



Another ARA-2000 rebuild and LNA approach

## Active Wideband Receiver Antenna for your SDR



Dressler ARA-2000

Software Defined Radio (SDR) has finally reached a much broader mass of people, who wanted to play with RF technology, but didn't find the time or resources to learn all necessary skills, to build a hardware based radio. Thanks to the work of the [GNU-Radio](http://gnuradio.org/redmine/projects/gnuradio/wiki) [<http://gnuradio.org/redmine/projects/gnuradio/wiki>] and [OsmoCom](http://sdr.osmocom.org/trac/) [<http://sdr.osmocom.org/trac/>] developer crowd, this barrier is finally gone and everyone can, more or less, directly access, what the antenna *receives*.

The last Mission-Log about a GNU-Radio based NFM SDR receiver pulled in a lot of people, looking for examples, to better understand GRC and to improve their own SDR projects. The real beauty about it is this: Unlike hardware receivers, which can't simply be replicated and shared, we only have to come up with good software receivers/transceivers once and then may just share them amongst each other, without any limitation.

However, the antenna itself, is still hardware and will most likely never be replaceable by software. On [##rtlsdr \[irc://irc.freenode.com/##rtlsdr\]](#) people often ask about antennas, because they are clearly not satisfied (and who could blame them) with the performance of the original L/4 DVB-T stub. Unfortunately, there just is no can-do-it-all-perfectly antenna, even if some despicable corporations try to market their products as such.

Other people often recommend Discone-Antennas for wideband reception, but there also are other, less known alternatives, which still are a very good compromise as a general purpose wideband receiver antenna. Not everyone has the space or possibility to put up a Discone-Antenna, so why not use an antenna, that performs even better than a Discone (at least it did here in direct comparison), is a lot smaller and looks way less "conspicuous":

One of them was the Dressler ARA-2000, covering 50-2000MHz, designed and built in the 90's. The company died the usual death by capitalism (bought by another company and then stripped down and moved production to China). Today there are only a few of these left in the wild and are traded for unrealistic prices on \$bay. This particular one was used for the [Argus-Prototype](#) but sacrificed and disassembled with the hope, that replicating the antenna will be easy, so that this knowledge would get openly reseeded into the wild, instead of being lost in some archives of a dead corporation. It would be great, if the following documentation about the ARA-2000 would inspire more people, to build their own Active Wideband Receiving Antenna (AWRA) and try to improve and evolve the concept even further or come up with completely new ideas.

### Disassembly

In order to open the ARA-2000, the black top cap has to be removed first. This can be done with a screwdriver that is pushed under the side of the cover, prying it free. After the cap is removed, the bottom plate needs to come off next. This was a tougher job and required the use of a hot-air gun, to heat up the glue and then carefully applying pressure with a wooden rod through the center of the open tube.

### Original Assembly

The following section shows the inner structure of the original ARA-2000 assembly, without the protective white PVC tube. Each image roughly represents a 120° rotation step:



ARA-2000 Assembly View 1



ARA-2000 Assembly View 2

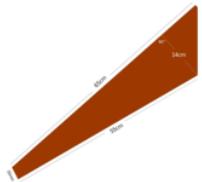


ARA-2000 Assembly View 3

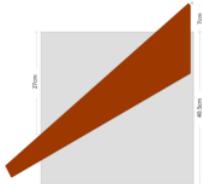
Length	405mm
Diameter	80mm

### Antenna Element

The antenna element itself is a simple quadrilateral monopole, in the shape of a wedge, with a narrow start and a wider end. For lack of a common nomenclature and a relatively close optical proximity to a log-per design, this type is going to be ignorantly called *log-per-spiral*. The monopole is “glued” onto a self-adhesive, semirigid, matte-white material and then rolled to a cylinder with 80mm diameter, thus forming a spiral. Unfortunately, there seems virtually no accessible background data available about the RF properties of this particular antenna design. A NEC simulation would be interesting.



Copper Antenna Element



Antenna Element placed



Original unrolled

The small start of the original copper log-per-spiral begins at a 25mm offset from the bottom part of the white, rolled 80mm cylinder, the wider end extends 75mm over the upper edge. After 55mm from the edge of the white cylinder, the rest of the copper is bent around the outer tube and then covered by the cap. This has probably no effect on RF properties (can someone verify this?) but is probably a way to give the whole structure more mechanical support.

Copper Element Cutting helper (1:1) [<https://apollo.open-resource.org/downloads/active-wideband-receiver-antenna-cutting-helper-V1.0.svg>]

### Properties

Material	Copper
Height	0.2mm

### Sources

1 [[http://www.ebay.de/itm/Kupferfolie-Kupferblech-3-00-m-SE-Cu-0-20-mm-x-148-mm-/270713937759?pt=Modellbauwerkzeuge&hash=item3f07cedf5f#ht\\_4247wt\\_1414](http://www.ebay.de/itm/Kupferfolie-Kupferblech-3-00-m-SE-Cu-0-20-mm-x-148-mm-/270713937759?pt=Modellbauwerkzeuge&hash=item3f07cedf5f#ht_4247wt_1414)], 2 [<http://www.modulor.de/shop/oxid.php/sid/c5b9a86a17a8d23d1c6e87f76c77fcfc/cl/details/cnid/EAB/anid/127151S>], 3 (Thanks to christian) [<http://www.ebay.de/itm/Kupferfolie-Kupferblech-1-00-m-SE-Cu-0-20-mm-x-200-mm-/271170987669?pt=Modellbauwerkzeuge&hash=item3f230ce695>]

### Structure Tube

Further analysis and research regarding material and availability lead to the speculative conclusion, that this foil probably is Aslan S22 [<http://www.aslan-schwarz.com/Lampenschirme/Selbstklebende-Hart-PVC-Folien/Mit-Kunststoffabdeckung/ASLAN-S-22-0-30-mm--380.html?cl=292>] PVC lamp shade film. The non-adhesive side of the material could be very much described as a satin surface and it's clearly not paper.





PVC seems like a logical choice for this support structure material. It shouldn't interfere with the RF properties of the device and can also be used in an outside environment, where it has to withstand a lifetime of exposure to drastic humidity and temperature changes and extremes, without changing its own form or function.

The transparent outer foil with the printed grid pattern (non-adhesive), which is wrapped around the *log-per-spiral* and PVC foil cylinder assembly, has the same dimensions as the PVC foil (405x405mm). It's obviously the by-product silicone release liner, that was originally used to protect the adhesive side of the Aslan PVC foil. That approach is actually very neat, since these foils usually end up in the trash and were put to good use here instead.

#### Properties

Material	Aslan S22 [ <a href="http://www.aslan-schwarz.com/Lampenschirme/Selbstklebende-Hart-PVC-Folien/Mit-Kunststoffabdeckung/ASLAN-S-22-0-30-mm--380.html?cl=292">http://www.aslan-schwarz.com/Lampenschirme/Selbstklebende-Hart-PVC-Folien/Mit-Kunststoffabdeckung/ASLAN-S-22-0-30-mm--380.html?cl=292</a> ]
Length	405mm
Width	405mm
Height	0.3mm

#### Sources (DE)

1 [<http://www.agnes-quiltshop.de/quiltshop-p2954h305s307-Aslanfolie-20-x-120-.html>], 2 [[http://www.hobbyshop.de/shop2/start.php?basteltechniken\\_lampenbasteln\\_lampenschirmfolie.php](http://www.hobbyshop.de/shop2/start.php?basteltechniken_lampenbasteln_lampenschirmfolie.php)], 3 [<http://shop1.bastelfex.de/Basteln/Lampenschirmfolie/Lampenschirmfolie-60-cm-breit.html>], 4 [[http://www.stoff-flausen.de/neugkeiten?page=shop.product\\_details&product\\_id=232&flypage.tpl&pop=0](http://www.stoff-flausen.de/neugkeiten?page=shop.product_details&product_id=232&flypage.tpl&pop=0)]

Judging by the original build quality, it seems that there is some room for tolerances. It should be possible to hack the assembly ghetto-style, out of any rigid PVC foil you can find and just glue the copper *log-per-spiral* onto it.

#### Cover-Tube

The outer cover tube is made of sturdy white PVC, to protect the inner assembly from rain, hail and UV-radiation and is also used to mount the antenna. Even after several years out in the weather, the tube still looks like new. Again, other materials could also be used here, as long as they won't interfere with RF and can withstand weather and UV-radiation. However, experience has shown, that a more professional looking antenna has a higher chance, that other people like neighbors or landlords won't raise objections to the installation. Depending on your local circumstances, that is something you should keep in mind.

#### Properties

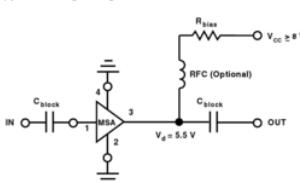
Material	PVC
Length	450mm
Diameter	90mm
Inner	84mm
Color	white

#### Sources (DE)

1 [<http://www.pvc-profi.de/PVC-Rohr-Klebschlauch/PVC-Rohre/PVC-Rohr-Druckrohr-90mm::1263.html>], 2 [[http://ecat.georgfischer.com/mediacockpit/servlet/CatalogServlet?page=catNode&context=article&catalogId=111bbe904f759973&lang=de&objId=0fe6dbe0397c803&articleId=1328a89b53baa33c&navIds=111bbc87fd956873\\_13044d9f08b3b3c\\_13044e1ca7b6ecc3c\\_13044e1cb4e6f33c\\_13044e1ccc47103c](http://ecat.georgfischer.com/mediacockpit/servlet/CatalogServlet?page=catNode&context=article&catalogId=111bbe904f759973&lang=de&objId=0fe6dbe0397c803&articleId=1328a89b53baa33c&navIds=111bbc87fd956873_13044d9f08b3b3c_13044e1ca7b6ecc3c_13044e1cb4e6f33c_13044e1ccc47103c)], 3 [[http://www.plast24.de/artikel\\_anzeigen/179304181-1226505718/PVC\\_U\\_Rohr\\_SDR\\_13.6\\_-\\_PN16\\_-\\_d\\_90\\_x\\_6.7\\_mm\\_PN16.html](http://www.plast24.de/artikel_anzeigen/179304181-1226505718/PVC_U_Rohr_SDR_13.6_-_PN16_-_d_90_x_6.7_mm_PN16.html)], Franz Wolber/[info@kwerk.de](mailto:info@kwerk.de) [<http://www.Kwerk.de>], Caps [<http://www.gpc-shop.de/index.php/kappen/kappen-fur-rundrohre/kappen-fur-rundrohre/k-serie/pvc-kappen-fur-rr-wciss/k-90-w.html>]

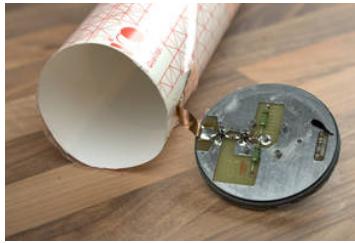
#### LNA

##### Typical Biasing Configuration

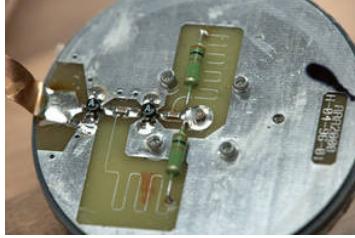


 Typical MSA-1105 configuration

The low-noise amplifier PCB is mounted directly on the bottom plate and consists of 2 cascaded MMIC Amplifiers. Although the types of the MMICs are not 100% known, DD1US speculated that they most likely are Avago (Avantek) MSA-1105 cascadable Silicon Bipolar MMICs. The specification, package type and marking (Top A, bottom H) support this assumption. The typical application circuit in the datasheet also seems to match the actual circuit in a cascaded configuration with etched PCB inductors:



 ARA-2000 LNA (assembly view)

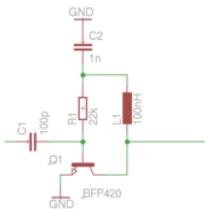


 ARA-2000 LNA (closeup)

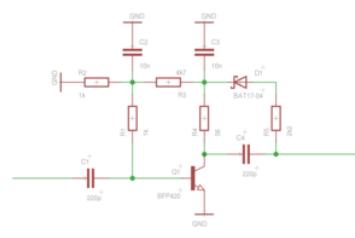
### Alternative LNA Proposals

#### BFP420

Due to the venerable age of the original LNA, it is very likely, that more recent semiconductors can deliver superior performance compared to the old design. The LNA is going to be replaced by a new LNA based on Infineons BFP420 which is cheap and available and should perform equally or better. The following two schematics show typical LNA configurations for the BFP420, the left one is the most simple approach (to be tested first), the right picture shows a more refined approach, with better base/collector voltage stabilization.



 Simple BFP420 LNA

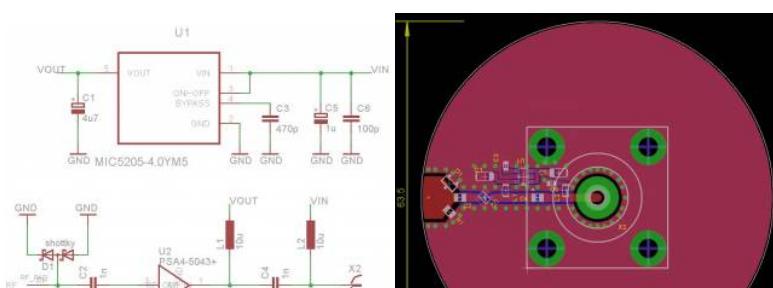


 Stabilized BFP420 LNA

Both designs should also be equipped with a 50MHz high-pass filter between the antenna and the LNA input, to increase their large-signal immunity by attenuating lower frequencies, which the rtl-sdr or OsmoSDR can't handle anyways (everything below 60MHz). Additionally, it would be worth a try to compare the following cases in real-world tests:

- Antenna element → RTL/Osmo-SDR stick (No LNA).
- Antenna element → LNA → coax cable → RTL/Osmo-SDR stick (Ext. LNA Power)
- Antenna element → LNA → coax cable → Bias-T → RTL/Osmo-SDR stick
- Each setup with and without a high-pass filter after the antenna element

#### OK3ZB ARA-2000 LNA





See also: <http://blog.brichacek.net/klon-sirokopasmove-aktivni-anteny-ara-2000/> [<http://blog.brichacek.net/klon-sirokopasmove-aktivni-anteny-ara-2000/>]

#### LNA4All

<http://lna4all.blogspot.de/2013/04/lna-for-all-low-noise-amplifier-for.html> [<http://lna4all.blogspot.de/2013/04/lna-for-all-low-noise-amplifier-for.html>]

#### Ultra-Cheap LNA alternatives

Another possible way which would keep the price low would be using inline amplifiers, such as these one: Wentronic Inline Amplifier  
[[http://www.amazon.de/gp/product/B001C6G56Y/ref=oh\\_aui\\_detailpage\\_o02\\_s00?ie=UTF8&psc=1](http://www.amazon.de/gp/product/B001C6G56Y/ref=oh_aui_detailpage_o02_s00?ie=UTF8&psc=1)]

The internal PCB is not that bad and it can be powered via a bias circuit. After removing the back cover you can take a look on the insides:



opened Inline Amplifier



Amplifier after rework

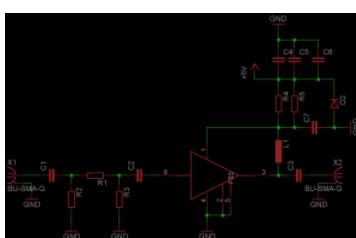
Here you can see why these Amplifiers get all these bad reviews. I left and right mark show long wire endings, which could lead to bridges in the circuit. In the middle there is some solder on one via at the PCB. Again this dirt could cause a short circuit. All in all the inner manufacturing was poor but nothing that couldn't be solved. After some research the MMIC that is used was found as

a BGA2709 [<http://www.mouser.com/ds/2/302/BGA2709-107790.pdf>] manufactured by NXP. This MMIC can be powered with 5V and therefore directly by an USB-Port. Beside the loose solder in the case there were two little pieces of copper wire.



Dirt and confusing markings

This is a close-up of the inside PCB and the used MMIC. Confusingly the pin-numbering of the MMIC is obviously wrong and I'm not sure if that is a mistake / stupidity or a distraction to "complicate" reverse engineering. The marking on the top of the IC says "E3", which fits perfectly to the BGA2709 [<http://www.mouser.com/ds/2/302/BGA2709-107790.pdf>]. I found this list with case markings of about 22k parts.

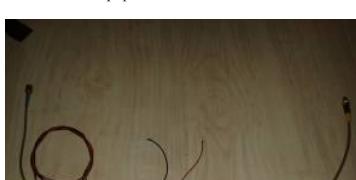


Schematic of the PCB

The schematic revealed no surprise. It seems that a Zener-diode was used to stabilize the voltage of standard 12V BIAS supply to the needed 5V. On the input-path there is an attenuator installed, right after the first decoupling C. It seems that it has an attenuation of 3 dB.

In order to be used with a direct power supply you have to remove two inductors on the input and output Path of the power supply. In order to be used in different positions in the signal path I soldered two SMA plugs in the case, after removing the standard F-connectors. I attached an USB connector to the power supply line and after a short test the amplifier was ready to be closed and used.

This one was equipped with cables to be installed better.

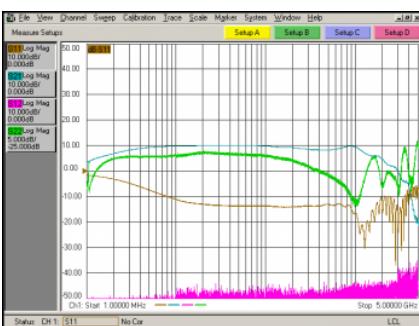




Amplifier ready for use

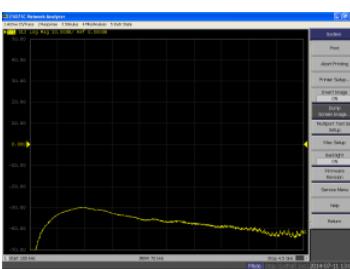
The first picture was taken with an Agilent network-analyzer. In advance to the measurement the device has been calibrated. The device number will be added in some days, I forgot to write it down 😊 I think it is an Agilent E8357A [<http://www.home.agilent.com/en/pd-1000003538%3Aepsg%3Apro-pn-E8357A/pna-network-analyzer-300-khz-to-6-ghz&ccc=DE&lc=ger>]. Sorry for the bad quality but there was no possibility to change the resolution.

For this test I put an attenuator with 10dB in the output-path of the measurement. Keep in mind that there is a attenuator circuit installed on the input path of the amplifier. I will make some measurements after removing it later.

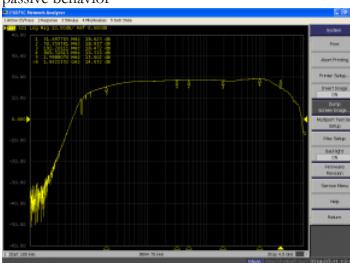


1MHz - 5 GHz logarithmic, all parameter, 10 dB attenuator

The other pictures were made with an Agilent E5071C [<http://www.home.aplent.com/en/pd-1685432/pr-15071C/2-port-test-set-300-khz-to-14-ghz-with-bias-tees?nid=536902682.903457.00&ccc=DE&lc=ger>]. The analyzer was calibrated before test. In this test there was no attenuator present in the signal path and the stimulus was set to -30dBm.



passive behavior

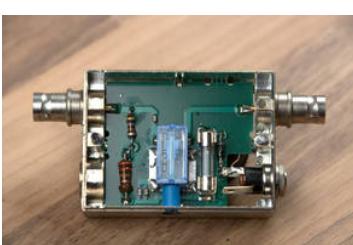


active behavior with no attenuator

To put it in a nutshell: These amplifiers are just amazing after you clean them and I was surprised of the performance. A comparison to LNA4all and similar projects will be done as soon as the orders arrive. If someone has other amplifiers to be tested please let me know and we can compare even more amplifiers out there.

## Bias-Tee

Although it won't be used anymore, for sake of completeness, here are some images of the original Dressler Bias-Tee, that was used to feed power to the LNA through the coax cable. It was supplied by a 12V power supply. It seems that the voltage feeding the MMIC's was kept constant and an adjustable attenuator (the blue part) was used to prevent receiver input overloading.



Dressler Bias-Tee Component-Side





Dressler Bias-Tee Solder-Side

## Replication

Ideally, the *log-per-spiral* assembly should be simulated with NEC to get a better understanding of the design principle. Afterwards the antenna should be evaluated with a network analyzer, to find out if there is any room for improvement, leading to evolution instead of simple replication. But, as Lord Kelvin already said, a long time ago:

If you can not measure it, you can not improve it.

*William Thomson, 1st Baron Kelvin*

Since the lab has no vector network analyzer yet (it's on the Wishlist), there currently is no tool available, to be realistically able to improve the design. Therefore, the antenna element should be replicated according to the original design, because it worked surprisingly well for years. When looking at the production quality of the disassembled antenna, it seems that this design type doesn't have the usual constraints regarding precision as a resonant design would.

The following assembly guide is a conclusive mini-howto, trying to best guess the original assembly instructions, based on the disassembly and reverse engineering process:

cylinder with 80mm diameter [<http://www.acrylformen.de/shop/de/Acryl-/Plexiglas-Rohr/Plexiglasrohr-AD80-mm>]

As soon as the new LNA prototype is tested and all other relevant parts are delivered, the new prototype is going to be built and a more extensive and practically proved assembly documentation will be released.

This would also be the perfect scope for some SDR-Wideband-Antenna-Building workshops, so if you're interested in having/building one of these too, please drop a note, so that it can be planned. It should be possible to build this Antenna for less than 50EUR.

NFM GNU-Radio Receiver for RTL/OsmoSDR  
The DARC side of Munich  
Hacking RF controlled power switches with HackRF  
Another ARA-2000 rebuild and LNA approach

gnuradio osmosdr rtlsdr radio hardware rf wideband antenna diy sdr receiver ara-2000 awra research  
Mission-Log entry created by on

## Linkbacks

Use the following URL for manually sending trackbacks: <https://apollo.open-resource.org/lib/plugins/linkback/exe/trackback.php/mission:log:2012:08:02:active-wideband-receiver-antenna-for-sdr>

## Discussion

Martin  
2012/08/05 08:24

Hello,

I've tried to contact whomever at the IRC channel, but no reply.

Please email me when its tested and ready.

And keep up the good work.

Sincerely,

Martin

chrono  
2012/08/05 10:05

Hi Martin,

as you've seen, you sometimes need to be a little bit more patient on IRC, until someone can answer your questions :) Thanks for the nice talk.

Martin  
2012/08/05 18:30

Chron0,

26/09/2015

## Apollo-NG - Active Wideband Receiver Antenna for your SDR

:)

YUP!

Sincerely,

Martin

margot  
2012/10/04 02:55

This antenna is kind of tapered helix antenna and must be installed horizontally pointing to a transmitter.

chrono  
2012/10/05 17:30

Hello Margot,

where did you get this information? The antenna that was disassembled here was working for years as an active receiver antenna with an ICOM-PCR1000, a Realistic PRO-2400, an ICOM IC-92ED and lately with the rtl-sdr all in an omni-directional fashion, mounted vertically with very good results, compared to multiple groundplane and discone designs, at the same location. I can assure you, it's not a helix antenna, perhaps you've confused the designs, since the ARA might look similar to the gamma match, helix antennas usually have attached at the bottom, to get them back to 50 ohms.

peter  
2013/01/30 04:59

Any updates on this? I'm needing to construct an antenna for my SDR and this looks quite interesting.

chrono  
2013/01/30 08:52

At this moment, this is all there is. My personal resources are currently bound in DSpace, but I was hoping that we can come to the same principles of working as we do in software development.

The Resources are online and freely available, someone else takes the information, uses it, perhaps builds an LNA, tests it and submits it back to the net, might even give a ping/pull-request. It's interesting to see that each month over 350 people visit this page, getting all infos for free and even without any ads or other forms of commercialization (as it should be) but the level of external contribution, feedback and improvements is rather low.

Sitting and waiting for other people to do stuff for us instead of doing it ourselves is one of the key components of why we as a society are where we are right now. Instead we should connect, share and redistribute. Take the information here and go to your local ham-radio/hackerspace group, build it, test it, improve it. :)

The basics are here and if no one else steps in, the antenna will eventually make it back to the lab in order to continue improvement because it certainly was a very well performing general purpose receiving antenna. But this all depends on support from other people in order to have more resources for different projects.

chrono  
2013/01/30 09:54

If enough SDR/RF people in the area of Munich are interested in building this, it would make sense to make a workshop. This way we can get the materials really cheap and will also have fun and learn/build something together. Maybe someone with solid LNA design knowledge would also like to join, to have a final complete rebuild manual/partlist.

peter  
2013/02/05 21:25

I have a LNA kit that I can probably try with this. Once I get it built, I'll see about constructing a copy of the antenna. I'll be sure to post back here if I come up with any useful data.

chrono  
2013/02/05 21:28

cool :) I'm looking forward to it, because that's the only thing missing at this point, and since the antenna is relatively easy to build and inconspicuous in appearance, we would have an open and free wideband receiving antenna :)

chrono  
2013/02/05 21:30

I also would really like to try out the BFP420, which is cheap and available. I already got the chips but no time to play with them :(

peter  
2013/02/06 00:33

The LNA kit I have is based around the Mini-Circuits PGA-103+. The BFP420 also looks like it has some nice specs.

Another problem is that I have no antenna analyzer or network analyzer so my tool for determining how well the LNA or antenna is working is looking at the gain and noise on my SDR software.

Now if I only had time to actually turn the soldering iron on...

[http://www.minicircuits.com/pages/npa/PGA-103+\\_NPA.pdf](http://www.minicircuits.com/pages/npa/PGA-103+_NPA.pdf) [http://www.minicircuits.com/pages/npa/PGA-103+\_NPA.pdf]

26/09/2015

## Apollo-NG - Active Wideband Receiver Antenna for your SDR

chrono

2013/02/13 18:32

Same conditions here. Network Analyzer is even on the lab wishlist, but since more funding is needed (which I have to come up with through the dayjob as Apollo-NG doesn't receive real additional funding from other sources) it's lower in priority in order to get Apollo finished and finally on the road. The minicircuit looks good, but they are somewhat of a hassle to get in Europe and they don't provide free samples. However, since this page already receives a lot of traffic from people looking for sdr wideband antennas, it's probably just a matter of time until somebody can contribute something more to it :)

Lewis

2013/02/18 11:21

What about using one of the kits off this page? <http://www.g4ddk.com/> I have the SPF5043Z amplifier which I bought to attach to my discone, however I'm considering building one of these and I'd be able to put it outside, unlike the discone

The 2nd amplifier on his page that looks good is the PGA kit. Maybe someone else can try this or tell me if it would be worth trying?

Both kits are (UK) £12 each and I think postage is (UK) £5 so well worth trying.

Lewis

chrono

2013/02/26 14:18

That seems like a good option because having the antenna outside really makes a big difference. There is also one more option, that wasn't tested yet:

How does the system perform, when the SDR is connected directly to the antenna element (without LNA)? The LNA originally was only there to mitigate the losses of the coax cable between antenna and the receiver. What if we put the SDR directly to the antenna element and then use 5m USB cable to get indoors (should be enough for window/balcony placement)?

Nocturnal

2014/07/24 21:42

So this antenna design should be viable without the LNA when directly connected to a SDR?

Also, if I am following things correctly, this "Aslan S22 lamp shade film" only purpose is to provide support (and limited protection) to the copper film. So I should be able to use any thin plastic as a support.

Paul Reich

2013/03/17 04:41

I'd think that "remoting" with the USB cable would be more efficient than running a lot of lo\$\$y RF cable, esp at the high end of the tuning range.

Regards,

Paul <K9PR> Retired antenna engineer

- Repair is the ultimate recycling [www.workshop88.com](http://www.workshop88.com)

Lewis

2013/03/18 18:29

Does anyone know where in the UK sells Material PVC pipe or something similar? Length 450mm Diameter 90mm Inner 84mm

I can't find anywhere that sells it cheaply, the cheapest was around £20 which is a lot as I only need 450mm (aprx) length

Lewis

2013/03/18 18:31

Paul I did consider "remoting" the usb cable, the only problem is my rx is 150Khz - 2200Mhz and I need a 2nd antenna connected for HF so unless I spent a lot of money on some kind of remote external antenna switching it would be cheaper using the preamp and probably better anyway

Lewis

2013/03/26 20:14

Has anyone actually built one of these yet and if so how did they work? Does Anyone know Anywhere in the UK that I can buy 90mm OD PVV tube? The only places I can see that sell it want stupid money for it - between £35 and £150 I only need 1M length at most.

chrono

2013/04/03 14:17

Lewis: I had some trouble myself finding PVC pipes in DE. The sources I finally found I got from one of these "national industry supply webcatalogs" if you know what I mean. I'm sure there must be websites listing UK industrial companies by business type as well. I've been in contact with numerous companies since I started to build Apollo-NG and told them what I wanted to do and - although by far not every company but still - quite a lot offered to send sample material for free.

Lewis

2013/04/03 14:24

Thanks, in the end I bought clear acrylic tube <http://www.ebay.co.uk/itm/300751953750> Hopefully RF passes through it ok, and I also bought

<https://apollo.open-resource.org/mission:log:2012:08:02:active-wideband-receiver-antenna-for-sdr>

26/09/2015

## Apollo-NG - Active Wideband Receiver Antenna for your SDR

black heatshrink to cover it - couldn't find white large enough. I've got another month or two before I can put it all together and get it outside, I have 2 more antennas plus a satellite dish to put up at the same time and I can't climb ladders due to being disabled. Hopefully by June it will be up and working

chrono

2013/05/07 22:07

Somebody else was tinkering with an RTL-SDR LNA design and at a short glance it looks pretty decent with a fair price. Haven't looked at the real specs yet but I wanted to share the link (also updated in the LNA section):

<http://lna4all.blogspot.de/2013/04/lna-for-all-low-noise-amplifier-for.html> [http://lna4all.blogspot.de/2013/04/lna-for-all-low-noise-amplifier-for.html]

TC

2013/06/01 20:36

@Paul:

it can be done even better:

TP-Link MR3020 or clone as RTL-SDR server with PoE

Lewis

2013/06/01 20:45

"it can be done even better: TP-Link MR3020 or clone as RTL-SDR server with PoE"

How? Thats for a 3/4G modem not an rtl stick

chrono

2013/06/03 13:12

@TC: Indeed, that is basically what I've been doing with the Argus setup.

Finni Syndergaard  
2013/10/11 22:11

Hi.

I would like to make a PCB to the LNA. Can anybody help with a good quality Picture?

Thanks in advance OZ5ZI / Finni

chrono  
2013/10/15 07:40

Pictures of the original LNA, LNA4All or another BFP design?

Finni Syndergaard  
2013/10/16 21:51

Hi Crono.

This is pics of the original LNA.

chrono  
2013/10/17 07:53

Well, you can click on the images above to get higher resolution images. If I can manage to find it quickly, I might be able to make a top shot with a ruler in the image so that measurements can be taken from it. IIRC there is no bottom layer on the LNA PCB so what we can see in the images above is all there is to it.

finni Syndergaard  
2013/10/17 13:23

Hi Crono.

I understand your disappointment that everyone wants, but no one sends back. For my part, I have no instruments and no education to make measurements on such a complicated antenna. I am a radio amateur and can make more simple measurements. But if I find out anything else can benefit from I send of course into. If you have a top picture is good I do not need ruler. I am familiar with PCB manufacturing and will adapt according to what I can get by PVC pipe. But i think the coils on pcb are importent.

chrono  
2013/11/11 10:23

@Finni: What gave you the impression of disappointment? Everybody wants something, that's just our nature :) Now, if everybody is willing to share what each of us can, it will be more than enough for all of us since most stuff is just artificially capped by legacy "culture" like copyrights, patents and the like.

In today's world it has become so easy to spread knowledge, to copy wisdom/experience instantly with no cost and no loss. Imagine it like software downloads, it's asynchronous: A given problem has to be solved by one person, if this person documents this online and makes it accessible, everyone can use that info and we all can benefit :)

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## Apollo-NG - Active Wideband Receiver Antenna for your SDR

I hope you got the measurements, if not, give me a ping and I will put a ruler into the picture (should be doing this more anyways :))

Finni Syndergaard  
2013/11/11 10:36

Yes, right.

In the meantime, I have tried to

get the used "original" IC's.

But they are no longer on the market.

So now I make my own PCB with

maybe Mar6 or similar.

Regards

sebastian  
2014/01/28 20:26

I tried to build the Antenna. But I was not able to "Transfer" it to the Copper Foil.

Can Anyone give me a hint how to Draw it in Original size?

chrono  
2014/01/29 08:58

I would cut a 66x15cm sheet of copper and then start going by the measurements above. Probably a little bit of Pythagoras to get the distance from the edge to the point where the 90° angle is marked.

I've also created a 1:1 svg file (see above) with the antenna element in place. If you print it onto 3 DIN A4 sheets, glue them together and use the shape to cut the copper you should be good to go. Can you try that? The longest edge should be about 65cm (for reference).

sebastian  
2014/01/29 15:16

Sorry...didn't see the svg file -.-

chrono  
2014/01/29 15:22

Not your fault - wasn't there until this morning :)

sebastian  
2014/01/28 20:54

I also have an "Old-School" 3,6GHz Spectrum Analyzer with Tracking Generator and Directional Coupler.

So maybe I can make some Measurements.

But what is the Best Method to connect it to the Antenna? (Without LNA)

Sebastian  
2014/02/24 09:29

Ok...I built me a Dressler.

I did some Frequency Response Measurements. And Compared them with an Original "AOR 50MHz-3GHz Discone Antenna". I'm no RF-Engineer. But I must say, I'm Impressed by the Dressler.

I think the Dressler is Usable up to 3GHz. The Dressler performs very Good at Higher Frequencies over 900MHz.

I did some Tests, with a Ground Plane in form of a Copper-Epoxy Board too. I think, this Improves the Performance.

I May post the Results later.

Here I found someone, who Re-Invented the Dressler for himself: (Real Engineer :)

<http://www.leobaumann.de/funk.htm#ghz2> [<http://www.leobaumann.de/funk.htm#ghz2>]

chrono  
2014/02/24 09:53

Oh sweet! And please, by all means, post your tests/results and experience. There a lot of people visiting this wiki page frequently and I'm sure we all would like to see some more reviews to encourage other people to hack away as well :)

sebastian  
2014/02/24 18:39

Ok

<http://www.docdroid.net/9hkq/return-loss.doc.html> [http://www.docdroid.net/9hkq/return-loss.doc.html]

chrono

2014/02/24 19:07

Great, thanks for investing your time :) Now I am really curious about the setup. How did the built go? Were the measurements clear enough, could you use the printing-helper.svg? How about the LNA? I would guess the VNA test was just with the rolled antenna element? Have you already done tests in a more practical usage scenario? A picture maybe? :)

Hopefully someone can shed some more explanatory light on the VNA results because I have never had access to one so I have a hard time to really interpret the results. No experts here, only people willing to learn and share what ever comes out of it :)

Q

2014/06/23 13:47

I just started playing with my SDR Sticks and found this awesome antenna which would fit all my purposes. I read that some guys are from Munich and interested in re-building one of these. I am also interested in building one or two.

Her is my idea:

If we find enough people who want to have an antenna, no matter if they want to build one by themselves or built by others, we could get the materials very cheap. Especially the copper-foil and the PCBs for the LNA. In Addition we could order professional PCBs with better LNAs and see if this make this antenna even more awesome 😊

I would be happy to get some Mails if you are interested.

chrono

2014/06/23 13:56

Sounds great, originally we were planning something like a workshop but not enough people in/around Munich showed interest. The whole reverse engineering job was done in the hope that the preserved knowledge would be useful to others and sacrificing the original antenna wouldn't be in vein.

I would very much like to do a complete rebuild just to have that antenna back again and have something to test the proposed scenarios. If you're also from the area, why don't you join us on IRC (see [Contact](#)) so we can talk in realtime :)

Q

2014/06/23 14:03

At the moment I have no access to IRC (I'm at work 😊) but I will try to join later.

Maybe we could design something like a "ready to build" kit for people having trouble getting all the material. I think there are lots of people around using SDR-Sticks who search for exactly this type of antenna. E-Bay comes to mind to get a larger number of participants.

Lewis

2014/06/23 13:53

Brilliant idea I find trying to get the right amount of foil in England hard, Although there are other LNA's out there, getting one that was built to go in the antenna and attach directly to the foil would be brilliant

The other thing I've found impossible to find in England is the outer tube, 80mm inner dia tubing is practically impossible to find, and also the end caps for it if I had found one, this is the only thing that stopped me making one yet

Lewis

2014/06/23 14:02

If you do decide and go ahead with making a new LNA with PCB for this project, can you use one of the newer lower noise ones with as much gain as possible? I for one would definitely be interested in buying it (providing it wasn't stupidly priced) This one seems ideal and is only €20 <http://lna4all.blogspot.com> [http://lna4all.blogspot.com] I especially like that it can be powered from the cable, ideal if we were using a receiver that can provide 5V through the cable such as the Funcube Pro+

Q

2014/06/23 14:08

Designing a PCB for newer LNAs is not a very big deal and if you add a DC-filter in front of the DVBT-Stick you can use the 5V- of the USB stick directly. The problem with Funcube is the price compared to a 6€ DVBT-Stick from China.

Goal will be to get a cheap antenna with LNA for the whole spectrum of the DVBT-Stick that shows up with a good gain.

The best result would be a combined price for antenna + DVBT-Stick < Funcube

Finni Syndergaard  
2014/06/23 21:31

Hi.

I made this dish. But not with copper foil but quite thin PCB. And I have used RF2132 IC as amplifier. As a recipient RTL stick from China. And the original PCB layout. I do not have good experience with the antenna. This antenna + RTL stick is a very broadband system that brings together all the noise up. So I think that much depends on the receiver along with this antenna. It must be a receiver with some good filters in the entrance. I would say a high performance receiver. The signals that it might be interesting to receive are often far away. Perhaps as a mobile system where you can drive closer to the signal source.

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## Apollo-NG - Active Wideband Receiver Antenna for your SDR

Vy73 de OZ5ZI

beckgyver  
2014/07/12 11:55

I just tried to find further information to the amplifier u used and I only found sheets that name the usable frequency range from 800-950 MHz. This might be one of the problems in your setup. I built several broadband antennas and and so far I found no issues beside too strong signals. Please let me know if you have further details or measurements concerning the amplifier.

Zinahc  
2014/08/19 04:06

Question. Does it need to be built out of copper foil ? What about using aluminum foil which is readily available in the kitchen. Understandably Al might be lossy, but the LNA should take care of that. Am I making any sense at all ?

chrono  
2014/08/19 07:38

Simple Answer: Of course you can. It's a conducting metal, it can be shaped easily and is globally available in virtually any kitchen. My question is: How much effect does this decision have on the reception quality and am I willing to accept these (not yet determined) losses. I wouldn't want to invest time into building something I know I could do better with another material but hey, it's a valid question and if you're willing to try it, please, let us know how your mileage varied :)

Christian  
2014/08/30 21:13

Is the copper one piece or is it 2 pieces taped/soldered together? I see some black tape on some images, in the middle of the copper.

That would actually be quite helpful to know because you wouldn't need as much copper foil.

chrono  
2014/08/31 07:46

The element itself is made in one piece. I have no clue why that is there but I don't think it has much to do with RF tuning so I just disregarded it as production fallout (you know, leaving fabrication rests behind on/in final products)

Christian  
2014/08/31 20:56

I'm going to rebuild this thing with the cheap inline amplifier. Already ordered the amplifier and the copper foil. The structure foil is going to be replaced with whatever i can buy locally, since it's not crucial to the design (at least i think so), same for the outer housing.

I don't have any advanced measurement tools or any expertise in this topic, so i'm afraid i can only give you some general feedback.

chrono  
2014/08/31 22:06

Sweet... I reckon I'll rebuild one as well, since the original one is in pieces now :) As for structure material and outer tube: The original materials were good choices in terms of definitely not interfering/dampening any RF of the antenna's spectrum range, while, at the same time, offering good UV/weather resilience. As long as other material choices reflect that, you're good to go, otherwise you'll probably have to accept a compromise :)

Any Feedback is welcome, this is all hack/ghetto tech, we go with what we have and learn/teach/distribute however we can :)

Christian  
2014/09/02 20:00

Decided to buy the real thing and got some small snippet of Aslan S22 on ebay, it's 0.05mm thinner, but shouldn't matter: <http://www.ebay.de/itm/ASLAN-S22-einseitig-klebende-weis-matt-opake-Hartfolie-Starke-0-25-mm-61x60cm-/261582167892?pt=Bastelmaterialien&hash=item3ce7831f54>

Maybe you should link this 1.00m copper foil variant instead of the 3.00m one: <http://www.ebay.de/itm/Kupferfolie-Kupferblech-1-00-m-SE-Cu-0-20-mm-x-200-mm-/271170987669?pt=Modellbauwerkzeuge&hash=item3f230cce695>

If you are looking for a 80mm cylinder as a helper, I got this one: <http://www.acrylformen.de/shop/de/Acryl-/Plexiglas-Rohr/Plexiglasrohr-AD80-mm>

I'm at 56Euro overall, still need the outer tube though.

chrono  
2014/09/03 08:02

Links are updated. If you can, please try to take pictures of the steps/result :)

Christian  
2014/09/03 18:54

26/09/2015

## Apollo-NG - Active Wideband Receiver Antenna for your SDR

I started working on it :) Made a WIP blog post describing my approach: <http://lordvoxel.blogspot.de/2014/09/replication-of-dressler-ara-2000.html>  
[\[http://lordvoxel.blogspot.de/2014/09/replication-of-dressler-ara-2000.html\]](http://lordvoxel.blogspot.de/2014/09/replication-of-dressler-ara-2000.html)

Still waiting on parts though.

Lewis

2015/01/07 19:57

Has anyone done anymore with this?

I found a source of cheap bias tee's on ebay (MMDS downconverter bias tees)

all I have to do is cut the 240v psu off and supply it with 5 or 12v whichever the lna needs

I've also found a source of cheap 28.8M Mhz TCXO's so hopefully I can replace the crystal in the rtl sdr stick and have 1ppm accuracy

Once I get this antenna finally buily I can use this with one rtl stick and another rtl sdr with a hf antenna (hopefully)

I like the idea of having the sticks at the antenna and using a router to get the signal inside

Can anyone give intructions or tutorial on how to do this?

I'm still looking for the outer tube, cannot find one in the UK a suitable size cheaply

I havent made/got the lna yet either, I was waiting to see how others did first, I'm considering a GPS active antenna which I got cheap £3 on Ebay, taking out the GPS saw filter and it should be a low noise wideband amplifier (hopefully)

chrono

2015/01/07 20:04

Sweet, thanks for the updates. As for stick/router configuration, have a look at `rtl_tcp`. Run it on the device where you plug in your rtl-sdr stick and stream the IQ data to where ever you like to process it further. There is an example on <http://sdr.osmocom.org/trac/wiki/rtl-sdr> [http://sdr.osmocom.org/trac/wiki/rtl-sdr]

Lewis

2015/01/15 13:49

Does anyone in the UK got any ideas where I could get some PVC tube 450mm (500mm) long ???? - and end caps for the tube Outer Diameter 90mm Inner diameter 84mm

I've searched and cannot find anything suitable - any ideas or clues on where to look would be great please

I've been looking at the idea of `rtl_tcp` and done some research

What do people think of these??

<http://www.cdlmicro.co.uk/usb2-boost-usb-2.0-to-rj45-over-cat5-cat5e-cat6-extender-repeater-cable-lead-wire-adapter.html> [http://www.cdlmicro.co.uk/usb2-boost-usb-2.0-to-rj45-over-cat5-cat5e-cat6-extender-repeater-cable-lead-wire-adapter.html]

Basically for those who don't like clicking links, its an active usb repeater using cat5/5e cable

If it worked the way I think it might, it would allow the receiver to be mounted in the same tube as the antenna/amplifier (or very close to it) and eliminate all cable losses

chrono

2015/01/15 18:19

I've never actually tried these RJ45 TP repeater cables myself. Apart from device connection issues I'm not sure how much noise these will pickup on the power line. I never had the time to go for some conclusive testing regarding power supply of the rtl sticks. It may make a difference when the stick's powersupply is as clean as possible (like any A/D converter). If someone else could beat me to it, I'd be happy to hear about it.

Lewis

2015/01/15 15:49

Would this work for the copper? Its cheap

<http://www.ebay.co.uk/itm/291333330893> [http://www.ebay.co.uk/itm/291333330893]

chrono

2015/01/15 18:12

Apart from the fact that it's adhesive on both sides it shouldn't make a difference from HF point of view I reckon. Soldering through the glue might be a little nasty though :)

Sparks

2015/02/07 10:46

Hello... I think I solved the tube diameter availability problem ... just take some one sided self adhesive plastic/paper and roll it to the diameter requested. Be sure to draw some lines that will eventually overlap at each roll so that you have a control mechanism for rolling the right size. Do the rolling as many times as you like/or requested. Also for fixing the cooper foil on the tube we could use kitchen transparent foil and after that another roll of the above plastic/paper from which we built our cylinder. Take all this and put it in whatever bigger plastic cylinder you have cause I don't think that will interfere with rf. Be aware that not all plastics are resistent to uv light and I don't know if painting the exterior with spray paint would interfere with rf. I think that a piece of polypropylene water tube is a good place to start.

A good add on to this antenna would be a diy pcb design for the LNA and for a 5v or something power injector trough the coaxial cable.

This is a nice project and I hope will get a good final result as long as everyone solves a small part of the problems

Keep the good work and thanks

<https://apollo.open-resource.org/mission:log:2012:08:02:active-wideband-receiver-antenna-for-sdr>

14/17

26/09/2015

## Apollo-NG - Active Wideband Receiver Antenna for your SDR

keep the good work and thanks.

sparkx  
2015/05/30 12:11

Hello Chrono

I have already built an antenna but with local materials ... First modification - antenna element made of aluminium (had some foil from printing press «books printing» laying around). Depending on the quality of the reception this can be replaced by cooper. Second modification - only have a plastic tube that I want to use as external casing which is 80mm (outside) in diameter and the inner side is 77mm (wall size 1.5mm x2). No lna available to me so far (no tested and known to work schematics so far) but depending on results I can etch (or order boards) and solder locally.

I will be in Hamburg next week and want to ship the antenna to you (since I am new to antenna field and lack the means to test) so that you can test it and maybe post the results so we can see if small variations in size and materials make a big difference. If you are interested please contact me with the shipping address. Thank you.

Lewis  
2015/04/21 11:25

I'm nearly ready to finally put the parts together to make the antenna

I have a problem though - I hope someone has some ideas how to fix

HOW do I mount (attach) the 90mm diameter antenna to a 2 inch (50mm) diameter pole?

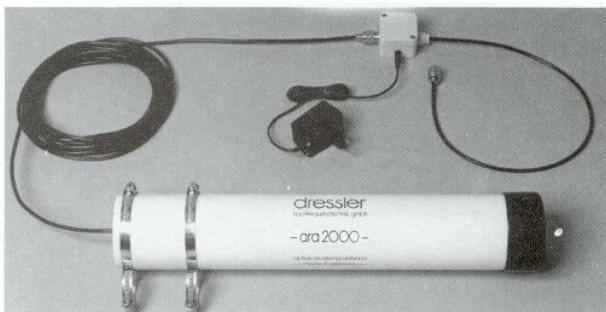
Any ideas or suggestions? pictures would be good if you have ideas please

chrono  
2015/04/21 12:40

Ahoy, originally there have been two "special" metal clamps, shaped like an 8 with a larger diameter and a smaller diameter (I'll look tonight, if I can find them and take a picture) around the outer tube at the bottom in order not to interfere with reception above the level of the LNA board. You could use just two regular hose clamps to strap it to the smaller diameter, in that case it might make sense to make the outer tube a little bit longer to have more area to press against to.

chrono  
2015/04/22 05:36

Sorry, didn't have enough time to look but found this, using a duckduckgo image search for ara-2000.



There are a couple of more images, which should give you a good impression of the original thing.

Lewis  
2015/06/04 14:43

Help

Can anyone tell me HOW to print the svg file properly?

I've tried everything I can think of and it doesn't end up the same size as the original

The closest I have got is 61 X 52 X 17cm

I've got Windows 8.1 X64

I've tried, paint, acdsee, inkscape printing from chrome and internet explorer

Inkscape was the one the forums said try so I downloaded it, but it just prints a blank page and not the image

The only thing I could get it to do was export as a png - it won't even export to pdf

It will print as pdf but only saves a blank page

Lewis

chrono  
2015/08/24 11:08

Ah sorry Lewis, have been offline for quite a while now :( The image was created in inkscape so it should be possible to print it with inkscape on Windows too :) Or we could try to update it, since it's bigger than A4 so that the splitting to fit the print on two pages is less of a hassle.

26/09/2015

## Apollo-NG - Active Wideband Receiver Antenna for your SDR

Lewis  
2015/06/07 14:40

Well I made mine last night and got it in the attic today.

Must say - first impressions is I'm impressed.

I was able to audibly hear Noaa 18 today when it was appx ove the east border of Turkey, I couldn't hear it that far east using the proper turnstile antenna tuned to 137Mhz - it was in the noise but I could definitely hear it as well as see it on the waterfall of the sdr receiver.

It's only in the attic at the moment, I'll get it outside in the clear and higher sometime in the next couple of weeks (hopefully)

I used 1mm thick copper foil bought off Ebay, and a preamp off <http://www.g4ddk.com> [<http://www.g4ddk.com>] (<http://www.g4ddk.com/PGAV2.pdf> [<http://www.g4ddk.com/PGAV2.pdf>])

Stuck it inside a tinplate box and shoved it inside the tube under the antenna, the feed for the preamp I just used a short piece of 75ohm coax,

I use 75ohm cables and F connectors for my receivers, much lower signal loss, and the difference in impedance means nothing on receive.

Lewis  
2015/06/22 10:48

Has nobody else made this antenna yet?

I'd like to hear other peoples views on how they think it performs

Christian  
2015/06/22 11:26

I build this antenna last year. It's placed in the attic with a few higher buildings in the neighborhood and located in a valley, so conditions are not that good. The LNA (cheap one for SAT purposes) is connected to the copper element via an F connector and the cable to the receiver is only about 5cm long. I use an raspberry pi to stream the data when I want to play around with SDR# or similar software. The pi is powerful enough to decode ADB-S/ACARS signals directly, so no need for streaming there. It's important that you use a cable connection though, WLAN might only work if you have a REALLY good connection. I mainly use the antenna for aviation related signals like ADS-B (1090Mhz), ACARS, FLARM(868.2/868.4MHz) or just for listening to AM communications. This is the first antenna I use for SDR so I have no reference. There seems to be a lot of noise which might be caused by wireless devices in the home, not sure. I was able to receive ADS-B signals from 260km, which is quite impressive (depends on weather conditions though).

Sparkx  
2015/09/05 22:29

Built the aluminium antenna and had problems soldering the damn thing to the cooper wire ... aluminium can not be soldered with soldering wire Pb to nothing, even to Al so it was only a contact transmission for the signal. Was pretty happy with the signal (first antenna built for 119 MHz AM and was ok but for the 1090 MHz was not) so had to go for the original ...

ReBuilt the antenna of cooper and I live with the sensation that the aluminium (4m cooper wie ) was better .... the cooper I bought is 99.9 pure (for electronics use, Pb solder sticks to this one and used multifilar cooper coax, max 10m wire for connection to the RTL) - 40eur for 3kg band 0.2mm x 300mm this is enough for 6 antennas per design) and when putting it inside the tube it bent freely ... this was not my plan but ahappened to be the case, with aluminium as it was pretty sturdy and didn't bent easily, I will have to redo it to bend on the 80mm (now 67mm diam for antenna) tube and include it in some 90 mm tube when I figure out how to make it weather proof (together with the Gamma tube and the wind generator and the rasp pi 2).

This being said do you recommand/impose a setup to test the antennas? Software / Hardware recommandations like a procedure and predefined tests? maybe based on satellite signals/rtl chips and manufaturers strength which should not vary too much over large swats of continents so we can have a reference?

I enjoy learning and i think this should be 4 everyone

dan. PS Could I not be human ... robots do tests ?????

Max  
2015/09/14 12:27

Could it be the same concept of PA0RDT mini whip? At first everyone wondered how that magic antenna could get so good reception being composed only of a LNA and a 3x3 cm pcb as antenna; then it became apparent that the real receiving antenna was not the pcb 3x3 but the shield of the coax cable. For this reason it was so important to place the antenna at a minimum height of 5-6 meters, because it needed a long vertical coax cable to receive

chrono  
2015/09/14 13:57

That's highly unlikely, since it **doesn't require** a long BNC cable to work. Also, the elements surface is much bigger than 3x3cm.

Max  
2015/09/15 10:34

Hi, i agree with you for the simple reason that this is mainly a VHF-UHF antenna while the PA0RDT mini whip is for short waves p.s. came here from a link at <http://www rtl-sdr.com/building-an-active-wideband-antenna-for-your-sdr/> [<http://www rtl-sdr.com/building-an-active-wideband-antenna-for-your-sdr/>]

peerfunk  
2015/09/20 08:09

mhm I am new into radio stuff but I have a 900mhz version of this antenna but it seems not to function properly. It has a lot less noise than the tv antenna that came with the tv stick but does not have as much gain as the original antenna mhm...

chrono  
2015/09/24 08:07

What do you mean by "I have a 900Mhz version of this antenna"? This was designed as a wide-band antenna to work between 50-2000MHz, so I'm a bit confused by this.

26/09/2015

## Apollo-NG - Active Wideband Receiver Antenna for your SDR

Also, although I haven't run NEC simulations, I don't believe that this particular physical antenna element type has any kind of considerable gain to speak of, it is, after all: A general-purpose, omni-directional, wide-band receiving antenna.

Algawat  
2015/09/21 00:25

Made one of these using 0.5mm sheet Al, 80mm inner and 90mm outer pvc. Add a few tweaks to make rolling and connection easier, no solder just a crimp tab on the bottom end. see this blog for pics.

<http://cometal-comets.blogspot.com.au/2015/09/rough-dressler-antena.html> [<http://cometal-comets.blogspot.com.au/2015/09/rough-dressler-antena.html>]

chrono  
2015/09/24 08:02

Ah nice, thanks for sharing. It would be interesting to see a direct comparison between copper and aluminium. It would make sense to throw a link back from your post, so that your audience will find this content easily as well.

Another ARA-2000 rebuild and LNA approach