

From Rubbish Skip To Beauty Queen Restoration of an Eddystone Model S.730/4, Serial No. 319 by Alan Crookes

Introduction

As the title suggests this is the story of my trials and tribulations while restoring the above receiver, but before we start let me tell you about myself. It all started back in 1964 when I was a young lad of 12 years old, my father had this massive radio gram, it was made by Gilbert Radio. The thing measured about 3 foot long by 2



Maybe not a Gilbert but an example of what a radiogram looks like for my younger readers...

foot deep by 2 foot 6 high (for you modern guys you will have to work that out in metric, but if your restoring old masters of the airwaves you don't need to know) and must have weighed a ton.

It was Father's pride and joy, and when he was in and it was turned on, it would be tuned to the 'Home Service'. But when Father was out, I would switch it on and go up and down the two Short wave bands it had, fascinated by the voices of foreign stations it



picked up. And of course it was the 'Pirate Radio' era, so listening to the stations coming from off the North Sea on Medium wave really got my interest. But the trusty old Gilbert had one problem, after it had been on about 3 or 4 minutes it would start to make a whining noise, that would change note with the sound of the signal, it would drive me mad, but this was not to last long...

While at school one day we were watching an 8mm film (we had them when I was at school - who knows what they have now) in Science Lesson, and it explained how the 'Thermionic Valve' worked. I was enthralled in the film, just what I wanted to know - the guy in the film was explaining all the details, and then he went on to show a very quick and simple way of finding a faulty valve. This I must see, and to my amazement he had a valve radio on the bench with no sound coming out. He then produced a pencil and went around the valves tapping them with the pencil. As he tapped one of the valves the radio came to life and then went off again. I thought to myself "the next time Mum and Dad are out I know what I going to be up to with Mr. Gilbert"...

The following weekend my Mother and Father were going shopping in Sheffield and I was to go with them. I thought this is my chance; I made some excuse and managed to stay at home with my older sister. While my sister was upstairs in her room - where all

older sisters go when watching over little bothers - I managed to drag the Gilbert radiogram away from the wall. I can still remember unscrewing all the black screws from the wooden frame which held the black gauze in place to let air in to the cabinet, and thinking what will I do if this thing all falls to pieces in a heap? At last the cover



came free and all was exposed. With the set switch on and whining away, I went around the valves tapping them with my pencil. And then to my amazement I tapped one of the valves and it stopped whining!!! But in my surprise the side of my thumb touched some part of what I know now must have been the HT line. WOW what was that! - and I pulled my arm out very quickly, at the same time catching the back of my hand on the main chassis which sliced my hand. My arm was throbbing from the HT shock, blood was pouring from my hand, but it didn't matter - I had found the fault, and that was it: I was hooked. I left the radiogram out away from the wall, and waited for Mum and Dad to come home, hoping it was going to be praise and not a 'clip around the ear hole' (that's what you got in those days when you stepped over the line). Mum and Dad came home and the look on Dad's face was sheer horror. He wasn't too

pleased, but Mum let me tell him what I'd seen and done and when I showed him what happened when tapping the certain valve, I saw a smile come on his face. A few days later we took the guilty valve to a shop in Sheffield called 'Phillip Cann Radio Shop'. I stood at the counter in front of the guy dressed in a brown smock and said "I want one of these" did I feel good. The replacement valve was fitted back in the set and it worked for as long as I can remember. Well with all

the Pirate Radio on air at this time my brother (sorry I'd forgotten about him) and I wanted a radio so we could listen to all this rock and roll, or as dad would say, 'rack and ruin'. My Grandma came to the rescue, and gave us a Bakelite-cased valved radio, I think it was a Regentone. So, we could have this up in our room, and guess what, it had two short wave bands. When it wasn't

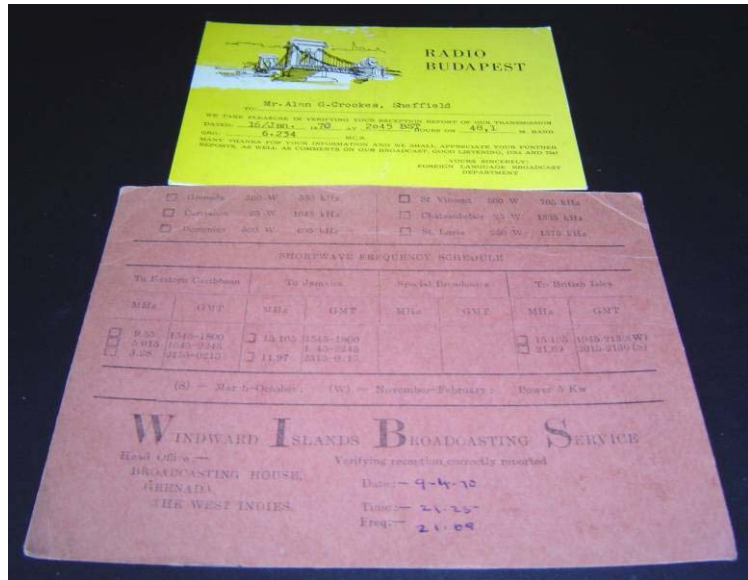


tuned to Radio Caroline or Radio London, I would be tuning up and down the short wave bands listening to all the other stations - in those days the bands seemed to be full of stations. The years went by and I got up to all the things you do when you are in your teens, I went through school and finally finished up as a Steel Operative Apprentice at the local Steel Works (Samuel Fox & Co Ltd) and then three years at College studying metallurgy and heat treatment of steels. This is when a friend of mine, John, who I had known since I was very young, discovered we had a joint interest: Short Wave radios. He had a set which came out of a tank, an 'R1069' comes to mind but not sure now, but he was getting a new set which was a Verytone CR150 (valve of course). When he got this it opened up the world and I had got to get in on this. We rang a 'Swop Shop' (like a pawn broker) to see if he had any thing in: we were in luck he had a Unica UNR30 - 5 valve I think, and it had a BFO - enter SSB.

First Encounter With an Eddystone

Well that was it, I couldn't leave it alone, the Unica was always switched on and I could move it about as it was only about 9 inches by 5 inches by 5 inches, mains operated and it had an internal speaker. When you fastened a 75 foot end-fed wire on the end the whole world came out of the speaker, check the QSL cards, photo, right.

Note the frequency and time on the Winward Islands card - it's a long time since we heard any signals up there at that time, and I've just checked the historical Solar data for that date, Solar Flux 225, Sunspot 185. That same year (1970), a station came on air which I would listen to for hours during the day time "On 6.205kHz. This is a test transmission of Radio Nord Sea International". I've still got the QSLs and the tapes. By now my friend John and I were keen Dx'ers and we were both a member of the WDXC. One spring we went to York on a Dx'ing weekend. That weekend I would have my first encounter with an Eddystone. We were to listen all through the weekend in shifts to see what stations we could get, and the receiver that was to be used was an Eddystone 840C. When we saw the receiver we couldn't wait to get to the controls and both started to make our comments on the way it performed, but the overriding thing was the tuning drive. John was a little older than me and getting paid more than I was, and he was now determined to have an Eddystone. In the end John got his wish, a few months later he asked me if I would go to London with him on the train. I was still doing my apprenticeship and hadn't got the money, but I asked why are you going to London? His reply was "I'm going to Laskys on Edgeware Road to buy an Eddystone EC10 Mk2". When he got back I drooled over that Eddystone, sadly that was the nearest I got to one.



'Monsters of Radio'

It was 1972 and as the years went by I stayed with valve radio's. I had some very happy times over those years with some of the 'monsters of radio': Murphy B40's were a favourite (I had two of them) and a mighty AR88D, while I had this I became very friendly with Harry, G3XFU, who I listened to on top band. Harry told me I should go for my ticket and in 1979 I became G8UCN, unfortunately Harry had already gone silent key by then, so I was never able to have that QSO with him.

Time moves on - you bring up a family and get a little older, and then one day 30+ years later while having a QSO I bring up the subject of valve radios of the past. I made the comment that it would be nice to get hold of a Murphy B40 as I had owned one before

back in the 70's and do a restoration project, my contract then informs me he knows of one which was rescued from a scrap yard, and there was also an Eddystone which was found in a rubbish skip at the same QTH. He couldn't see it, but my eyes lit up with a sparkle - the thought of the Murphy B40 was one thing, but to get hold of an Eddystone? now that would stimulate the little grey cells! A mutual day and time was agreed for a meeting, and the said time came around and off I went. I didn't know if either of the radio's were complete or if they worked. When I arrived he had got the B40 fired up, the lights were on and there was some sound, but the front Perspex panel was missing and it was going to need a lot of 'tlc'. But when we came to the Eddystone to find it was a 730/4, which I had never seen before, was one thing, but the state of it showed it had a rough time in the rubbish

(muck) skip. It was obvious it was not in working order, and my friend said that in its state he had not dared to put mains on to it. But I wanted them both - these would keep me out of trouble for the next 6 to 12 months. I finished my working career at the age of 54 due circumstances which you don't want to know about, but after doing all the decorating things inside the house, and then all the things that needed doing on the outside I was going to have plenty of spare time to give these two 'old ladies'. The Murphy B40 was the first radio I worked on. You can see the work in progress and the finished project in the photos, right, and on the next page – though the story of this refurb is for another time.



Scrap? – Not this Eddystone!

Now to the Eddystone, unfortunately I cannot find the pictures of the radio before the refurb, but here is a description of what I had to start with: the outside case was badly scarred with deep scratches, the back of the case had a substantial dent in the back, and once the top hatch was opened it was not possible to reclose it. Needless to say, the door was sprained, with a gap of 1/4" at one side and an overlap of the same at the other side. It made sense to assume that the impact of it being thrown into the skip had been taken on the back panel. As I said earlier, the side panels were all badly scratched, this outer case was going to need a lot of work doing to it, but my worst fear was yet to come. On



looking at the front panel, which is made of cast alloy/aluminium, the top edge by the Eddystone name plate was bent: when I placed a straight-edge along the top between the chrome handle anchor points there was a gap at one point of near on half an inch. Amazingly, the 1/4" glass plate had not broken, but it was loose behind the front panel casting, so whatever was suppose to hold it in place was damaged. The left hand chrome handle (thanks Ian for supplying new ones) was bent right back to the louvered part of the front panel.

Looking down to the 3 toggle switches at the left side, the noise limiter switch had no top - it had been snapped clean-off, level with the finger panel, and the main tuning knob was broken, photo, right. This area gave me a lot of concern, as rotating the tuning control made a horrible grinding noise, the fingerplate had a scuff mark across it in this area and the cursor didn't move.



On to the crystal phasing control, or I should say where the crystal phasing control should be - that again had been snapped off level with the finger panel, no knob, not even a 1/4" shaft to fasten a knob on to. Fortunately the chrome selectivity switch was ok, and seemed to function along with the other controls. The chrome handle at this side had also suffered damage with a gouge on the front. Looking again at the rear of the radio, the shorting plug had been crushed, but I thought it could possibly be repaired. I stood back and looked at the radio wondered was this beyond refurb?- all this damage and I hadn't got the cover off yet, what would that reveal? Well, the case had got to come off, so I started to unscrew the four chrome screws at the rear, and as usual one refused to move, but after some persuasion it finally came free. However, the case was so badly distorted that it wouldn't slide off the chassis. Looking through the top hatch I managed to get a long screwdriver down the sides to lever the case free, all was then revealed, and first thoughts were "what a mess". The valves were all there and none seemed to be broken, apart from V13 (5Z4G), the HT rectifier, which wobbled in its base.

Some of the screening cans were missing and the drive cord for the cursor was off the pulleys and tangled up in the gear box. However, other than a lot dust and dirt inside this area all seemed to be well, or so I thought... Looking at the brass cursor rails I noticed they were bent - this was due to the bending of the top part of the front panel. Looking further down inside, the gear box and tuning scale had all come away from its fastening points on the rear of the front panel. Well, the next thing was to turn it over to see the damage underneath. I was fearful that some of the coils in the RF/IF stages were going to be broken. But at last some hope, the covers over the coils were still intact and looked like they had never been touched from manufacture, and apart from again being very dirty, all components seemed to be in place with no sign of any burning or damage. Things were starting to look up, and the rays of hope started to run through my veins. Looking again at the tuning drive, I could now see what had happened: it would seem that the main tuning knob had sustained an impact, which had pushed the drive shaft through the locking flywheel bush and then the pinch rolls on the friction disc had pushed past the disc - it didn't look too good. My first thoughts were that first I must find out if this thing works, as it's going to take a lot of time to get it presentable. I started to Hoover-out all the dirt and eased the 5Z4G valve clear of its socket. Although it was loose in its base it seemed to be still attached to the pins, so a couple of drips of super glue around the globe sorted that problem out. I checked the two chassis-mounted fuses out and they were still good. After more Hoovering, it was starting to look like a radio, despite the damage. I had already been on the net and downloaded quite a bit of information about the radio, and this was read at night sat with my wife along with a few glasses of red wine, while she watched those programs what women watch (you know strictly 'Come Dancing' and the like).

Tense Moments... Switching On

After a few days of checking things out - caps, electrolytics and obvious shorts - the time had come to apply some power to see if it would fire up or blow up. In an ideal world with something that has been stood for such a long time it would be wise to run it up on a variac, if you've got one. I hadn't, but I had got access to a drop-down transformer of 115v. Looking at the electrolytics there was no sign of bulging or any funny coloured substances oozing out, and if its going to bang well I'd rather it went bang now rather than after spending a lot of time on it. The SAS say "He who dares, wins", well I decided to put that proverb to the test, with a mains lead set up with 3-ply cable (I have an external earth set up in the garden for this sort of thing), a 3 amp fuse in the plug and a speaker fastened on the back, I switched it on. Nothing, not a light, not a crackle, not even a pop, I thought a while and then remembered an article in the manual I had read, about the 2 chassis-mounted fuses (750ma) may blow if the set has been switched off for a period. This is due to the sudden current load, and sure enough after removing the mains and with drawing the fuses both had blown. These needed to be replaced - the document says to use slow-blow fuses. I looked through my fuse box and found a couple



of 800ma AEG ceramic fuses - not ideal, but worth a try. If these failed it was time to start looking more in depth for a disaster lurking away in some corner. Well ready again: I switched it on... a result! - two of the pilot lights came on, better still that beautiful lilac fluorescent glow came from the VR150 voltage regulator (every radio should have one of these fitted just because they look good), then a nice warm glow started to appear in the other valves. I couldn't contain myself and yelled out a loud 'YES!'. A few seconds later there was a low-level hum coming out of the speaker. I got a length of wire and stuffed it into the aerial socket - more hope as we got a few crackles. Looking at the scale it was impossible to know what frequency it was tuned to, but I changed the band switch to band five ('Medium Wave'). More reassurance - the little green light came on to tell me I was on Band 5 and, with a turn of the rough tuning knob and a twist of the RF and AF gains, I heard a woman's voice in some unknown language. Another big yell of 'YES!!' went around my workshop at the back of the garage, at which point my wife appeared and asked "Are you all-right or are you just having a funny turn?" and looked on as she saw a large smile that went from ear to ear. This was the start of a relationship with an 'old lady' who was going to be turned into a beauty queen.

A Shocking Story

At this point I thought it wise to do some safety checks. I spoke earlier of my love for the mighty Murphy B40, well if any of you have seen or owned one you will have noticed the large shinny earth screw on the front panel - very pretty but its there for a good reason. In the official handbook there is a section on shore installation, noting that the set must be earthed at this point when installed on land. Let that be a warning to all: this set is powered by twin flex, and if it is not earthed and you touch the cabinet while touching an earthed surface, SHE WILL BITE!!. I've now owned three B40's and they have all given out round about 60/80 volts at this point. I don't think it would kill you if your healthy but any one with an electronic heart pace-maker might get a new lease of life (or not) as a short distance sprint runner. Joking apart, be warned, and don't think of earthing it through the mains earth, as all you will do is trip all the earth trips on you distribution box. You must remember that the B40 was built to be fastened to the bulkhead of one of Her Majesties Fighting Ships, out on the high seas with the best earth you could wish for, so it wasn't a problem. I earth mine through a dedicated earth lead to an earth in the garden with no other equipment connected to it. This works fine and she doesn't bite anymore. Some of you may frown, so I will make it clear I do not claim or imply that this is the correct way to solve this problem or that it is completely satisfactory, but this is the system I have used for the last 30 years - my garden is my sea. It is up to the individual about how to deal with it, this is merely a warning against the possibility of electric shock. Back to work in progress. I wanted to make sure the condition I have just mentioned was not apparent with the Eddystone, as this too is fed by twin flex. So with the mains switch off I uncoupled the earth from the chassis, and then connected my trusty AVO 8 between chassis and earth (external buried in the garden) and with the AVO on a high voltage setting switched the set on. I watched the AVO for any readings - nothing. I moved it down the ranges - still nothing. It was clear that this old lady wasn't going to bite.

Clean-up and Disassembly

So it was time to start the refurb. I had some of the valves it used, but I like to know any valves I put in sets are good, so a quick call to my dear friend Jim Fish (G4MH) of Wilson Valves, told him what I had acquired and asked for his assistance. A few days later I drove over to Huddersfield with the valves I had removed, and Jim, true to form, was there to greet me. We went in to the workshop, and each valve was tested on the trusty AVO valve tester, (not sure on the model, but it's as big as the Eddystone). The results were quite good despite their age and the abuse the valves had suffered. Just a couple tested low: the 2nd RF amp (6BA6) and the Crystal Calibrator (6AM6). Replacements were purchased from Jim's vast stocks. I praised his assistance and he asked I let him know if all goes well with the refurb. I made my way home and thought of the challenge that I was to undertake - this all was to start that afternoon.

First of all I removed the screening cover from the main tuning assembly and disconnected the drive. I Hoovered all the dust out from the tuning-gang vanes, closed the vanes into mesh and covered them with some wide masking tape for protection. From the documentation I had, to remove the front panel all the knobs had to come off, along with the switch retaining rings, this was done. Then slowly and very carefully I eased the fingerplate away from the front panel - it was not glued, but some black tar-like substance was used to keep it in place. This revealed four brass countersunk screws, and they looked tight. I tried to release them: two were free, and two were solid. As time was getting on I decided to call in WD40. The plan was to stand the radio on its back, squirt some WD40 into the screw holes and leave overnight to soak through - if the plan worked the screws would be free by morning. The next day back in the workshop I tried to undo the screws, bingo! - good stuff that WD40. All 4 screws came free, but at this point I didn't remove them as there were various other screws for BFO and Crystal Phasing capacitors that also had to be taken out. Next was to remove the chrome handles, as the bolts for these also hold the framework on which the case sits on. The right hand handle came off but the left hand handle was solid, no chance. The handle was badly bent, and for me was unusable, so I reverted to removing it by hacksaw. Once sawn-through I was able to twist it from both sides and the handle came off. With the set now back in its operating position, I removed the four brass screws from the front, and drew the front panel clear. The whole front section nearly collapsed in my hands, but all was gathered in and examined on the bench to evaluate the damage. It would appear that two of the retaining screws for the metal scale panel at one side had come out, the gearbox was still attached to the panel, and the glass had slipped down between the two panels. It was all loose but there didn't seem to be any permanent damage - was I lucky! Complete removal of the gearbox was then carried out. This was to be dismantled, all cleaned and re-greased with graphite grease, taking note of where the anti-backlash springs were tensioned and the lining-up position of the cogs (a digital camera is a must for recording this). As I had noted before, the pinch rolls had been pushed past the drive disc, this had put a kink in the disc, and had to be repaired by carefully rolling a drill piece on the edge, thus pressing it back into shape, then finally smoothing it out with some very fine emery paper. The logging disc was buckled and this was carefully brought back to some

acceptance. Now came the challenge: the drive shaft, brass bush and pinch roll section was all removed. To my despair I found the shaft was bent. I had to think about which way I was going to go. Really a new shaft should be fitted, but what were the chances of finding one at a radio rally? (where I do all my scavenging).

Unbending Yields Success...

I had been working on the radio for over a week now doing bits, a couple of hours here and there, and the more I cleaned the more I found damage to the front panel area. Don't forget it was still bent along the top where the name plate is mounted, and my fear was it would snap when I tried to straighten it. One or two radio rallies were coming up, so I made the decision I would start looking for a scrap Eddystone with an identical front, then do a rebuild with the parts I could salvage. I think I would have had more chance getting 5 numbers and the bonus ball on the lotto. But strange as it seems at one of the rallies I found parts of an Eddystone gear box, but the drive shaft was missing, but other parts I did get. I now had a full set of valve screening cans picked up for 10p each, a new Eddystone tuning knob was found for £1 and it was still wrapped in tissue paper and the metal toggle switches were found in a jar at a silent key sale for 10p a piece. But alas no drive shaft, and no Crystal Phasing knob (part No 5301P), but you never know what may turn up, so if you see someone at a rally rummaging about in the boxes under the tables or going through piles of valves, odds on its probably me. Well, the tuning scale had all been cleaned, the gear box was all reassembled and free running, and I had found an article on the net showing the drive cord layout with pictures. Also, the brass cursor slides had been cleaned and straightened but the front panel was still bent. There was nothing else for it: I had to take the bull by the horns and attempt to get the front panel straight, I wasn't to keen about putting any heat on the panel, as with it being alloy/aluminium I didn't know what to expect. My plan was to lay the panel on the garage floor, support both ends with some flat pieces of wood to create a bridge effect under the bent area, which was facing upwards. Rather than trying to bend it back in one go, I would use the softly-softly method of a bit at a time, so a spacer was placed under the bent area so it could only be bent back so far. My improvised press would be a redundant 4"x4" x 5 foot wooden fence post. I stood this on the bent spot and with the weight of the post and a bit of pressure I pressed downwards. The panel started to go back into shape. I removed the spacer from under the 'bridge' and replaced it with a thinner piece which gave a bigger gap, and did the same thing again, the panel moved a little further. At this point I checked the bend with a straight-edge - it



wasn't too bad now, not straight, but a lot better. Another great help was that there was not much spring effect in the panel, so most of the corrective bend was absorbed. The final press was to get the gap under the panel just right so as the edge would regain its trueness. This was found and carried out and the panel was straight again, see photo at base of previous page and below. The bend had been just to the left of the name plate and this was a successful repair.

Shafted?

So now I took a look at the tuning drive shaft - this had a definite bow and had to be removed. The obvious way would be to heat it up and try to straighten it in the vice.



But if too much

heat is applied, kinking in the rod may happen as it is straightened. Also the rod may crack, go brittle and then break. It was time to call on my metallurgical studies of my apprenticeship: the secret is to warm it up to about 250C, and at this temperature the grain structure allows it to be less rigid, but also cuts the risk of putting kinks in the rod where it is straightened. Another thing is that at this temperature any change in the grain structure is not permanent, so the rod will retain its properties when air cooled, therefore the risk of breaking or cracking when straightening the rod should not happen – anyway, that was the plan. Now to put it into practice. I warmed the rod up to just less than black hot - that's about 250C (there should be no scale appear). With a pair of pliers, I quickly put it in the vice and started to press it straight again. After a few checks on the rod the result was a complete success. When the rod had cooled at room temperature, a quick rub down with some fine steel wool to remove any discolouring, the rod looked as good as new.

Gear 'Train'?

It was now time to reassemble the front panel and tuning drive. I had already cleaned the glass and scale panel, the cursor slide bars were refitted, and then from the retrieved diagrams I re-strung the cursor. The drive rod was aligned up and the flywheel and the grub screws secured - just the pinch rolls to line up on the drive disc and all should be well. I tried the main tuning knob, and I was very pleased it was free and spinning true, the cursor was gliding up and down the scale, but something was catching, as when the

cursor travelled the scale it sounded like the bell on a steam train going ‘ding, ding, ding’... funny, I didn’t remember the Eddystone 840C back in 1972 having that sound effect. The fault was traced to the circular log scale which was catching the scale panel as it rotated. I adjusted the grub screw on the centre bush, but no joy as it now caught on the gear box with an even worse noise. The problem was caused by this circular scale still being slightly buckled. I readjusted the scale back to clear the gearbox and I then put identical washers under the gearbox at each screw point which held the gearbox in place. This would then give a little more clearance for the scale to rotate. Success! - the tuning drive was now as smooth as silk, with no bells and the cursor was gliding up and down the scale.

Capacitor Repairs

Back to the radio. I fitted a new noise limiter switch and then I had to see what could be done with the crystal phasing capacitor. I removed the connections and withdrew the capacitor. Unfortunately disaster had raised its head again as the ceramic housing was broken and the shaft was snapped off. A new part should be found, but when and where? I removed the circlip from around the remainder of the shaft and this allowed me to completely take the capacitor apart, including the ceramic which fell into three pieces.

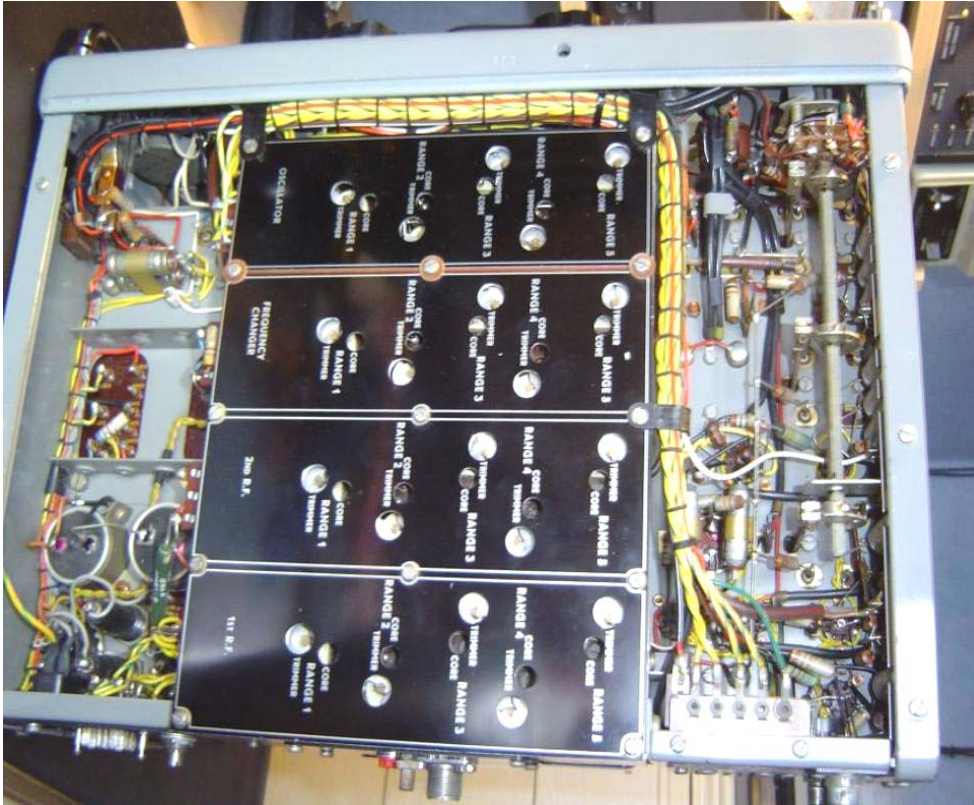
After giving some thought to the issue, I knew I had some ¼”dia circular stand-off pillars, and these had a small BA threaded stud at one end. My idea was that if I could drill a small vertical hole in the centre of the shaft at the broken end, then spin the stand-off pillar in the drill and run a small file on the stud making it a little thinner, with a tight-fit in the hole and with threads acting as a grip, I might just be able to fabricate a new shaft. Well the plan was put into operation: I cut the pillar back to the required length for the shaft, did all the above, and with the aid of the vertical drill stand got the hole spot in the middle. A spot of trusty super glue in the hole and a tap with a toffee hammer and the new shaft was complete. The ceramic base plate also had a taste of super glue - marvellous stuff - it held it all together nicely. With this capacitor and the BFO capacitor cleaned and the shafts greased they were reassembled and reconnected to the radio.

More Cleaning and Greasing

Things were going well, mind you I had been working on the set for about three months. As well as the repairs above being undertaken, the inside of the radio had been completely cleaned with a combination of Dura Glit, Brasso, Surgical Spirit and good old Mr. Sheen. Screw heads are a thing with me - I hate to see rusty or dirty screw heads in view on a set, so I whip them out, grab them with a pair of snips and put them under a spinning wire brush on the drill and they come up great. The IF can covers were first cleaned with Dura Glit to remove



Brasso – what a marvel: it cleans, it polishes, it buffs paint, it removes blemishes from S.730/4’s... and makes your hands go black.



the grime, then a final polish with Mr. Sheen. This treatment was also applied on all the other covers. The replacement valve screen covers were re-sprayed in matt black. It was quite remarkable to see how well the inside of the set had come up. The under-

chassis area had also all been cleaned out (photo, above): a good examination of the components did not reveal any physical or burnt damage. The switches were all given a good soaking with Servisol switch cleaner, and the ball-bearing latches greased with graphite grease. The push/connecting rods to the IF coils were all cleaned and freed from grime and were now functioning perfectly. The valve sockets I cleaned by using tooth floss brushes - these are like a mini test tube brush, but when dipped in surgical spirit and then worked inside the valve socket, any grim within is soon removed. A quick squirt of switch cleaner finishes the job.

Case Repairs

Now it was now time to give the outside case some attention. The dents had to be knocked out and I did this using a piece of hard wood, oak I think, which was about 9" long by $\frac{3}{8}$ " thick by 2" wide, with the top being flat and the edges all rounded off. This was ideal for getting to the damaged area from the inside, while supporting the case on a firm surface, I was able to panel-beat the dents out. It's a slow job, but taking your time will yield good results. The dent at the back of the case was coming out and at the same time this was bringing the top hatch back into alignment - this was due to the fact the dent was immediately at the back of the hinge and so this was pushing the door forward at that side, which in turn twisted the door. As time went on I got the door more or less back to its correct position, at the same time knocking lots of other imperfections out. At last I was happy with the shape of the case and the next day was spent rubbing it down, preparing for spraying.

A couple of days later I was picking what colour paint I was going to spray the cabinet. I had a sample to match the shade of grey I wanted - the nearest I got to it was 'metal window frame grey', an odd name but it was the best match and it was satin finish - I didn't want that 'glassy' gloss look. Two cans of paint and two cans of primer and we were on our way (photo, below). The front panel was scrubbed with neat 'Jiff' (I know they now call it 'Ciff', to me its still Jiff). This removed the grime and took the old glaze off the surface. Just a few areas now needed more abrasive treatment and that was done with steel wool and fine emery paper. With it all blended in, the case was ready for spraying. After four coats of primer and a warm air blower to bake each coat, then five coats of paint with the same warm air blower, the case and front panel looked good, and I was happy with the results. This was now left for a week to cure and for me to go for a week away in Benidorm.



Rebuilding the 'Old Lady' and Switch-On

A few days after getting home the rebuild started. First the tuning scale and drive were replaced followed by the re-stringing of the cursor, making sure the scale number matched up with the cursor at the correct point, as described in the service notes, and as before were running freely. The front panel was then refitted to the main unit, taking care with the coupling to the main tuning capacitor. All the switches were replaced in their holes and the brass panel screws re-fitted and secured. The fingerplate (photo, below) had been cleaned and touched-up in the areas that were scratched - the method I use is to



use Humbrol model paint, which you can mix to get the shade required, then with a very fine paint brush, paint over the scratches and lettering. Once the paint is dry, very carefully use a soft cloth with some car polish to polish and blend the repainted area in, this has a 'T-cutting' effect on the area and gives a nice smooth finish. The fingerplate was now replaced on the front panel, and the switch lock rings refitted, along with the lock nuts for the other controls. New chrome handles (thanks again Ian) were also fitted at this point, and the front panel was now secure.

Back to the chassis. As we all know, the mains is supplied via a two pin plug and socket. I did not have the correct lead, so this was all replaced with the standard electric kettle connection (photo, right), which fitted in chassis without any chopping or cutting required. The shorting plug at the back was straightened out and repaired, and when refitted was a nice snug fit. All the valve pins had been cleaned of dark deposits and were replaced in their sockets, and one of the pilot lights had to be



replaced due to damage. After nearly six months of on and off work it was time to power-up old lady again. With aerial and a speaker connected I switched on, all seemed well with no smoke or flashes, then glorious sound came flowing from the speaker.

Testing, Testing... Voltage Checks and Re-alignment

The set had still to be realigned and tweaked up, but it was very lively. Using Virgin on 1.215kHz as a marker, the signal was very strong and I had to back the RF gain off to prevent over-modulation. The next few days would be used to soak test the set, switched on in the morning and left running all day, all was fine but I did notice the mains transformer did get a little warm, but reading more information this is normal for this set. Could be worse, as other sets I have are fitted with big dropper resistors, and these run hot.

One day after the set had been switched on for a few hours it was decided that nothing was amiss, so it was time to do the re-alignment. I wasn't convinced the IF stages were in need of any adjustment - the set despite its age was very lively - so it was decided to leave well alone. Also, the BFO was giving the results as expected on 80m lower SSB, and 20m upper SSB (oh yes, it was pulling stations in on 20m in the afternoons). So reading the service details it was noted that the standard routine and equipment was required for tuning-up the RF stages: a signal genny, tune the trimmers at the high end of the band and the cores at lower end. I spent a lot of time on this procedure to get the optimum settings, and being very careful with the cores as these had been in the present setting for the last 50 years.

At last I was finished, but before I would see how the old lady would perform, I thought as I have the voltage readings from the manual I would do some checks. This set has never ceased to amaze me in its will to live, as I went through the voltage checks, with the 5% tolerance allowed on the readings from an AVO, the voltages were pretty close to the requirements, I was more than suited.



Comparisons and Conclusion

The next day the set was taken up into the radio room, (that's an agreed term with my wife, as it is my sons old room who left the nest to get married and have his own house) not a 'shack'. A space had been made at the side of my FT2000 (photo, above) and I



thought it looked good - the new and the vintage side by side. Now connected up, with the aerial going through a change over switch, the Eddystone would meet its competitor, my trusty Icom IC-R71 (photo, left) which was fastened on the other end of the change over switch. I

thought it a little unfair to put it up against the FT2000. So, where better to start than the Medium Wave? The plan was to find a weak station at each of the lower, midway and top end of each band and compare the results on both sets, switching the same aerial between them. A station was picked up on the Icom on 610kHz - that would do. A press on the calibrator button on the Eddystone, which had also suddenly burst into life after

the refurb, cursor set to 500kHz for starters, a tune up the band and there it was, and more to the point it was where it should be on the scale. This continued across all the bands and I found that if the Icom could hear it the Eddystone could. Ok, so the signals were a bit weaker 24MHz upwards on the Eddystone, but they were there, and if the calibration was done at each 500KHz they were where they should be. I was well pleased, to think back to where the old lady was destined to go, and to look at her now who would have thought I could have got her back to the Beauty Queen she is now..... see photos below.

By the way anybody got a Crystal Phasing knob part 5301P?????

73's

© Alan Crookes, G8UCN, Sheffield, November, 2008



Further Reading:

- Eddystone 730/4 Manual
- Numerous references in 'Lighthouse'/EUG 'Newsletter, and articles on the EUG website, including:

Featured Model, -730/4.



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All the above can be downloaded from the EUG website,
<http://eddystoneusergroup.org.uk/>)





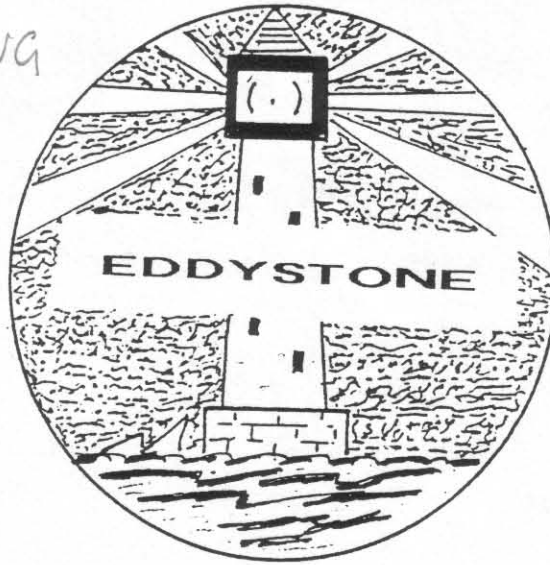
What a beauty! – not bad for a radio someone though ‘fit for the skip...

(17)

730/4

Eddystone User Group

EC10 FINE TUNING
 MK II
 880 - p. 15
 GREASE - p. 11
 730 - p. 12
 INJECTOR - p. 14
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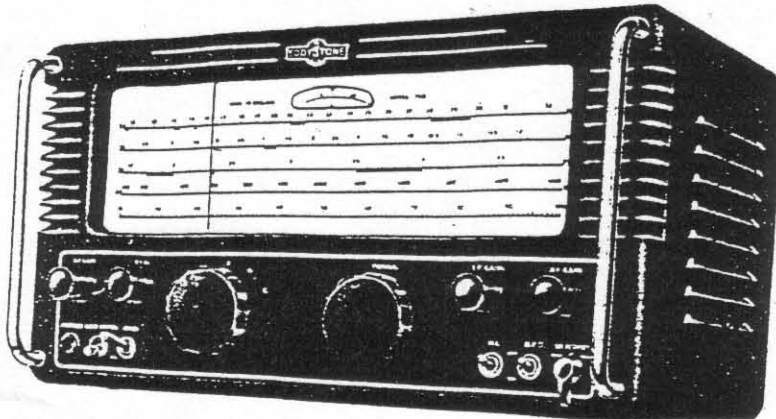


5680kc/s =
 EDINBURGH RESCUE
 4772 - RAF VOL
 2182 - EMERG.
 3812.3 - GAM 1
 5975 - BBC

Newsletter

Issue No. - 17.

Featured Model, - 730/4.



- A NON PROFIT NEWSLETTER FOR EDDYSTONE USERS.
- INFORMATION QUOTED FROM EDDYSTONE LITERATURE BY KIND PERMISSION OF CHRIS PETTITT, MANAGING DIRECTOR OF EDDYSTONE RADIO LIMITED.
- PLEASE ADDRESS ALL MAIL:-
 Eddystone Users Group.
 112 Edgeside Lane.
 Waterfoot.
 Rossendale, Lancs; BB4 9TR.

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Featured Receiver - 730/4.

- This 15 valve model was produced in vast numbers for all the armed forces and many other 'civvy' government departments. It was also sold to many private companies such as the then BMC, now Austin Rover, and went abroad to various foreign governments. I have seen a Canadian Army version of the manual and know of some 730 variants in Scandinavia. It is an updated version of the 730/1 model, operation is from normal mains supplies of 110-230 volts A.C at 40-60 c/s but removal of a 'link' plug at the rear will permit use from external supplies of 6.5 volt A.C and 250 volts D.C. at 120 mA. Normal mains consumption is 80 watts. With five ranges the coverage is from 0.48 to 30 Mc/s, an I.F of 450 Kc/s and an audio filter for C.W in conjunction with a 4 position selectivity switch give a best bandwidth of 100 c/s at 6 db down. The circuit is the almost conventional one of 2 R.F stages, heptode frequency changer, but separate local oscillator, 2 I.F stages and the usual D.D.T detector/AVC stage. A double triode A.F stage feeds the pentode output stage, this has both low impedance speaker output and 600 ohm line output. Phones are fed by RC coupling from the anode of the output valve and cater for medium to high Z types. A second double diode is used for the NL and 'S' meter stages, the 'S' meter being in the top left hand corner of the scale plate as is usual Eddystone practice. A 500 Kc/s calibrator gives pips up to the HF end of the range and the pointer can be reset by a front panel control. For some undefinable reason the HT on/off switch is to be found inside the cabinet, it can only be reached by opening up the lid. even more strange when you think that the 730 was very often rack mounted. Two paralleled aerial sockets are fitted, one Pye type and one BNC. Input impedance averages 70 to 80 ohms over the full coverage of the set, possibly a little higher on range 5. Sensitivity is given as better than 1 microvolt for 15 db signal to noise and with 50 milliwatts out. A maximum of 1 watt output is adequate for normal locations. The Kathode follower stage allows use of the Eddystone RTTY/FSK unit, output into a 70 - 80 ohm load is around 300 mV. Both local oscillator and BFO have a stabilised HT feed and overall stability is quoted as better than 150 parts per million per hour. Mechanical linkage varies the relative positions of the I.F primary/secondary coils to give variable selectivity this is supplemented by a crystal filter. Gain compensation

730/4 cont;

is fitted to the selectivity control via resistors and extra switch contacts. The 'S' meter is only operative in the 'narrow' position, but I have seen some models modded to permit its use on all positions. Front panel controls are range, maintuning, On/off, phones socket, AVC, NL, RF gain, AF gain, BFO on/off, BFO tune, crystal phasing, AF filter, selectivity, calibrator, and cursor adjust. Two commonly met variants of the /4 are the /6 and /8, the former has provision for 4 switched crystal spot frequencies between 2 - 20 Mc/s, the latter has this and a modified range 5 coverage, from 200 to 410 Kc/s. No doubt this was for coverage of the 'beacon band' when in aviation or marine service. The block schematic and valve line-up are in this issue and since this model was exclusively fitted with CV types these are shown.

- - - - -
- HINTS, from members. -

- Do you have the 730 or 830 model with the crystal switch for spot frequencies ? Why not fit crystals for YOUR favourite station be it broadcast or utility ? As an example Dan has fitted his 830 with crystals for the following, 2182 Kc/s the emergency channel, 4772 Kc/s for RAF volmet, 3812.3 for GAM 1, and 5975 for the BBC W/S. Instant selection and no fiddling.

- - - - -
- How about making this for your NDB chasing, Alan has a loop aerial of 20 x 20 inches, 40 turns wound on a sheet of plywood, with a 2 turn coupling loop to the input of his receiver. The loop is resonated by a mini variable condenser of the 'tranny' type which is fitted into a hole in the plywood square, both gangs are connected in parallel and an extra fixed condenser is needed. Works well for MW Dx-ing too. He has fitted a mini slide switch to add or remove capacity to give both MW coverage or the NDB band coverage at will. Results are fantastic he says.

- - - - -
- Answer to queries from several members as to why low/leaky condensers can cause burnt out resistors or just low value voltage on valves. Lets go by the circuit over the page, if C1 is leaky then the load will be in parallel with R1 and will lower the grid voltage. If C2 is leaky then being across R2 it will effectively lower the kathode voltage. If C3 is leaky then it will allow current via R3 to pass to earth, lowering the screen volts, possibly also

THE EDDYSTONE 730/4

DISCUSSING A USEFUL
GENERAL PURPOSE RECEIVER

F. G. RAYER, T.Eng. (CEI), A.I.E.R.E. (G3OGR)

DETAILS of some of the well-known Eddystone receivers have appeared in past issues of SHORT WAVE MAGAZINE. These included the S.640 (Jan. 66), 740 and 750 (May '69), 840A and 840C (Dec. 69) and 888A (April 72). Now that the 730/4 model has recently become available from several suppliers, it is felt that details of this receiver would be of interest. The 730/4 has features which make it an exceedingly good general-coverage receiver. As is usual with Eddystone receivers, components and mechanical construction are of the highest quality. Indeed, many earlier Eddystone models are still giving good service in numerous shacks after 25 years or more, and the 730/4 is a relatively new and "young" receiver.

Band Coverage

There are 5 ranges: (1) 12.3-30 MHz, (2) 5.3-12.5 MHz, (3) 2.5-5.7 MHz, (4) 1.11-2.5 MHz, and (5) 480-1110 kHz. One of five small indicator lamps shows which range is in use. These ranges do of course give coverage of all amateur bands, Top to 10m., as well as general SW coverage for the SWL, or as use with a converter for 4m. or 2m. as IF/AF amplifier.

The familiar Eddystone tuning drive which breaks up the scale into 2500 divisions for logging purposes is again used. Readings on this scale for the various amateur bands are as follows:

1.8-2.0 MHz—254 divisions; 3.5-3.8 MHz—180

divisions; 7.0-7.1 MHz—31 divisions; 14-14.35 MHz—71 divisions; 21-21.45 MHz—45 divisions; 28-29.7 MHz—191 divisions.

It is thus practicable to prepare an individual graph for any amateur band, if wanted, and the reduction ratio of approximately 120:1 allows easy tuning. Calibration and re-set to frequency can be extremely accurate, and the cursor can be set by the small top right hand adjusting knob to agree with pips from the 500 kHz internal calibration oscillator, operated by pressing the topleft hand button. The 500 kHz calibration points throughout all ranges are marked in red. For amateur-band purposes, calibration can be checked by this means at 1.5 and 2.0 MHz, 7 MHz, 14 and 14.5 MHz, 21 and 21.5 MHz, and 28 to 30 MHz. The actual tuning scale length is 12in., with finely calibrated scales.

In terms of reception, this means that a transmitter of known frequency can very nearly be found by dial readings alone.

Block Diagram

Fig. 1 is a block diagram. V1 is the 1st RF (6BA6) and V2 the 2nd RF (6BA6). The use of two RF stages reduces 2nd channel interference to an exceedingly low level. V3 is the mixer (6BE6) with separate oscillator V4 (6AM6) operated from the voltage regulated supply from V14 (VR150/30).

V5 and V6 are the two IF amplifiers (6BA6's) and variable selectivity and optional crystal filter are provided. V7 is a double-diode (6AL5) used for AVC and demodulation, and V8 (12AU7) provides two stages of AF amplification. V15 is the output stage (6AM5) and there is an optional audio filter between V8 and V15.

V9 (6AL5) is a cathode follower for S-meter protection, and noise limiting. V11 (6AU6) is a cathode follower giving an optional IF output point at 70-80 ohms impedance.

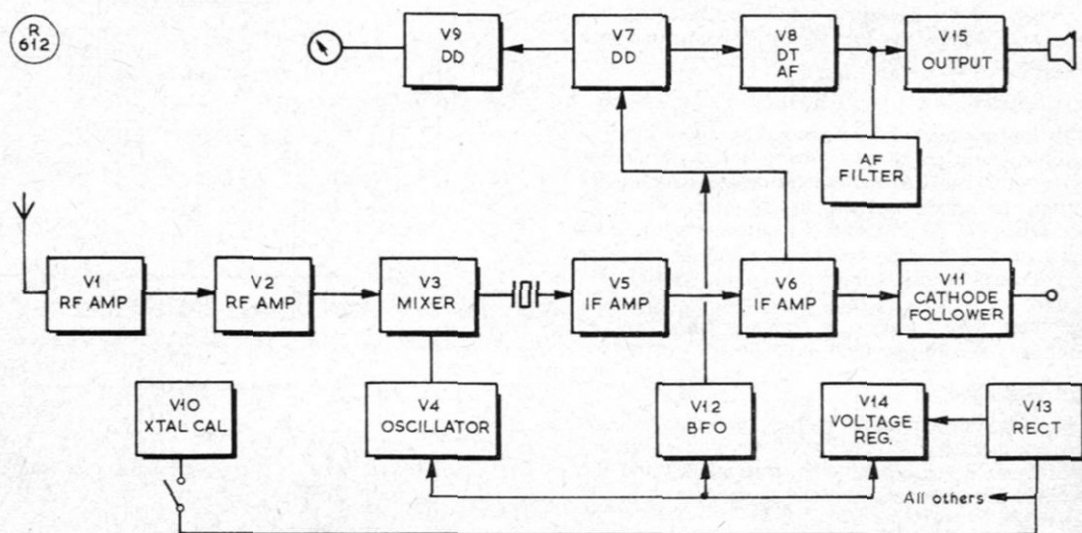
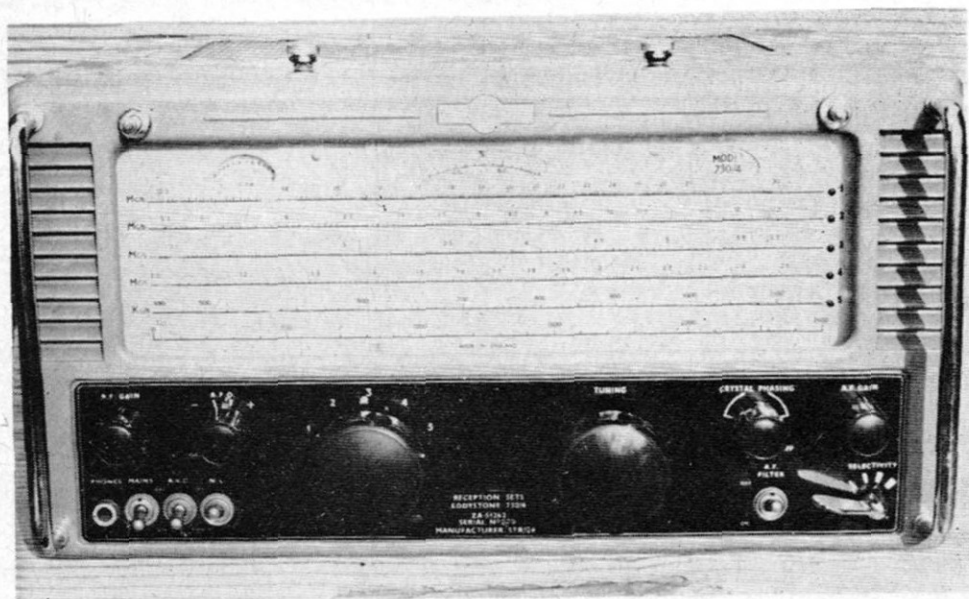


Fig. 1 Block Diagram of the 730/4



(Front.) The band in use is indicated by the small lamps to the right of the scales. The centre logging scale is read in conjunction with the bottom scale in the manner familiar to users of similar models. Controls are described in the text.

V10 (6AM6) is the crystal calibrator, with means of adjusting to zero beat with the 2.5 MHz or other standard frequency transmission if required. V12 (6BA6) is the BFO, also receiving regulated HT. V13 (5Z4G) is the full-wave rectifier.

There is provision to use the audio section alone as an AF amplifier, pick-up terminals being provided at the back. Output is for a 2/3 ohm speaker, or 600-ohm line. Other facilities at the back of the receiver include adjustment for the S-meter zero, two aerial inputs, a dial light brilliance control, mains input socket, and socket for alternative supply. Here, the receiver requires 5 amperes at 6v. or 6.3v., with 120 mA at 250v. for HT; or it can be operated from 110v. to 250v. AV mains, by adjustment of taps on the internal mains transformer, these being marked for the various voltages.

Panel Controls

The crystal calibrator switch and cursor adjuster have been mentioned. Knob controls, from left to right, are (1) RF Gain, (2) BFO Pitch with "Off" position, (3) bandswitch, (4) main tuning, (5) crystal phasing control with "Off" position, and (6) AF Gain.

Lower, at the left, is an outlet for phones, and toggle switches for mains, AVC, and noise limiter. At the right is a toggle switch for the audio filter, and a 4-position selectivity switch.

The S-meter is fitted at the top left of the tuning scales.

Aerial Input

There are two co-axial sockets in parallel, and either may be used for the aerial. The input impedance is 70-80 ohms. This means that a conventional dipole with

co-axial or twin feeder will automatically provide best matching. So will an end-fed or other type of transmitting aerial used with a tuner or Z-match adjusted to present a load of about 75 ohms to the transmitter, and switched to the receiver for reception.

DX reception is of course possible with a random length of end-connected wire, taken directly to the inner pin of the aerial socket, though the use of a matching device will improve results, in the customary manner. A terminal allows a "silent" (non-mains) earth to be connected.

Calibration and Alignment

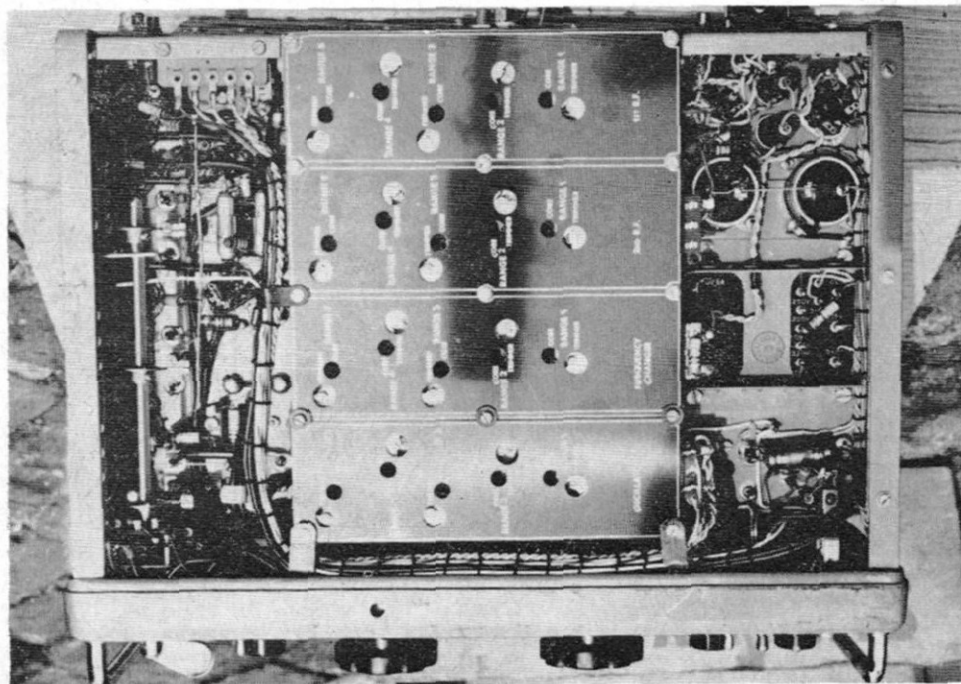
Any adjustment to the IF, signal-frequency or oscillator circuits should only be made with appropriate equipment and a full knowledge of procedure. The IF is 450 kHz, with a 1.5 kHz latitude to suit the individual crystal.

The setting points for the oscillator trimmers and cores are; *Range 1*, 28/14 MHz; *2*, 12/6 MHz; *3*, 5.6/2.5 MHz; *4*, 2.5/1.2 MHz; and *5*, 1,000/1500 kHz. The cursor adjuster should be at its middle position. Trimmers are always adjusted at the HF end of a band, and cores at the LF end.

The tracking points to adjust aerial, 2nd RF and mixer signal frequency circuits are: *Range 1*, 28/13.3 MHz; *2*, 12/6 MHz; *3*, 5.4/2.6 MHz; *4*, 2.3/1.2 MHz; and *5*, 1000/520 kHz. A very high degree of scale accuracy should be obtained on each band.

Selectivity Controls

The main selectivity control has four positions, and changes the coupling in the three IF transformers. This



(Inside bottom.) The cast coil box is covered by a plate with trimmers and cores marked for each range. Here, the IF section and associated circuits are to the left, and audio and mains sections to the right.

control also operates a switch which adjusts the gain of the 1st IF stage, to obtain more equal output over the range of selectivity positions.

In addition a single crystal is used with phasing capacitor, as in Fig. 2. This capacitor operates a switch in one position to eliminate the crystal.

These ranges of selectivity will allow good results under bad conditions, for AM, SSB or CW reception.

With selectivity in the minimum position, the response is substantially flat-topped, and is 9 dB down at approximately 7 kHz off resonance, and 50 dB down about 12 kHz off. The next position has 9 dB points at about 3.5 kHz off resonance, and 50 dB points at about 9 kHz off. The next position provides 9 dB points at a little over 2 kHz off resonance, and 50 dB points at 7 kHz off. The sharpest position (without crystal) gives 9 dB

points at about 1.8 kHz off, and 50 dB at 6 kHz off. This position is some 30 dB down at 4 kHz off and the sharpest likely to be normally used for AM.

With the crystal in, signals are 30 dB down at about 1 kHz off resonance, results depending on crystal phasing. As is usual with this type of filter, a very deep rejection notch can be moved across the IF passband by adjusting the phasing capacitor. The maximum degree of selectivity available is very high.

Audio Filter

This is, of course, only used with CW. In difficult conditions the filter is switched in, and the BFO adjusted to place the audio tone in the filter pass-band. This results in a great clearing up of surrounding mush of other signals.

The filter has tuned inductances, and is resonant at about 1000 Hz, with a pass-band of 100 Hz or so at about 6 dB points. This filter can select a wanted signal out of a background of other signals which normally would be almost impossible to separate.

S-Meter

This is calibrated at 6 dB per point, and 6, 12 and 18 dB over S9. Fig. 3 is the S-meter circuit. VR1 allows this arm of the bridge to be adjusted for zero. The presence of a signal causes a rise in voltage at G2, V5,

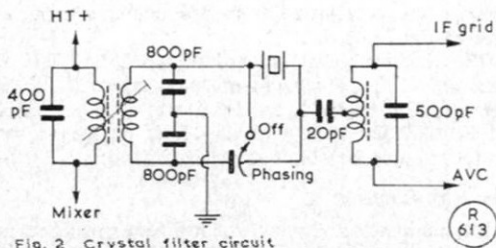


Fig. 2 Crystal filter circuit

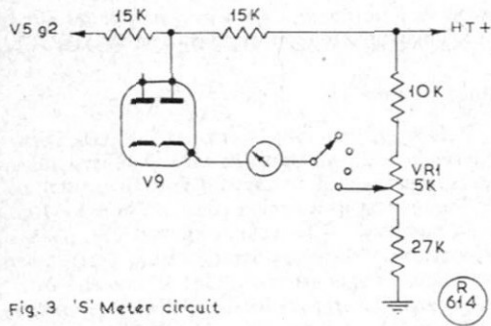


Fig. 3 'S' Meter circuit

operating the meter. For normal readings RF gain is at maximum (and AVC on). The meter only operates at the maximum selectivity position (but with crystal in or out) as this helps separate the reading from that of adjacent carriers in a congested band.

There is no adjustment other than temporarily shorting aerial and earth at the back of the receiver, and setting VR1 for zero on the scale.

Crystal Calibrator

The circuit of this unit is shown in Fig. 4, and it is fitted to the top of the ganged tuning capacitor screen. Adjustment of frequency should rarely be necessary, but is possible by rotating T1 with the tool clipped near the unit.

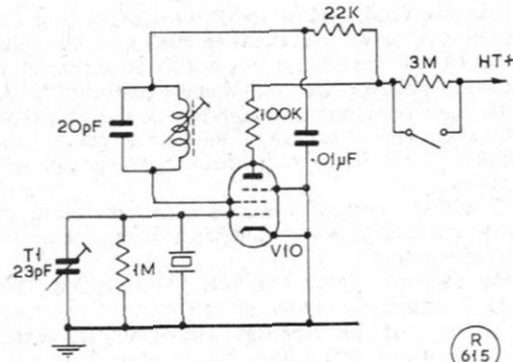


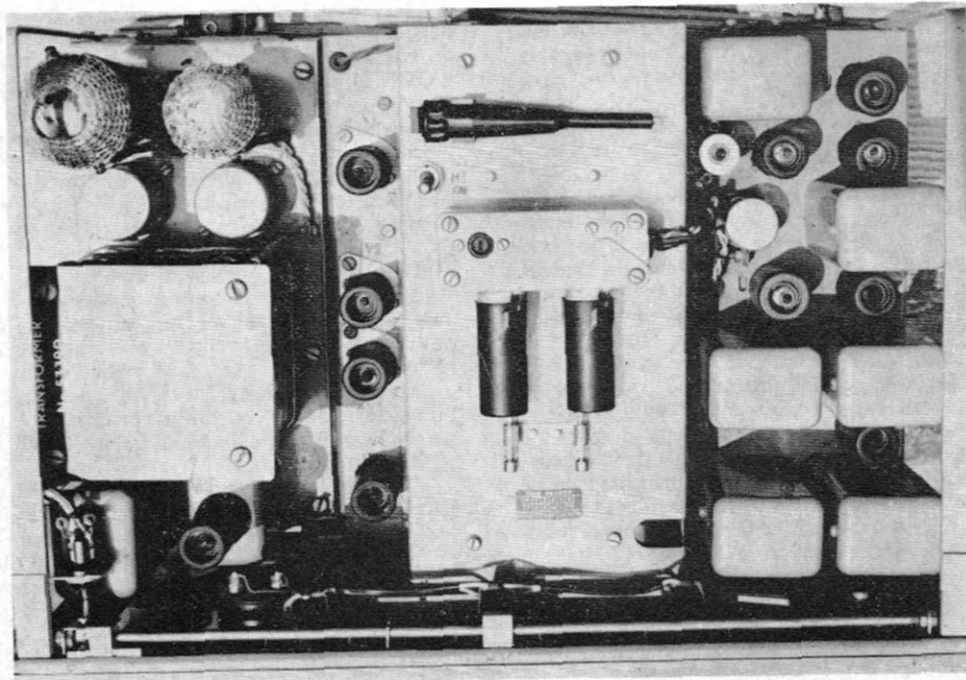
Fig. 4 500kHz Crystal Calibrator

Assuming the calibrator is to be checked against the standard frequency transmissions of 2.5 MHz or 5 MHz, tune in the latter, and rotate T1 for zero beat of the crystal harmonic.

The 500 kHz marker pips can be located up to 30 MHz, but naturally get weaker as frequency increases. If the BFO is on (white mark on top) a heterodyne is produced at the 500 kHz points.

CW and SSB

It will be noted that the receiver has no product or mixer detector (as with the 888A). However, satisfactory SSB reception is readily achieved provided it is remem-



(Inside top). This clearly shows the calibrator on top of the gang cover, with tool behind. The three IFT's on the right have mechanical adjustment of coupling for selectivity purposes.

bered that the SSB signal at the detector is kept down to a substantially lower level than the BFO injection. This means that whereas RF gain is usually at or near maximum for AM reception, with volume controlled by the audio gain, the reverse is so for SSB (and probably CW). With audio gain at maximum, RF gain is reduced until rotation of the BFO pitch control gives proper SSB reception.

The BFO is pentode connected, with 8 pF from anode to AM diode demodulator, so there is quite a reasonable level of injection.

No particular points arise with CW reception. The makers suggest maximum or intermediate selectivity for normal purposes. The BFO can be adjusted to that side of zero beat which gives best freedom from other signals. Naturally, with the crystal in, and also the audio filter if wanted, the receiver can produce CW

which can be copied but which would be almost or quite impossible to read without these features.

General Points

Removing four large screws at the back allows the receiver to be drawn out of its case. A hinged lid permits valves to be reached, or adjustment to the crystal marker.

The recommended mains fuse is 750 mA Magnickel or 1A standard. The scale lamps are 6.5v. 0.3A, small bayonet cap. There are five miniature lamps for range indication. These are assembled in holders on a strip which can be taken out when a thumbscrew is undone.

The weight is not much over 45 lbs. Dimensions are approximately 17 x 9 x 14 in. including the front handles. On those models so fitted rack-mounting brackets are fixed with screws and easily removed.

LOW-BAND "CAMBRIDGE" AM.10 CONVERSION FOR TWO METRES

MODIFYING THE RECEIVER SIDE

R. E. G. PETRI (G8CCJ)

THERE must be many people with a Low-Band Pye Cambridge just lying about doing nothing, simply because it is thought an impossible task to convert it for use in the two-metre band.

This article describes the method employed when converting such a unit so that it could be used as a fixed-channel two-metre mobile.

The mobile which was converted was in Band "E", 68-88 MHz, which may seem ideal for four metre working but is of little use to the owner of a "B" licence.

Once the mobile has been converted to fixed channel on two metres, any of the standard well tried modifications may be used to make it tunable if required.

The first, and often considered the most difficult, task will be to make the receiver tune to a signal at 145 MHz, the mobile calling channel.

For the conversion work the user should have a copy of the "Cambridge" manual by Pye with the original circuit diagram. A glance at this for the front-end shows us that this is nothing more than the familiar "converter," but instead of being followed by an Eddy-stone or a CR100 as a tunable IF it feeds into a fixed-frequency 10.7 MHz amplifier. As the Cambridge will not tune over a band its "receive" frequency must be controlled by its first local crystal oscillator. This must beat with the received signal at the mixer to produce the 10.7 MHz IF. The crystal frequency is calculated from the formula:

$$\frac{\text{Signal freq.} - 10.7}{3} = \frac{\text{Local osc. freq.}}{3}$$

So for the mobile channel,

$$\frac{145.0 - 10.7}{3} = \frac{134.3}{3} = 44.766 \text{ MHz}$$

The oscillator in the diagram is VT3 (using the manual nomenclature) with its collector tuned to the third overtone of the crystal, *i.e.* 134.3 MHz, which is fed *via* C24 to a mixer diode MR1 where it mixes with the 145 MHz signal to produce the 10.7 MHz IF.

Required

The test gear needed before attempting this conversion is VHF signal generator or a signal source at the tune frequency, *e.g.* a transmitter tuned to 145.0 MHz will do with a low level coupling taken from its dummy load; a GDO for checking the coil resonance; and a sensitive absorption wavemeter will be useful.

An RF probe can be simply constructed and used in conjunction with a 50 μ A meter for checking the oscillator injection voltage and a three turn coupling coil fitted to it for detecting the presence of RF in coil windings—*see* Fig. 3.

Step-by-Step

The procedure is to convert one stage at a time and ensure that it is working before going on to the next—in this way we will not end up with a receiver that does not work and so has many fault possibilities.

All coils to be wound with 20g. enam. copper wire, turn spacing about one wire's diameter.

- (1) Remove winding from former of T2 and note position of taps,
- (2) Take out C16 and C19, to be replaced later.
- (3) Rewind with 4 turns 20g. enam.,
- (4) Tap coil at 1 turn and 2½ turns from HT end, connect taps to original positions on former,
- (5) Replace C16 and C19. Check for resonance with GDO,
- (6) Insert crystal for "receive" channel,
- (7) Connect battery supply and switch on.
- (8) The oscillator should now be working if the coil has been correctly wound. Check this by use of the absorption wavemeter which will roughly check frequency; in our case it should