The tuning assembly for the Radione R3 radio receiver.

No assembly and aligning instructions for the receiver are available today. What is described below is derived from “trial and error”.

Any component repair on the R3 requires the disassembly of front side the receiver in terms of removing the vertical cover. The front cover is attached to the 4 sides of the main chassis with 6 Parker screws. The front cover contains on the front part of the tuning assembly, the volume control and also the electro dynamic loudspeaker, see **Figure 1.**

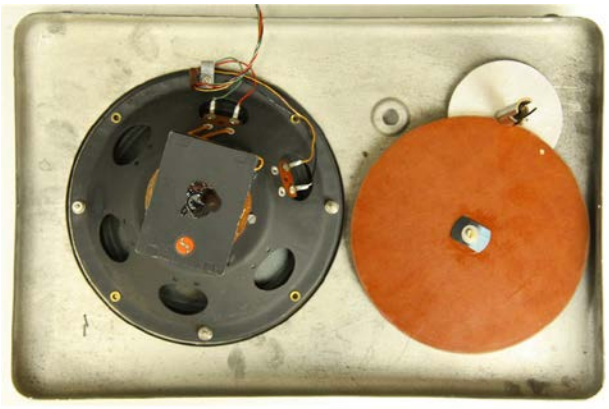

Figure 1

Prior to disassembly, the nut on the outside securing the volume control has to be loosened and removed. The loudspeaker has usually a long cable loom, connecting it to the power supply and the audio output transformer, located on the main chassis.

Figure 2 shows left from the lower middle part the output transformer and the unsupported volume control potentiometer. The left side is occupied by the shield around the mains and 28V power supply. On the right, near the antenna connector, the second half of the tuning shaft is visible.

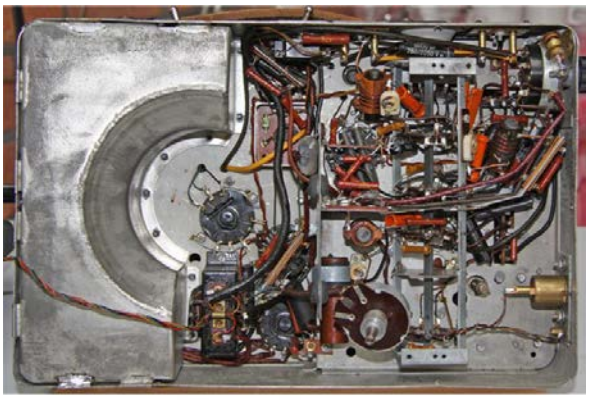

Figure 2

The tuning assembly consists of two parts. First the three-fold tuning capacitor and a turns ratio reduction, connected to the main chassis. This assembly is located on the rear of the main chassis and the tuning shaft goes forward through the bottom of the chassis. The turns ratio reduction consists of the tuning shaft coupled to a worm gear, in turn coupled to a pair of spring-loaded gears that directly drive the tuning capacitor, See **Figure 3.** The worm gear is hidden on the left of the gear wheels behind the adjusting screw.

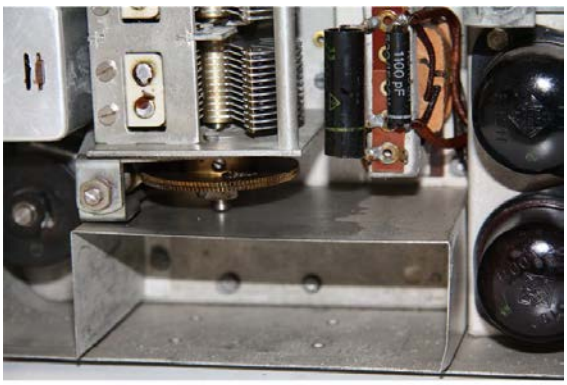

Figure 3

The tuning scale and front part of the shaft are located behind the front cover. The tuning scale is driven by a small gear that is part of the tuning shaft and therefore driven by the tuning knob and shaft. The main scale, manufactured from a phenolic resin impregnated cloth (Hartgewebe), is geared on the circumference. The turns ratio of the tuning knob is 30:1, both to scale and tuning capacitor.

To be able to separate the front cover assembly from the main chassis, the tuning shaft is divided in half and provided with a cross pin through the shaft, see **Figure 4**. The geared tuning shaft and Vernier logging scale is provided with a fork that slides over the tuning shaft and cross pin, see **Figure 5**. One side of the fork is formed by a flat spring, as such providing a sliding coupling without play.

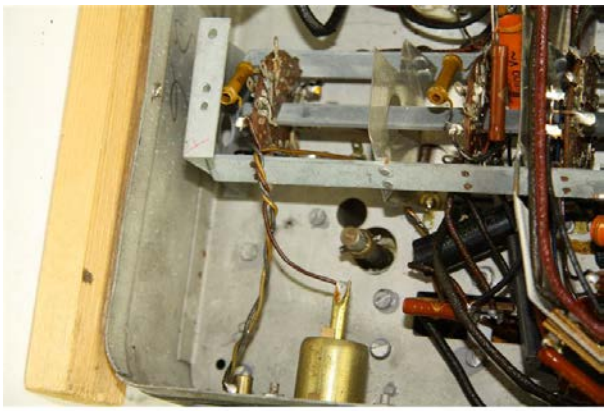

Figure 4

It may be said that the primary tuning is through the tuning knob, shaft, coupling fork and turns reduction assembly to the tuning capacitor. Although a spring-loaded double gear wheel, coupled to a worm gear, is provided in the primary tuning/rotating of the tuning capacitor, this is not the case with respect to the driving of the tuning scale. This will not affect the tuning accuracy or reproducibility but the read-out, to some degree.

Figure 5

So far the disassembly of the front part of the receiver. Ideally the assembly is just the reverse, provided that nothing has been rotated and that the removing of the cover has been performed with the absolute care.

End point adjustment and alignment of the tuning mechanism

When assembling and aligning the receiver after a repair or a major disassembly, the following has to be observed. This involves the tuning and logging scale as well as the vernier logging scale, as rigidly coupled to the tuning knob and geared shaft, see F**igure 6**. Mechanical end points have been located as a part of the manufacturing on the tuning /logging scale and the vernier logging scale as part of the manufacturing of the components. This mechanical alignment should be performed prior to the replacing of the front part on the receiver.

Figure 6

1. The bearing of the tuning shaft consists of two disks placed on the inside (steel disk) and outside (bronze disk) of the front cover respectively and are secured by 3 countersunk screws. Two holes are deliberately oversized and allow the bearing assembly somewhat to be rotated around the screw in the small hole, see **Figure 7**. Assemble the baring with loose screws and rotate the gear shaft away from the tuning scale. Rotate the logging scale "0" position (high frequency side of the scale) accurately on the tuning hairline. Rotate the vernier scale "0" position or a bit above it on its hare line. Gently move the tuning gear shaft towards the tuning scale and secure the 3 sunken head screws. The tuning knob should be placed and aligned for this operation, see below. The sunken-head screws can be reached through the hole in the knob respectively When rotating the tuning assembly to the low frequency side the end point will appear somewhat above the "0" position of the Vernier logging scale because of the respective thickness of the mechanical end points.

Figure 7

2. The tuning knob should be placed and aligned for this operation, see below. The sunken-head screws can each be reached respectively, through the hole in the knob, see **Figure 8**.
3. The assembly of tuning knob and scale is sensitive to misalignment. Make sure that the mating of tuning knob gear and tuning scale has been done gently, otherwise damage to the scale on the long run may occur and also to the read-out of the frequency, since this is given by the diameter ratio of the respective gears. If the mating is not complete, the tuning shaft gear will slip on the tuning scale disk and will damage the gearing of the disk. Also make sure that when placing and securing the tuning knob, the tuning shaft is well pushed forward to the steel disk inside and that the knob is well placed against the bronze or brass disk on the outside, such that the knob and shaft does not "wobble".

Figure 8

Tuning verification and sensitivity

Switch the receiver on, let it warm-up for some time and tune it with the help of a signal generator to the low frequency side of the scale. Rotate the tuning scale to the corresponding position and verify that the rotational position of the fork and flat spring are corresponding with the tuning shaft and cross pin of the chassis part of the tuning mechanism.

Perform the final assembly of the front side and verify the tuning for correctness. If not, do not start tuning or rotating any coils or capacitors or loosening the tuning shaft bearing disks, but remove gently the front, rotate the tuning knob for 180 degr. of rotation only, in the direction of the misalignment and assemble and verify again. This procedure has been derived from practical experience.

As a verification of the disassembly and assembly operation the receiver tuning has been compared to that of a stable signal generator, in the following table 1 See also **Figure 9** for a : comparison of scale definition and the concluded deviations from actual frequencies

In addition a rough indication has been performed of the sensitivity for the reception of unmodulated CW signals. The BFO was switched on and the receiver sensitivity was at its maximum level, the audio output was at about 25 %.

For the 3 mid-scale tuning positions the signal was clearly discernible with the loudspeaker switched on

Table 1. Tuning accuracy

Red tuning scale		White tuning scale		Green tuning scale	
Receiver MHz	Signal gen. MHz	Receiver MHz	Signal gen. MHz	Receiver MHz	Signal gen. MHz
2,70	2,790	7,0	7,002	15,0	15,022
5,0	5,045	12,0	11,929	20,0	20,081
6,0	6,056	14,0	13,926	25,0	24,990

Figure 9. **A reproduction of the actual tuning scale**