Build your own
Satellite Signal Meter

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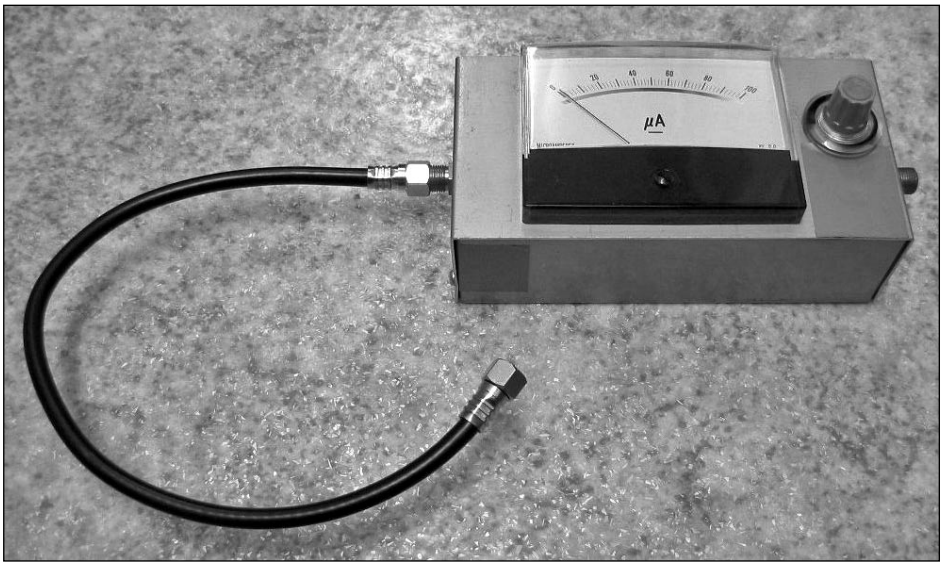
This article describes a tool you can build yourself to assist with aligning your satellite-TV dish without having to take your receiver or PC outside. Once you have located the satellite you are interested in, the signal meter will greatly help in optimising your dish alignment precisely.



The author's completed satellite signal meter

How the Signal Meter Works

The LNBs we use for satellite reception (digital or analogue) do not just receive a single channel; they receive the complete range from all transponders that are operating on a particular satellite. Together with the high gain that modern LNBs possess (over 50 dB), this feeds a lot of RF energy to your receiver when the dish is correctly aligned.

This signal meter design measures the amount of RF energy over a wide frequency range by summing the power from all transponders then rectifying and amplifying this for display.

Don't try to align your Meteosat dish using this device because, with only two 'low power' channels on Meteosat, you won't be able to distinguish the signal from the noise.

Using the Signal Meter

Disconnect the coax running from your receiver to the LNB (at the LNB end) then connect the signal meter to the LNB using a length of coax (between 1-3 metres). The receiver can then also be plugged into the signal meter. As the device is symmetrical, you can connect it either way round.

Power from the receiver is needed, so leave your receiver powered on. But it is not necessary to set it to a specific channel. Point your dish in roughly the direction of the desired satellite, using either a compass or the shadow of the sun at a predetermined time.

Use your favourite tracking program to determine the compass heading or the time when the sun reaches the same direction (azimuth) as the satellite.

Turn up the gain on the satellite signal meter and gently vary the azimuth and elevation to maximise meter read-out. Be aware that only 5° off direction can mean that you won't receive anything, or worse, you may have optimised on a neighbouring satellite!

Decrease the gain if needed. Once you have found the best dish alignment, you can optimise the position of the LNB in the feed clamp. Try rotating the LNB slightly from the normal position and shifting it towards or away from the dish to obtain maximum read-out.

Always check the reception on your receiver to verify that you have optimised on the correct satellite before fixing up your dish! If you are using a motorised polar mount, you can use the satellite meter at the receiver side too.

Although this design draws only a very small amount of RF from the LNB, it could degrade the performance of your system, so remove it after dish alignment has been completed.

Components, Building and Aligning

The circuit diagram for the satellite signal meter is shown on the following page.

The key components are the two detector diodes. The type used is a low barrier *Schottky* diode capable up to 3 GHz. Type *HP2800* can be used too.

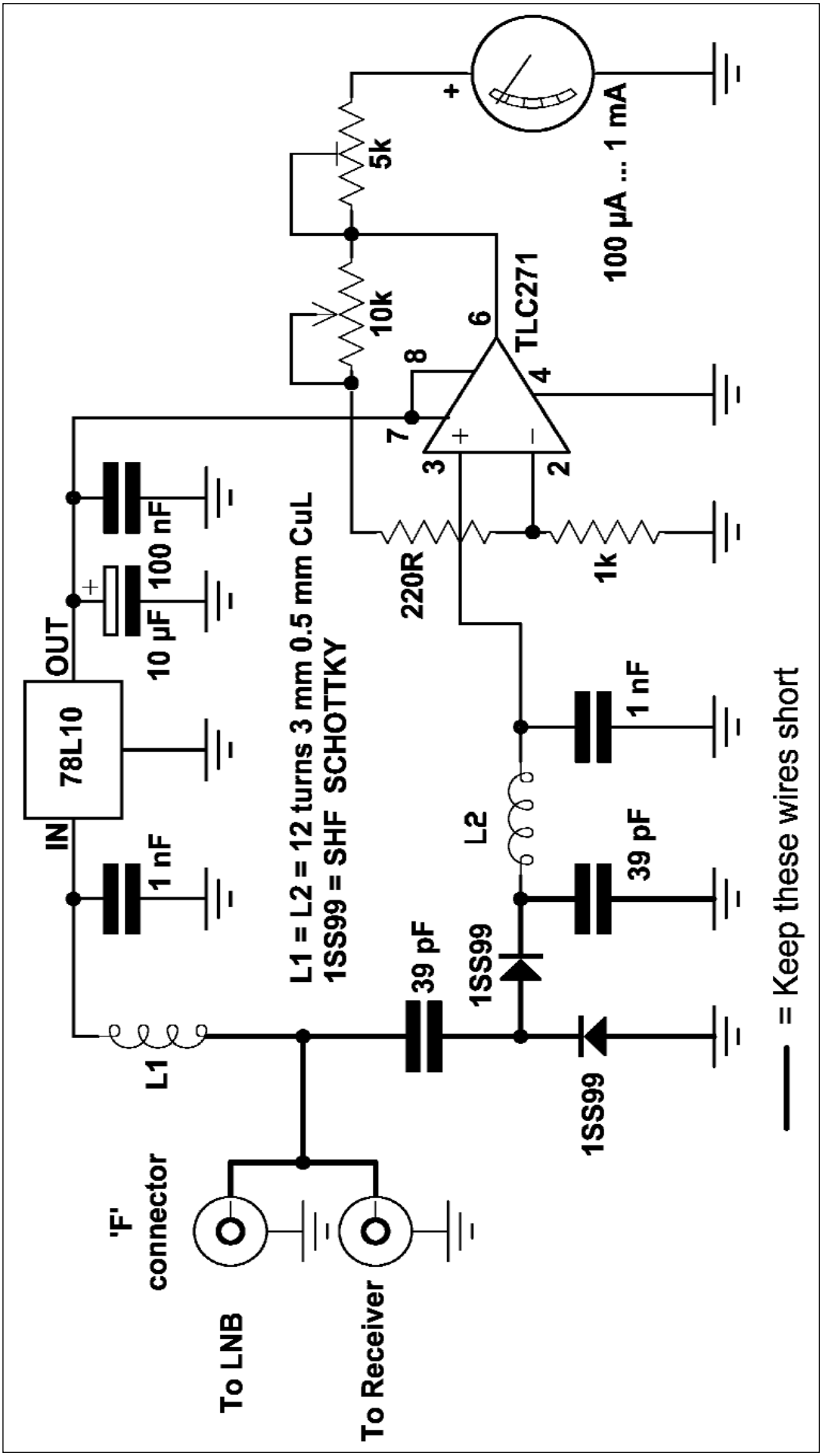
Some sources mention that other types like the *AA119* can be used but I have not tested this. Don't use ordinary silicon diodes (like the *1N4148*) because these won't detect signals of up to 2200 MHz.

It is important that the wires shown thickly in the schematic diagram are kept as short as possible (less than 5 mm) as we are dealing with high frequencies here.

Solder these parts directly to the back of the F-connector. Use a short length of coax to connect both F-connectors to each other inside the box.

The 5k trimpot is used to limit the meter read-out to full-scale once you have found the maximum signal with the 10k gain potentiometer set to maximum sensitivity.

Finally, the completed unit must be housed in a metal box to prevent RF leaking out.



The circuit schematic diagram for the satellite signal meter