Eddystone S.504 - Dial Drive Cleaning and Servicing – Roy Kavanagh, GM4VKI[1]

Introduction

The S.504 (photo, right) was the first communications receiver that Eddystone produced after WWII. It was based on the S.556, a 'Tea Planters' Broadcast receiver introduced earlier in 1946. These receivers sported the (then) new-look distinctive fluted-front cabinet style that was to last throughout the next decade, with the 1940's 'half-moon' dial eventually being replaced by the Eddystone hallmark sliderule dial in the early-1950's. The S.504's half moon dial has a range indicator window in the upper left corner and an S-Meter in the other, and added a BFO, dual-gate crystal filter and noise limiter to the specification, but lacked the internal speakers of the S.556. The EUG Quick Reference Guide (QRG) notes that the S.504 is 'rare' - the low production numbers probably resulting from lack of demand in an over-saturated market, its high price and the poor immediate post-war economy.

An S.504 was recently acquired by the author while undertaking his SKI[2] duty – a good find and one that is providing him with endless hours of fun that he is sure will pay off in the end with a great receiver that is still 'doing the business' well, after some 65 years of slog reliably hauling-in signals on the shortwave bands.

As part of the restoration process, it was decided to give the dial drive mechanism a thorough overhaul. Details of this were originally provided in email form to Chris Pettitt, who asked Gerry O'Hara to help assemble them into an article for the EUG website. A selection of more general photos of the receiver are also included at the end of the article for information. Further details of Eddystone drive mechanisms may be found on the EUG website, covering the S.750 gearbox (Technical Short #20), the Type 898 Drive Mechanism (as used in an HBR13C Receiver) and also for several specific models, such as the S.770R and S.680/2 (the latter's dial drive mechanism is somewhat similar to the S.504), in their respective restoration articles.

S.504 Dial Drive Overview

This is an overview of the S.504 dial drive mechanism, however it is the same (more or less) for all the older series of Eddystone receivers.

The basic system starts with a friction drive via a split spring-tensioned ring on the outer perimeter of a spring steel disc. This transfers the drive to a larger fibre gear which is split into two gears laid one on top of the other with spring tensioners to provide anti-backlash. The drive is then transferred to a larger gear which, like the last gear, is split and has spring tensioners within it. This gear drives the main pointer and also drives another brass wheel, which through a transfer cog, drives the small rotating pointer (logging scale) on the outer tube of the main pointer shaft.

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[1] Minor additions, layout and editing by Gerry O'Hara, VE7GUH, October, 2011

[2] '**S**pending the **K**ids **I**nheritance'

Initial Clean-Up Attempt

In my case, the drive mechanism was full of old grease and dirt which was prohibiting the drive from working making it stop at various places. I tried to fix it by using petrol suitably dowsed all over the assembly to wash all the congealed grease off, however this failed, and I was left with no other alternative than to completely strip the gears and clean individually then reassemble.

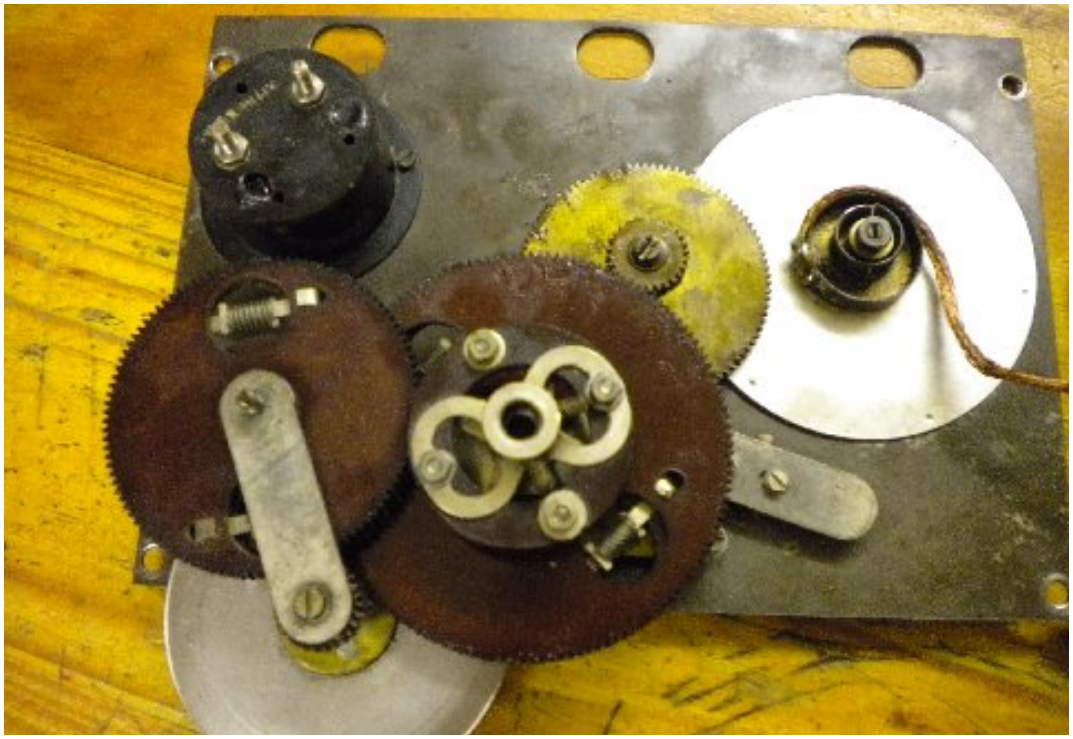

Photo 1. Drive mechanism before stripping-down: full of old grease and muck - note the tension on the anti-backlash springs. It was found that when re-assembly was completed that the flexible coupling caught on the small Paxolin wheel - it turned out that it wasn't the smaller correct one that should have been fitted but a replacement for a broken coupling. This was changed to a smaller diameter one and all was then ok again (see Photo 15)

The disassembly and reassembly process is not quite as daunting as it sounds if a methodical working practice is taken from start to finish. Likewise a good digital camera is a great help to take photos whilst disassembling , mainly to allow one to look back when reassembling.

Disassembly and Cleaning

The following is a step-by-step description of how to disassemble the drive mechanism (Photo #1, above):

1 Having taken off the front panel and band change indicator drive mechanism, remove the four screws holding the dial main plate to the chassis.
2 Lay the assembly onto the gear side so that the face plate is upper-most.
3 Move the spring steel wheel until the gap in the small pointer's fixing spring ring is below the main pointer and with a suitable tool ease up the small

pointer below the spring ring until it pops off the drive spigot. Place these parts in a box (a box with multiple partitions is best).

4 Turn the assembly over.
5 Remove the nut/ washer and screw/washer holding the flat plate over the spring steel wheel and the smaller Paxolin wheel. Put these components in the box.
6 Whilst wiggling the smaller Paxolin wheel, ease it up off its shaft and place in the box.
7 With a small screwdriver, undo the locking screw holding the split-collar around the spring steel wheel and lift both off their individual shafts. Place in the box.
8 Hold the assembly vertical with the pointer upper- most and looking at the back of the pointer on the shaft connected to the big Paxolin wheel you will find a small locking screw on the gear within the sub assembly next to the back on the dial plate.
9 Unscrew the locking screw and the large Paxolin wheel will come away with the shaft. Place in the box.
10 The small gear wheel around this shaft will fall out as you remove the large Paxolin wheel and shaft. Place in the box.
11 Remove the gear wheel which covers the band indicator and place in the box.
12 Remove the idler gear place in the box.
13 Now remove the three screws holding the remaining gear assembly which is the drive for the small pointer (logging scale).
14 At this point the main pointer can be withdrawn through the centre hole (backwards) and the sub-assembly disassembled and stored separately.
15 Take off the band indicator and store away carefully.
16 With a cleaning fluid (I use non leaded petrol[3]), carefully wash and clean all components. The Paxolin split gears should be carefully washed to make sure

Photo 2. No going back now - all stripped down…

[3] Try lighter fluid as a less pungent alternative. Wear suitable protective gloves when using aggressive solvents. This process should be undertaken outside or in a very well-ventilated room and DO NOT SMOKE!

that it is perfectly clean between the sections to allow easy rotation for spring tensioning.

17 Carefully check the large Paxolin gear as it has three hidden screws which hold the bottom section onto the brass bush: make sure these screws are secure as mine weren't, so I had to split the gear layers and put new 6BA countersunk screws in place of the old worn ones. This is done by carefully unbending the tension springs' tongues that are poking through the top gear layer. Re-bend the tongues to secure the top gear layer back on when completed.

18 Clean the band change indicator (carefully) with soap and water only.

Hey presto – all now clean and in bits! (photo #2) – fun part over. Now the more difficult (but satisfying) part…

Reassembly

1 When refitting each gear/shaft give it a small droplet of 3-in-One oil[4] - only a small droplet mind you.
2 Reassemble the sub assembly and fasten it to the main backing plate.
3 Replace the idler wheel with its two large spacers, so that it just slots into the gears of the sub assembly.

4 Refit the band change indicator (I forgot, and had to take the whole thing to pieces and start again – photo #3, above).
5 Refit the brass double gear which lies over the band change indicator and slots into the idler gear.
6 Now spin the large brass wheel with one finger and adjust the idler until a smooth action takes place in the gears fitted so far.
7 Refit the spring steel wheel and its collar.

[4] Gerry O'Hara advises against using 3-in-One oil as it goes gummy with age due to various additives in the mix, and recommends using a thin high-grade machine oil instead

8 If you now look at the underside of the large Paxolin wheel you will see two screws fitted into the underside of the lower section, these screws are the two

Photo 4. Large brass gear replaced

stops which limit rotation to 180 degrees, so this wheel has to be fitted so that when rotated, the main pointer goes from 0-180 and hits the stop.

9 Fit the small gear which fell out of the sub assembly and push the large Paxolin wheel shaft through it. Hold the pointer at 0 degrees and push the Paxolin wheel fully home.

Photo 5. Idler gear fitted

10 Give the small securing screw in the small brass gear just fitted a ‘nip-up’ and rotate the large Paxolin wheel by hand and see that a full 180 degree rotation is achieved. If not, ‘un-nip’ the screw, lift the wheel a fraction so these stop screws lift above the stops (which are the fixing screws for the sub assembly)

e Photo 6. Spring steel drive wheel and collar fitted.

and refit the large wheel. Nip-up the screw and test again. At one point you will be able to spin the large Paxolin wheel 180 degrees and the pointer will follow.

11 Refit the smaller Paxolin wheel whilst applying spring pressure between the top and bottom sections of the large Paxolin wheel, and also put a (small) spring tension on the small Paxolin wheel anti-backlash arrangement[5].

12 Refit the covering plate across the spring steel wheel and the small Paxolin wheel.

13 You should now have a complete and fully serviceable dial drive assembly.

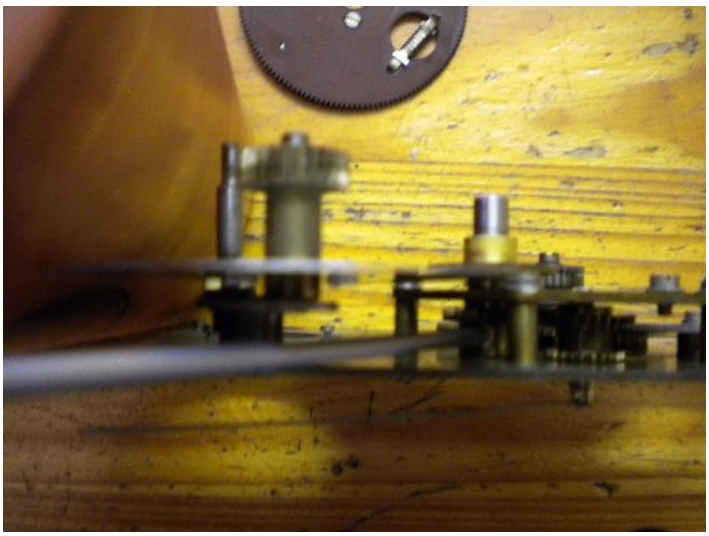

Photo 7. Screwdriver unscrewing the dial pointer to final Paxolin drive wheel for adjustment of the pointer.

14 If there are some sticking points, adjust the spindle in the large brass gear (as it has an off-centre fixing nut) and the idler until a smooth action is achieved.

[5] Try a two teeth difference for the correct tension – you don't need a lot. Too much will only result in increased wear

Photo 8. The large Paxolin drive wheel is in two halves - the lower half is screwed to the brass boss with three very small screws and they are each only holding by one turn. One of mine was stripped causing the wheel to run untrue, so three new brass 6BA screws were fitted and sawn off at the back . The thread was re-tapped as well.

Photo 9. Final pointer drive wheel re-fitted

Photo 10. Six hands required for this one (see Photo 23). First the large final Paxolin drive wheel has to be tensioned and held. Then the smaller Paxolin drive wheel has to be tensioned and held . It is then slid down its shaft linking the spring steel wheel to the final drive. Once in place the anti-backlash springs can be released to take up the slack.

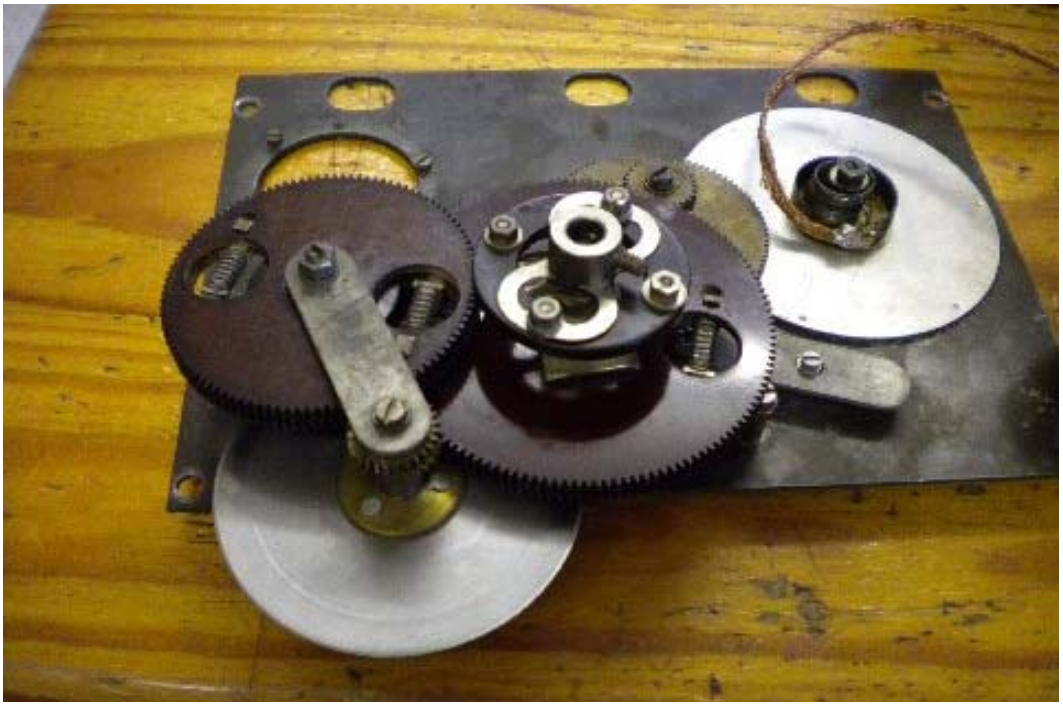

Photo 11. Flexible coupling replaced (note how it is very close to the smaller Paxolin wheel which when refitted into the set started to bind onto the smaller wheel, this was due to it being the wrong-size coupling)

Photo 12. Front panel showing new hand-marked dial and testing the overhauled gear drive mechanism

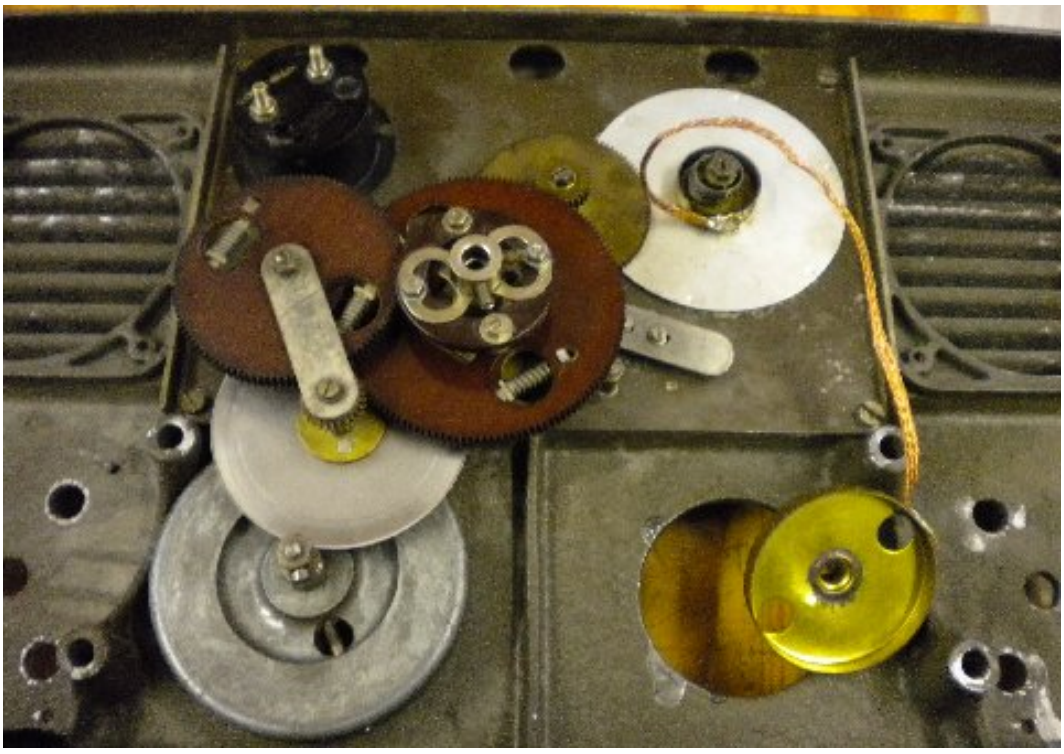

Photo 13. Completed drive chain re-installed onto the front plate.

Photo 14. Dial drive mechanism installed in the S.504

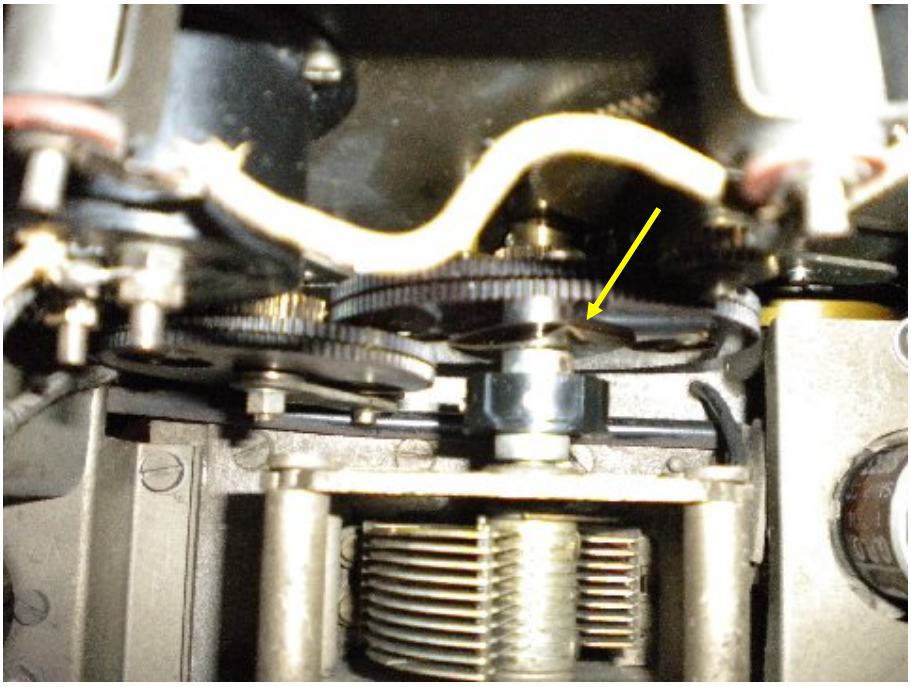

Photo 15. Close-up of the spring-tensioned split Paxolin gears and the new (smaller) flexible coupling (arrow)

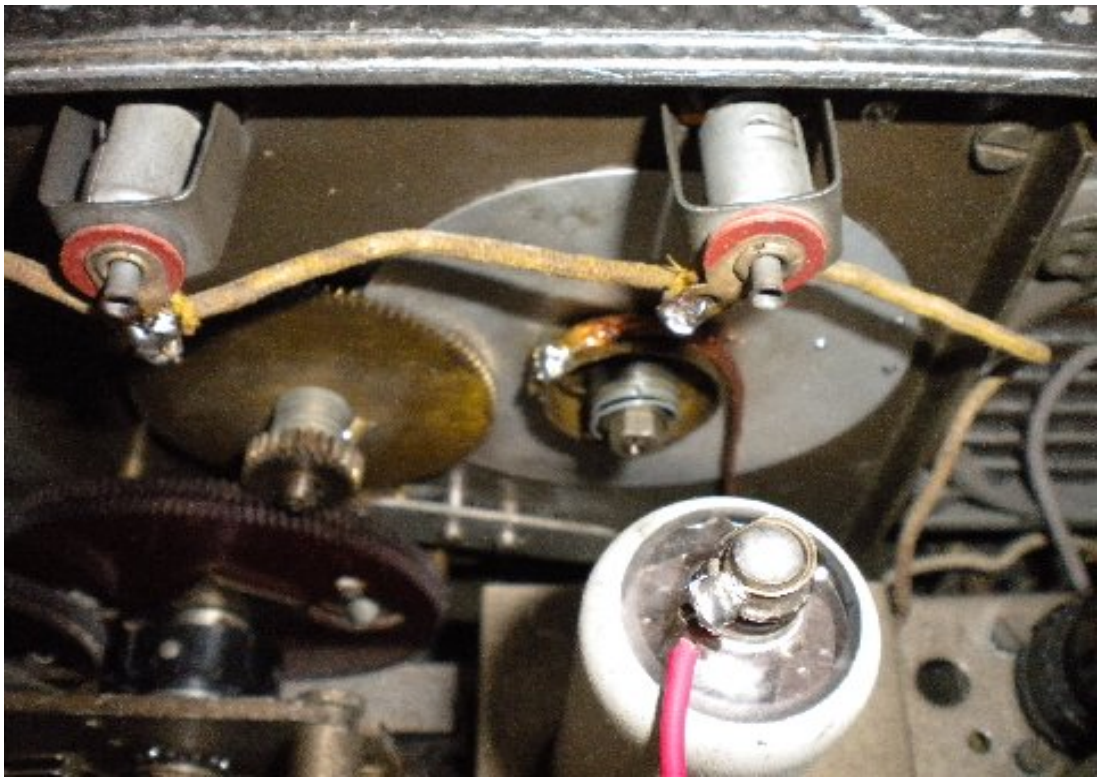

Photo 16. Close-up of the rear of the band indicator wheel

Photo 17. Rear view of the S.504 chassis

Photo 18. Re-capped IF section

Photo 19. Coilbox – the start of an era in communications receivers…

Photo 20. IF and AF section

Photo 21. Power supply and RF stages

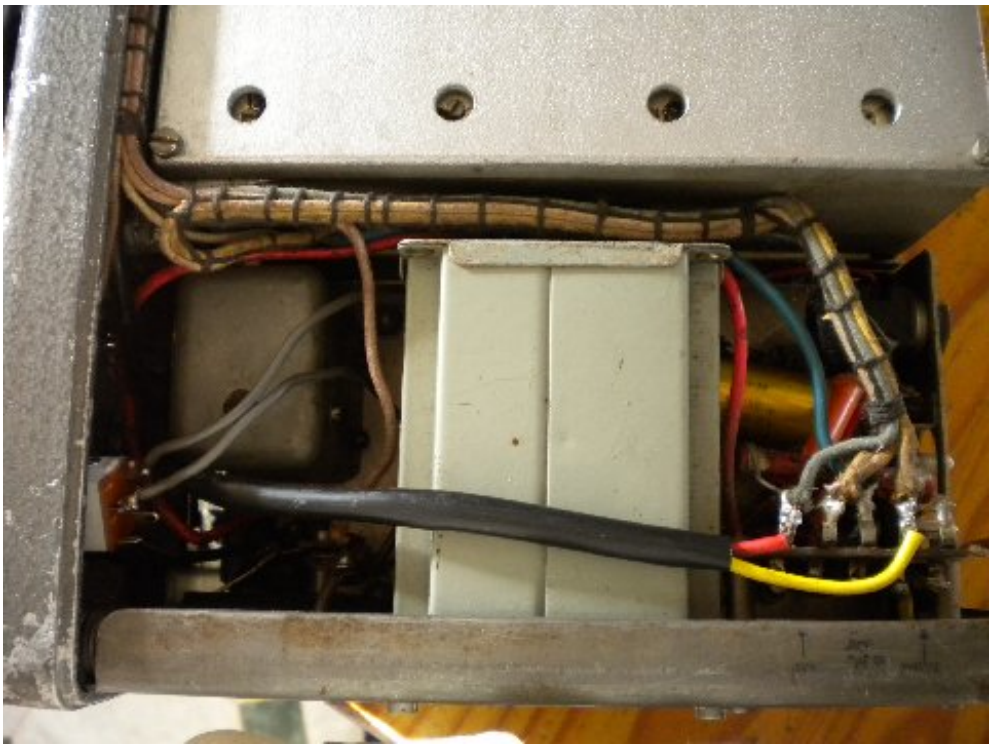

Photo 22. Output transformer mounted under the chassis

Photo 23. Eddystone's secret weapon of the 1940's and 50's – six-handed workers on the dial drive mechanism assembly line (or maybe they just used a jig…)