

# 'TECHNICAL SHORTS'

by Gerry O'Hara, G8GUH

**'TECHNICAL SHORTS'** is a series of (fairly) short articles prepared for the Eddystone User Group (EUG) website, each focussing on a technical issue of relevance in repairing, restoring or using Eddystone valve radios. However, much of the content is also applicable to non-Eddystone valve receivers. The articles are the author's personal opinion, based on his experience and are meant to be of interest or help to the novice or hobbyist – they are not meant to be a definitive or exhaustive treatise on the topic under discussion.... References are provided for those wishing to explore the subjects discussed in more depth. The author encourages feedback and discussion on any topic covered through the EUG forum.

## Some Thoughts On Restoring Eddystones (and other radios...)

### What is 'Restoring'



Some radios are perhaps just a bit toooo far gone for restoration – above is a 1930's Philco Model 20 cathedral set now on display at the SPARC radio museum in Coquitlam, BC as an example of what can happen if you neglect the storage conditions of your radio... Right: what the poor thing used to look like

The term 'restoration' can mean many things to many people. Another similar term is 'renovation', though rarely is this term applied to radios. Both terms imply effecting some degree of repair and maintenance, whether that is cosmetic, mechanical, electrical/electronic or a combination thereof. 'Renovation' implies adding new parts or attempting to improve the receiver's operation in some way. There is a school of thought that would reserve 'restoration' to mean undertaking whatever work is necessary to a radio to bring it to its original ex-factory appearance and performance specification; anything less merely being a degree of repair or maintenance. To do this degree of work, however, for most 40-plus year old communications receivers that have seen lots of use (and probably abuse) would usually mean completely dismantling the set and rebuilding it – you could then of course argue that you no longer have the original set at all!

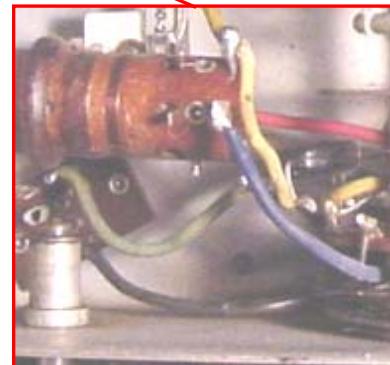
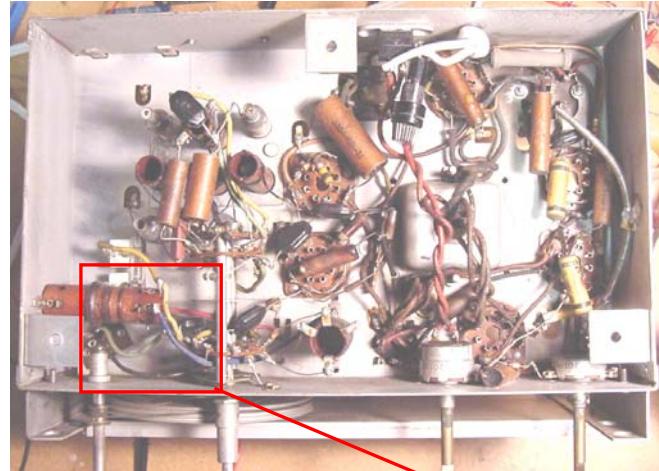


I for one am not in that school – I use the term somewhat loosely and my 'restoration' of any particular set reflects the amount of effort that I see fit in imparting to it to deliver the results I desire for that set, either cosmetically or

performance-wise. If I value a particular set highly (not necessarily in monetary terms), the level of restoration effort generally goes up. Thus, some sets I restore may be partly dismantled if there is a need to resolve some mechanical fault or if dirt and grime has penetrated every nook and cranny and/or I want the cosmetic appearance of the set to be of a very high standard, both internally and externally. Complete dismantling of the electronic circuitry is very rarely warranted: the closest I came to this was the replacement of every fixed-value capacitor and about 80% of the resistors in a 1939 domestic GE console radio (chassis, right, before restoration) as they were all way out of tolerance/open or short circuit,

also the replacement of some rubber-insulated wiring where the insulation had turned very brittle (enlargement, right) and where it was largely missing off many of the wires that had been subject to heat. Even so, all but one valve was re-useable and the all-important RF/IF/AF and power transformers were ok (though I did have to improvise for the missing dynamic speaker coil that acted as the HT choke). Some cosmetic details need to be carefully evaluated, particularly when you look at them every time you use the radio, when even minor defects can become very annoying, eg. the fingerplate on an

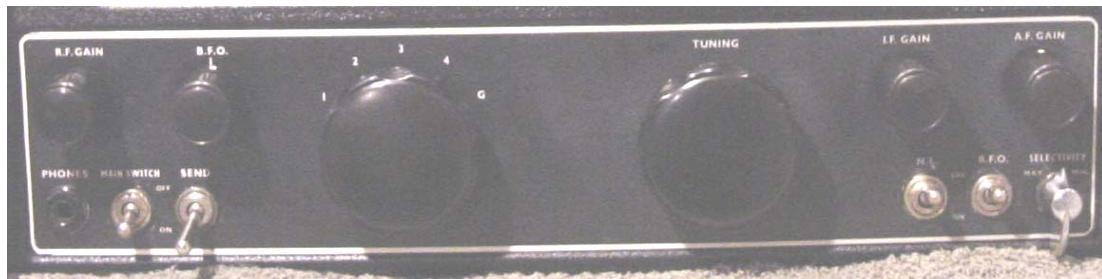
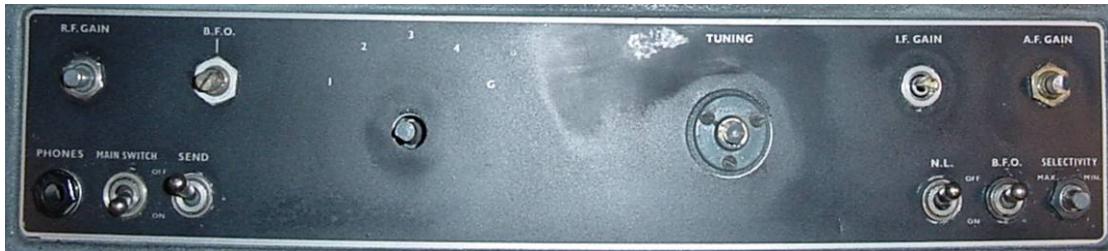
Eddystone is a major visual feature - this item is subject to day to day wear from operating the controls and therefore sets that are half a century old usually show signs of



Above: fingerplate off an S.940 before any restoration work – note the heavy scoring associated with the bandswitch and typical circular scratches around the other control cut-outs (especially the RF gain)

wear, maybe even to the point of bare metal showing through around the most-used controls, as well as score marks around the switches

where their bezels have been carelessly removed/replaced during past servicing efforts. The question then is should you try to obtain a NOS ('new-old-stock') part, eg. from Ian



Above: fingerplate off an S.750 before any restoration work – note the 'bloom' on the surface caused by the application of a lacquer at some point in the set's life (probably in a misguided attempt to freshen it up), also the wear above-left of the tuning knob. Below: the same fingerplate re-fitted to the set after cleaning off all the old lacquer and careful touch-up with a permanent marker and silver felt-tip – not quite as-new, but its good enough to be on my desk and used every day

Nutt for Eddystones, so the appearance is as-new, try to improve the appearance of the original fitment by carefully touching it up, re-finishing the original completely, ie. stripping, painting and replacing all the markings with transfers, or simply live with the worn fingerplate and accept the wear as 'patina'? The answer is simple – it is really 'your choice' depending on what your aspirations are for that particular set.

### Where to Look for a Restoration Subject

Before you can restore a set, you need to acquire it – the way this is undertaken is different for every individual's circumstances: there are 'local', 'national' and 'global' sources.

By 'local', I mean friends selling sets, car boot sales, house clearance sales, near-by amateur radio rallies, local radio club sales, flea markets, local amateur radio dealerships, second hand stores, etc. and even adverts in the local 'rag' for sets that are within a reasonably short travelling distance. The main criteria here is that you have the opportunity to inspect the set before you buy, can haggle on the spot over price – pointing out defects etc. – and cart



it home without forking out for shipping, apart from your local travel costs. This is definitely the best way of buying a set, but it is a bit ‘pot-luck’ as to what will turn up and when. For myself, being located near Vancouver Canada, this affords little opportunity to pick up Eddystone sets – if you live in the UK, things are a bit different...



‘National’ sources could include sets that are advertised in journals like RadCom, ‘For Sale/Wanted’ adverts on the EUG website, amateur radio dealerships and amateur radio rallies that you would think twice about travelling to due to distance, EBay or other internet buy/sell sites within your own country, sometimes offering a pick-up option instead of shipping the item etc. Some of these sources may allow a personal inspection before buying

- though with greater effort on your part - others would not. On an EBay auction, you are committed to buy if you ‘win’ unless the seller can be demonstrated to have misled or falsely represented the goods on offer, ie. *caveat emptor* applies. There will also be additional costs associated with these sources, either in the form of shipping, packing and possibly ‘handling’ charges or personal long-distance travel costs. Shipping costs can be significant, even within the same country, for large heavy items such as Eddystone sets. For me, located on the west coast of Canada, the term ‘National’ has quite a different meaning than when I used to live near Nottingham in the UK...

‘Global’ sources are really limited to those where pre-buying inspection is impossible, apart from looking at photographs and written descriptions of the set. These sources include EBay sales in other countries, or things like ‘For Sale/Wanted’ adverts on the EUG website that are for sets in another country. I have found that EBay sellers will often provide additional photos if requested in plenty of time before the auction ends, will answer straightforward questions about the radio, and provide quotes on shipping costs and any charges for packing and/or insurance. The latter often puts me off buying bulky, heavy items when added to the import duty and taxes.

I collect and restore radios other than Eddystone, mainly wooden-cabinet US and Canadian domestic sets from the 1920’s and ‘30s, as these are relatively easy to obtain ‘locally’ (flea markets and the like) and I quite enjoy the ‘cabinetry’ involved in restoring the cases, even though my wood-working skills are only marginally better than my metal-working prowess... Another good thing about these type of sets is that they can be placed around the house with my wife’s blessing, as for some reason that I cannot quite fathom, my Eddystone sets are not allowed in the lounge...



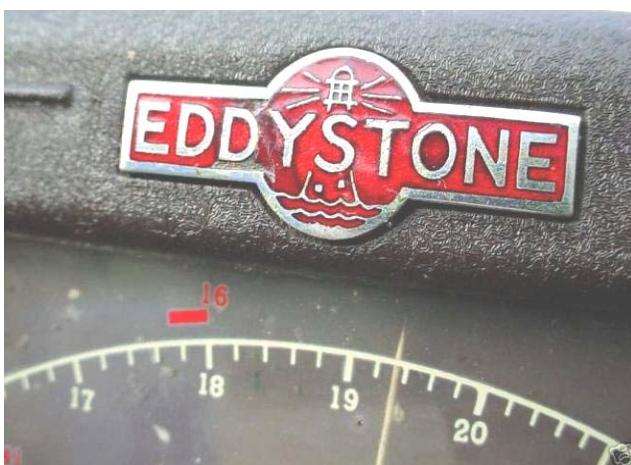
### Things to Look Out For When Buying

These fall into two ‘camps’ – the cosmetic/mechanical condition, including the case, knobs, dial plate, gear-train, fingerplate etc, and the electronics, including the presence of all major electronic parts, especially ones that are unique to that radio, eg. IF transformers, BFO unit, tuning gang, power transformer, chokes and the like. The absence of one or two valves is not a concern, but if they are all missing it can be a costly undertaking to replace a full set at once. A missing valve may provide a clue to the demise of a set of unknown provenance, though equally it may have been removed to be fitted in another piece of equipment. The cosmetic condition of the front panel and case paint finish is an obvious thing to check, but don’t fret too much if this is not too brilliant as re-finishing to a good standard is not that difficult or expensive.

In EBay adverts, look for comments like ‘power lead is cut off so I could not test the set’, ‘I don’t have an aerial so could not test the set’ or ‘I know nothing about radios so did not try it out’. At face-value, these sort of statements may indicate naivety on the part of the seller, but may also be deliberately misleading – lets face it, many sellers would likely be curious as to whether the set worked as they could expect more for it if they could say it was in ‘working condition’. Statements like ‘the set lights up but makes no noise – probably needs a longer aerial’, ‘I tested the set and a loud hum was heard’, ‘a minute or so after I switched the set on a bang and smoke appeared’ or ‘crackles and hums a bit but no programs heard’ are at least probably honest and may give you a clue as to what to expect - they also put most folks off and tend to result in a much lower price in the auction. Carefully examine power transformers and chokes and their environs – look closely for tell-tale blackening or waxy deposits on or near these components (easier ‘in the flesh’ than on photos) – I once bought a 1920’s Atwater Kent set with a power unit that must have been boiling hot at one point in its life, literally - the tar surrounding the transformer and choke had poured out and covered the base of the chassis with a hard black coating (photo, below right) - this was not visible in any of the six or so (I suspect) very-carefully-taken set of photos on the EBay advert: once caught, twice shy... Also, look out for possible water damage, rusty chassis, ‘water marks’ in wood cases, peeling veneer and the like, which indicate very poor storage conditions for extended periods, as it is likely that many other issues will crop up as a result, such as corroded inductor windings, poor switch contacts etc.

The main thing is that all ‘bespoke’ parts pertaining to the set should be present as



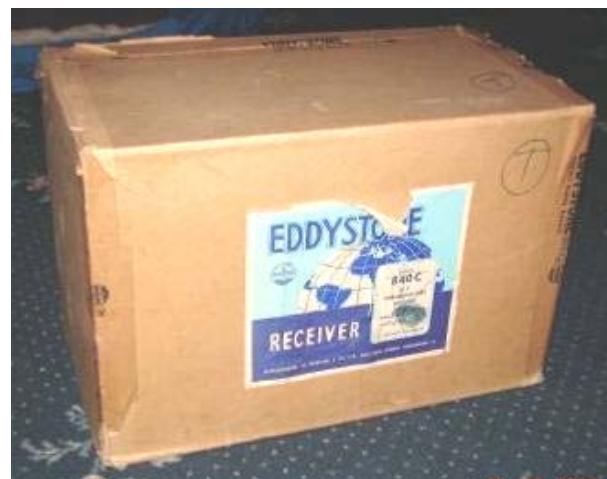


these are generally the hardest parts to obtain elsewhere. If too many of these parts are missing or damaged, then the set may still be of some worth to you as a 'parts set', but unless it is a very rare model, or you specifically need parts from it to repair another similar model and you have been looking out for one for months/years, its value will be much reduced. Two or more such 'parts sets' may be combined to make a complete set however and this should be considered as a possibility.

## Price

A good question this, as many factors come into play: most sets can be purchased at lower cost from a local source or private sale than from an EBay auction where the whole world and its aunty is watching. The condition of the set and whether it is working or not is obviously important, with unmodified sets that have excellent cosmetic appearance commanding a premium - Eddystone owners frequently modified their sets by drilling holes in the front, side or back panels to add extra switches and other controls, RF and audio connectors, S-meters etc – all of which no doubt seemed like a good idea at the time but which significantly lower the desirability for collectors/restorers. By way of an example, at the time of writing this article, an S.750 in reportedly good condition just sold on EBay for over \$900 with 20 bidders, whereas another S.750 from the same seller sold for 'only' \$270 with 6 bidders, the latter having had an AGC on/off switch added by a former owner which had resulted in a slot being cut in the side of the case. Also, some Eddystone sets are much more scarce than others and one thing is certain, no more will ever be made, so rarer sets have a desirability factor attached (over a few months check how

Right: Well, look at that, an 840C still packed in its box – that set must be worth a lot more... (?)



many EC10's or S.840 series sets appear for sale on EBay compared with S.730/4's or S.880's). Also, some sets have much better performance specifications than others as they were top-of-the-line sets in their day – again this makes them more special and desirable. Thus, when a set like an S.880 in first class cosmetic and working condition comes up for sale, expect a much high sale price compared with an S.840C with mongrel knobs, extra switches from a previous owners 'improvements', cracked dial glass and a badly scratched case. Common sense really, but I often still get a real surprise at EBay selling prices for some sets and for accessories like bug keys, speakers and S-Meters. I personally tend to go for sets that offer somewhat of a challenge as I get a 'kick' out of seeing a sad old radio nurtured back to life and respectability with some careful thought, planning and much TLC...



Check out the EBay price guide on the EUG web site or do your own research on the web. Remember - at the end of the day, a set is only worth to you what you are willing (or able) to pay for it.

## Finding Parts

Many components used in Eddystone sets, especially those that age and develop faults, can be replaced with readily-available modern equivalents, indeed, modern components are generally more reliable, more accurate in value, are smaller and (should) age better than the originals.

I provide some comments on various components below:

**Fixed-value resistors:** readily available from many suppliers at low cost. The nearest standard value may be used as tolerances were generally quite high for older components, eg. a 470k ohm unit can replace a 500k ohm unit). For appearances, you will find that a resistor with a wattage value of around twice that specified in the circuit details will match the original fitment in physical size and will be more reliable. Be careful using certain resistor types in RF circuits and/or where high voltages are present - see my 'Resistor Lore' article for more discussion on this issue.

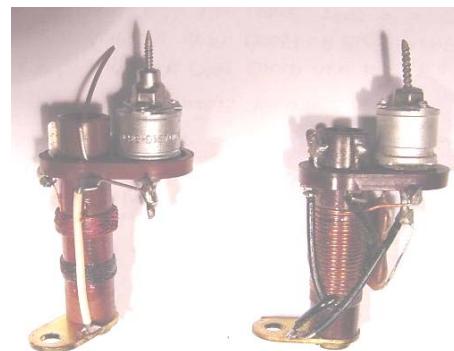
**Fixed-value capacitors:** readily available from many suppliers at low cost. Modern plastic film and ceramic types far out-perform the older waxed-paper capacitors in RF/IF and AF applications, offering lower leakage, improved tolerance, better reliability and often smaller size. The replacement units will, however, generally look completely different to the old parts. If under-chassis appearance *really* matters to you, in many cases these can be installed inside the case of the original part - see my 'Capacitor Lore' article and articles on 're-stuffing' capacitors on the web.

**Variable resistors:** standard values used in many Eddystone sets are still available from some suppliers at reasonable prices. However, a few words of caution are appropriate:

- Before replacing, try to ‘resuscitate’ the faulty part using contact cleaner, eg. De-Oxit, Servisol or Electrolube – I always feel that using the original part is better than a replacement in this situation, even if that means living with minor imperfections (eg. a small click or two when turning the volume up/down)
- do not attempt to replace wire-wound components, eg. as used in RF and IF gain controls, with carbon (composite) track units. The latter are not suitable for any circuit where DC is present – even a few mA of DC can result in problems. Also carbon track units can only dissipate a very low wattage (fraction of a Watt), whereas even the smallest wirewound units can usually handle more than a Watt or two
- some wirewound units fitted to Eddystones are of a bespoke design and actually provide a simulated semi log-taper characteristic (wirewound potentiometers are generally linear-taper)
- make sure that you use a log-taper potentiometer for AF (volume) controls and linear-taper unit for tone controls
- only buy high-quality replacements and make sure the physical size, panel bushing and shaft length/diameter are suitable

**Variable capacitors:** these rarely give problems and ones that do can usually be cured by careful cleaning, lubrication and/or re-adjustment of the rotor/stator plates. If a variable capacitor must be replaced, eg. if it is missing from the set you are working on, or the rotor plates are so badly bent that they cannot be re-adjusted to mesh reliably, then replacement may be the only route. Modern day replacements for BFO and crystal phasing variable capacitors are still made and can be bought from some component suppliers, or look out for suitable parts on EBay. More specialized parts, eg, the main tuning gang, would not be available new from such sources, however, try contacting Ian Nutt ([iandcnutt@msn.com](mailto:iandcnutt@msn.com)), appeal to folks that may have one in a scrap set on the EUG site/forum, or search for a ‘parts set’ of your own to act as a donor.

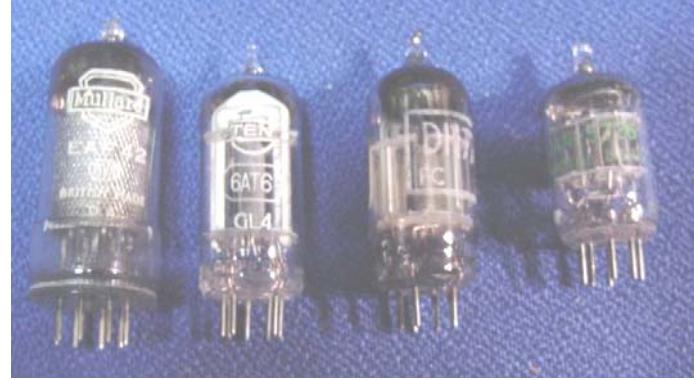
**Inductors:** now we are starting to get into difficult territory – most inductors used in Eddystone sets were bespoke components. Occasionally an RF choke may be used that could be replaced by an off-the-shelf new part, but this is very infrequent. Finding the right inductor in Ian Nutt’s stock or finding a suitable scrap set offer the only options other than ‘roll-your-own’. The latter option is often not as difficult as it may appear in some cases, especially for the higher-frequency coils where fewer turns of thicker wire are



used. Supplies of enamel-coated wire are readily available, however, the ‘Litz’ wire used in lower frequency coils is harder to come-by, but can be reclaimed from coils in scrap sets – even then, reliably soldering Litz wire is problematic. I would advise extreme caution if you are contemplating any rewinding of power-supply transformers or chokes on safety grounds - refer to my ‘Inductor Lore’ article for more information.

**Valves:** Many entering the world of valve radio restoration (Eddystone or not) start out by being concerned that as it is over 50 years since the widespread use of valves, then new ones, or even used ones that still work ok, must be extremely rare. Fortunately, the most

popular types were made in their millions and there are vast quantities of good used, NOS and even NIB valves around, including original Mullard, Brimar and Osram makes, as originally fitted in Eddystone sets. Many NOS popular receiver valve types can be bought for \$5 to \$10 each, though some may command much higher prices. Also, many valve types are still in production, eg. in Russia or China (the Russian-made ones tend to have a better reputation), particularly those used in audio amplifier and amateur transmitter applications, ie. rectifiers (eg. 5AR4), small-signal AF triodes (eg. 12AX7) and pentodes (eg. EF86), audio output (eg. EL34, KT66), together with some RF small-signal and RF power valves (eg. 6BA6 and 6146 types).



**Bespoke Eddystone parts:** By ‘bespoke’ I mean parts that are uniquely Eddystone, as in most inductors and the tuning gang units used in Eddystone sets as noted above. This includes items such as knobs, finger plates, scale plates, gearbox parts, metal castings and the

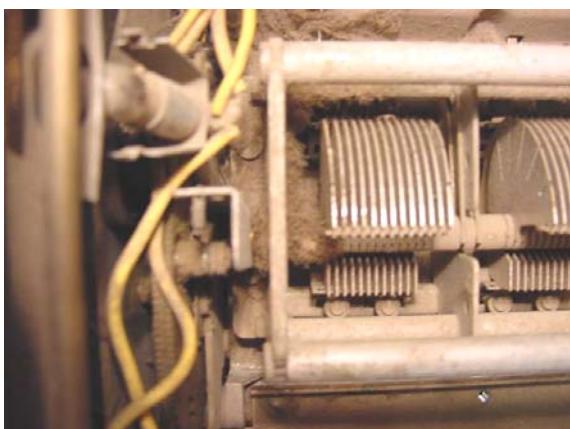


like. I again mention that some new genuine Eddystone spares (and one or two ‘reproduction’ parts, such as brass tuning shaft bushes) may be purchased from Ian Nutt, otherwise the only options are from other sets - so-called ‘parts sets’ or ‘scrappers’, attempt a repair, eg. metal castings may sometimes be glued successfully, but usually not so if the join will be subject to strain, or to scratch-

build/adapt something similar to suit, eg. as I did for my S.940 coilbox cover plate (under construction in the photo at bottom of previous page): your choice, depending on if ‘making do’ is ok for you, or if you are more of a perfectionist...

### First Stage Cosmetic Work

First, remove the chassis from the case and undertake a thorough check of the chassis, including all nooks and crannies, for any loose parts - I nearly threw away some of the parts from the ‘scale linearizing arm’ mechanism in my S.750 as they had come loose and were lodged in the dirt/jammed in-between the frame of the tuning gang and the chassis. Next, remove all valves, inspecting for any



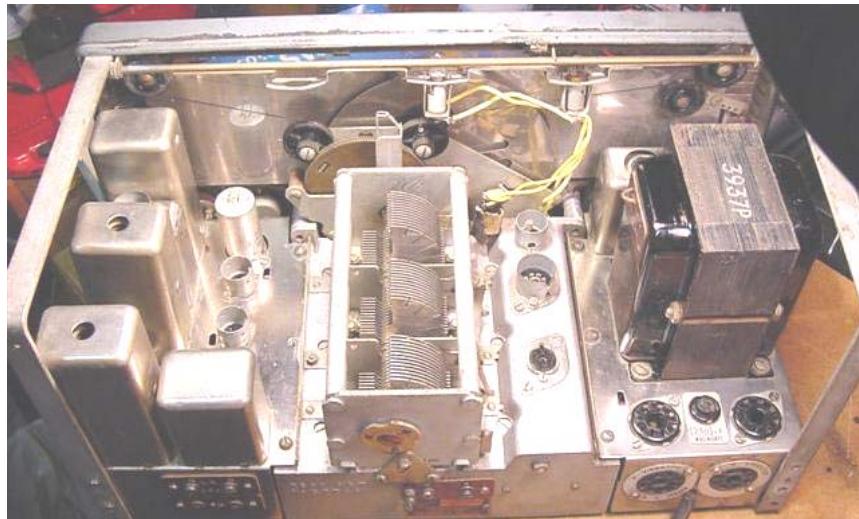
mechanical damage (cracks, snapped-off tip, bent pins etc) or whitened getter, indicating a poor vacuum, and check that each type corresponds to what the circuit/layout diagram says it should be (its surprising how often one or two are incorrect), clean each one (be careful not to erase the markings), including the pins - use a contact cleaner for this and ‘crocus’ paper/small soft wire brush if badly tarnished. I then usually mark each one with the circuit valve number using a fine permanent marker near its base. Store the valves in a safe place. If you have

access to a valve tester, now is a good time to run some function checks on the valves.

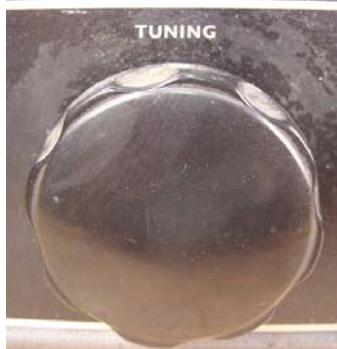
Once you are confident there are no loose parts and the valves have been removed, carefully vacuum-clean the chassis and case, using a small paintbrush to penetrate nooks and crannies. At this stage I also wipe the case and front panel with cotton wool wipes and warm soapy water and then clean the chassis by wiping with alcohol (using Q-tips and cloths) to remove the decades of grime. Use lighter fluid, ‘Goof-off’ (xylene) or similar petroleum-based solvent to dissolve stubborn areas of melted wax if present. Use caution when using any form of solvent however, as these are flammable and toxic – they can be absorbed through vapours and dermal contact, so wear suitable protective gloves and undertake these operations in a well-ventilated environment. Most Eddystone chassis comprise aluminium castings for the RF stage/coilbox section and nickel-plated brass IF/AF and power supply sub-chassis, though some are enamel-coated steel. The

aluminium and nickel-plate brass sub-chassis generally clean up well with the methods described above, though some may benefit from a little carefully applied metal-polish to remove ‘spots’ and any really bad tarnish. Be cautious of using solvents on enameled chassis as they can affect the appearance.

Inspect the valve bases and clean using a spray of contact cleaner if the contacts are tarnished and insert/remove the valve a few times before wiping away excess cleaner. Also, check for any damage to the valve base, such as



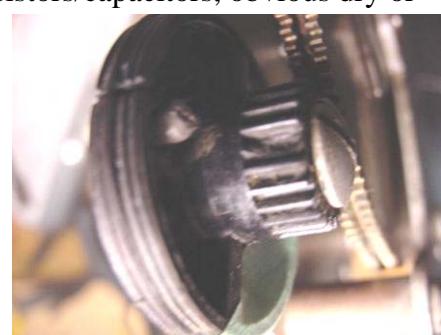
scorch marks or carbonization (‘tracking’) between pins - especially the rectifier - and/or any physical damage. A badly damaged valve base should be replaced.



Remove all knobs and clean these using a toothbrush and soapy water. I always remove the grub screws completely before doing this and apply a dab of oil to them prior to re-installing once the knobs are completely dry – it is often quite amazing how much grime can be removed. Also, re-wipe the finger plate with warm soapy water, as well as the dial glass. Use a fine paintbrush and vacuum cleaner and/or an air compressor to clean between the tuning gang rotor plates.

### Preliminary Visual Inspection

At this point have a close look over the chassis, inspecting for any mechanical damage, condition of the power cord/connectors, if the correct fuse rating and type are fitted (see my ‘Fuse Lore’ article), physically damaged/broken resistors/capacitors, obvious dry or poorly-made soldered joints, bulging electrolytic capacitor end plates, signs of overheating or burning, damaged or perished insulation on wires, shorting components, operation of the tuning mechanism: is it silky-smooth? are all the teeth present on the gear wheels?, do the gears mesh correctly? does the pointer travel the full length of the scale plate? does it ‘catch’ at all along the way? – if so, what on? does the pointer travel extremes correspond with full/zero



engagement of the tuning gang (with the low frequency end corresponding with maximum engagement – yes, I have found this reversed on some non-Eddystone sets before now due to someone's incorrect dial re-stringing efforts...), is the transformer tapping set correctly for the prevailing mains voltage? (double-check this on imported sets), do all grounding points look secure and/or are they corroded?, do all switches work (at least mechanically), including the bandchange switch and, where present, the variable selectivity mechanism (eg. S.830 series), and on some models, is the octal plug with the shorting loops present in the back of the set (eg. S.750). Check also that all the iron-dust cores ('slugs') are present in RF and IF transformers and note what condition they are in.

Now have a close look at the dial glass and the scale plate. The rear of the dial glass and the scale plate are often grubby, harbouring decades of grime, fluff, fly and spider carcasses, etc. If the condition is not acceptable for the desired level of restoration, then some level of mechanical dismantling will be required to do a good job. A bent brush or pipe cleaner can be used with limited success, or even a blast of compressed air.

However, these are not recommended as they do a half-hearted job and can result in damage to the all-important scale plate marking - there is nothing more annoying than a scratched scale plate with some missing markings. The level of dismantling needed depends on the model of set: the older-style sets need more dismantling than the



'MkII' sets. The MkII set case style (early-1960's onwards) allows the dial glass to be removed relatively easily by removing a couple of screws and sliding the end 'cheek' plates away from either end of the glass and then the removal of the dial light support strip (instructions are given in the manuals, eg. the S.830 series), the glass then being lifted out from the top. This operation on the older case styles is more difficult – refer to my restoration articles on the S.750 and S.770/R for details and photos of this operation.

Once the above evaluation is complete, make an assessment of what work is needed to raise the cosmetic appearance of the set to an acceptable level to meet your needs or expectations, what mechanical items need obvious attention and if any wiring or electronic components need replacing as a matter of course due to mechanical damage, 'roasting' or because they are plainly incorrect/inappropriate parts left over from someone's earlier bogged repair attempt(s).

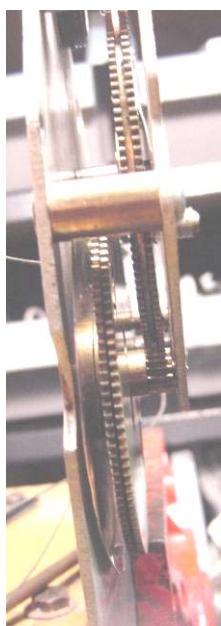
A lightly scuffed case can be buffed up (shoe polish for black crackle-finish cases, T-Cut or similar for the grey enamel MkII cases). Minor paint chips can be touched-up using modellers enamel paints (you will need to mix a few by trial and error to get a good match), though if there are deep scratches and many paint chips and/or rust present, re-finishing should be considered. This can be by sandblasting followed by a powder coat finish at a local paint shop, or a DIY paint spray job. I have tried both with success, though remember, preparation is paramount for satisfactory, long-lasting results.



### Mechanical Inspection and Repairs

The main issue usually of interest here is correct operation of the tuning dial mechanism, although other mechanical defects may be apparent, eg. the set may have been dropped, bending part of the chassis or the carrying handles (check out my S.770/R restoration article), or the mechanical variable selectivity mechanism as present on some models.

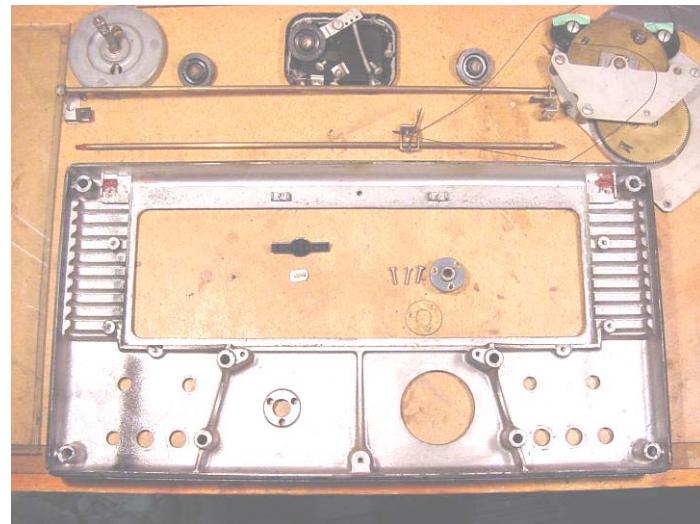
As noted above, the method of dismantling Eddystone sets to allow repairs to the dial



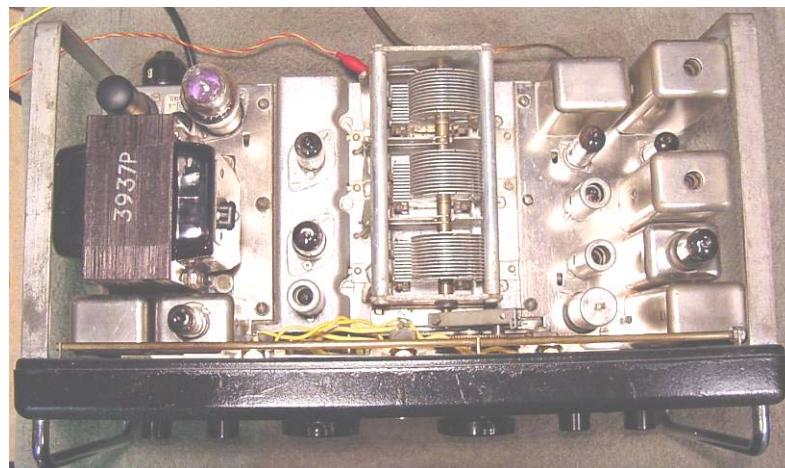
mechanism and or to clean the rear of the dial glass or the scale plate depends on the model, although the principles are the same for many sets. My restoration articles on the S.740, S.750, S.770/R, S.830 and S.940 should be referenced for further details and step by step instructions and tips on how to do this. There are also various articles in Lighthouse (referenced in the articles) on how to re-string dial mechanisms and on repairing spool pulley gears, etc. During disassembly, ensure that all parts are stored carefully, placing screws, washers etc into small containers, preferably separating parts for each sub-assembly so things do not become mixed up. Also, make sketches and take photos to help in the re-assembly process.



When re-assembling, ensure that all parts are cleaned and that the correct type of lubricant is applied only where appropriate. Ensure that no lubricants get smeared onto the friction drive mechanism when greasing the drive shaft and bushing. Also, take extreme care in adjusting the tuning drive flywheel and tuning knob positioning to ensure that the friction drive engages without stressing the drive plate and that only a touch of free front-to-back movement is discernable. I tend to use high-grade light machine oil (not 3-in-One) and molybdenum disulphide (moly) grease as lubricants, although white (lithium) grease can be used, especially for plastic parts. Be sure to check that the main tuning gang ball bearings are cleaned and re-packed with moly grease and that the spring contact arms are cleaned and lubricated with De-Oxit or other contact cleaner. Use any lubricants very sparingly.



Once all mechanical repairs have been effected and you are happy with the results, re-install the valves (or only the rectifier valve if power supply smoothing capacitor re-forming has yet to be carried out) and move on to the safety and electrical checks.



### Safety Checks, Electronic Inspection and Repairs



Before you even think about plugging the set in to the mains (never mind switching it on!), re-check the mains lead, connectors, fuses etc, ensuring they are safe to use. Pay particular attention to where cables pass through holes in the chassis or enter plugs, looking for frayed, broken or worn insulation, replacing as necessary.

**Remember - Safety is paramount: valve radios contain lethal voltages and must at all times be treated with respect and caution. Therefore always double-check whether power is being applied to the set, on any temporary connections made for**

**testing purposes, and never hold on to/touch the receiver chassis with one hand when probing around with the other (put your ‘spare’ hand in your pocket). Even after power is removed, electrolytic capacitors can hold a charge for long periods that can shock you when your guard is down. Safety is paramount.**

The reader should now reference the receiver manual, my other ‘Tech Short’ articles, eg. those on Eddystone Circuits, Fault-Finding and Alignment, the various restoration articles on the EUG web site, along with the many cited references therein for information on identifying receiver faults and repairing them, including the **all-important safety checks and power supply smoothing capacitor re-forming**. Details on undertaking such work are not repeated here, however, I include below a few comments that are more of a ‘restoration’ nature rather than purely ‘repairing’.



(compare with the domestic valve receiver chassis on page 2).

Hallmarks of this care include:

- Interconnecting wires in neatly tied ‘looms’
- ‘Linear’ above-chassis layout of valves, transformers, IF cans, chokes and other major items

Eddystone often made a work of art out of wiring their sets - the workmanship really shows through (see the below-chassis photos above and left of an S.680X currently on my workbench) - this is seen especially in the higher-end ‘professional’ grade sets like the S.730/4 and S.830 series, though even ‘medium-priced’ sets such as the S.940 are very well constructed and neatly-wired

- Careful alignment of component axes, ie. resistors and capacitors generally aligned parallel with each other or at right angles
- Standard colour-coded wiring:



AC Mains	Grey
HT	Red
Anodes	Light Blue
Grids	Green
AGC	Pink
Heaters	Yellow
Negative to Chassis	Brown
Chassis Potential	Black
Other	White

- Neatly-dressed wiring, eg. the component wires being bent carefully to allow the component alignment noted above and hook-up wires all carefully dressed
- ‘Lay-on’ soldering technique instead of ‘wrap around’: this makes for much easier component replacement

In order to preserve this desirable feature of Eddystone sets, the restorer should consider these issues and make every effort to preserve the integrity of the layout when replacing components: select appropriately sized components, carefully dress the component wires, bending to shape before fitting (preferably mimicking the original dressing style), use the correct wire colour coding, taking care to make neat lay-on soldered joints, etc.

One of the less ‘stellar’ features in some sets is the poor accessibility of various components,

especially in the RF, LO and mixer stages of many models (ie. in the RF sub-chassis) and in the IF strips of the S.770/R and S.770/U series (photo, right). In the case of the RF units, this is an



artefact of the construction techniques used, where some components were mounted on the valve bases prior to assembly and then the remainder of the components added in ‘layers’. Thus, to easily access some of these components, some temporary disassembly may be required to avoid ‘collateral damage’. The only other real ‘quirk’ is the BFO units, where most of the BFO components are mounted in an IF transformer-type can, requiring the unit to be detached from the chassis and its wiring connections to be

removed for access. This makes interim checking of the unit to check on the efficacy of your repair efforts difficult without some temporary lash-up wiring.

### Second Stage Cosmetic Work

Once the scale plate has been removed/accessed, this can be cleaned using a weak detergent/warm water solution, dabbing/wiping very gently - try your technique first on a less conspicuous area to make sure it will not damage the scale plate finish and/or remove the markings. DO NOT USE ALCOHOL OR OTHER SOLVENT on the scale plate or you will likely cause permanent damage to it. The dial glass can be cleaned with the same soapy water, dried and then finished off with a commercial glass cleaner and then polished clean.

Minor scratches/scores on black fingerplates may be rendered (almost) invisible by the careful application of a black permanent marker to the scratch. The silver line and even the text can be touched up using a silver marker pen if you have a steady hand. If this type of detailing will not produce acceptable results, then the options open to you are to obtain a replacement (Ian Nutt has some new and used ones for some models), one from a 'parts set', or to strip and re-finish your old one completely, using transfer lettering – this could be quite a challenge to get right, or if you are really clever, try using computer and printing techniques to replicate the original. However, unless the old fingerplate is really bad, I think I would rather live with the 'patina' (or get a new/better used one...).



Knobs were cleaned in the first stage cosmetic work. Their appearance can be improved further by applying a Carnauba wax, 'Armour-All' type of cleaner/polish, or one of the specialty bakelite/plastic polishes available from radio restoration suppliers.

Black crackle finishes can be cleaned using warm soapy water and then given a coat of black shoe polish if the surface still looks a bit dull and lack-lustre. If the finish is really bad, scuffed and scratched, or has been completely 'knackered' by a half-hearted strip and paint job, as in my S.750, then consider applying a black crackle spray paint, but if you do this ensure you undertake adequate surface cleaning and preparation first and, if re-finishing a front panel, strip it down completely of all parts (refer to by S.750



restoration article and see photo at bottom of the previous page). An alternative is to have the case and the (stripped-down) front panel re-enamelled/powder coated at a local paint shop. I had the badly scratched case for my S.830 powder coated for a mere \$30 and am currently having a case for my S.750 coated with crackle finish enamel.

Be very careful when re-assembling the controls onto the front panel: always use a protection ‘washer’ between your nut driver/pliers and the finger plate when tightening-up retaining nuts on potentiometers, variable capacitors and switches (especially the switches with those pesky round knurled nuts). Also, do not over-tighten the grub screws when re-fitting the knobs.

### Maintaining Your Set(s)

Do not store your radio collection in a room(s) that have a high ambient humidity or where the temperature experiences large swings. These conditions are asking for long-term trouble, even in ‘tropicalized’ radios such as Eddystones. Problems arise due to atmospheric moisture condensing onto metal surfaces resulting in corrosion and from it

being absorbed by some components, eg. old wax-coated paper capacitors and some resistors. The dreaded ‘green lurgy’ or ‘green spot’ is an extreme form of such corrosion which manifests itself on coax-cable screen braid, transformer and coil windings etc – this is a good source of intermittent faults and it is often unseen as it develops because the problem is hidden from view inside a screening can or shroud.

Valve radios should be powered-up for at least an hour or so each month. This simple expedient re-forms the electrolytic capacitors in their circuits and generally ‘airs them out’. Be sure to work each of the controls once or twice to check that they are still functioning ok. This exercise will pay dividends in the long-run and should not be a chore to a radio-enthusiast, but its amazing how quickly time flies by and we all have our favourite sets that get used more than the others.



At the first sign of a fault developing, make a note of it and try to get around to investigating and repairing it as soon as possible – little things can develop into major disasters all too quickly: one day it's a slightly distorted output, leave it alone for a few hours and you may end up with a melted audio output valve and worse, a burned out mains transformer if you are really unlucky... all for an hour or two of your time and a 50 cent coupling capacitor.

## Keeping Records

Consider keeping a file on each of your radios. I use a loose-leaf binder system that includes details of where/when acquired, price paid, a copy of the manual, a couple of copies of an enlarged version of the circuit diagram annotated with voltages (either taken from the manual or as measured in my set when working well), notes as to what components were checked for value (and what was measured) during electronic checks,



which ones were replaced (with date), copious photographs (I also have these electronically on hard disk and on CD), alignment or measurements performed, sketches of things like dial cord set-up and alignment of gears etc, copies of extracts from Lighthouse or other technical or review articles pertaining to that set, etc. This may

seem a bit over-the-top, and is certainly a couple of steps further down the road to madness than the ‘service cards’ that I recall from my radio and TV service days, but I have failed on this aspect of radio repair in the past and don’t intend to do so again, especially as my memory starts to fade with the passing years...

## Closure

Restoring any radio set can be challenging and fun – in my book much more so than restoring an ‘inanimate’ piece of furniture, after all, a radio can come to ‘life’ after many years, even decades, of dormancy and neglect and then talk to you – try doing that with a table, chair, dresser or bookcase...

I find it a good therapeutic part of the radio hobby with a satisfying end result that can be enjoyed long after the initial work on the set is over. Also, scouring flea markets, antique and second-hand shops in general is a shared interest of my wife and I so that part is easy – with two pairs of eyes on the job you never know what will turn up! My first restoration project was a 1924 TRF (photo, right)





bought from a local flea market (spotted by my wife), another was a 1939 console that someone had painted gaudy colours and had been using the speaker for guitar practice, and yet another was my first 'new' Eddystone for over 35 years, an S.830/4. Other unexpected flea-market buys have included an illuminated RCA shop clock/sign for my workshop (photo, left), a Millen grid dip

oscillator in perfect condition, a TV alignment (VHF) sweep generator and a cute little wooden 'Airline' table-top radio. Scouring EBay is another interesting pastime and some bargains can be had if you are canny and do not get carried away in a 'bidding frenzy' – there will always be another time... I still cannot believe some prices that are paid on EBay.

So keep an eye out for a bargain and a challenge, take it home and apply your knowledge to 'breathing' new life into your find – it will repay you with feelings of satisfaction and listening delight for years to come. Oh, and don't forget to drink plenty of tea and make sure you write an article on your endeavours to help other folks do the same and learn from your experience!

Gerry O'Hara, G8GUH, Vancouver, BC, Canada, February, 2007



## Some Sources for Parts

### General Components Suppliers

I tend to use local suppliers for resistors and capacitors and the like, but the following folks can supply these as well as some more specialized bits and bobs, including some reproduction items.

- <http://www.vcomp.co.uk/>
- <http://www.justradios.com/>
- <http://www.tubesandmore.com/>
- <http://www.maplin.co.uk/>
- <http://uk.farnell.com/jsp/home/homepage.jsp>
- <http://www.alliedelec.com>
- <http://www.hammondmfg.com/5cindex.htm>
- See also the many supplier links on <http://www.vintage-radio.com/contacts/suppliers.html>

### Eddystone Parts and Manuals



Many manuals for Eddystone sets can now be downloaded from the EUG site, though sometimes original manuals appear on EBay, usually at a premium, but perhaps worth going for if you want to be 'all original' (and some scans can be illegible in parts). As noted in the text, some Eddystone spare parts can be supplied by Ian Nutt ([iandcnutt@msn.com](mailto:iandcnutt@msn.com)) and it is certainly worth checking in with him for that replacement coil, knob, switch, variable capacitor or fingerplate etc., or try a search on EBay.

Manuals for (some) Eddystones and other sets can also be obtained from many other sources, some free, some with a nominal charge, including:

- <http://www.justradios.com>
- <http://www.mauritron.co.uk>
- <http://bama.edebris.com/manuals/>
- <http://www.antiqueradioschematics.com/>
- <http://www.manualman.com>
- <http://www.radioera.com/l-manuals.htm>

### Valves:

- EBay: there are many 'EBay stores' specializing in supplying valves, as well as individuals disposing of valves from estate sales, old radio shops, family clear-outs and from private collections. Be wary of unserviceable valves masquerading as 'NIB' in the boxes of the ones that replaced them though – some old timers never threw anything away;



- Specialist valve suppliers focussed at the radio amateur: eg; Wilson valves (<http://www.flashbacksales.co.uk/wilsonvalves/wvindex.htm>) etc.;
- specialist valve suppliers focussed on the ‘antique’ radio market, eg: Antique Electronic Supply (<http://www.tubesandmore.com/>) ; and
- Music stores: my local ones stock a range of rectifier and audio valves at competitive prices (as used in guitar and ‘vintage’ organ amps).

## Some Useful References

- The Restoration of Valved HF Communication Receivers, C. Parry, 2005, downloadable (free) from <http://www.vk2bv.org/radio/parry1.htm>
- Antique Radio Restoration Guide, D. Johnson, 2<sup>nd</sup> Ed. 1992, Ch.s 3 – 8, 10
- Guide to Old Radios, D&B Johnson, 2<sup>nd</sup> Ed. 1995, Ch. 8
- Old Time Radios - Restoration and Repair, J. Carr, 1991
- Restoring Valve Radios – A Comprehensive Guide, T Thompson (see also <http://www.vintageradioworld.co.uk/>)
- Vintage Radios – Collecting, Servicing, Restoring, T. Thompson
- Valve Radio & Audio Repair Handbook, C. Miller, 2<sup>nd</sup> Ed., 2000
- Various sections of Eddystone manuals downloaded from the EUG web site and specific articles in Lighthouse including:

Subject	Issue	Page
Electronic Repairs To Eddystone Receivers .....	70 through 75.....	12
Duffers Guide To Valve Set Fault Finding.....	86 through 93.....	32
Repairing Drive Gears on Slide-Rule Eddystones .....	93.....	16

- Some web-based articles/resources on subjects covered in this article include:
  - <http://www.vintage-radio.com/>
  - <http://antiqueradio.org/restoration.htm>
  - <http://antiqueradio.org/radwink.htm>
  - [http://www.tone-lizard.com/Table\\_Of\\_Contents.htm](http://www.tone-lizard.com/Table_Of_Contents.htm)
  - <http://www.philcorepairbench.com/>
  - <http://www.borg.com/~dave2/dave3.htm>
  - <http://www.radioera.com/repair-restore.htm>
  - <http://antiqueradio.org/books.htm>
  - <http://www.tuberadioland.com/>
  - <http://www.vintageradioworld.co.uk/>
  - <http://www.antiqueradios.com/>
  - <http://www.nostalgiaair.org/>
  - <http://antiqueradio.org/restoration.htm>
  - <http://www.ppinyot.com/Restoration/Capacitors.htm>
  - <http://www.radiodaze.com/>
  - <http://www.vacuumtubes.net/>
  - <http://www.valve-radios.co.uk/>
  - <http://www.lairweb.org.nz/radios/>
  - <http://www.valve.demon.co.uk/>
  - <http://www.g4nsj.co.uk/restoremenu.shtml>
  - <http://www.radiocraft.co.uk/>



My restored S.750 still pulling 'em in strong after 56 years and looking pretty good doing it...