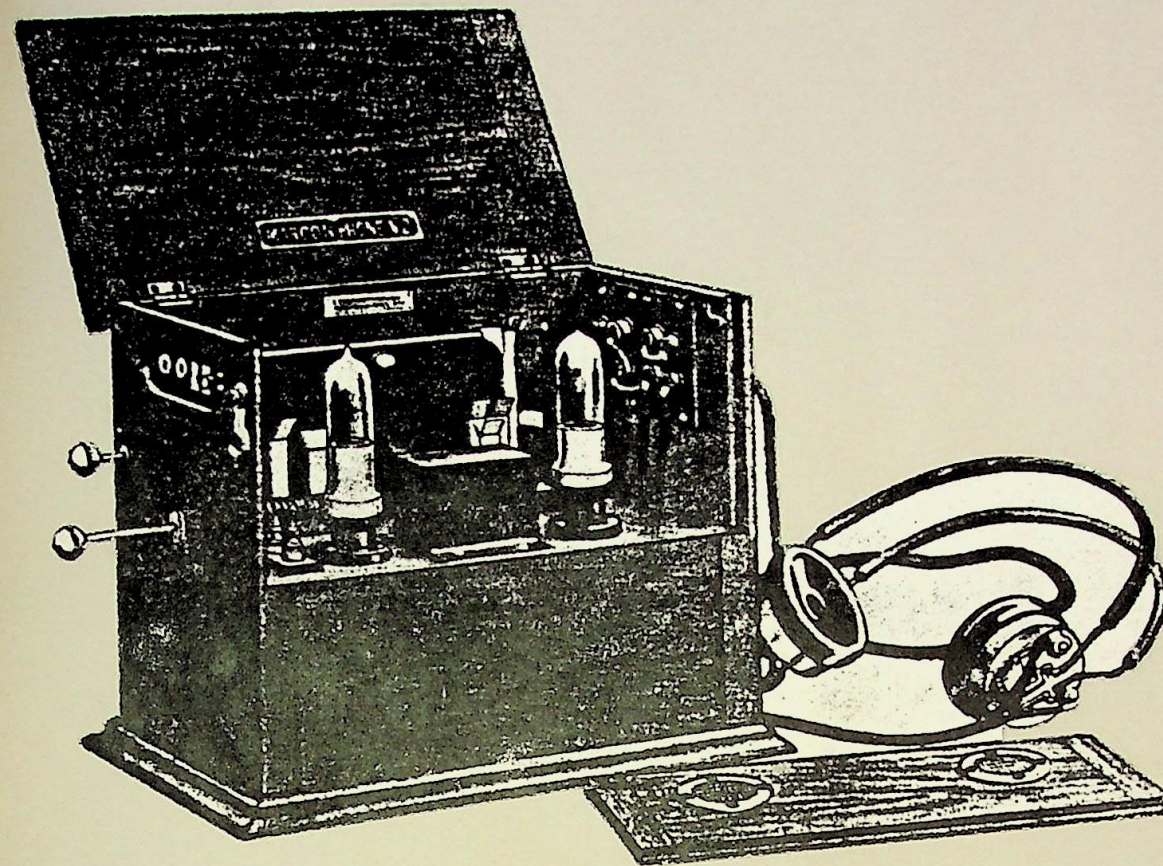


Fig. 3. Marconiphone V-2 Radio Receiver, 1922

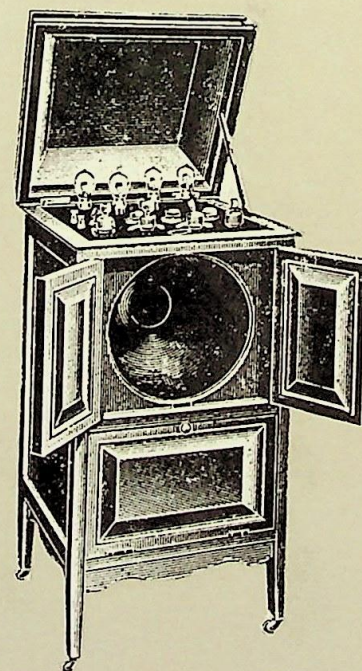


Fig. 4. Pye 550, 1923

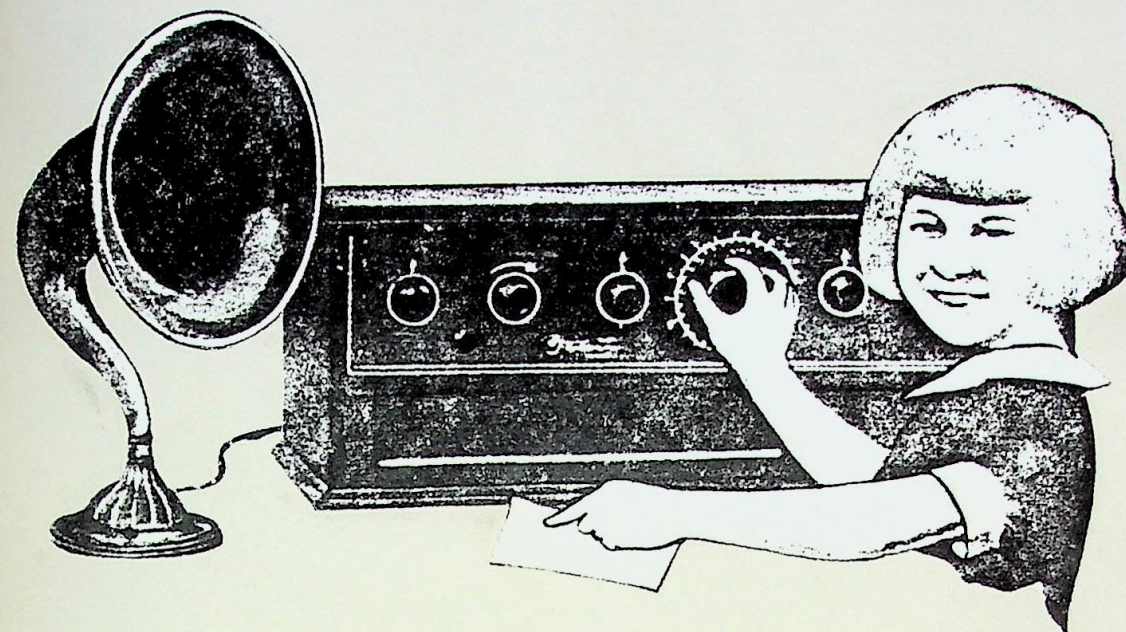


Fig. 5. Themiodyne TF6, 1924

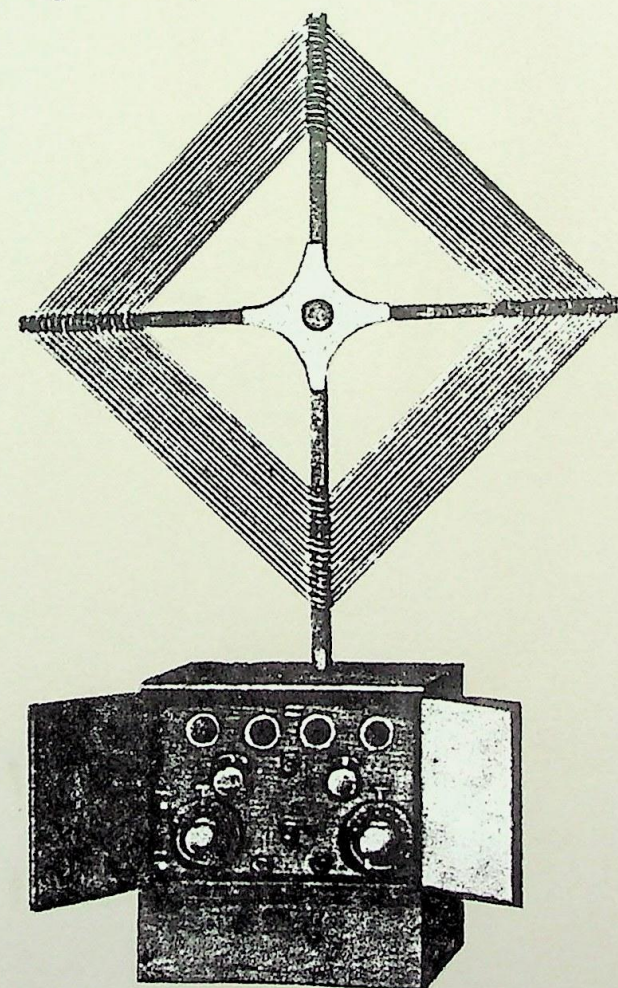


Fig. 5A. De Forrest Radio, 1924

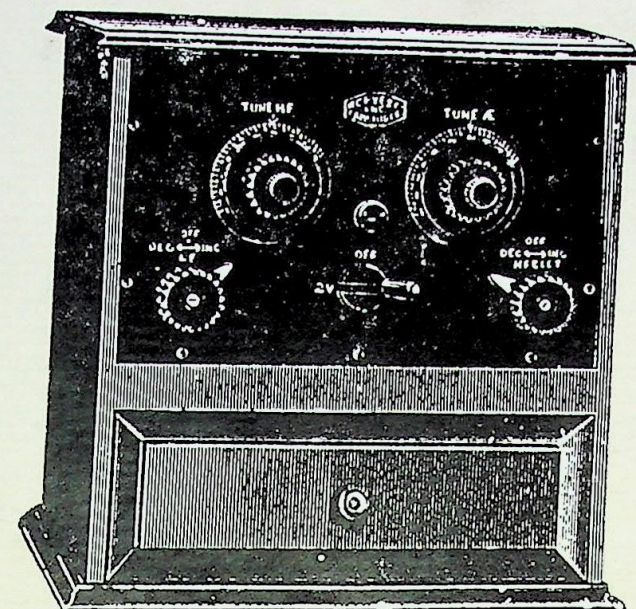


Fig. 6. Pye 730, 1924

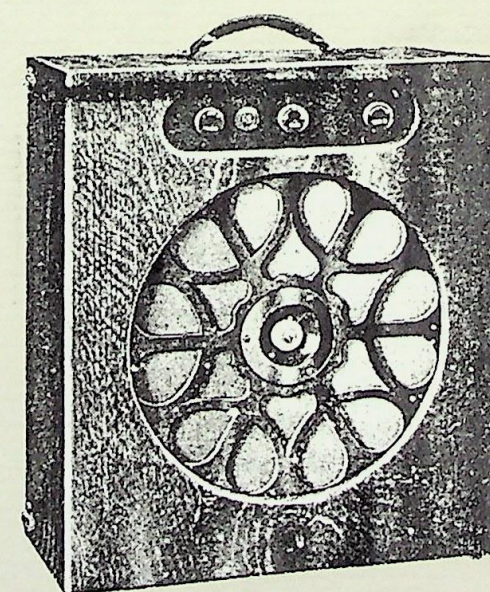


Fig. 7. Pye 555, 1927

angles of separate panels which made up the cabinet, but was not used to display individual style for a particular companies product as all of the receivers of the time were either a long rectangular shaped box or a more square shaped box. (Note similarity of "De Forest" radio and "Pye 730").

A notable achievement in 1925 was by Pye who successfully mass produced a portable receiver, the "Pye 555". (Fig. 7) This was a five valve single band (long wave) receiver limited to reception of Daventry only, with amplionhorn type loudspeaker inside the cabinet. In 1927 Pye gave the 555 a modified cabinet and speaker grille, as it now contained a cone type loudspeaker. The speaker grille was contained in a circular hole in the cabinet, which was still a wooden box, with floral type design. The price complete with valves and battery was £25.12s.6d.

Identification by styling was first introduced by Pye when they designed and used the "Rising Sun" motif on their loudspeaker cabinets and second series of Model 25 receivers in 1927. (Fig. 8) This was the first use of styling other than due to functional consequences and it was purely as an identification motif for Pye's radios. Styling due to production and marketing structures or aesthetic compatibility in the home did not emerge



Fig. 8. Pye "Rising Sun" motif, 1927

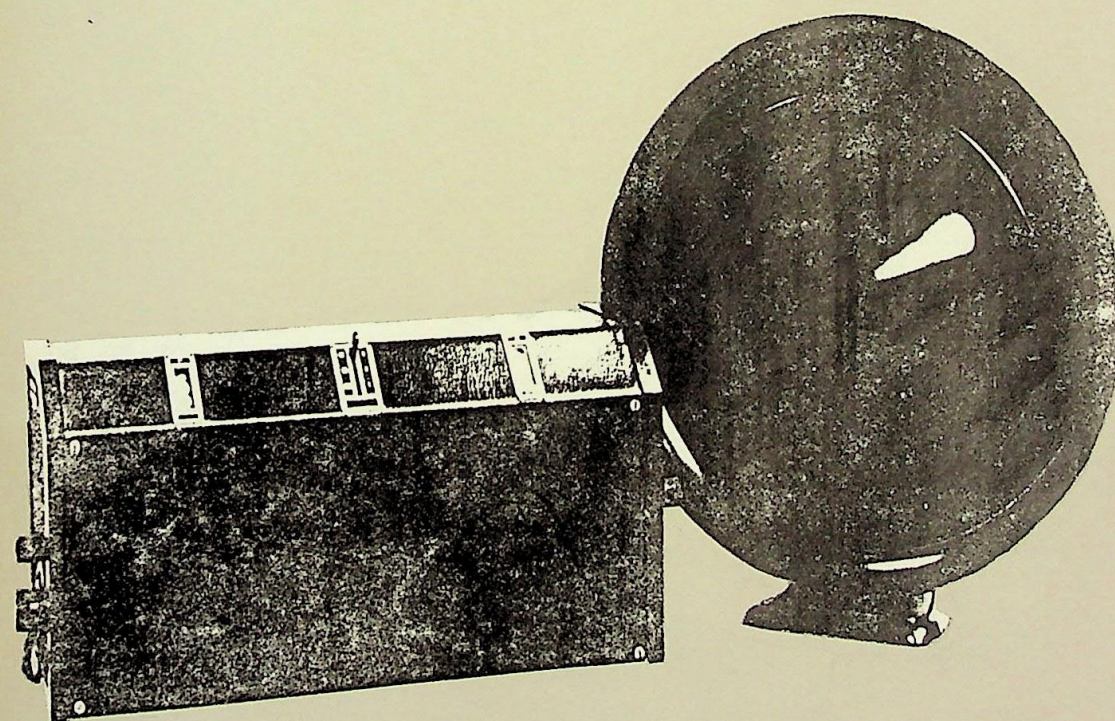


Fig. 9. Philips Type 2514 Radio, 1927

until the 1930's.

By the late 20's technical development of radios had been rapid and successful. This period also seen some research and development into new materials for radio. This search for new materials was associated to the beginning of finding a style appropriate to the new technology, rather than treating it as an extension of the home furniture industry. The "Philips Type 2514" like the contemporary Gecophone was a two-valve battery receiver, with a two-valve amplifier, but unlike the British product, its astonishing appearance showed that Philips had made a conscious effort to find an appropriate style for the radio. (Fig. 9) Due to its good insulation, moisture-resistance and shock-absorbing properties, phenolic resins were ideal for the replacement of expensive timber cabinets for radio and similar equipment. Radio's in particular suffered shocks through packaging and handling and were affected by changes of temperature. Plastic allowed experimentation into styling and due to production techniques allowed radio-cabinets to be designed with highly decorative Baroque-style mouldings and fret-work panels. The use of plastics continued secondary to wood through out the 30's and later. (Fig. 10)

In Germany, Walter Maria Kersting was an important pioneer of industrial design. In his designs and teaching

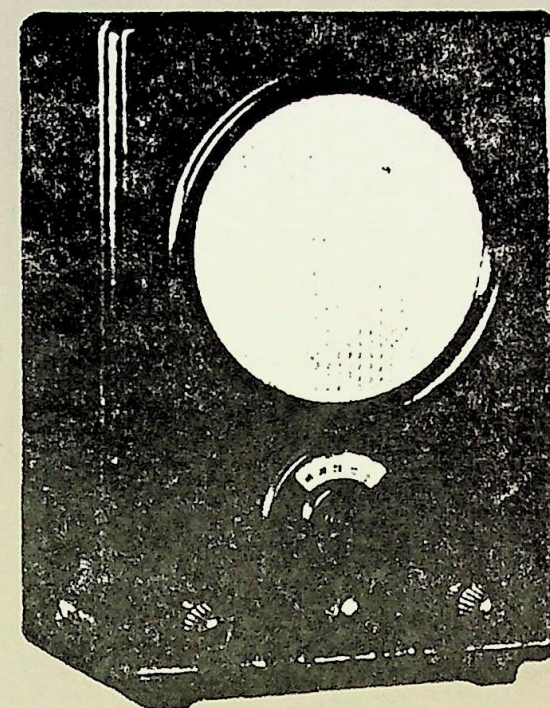


Fig. 10. Walter Maris Kersting, radio-cabinet in
moulded plastic, 1928

he sought to integrate considerations of Aesthetic form with commercial and technical factors. He seen the role of designers as the creation of "simple and inexpensive objects, that should not appear more than what they are. Capable of being mass-produced in series in craft workshops and mass-production factories". Mechanisms should be simple, he argued, in order for them to be immediately comprehensible to a non-mechanically minded person and foolproof against mishandling. This approach was first witnessed in his design for a radio-cabinet of 1928, that in concept, form and material was remarkable innovative. The moulded plastic casing which integrated the component units of the radio, and the clarity and simplicity of the controls were features that were later widely adopted in commercial production.

were less ornate than those on the American market. The basic design policy in the 30's was to integrate the various subdivisions of the radio into a single box. As a result the component units were grouped in a unified casing, with simple controls for volume, tone and tuning.

The camouflaging of the technically visual parts was necessary for the styling requirements of the radio-as-furniture. This was achieved by camouflaging the box in a play of geometric and floral designs resulting in the radio looking like a chest or any piece of furniture for the sitting room. The integration of the radio cabinet

3. The 1930's - The Golden Era

The 1930's was the era when radio cabinet styling first played a major part. This was especially true in the USA where the accepted vogue had to identify with one of the styles being currently revived i.e. neo-gothic, neo-baroque, neo-classic etc which was in total contrast to the streamlining being developed in other areas of design such as in the car industry. This move did not occur in Europe where the streamlining approach seemed more evident. Styling followed what was made possible by the technical development of materials and electronics. European radio styling was dominated also by the attitude that it was a piece of furniture for the home and should be styled appropriately. This led to designs which were less ornate than those on the American market. The basic design policy in the 30's was to integrate the various subdivisions of the radio into a single box. As a result the component units were grouped in a unified casing, with simple controls for volume, tone and tuning.

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did not even make sense from a technical point of view for a number of reasons such as - the speaker and chassis produced vibrations, the furniture unit which had to be open at the front to expel heat from the valves and sound waves from the back-come speaker, became a dust collector. The only technical justification for the integration could have been the introduction of the first alternating current valves fed directly by domestic current, also the valves no longer needed to be supervised during ignition as they no longer required low consumption and had sturdier wiring.

The progression can be seen in a sequence of designs over a period of ten years for the German company, Telefunken. The "Alpha set of 1927" had the appearance of a technical appliance with little attempt at refinement. It was dominated by large valves protruding from a plain box of natural wood and required a separate loudspeaker extension. The "WIKING 125 WL" of 1933 marks the transition to unified models with a case of moulded bakelite styled in stepped art Deco fashion. A built-in loudspeaker placed above the concealed receiver and tuning units gave a pronounced vertical emphasis. The appearance of the "T 644 W" set of 1936-7, with a walnut-veneered casing, was the culmination of radio sets of the radio-as-furniture concept, accentuating external qualities of form and the materials. The positioning of the loudspeaker alongside

other units gave a low profile, enabling horizontal lines to be stressed. (Fig. 11)

By the 1930's "Pye Radio Ltd" had also developed some mains powered models. Other technical improvements was a new high frequency amplifier with two H.F. stages which resulted in a station being found by the operation of a single knob. New manufacturing techniques had heightened competition and reduced prices, allowed high volume production on three very successful series of receivers - they were the "Model Q, 1931", and "Model MM" together with the six valve superhet "Model S" in 1932. The Model MM established a great reputation for reliability and consistency of performance from its three valve mains operated circuit, with built-in frame aerials and improved moving-coil speaker. (Fig. 12)

Gordon Russell who had been a furniture designer, changed direction and with his brother R.D. Russell, designed mass production radio-cabinets for the Murphy Radio Company. The impetus for this change of direction, as with many American designers, came from the depression, which caused a drastic reduction in furniture orders from the United States. The Russells designs used similar principles as those of Walter Kerstings plastic cabinets, simplicity and mass-production capability. The Russells used bent plywood-sheet, a far cry from expensive natural

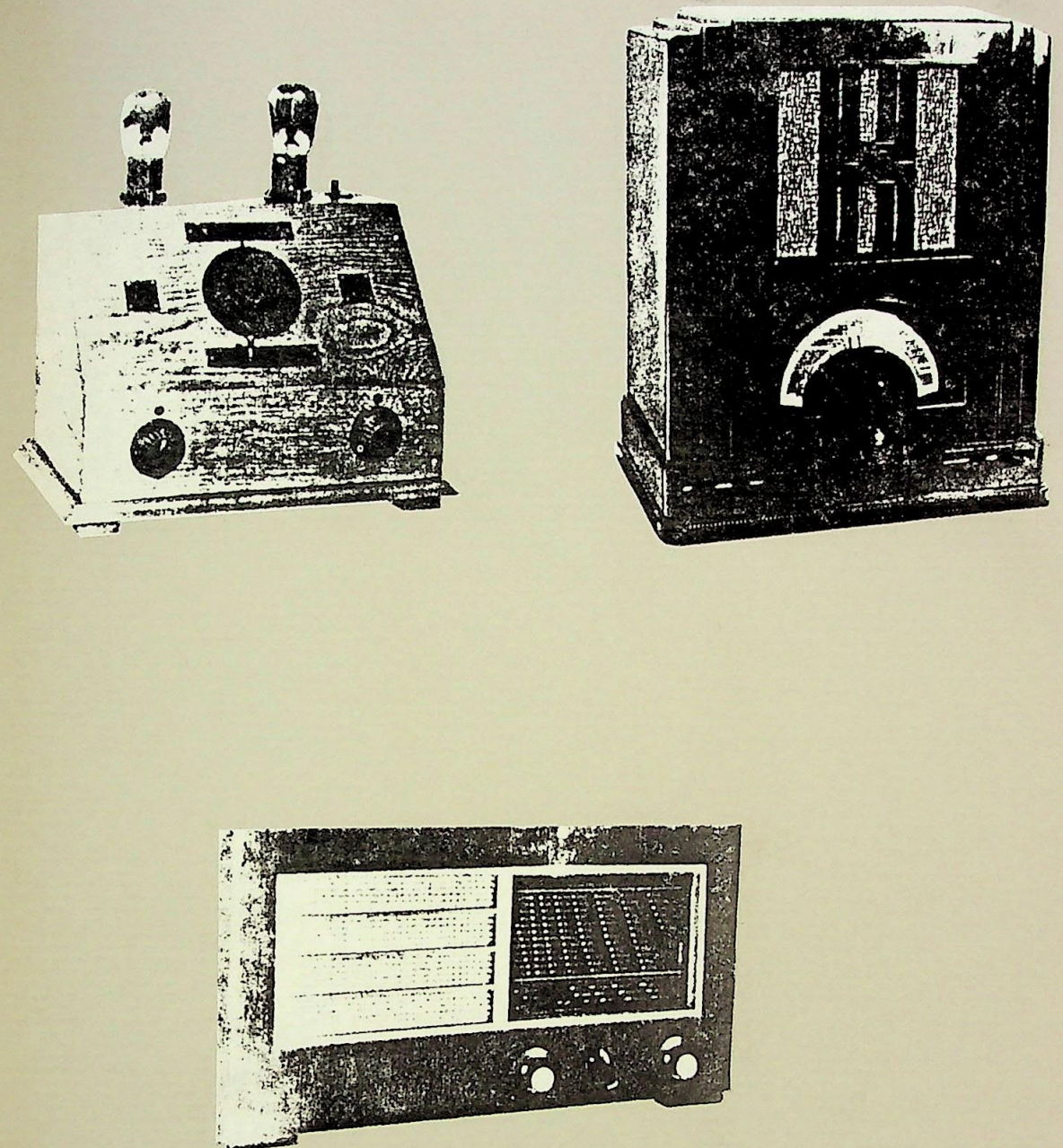


Fig. 11. Three radios by Telefunken showing the progression of radio-cabinet design within a decade: "Alpha", 1927. "Wiking 125 WL", 1933 "T644W", 1936-7.

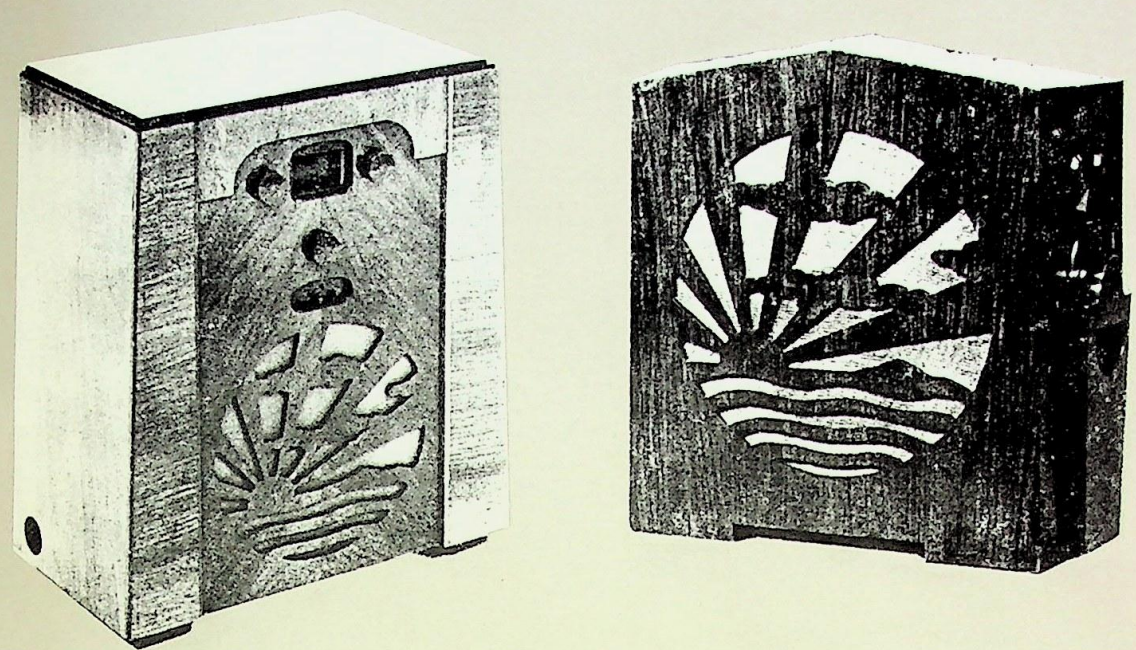


Fig. 12. Pye G, 1932 and Pye MM, 1932

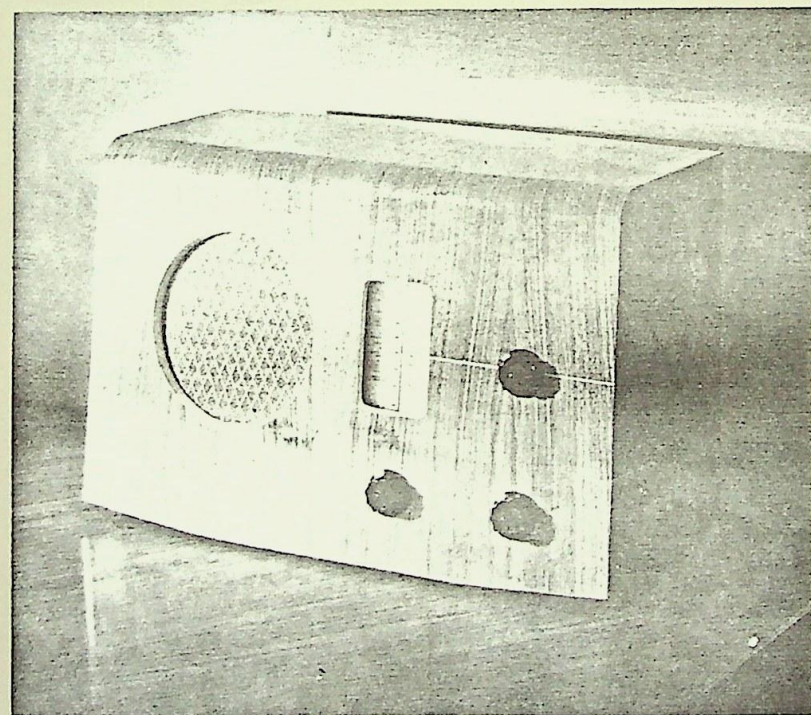


Fig. 13. Radio-cabinet in light walnut designed by
R. D. Russell for Murphy Radio, 1937

timbers, but they showed great skill and ingenuity in devising forms appropriate to mechanical production that displayed the same sensitivity to materials and form as did their more exclusive craft products. (Fig. 13)

Gordon Russell believed that the designers role was more than just a styling function. A contribution to the component arrangement and chassis design as well as the cabinet design would introduce some technical innovation as the designers approach would not be limited by an overbearing knowledge of the standard production techniques. He felt it was important for the designer to work with the production staff on the factory site to avail of their technical criticism and shape a less hostile attitude to the designer and his involvement. Russells approach can be gauged from the following brief which he wrote for the design of a radio cabinet for the Murphy Company:-

1. "The case must be made to very accurate dimensions, in large quantities, and at a price lower than anything we had previously attempted. Mr Murphy insisted that price was a secondary consideration - his aim to produce a good article. It is obvious, however, that the price must in any case be far lower for mass production than for things made singly or a few at a time."

2. Wireless was not then in such an advanced stage of development that the case would be likely to be needed for more than five to ten years. On the other hand the cabinet had to take a concentrated load of about 140 lbs of machinery, so that very severe stresses would be set up if it were jolted or dropped even a few inches.

3. Great care must be taken to prevent any loose parts from causing vibration, and also some heat would be generated by the valves, which might cause shrinkage in the wood. It would, of course, be most awkward if the cabinet work gave any trouble after delivery to the customer.

4. The polish must be hard enough to stand rough handling, as the cabinet had to go on the assembly bench at the radio factory.

5. The complete cabinet must pass a formidable inspection.

6. If the public failed to buy it, further experiments would be doomed! I had always believed that public taste was much higher than many buyers thought. Here was a chance to test the theory.

A blue print of the chassis was sent to Russell - the cabinet had to fit it. The Russell design team asked to be allowed to design the controls and wavelenght

aperture, as they regarded it as integral parts of the design. The cabinet was completely unlike any other on the market which startled Messers Murphy at first but they then realized it was a perfectly logical solution of the problems.

In dealing with the next cabinet, the designers were called in at an earlier stage. One of the designers worked in the radio factory for several days at a time and the chassis was altered in one or two minor ways to give a better cabinet design.

The next advance was to have a cabinet designer working alongside the chassis designer for several weeks on a new model. This led to still cleaner design and encouraged working on a technique of co-operation which was hoped to lead to the best results out of both chassis and cabinet.

The use of plastics in radio cabinet design developed technically during the 1930's. One of the main pioneering companies using Plastic cabinets was "Ekcole Ltd" of South-end on sea, Essex. Their first plastic cabinet radio was designed by J.K. White and was called the "Ekco SH25" of 1931. It was a five valve AC/DC mains superhet receiver, developed from the four valve model RS 3, both featuring a new tuning scale which was the first to have station

names marked on it. The cabinet moulded in brown phenolic resin, assembled from simple textured panels, with the main emphasis on a hand-fretted circular design of trees against a winter sky with watery reflections below. (Fig. 14) Nearly 40 cm wide it was the largest plastic cabinet of the time. The tapering form of the whole cabinet eased ejection from the mould. E.K. Cole continued plastics cabinet design in England by commissioning work by industrial designers, starting in 1933 with Serge Chermayeff whose "Bakelite" designs still betrayed the influence of timber. In 1934 they employed Welles Coates, who designed the first circular cabinet. (Fig. 15) In 1935 Chermayeff and Coates worked together and in 1936 Jesse Collins of "Industrial Designs Partnership", brought a new simplicity to cabinet design. In 1937 Misha Black, also from "Industrial Design Partnerships" used the latest "Spinning Wheel" tuning to produce a cabinet with clean, sweeping lines. Their designs stood out amongst many of the Gothic cabinets in imitation wood and other forms and shapes still rooted in the past.

E.K. Cole Ltd sold over 100,000 sets of Coates "AD65" radio in 1935, during what they described as the "Radio Season". Standing 35.5 cm high it was one of the largest mass-produced mouldings on the British market. This was bettered in America by the new "All-wave Pilot Radio" designed by Jan Streng in 1936, which was over

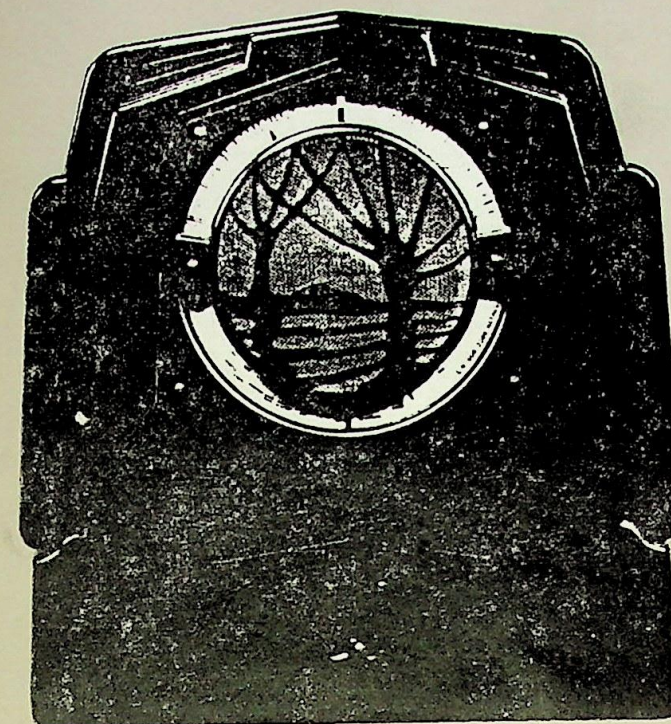


Fig. 14. Ekco Model "SH25", 1931

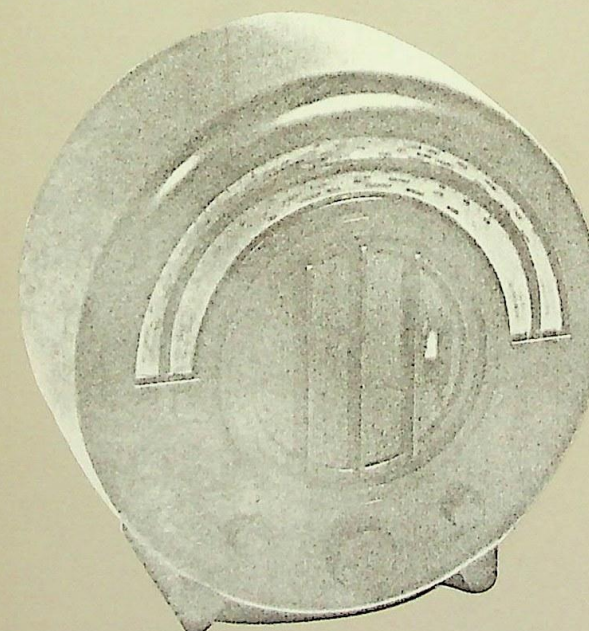



Fig. 15. Ekco radio cabinet in bakelite, designed by Welles Coates in 1932



46 cm high. (Fig. 16) This somewhat gothic-style radio cabinet was manufactured in phenolic by the Makalot Coropation, for the pioneering radio cabinets had proved that the initial expense of tooling-up for production was an investment.

Experiments were also continually being carried on with development of electronic technology. It was recognised that the people maintained a large interest in radio despite the incursion caused by the development of the television, in 1939 there were nine million licence holders for radio in Britain alone. Experiments with new technology to improve radio for broadcasting led to the development of VHF/FM transmission. Frequency Modulation (FM) was first demonstrated in 1935 by Edwin Armstrong, an American scientist, This system lent itself particularly to transmission of signals over short distances. Utilisation of VHF and FM transmission was not fully accomplished until after the second World War, but was to play a major part in radio broadcasting from the 1950's to the present day.

The plastics industry also benefited from rounded forms as shown in these radio cabinets. (Fig. 17) A mould with sharp corners had to be hand polished, but a mould with rounded corners could be polished by machine. Moulding compounds flowed more evenly in a curved mould.

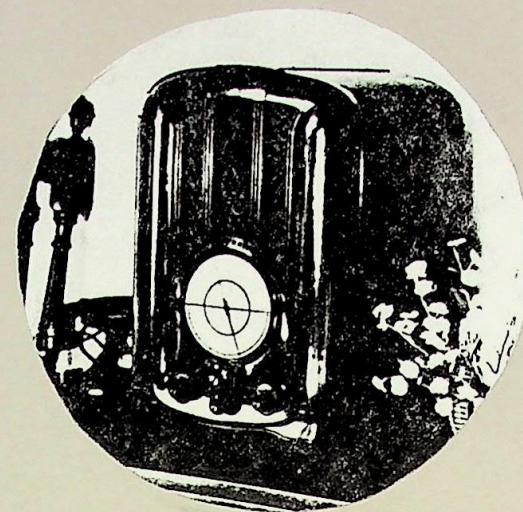


Fig. 16. The New Pilot All-Wave Radio designed by Jan Streng, 1936, for the Pilot Radio Corp.

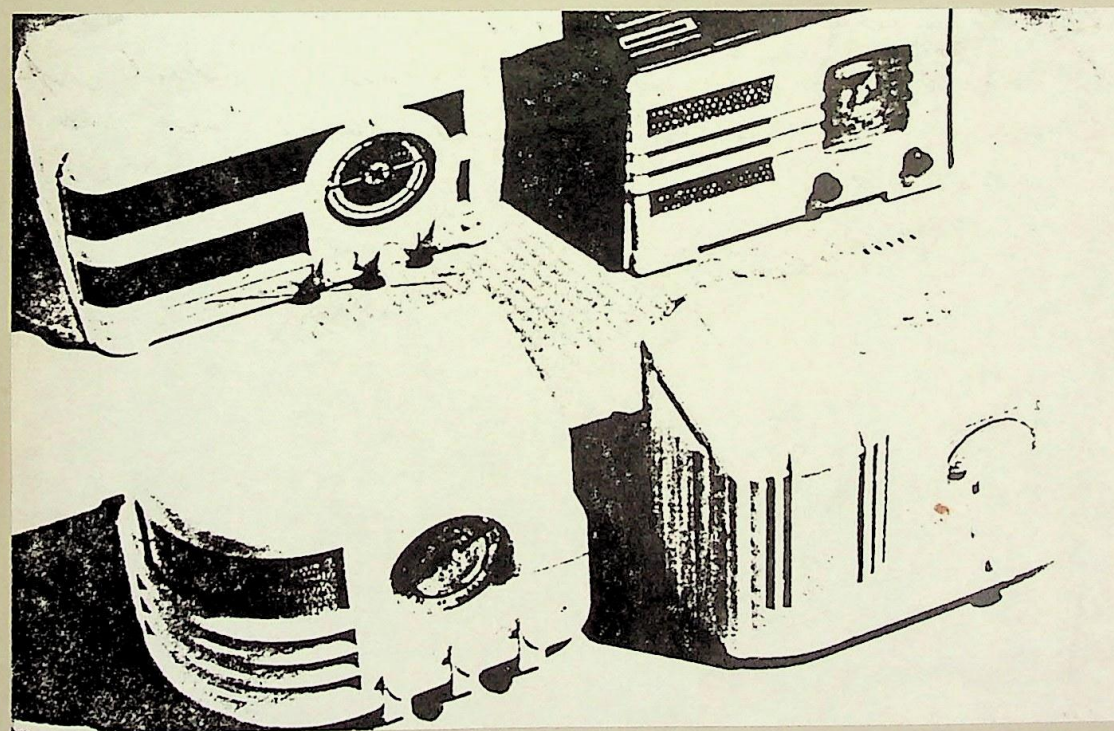


Fig. 17. Plastic Radio Cases, 1937

Finally the finished product would be stronger and would have no corners to be chipped in transit.

In the 40's the furniture radio design continued to dominate the U.S. market. This phenomenon being more American than European was probably due to European industries such as Philips, Telefunken and Siemens having a solid and various tradition of electrical home appliances (telephones to irons) and were therefore less influenced by the style of American radio furniture. The radio furniture unit had already been viewed negatively in Italy. As a result of an article by Gio Ponti in a 1933 edition of "Domus" urging manufacturers to adopt a simpler design of radio that would be better suited to the modern home, a competition for a rational radio chest brought forth several designs of the first radio receivers whose shape was the strictest requirements of functionality. It was not until 1949 at Milan in the Triennale that the problem of the design of radio found a serious and complete solution.

The design of radio divided into two parts at this stage. On the one hand, the radio acquired a formal identity of its own and no longer existed as an appliance within a piece of furniture, style and decoration were abandoned in favour of the form emerging from physical characteristics of the set itself. The "pneuma 347" is extremely significant from this point of view as one of

4. The 1940's - A New Look For Radio

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the first examples of an "Organic Container" that was functional and totally opposed to traditional radio designs in both concept and result. (it is a highly complex process of plastic moulding ureic resin) (Fig. 18)

On the other hand, there was an emphasis on "non-form" by the separation of the basic components which was contrary to the period of integration which had led to the "organic (functional) forms". Thus tuners, amplifiers, acoustic sets (loudspeakers and baffles made up of wood panels or wooden boxes) became available as structurally separate units. The technological aspects were emphasized with total disregard to visual results, hence speakers that looked like large ears, sets that were elastic or suspended to eliminate vibrations and other such practical "improvisations". In a way, it was a return to the origins, to pure images but was a move that has affected the whole audio-visual design world right up to present day.

The second World War affected the development of radio design, many radio companies concentrated on manufacturing "Walkie-talkies" and other such equipment to help the war effort. Socially radio played a major part at this time, as there were no newspapers printed, radio became the major communication with what was happening around the world. It was used to broadcast

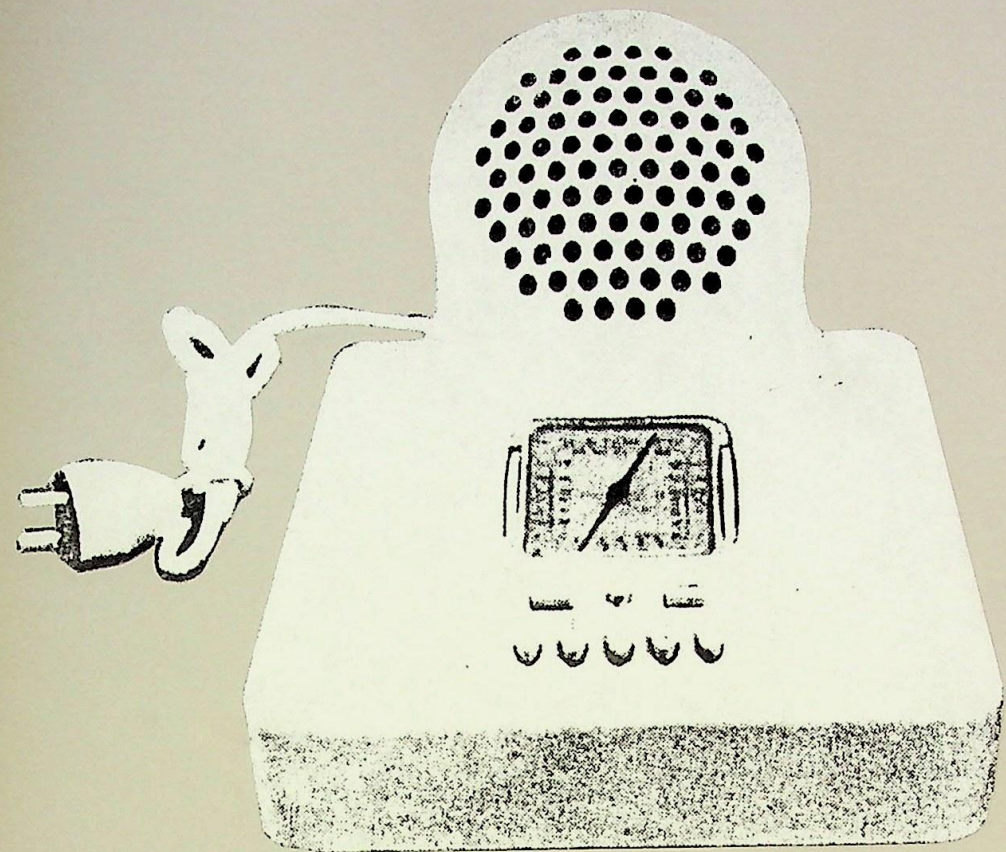


Fig. 18. Phonola 547, 1939

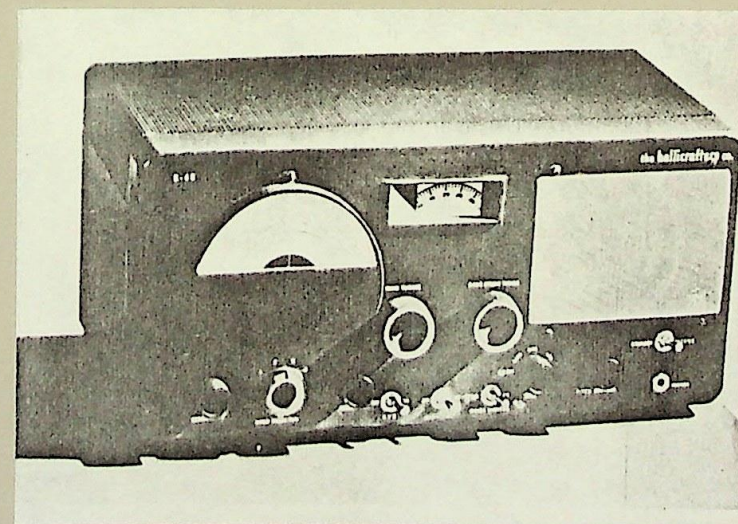


Fig. 19. Hallicrafter, 1947

to the public, important news or messages, and also became a major method of conveying propaganda ("Lord Haw-Haw").

The design of "Walkie-talkies" was naturally straightforward and functional. The absence of "styling" was an honest and appropriate design approach and this effectively expressed its new technological qualities. This approach was utilized in the design of the radio after the war and in itself became the "styling" method which has been developed and used right up to the present day. (Fig. 19)

Due to technical improvements made in electronic components during the war, radio design took on a role towards miniturization. This development along with the visually technical approach were combined and developed from the late forties and right through the fifties.

Raymond Loewy's radio designs for Hallicrafter, after the war, were technologically remarkable and are some of the best examples of the effect of the war on radio design and the attitude which had developed to design in general. (Fig. 20) Instead of enclosing them ornamented walnut cabinets, with gold-fabric speaker grilles, their qualities were expressed in a direct manner. The designers used black and white, dials were precise, and they looked mechanically convincing. These

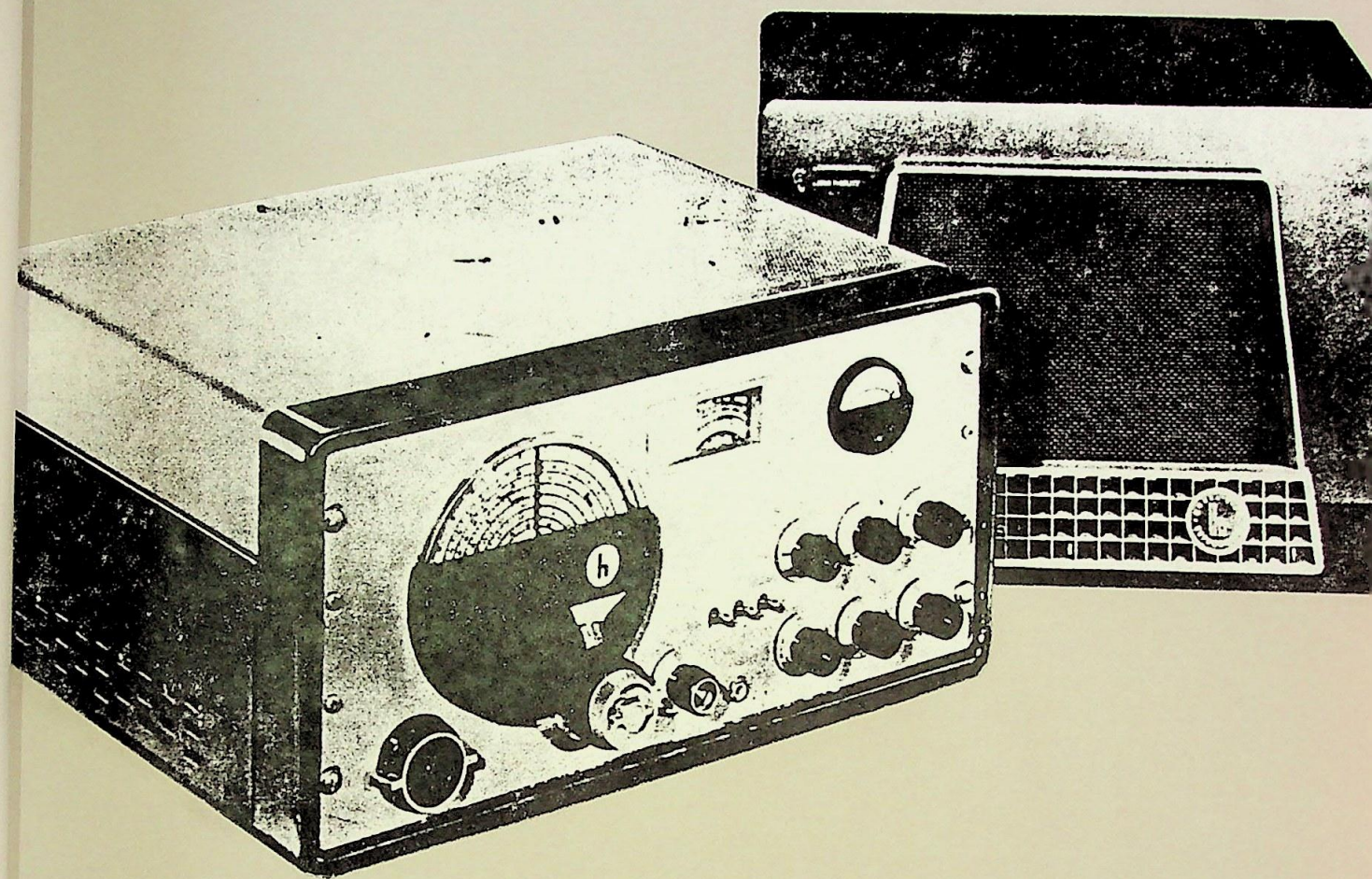


Fig. 20. Hallicrafter Radios designed by Raymond Loewy

sets were commercially successful, an indication that a considerable number of consumers appreciated conservative design.

Welles Coates continued his work as a designer after the war and continued to work on radio cabinet designs for E.K. Cole and Company Ltd. In 1945, he designed the "EKCO Model A22" radio. (Fig. 21) It was similar to his circular radio of 1934 in shape, size and position of control knobs. It was made of black moulded plastic with chrome details. The speaker was situated in the centre of the cabinet, as it was in the 1934 model. The tuning scale was positioned around the speaker with chrome edges and differing from the 1934 model it made a complete circle rather than a semi-circle. It was ~~selected~~ for the "Britain can make it" exhibition in 1946.

Both A.F. Thwaites and R.D. Russell continued designs for "Murphy Radio Ltd" after the war. In 1945, A.F. Thwaites designed a table radio using the principle of the "baffle-board", which was once extensively used by amateur radio enthusiasts. (Fig. 22) Thwaites used it as his central theme in this design and because of this created an original and distinctive shape. The speaker, control knobs and tuning scale were mounted in a geometric pattern in the centre of the "Baffle Board".

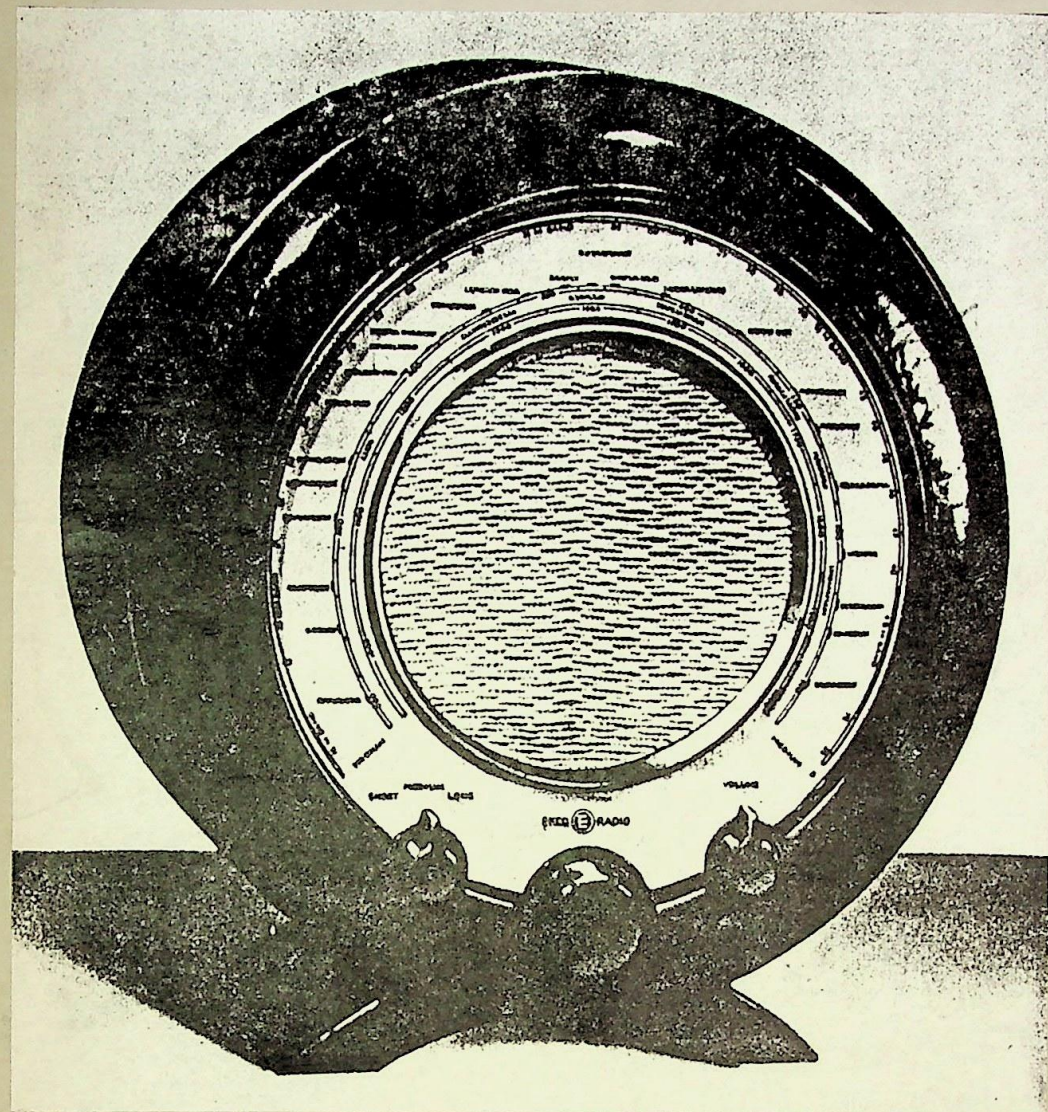


Fig. 21. Ekco Model A22 Radio, 1945

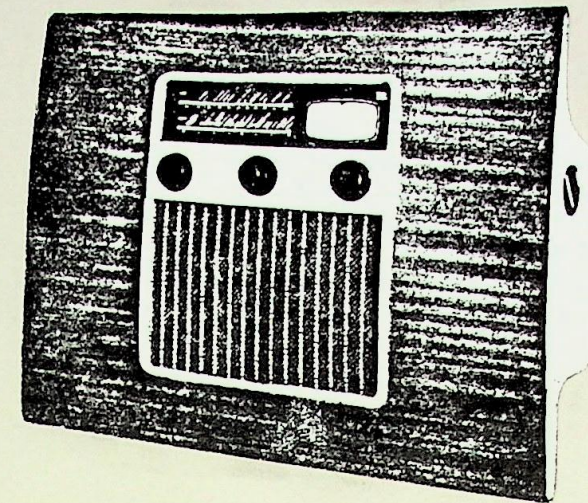


Fig. 22. Murphy Radio designed by A. F. Thwaites, 1945

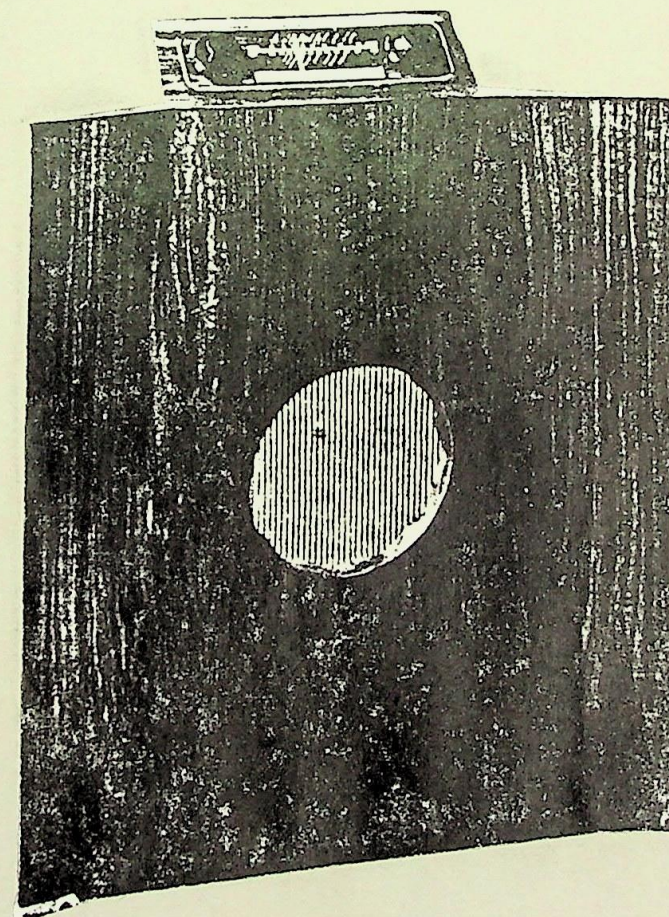
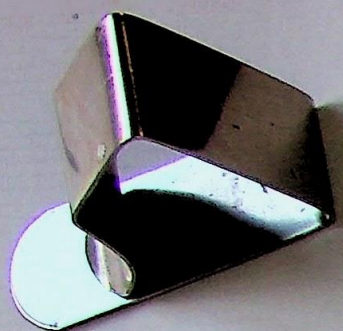


Fig. 23. Murphy Radio designed by R. D. Russell, 1948



5. In 1948, R.D. Russell designed a console model due to demand, using the same sound principle as Thwaites in his table model. (Fig. 23) Here the baffle was more effective because it was larger, and formed a tapering concave frame to the sound hole. The control knobs and tuning scale were approximately waist-height and positioned on a sloped surface for ease of use from a standing position. This radio was also designed for "Murphy Radio Ltd", and neither Thwaites nor Russells radio were decorated by any floral patterns or carvings. Both radios were made mainly from wood and the decoration of the large flat surfaces came only from the highly polished grain of the wood.

greatly reduced volume, and the perfecting of plastic moulding techniques and consequently to relatively inexpensive shells having a certain functional/formal complexity.

As a high standard of design had been reached in plastic radio cabinets, the main limitation was the shortage of Ureaformaldehyde and other materials suitable for moulding in the lighter colours. The use of various colours, and different materials led to a much more imaginative and freer approach to the design of radio cabinets.

A process called stove-enamelling was sometimes used,

5. The 1950's - Miniaturization and The Transistor

The concepts expressed and developed by Gio Ponti and the 7th triennale in Milan were too disregardful of current tastes and production techniques to gain immediate acceptance. It was more than ten years later due to the war and the complex task of reconstruction, before the market and production structure could take in these proposals.

The two main technological factors which marked a turning point at this stage of radio design were the miniturization of electrical components which led to greatly reduced volumes, and the perfecting of plastic moulding techniques and consequently to relatively inexpensive shells having a certain functional/formal complexity.

As a high standard of design had been reached in plastic radio cabinets, the main limitation was the shortage of Ureaformaldehyde and other materials suitable for moulding in the lighter colours. The use of various colours, and different materials led to a much more imaginative and freer approach to the design of radio cabinets.

A process called stove-enameling was sometimes used,

this meant the colour of the moulding material did not dictate the colour of the cabinet made from it. A styling advantage of this process was that the radio cabinet could have a two-colour effect on the cabinet despite the use of one particular moulding powder.

In the Pye 49Y the body was made up of four separate moulded panels which screwed together from the inside to form the top, front, and sides. (Fig. 24) The speaker grille was made of expanded metal backed by fibreboard and was secured in recesses moulded in the side panels of the cabinet. The back and base were enclosed by fibreboard panels sliding in guideways which were also moulded in the side-panels. This provided easy access to the mechanism inside for easy servicing. The construction also allowed for a two-colour scheme to be used; e.g. the ends could be stove-enamelled in cream and the front and top in maroon. (Fig. 25) In the Murphy 144 mains portable model, the cabinet is moulded in phenol-formaldehyde in two identical halves. These were stove-enamelled in cream with beige shoulders to the handle portion, a beige-coloured PVC grommet being used to conceal the joint between the two halves. This construction also fulfilled a unique criteria for the portable set - that is, it should look good when viewed from any position. Conforming to the "same both sides" design, a tuning scale was provided on each side, and the control knobs

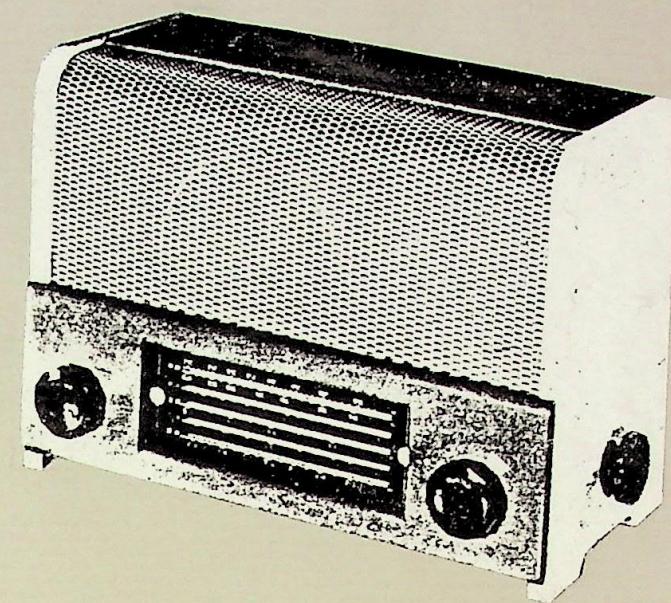


Fig. 24. Pye 49Y showing the separate Phenol-formaldehyde mouldings on a smaller scale.

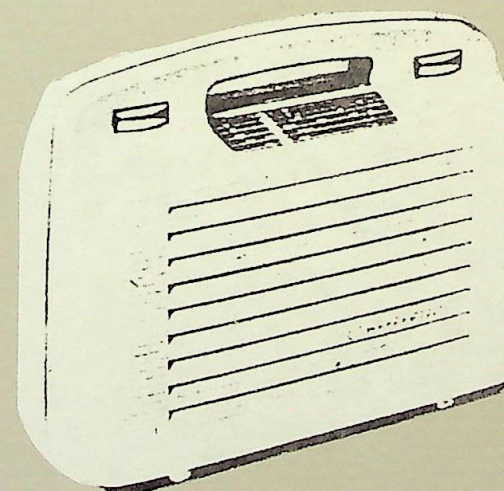


Fig. 25. Murphy 144 with bakelite cabinet moulded in two identical halves.

were recessed into the handle in such a way that they could be used with the radio in any position. The scales were printed in blue and cream on clear perspex with a dark background and the control knobs were blue. A simple pattern of straight lines, of which the loudspeaker grille forms an integral part, was used to break up the otherwise plain surfaces.

The Bush battery portable, designed by F.E. Middleditch was somewhat reminiscent of the general shape of a lady's handbag of the time. (Fig. 26) The tuning scale cover, control knobs, carrying handle and speaker grille were made from injection moulded methyl-methacrylate (Diakon) which was an interesting development at the time. The main body was moulded in two parts, in plum coloured phenol-formaldehyde. The cover which protects the tuning scale and the control knobs when not in use was coupled to the ON-OFF switch so that the action of opening it switched on the set.

The Murphy 152 designed (like the 144) by A.F. Thwaites had a two-piece phenol-formaldehyde cabinet. (Fig. 27) The main body moulding is in the natural brown of the material, and the front panel moulding is stove-enamelled in cream. The perspex tuning scale is extended down to the control knobs to protect the enamelled front from scratches.

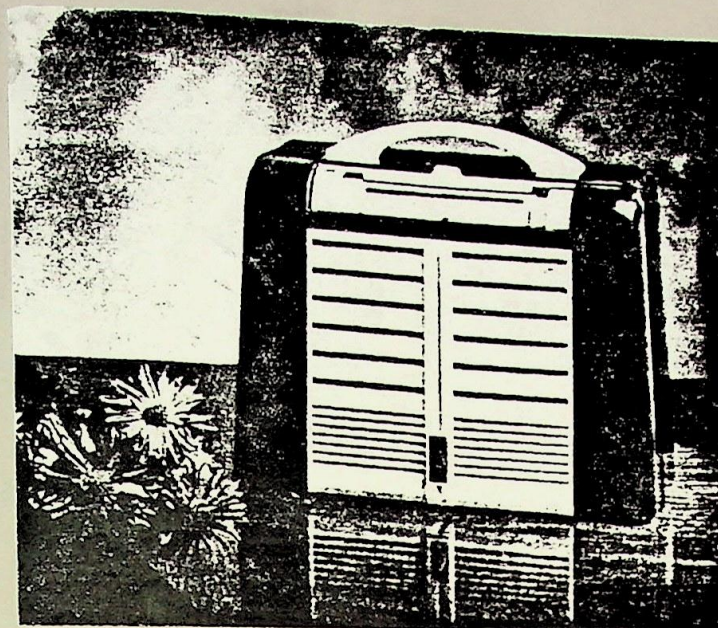


Fig. 26 Bush Portable Radio designed by F. E. Middleditch

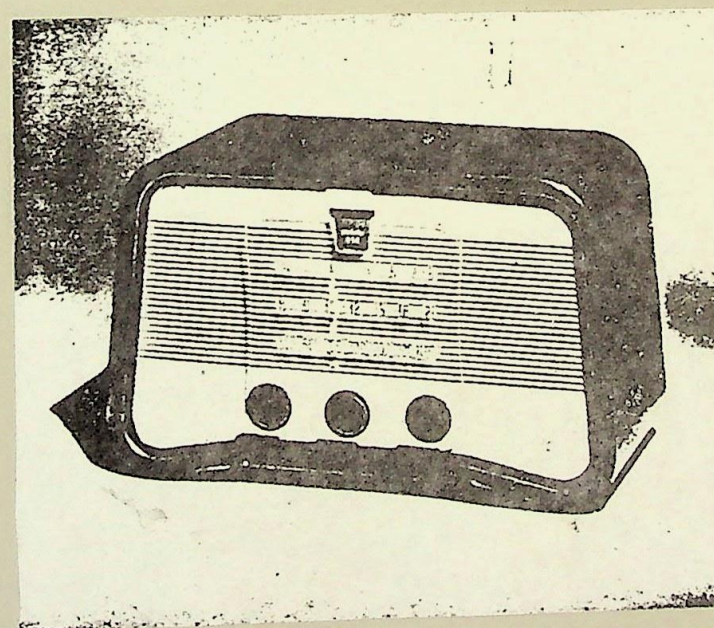


Fig. 27. Murphy 152 designed by A. F. Thwaites

The main contributor to the movement towards miniaturisation was the development of the transistor. The transistor was invented between 1948-51 by three nobel prize winning scientists at Bell telephone laboratories in America - Bardeen, Brattain and Shockley - and replaced the thermionic vacuum tube as a means of controlling electric currents. A transistor is a small electronic amplifying device which is made from a tiny piece of Silicon germanium or other semiconductor material. The transistor radio had the advantage of very small size, they operated at low voltage suited to battery use in portable equipment, they were highly efficient, were free from vibratory disturbance and lasted well. The first transistor models were introduced to Britain in 1956 by Pye through a subsidiary company "Pam (Radio and Television) Ltd". The Pam Model 710 not only contained transistors, but also a new development to replace wires, called the Printed Circuit. (Fig. 28) However the first company to produce the transistor radio were "Sony" of Japan. In 1955 they introduced the first mass-produced transistor radio the TR-55 and it became Sonys first export when Canada's general distributors bought 500 examples. (Fig. 29) In 1957 other manufacturers had begun to produce small transistor radios and Sony set out to emphasize its market lead by increasing the already apparent impulse towards miniaturisation. They produced the TR-63, which was the first pocket-sized radio epitomising the trend



Fig. 28. Pam Model 710 Transistor Radio, 1956

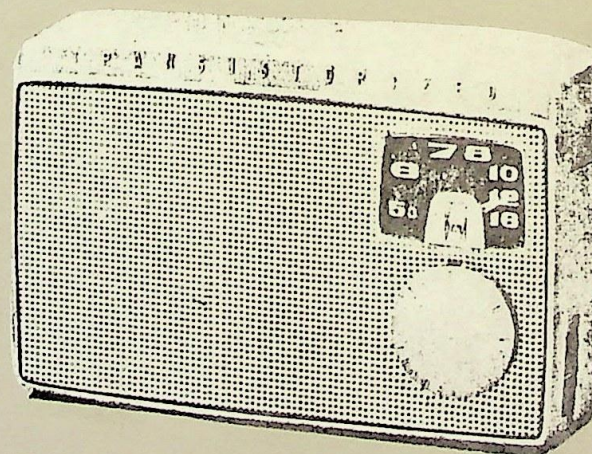


Fig. 29. Sony TR-55, 1955

towards reduction in scale and when 50,000 were sold in one order Sony had become an international force in consumer electronics. (Fig. 30) The level of technical innovation was hardly reflected in its external design, however, which consisted of a coloured plastic casing, to which an anodized metal-gauze loudspeaker was riveted, with a relatively large tuning control protruding. Later models, TR-610 1958, were revised to give a crisply delineated rectangular form with recessed controls. (Fig. 31) These improvements to the basic type brought sales up to $1\frac{1}{2}$ million and Sonys expanding reputation as a supplier of unique and attractive products received a happily accidental boost when a robbery at a New York warehouse removed 4000 TR-63 models, leaving other manufacturers products untouched.

The introduction of VHF tuning and the beginning of FM/VHF transmissions by the BBC in 1955 was instrumental as much as the development of the transistor in maintaining mass audiences despite the incursion of television. FM/VHF transmission gave impressive improvement in freedom from interference and quality of sound. The development of the portable pocket sized transistor also provided entertainment while the listener was moving about, as well as allowing installation into their cars, which was another area where television could not intrude.

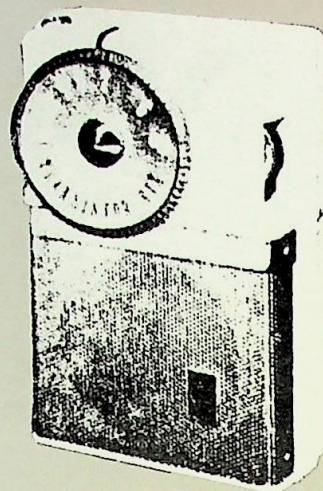


Fig. 30. Sony TR-63, 1957

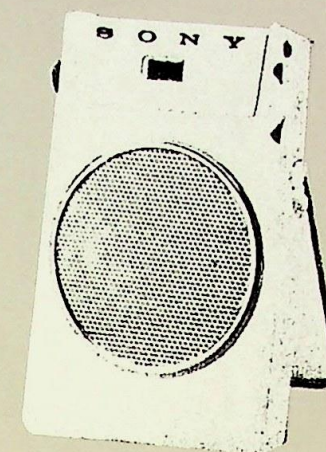


Fig. 31. Sony TR-610, 1958

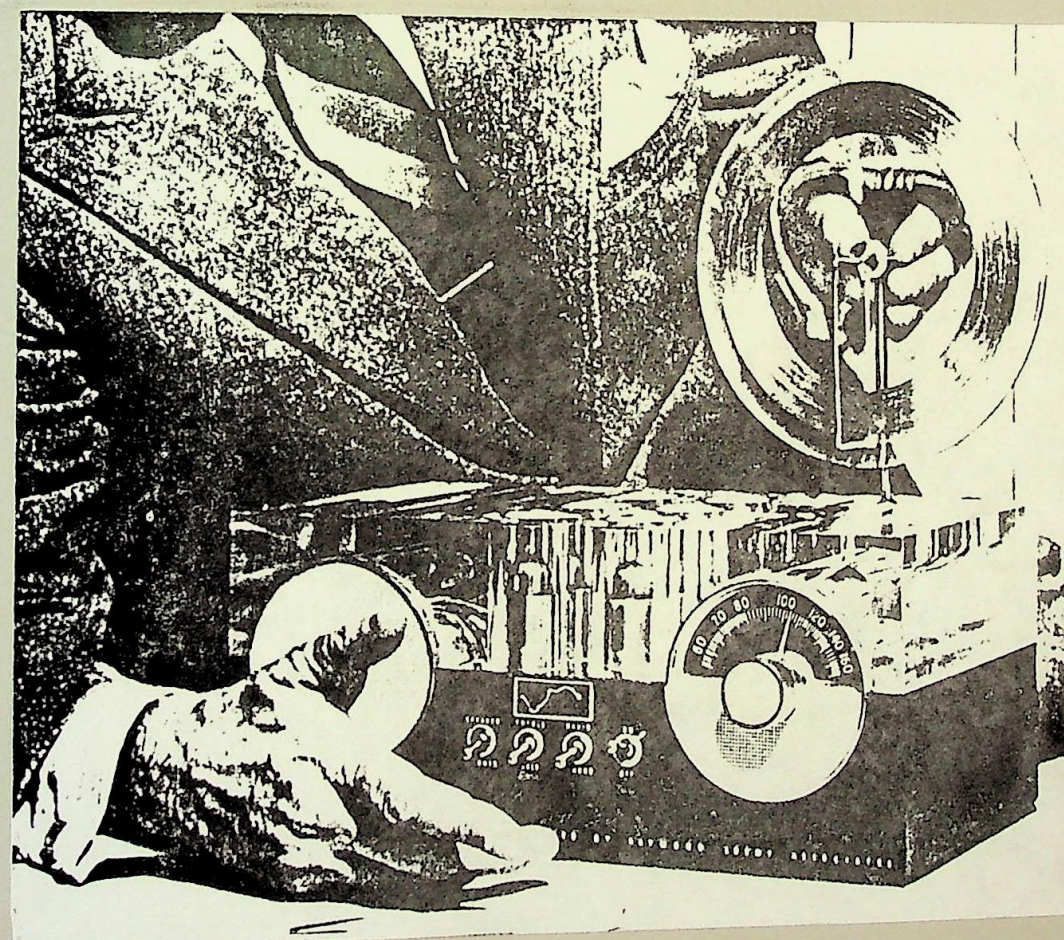


Fig. 32. Plastic Radio by Raymond Loewy

Despite all the technical advances in electronics and plastics during the 1950's, it was still some time before the concept of the radio furniture set was forgotten. Some designers were so tired of the sculptured walnut cabinets and all they entailed, that personal crusades to design radio's on a totally opposite principle, occurred in the 50's. One such crusader was Raymond Loewy who designed and built a radio to please himself. (Fig. 32) Its components were displayed within a box of clear plastic on a black base. The control knobs, switches, and dials were designed honestly, the speaker grille was satin-finish perforated aluminum, and the whole set had an appropriate electronic look. The pivoting directional antenna was mounted on a vertical jack and was removeable for packaging and transport. However, many manufacturers, including those on a high level of technical achievement such as Grundig and Telefunken, still advertised, corrected and revised versions of the wooden radio/furniture sets without the formal decorations, but with a more modern line in keeping with the taste of the fifties and sixties. (Fig. 33)

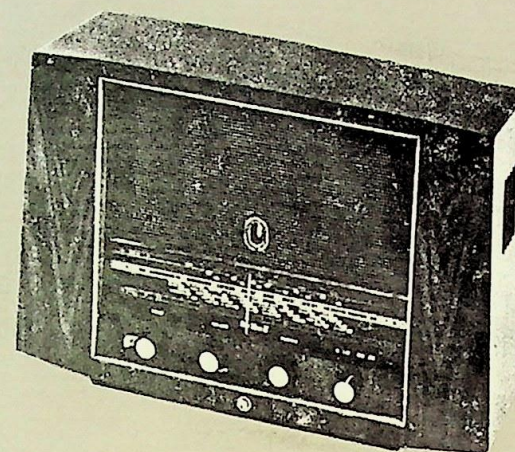


Fig. 33. Pye FenMan II, 1955

6. The 1960's - From Transistor to Integrated Circuit

The more imaginative approach to radio design introduced and developed in the 50's continued in the 60's, especially with the booming Italian design which softened the rigour of certain Germanic forms (scienticity and rigour were always accentuated more by the use of white) by using colours other than cream and brown, continually using new materials and a taste of asymetry was developed.

The Brionvega production somehow exemplifies this important phase in radio design which to an extent is still continuing today. (Fig. 34, A & B)

The 1960's was the period of development from the transistor radio to the integrated circuit radio as a development in the trend towards miniaturisation. In the early 60' the transistor radio was a remarkably unified product. The only market differentiation was that required to separate the trannie - trade from the rest of the radio business, which was settled, middle class and adult. T.V. took over radio's position for demand in home entertainment, which was also an incentive to radio manufacturers towards compactness and portability for personal use. So, while T.V. and Hi-fi slipped into domestic furnishing styles and were made of furniture materials like wood, transistors were promoted by identifi-

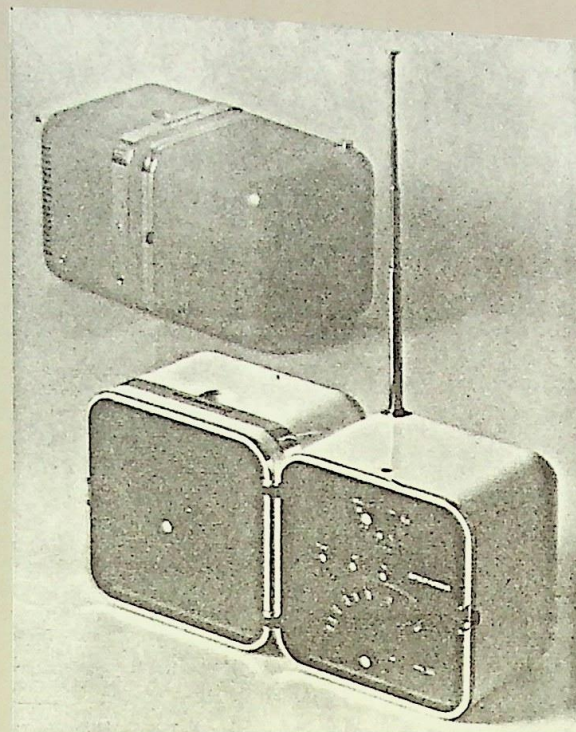


Fig. 34A. Brionvega Radio, 1965

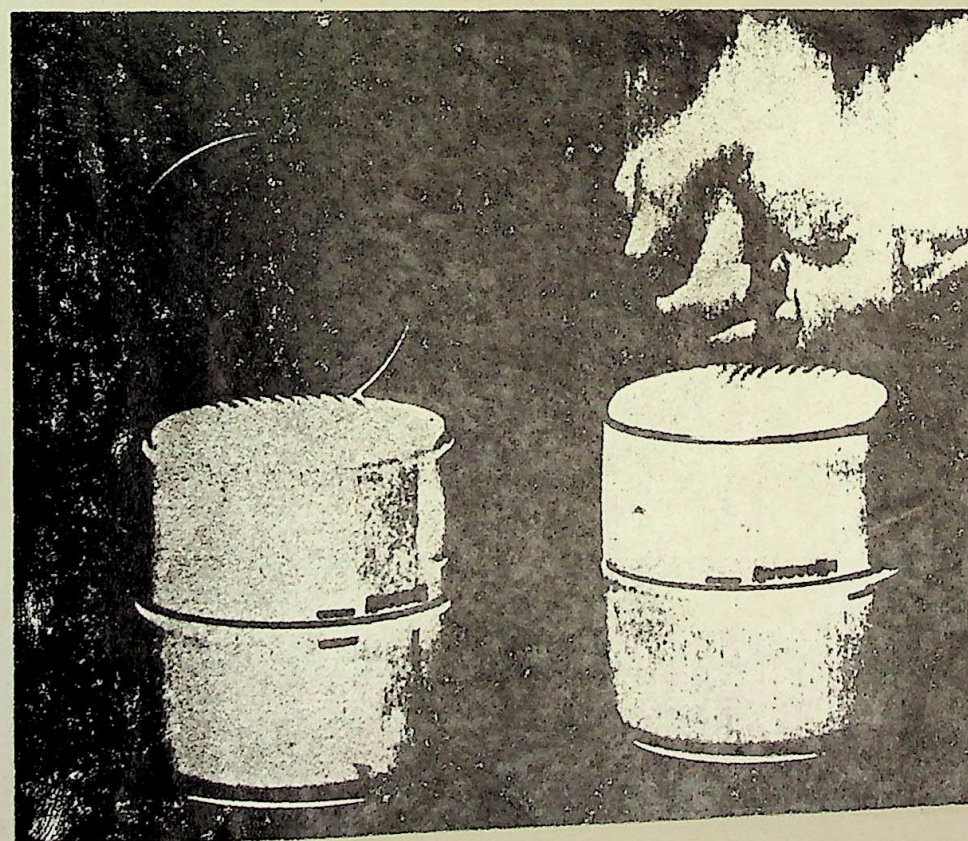


Fig. 34B. Autovox "Magic Drum", 1968

cation with portable personal gear and was packaged in such materials as leather. This identification with the youth culture, which was developing and introducing its own principles, was further accentuated by buckles, extension aerials and large knurled chromium knobs, making a statement as strong as the music being played on them at this time. The portable radio had become fashion and was used as fashion was, displaying one's social preferences every bit as much as jeans. This phenomenon continued throughout the 60's and well into the 70's and as a result the styling of the trannie became somewhat static. (Fig. 35)

The "Toshiba 6TR-127" was designed with a thick and stiff leather cabinet. (Fig. 36) It had the effect of making it thin, light and good in appearance. The use of leather was to identify the radio with the leather bag in this design.

From the efficiency of mass production (transistorization had the advantage in mass production) plastic cabinets were the most suitable. As a result of this Toshiba developed the "7P-77S" to replace the "6TR-127" on the market. (Fig. 37) The design concept for the "7P-77S" was to have a symbolic and simple symmetrical styling, moulded in plastic which reduced the price compared to the leather cabinet.

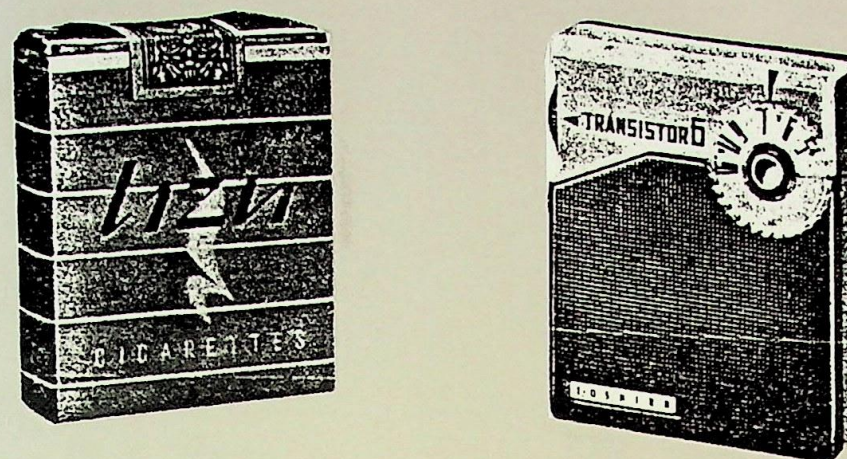


Fig. 35. Toshiba "6TP-357"

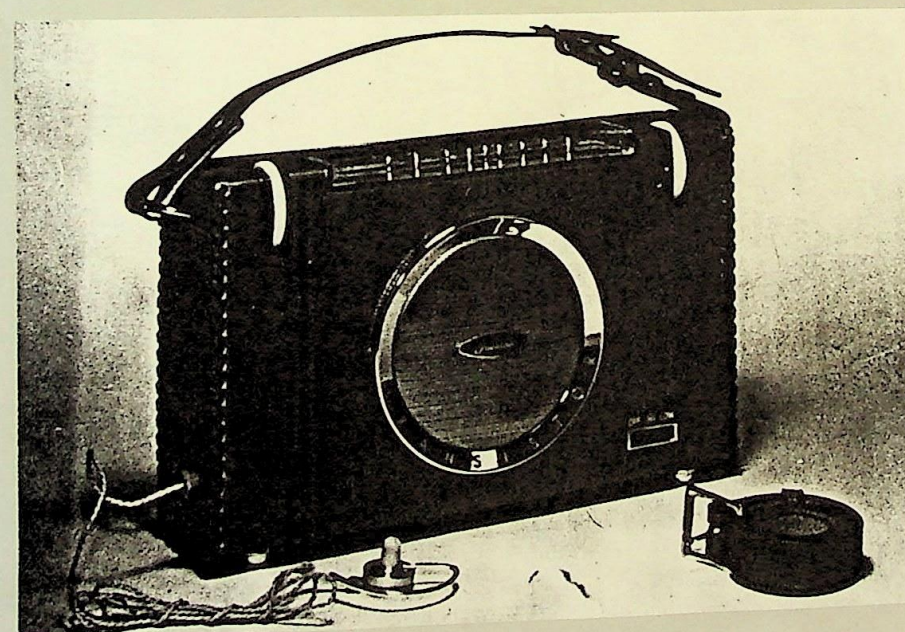


Fig. 36. Toshiba "6TR-127"

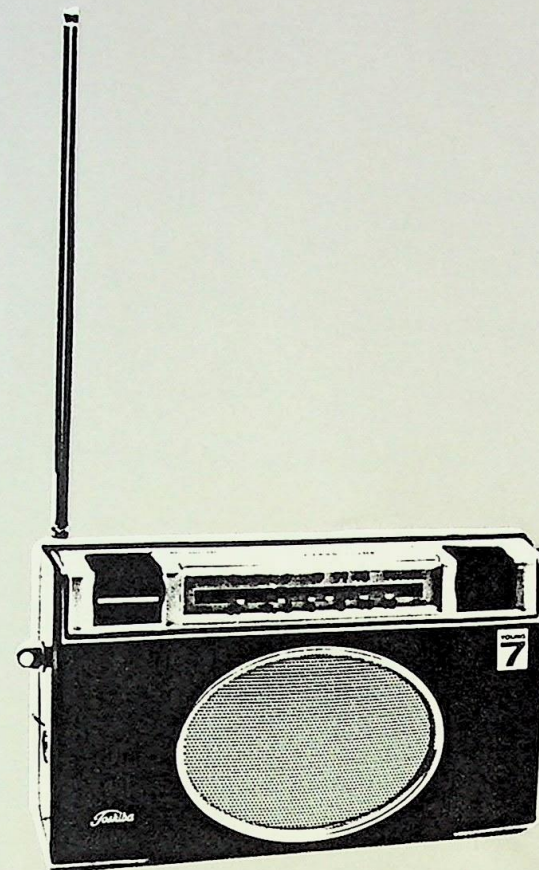


Fig. 37. Toshiba "7P-77S"

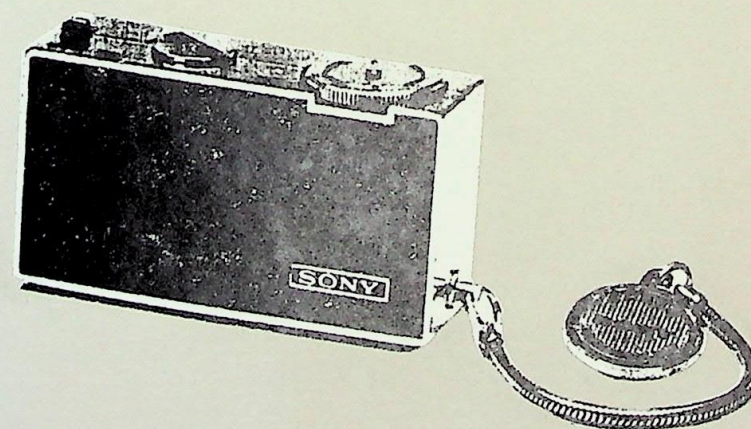


Fig. 38. Sony "ICR-100", 1966

Miniturization was contrary to good sound quality due to the physical parameters of the speaker box, which was a factor which had to be overcome by speaker and cabinet design. It was perhaps due to the obsession of the new liberated youth of the 60's with having music around all the time, that the trend towards miniaturization of the radio continued despite the lack of good sound quality. In the mid-60's the transistor was replaced by the integrated circuit which was such a big development that it still effects technology today. In 1966 Sony, who had been the most successful company in sales of the transistor radio, introduced the "ICR-100", which weighed 90gms and measured 31mm X 58mm X 18mm, smaller than a packet of cigarettes. (Fig. 38) The styling of the "ICR-100" symbolised the new electronic technology, the simplicity of the electronic components being reflected in the simplicity of the styling. A Sony type badge was attached to the radio cabinet by means of a metal wound strap identifying the product with a "keyring". The cabinet was made of cast metal surround with plastic back panel and front panel containing the speaker grille. The holes forming the speaker grille were arranged in a regular linear pattern lending itself to the overall geometric pattern of the design. By 1966 Japanese firms had become the main developers of "sound equipment" and competition between Japanese firms was paramount. However despite this rivalry, Toshiba, who were probably one of Sony's main rivals, had some reservations

about introducing integrated circuit radios on the market so soon. It wasn't until 1969 that they produced their first integrated circuit radio. This was the "IC-70" which Toshiba developed as a practical use model with high sensibility, high sound quality, long battery life at a low price. (Fig. 39) It was made by press formed aluminum panels with a plastic moulding, to construct its cabinet. The arrangement of the functional devices were as follows:- the speaker grille and dial plate were placed on the front side, with all the switch knobs on the right side panel. This arrangement became the basis of radio and radio cassette recorder designs thereafter in Toshiba. The colour of the plastic parts were black with white graphics. A black leather strap was attached to the right top end of the cabinet, a feature that had become commonplace on portable radios.

Further miniaturization was bound by physical parameters i.e. the user had to be able to read the tuning scale, control volume and tone by moving knobs or slides, and these considerations of design are as important as the technical sophistication of the product. This consideration was emphasized by the "AKCENT" portable transistorised radio, which had, exceptionally large and clear graphics for the wavelength markings. (Fig. 40) It was designed by "Mira" for "Tesla" in 1964.

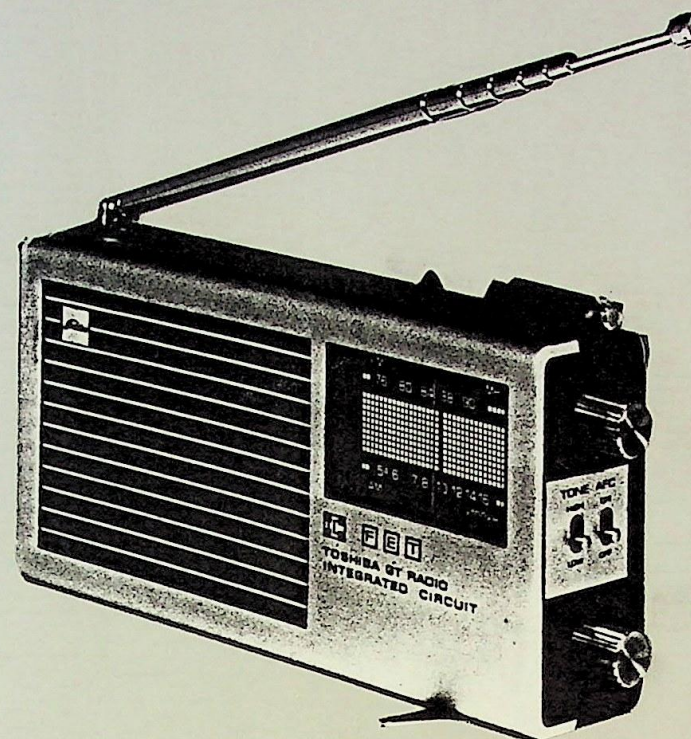


Fig. 39. Toshiba "IC-70", 1969

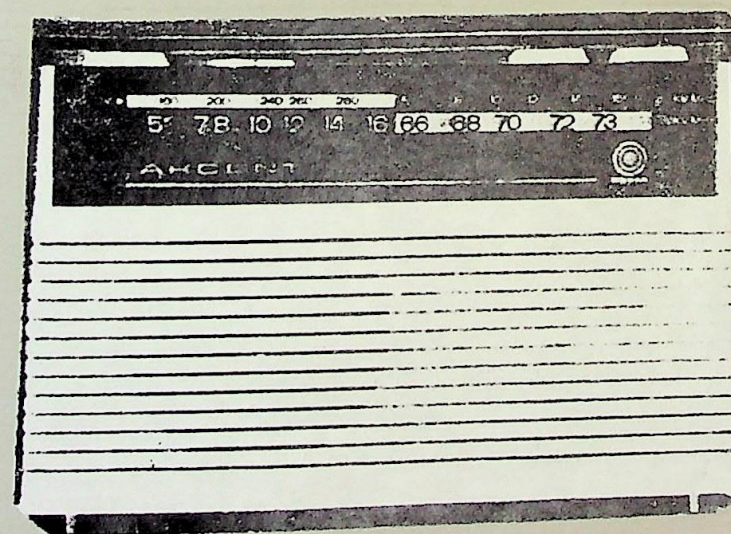


Fig. 40. Akcent Portable Radio, 1964

As miniturisation was more associated with the youth and portability, large scale radios were still being produced for the home. A typical example of the home product was the award winning design by Robin Day for Pye. This was the "Pye Cambridge". This was an all-transistor table radio in two versions- model 1108 which was Mono and model 1111 which was Stereo. They covered long, medium, short and VHF wavebands. The stereo in model 1111 was achieved by suppling a separate second speaker and could give stereo reproduction from a recorder-player, tape recorder or special radio broadcasts. (Fig. 41)

The cabinet was in veneered, natural satin, straight-grained teak with anodised alumimium trim and legs. The loudspeaker grille was black, knobs were grey, and the tuning scale black and white. Its height was 8 inches, width 26 inches and its depth was 7 inches. The separate speaker for the stereo version was 8 inches high with a depth of 7 inches making it compatible with the main radio body.

The split in the radio market into the portable personal sets and the home furniture radio is a division which has continued up to the present day. Radio design subsequently continued in these two areas quite separately, with different design parameters attached to both areas. The most obvious design difference in the 60's between these two areas which had developed was the trend towards integration of the separate components in the area of the

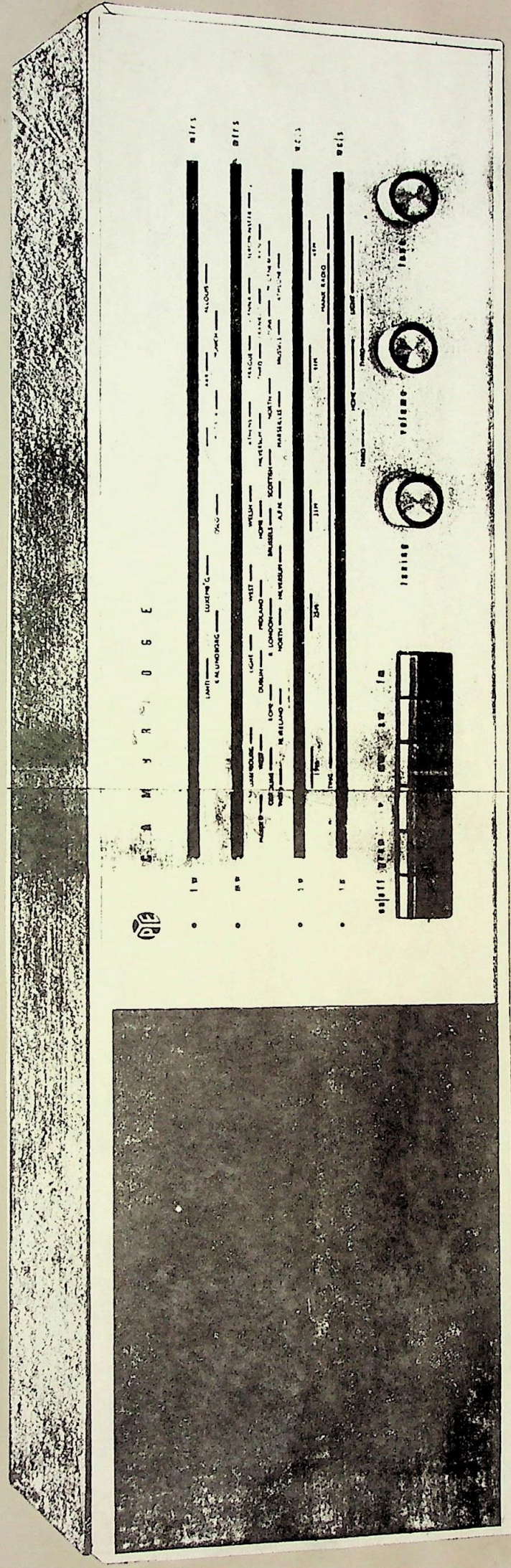


Fig. 41. Pye Cambridge-1108, 1966

portable radio and by the late 60's the beginning of the trend towards separating the components for the home use market. Although these trends did not become a permanent basis for designs within the two areas, they did remain so well into the 70's with many changes occurring separately within the two areas since.

7. The 1970's - Pure Mechanism Styling

In the 1970's there was on the one hand; continuing research into design in various areas of production as the Italians initiated in the 60's and on the other hand there was a return to origins and a re-evaluation of the "technical image" equipment. The subdivision of the various components had once again become a fundamental factor; it was no longer a radio incorporated into a piece of furniture nor an "organic container", but a set of appliances (amplifier, tuner amplifier, speakers, turn-table and cassette deck) often of different brands joined together by a tangle of wires and with various tuning up and adjustment mechanisms implying more than their primary function. In the home the radio has become a component in what is commonly known as the "Home Sound System". (Fig. 42)

These appliances have become indifferent to their setting, they can be built-in, rested on a surface or juxtaposed to constitute a complement rather than a presence within its surroundings. This has often led to the designer shifting from the three dimensional and the problem of form to the two dimensional and the problem of graphics on the front panel, and lettering of the various controls and indicators.



Fig. 42. Pioneer S80W Hi-Fi

Some technical aspects are not only shown but exhibited e.g. speakers which were once screened on one end for the emission of sound, with holes, slits and other such methods, now totally expose the "tweeters" and "Woofers".

This shift to the graphics approach and new ethics of mechanism is not entirely for positive purpose, but a more refined, less blatant but aggressive styling which is equally deviant to the consumer as were the "neo-classic" and such designs of the 1930's. Now the styling appeals to the consumer by means of indicators "with green lights - yellow writing on a black background" - similar to the visual sophistication of Airplane control panels - and tone selectors having twenty intermediate settings.

This new form of aggression of the consumer through the appeal of tuning mechanisms and other such controls is indicative of what happens when an area of production reaches a technological boundary, competition is based on the promotion of devices and performance levels which could only be of interest to a limited bracket of consumers with whom everyone identifies and is encouraged in this belief by advertising and the "Media".

Styling which was at one time seen as illogical in industrial production and was shut out, has now returned

in the guise of pure technical mechanisms with no formal elegance, easily sold to a manipulated, pseudo-educated consumer.

The same graphic approach to styling has also been used in the portable radio. (Fig. 43) Here the radio has been designed as a simple rectangular box, suitably small and slim to make it portable, with some accentuation of joining details caused by the production methods used. Graphics then becomes the main styling aspect as in the "Home Sound System", again making the radio look like a highly sophisticated piece of technology which the consumer can carry on their person, thus associating themselves with the few knowledgeable consumers apart from the general public.

In the area of the portable radio the other form of styling is through the "Gimmick" type product, such as radio-watches, radio headsets - where the user wears what looks like a pair of electronic ear muffs with an aerial for FM tuning protruding from the device, as if it has emerged from the users head. Indeed the radio is no longer just carried on one's person but worn like a piece of clothing or incorporated into ones jacket ("Radio Jacket Pioneer"). (Fig. 44) As with the graphic image identifying the radio with the technical sophistication of an aircrafts cockpit, now the consumer can identify oneself with the "pilot".

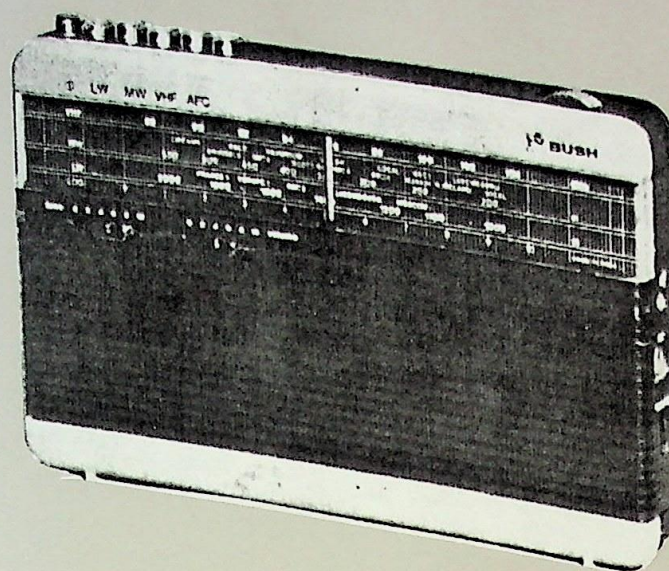


Fig. 43. Bush BW5772, 1977



Fig. 44. Pioneer "Sound Warp" Jacket

By the mid 70's the public had come to expect their portable radios to withstand the most gruelling abuse. Radio salesmen were subjected to consumers bringing in for repair, radios which had been swamped by flood waters, fallen off cliffs, braved blinding snowstorms and smouldered under merciless heat. Indeed the public had developed a longing for radio no matter where they were, on holiday, touring, at work perhaps even deep sea diving. Had radio manufacturers marketed the portability of radios to such an extreme that, they could not meet the demands made by the public on their radios? Surprisingly even after being subjected to some of the aforementioned "tests" some portables did continue to operate. As well as developing its style due to electronics and materials technology the manufacturers had also developed highly dependable products. This was an added advantage in keeping portables in pace with the increased mobility of people. By 1975 the portable radio as a unified product became threatened. (Fig.45)

By 1977 nearly 50 per cent of all portable radio receivers purchased were radio recorders. This had led to a wide range of products been developed for the portable market which, although catering for every want the consumer might have, it certainly did not simplify the task of a prospective purchaser. The individual was by now confronted with the problem of integrating price, type and technical features with his own personal requirements. Indeed, what were his own personal requirements? To help the

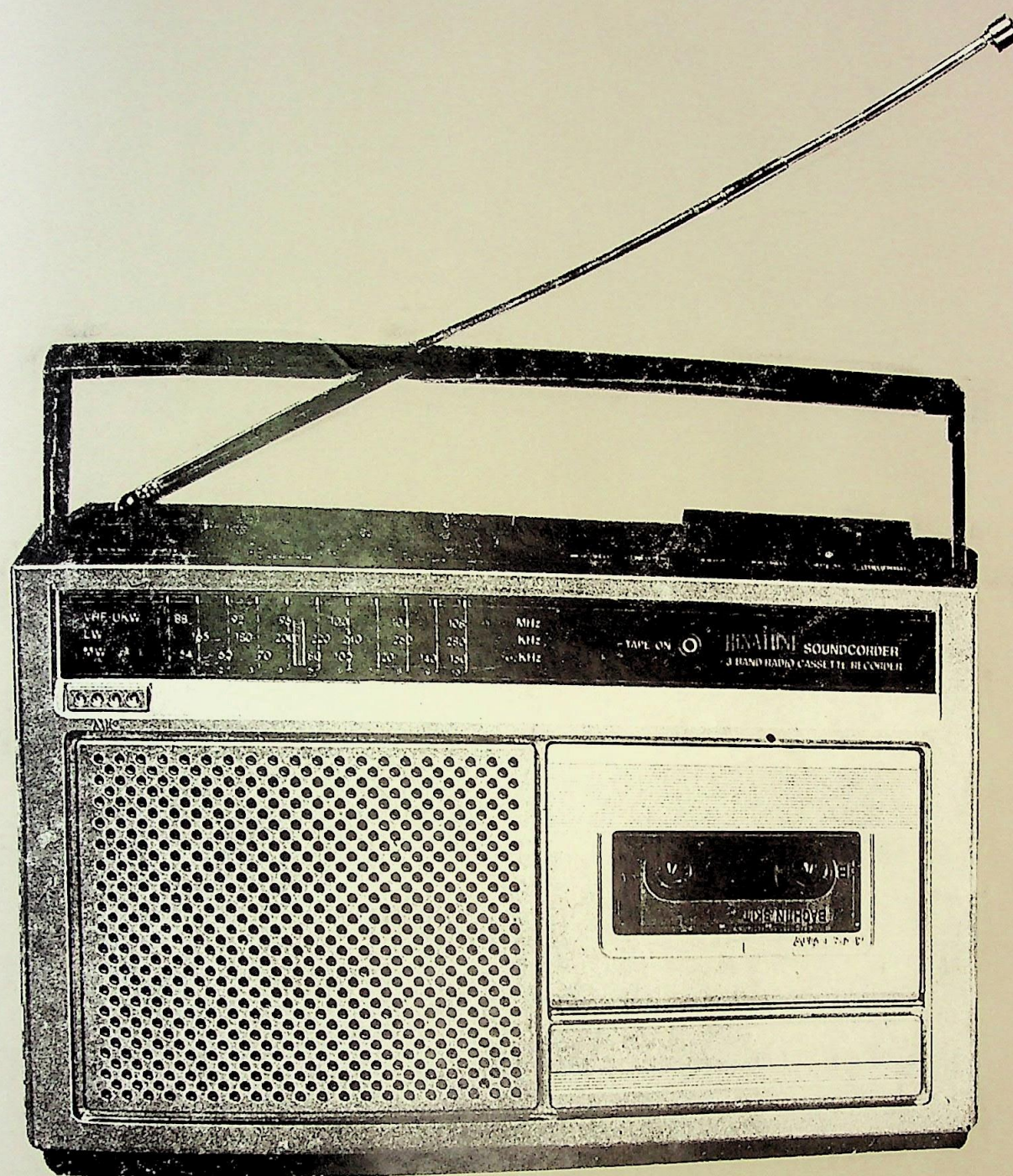


Fig. 45. Binatone Radio Cassette Recorder

purchaser in his choice the radio business defined the choices into five main classifications of portable radio as follows:-

Pocket Receivers

- generally medium wave only.
(Fig. 46)

Portable Receivers

- two or three wave ranges,
FM more or less standard.
(Fig. 47)

Portable Receivers

- four wave ranges, FM, Medium,
long and short.

Communications-type Receivers - four wave ranges, plus
additional short wave ranges
with band spreading. (Fig. 48)

Radio Recorders

- combined portable radio and
and cassette recorder with
three or more wave ranges.
(Fig. 49)

The main consideration in buying the radio no doubt, is the way in which it is to be used. If it was to be used as a second set in the home, weight would be of less importance than styling, connecting facilities for a

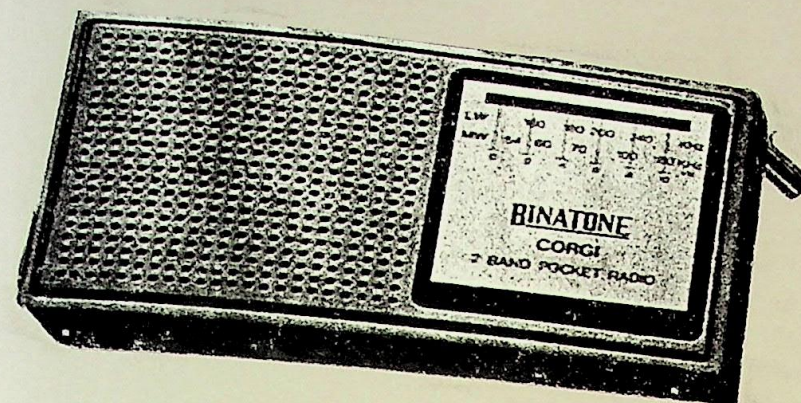


Fig. 46. Binatone "Corgi" Pocket Radio

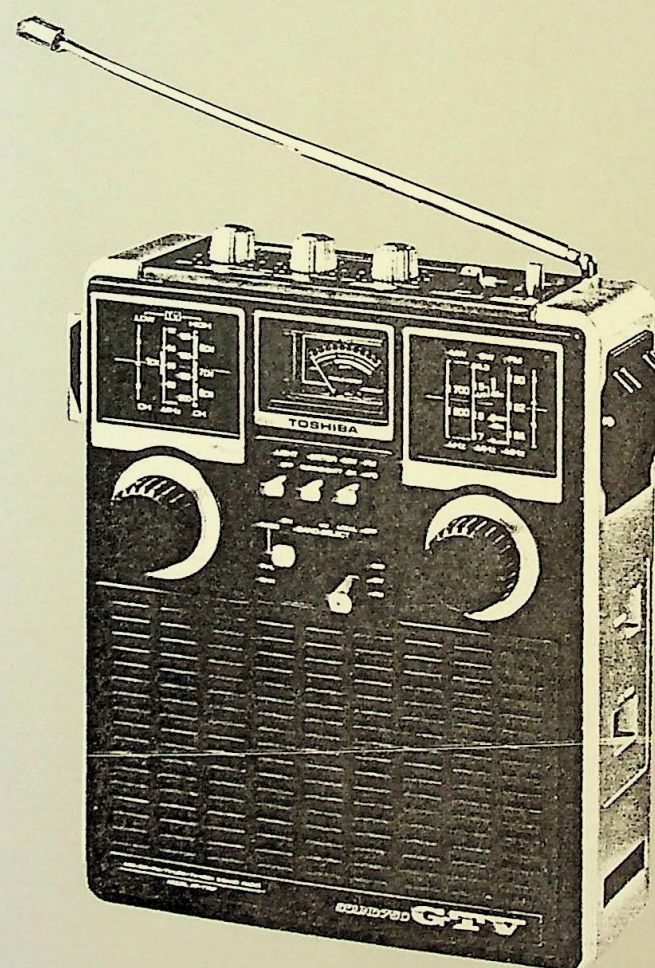


Fig. 47. Toshiba "RP-770F" Portable

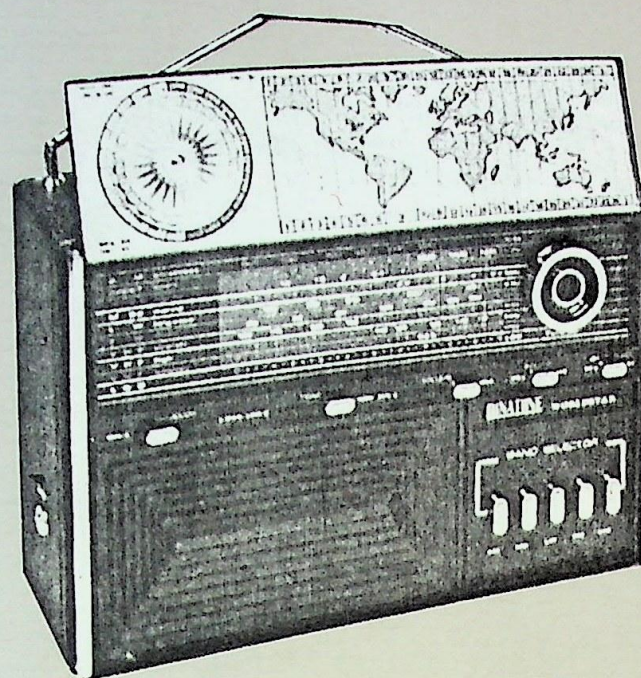


Fig. 48. Binatone Worldstar Multi-band Radio

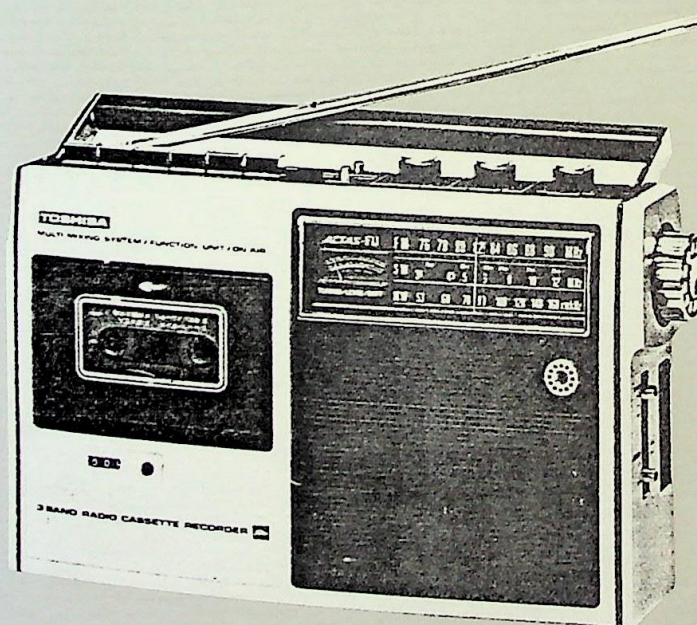


Fig. 49. Toshiba "RT-330F" Radio Recorder

record-player, tape-recorder, head-phones, ear-phones or an extension speaker, and whether it had a built-in mains power unit. On the other hand if its role was to be that of a travelling companion, long-range reception, economic battery consumption, uncomplicated tuning, light-weight and compact dimensions were of most importance. In portable models practical and attractive features, such as carry handle, strap or loop, carrying case or bag, trim and scale design were also of importance.

The main technical development in portable radios in the 70's was improved sound quality. This had developed into "Concert Hall" quality during this time. Loudspeakers were optimally matched specially to the performance and size of the radio, to produce a depth and clarity far removed from the "portable tone" of the 60's.

To further improve sound quality manufacturers developed the personal portable radio further by producing stereo FM/AM receivers, small enough to be carried around and listened to by stereo-headphones. In the 80's portable radios and cassette players were small enough to carry in one's pocket or clip to one's belt, but with a sound quality to match most home "Hi-fi" systems, in the ultimate personal manner. Appropriate names were given to these products by the manufacturers, such as, "Walky", "All-weather", or "Walkman". (Fig. 50) The technical image of the radios

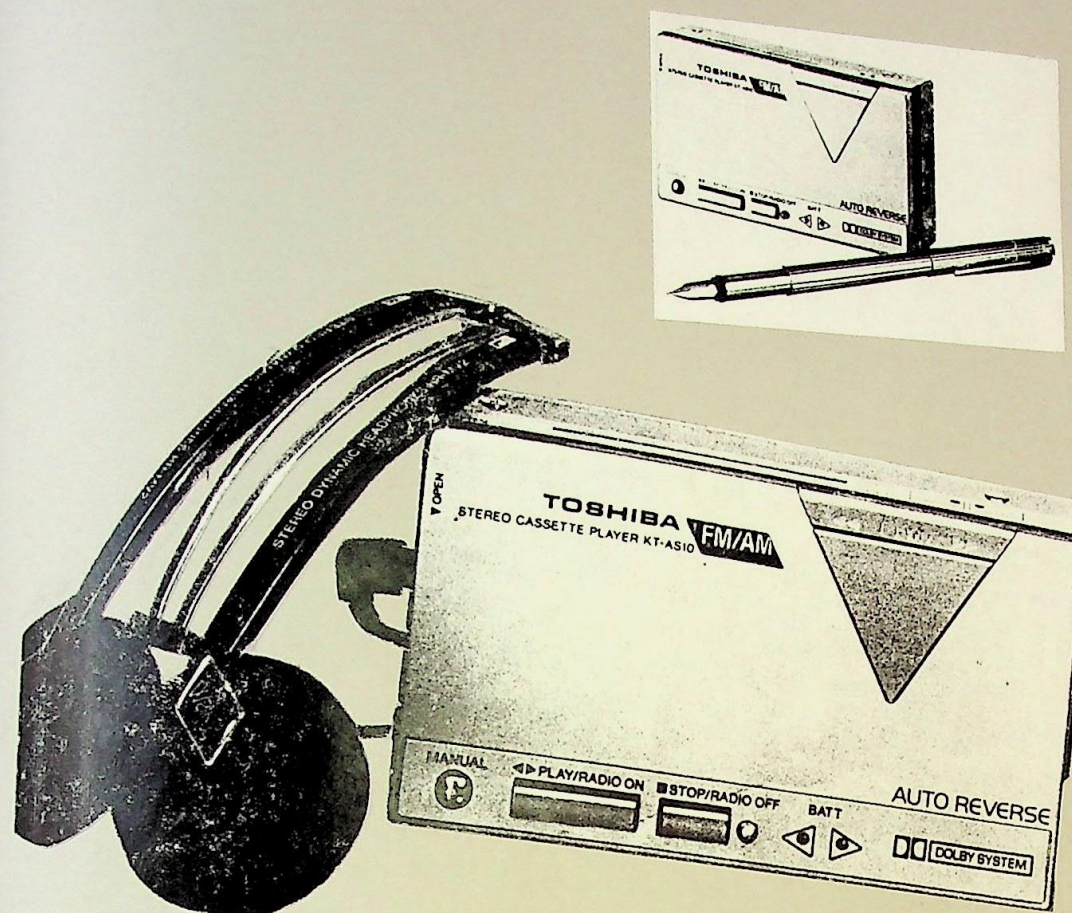


Fig. 50. Toshiba "KT-AS10" Stereo Cassette Player

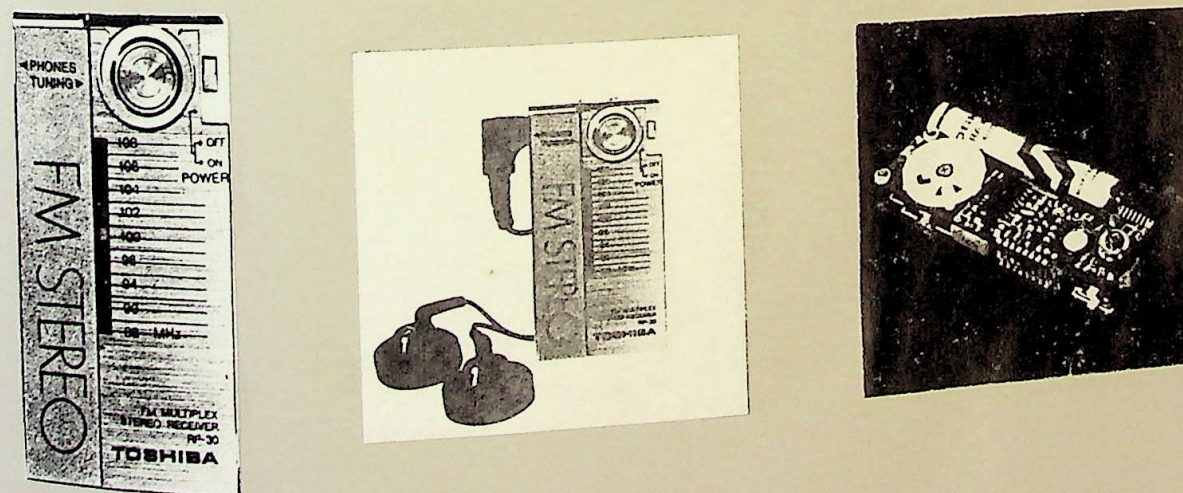


Fig. 51. Toshiba "RP-30" FM Stereo Receiver

was maintained but was now packaged and displayed in a more gay and colourful manner than previously. The products were produced in ranges of colours such as red, blue, white, black, bronze, or silver with the technical image being accentuated by geometric patterns relating to the tuning scale, white stripes or red diodes as battery power indicators. (Fig. 51) Miniaturization had reached cigarette lighter size, another advance that could be achieved by using headphones.

The portable radio in the 80's has still remained popular, with little design change in form from its predecessors of the 70's. Visually the change has been slight with semi-exposed speakers, and sophisticated tuning scales with simple graphics but still maintaining the carrying strap or fold away handle. (Fig. 52)



Fig. 52. Toshiba "RP-22F/22" Portable Radio

Conclusion - Thesis

When Samuel Morse, in 1844, first succeeded in communicating through the transmission of electrical pulses in wires, he truly opened a new horizon for mankind. It was different in the sense that much good stemmed from his invention.

Electrical and electronic methods of communication have been used for good and ill, for war and for entertainment, for the communication of the art of Opera and the selling of soap powder on television.

The first great burst of creativity in home electronic entertainment came near the end of the 19th century with the development of the Gramophone, which encouraged new ideas and principles among the Victorians both in Britain and the United States.

The introduction of radio in the 1920's was the beginning of a home entertainment which has gone from success to even more success despite the later competition of other electronic entertainment equipment such as television, video and the cassette recorder. Originally radio's were so difficult to use that they became the domain of the dedicated amateur. However, because of the demand and interest shown by some of the public, commercial companies started to mass produce simple radios and sales began to soar to unexpected levels.

By 1927 there was over two million licences for radio receivers in Britain. By 1939, this figure had reached nine million, showing the demand and enthusiasm of the public for radio. The introduction of radio into the home changed peoples social habits completely. In the 1920's the main entertainment was the silent movie at the cinema, the only social outlet in the home was an evening spent conversing with friends and neighbours. This became friends and neighbours gathering into one home to listen to the radio. During the second world war, people would gather into the homes of those who owned radios at NewsBroadcast times as, radio was the only source for news during the war. Many of those who owned a radio saw this as radio's main contribution to their lifes, the radio often being switched off after the news to allow conversation to take place.

The second world war increased the urgency for technological development in all areas of industry. The radio also developed dramatically with many improvements to it electronically. It was not until the 1950's that these developments were realized commercially as many other more important products and facilities were more urgently needed during this period of "reconstruction".

Television became much more common in the home during the 1950's. However radio broadcasting had become much more versatile offering the public a greater variety of programmes, everything from documentaries, interviews and music of all types from "Classical" to "Jazz" and "Rock and Roll". The radio had also advanced electronically

and production wise. The miniaturization of components and the development in plastic moulding processes had made radio more portable and less visually like furniture. The public responded to these improvements, radios were everywhere, in cars, in the home, on the beach, where ever the public were they could now bring their radio.

In the sixties this trend towards portability continued. People seemed to be leading a quicker pace of life. The young generation were asserting themselves in a way never before experienced. They rejected the morals and principles of the older generation and this was reflected by the way they dressed but mainly through the music they listened to. Radio manufacturers were quick to realize how much this new generation wanted music and so they increased their development of portable radios to market to this generation. The 60's teenager listened to music where it had never been listened to before, perhaps never accepted before, on the street, in the parks or on the bus. Radio manufacturers had developed a highly portable radio and it was used to the most "far out" extremes. Indeed the preferences and fashion of the young generation was reflected in the radio styling with materials such as leather being used to package the portable radio.

The area of the portable radio and indeed other portable products such as cassette players, is still styled to attract the young buyer. Radio products are now designed to be easily worn while engaging in active pursuits such as cycling, rollerskating or even skydiving. The improved sound quality and use of FM stereo transmission has

led to headphones rather than speaker being used in the most versatile and portable radios which have become the most popular portable audio products of the 80's.

Radio broadcasting has also changed to meet the demands of the younger listener. Many radio broadcasting companies have two or more stations one which is totally devoted to popular music. In the USA during the 60's popular commercial radio stations operated either as "AM" channels which played the top pop singles and "FM" channels which played more progressive music from albums. Young radio listeners liked either FM or AM and this split was so evident that radio manufacturers started to produce FM receivers and AM receivers separately. By the 1980's most radio manufacturers had combined FM and AM into a single receiver which was as a result of the development and promotion of radio receivers with headphones.

Radio over the years, despite competition from other forms of entertainment, has maintained its success as a form of entertainment. One of the main reasons for its continuing success is the fact that it can provide entertainment without any concentration from the listener being required. Where television, video games or any other form of entertainment requires some concentration or use of more than one of the senses, radio can be listened to as background sounds to monotonous tasks or while driving, even reading to provide some atmosphere for the listener. With the ever increasing amount of leisure time providing people with the opportunity to enjoy other pursuits more deeply, how will radio compete?

Will it become obsolete or Will its role in entertainment enter a new as yet undefined area?

There has been no evidence in the recent past to suggest that radio will eventually become obsolete as a form of entertainment. The following comments by two boys both aged 11, when asked for their opinion of Television and Radio can offer the main reason why the future of radio should be approached with optimism.

"T.V. is bad. I much prefer radio, because you can use your imagination".

"I like the radio because it gives you pictures in your head, especially the plays".

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