

The Telefunken E-1501
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Introduction

This is my story (and no, it's not The Story) about the Telefunken E-1501 HF receiver. I have found very little on the web about this receiver, especially user comments or reviews. This article may not remedy the situation, but at least give one link as to how, and how well it operates, should anyone have the interest of acquiring one for serious HF monitoring or DX-ing. Now, if you are a radio receiver purist, in the sense that old and good radios should not be tampered with or altered from their original state, please do not read on. My radios are not put on a pedestal; they are here to do a job.



I found my E-1501 on German Ebay in November 2004. Actually it was a friend of mine who spotted it; he wanted to bid on it for himself. For reasons irrelevant to this article he chose not to, and I thought I'd have a go on it. I didn't want it "very much" myself, so my maximum bid was chosen accordingly. Apparently, nobody else wanted it "very much" either, so I got off extremely light with EUR 611 for a radio which easily sells for several hundred Euros more, depending on configuration. I had a friend of mine pick it up in Germany in mid-December, and got it just before Christmas. It was "naked", i.e. no rack cover.

Configuration, outline of features

The E-1501 I won had the following configuration: ISB and RTTY modules included. It is ready for diversity reception with front panel antenna switches and dedicated antenna inputs on the back panel. Telefunken had a suite of mechanical filters for the E-1501, mine had the following installed: 0.6 kHz, 3 kHz, 6 kHz, -3 kHz and +3 kHz. 14 kHz bandwidth is also available. Modes are CW, AM (fast AGC), SSB (fast and slow AGC), ISB (fast AGC) and RTTY. When in SSB (A3J), USB and LSB is chosen on the filter selection (+3 kHz and -3 kHz respectively). Fast AGC release time is around 0.5 seconds; Slow AGC release time is around 2 seconds. AGC speed is chosen from the mode control rather than from a separate AGC switch. There are two N-plug antenna inputs; one for 10 Hz – 1600 kHz reception, one for reception above 1600 kHz. The <1.6 Mhz input is somewhat desensitised by design compared to the other input, probably around 12-15dB. The >1.6 Mhz input works on MW too, but a highpass filter starts to roll off between 1400 and 1500 kHz and MW sensitivity as such is down to around -80dBm in the low part of the MW spectrum. It has red LED digital readout to 10 Hz. Tuning is by way of a speed-sensitive tuning knob, in addition to "fast" and "very fast" up/down toggle switches. It has a 200 kHz IF Output (BNC). The first IF is 42.2 Mhz.





Incidentally, this is the first receiver I have where I can actually see the AM signal. The visual display to the right of the frequency readout has 8 green LEDs on both sides of a red LED. When I am 100 Hz away from the center frequency, the outermost green LED lights up. As I approach center the green LEDs will follow, until I am in the center of the passband and the red LED lights up. Fancy! Now I can tell if there is a sub-audible carrier on a frequency without using SSB/ECSS. When there is no signal, both border green

LEDs light. When in SSB mode, the display shows a far left LED in USB, a far right LED in LSB.

My E-1501 – picked up from a dust bin?

One can wonder. First, the good news. Yes, it powered up. Yes, it was accurate and rock stable.



Yes, all the filters worked fine, as did AM and SSB reception. The display was fine. So all the basic requirements were met. I had not bought a dead receiver. A positive feedback was then issued to the seller – however I had plenty of time afterwards to regret that. First, its physical appearance: The frame seemed to have taken some beating. From the front end of the module section to the front panel (9 cm) the frame was skewed sideways around 10mm, and the upper right hand corner of the front panel had been bent inwards, so it would have been impossible to rack mount it, or put it inside a rack cover. Several screws

were missing; the RF module for instance wasn't fastened at all. And one screw was loose on the inside of one of the modules. ISB didn't work; the ISB channel one/two toggle worked only in channel one. Channel two was dead. The tuning knob was not original; it had been replaced with a 400 gram (!) knob. Since the encoder itself had very little friction, the weight of the knob made its "flywheel" function approach that of a perpetual mobile...one light push and it went on forever... Needless to say, this made SSB/ECSS tuning extremely difficult, actually downright impossible. The knob nut covers of the six rotary controls were damaged, probably someone has tried to remove them by using a small screwdriver. Unfortunately these covers were made of a rather soft plastic material that was easily damaged when exposed to sharp tools. Even a fingernail would leave scars.

I had my pick-up friend measure sensitivity before he forwarded it to me. Sensitivity above 1.6 Mhz was fine, around 1uV. Measuring the <1.6 Mhz input provided disastrous numbers, -60dBm! Not a good thing for a MW DX-er when the >1.6 Mhz input is already de-sensitised on MW due to its highpass filters. This was indeed bad news for a me. Obviously, the <1.6 Mhz input was malfunctioning.

Breakfast in America

It needed work, and it needed it badly. My friend Dallas Lankford in Ruston, LA had been wanting to put his hands on a German receiver for some time, and with me in dire need of a repair man we decided that I send the Telefunken to him. It shipped around Jan 3 and arrived the week after. Dallas has prepared a technical review of the receiver which will be put on The Dallas Files on www.kongsfjord.no. I will not go into detail about his work. However, the <1.6 Mhz input was left unattended, and as such disabled. The >1.6 Mhz input was modified to accept MW signals as well with the removal of the highpass filters. Thus, there was no need for another antenna input. The ISB fault was nothing more than a poor contact. Dallas also enabled Slow AGC on AM by using

one of the RTTY control toggle switches (I will never use RTTY anyway).

Sensitivity is now around 0.7 to 0.8uV on MW, 30% modulation, 6 kHz bandwidth AM. This is very good, although I have receivers that are more sensitive. The filters are excellent. The 6 kHz AM filter measures 6.2 kHz at -6dB, 8.0 at -60dB!! The 3 kHz AM filter measures 3.0 at -6dB, 4.7 at -60dB. The -3/+3 SSB filters also perform admirably, 3.0 at -6dB, 4.2 at -60dB. Phase noise is excellent and there are practically no spurious signals. Even with the modified >1.6 Mhz input, IP3 is good at +13dBm in the MW band, but IP2 is somewhat meak with +35dBm – still on MW. One may conclude that Telefunken put in the <1.6 Mhz antenna input for a good reason and that this may not be a good MW DX receiver in a high signal level area. A correctly working <1.6 Mhz antenna input is likely to have a 2.0uV or worse sensitivity. For my use, 2.0uV is far from sufficient. There is no reason to expect IMDs where I live though. Dallas' conclusion before shipping it back was that this is a very good MW DX receiver.

Home again

After an incredibly fast shipment (three days! That's what a letter from the neighbour community takes!) it was back in the beginning of February. After having checked that it had not suffered damage during transport, I started to work on the skewed frame. I removed the front panel and all modules sans the PSU module, and put the frame into a large bench vise. Scary... I screwed very slowly and stopped several times to let the metal "stretch" – of course I was afraid it would snap off. It was really impossible to completely "undo" the damage but at least I was able to reduce the skewing to around 3mm, enough for enabling rack mount or case mount. Also, the front panel bend was straightened out. So. At the moment, it looks like a good candidate for my receiver shack.

Passing the final exams

So, how does it compete with my other receivers, all modified for optimal MW performance? Excellent receivers in other respects need not necessarily perform well as MW DX receivers. In order to do that they need to have outstanding sensitivity, low noise levels and excellent selectivity.

I fed the E-1501 through a 1:4 splitter which also fed an EAC R-390A, a modified NRD-525 and a modified Icom IC-746Pro. Conditions were mediocre to say the least with a CME having arrived a couple of hours earlier; still I had one trans-polar station audible, a number of trans-polar carriers and one semi-local MW station with a signal level around S9+20. The splitter was connected to a beverage antenna.

As would be expected from a 0.8uV receiver, it didn't quite match the R-390A and the NRD-525 in recovering audio from extremely weak signals; however as soon as the signals approached readable levels I copied them just as well on the E-1501. The E-1501 played roughly equal to the 746Pro (0.6uV measured).

Real-life selectivity is superb. Comparing with the 32-bit DSP 746Pro, which itself has excellent bandwidth properties, the E-1501 performed better (= less splatter) in all comparable bandwidth settings – however it should be mentioned that the 746Pro "6" kHz filter is really 6.8 kHz. This also seemed to be the case when comparing with the NRD-525 6 kHz filter and the modified R-390A 6 kHz filter. I didn't compare the 3 kHz AM filter a lot, but the SSB filters too were excellent although not better than (and definately not worse than) comparable filters in the other radios.

AM audio quality is excellent. When I compared it with the other receivers, I began to wonder if perhaps they had put a transparent synchronous detector in it, like Racal did in the RA6790/GM. I observed practically no AM distortion, although the cases of selective fading I found were few and light. Not so; the manual states that it uses a "hüllkurven detektor" which would translate into an envelope detector. Unfortunately, stock AM audio is somewhat limited to the properties of the Fast

AGC setting, so adding a Slow AGC to it by using one of the RTTY toggles improved audio quality in situations with fast fading. Audio response from the built-in (but quite large) speaker was somewhat flat. Curiously enough there is no connection for an external speaker, instead there are two headphone outputs; one ¼" jack and one with two banana plug inputs. A little more responsive bass, and audio would be right up there with the 746Pro.

One interesting bit is its accuracy. On low frequencies (say, from 6 Mhz and down), its readout seems to be very accurate within the 10Hz resolution. On 12 Mhz I noted a 10 Hz shift upwards (see the picture on page 1). On 18 Mhz the shift was 20 Hz.

Things I would have liked to see

Like many commercial receivers, the E-1501 lacks functions that are common on amateur-grade receivers, such as a notch filter and passband tuning. Since I usually use ECSS when interference on one side of the desired signal gets too high, I don't use passband tuning much in general. Yes, a notch filter would be desirable, especially an IF notch filter such as implemented on the IC-746Pro. But it is not a major shortcoming.

I would have liked to see some text on the front panel as well...such as "Mode", "Bandwidth", "BFO" and so on. Instead all functions are described by symbols. For a non-technical mind as mine it takes some effort to learn this. But it seems to be rather common on older German receivers. I guess the original operators weren't troubled by this.

Verdict: Passed, *laudabilis*. In its original configuration however, it will not perform as well on MW as many other receivers, since its <1.6 Mhz input is slightly desensitised. If you can live with that (and I believe that most people can), you have an excellent receiver on your hands.

Bjarne Mjelde, February 2005