

***A Simple Weather-Resistant Housing for the Nooelec SAWBird H1 Low Noise Amplifier and 1420.405MHz SAW Filter.***

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**The need for a cost-effective water-resistant housing for low noise amplifiers on the hydrogen line radio telescopes at Lichfield Radio Observatory.**

Lichfield Radio Observatory (LRO) is located at latitude 52.6815 north, longitude -1.8255 (1.8255 west) in Staffordshire, central England, UK, north of Birmingham. The observatory currently includes three radio telescopes designed for the hydrogen line (1420.405MHz). The aerial used on the LRO-H1 Radio Telescope is composed of a Ptarmigan Triffid ex-military 4x4 dipole array, measuring 86cm x 86cm in size, whereas LRO-H2 was constructed from a 1.5m (150cm) parabolic aluminium dish sold by its makers as a solar cooker. The aerial for LRO-H3 was constructed by Alex Pettit from SARA and uses a tuned Plate Yagi design.

All three systems use a Nooelec SAWBird H1 cascaded dual low noise amplifier and SAW filter to narrow the detected signal band down to 1420MHz +/- 30MHz. These low noise amplifiers and filters are not water-proof. They are best located immediately behind the aerial before the coaxial cable run down to the receiver and computer, which can then be placed quite some distance away, as the signal now has been amplified at the aerial.

Therefore, there is a need for a cheap, simple, and effective water-resistant housing that can be used for the Nooelec SAWBird H1 LNA on the hydrogen line radio telescopes at LRO. In this paper, I describe such a housing which has been implemented at Lichfield Radio Observatory.

**Obtaining an appropriate housing.**

I was able to purchase an appropriate housing from ebay.co.uk for only a few British pounds. The internal dimensions are 28mm x 83mm. External dimensions are 120mm x 35mm. There are two convenient screw holes for attaching the housing to either aerial or mount. The main box has a lip, over which the lid fits, supplying water-resistance.

***Photos of housing:***



### **Effectiveness of the housing.**

The Nooelec SAWBird H1 LNA comes in two forms, one with a plastic cover around the PCB and the other without, the “bare-bones” version. The version with cover does not fit into this housing, so it is best used with the bare-bones version.

One advantage of using a housing of this nature is that alternative connectors can be screwed onto the housing, which are less liable to damage from bending pressure on the connection, and which are more water-resistant. In this case, it allows N-type chassis connectors to be used and then connectors internally to the SMA connector on the SAWBird LNA.

The size of the SMA connectors on the Nooelec SAWBird H1 Bare-Bones LNA is such that when screwed onto the SMA connector on inside of the N-type-SMA chassis connector on both sides, then

the chassis plate projects slightly outside of the length of the housing. As a result, a shim is required between the plate on each side and the housing to compensate for this difference.

In addition, the SAWBird PCB contains a white LED which lights to indicate that the device is powered. This is important as the device is powered via a bias-tee and it is important to be able to confirm that this has been correctly set in software such as Easy Radio Astronomy or SDR Sharp. Without this confirmation, then it would be easy to accidentally not power the SAWBird H1 and hence not obtain either amplification or filtering of the signal picked up by the aerial.

To be able to observe this LED light, a small hole needs to be drilled into the side of the housing which can then be protected from ingress of water by gluing a small piece of clear plastic over the hole.

***Photos showing housing and Nooelec SAWBird H1 and how this fits into housing:***



**Further information.**

Further information about this project is available on the [www.astronomy.me.uk](http://www.astronomy.me.uk) website or by contacting me using the “contact us” page on that website.