

70CM PRE AMPLIFIER FOR SATELLITE USE

by ON6UG.

Preview

A pre-amplifier for 70 cm satellite reception must have properties that are different from other amateur radio use like EME, tropo, etc...

1. Most importantly, it must have a good filter at the input to allow full duplex operation 2m/70cm and must reject the 3rd harmonic of the 2m transmitter. This is important for good full duplex phone/CW operations but most important for full duplex digital operation on today's digital satellites for 1200/9600 baud.

2. It must also have good IMD properties (3rd order ICP) to withstand strong in-band signals. e.g. a GaAs fet amplifier is not as good as a silicon N Channel Mosfet amplifier. A good indication is the drain-source voltage. The higher the voltage the better the strong signal performance.

3. It must have good noise figure preferably < 1 dB.

4. It must have high gain to allow use of simple lossy cable like RG58 between pre-amplifier and receiver. Preferably >15dB.

5. It should have no tuning elements such as tuning capacitors, inductor or potentiometers to and be able to perform in all weather conditions at the antenna.

6. It must be small to allow easy mounting at the antenna with simple BNC or N type connectors.

7. It must be unconditionally stable with all loads at the input to allow a wide range of antennae used.

8. Last but not least, it must be easy to construct and easily reproducible.

With all these conditions in mind, the following pre amplifier was developed from state of the art SMD devices. When carefully constructed, no tuning other than a simple optimisation of the input is required.

CONSTRUCTION

The box is an in-line BNC module-case from RS components No. 456-201 but can be any other box with the same dimensions as in Fig.1.

Begin by filing half of the teflon and centre pin of the connectors as indicated in fig 2.

Next solder two copper foil strips along the sides of the PCB to connect the side striplines to the ground plane. Make a slit in the PCB for trough-contacting the source capacitor ground. Use the same copper foil for this. Drill a hole in the PCB at the position marked X Fig 3.

Clear the hole at the plain copper side with a drill diameter 4 mm. Solder both short sides of the PCB to the connectors aligning and centre pin with the strip on the PCB. Clean the board and connectors.

Solder all SMD components except the fet.

Solder inductor L1-L4 as in the photograph.

Pay attention to the height of these coils above the PCB as in fig 4.

4. Solder the RF choke and transformer and stabiliser. Check the voltage at the pads of the fet. Solder the fet in place.

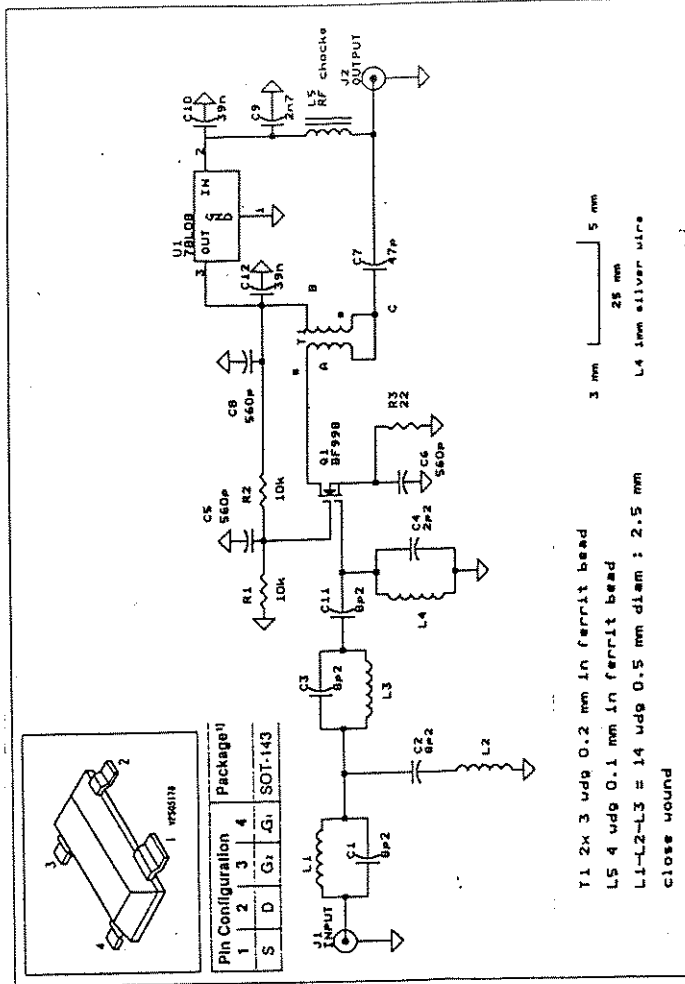
TESTING

Connect the pre amplifier to the receiver and antenna. Tune to a weak signal on 70 cm and bend L4 more or less towards the PCB for optimum signal.

That's all ! Adjusting the fet source resistor does not give much better performance.

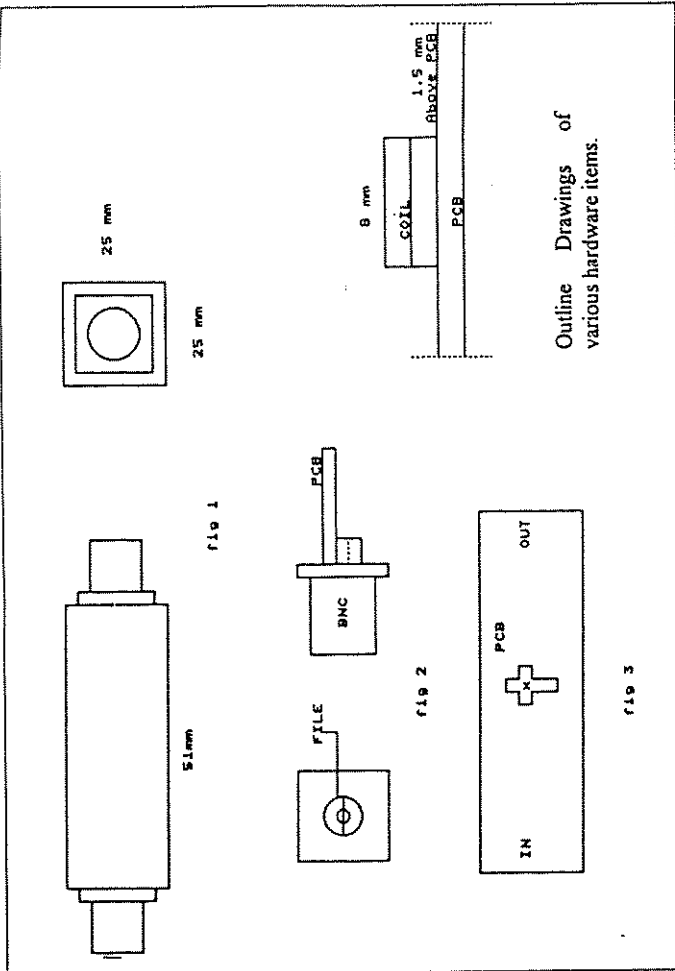
The input filter rejects Two metre signals very good. It is possible to connect your Two metre transmitter output (terminated) direct to the input of the pre-amplifier without destroying the fet !

Acknowledgement: I would like to thank Knut Brenndorfer, DF8CA for stimulating my appetite in experimenting with these Mosfet devices. Freddy. de Guchteneire. Belgium.

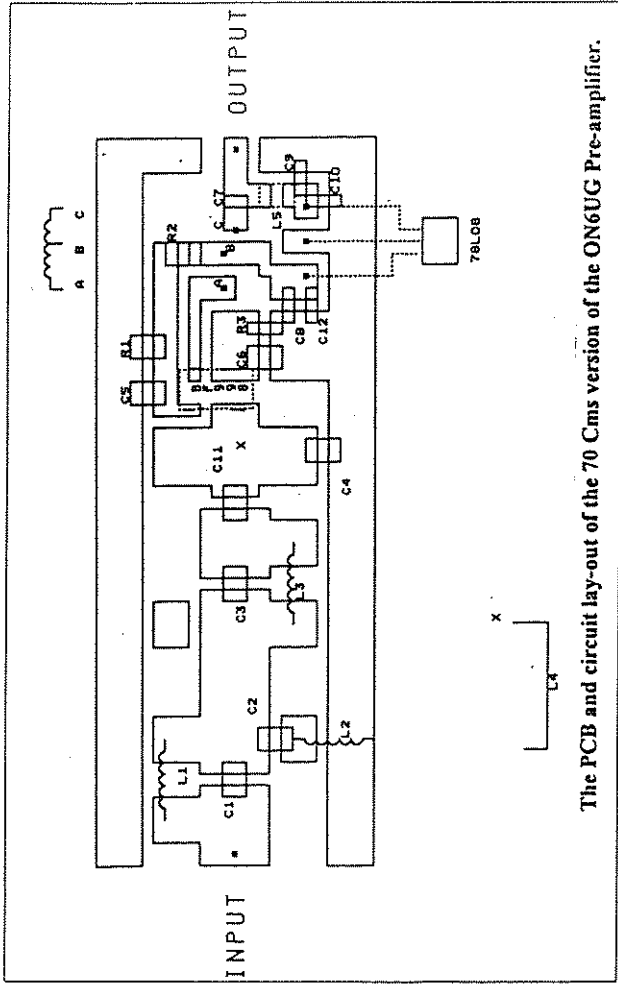


Photocopies of this set of Drawings can be obtained for the usual small donation to P3D Fund from the Editor of Oscar News. AMSAT-UK. London. E12 5EQ. England.

If there is a demand for bulk purchase we would also be willing to obtain the RS Boxes for Overseas MEMBERS. (and UK members if required) However as we do not have an account with any supplier of components the price must be Cost plus VAT and our Postage/packing costs. Sorry, but we are not dealers in electronic components and therefore do not get a Traders percentage. G3AAJ.



Outline Drawings of various hardware items.



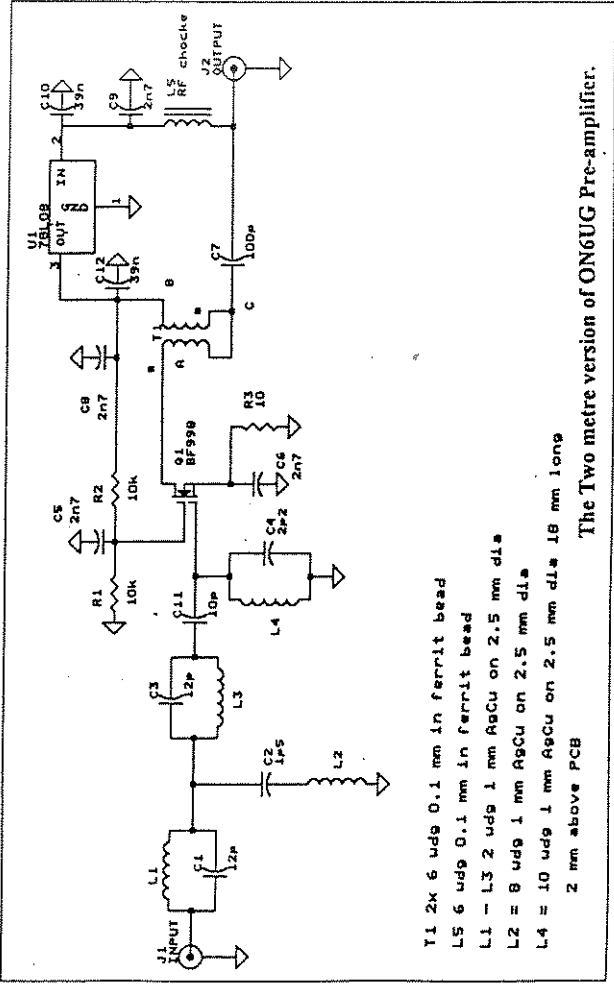
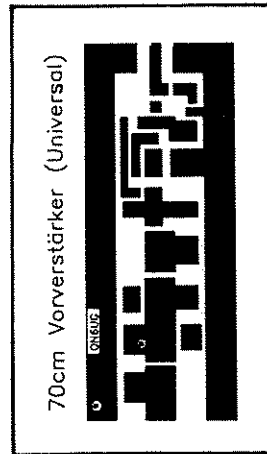
The PCB and circuit lay-out of the 70 Cms version of the ON6UG Pre-amplifier.

ACKNOWLEDGEMENTS

We acknowledge the original article printed in the March 1993 AMSAT-DL Journal, and permission to reproduce the line drawings from the Journal. Photographs and PCB layout are originals and may not be EXACTLY to scale on re-production in the AS format we use for OSCAR NEWS. It is suggested that constructors obtain the box first, and then scale up/down with a piece of cardboard before they do a PCB etch.

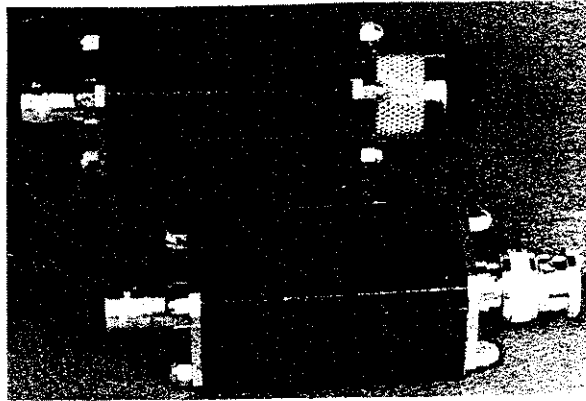
We have also printed the Two metre version for interest. Feed-back is very welcome for this and any other construction item.

Thank you Freddy for another fine constructional article. Ron. G3AAJ.



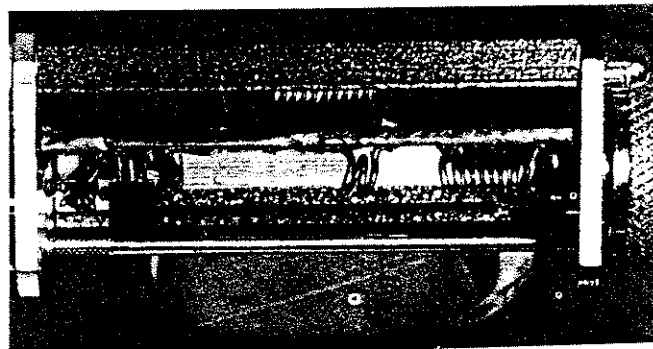
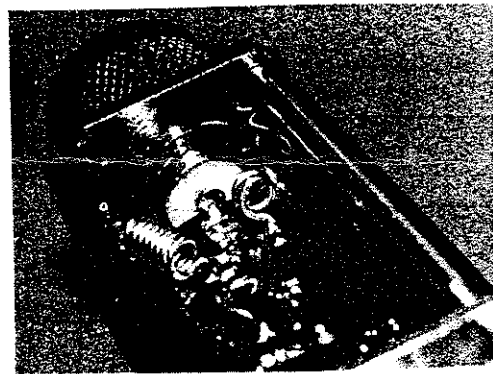
The Two metre version of ON6UG Pre-amplifier.

Photographs of the ON6UG Pre-amplifier.



The Two Metre and 70 Cms versions of the ON6UG Pre-amplifiers detailed in this article.

Detail showing cut-out on Co-axial socket.



Elevation view of PCB and coils on 70 Cms unit.