

THE FASCINATION OF VINTAGE RADIO



Part One What's it All About?

by Geoff Arnold

In these days when it is possible to buy an integrated circuit to do almost any task you like to think of, it might seem strange that the radio equipment and techniques of years gone by should attract so much interest. There are many thousands of people, in the United Kingdom and right across the world, who search out and lovingly restore radio, TV, sound, recording and telegraph equipment, and telephones that may date anywhere from the turn of the century to a decade or so ago.

As with any hobby there are those who limit their involvement to reading about the objects that they desire. This may be for a variety of reasons, but usually it is due to a shortage of money, time or space. For them, the collecting of books, magazines, catalogues, service sheets and technical manuals becomes an end in itself. For the active equipment collector and restorer, this 'data bank' of reference material is an adjunct as vital as a stock of components, valves and other parts.

Do not be put off by an idea that in order to get anywhere in the hobby, you must go in for it in a big way. A vintage radio collection may be anything from a single receiver or book, to a house where every spare room and corner, plus the loft and perhaps a row of wooden sheds in the back garden, is crammed full of equipment, parts and papers.

Old or Young

It has to be admitted that many fans of vintage radio – myself included – might be classified as 'vintage' themselves, although I hasten to add that in the radio context the term is not limited to a specific period in the way that it is for cars! For these older devotees, the attraction stems from having used the equipment at home, at work, or in the Services – or simply from having seen it advertised or displayed in a shop window. There are three or four radios from the post-war years that I then thought exceedingly smart and desirable, and longed to own. If I see one now at a vintage swapmeet the yearning returns, although I have since learned from repairmen of the time that, in some of those sets, the elegant exterior concealed an unreliable nest of trouble.

For younger collectors, the interest in vintage radio was perhaps sparked off by recollections of a cherished set, in an aged relative's home, or by listening to tales of wartime exploits from their fathers or grandfathers. For others, who may be professionally involved in the application of 'cutting-edge' electronics technology on a day-to-day basis, it seems to provide relief from an environment in which most of the design decisions have already been made by the technologists of the integrated circuit fabrication houses. In our high-technology world, the desire to become involved in a hobby where we can get our hands on the 'nitty-gritty', be it gardening, D-I-Y or whatever, is innate in many of us.

Learning About Vintage Radio

Having decided that there is something rather fascinating about old-fashioned technology and equipment, how do you go about learning more? You may already know someone who has been bitten by the bug, in which case you are in a good position. Indeed, you may already have found that, once prompted to begin talking about vintage radio, the dyed-in-the-wool enthusiast takes some stopping!

A number of museums around the UK, especially those dealing with industrial, scientific, military or domestic themes, have sections devoted to radio and other communications systems, although often they



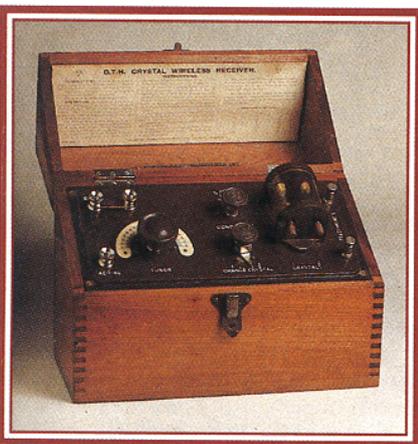
The Gecophone Model 2001 2-valve set of 1922, sitting atop its matching 2-valve LF amplifier. The instrument-like styling of the black ebonite control panel is obvious, but when the hinged doors are closed, the set resembles a 'smoker's cabinet', and therefore became known by that name.

are fairly small in scope. If you don't know of any in your area, a browse through the listings in a copy of "Museums and Galleries in Great Britain and Ireland" at your local reference library will be helpful.

Museums devoted entirely to radio and line communications topics, and general museums where they occupy a large part, are growing in number at the present time, due to an increasing realisation that valuable historical material and records will otherwise be lost to posterity. Almost every one of these museums is based on what were originally private collections of one or more individuals, although many have expanded considerably since those early beginnings.

Some of the museums are open all year round, for example the Science Museum in London, and the Royal Signals Museum at Blandford, Dorset. Others are open only from around Easter through to September or October each year, and are closed throughout the winter months. In this category are the Amberley Chalk Pits Museum, Amberley, West Sussex, the twin Wireless Museums at Arreton Manor and Puckpool Park on the Isle of Wight, and the Scottish Museum of Communications at Bo'ness, West Lothian.

As for the collections that are still in private hands, there are literally hundreds in



BTH Crystal Wireless Receiver Type C Form A of 1923 with twin crystal detectors. The basic set was variometer-tuned over the medium waveband, but a long-wave coil was available as an option.

December 1992 Maplin Magazine

the UK alone – some of them as large as anything on display in a museum. The costs and complications involved make it impossible to put them on permanent display, but quite a few of these collections are open to viewing by interested members of the public either on special occasions or by appointment. Perhaps the largest and best known of these is the Vintage Wireless Museum at West Dulwich, London, which can be viewed on application to the Curator, Gerald Wells, on 081-670 3667.

Selections of exhibits from some of the other collections are put on show from time to time at communications exhibitions, vintage fairs and amateur radio rallies. Notable among these is the Journeaux Historic Wireless Collection, run by Bill Journeaux of Poole in Dorset, who is often to be found at events in southern England showing examples from his vast collection of pre-World War II radio sets and 405-line TV receivers.

Clubs and Societies

One way of becoming really involved in any hobby activity is to join a club or society. In the vintage radio and TV fields, some of these organisations devote most or all of their subscription income to publishing an informative newsletter; others exist purely to promote regular meetings of their members. The British Vintage Wireless Society produces a very interesting and attractive quarterly bulletin (planned to increase in frequency) as well as organising swapmeets for its members in Harpenden and occasionally elsewhere. Details of BVWS membership can be obtained from Dave Adams, the Society's Information Officer, at 69 Silver Lane, West Wickham, Kent BR4 0RX. The Vintage Radio Circle organises regular swapmeets at a venue near Swindon for its members, but does not produce a club journal. Membership details are available from M. Williams, 28 Barton Lane, Cirencester, Gloucestershire GL7 2EB.

On the military communications side, the amateur radio societies of the Royal Navy, Royal Signals and Royal Air Force give, from time to time, coverage to vintage services equipment in their magazines. Anyone with a past connection with the services is welcomed into membership, which could be well worth considering. The RNARS also embraces ex-merchant service personnel.

Some brands of radio equipment attract such a loyal following among owners that User Groups have been set up to exchange information and to put members in touch with each other. The Eddystone User Group, catering for owners of this well-known series of receivers, is a case in point. Further details are available from W. E. Moore, Moore Cottage, 112 Edgeside Lane, Waterfoot, Rossendale, Lancashire BB4 9TR. Another group, for owners of Collins equipment, has unfortunately closed recently due to falling support, and you will now have to go to the United States, home of Collins, for a newly-launched magazine devoted to the marque. Incidentally, vintage radio is indeed a very popular hobby in the USA, with societies and other organisations producing general coverage newsletters as well as specialised

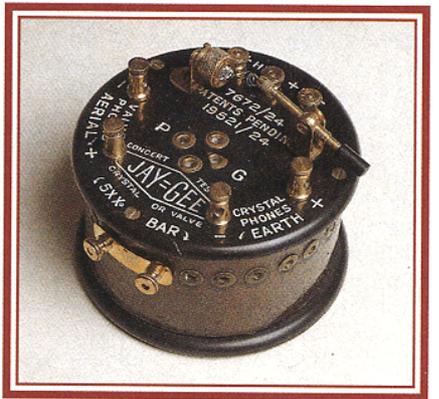
titles on such topics as communications receivers and valve circuitry, the latter termed 'hollow-state' to distinguish it from solid-state.

You should remember that all of these organisations are run on non-profitmaking lines, and your enquiries will be better received if accompanied by a stamped, self-addressed envelope for the reply.

Magazines

The dividing line between society newsletters or journals and magazines in this field is somewhat blurred, for there are several such publications on particular topics produced for circulation to subscribers who might just as easily have been organised as a club or user group.

The vintage television publication "405-Alive" is an example. Although it might be assumed from its title that its coverage is limited to the now extinct British 405-line system, it extends back to Baird and the French 819-line system, and even to early 625-line equipment. It deals with both transmitting and receiving equipment – in addition to cameras, programmes, test-



The JAY-GEE 'crystal-or-valve' set of 1924.

cards and personalities. Further details from Andrew Emmerson, 71 Falcutt Way, Northampton NN2 8PH.

Devotees of Morse Code communication and history, and collectors of vintage keys and other telegraph equipment, are catered for by a quarterly magazine mysteriously entitled "Morsum Magnificat". Although Morse Code is increasingly being phased out in professional communication systems, it is still very much alive in amateur radio circles, and MM combines the historical side with news of current events. Further details from 9 Wetherby Close, Broadstone, Dorset BH18 8JB.

Collectors of domestic radio receivers are catered for by a long-established publication entitled "The Radiophile", produced by Chas Miller at 'Larkhill', Newport Road, Woodseaves, Staffs. ST20 0NP. It combines detailed articles on fault-finding and restoration techniques with occasional items of off-beat humour.

On a broader front, embracing the whole range of domestic radio and TV, broadcasting, recording, amateur radio, military, aeronautical and maritime communications, is the bi-monthly magazine "Radio Bygones". It covers the equipment, the technology and the personalities behind the developments which we now tend to take for granted, with news of happenings in the vintage radio field and a full-

colour photo-feature in every issue. Further details from 9 Wetherby Close, Broadstone, Dorset BH18 8JB.

This list of societies and magazines is by no means exhaustive. There are others in the UK which cater for specialist interests, and many more in mainland Europe, the USA, Australia and New Zealand – most of which receive mentions from time to time in the publications listed here.

Books Old and New

As already mentioned, collecting old books about vintage radio can be a hobby in itself, and that aspect will be dealt with in depth later in this series. However, researching and writing books on vintage radio topics continues to occupy authors and enthusiasts, and these 'modern' books provide a useful introduction to various aspects of vintage radio, as well as a basis of a personal reference library.

Many of the books in this category from UK authors are unfortunately out of print at the present time, and even those in print are likely to be difficult to find outside the lists of the specialist suppliers. Titles you should be able to locate fairly easily include the recently-published "Radio Art" by Robert Hawes. This looks at the evolution in domestic receiver design from the point of view of the cabinet rather than the more usual analysis of the circuit technology, and includes over 250 magnificent colour photographs. Others are "The Setmakers" by Keith Geddes and Gordon Bussey, a fascinating book which chronicles the history of the radio and TV receiver manufacturing industry in Britain from its earliest days, and "2MT – the Birth of British Broadcasting" by Tim Wander.

Of the traditional technology-based titles, you should still be able to find the "Practical Handbook of Valve Radio

Repair" by Chas. E. Miller, an invaluable guide to the techniques of fault-finding, repair and restoration.

Two out-of-print books worth searching for in second-hand bookshops and markets are "Radio! Radio!" and "The Cat's Whisker", both written by Jonathan Hill and full of historical information, pictures and descriptions of domestic radio sets. A new, revised edition of "Radio! Radio!" is planned to appear some time during 1993. In similar vein are "Early Wireless" by Anthony Constable, and "Vintage Crystal Sets" by Gordon Bussey.

A considerable number of books on vintage radio and telegraphy have been published in recent years in Europe, the United States and Australia. Should your interests extend to sets originating in those countries, a look at the book-lists of the Vintage Wireless Company Limited, Tudor House, Cossham Street, Mangotsfield, Bristol BS17 3EN could prove rewarding.

Another company, Chevet Book Supplies of 157 Dickson Road, Blackpool FY1 2EU is a good source of second-hand books on radio and electronics, and also of 'warehouse clearance' lines of more recent books on those topics.

Before leaving the subject of books, there is one area – valves – where recourse to earlier publications is essential. If you are to understand the operation of valved receivers, or do any work on them, it is vital that you understand at least the basics of valve characteristics and biasing. If your technical education has been confined to the solid-state world, the fact that virtually all valves require reverse bias applied to the control grid at all times, if they are not to be destroyed, can come as something of a surprise. A study of one of the elementary text-books from the days of valves is the best way of filling such a gap in your knowledge.

Starting a Collection

Most collections start fairly haphazardly with just one piece of equipment, or perhaps a book which catches your imagination. A second item is added, then another, and usually a theme will quickly establish itself. As the number of variants on the original item grows, they have a habit of leading in different directions, starting new themes, and before long you will have to decide how much space, time and money you are prepared to devote to your collection.

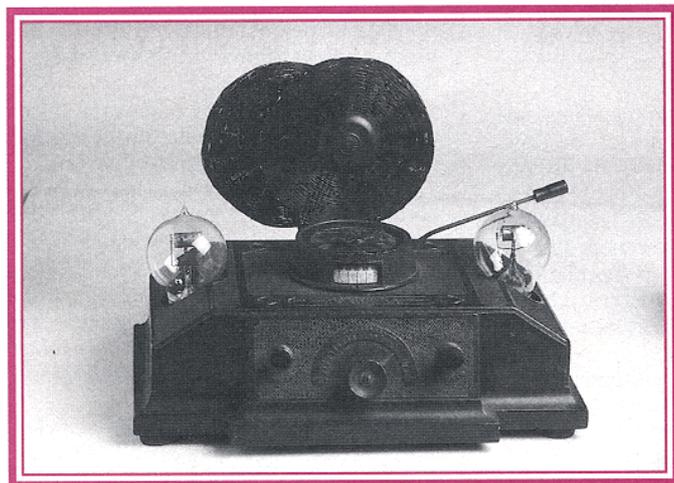
As soon as you have more than a couple of items, it is a good idea to start a log in a small notebook, recording where and when you acquired each item, how much you paid for it and what repair or restoration work you do on it. It is also worth noting where in your personal reference library you can find related technical details, a circuit diagram and information such as the date of manufacture.

People don't just collect complete sets, of course. For example there are large collections of loudspeakers, from the days before the loudspeaker was incorporated into the cabinet with the rest of the set. There are even larger collections of valves, from the tiny types used in hearing aids up to the giants, measuring eighteen inches in height or more, which form part of huge broadcasting transmitters.

Choosing a Theme

The theme that you choose is of course entirely up to you and, to some extent, to chance! Here though are a few suggestions, not in any particular order, of the different types of themes that might be adopted, to help you organise your thoughts.

Collecting by manufacturer is perhaps one of the most obvious. You may admire



Above left The Brownie Wireless Company's 'Two-Valve Receiver' of 1926. In its moulded black Bakelite case, it was one of the last sets to have externally-mounted valves.

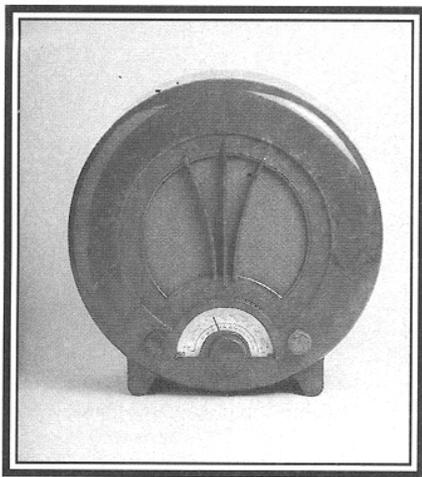
Above right: One of the earliest Pye sets with the famous 'rising sun' loudspeaker grille, the Model 25C was a 5-valve battery set covering medium and long wavebands, released in 1929.

Right: Reputed to be the first mains-powered receiver to include the loudspeaker within its cabinet, the 'H-I' was made in around 1926-27 for operation from 200V DC by the Swedish Aga Company, now more famous for its solid-fuel stoves!



the cabinet designs or the technical features of a particular brand. You may think that one particular make of set produced the best sound quality, or the best 'station-getting' performance. Perhaps you had a relative who used to work for a radio manufacturer. There are many reasons.

Sets from a particular age or era may take your fancy. Back in the first days of domestic radio production – in the 1920s and early 30s – there were many, many different manufacturers. A collection based on sets made during a period of just two or three years could give enormous variety.



This later variation on the 'round Ekco' theme, the AD75, was a 3-valve, long and medium wave AC/DC mains set, first launched in 1940 and re-released in 1946, when it became the last of the genre.

The snag, of course, is that not so many sets of that era remain. A variation on the age or era theme sometimes adopted is to collect a few representative designs from each era. The era chosen does not have to be particularly old. For example, if such things take your fancy, a collection of early transistor sets is fairly easy to put together at present, with jumble sales and car boot sales providing a happy hunting ground. Once you get started, you never know where it will lead you.

Collecting equipment produced for a particular application or use is yet another option. This brings in all the military, marine, aircraft and other professional sets. It is well to remember, though, that much of such equipment is large and heavy; the phrase 'built like a battleship' is often appropriate! You need pretty substantial shelves or benches to store and display sets which can weigh upwards of half a hundredweight. If you have a background in the armed services, or the merchant navy, you have a ready-made theme with some background knowledge to go with it.

My final theme type is collecting by style, meaning sets in plastic, metal, fabric-covered, polished wooden cabinets or whatever appeals to you. These theme types are not exclusive, and you can combine them to widen the scope of your theme, or specialise and narrow it down.

Finding Collectibles

Where you will find items for your collection obviously depends on what you choose to collect. Second-hand shops, jumble and car-boot sales are good for things from the 1960s onwards, and you may with good fortune occasionally find something a little earlier.

The amount of pre-war equipment available on the general market is far less, much of it being already in collectors' hands. Still, you never know your luck. If that era is the one for you, it will really pay to join one of the societies so that you can go along to their swapmeets.

Although a limited amount of military communications equipment changes hands at these radio swapmeets, you may have more luck at one of the military vehicle rallies, as these often have sections devoted to

wireless. Unfortunately, they have a reputation for being rather expensive. The surplus and second-hand radio dealers who advertise regularly in the amateur radio press are a good source of military and other professional equipment, as are small advertisements in magazines. Such traders are often encountered at amateur radio rallies; these give you a chance to examine the equipment thoroughly before buying it.

Domestic Radio

Crystal sets, being the very earliest domestic radios, have a certain fascination. Like the earliest valve sets, they are very collectible. Many of the early manufacturers had a background in scientific instrument making, and this fact is evident from the appearance of their radio sets. Presumably having the materials, fittings and skills in instrument making, they saw little reason to produce radio receivers which were any different.

Early crystal set designs were divided between those built onto base-boards or otherwise having their works permanently open to view, and those built into boxes with lids. Obviously, the need to have ready access to the cat's whisker adjustment on the crystal meant that a completely closed cabinet was impractical. The earliest domestic valve sets, on the other hand, were mostly of open construction, with the valves sitting in holders mounted on the top panel. Designers of military sets of the era had recognised that a more rugged and protected design was needed for their products, and the fact that sets for the home market were so different must presumably be put down to production costs.

By the middle of the 1920s, most new domestic receivers had their valves enclosed within the cabinets, and by 1927 sets were looking less like scientific instruments and more like pieces of furniture, with some stylistic thought put into the design of cabinets and loudspeaker grilles. The famous Pye 'sunrise' loudspeaker fret design first appeared in that year.

During the 1930s, domestic receivers came mostly in veneered wooden cabinets, although the plastics of the day were used for their control knobs, and for some cabinet fittings such as tuning dial surrounds and pieces of decorative trim. A number of manufacturers, notably Southend-based E. K. Cole who made sets under the Ekco trade-mark, were producing complete cabinets moulded from Bakelite. The first of the so-called 'round Ekcos', the Model AD65, appeared in 1934. The round Ekcos have become a cult item in recent years, highly sought after by people wishing to include them in the furnishings of a 1930s-style room. As a result, such sets in good condition now change hands at astronomical prices. A peep at the couple of pages devoted to radio sets in the annual "Miller's Collectibles" price guide will give an idea of current values, but take a deep breath before you look!

Between 1940 and 1945, the manufacture of domestic radio receivers in the UK was naturally severely limited, confined almost entirely to the production of a standard 'Wartime Civilian Receiver' design. This was produced by no fewer than 44 different manufacturers and came in a 3-valve plus rectifier mains-powered version, as well as a 4-valve battery-powered version. These

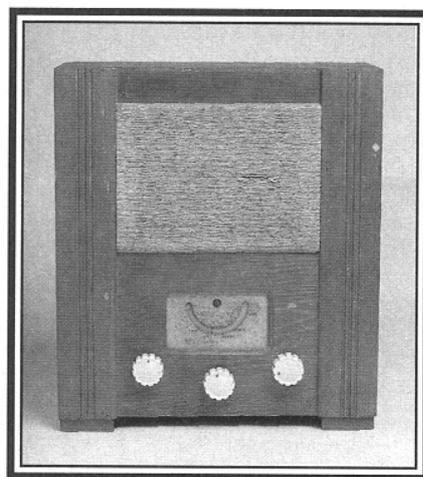
receivers were housed in very 'Utility-looking' varnished or oiled wooden cabinets. Most covered the medium wave band only, but later production included a long-wave band.

Civilian Receivers are still being unearthed from lofts and garden sheds, and provide a reasonably-priced introduction for newcomers to vintage radio wishing to get their hands dirty (literally) on a restoration job.

Domestic TV

To anyone having thoughts of finding an original Baird 30-line Televisor for their collection, the best advice is to forget it! There are very few still in existence, even in museums. Should you feel inclined towards the 405-line era which followed, then you have considerable scope, for despite many having been consigned to the council tip, there are lots still around. Here again, there are one or two models which have become 'yuppie favourites' in recent years, notably the Bush TV22 with its 9in. screen and plastic cabinet.

Although vintage radio receivers will go on receiving radio programmes, albeit not for the most part the same stations or programmes that they used to receive, the situation for vintage TV sets is different. The last of the 405-line Band I and Band III TV transmitters has now long since closed down, and if a collector is to have his vintage TV as a working exhibit, he requires some other source of programme material. Luckily, a number of enterprising enthusiasts have acquired copies of several TV pro-



This 1944 AC mains Wartime Civilian Receiver is hardly in showroom condition. The wooden cabinet is 'tatty', the loudspeaker fabric is torn, the tuning dial is corroded and the control knobs are not original. Despite this, all of its parts (apart from the fibreboard back cover) are present. Typical of a set requiring fairly simple restoration, this would be an ideal project for a newcomer to the hobby.

grammes from the 405-line days, which are now preserved on videotape. With the aid of a suitable videotape player and a VHF modulator capable of handling sound and vision to the old System-A standard, you can enjoy a real breath of nostalgia!

The magazine 405-Alive has already been mentioned as a source of information, materials and contacts with other vintage TV enthusiasts. One particular aspect of TV

Continued on page 29

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Part Two Widening Horizons

by Geoff Arnold

In last month's instalment, it was made clear exactly how popular vintage radio collecting has become. This month, we look at the various themes that your collection can take. Amateur or professional? Domestic or military? In the end, it's all down to what appeals to *you*. Were you in the Armed Forces during the Second World War, or a radio operator on board a merchant vessel? Your career could be the dominant influence. Even if your interest is triggered by nothing more than a love of bygone craftsmanship or the unmistakable character of the thermionic valve, the equipment of your desires can often be found if you look in the right places.

As I mentioned in the first part of this series, there are many different faces to the hobby that is loosely termed 'vintage radio'. Domestic radio – a collective term for the wireless and television sets of yesteryear – probably has the widest following. Some domestic collectors consider anything outside their particular sphere to be 'irrelevant rubbish', dismissing the whole lot as perhaps 'amateur radio' or 'professional gear'. Others have broader tastes, and are happy to have interests in different fields. As in many aspects of life, it is perhaps just as well that we do not all like the same thing!

This month's article looks at some of the non-domestic categories. Inevitably, there will be overlaps between them. Communications receivers, for example, are used in almost every radio service, amateurs use ex-military, aeronautical and maritime equipment, and so on.

Communications Receivers

Just what sets a communications receiver apart from other types? It has been defined as 'one which is not designed for limited or specific purposes'. In some respects it may be inferior to another receiver for a particular application (for example an interception receiver, which need only operate on a single fixed frequency), but in general it has high performance and flexibility. Control of many of the operational parameters is available to the user, of which some technical knowledge is required.

Communications receivers grew from the circuits constructed and used by the early radio amateurs, and have developed over the years into highly sophisticated sets for use by amateur, military and professional operators.

The 'Eddystone' range of receivers, produced for both professional and amateur markets by Stratton of Birmingham (now part of the GEC-Marconi group), is undoubtedly the best known from a UK manufacturer. Their valved sets ranged from the early-1940s Model 358 (with its plug-in coil packs), through many models and variants produced for radio amateurs, government and military users, to the Model 940. After that, the company entered the solid-state era, and moved firmly up-market.

From across the Atlantic, names like Hallicrafters, National, Hammarlund and Collins became well-known with UK amateurs – and with the military too. Large quantities of their receivers were in service with the British forces during World War II to help to fill the gap created by the enormous demands on our manufacturers.

The famous Marconi CR100, also known under its Royal Navy designation of B28, was one of our home-grown communications receivers produced at that time. Others were the Murphy B40 and B41. For the Royal Air Force, the legendary R.1155 and its companion T.1154 transmitter were produced by Ekco and several other manufacturers. All of these and many more have been avidly collected, used and modified over the past forty years or so by many enthusiasts.

For a collector wanting a working, living collection of communications receivers,

Maplin Magazine January 1993

these sets from the 1940s and early '50s have their drawbacks in terms of frequency stability and sensitivity. Any which is used above 20MHz or so will benefit greatly from the addition of a low-noise aerial preamplifier. This is especially true of the VHF and UHF models, which are particularly 'deaf' by modern standards.

The stability problem was addressed in another world-famous receiver, the Racal RA17, which first saw the light of day in 1956. The RA17 employed an advanced method of frequency control called the Wadley Loop, in which any frequency drift in the first local oscillator was cancelled out by effectively mixing it a second time in a later stage of the receiver. The result was continuously variable tuning with frequency stability approaching that of a crystal oscillator.

Most of the valve communications receivers originally used in professional and military circles during the post-war era have now been replaced by the solid-state variety. It is rumoured, though, that valved front-ends are enjoying a revival in military receivers because of their ability to withstand the effects of lightning strike, electromagnetic pulse (nuclear explosion) and static fields associated with rain and sandstorms. The discarded receivers have flooded onto the enthusiast market at reasonable prices, and are attractive purchases for anyone with the space (and a strong enough table!) to accommodate one.

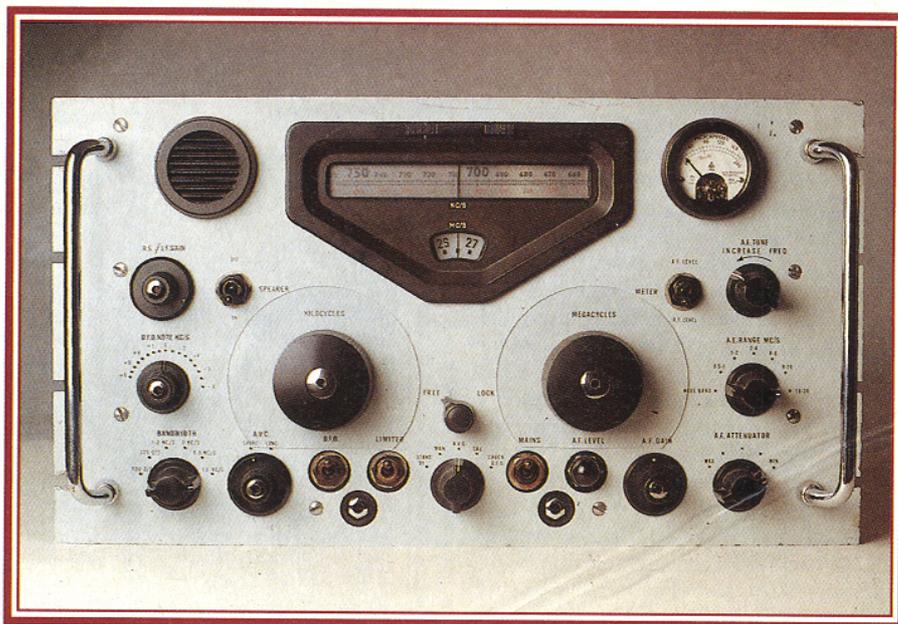
Like any professional radio equipment, many of the World War II era's ex-military sets adopted by amateur operators, have been heavily modified by them. After all, a receiver designed for operation from an aircraft's 28V DC supply via a whining 'Dynamotor' rotary converter is not immediately ideal for use in the home! When such sets pass from active use into collectors' hands, the aim is usually to restore them to their original state. For this reason, the less modified a set is, the more it appeals to the collector.

Amateur Radio

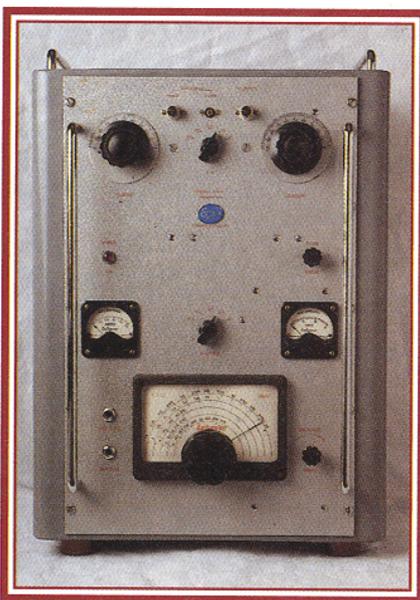
Originally, all radio or wireless equipment could be graded as 'amateur', for since it was only then being invented or discovered, there could have been no 'professional' wireless engineers or technicians at the time. In fact, much of the research that laid the foundation stones of today's radio and electronics miracle was performed by individuals who were not involved in any branch of engineering. This valuable contribution to research, carried out by private individuals in their own time and at their own expense, has continued to the present day.

The original amateur radio experiments were conducted with apparatus in which even the components had to be made by the constructor. Later, companies began to manufacture radio components which were offered individually or in kits, and the interest in construction and 'messing about with wireless' spread from the labs and workshops into individual homes.

Very little equipment intended for use by amateur radio operators was manufactured in the United Kingdom prior to World War II. A great deal of US-manufactured amateur equipment had been 'cross-



The Racal RA17, a 23-valve communications receiver, covering the range 1 to 30MHz, extending down to 500kHz with slightly degraded performance. The left-hand tuning knob selects the frequency range, while the right-hand one gives continuous tuning over that range. Read-out is on a film scale with an effective total length of approx. 145 feet.



The LG300 amateur transmitter, a 1950s product of Labgear, a company in the Pye group. It provides Morse Code communications in the 10, 15, 20, 40 and 80 metre bands.

ing the pond' since about 1937, to the extent that in 1938-39 the Radio Society of Great Britain, concerned by this trend, began to campaign for increased support of the home market.

When peace returned, enormous stocks of British Government 'war surplus' radio and radar equipment was sold off to dealers and enthusiasts under various schemes. Much of that equipment is still in use now by amateurs and short wave listeners, changing hands at radio rallies, swapmeets and through the small ads in radio magazines.

In the late 1940s, several British manufacturers began to produce sets for the amateur, but home construction (or modification of ex-military equipment) was still the most popular method of equipping a station, at least as far as the transmitting side was concerned. Commercially-built communications receivers covering the amateur bands were widely available, and were increasingly incorporated into otherwise 'home-brew' set-ups, beginning a trend which has unfortunately developed

into the largely 'black box' era of amateur radio today, dominated by the Japanese manufacturers.

From this potted history of amateur radio, you will see that a collection of amateur radio equipment prior to 1939 will be almost entirely home-constructed. Such equipment is of extremely variable quality, depending on the practical abilities of its constructor, and generally has little re-sale value among collectors. The exception is for particular items or complete stations built and used by one of the well-known 'pioneers' in carrying out their experiments, although such equipment tends to be donated to museums or established collections, rather than being sold on the open market.

From the immediate post-war years, very little UK-produced amateur radio equipment other than receivers is sought after, although some is still in use by old-timers. Some American equipment, such as that manufactured by Collins, attracts a considerable following.

Military Radio

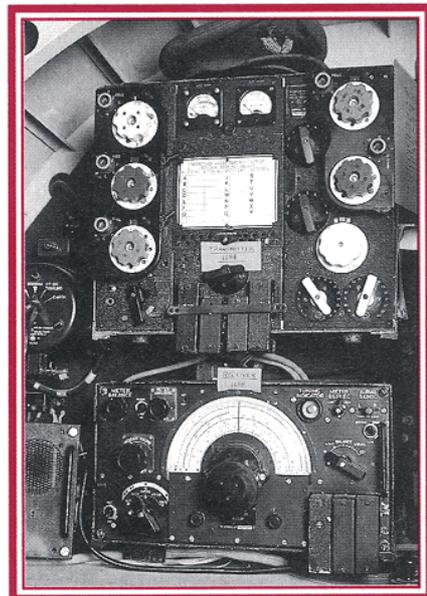
For the purposes of this article, the term 'military equipment' is used to cover that used by any of the fighting services. Their different operating and fighting environments greatly affect the equipment's design, and the practicality of collecting it.

Among naval equipment, radio-telephone transmitter-receivers like the British CNY (HF) or the American TBS (VHF) and Collins TCS (HF) from the 1940s and '50s, and their later replacements, are quite sizeable but at least they would sit on a tabletop. The same applies to the World War II receivers that have already been mentioned, although one of the Racal RA17 series, the last valved communications receivers to be used in the Royal Navy, weighed 44kg (getting on for a hundredweight) in its desk-top case! The average ship-board HF transmit-

ter, even one that might be found on a small warship or auxiliary, is likely to occupy at the minimum a rack or cabinet 6ft. tall and a couple of feet square. You would have to be a real enthusiast to consider preserving one of these in your home or even in a garden shed – and a shore-station transmitter would be even larger!

Army equipment is very different, although some large equipment was used at base stations and in the bigger wireless trucks, the cramped conditions in armoured vehicles and jeeps, and the requirement for mobile communications in man-pack and hand-held form, means that there is plenty of choice in transmitter-receivers for the collector with limited space. Perhaps the best-known from World War II are the 19 Set which was used in tanks, the W.S.18 man-pack, and the W.S.38/W.S.46 walkie-talkies. There are a considerable number of collectors of this sort of equipment – many of them, not surprisingly, having an ex-army background.

Equipment for use in aircraft needs to be as light and compact as possible, although the T.1154/R.1155 set-up used in Lancasters, and other RAF bombers of World War II, was pretty substantial. Ground station

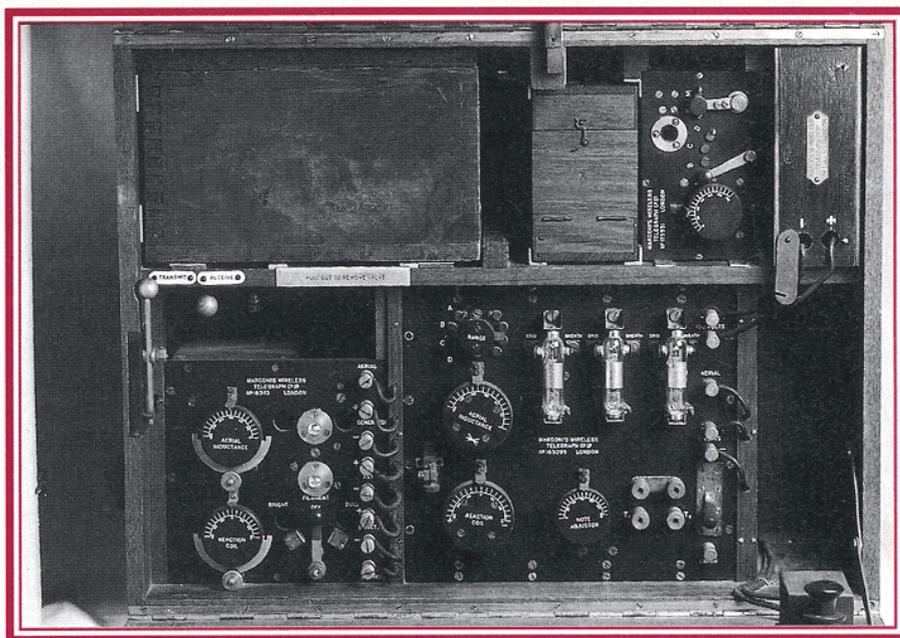


The famous T.1154/R.1155 aircraft transmitter-receiver combination from World War II, pictured here in a mock-up of an Avro Lancaster installation at the Chalk Pits Museum, Amberley, West Sussex.

equipment was much the same as that used in any other fixed station, ranging from desk-top units to floor-standing rack cabinets.

Of course, it wasn't just the UK and the USA that produced military radio equipment. Sets were also manufactured in Canada and Australia to help to meet the demand from the British forces. Germany, Italy and Japan made equipment for their various armed forces too, and there are enthusiasts in the UK and elsewhere who collect such pieces as and when they become available.

Military radio equipment from World War I is naturally somewhat rare and expensive, and most of that which remains is firmly in the hands of museums and established collectors. However, previously unseen bits and pieces do come to light



A World War I Marconi 50W CW Pack Set. This transmitter-receiver, from the Journeaux Historic Wireless Collection, is believed to be the only example remaining from a quantity of five, produced for the British Army between December 1918 and October 1919 at a cost of £283 each.

from time to time; within the last few months I have seen a World War I aircraft receiver on offer at an amateur radio rally, though it did look rather as if it had spent the intervening years at the back of a barn somewhere!

So far as military equipment from more recent times (the 1950s onwards) is concerned, there seem to be plenty of army sets, some navy, but very few aircraft radios. Technical information on military equipment, in the form of handbooks, etc., is subject to the 30-year rule on the release of official government documents. This has recently produced a strange situation; redundant equipment, for which the handbooks are still under a restricted classification, is freely available on the open market!

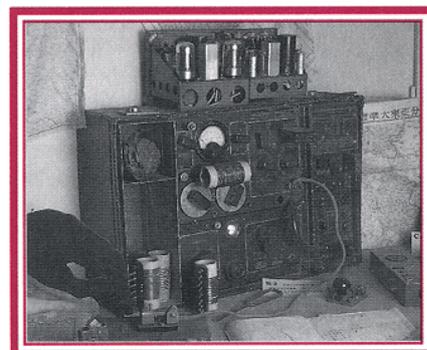
Clandestine Radio

The radio transmitters and receivers used by agents, spies and Resistance groups have a particular appeal to collectors because of their secret nature.

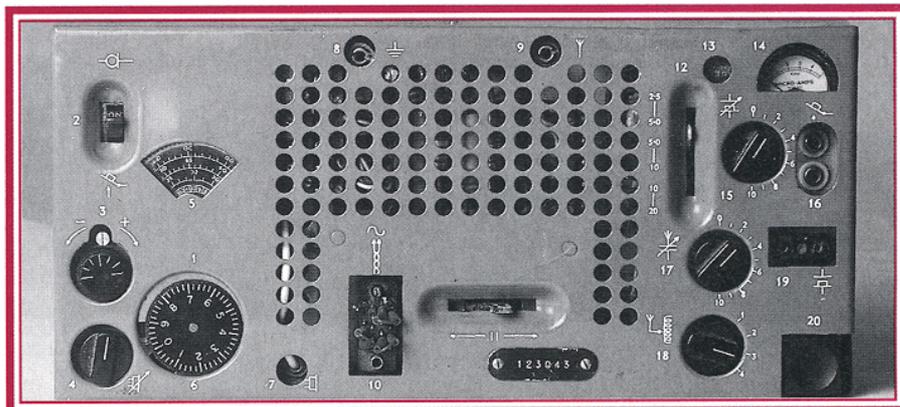
Of the sets used during World War II, undoubtedly the most famous is the suitcase transmitter-receiver Type 3 Mark II, better known as the B2, designed by John Brown G3EUR, but there were many others. A transmitter-receiver called 'Olga', subject of a recent article in 'Radio Bygones'

magazine, was designed and manufactured secretly in occupied Norway, being used for communications within the Norwegian Resistance. The OP3 pocket receiver, designed by Polish engineers working in Britain, was manufactured and distributed to Resistance groups in occupied Europe, allowing them to receive news and instructions from the BBC and other sources.

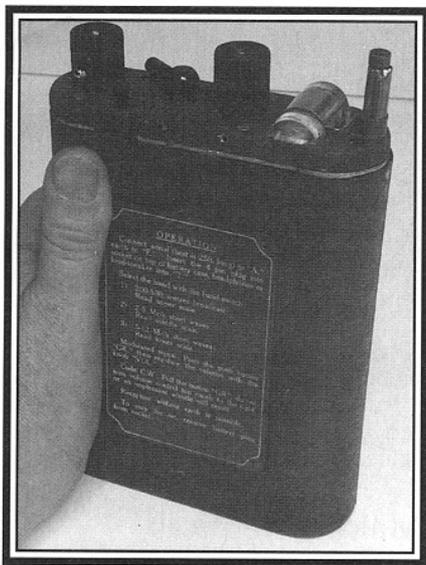
Moving to more recent times, the HF transceiver Mark 123, carried by raiding parties of Special Forces, has recently begun to find its way onto the surplus market, and



A collection of clandestine radio equipment from World War II pictured at the Chalk Pits Museum including, centre, the legendary B2 suitcase transmitter-receiver.



Transmitter-receiver Mark 123, used by Special Forces for telephone and telegraph communication in the frequency range 2.5 to 20MHz.



The Polish-designed OP3, a 4-valve receiver covering medium and short wave broadcast bands up to 12MHz. A second case of similar size housed the associated dry batteries.

represents a set which is not only collectible, but also still usable for communications by licensed radio amateurs.

Once again, similar sets were produced by other countries, both friend and foe.

Aeronautical Radio

Exactly what happens to redundant radio equipment from civil aircraft, large or small, is something of a mystery so far as I am concerned. More recent models which are suitable for fitting in small private planes are advertised from time to time in aviation journals, and some is in the hands of established collectors, but much more must have been disposed of over the past forty years or so. Perhaps it is 're-cycled', going on to provide further service in aircraft of the developing countries.

Maritime Radio

Communications receivers which have seen service on board merchant ships are popular with radio amateurs and short-wave listeners as working receivers, and they attract collectors too.

From Marconi Marine, the CR300 (a post-war development of the CR100), the 1950 'Mercury' and 'Electra' combination, and the 1954 'Atalanta' (the last model to use valves) still appear at amateur radio rallies and in the small ads. Sets of the same era produced by other UK marine wireless companies – Redifon and International Marine Radio, for example – have, for some reason, not enjoyed the same sort of popularity.

Occasionally, TRF receivers from the 1930s such as the Marconi Marine Types 352 and 730 appear on the market, but they are few and far between.

Several ex-seagoing radio officers, unable to tear themselves totally away from their former occupation, have begun to assemble, in a spare room at home, complete shipboard radio installations of a type dating back to their seagoing days. Although equipment removed from ships, as they are refitted or go to the breaker's yard, does come onto the market, a project of this magnitude is definitely not for the

faint-hearted! The space required, the weight loading on tables and floors, and the perseverance needed to track down some of the ancillaries necessary to complete an authentic installation are all considerable. The same points apply, of course, to similar collections involving other forms of specialised radio equipment.

For anyone collecting the type of equipment of the size used in coast stations, accommodation would be even more of a problem. However, in many cases, such equipment is normally demolished to scrap on removal, to prevent resale. Exceptions to this rule have been made for equipment going to recognised museums. For example, the operating consoles recently removed from Niton Radio on the Isle of Wight have gone to the island's radio museum at Puckpool Park, while equipment from Land's End Radio forms part of a display in the theme park at Land's End.

Broadcasting Equipment

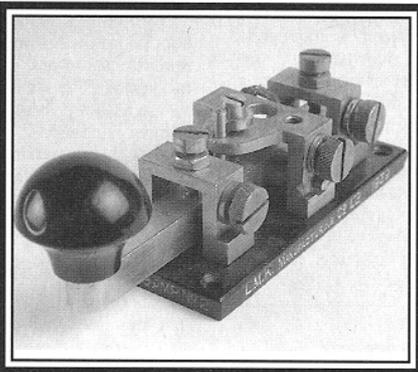
A limited amount of obsolete TV studio equipment finds its way onto the market, where it is eagerly snapped up by the aficionados, but studio and transmitter equipment are really rather more a suitable subject for a museum than for the average collector.

The Vintage Wireless Museum in Dulwich has several racks full of working TV video standards converters and associated equipment, and also a complete TV transmitter donated by the broadcasting authorities.

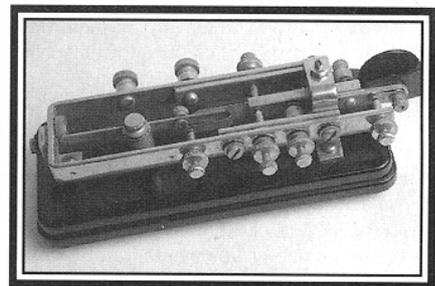
Telegraphy

In total contrast, the scope for collecting telegraph memorabilia is considerable. It might be thought that one Morse key is very much like any other, but nothing could be further from the truth. Morse keys of hundreds, if not thousands, of different types and patterns have been in use around the world for almost 150 years in land-line telegraphy, and for some 90 years in wireless telegraphy. They have the advantage, too, of requiring very little space to house quite a varied collection.

The term 'telegraphy' embraces all systems intended to produce a written or printed copy of a message at the receiving end. At its simplest, manual Morse Code, produced by a human operator with a manipulating key, is received aurally and



A conventional manual Morse key, the Army Key W/T 8 Amp No.2. This particular example dates from 1939, but many variants of this design have been produced in large quantities by manufacturers in various countries from the late 1930s to the recent past.



A 1950s semi-automatic 'bug' key, made in Japan. The trembler arm (centre left) is mechanically damped between Morse characters by resting against the green plastic stop. The rate at which dots are generated can be changed by moving the weight along the trembler arm.

transcribed by another operator at the receiving end. However, that was not the way it began, for the fore-runner of Morse Code, as we know it today, was actually sent by a simple machine, being received by another machine which marked it on a paper tape.

Even when the hand-operated manipulating key was adopted for sending, reception was still by means of a machine tracing symbols on paper tape, from which an operator had to transcribe the message. Experienced operators soon found that they could 'read' the incoming signals directly from the distinctive click-clack sounds of the receiving machine, without having to look at the paper tape, and so the receiving 'sounder' was born. The idea of using buzzers or tone oscillators for reception came later.

Automation returned, at the beginning of this century, in the form of senders that produced Morse characters from perforated paper tapes previously prepared by an operator. At the receiving end, the signals operated another form of paper tape 'inker'. However, the dots and dashes of the Morse Code were not really suited to mechanical interpretation, and so more sophisticated direct-printing systems using codes of a totally different type were developed, such as electro-mechanical teleprinters and their modern electronic replacements.

The greatest nostalgia among telegraphy buffs is for hand Morse keys, relays, indicators and sounders. Keys take many forms. There are the traditional 'up-and-down' and 'side-swiper' keys, in which every dot, dash and space element is directly formed by the movements of the sending operator's hand and wrist. There are the semi-automatic or 'bug' keys, in which the dashes and most spaces are directly formed by the operator, but the dots and the spaces between strings of dots are formed by a weighted spring 'trembler' mechanism controlled by the operator. To use one of these successfully is quite an art!

A more modern development of the 'bug' is the electronic keyer, in which the mechanical trembler is replaced by gated oscillators that send dots, dashes and spaces of the correct lengths controlled by the side-to-side movements of a keying paddle by the operator.

Apart from the sending keys, other collectibles include the receiving devices – single-needle and double-needle visual indicators, sounders, buzzers – plus the relays, regenerators and repeaters necessary to overcome the signal distortion caused by

the natural inductance and capacitance of long telegraph lines stretching across continents, and beneath the oceans.

Audio Equipment

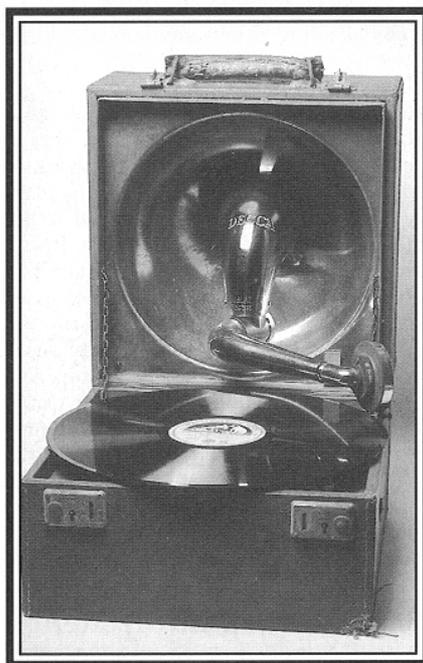
The ability of books, photographs and recordings to preserve images of the thoughts, events and achievements of the past has a great fascination. In many ways, sound remains the most evocative image, for most silent films and videos are but a pale reflection of the past.

Since Edison invented his cylinder phonograph in 1878, developments have been ceaseless. After the cylinder came discs, first single-sided, and then double-sided. Magnetic wire recording followed, before being replaced (in most applications) by magnetic tape. The original tape recorder, developed by a German named Stille, used steel tape carried on huge reels some 600mm in diameter. Later developments used magnetic oxide coatings on paper tape, and eventually plastic tape.

The inconvenience of having to lace up each new tape through the heads and transport mechanism of a reel-to-reel machine drove forward research for some form of 'drop-in' modular tape carrier. As a result, the Philips Compact Cassette and the Lear Jet 8-track cartridge were developed, more or less in parallel, in the early 1960s. The cartridge format, which used a continuous loop of tape, was intended mainly for use in in-car entertainment systems, but the design had a number of inherent drawbacks, and was soon abandoned in favour of the ubiquitous cassette.

Another unusual recording medium, which has been superseded by the tape cassette and mini-cassette, was developed for use in office dictating machines. This was a strange flexible plastic sleeve with a magnetic coating, perhaps best described as a 'floppy cylinder'!

To anyone wishing to start a collection of recording equipment, there is considerable scope. The clearing out of old homes, lofts and barns continues to yield a wide selection of machines, of all ages and in varying states of preservation. Even the



A 1922 Decca wind-up gramophone, a model reputed to have been developed from one used to entertain the troops in the trenches in World War I.

odd Edison Phonograph surfaces from time to time – I saw a somewhat worm-eaten example in a Wiltshire farmhouse clearance sale quite recently. A totally different theme for a collection would be those 8-track cartridge machines – why not grab some before they all migrate to the rubbish tips!

A *working* collection of vintage gramophones or recorders makes a much more attractive proposition than one that simply sits on shelves gathering dust. However, you will require suitable cylinders, discs, wires or tapes, preferably containing recorded material of the era; these are at present still fairly widely available. If acoustic gramophones are your particular interest, you also need supplies of the appropriate thorn or steel needles – not quite so common, but still advertised by several specialised stockists.

Another popular theme for an audio equipment collection is early Hi-Fi – for example the amplifiers, loudspeakers, tuners and control units made famous by companies such as Leak, Quad and Williamson. As with all valve equipment, it is vital to ensure availability of replacement valves if you want to keep it working. Most are available from one source or another, but some types can be very expensive.

You would find that a good-quality Hi-Fi system from the 1940s and '50s can still produce a wonderful sound; and because valve audio amplifiers are making a comeback in the 1990s, you could also consider yourself very 'with-it'.

Making Replicas

It is undeniable that the rarer a piece of equipment is, the more desirable (and expensive!) it becomes. Some items, by virtue of their style and design, lend themselves to the construction of replicas, and this is sometimes done by collectors who can find no other way of achieving their heart's desire. As in the art world, it is quite acceptable to produce a replica or copy of some item from a bygone era, providing that you do not try to pass it off as an original – it then becomes a fake!

In general, the older designs of radio equipment are the easiest to replicate satisfactorily, assuming that you can find or reproduce the components. Factories in those days did not have sophisticated machine tools and presses, and the manufacturing processes were sometimes not far removed from those available to a competent kitchen-table or garden-shed worker of today.

Later radio equipment does not lend itself so well to replication, apart from the sort of thing that was hand-made in very limited numbers under model-shop conditions. This is perhaps typified by the Norwegian 'Olga' clandestine transmitter-receiver already mentioned, which has been successfully replicated by a number of enthusiasts.

THE FASCINATION OF

VINTAGE RADIO



Part Three Devices, Instruments and Data

by Geoff Arnold

Putting together a collection of vintage radios is one thing, but unless you simply want to restore the cabinets, a collection of relevant data is essential. Back in the days when valves reigned supreme, many books and magazine articles catered for the novice and expert alike, of which most are still eminently readable. The sources of such material, vital if you need to understand how valve circuits work, are given in this article. Of course, such information is collectable in its own right, as are 'point-of-sale' advertising displays, vintage QSL cards, the valves themselves – and even the corrugated cartons in which they were packed!

If you become hooked on collecting vintage radio sets, no matter whether they are from the amateur, domestic, military, or other professional fields, you will soon find that you need valves to repair them. Of course, you may intend simply to put the sets on a shelf to admire the appearance of their cabinets, and never plan to take the back covers off. In that case the odd empty valve holder does not matter, although if you have a liking for the sets from the earliest days of radio, when the valves were proudly displayed to view rather than being hidden away inside the cabinet, you will have to think again.

Some types of valves are now much easier to come by than others. Most difficult of all to find are the very early 'bright emitter' variety. With the primitive materials technology available at the time, it was necessary to heat the filament to a very high temperature to produce the required flow of electrons inside the valve. The high temperature made the filament glow as brightly as that in an electric lamp. The light from the valves was so intense, in fact, that you could reputedly read a newspaper whilst enjoying listening to a broadcast programme of music. An early form of energy conservation, I suppose!

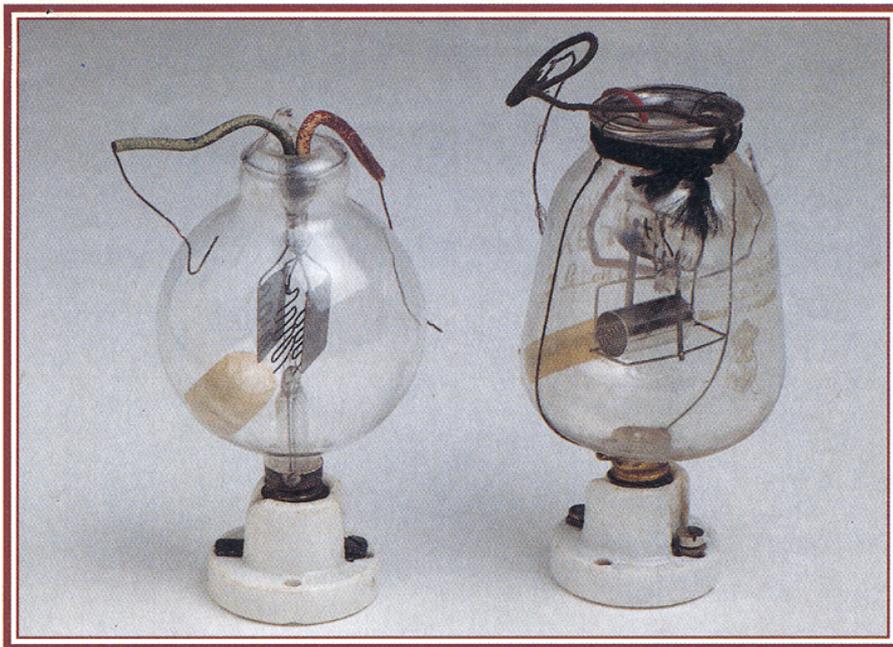
If, like most collectors, you want your treasures to look authentic, and preferably to work as well, you do need valves. Obviously, if the sets are to work, the valves fitted must be of the correct type – as originally specified by the set manufacturer – or at least an acceptable equivalent or alternative type. Sometimes, as a last resort, a set for which one or more valve types are now totally unavailable can be modified by making a few wiring or component changes, so that comparable valves can be substituted.

The purist collector will rebel violently at such an idea, and a set modified in this way is likely to fetch a lower price should it subsequently be sold. In the end, the decision is up to you. You can rest assured, though, that slotting a valve of the wrong era into an otherwise vacant holder will soon be noticed by an expert who sees it. The replacement valve need only be a year or two out to attract comment!

Valves and Tubes

Searching for rare and interesting valves and tubes, and putting together a collection of them, can become an end in itself. I am using the term 'tube' to cover the cathode ray tubes used for the display in oscilloscopes, and also those, now more commonly called 'picture tubes', used in television receivers. It is well to remember, though, that 'tube' is also the American name for the valve.

As with any other branch of collecting, there are all manner of themes which can be followed when assembling a collection of valves. The valve collector has one important edge over the set restorer, in that the valves in a collection do not have to be in a working state. They can have burnt-out heaters or filaments, even internal inter-electrode leaks or short circuits which would render them useless in a working set. The only unacceptable damage would be the cracking of the glass valve envelope – allowing air to enter, producing that characteristic 'milky' deposit on the inside of the glass.



Left: On the left is an American Audion valve, made in about 1914. The 3-5V 'Hudson' filament is mounted at the centre, between two zigzag wire grids with the two anode plates on the outside. A Hudson filament used fine tantalum wire, a good emitter of electrons when heated, wrapped around a tungsten heater which gave improved mechanical strength, reducing the chance of the filament assembly warping and touching the grid. On the right is a Naval triode Type NT.9X, manufactured by the MO Valve Co. circa 1920. The filament connections are made via the E12 screw base and two wires stretching up the outside of the valve to the top. The anode and grid connections are on flying leads.

Bottom Left: A display of receiving and small transmitting valves dating from 1915 to 1965, photographed at the Amberley Chalk Pits Museum in West Sussex.

Bottom Right: In 1925, the Metropolitan Vickers Electrical Co. Ltd. (Metrovick) introduced the SP.18 series. SP stood for 'short path', a totally new design principle that allowed a closer electrode spacing, and therefore higher gain, than had previously been possible.

design parameters for use by R & D engineers. Typified by the Mullard Technical Handbook series, a collection of these from a major manufacturer may take upwards of a foot of space on your bookshelves. Somewhat less comprehensive, and certainly less demanding of storage space, are the data manuals produced by the likes of Brimar in the UK, and RCA in the USA. These give a broad sweep of information on a manufacturer's complete product range in a paperback book around half an inch thick. Finally, there are the pocket-books containing brief details of pin-outs and nominal voltage, current and gain figures for service engineers. Unless you are planning to get involved in circuit design and analysis at a fairly advanced level, I would say that the second and third categories are probably more useful overall, since they usually contain helpful tables giving type numbers of equivalent and comparable valves, and sometimes typical circuits using that manufacturer's products.

Following the enormous growth in the number of valve types that occurred during the Second World War, several publishers began to produce data books giving brief details of the characteristics and pin-outs of all the major valve manufacturers' products. Perhaps best-known of these was *Radio Valve Data* produced by Iliffe

Another advantage of a valve collection over an equipment collection is that it will occupy a lot less space, unless of course you decide to collect large transmitting valves or TV picture tubes. A very attractive display of receiving, and small transmitting, types can be put together in a glass-fronted cabinet or showcase, or on a large board with the valves secured to it by means of looped wire.

A variation on the valve collection theme is a collection of the cardboard cartons in which the valves were supplied by the manufacturer. In the early days of valves, there was an enormous variety of small manufacturers as well as the famous names who survived to later years. Many of the cartons were very colourful, and some also carried technical details of the valve contained within. Further details were often found on leaflets tucked inside the carton or wrapped around the corrugated cardboard packing which surrounded the valve.

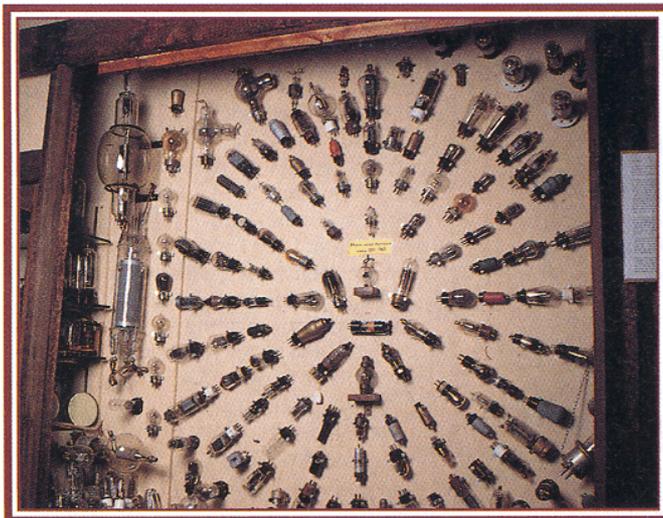
Obviously, the cardboard used for the carton will have deteriorated and yellowed to some extent over the years, depending on how it has been handled and stored. You may find end flaps torn or perhaps missing altogether. The printing inks used will have faded too. For these reasons, you will be very lucky indeed to find many

cartons in a bright, 'mint' condition, but for a really rare item this is not the end of the world. For an item that is not quite so rare, there is always the chance of finding a sample in better condition at a later date.

Valve Data

If you are involved in the restoration and repair of valved equipment, you will very soon find a need for some sort of technical data to help you identify the pins carrying the various electrode connections in a particular valve, and find out typical values of working voltages and currents. You may well have a circuit diagram, or even a full service sheet, for the equipment you are working on and, in theory at least, all of the essential information will be included there. Unfortunately, this isn't always the case. Should you be faced with a faulty set without any circuit data, the valve type numbers will provide you with a starting framework from which to build your knowledge of the set and, with luck, to restore it to working order.

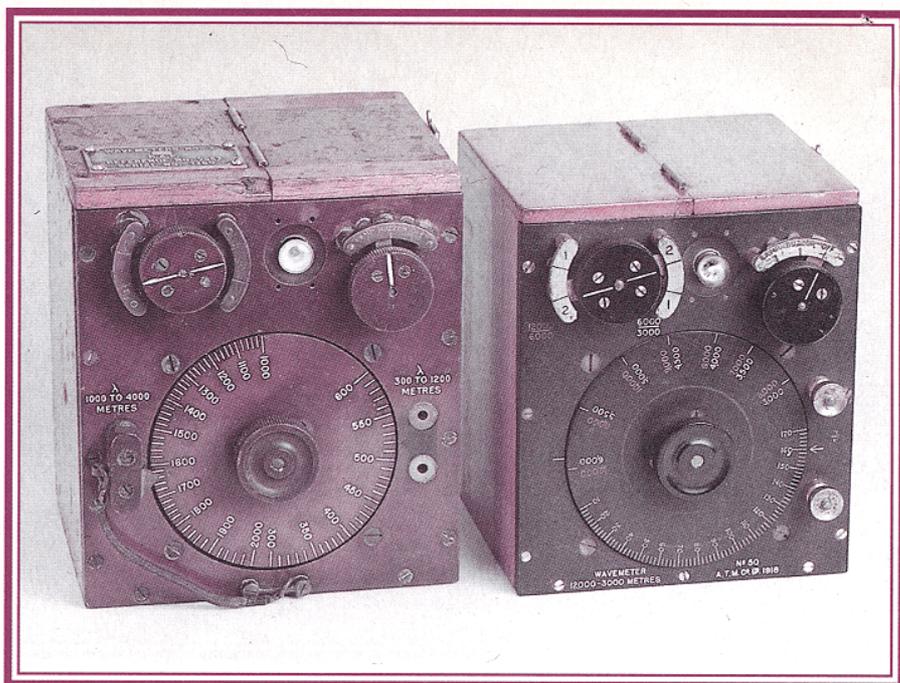
Valve manufacturers have, over the years, provided all manner of data for users of their products. The form and extent of this data falls basically into three categories. First, there are bulging volumes of tables and graphs giving full performance and



(publishers of *Wireless World*) which first appeared in 1949 and ran through some ten editions, expanding later to include semiconductors. Other well-known books were the set of five compiled for Bernard's Publishers by Bernard Babani between 1951 and 1963, and the *International Radio Tube Encyclopaedia* from the same stable. Unfortunately, all of these books are long out of print, but copies do turn up at radio rallies, car-boot sales and second-hand book shops from time to time. If military radio equipment is your field of interest, look out for copies of official publications which were produced. These give a similar range of data for valves used by the armed forces, including listings of type-numbers of commercial equivalents indexed against the military type and stores codes.

If valve collecting for its own sake becomes your interest, you will soon find the need for information on who made what types and over what period, the backgrounds of the different manufacturers, company takeovers and so on. There are some unexpected names from the early days of valves. For example, the logo of Ever Ready, now well-known for torches and batteries, once appeared on valves, although these were made for them by Mullard. Similarly, the name of BSA Radio Ltd, an offshoot of arms and bike manufacturer BSA (standing for Birmingham Small Arms) once appeared on valves made for them by Standard Telephones and Cables (STC).

This sort of information can be painstakingly gathered from catalogues and advertisements of the period, and occasionally from company histories, but is far easier to find in reference books produced by other enthusiasts who have already carried out the hard research. Perhaps the two best-known titles are *Saga of the Vacuum Tube* by Gerald F. J. Tyne, published by Howard W. Sams, and *70 Years of Radio Tubes and Valves* by New Zealand valve historian John W.



Two Townsend wavemeters from the First World War era, covering between them the range 300 to 12,000 metres (25kHz to 1MHz).

Stokes, published by The Vestal Press. Although both are American publications, they cover manufacturers from all parts of the world. They are stocked in the UK by the Vintage Wireless Co. Ltd, Tudor House, Cosham Street, Mangotsfield, Bristol, BS17 3EN.

Lamps

The valves used for radio detection and amplification had their origins in experiments carried out on electric filament lamps by Thomas Edison at the end of the last century. This affinity between the lamp and the valve has led some valve collectors to include examples of early lamps in their collection. Indeed, they can be a fascinating field in their own right.

Semiconductors

Collectors whose interest in vintage radio comes to an end with the passing of the valve era consider any device not containing a filament or heater to be beyond the pale. However, in reality the semiconductor diodes and transistors of the 1950s have now become collectors' items which merit preservation as examples of just another stage in the development of radio. In this, they are already being followed by the early integrated circuits.

Test Equipment

Serious work in restoration and repair of any radio or electronic equipment requires a workshop equipped with a basic complement of suitable instruments. First, and most important, of these is a suitable multimeter. Voltage readings given in manufacturers' equipment manuals and service sheets will have been based on the sensitivities of the multimeters of the day. These are likely to have ranged from 333 to 1000 Ω/V in the 1930s and 40s, to match the DC sensitivities of the AVO Model 40 and Model 7 and the like, rising to 10k to 20k Ω/V over the 1950s and 60s (AVO Model 8 and 9, etc.).

Voltage checks using a modern high-impedance DMM may produce very different answers to the figures recorded in the service data, and you would need to make due allowance for this in any fault-finding analysis. To reduce the number of calculations which might be involved, it is best to use a multimeter of similar sensitivity to that used by the equipment manufacturer in producing his service data.

The second test instrument required is a signal generator covering the frequencies of interest. These should at least be the broadcast bands between 150kHz and 22MHz, plus perhaps 88 to 108MHz for the more modern VHF/FM sets. For communications receivers, however, a wider range could be involved. Published data for broadcast receivers does not generally



Three lesser-known names from the early 1920s. The 362 Radio Valve Co.'s range included a special version of the SP2, for use in the Scott-Taggart ST600 receiver. Lowden was a trade mark of the Fellows Magneto Company. The Thorpe K4 was a space-charge tetrode, produced by Bower Electric for use in the Unidyne receiver, a revolutionary design which claimed to work without any HT supply! The rarity of this valve amply justifies the inclusion of this somewhat tatty and faded carton in the Journeaux Historic Wireless Collection.

include sensitivity figures, so you would be simply aligning for maximum response. For communications receivers, the data provided is usually sufficient to carry out full sensitivity and selectivity performance checks as well as realignment.

Because the selectivity in the IF amplifiers of valved receivers depended upon LC tuned circuits, rather than the pre-tuned crystal, ceramic or mechanical filters used today, a sweep oscillator or 'wobbulator' may also be essential. At the very least, such a piece of equipment will be a great time-saver when IF realignment is called for. You will, of course, need an oscilloscope to display the swept frequency response.

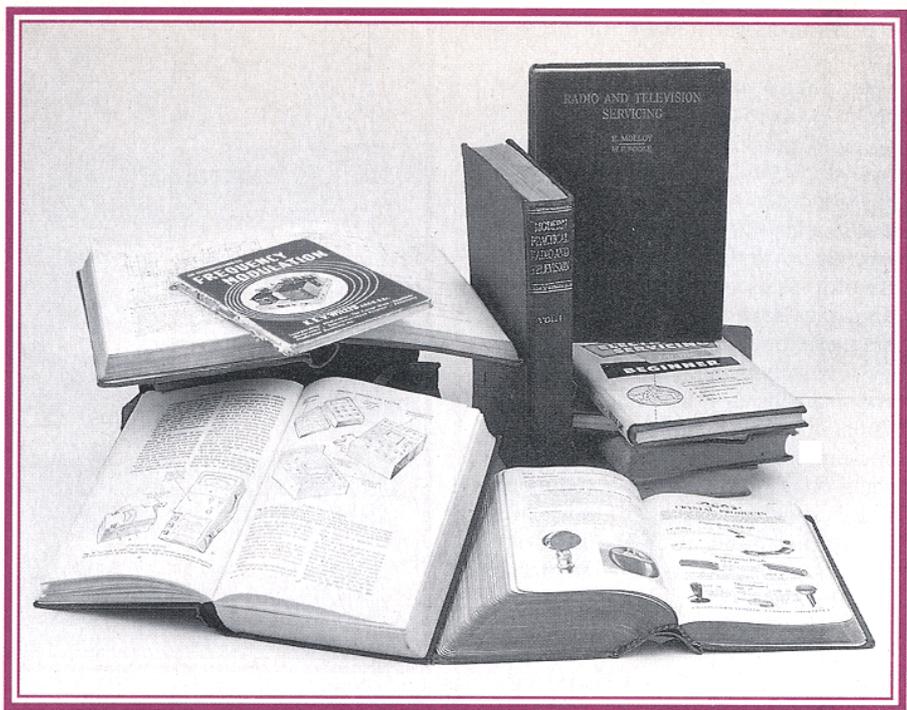
The last instrument that I would put in the 'essential' category is a valve tester. The days of being able to pop down to your local radio shop to have a set of valves tested are long gone, and you will require your own tester, or perhaps access to that of a friend. Luckily, ex-military valve testers such as those produced by AVO are fairly widely available at radio rallies at reasonable prices, but if you invest in one make sure that you get a copy of the accompanying valve data book with it. As a last resort, copies of the last book published are still available from AVO, but one will set you back almost as much as the tester itself!



A versatile valve tester, the 'Test Set, Electronic Valve CT-160', produced by AVO for the Ministry of Defence, and now widely available on the surplus market.

By the time that you've collected together this minimum set of instruments, you may well find your interests aroused in the instruments themselves. Yes, there are people who collect just test equipment; in fact, some even specialise in particular instruments. I recently heard of someone who collects valve testers, and apparently has around forty different models!

As with communications receivers, the controls fitted to most test instruments are many and varied, and it is absolutely vital that you obtain at least an operating handbook, or better still a full technical manual, for any instrument that you buy.



Just a small selection of the old wireless books that you can find if you look in the right places. Among them are several of the famed *Radio and Television Servicing* guides – essential information for those wishing to restore more recent valve equipment (1950s onwards). Reference copies can often be found in the larger libraries.

Books and Magazines

As mentioned in an earlier part of this series, a number of books have been written in recent years on the subject of vintage radio. However, it is the collecting of old books and magazines that I shall be looking at in this section.

It is fascinating now to read text-books on radio engineering from the first half of this century. If your interests extend to electrical engineering and to telegraphy, you will find even earlier books to catch your imagination – the earliest title in my own library is on the subject of landline and submarine telegraphy, and dates from 1878. Each book will provide a 'snapshot' of what was often the 'state-of-the-art' technology of the time.

Continuing research over the ensuing years has of course improved our knowledge, and you will find explanations in the old books which we now know to be untrue – and even occasionally downright rubbish! However, much more material is still valid, often providing a useful introduction to topics which present-day texts can tend to over-complicate.

I could not begin to list all the thousands of books on radio engineering that have been written since the turn of the century, but I shall try to pick out a handful of the most interesting and useful. You should be able to pick up any of them second-hand.

On the general theory side, the *Admiralty Handbook of Wireless Telegraphy* is arguably the best known, many of today's more mature engineers, technicians and enthusiasts (myself included) having been raised on the 2-volume edition dated 1938. Produced under the editorial direction of a naval officer called Louis Mountbatten, it contains some material (for example on wire aerials) which has never been bettered for its

clarity of explanation. Because it was reprinted in large quantities until well after the Second World War, the *Admiralty Handbook* is quite widely available on the second-hand market.

For a comprehensive treatise on valves, and the design of valved receivers and audio equipment, together with their associated loudspeakers and power supplies, etc., there is none better than the *Radio Designer's Handbook* by Langford-Smith, published by Iliffe. No valved-equipment enthusiast should be without a copy on their bookshelf.

Another standard title from Iliffe is Scroggie's *Radio Laboratory Handbook* (*Radio and Electronic Laboratory Handbook* in later editions), which explains the features and use of a wide range of test instruments. It also includes circuits for DIY versions and add-on bits and pieces, and gives guidance on setting up a lab, recording and analysing results, etc.

For circuits and servicing data on domestic radio and TV receivers, the *Radio and Television Servicing* series of volumes published by Newnes (later taken over by Macdonalds) is probably the best known. Be warned, though, that putting together a set of these can be a frustrating exercise, since between 1950 and 1961 no fewer than ten editions were published, each comprising anything between one and seven volumes. In each edition, the new season's sets were added, some information on earlier sets was repeated while some was deleted. The snag is that no publication dates or edition numbers were included in any of the editions produced over those years. To take an extreme example, a volume covering radio sets from 1955-56 could have come from any one of six editions.

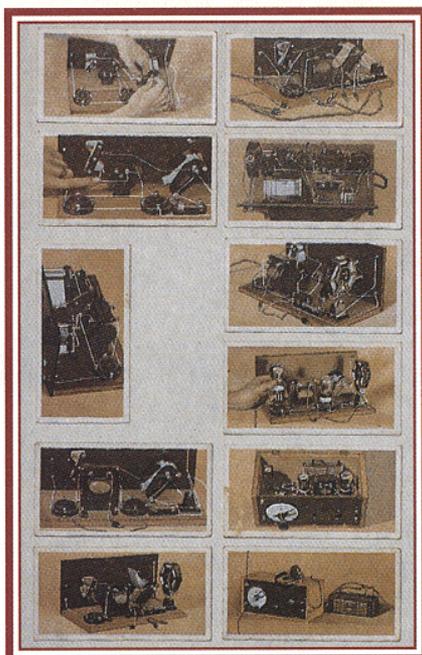
Look out, too, for books from the pens of the likes of F. J. Camm, John Scott-Taggart, Ralph Stranger and F. E. Terman – and for almost any of the annual 'yearbook'

or 'pocketbook' publications from the early radio years.

Although a single edition of a textbook informs us as to the state of technology at the time of publication, the development of technology with the passing of the years can be traced by a study of succeeding editions of a book. A glance through several year's worth of technical magazines can also provide us with similar information. Magazines have the dual advantages of being able to report more quickly on new developments than books can. They also carry (sometimes fascinating) advertisements, in which manufacturers proudly proclaim their new models and developments. Many textbooks also commonly carried advertisements at one time – even that august publication the *Admiralty Handbook* – but more recently the practice has virtually ceased.

Advertising and Display Material

Advertisements in magazines and books have already been mentioned, but radio manufacturers have also, over the years, produced much in the way of posters and displays intended for use in shop-windows, at exhibitions, and so on. Being largely composed of paper or card, such material has unfortunately for the most part been destroyed, and its rarity imparts a high price to that which has survived.



A set of 25 cigarette cards issued with Godfrey Phillips cigarettes, giving full step-by-step instructions on how to build a 2-valve (detector plus audio amplifier) receiver. They carry no date, but were probably produced around the mid-1920s.

Cards

Anyone familiar with amateur radio will have come across the often colourful and inventively designed 'QSL' cards exchanged between two stations in acknowledgment of a radio contact between them.

('QSL' is a radio procedural code meaning 'I acknowledge receipt'). Collections of QSL cards – for example those received by early amateurs famous for their pioneering research and experimentation – are much sought after by some enthusiasts. There is also scope for 'theme' collections, such as the cards related to Morse communication featured in a series currently appearing in *Morsum Magnificat*, the Morse magazine published by G. C. Arnold Partners, 9 Wetherby Close, Broadstone, Dorset, BH18 8JB.

There have been other forms of cards with radio associations. For example, there was a set of playing cards for a game similar to 'Happy Families', which was based on the early UK national and regional broadcasting stations rather than tradespeople.

Then there were sets of cigarette cards, patiently collected packet by packet, which gave fully illustrated instructions on how to build a radio receiver. These last two categories, together with occasional postcards which have appeared on radio topics, are quite rare, and you will be very fortunate indeed to come across any being offered for sale. Keep looking, though, for you never know your luck!

Next Month

In the fourth and final part of this series I shall be looking at the methods and materials involved in the restoration of vintage radio sets, how to maintain an original appearance, and the pros and cons of making modifications.

THE FASCINATION OF VINTAGE RADIO



Part Four Preservation and Restoration

by Geoff Arnold

Getting the equipment is one thing, but unless you are extremely lucky it will need at least some restoration work done on it – even if it is nothing more than a thorough clean of the cabinet. Restoration work can be a very fulfilling pursuit, as a radio receiver that has spent over forty years mouldering in a loft slowly becomes transformed into a fine example of its genre, like a Pheonix risen from the ashes!

Servicing the electronics is just one area...

You may start out with the idea of buying only well-preserved vintage radio sets, or those that are already refurbished, where the hard work of cleaning, repair and restoration has already been carried out by someone else. Sooner or later, though, you will find yourself buying an irresistible bargain in a state very much less than perfect. You will then be faced with tasks involving skills appropriate to several different trades.

Important decisions will need to be made. First, should the set be refurbished to a state compatible with its age – in other words, what it might have looked like had it been lovingly looked after since new – or should it be made to look as if it had just been unpacked from its carton for the first time? There are arguments for both approaches, and to some extent the choice depends on the material and finish used for the cabinet. Plastic, painted metal or Rexine/leatherette-covered cabinets can usually be restored 'as new' without looking too out of place. Polished or varnished wood can be a very different matter, however.

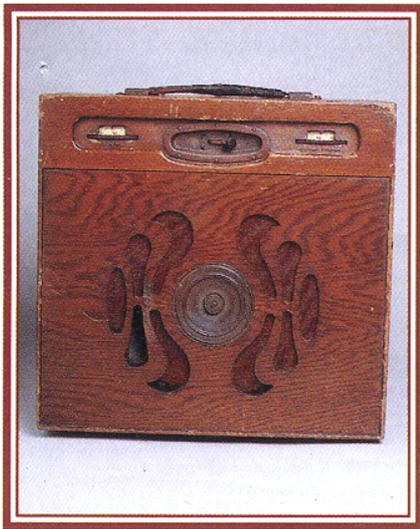
I recently saw a 1929 Marconiphone receiver, shortly after it was rescued from the loft of a Wiltshire farmhouse in a terrible state, with scratched and peeling veneers, tattered loudspeaker fabric and leather carrying handle, and internal damage to components and woodwork due to past sulphuric acid leaks from the low-tension accumulator. Six months later, I was privileged to see that same set following complete restoration by its young owner.

Two faulty inter-stage transformers, and the voice coil of the moving-iron loudspeaker, had been painstakingly dismantled and rewound. All metalwork and components had been cleaned, and perished wiring replaced. The cabinet back, which had suffered most damage, had been replaced by well-seasoned plywood salvaged from the bottom of an old desk-drawer. The whole cabinet had been completely stripped and repolished, and a new 'Marconiphone' transfer applied. Topped off with a new carrying handle, the whole set was in virtually original showroom condition and a joy to behold – it sounded good, too!

Not every wooden cabinet restoration job is so successful, for many modern polishes and varnishes tend to exaggerate the grain pattern of the wood or veneer, imparting a really 'cheap and nasty' appearance to the finished job. For that reason, it is best to keep work on such cabinets to the very minimum required, unless of course, you happen to be a furniture restorer by profession.

Plastic cabinets of the old-fashioned Bakelite variety can be cleaned and polished very successfully using a preparation originally made for use on the old black Post Office telephones, which is still available from specialist outlets catering for vintage radio and TV enthusiasts.

I would recommend considerable caution if tempted to use domestic cleaning products on vintage equipment, particularly on 'crackle' or 'wrinkle' finish paints, or on similarly-textured plastic cabinets. Household cleaners of the sort that claim to lift dirt on contact may do so, but unfortu-



The 1929 Marconiphone Model 55 receiver mentioned in the text, pictured after a quick dusting down following its retrieval from the farmhouse loft. This 5-valve medium and long-wave battery set cost 18 guineas (£18.90) new, and was the first to be sold with an instruction booklet providing a list of spare parts, presumably to encourage owners to do minor repairs for themselves.

nately they deposit it straight back in the natural crevices of such finishes, so that they look no better once they have dried! My own favourite method is to use an old toothbrush and toilet-soap and water.

With the toothbrush slightly damp, pick up a little soap on the bristles and apply it over a small area, rubbing well into the crevices. Obviously you must avoid getting water into the innards of the equipment. Rinse the toothbrush, shake off surplus water and brush over the same area using short gentle strokes, whereupon you will find the dirt drawn up the bristles as if by magic. Repeat the last step to remove the last traces of dirt and dry off the surface by dabbing it with a piece of terry towelling. Stubborn, greasy dirt may well require preliminary treatment with a stronger cleaner, the residual deposits being removed by the method just described. When cleaning is complete, any remaining traces of moisture should be removed by placing the unit in a warm place, such as a airing cupboard, for 24 hours.

Removing dust from a chassis, or around control knobs, etc., is best accomplished with a clean, dry paint-brush. Removing deposits of oil or wax from overheated capacitors will require solvents such as white spirit or methylated spirits – again, take care that they do not get into vital parts where they may do damage. It is best to avoid stronger solvents such as ‘switch-cleaner’, which can soften some thermoplastic materials employed in components, unless you are sure there are no such parts present.

Probably the most difficult components to clean are the old-fashioned variable capacitors used for tuning. Dust and dirt between the vanes can cause noise, or even a total failure due to a short circuit. Depending on the spacing between the vanes, careful cleaning with a folded slip of paper or a smokers’ pipe-cleaner may be possible. Alternatively, judicious use of a vacuum-cleaner may do the trick.

Materials for Restoration

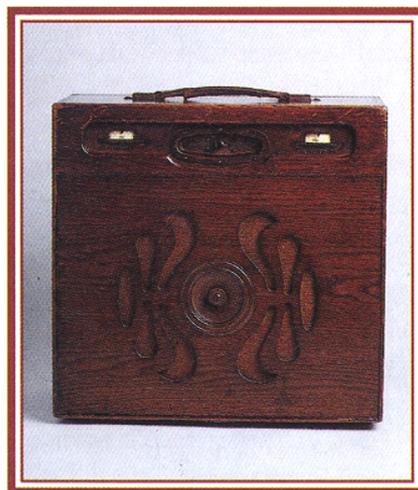
Although it is possible to carry out a lot of restoration and repair work on a piece of radio equipment without too much detailed knowledge of its circuit and technical characteristics, you could soon find the need to identify component values or choose correct alignment frequencies for optimum performance.

The excellent series of books entitled *Radio and Television Servicing*, originally published by Newnes and more recently by Macdonalds, was mentioned in Part 3 of this series. Individual service sheets for vintage equipment are of course no longer available from manufacturers, but they are often on sale at vintage swapmeets, and there are firms specialising in offering photocopies of sheets for both domestic and military/professional equipment. These firms advertise regularly in the vintage and amateur radio magazines.

Obtaining spare parts and components for repairs to vintage equipment can often be quite a problem. There are still some stocks held by enthusiasts and by specialist vintage dealers, who have acquired the contents of radio service departments and the workshops of old-time enthusiasts.

Cabinet parts are probably the most difficult items, since it is near-impossible to produce acceptable substitutes for broken, damaged or missing originals. Parts such as fascias and control knobs carrying legends which have been moulded or engraved and then filled with paint can usually be refinished quite successfully. Those that have been silk-screen printed are a different matter entirely. Tuning dials, particularly the type made of glass with the wavelength or frequency scales printed on the inside face, can be wiped totally clean in a few seconds by the injudicious use of the wrong cleaning methods and materials! Where the ultimate disaster has occurred, cannibalisation of parts from otherwise scrap sets may be the only remaining solution.

Electrical components, such as resistors and capacitors, are easier to substitute with present-day components, since the modern version will always be smaller, and can usually be fitted inside the emptied case of the original component to preserve the set’s original appearance.



Another Marconiphone Model 55 (unfortunately not the one shown in the ‘before’ picture!), restored in all its glory.

Materials like loudspeaker cloth, and original or reproduction manufacturers’ cabinet transfers, are still available from dealers advertising in the vintage radio press.

Programme Material

If your aim is to have a working broadcast receiving set at the end of your restoration work, the you need programmes – radio or TV – to reproduce over it. There are still transmissions on medium and long waves, of course, although they’re not the same stations whose names appeared on the tuning dials of bygone days.

Television programmes are another matter altogether, for although the vintage period for TV sets has now edged forward into the 625-line era, most are still from 405-line days, and as mentioned in Part 1 of this series, all 405-line transmitters closed down some years ago. The only way round this problem is to use a small modulator/transmitter operating on the appropriate frequencies, plus a video player and tapes of 405-line programmes.

To Modify or Not...?

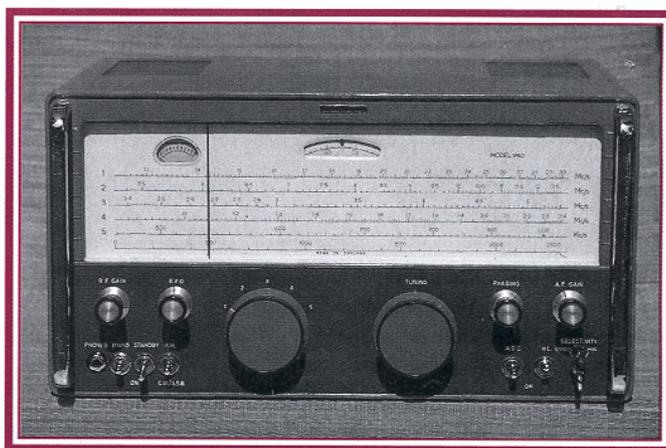
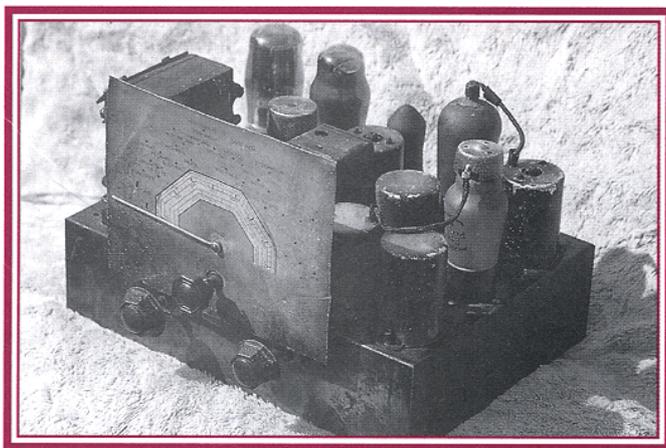
In general, broadcast receivers do not invite modifications, except where it is necessary to substitute a different valve for a type no longer available. This may necessitate changes to component values to give the supply and bias levels required by the new valve, and sometimes also a totally new valve base, with connections transferred to the appropriate pins.

Communications equipment, whether originally designed for military or other professional markets, or for the amateur market, is widely modified. This might involve changes to power supply arrangements, for example replacing the original 28V DC or high frequency AC supply arrangements in ex-aircraft equipment, or changing frequency coverage, as in private mobile radio (PMR) VHF equipment modified to work on an adjacent amateur band.

Communications receivers from all but the final years of the valved era tend to be notoriously ‘deaf’ on the upper HF bands. Many have been fitted with pre-amplifiers to boost performance on the 28MHz (10m) amateur band, but others have had front-end valves replaced with more modern high-gain types, accompanied by component modifications. This is all well and good where the owner wants the satisfaction of using a vintage set, but yearns for a more modern standard of sensitivity. For the purist collector, such modifications are anathema, and in fact there are some who devote their time and energies into reversing the modifications, restoring sets to their original state. Some modifications have proved so popular in the past that no unmodified sets now exist!

Round-Up

This series has really only scratched the surface of the subject, but I hope that it has given some idea as to why people find vintage radio so absorbing. As with any interest that centres upon the exploits and artefacts of bygone days, there are several reasons.



Even in these days of constantly developing technology, there is much to be learned from the exploits of the pioneers. What shaped their character and development? What technical, commercial and political constraints did they have to fight their way through? A good set of encyclopaedias will provide an introduction to the backgrounds of these pioneers, but a deeper understanding can only come from reading some of the many specialist books and biographies which have been written over the years.

The personal reminiscences of the less famous can be no less fascinating. They will often present a user's view of technology, sometimes even giving an insight into where the famous names got it wrong on occasion – no matter how famous or how lowly we may be, we all make mistakes! Such reminiscences generally tend not to warrant the interest of book publishers, with their high production costs, but do appear regularly in specialist magazines such as *Radio Bygones* and *Morsum Magnificat* (further details of both magazines from 9 Wetherby Close, Broadstone, Dorset BH18 8JB).

It may be that you have personal memories of the equipment of bygone days – a radio set owned by your parents when you were a child, perhaps. Coming across an example of that same model today can be quite an experience, indeed a most salutary one if the set happens to be preserved in a museum. There is no more potent reminder of the passage of years!

Collecting sets which evoke personal

Above left: Some vintage receivers have suffered simple indignities such as dust, damp and woodworm. Others fare far worse, like this smoke-blackened chassis from an Alba Model 540 awaiting restoration and fitting to a new cabinet, following its rescue from a house-fire.

Above right: Sometimes you can have a lucky find, as with this 30-year-old Eddystone 940 communications receiver from the author's collection. Following the removal of layers of dust, including a complete strip-down of the front panel assembly to clean the tuning scale and window, it required only the replacement of one cracked control knob and a quick tweak of the RF and IF alignment to restore it to near-mint condition.

memories, restoring each one to working order and preserving them in your home, can be a source of great personal satisfaction. Some friends may well dismiss such relics as just so much junk, and even go so far as to question your sanity. Do not be dismayed, for other friends will undoubtedly admire your collection, expressing a yearning for similar reminders of their younger days.

This may give you the idea of taking up the restoration of sets for other people. It can make money for you, though it can be hard work too. If you enjoy working with your hands, converting an object worthy only of consignment to the local tip into a working thing of beauty, this could be a rewarding pastime for you. Do not expect to make your fortune at it, though!

Today's Junk – Tomorrow's Treasures?

If you have the yen to assemble a wider collection, illustrating some period or theme of the development of radio technology or design, remember that today's collectibles were once the 'state of the art', and by extension today's 'latest thing' will all too soon become history.

Circumstances have changed, of course. Mass production techniques now allow many, many thousands of an item to be made, so that the likelihood of it becoming a rarity in the future are greatly reduced compared with the sets from the earliest days of radio. On the other hand, today's 'throwaway society' means that sets replaced simply because they do not provide the latest facilities or conform to the latest fashion trends, are likely to be thrown out, rather than tucked away in the loft or cellar as was done in days gone by.

Keep an eye open for equipment trends; take note when last year's bright idea is branded an obsolescent failure. Probably the most fertile ground of recent decades has been in superseded audio and video recording methods. To name but two examples (after all, I don't want to give all my ideas away), how about 8-track cartridges and the original Philips VCR?

The car boot sale, that modern phenomenon, is a happy hunting ground for discarded domestic technology. But don't tell everyone what you're looking for. We don't want to push the price up just yet, do we?