

Boulder Amateur Television Club TV Repeater's REPEATER

September, 2021
issue #86

BATVC web site: www.kh6htv.com

ATN web site: www.atn-tv.com

Jim Andrews, KH6HTV, editor - kh6htv@arrl.net www.kh6htv.com



Boulder Hams in QST: The cover & lead article in the September issue of QST was on "Finding and Fixing Power Line Noise". The very well written article was by Dick Kiefer, K0DK. In his article, Dick also mentioned getting assistance from our own ATVer, Joe Woods, AD0I, along with several other well known Boulder hams.

ATV in QST: Also watch for the October issue of QST in your mailboxes. Go to Paul Wade's, W1GHZ, Microwave column. There you will find an article about ATV on the microwave bands.



World Wide ATV QSO Party: The event was held on Friday, August 27th. Peter, VK3BFG, again organized the ATV activity involving ATV hams in the USA and Australia. Various repeaters' signals were sent to Peter over the internet and then redistributed from Australia via YouTube and Zoom.

The video is presently archived on YouTube at Ian, VK3QL's site:
https://www.youtube.com/channel/UCxPw_E-C0Ddc0FIKdjPnuew

It is recorded in four parts of lengths: 1:31, 1:20, 5:36 & 0:17 hours
Mick, VK3CH, has written an excellent summary of the QSO party complete with photos of all the many participants. It is published in the latest North East Victoria Amateur Radio Club NEWS newsletter for Sept. 2021. It is available in .pdf format from:
<https://nevarc.org.au/wp-content/uploads/2021/08/NEVARC-NEWS-Vol-08-Issue-09-2021.pdf>

My sincere apologies to those participating and watching. For our Boulder portion, I had asked for a 1/2 hour time slot on Friday evening. I had arranged for us to present a program with myself first talking about how we recruit new hams, then Ed, K0JOY, was to talk about our weekly nets, then Chris, K0CJG, about his experiences as an ATV newcomer, and finally Don, N0YE, about our off the repeater ATV activities. Well, the result was we ran way over our allotted 1/2 hour time slot and totally screwed up Peter's schedule. I take full responsibility for the screw-up. I should have had our group do a "dry-run" on our own ATV net ahead of time to find out we needed to severely tighten up our presentations. I wish Peter would have exercised his program director prerogative and simply turned off our TV feed to him.

I guess we really proved we are *AMATEURS* at TV. Thus the acronym ATV is very appropriate. The ATV QSO party was definitely an amateur production and not up to the quality standards of broadcast TV such as from the BBC, ABC, NBC, CBS, etc.

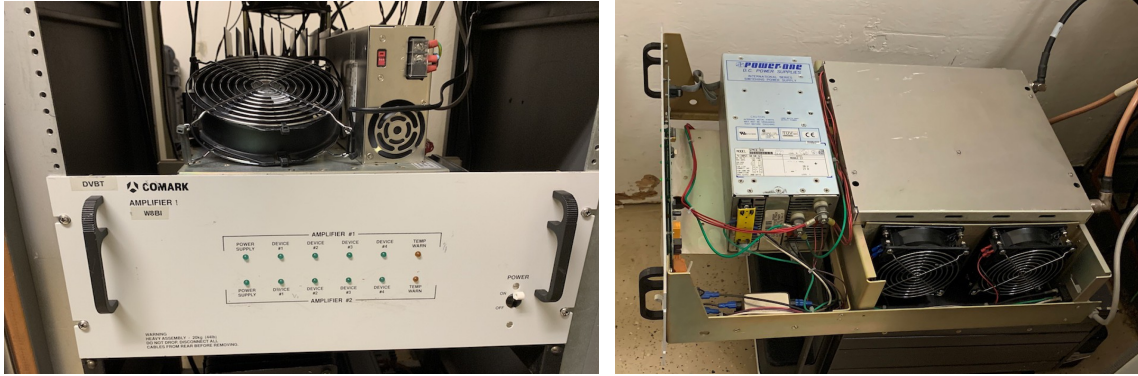
Jim, KH6HTV, Boulder, CO

ATV NEWS from DAYTON: Dave, AH2AR reports ---

HVAC Issue Continues at the DARA ATV Repeater Site..

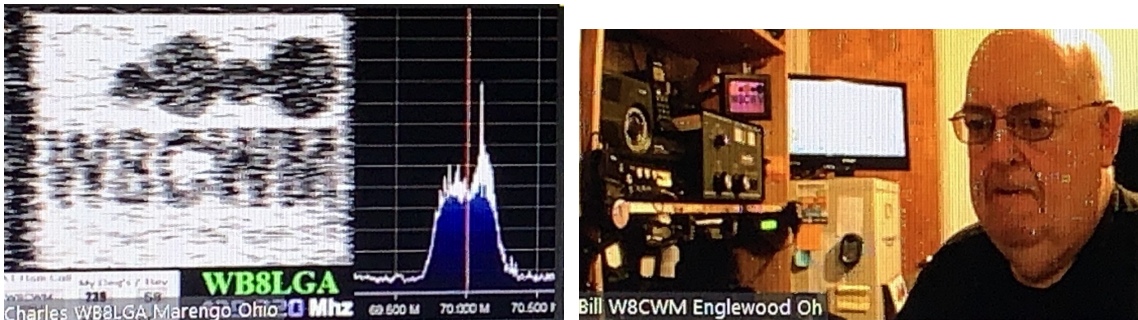
Within the last week, the HVAC System in the DARA Storage Barn's ATV Repeater Room has shut down twice and had to be restarted. Rob Lundsford, Volunteer DARA facility custodian is pressing to have another company come out and troubleshoot the HVAC system. This has been a continuing issue and hopefully, a new HVAC company may have better luck determining what causes the HVAC system's failure to restart. It seems to happen during times when there is a A/C mains power bump.

The on-again-off-again HVAC system has played environmental havoc on the ATV equipment in the repeater room. The latest ATV equipment failure that we have experienced last week is likely directly related to the brutal thermal conditions that occurs, as the room temperature soars when the HVAC is not running. It appears that one of the MOSFET transistors within the 70cm DVB-T amplifier has failed, so I have temporarily installed a spare amplifier within the room until we can remove the ailing amplifier for R&R. We also had to replace a video distribution amplifier that also failed this month.



Pictured above on the left is the ailing COMARK amplifier awaiting removal from the rack. This unit contains an integrated driver amplifier and separate 100 watt main amplifier. Once repaired, we plan to re-install it as opposed to swapping it out for the Comark spare, which only has one bank of trouble LEDs for its main amplifier. We suspect that one of the bipolar transistors has failed (MOSFET device: SD-1490-1) within the primary amplifier. Its integrated driver amplifier was unaffected. These are commercial TV amplifiers that contain fans and 32 V volt power supplies that were purchased surplus for DARA ATV use. As a side-note, the ATV repeater employs a similar amplifier for 70cm A5 (not pictured). Since the amplifier that failed has been running 24-7 for the DVB-T repeater output on 70cm, we suspect that it was more susceptible to failure since it continuously runs at 100 percent duty cycle. Alternately, the amplifier used for A5 is only in use when an ATVer is using the ATV repeater and during any given day, it is probably on for an hour or two.

Pictured above on the right is the spare Comark, powered up and running outside of the rack and (serving temporary duty) until the other amplifier is repaired.



W8CWM Station Improvements Now at 70 watts (peak) on A5 70cm.

Within the last week, Bill McCoy W8CWM has been successfully working W8KHP in Kentucky, along with W8LGA in Morrow County Ohio and W8URI (Mt Giliad). He is using a TC-70-10 ATV transceiver and TPL amplifier, along with an 88 element MBM J-Beam. Pictured above is W8CWM's A5 signal from Englewood Ohio as seen by Charles in Morrow County, Ohio (WB8LGA)

73 de Dave, AH2AR, DARA

NEWS from Mid-Atlantic ATV:

The Society of Broadcast Engineers, Central Pennsylvania Chapter 41 Ennes, Workshop on “Transitioning to ATSC 3.0” was held this past Friday, August 27th. The speakers did an excellent job of presenting the fundamentals of the new, NextGenTV standard for over-the-air broadcasting in the US approved by the FCC just a few years ago. The workshop was very well attended, including members of our Mid-Atlantic ATV group; Gary Black - WA3CPO, Jeff Elliot - W3JVU, Rick Reese - KR3EE and myself - WA3ATV. As one would expect there were also several other ham operators among the broadcast engineers, so our hobby was well represented.

One of the speakers was Javier Ruano of Televes USA who spoke on the various pieces of test equipment broadcasters will need to maintain a top quality NextGenTV signal. For those not familiar, Televes makes both broadcast quality and commercial (hotel, hospital, bar, etc.) grade MATV equipment. They are a European company that has been around for decades and has a good reputation. Here I need to stress that I have no relationship with Televes, no financial interest in their products and nothing to gain by passing this information along. *(editor's note: Televes is in Spain www.televes.com/es)*

Having said that, one of the items in particular that caught the attention of those of us from the DATV world is a device called the AvantX “Head End in a Box.”

This is a remarkable device that takes signals from up to four off-air TV antennas, plus an FM radio antenna as well as a CATV input all at the



same time! It processes the signals digitally (much like a wide-band SDR.) The box filters out the LTE signals that were dropped into the middle of the UHF television band and then provides up to 32 individual, programmable filters that can be applied to the inputs independently. The output of each filter then has AGC applied to it. The output of each filter can then be individually frequency shifted to another physical channel! The output level is up to +55 dBmV which makes it suitable for use as an MATV distribution amplifier. The box can do all of this from 54 to 1220 MHz. All of this is in a rugged package that is less than 3-1/2” x 2” x 1” and it is NOT made in China! If this were being done with traditional cable TV processing amplifiers, channel filters, combiners and converters it would take up several racks and would cost thousands of dollars. This box? \$400 on Amazon!

What really caught the attention of us ATV guys was the ability to filter and frequency shift individual channels. After the workshop I spoke with Javier at length, asking whether the box could frequency shift channels outside the standard US television channels into a US television channel. I explained that ham operators were using frequencies in the 420 to 450 MHz and 902 to 928 MHz for digital television and the ability to filter

and frequency shift signals in those bands would be very useful in ATV applications. I asked Javier whether the box could do that. His answer was no, not at present (the channel selection can only be made by channel number and CATV channels cannot be shifted) but he felt it would simply be a matter of a software change to add that capability.

Today we exchanged a few emails. Seeing a potential niche market for the product he has submitted the idea to the Televes R&D department to see what the feasibility might be. The question is whether there would be enough of a market to make the software alterations worthwhile. If this feature were added, it would be possible to filter, shift and amplify any ATV channel - no matter what format - to another frequency. It would, for example, be possible to shift your local analog or ATSC 3.0 ATV Repeater to a standard off-air TV channel, mix it in with signals you are receiving by antenna or by cable TV and watch it on any set in your household, watch it on multiple TV sets in an Emergency Operations Center or on multiple sets at an ATV demonstration.

If you'd like to see the AvantX have the ability to frequency shift channels in the ham bands to regular TV channels and filter ATV channels and would like to add your voice, feel free to pass along your thoughts to Javier Ruano at: jruano@televes.com

Mention that you received information about the AvantX on one of the ham radio lists and are curious as to whether it can shift channels in the ham radio bands of 420 to 450 and 902 to 928 or something to that effect.

Maybe this is not something members of our niche hobby are in fact interested in, but if it is I suspect Javier could use the additional ammunition to convince his R&D department to go forward with the software change.

Personally, I will eventually purchase one these for my home, software change or not. I can receive signals from several TV markets and have been looking for a cost effective way of combining the signals from several antennas into one MATV stream. This box fits the bill rather nicely.

ATSC 3.0 ROLL-OUT: For a summary of what is happening in the rollout of the new USA digital broadcast TV system, ATSC 3.0, check out this URL link: <https://www.tvtechnology.com/news/atsc-annual-meeting-focuses-on-30-rollout>

At the SBE NextGen workshop, one of the speakers put up a map showing ATSC 3.0 coverage. Expected to be 30% of the country expected to have at least one station available by the end of the year. More than three dozen NextGen TV sets now on the shelves from LG, Samsung and Sony. This is rolling along faster than expected!

73, Dan Rapak - WA3ATV, Treose, PA

ATV NEWS from Around the USA: We encourage other ATV groups here in the USA, and elsewhere to send us articles and photos of your

group's activities. We would love to let other hams know what you are doing. This ATV newsletter's circulation has now grown to over 450 ATV hams. Plus, if your members would like to receive their own copy of this newsletter, then send us their name, call sign and email address.

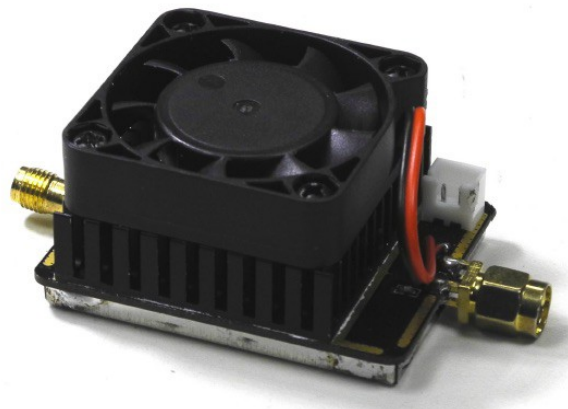


\$17 DVB-T Receiver: Bob, WB0NRV, has discovered a really low cost receiver for DVB-T that actually works on the amateur 70cm and 33cm bands. It is made by Pantosat and the model number is HD-99T2. It is sold on E-Bay for a ridiculously low \$13.69 + \$3..39 shipping from China. Bob brought it by KH6HTV's QTH recently to be checked out. We were able to easily program it successfully in the same manner as with the more expensive (\$50) GT-Media receivers. Unlike the GT-Media V7 Plus for both DVB-T & S, this receiver is strictly for DVB-T. The receiver is quite small as seen in the above photo. It comes with an attached AC power cord for 100 - 230Vac. The power plug is the European 2 pin. It can also be powered with 5Vdc via a USB port. The antenna connector is a PAL. It provides simultaneous 1080P HDMI and 480i composite video + stereo audio.

Jim, KH6HTV, Boulder, CO



New Amplifier

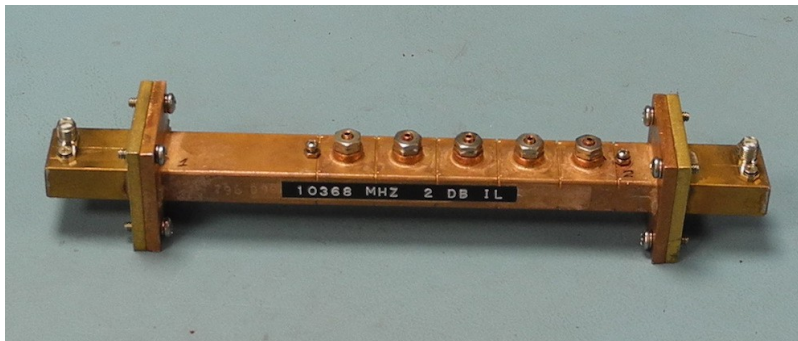


Old Amplifier

NEW 2 W, 5.8GHz AMPLIFIER: Chris, K0CJG, has discovered another new, low cost, RF power amplifier from China. In earlier newsletters

(issues# 30a, 31, 42, 54, & 56) we had discussed similar amplifiers, but had discovered reliability issues with them due to poor assembly of the heat sink leading to thermal failures. Issue #56 dealt with our fixes for the reliability issue. This new amplifier looks to have addressed this issue with additional heat sinking, but has deleted the mini cooling fan. The amplifier Chris bought cost \$27 from E-Bay plus \$3 shipping from China.

The amplifier is advertised to work from 6Vdc to 23Vdc. The photo shows a DC/DC switching voltage regulator pc board attached to the top heat sink. The output from this regulator to drive the actual amplifier is +5Vdc. There is also a Gain adjustment pot on the main pc board seen in the lower left of the photo next to the RF input SMA connector. Note the SMAs are both reverse polarity SMA-RP. The specs. say the amplifier can be driven with up to 500mW (+27dBm). Thus we suspect that, like the previous amplifier, it also includes a large value attenuator on it's input port. We hope to be able to give you more information about this new amplifier in a future newsletter after Chris has had an opportunity to complete evaluate it.



BUILDING BLOCKS for 10GHz TRANSVERTER:

In our last issue (#85) we announced the coming availability of a large assortment of microwave components being donated by a local Big Gun, microwave & EME ham. See the Ham Ads in this issue for details. For local Boulder area hams wishing to roll their own Transverters for the 13cm, 9cm, 5cm & 3cm (2.4, 3.4, 5.8 & 10GHz) bands, this collections of components is a real gold mine of critical building blocks.

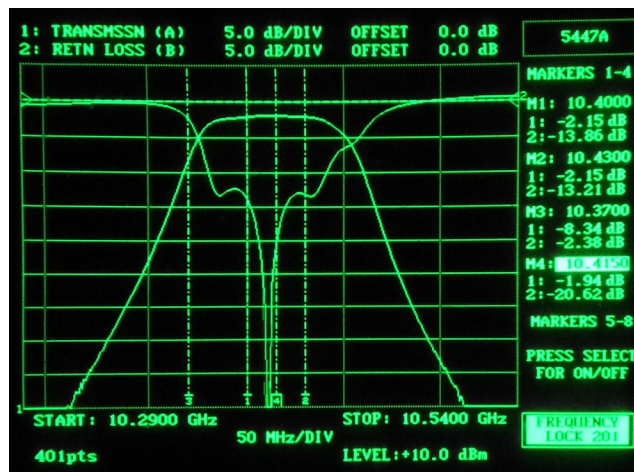
Among the items found in the collection were Band-Pass filters for each band. The photo above shows one which caught my attention. I hope to eventually incorporate it into a 10GHz Transverter. It is a 5 pole BPF built using WR-75 waveguide. Looking inside the waveguide I find that there are five cubical cavities with shorting plates inserted vertically in the waveguide to provide two walls. The waveguide walls provide the other four walls of the cavity. There are small aperture holes in each of the shorting plates to provide coupling to the adjacent cavities.. Each cavity is tuned with a 4-40 screw, with a #4 lock nut, as seen in the photograph. At each end of the filter there are also seen two #0 screws with lock nuts. They are used for fine tuning of the VSWR. At each end of the waveguide are home made WR-75 to SMA transitions.

Here in Boulder, the SSB hams are using 10.368GHz. So when we ATV hams decided to also try out the 3cm band, using modified SSB Transverters, our local microwave

guru, Don, N0YE, decided that we should operate on a nearby frequency that would still work with the transverters, but not interfere with the SSB fellas. Thus Don put us on 10.359GHz.

I grabbed the BPF shown in the photo from the collection of donated items and have tuned it up for 10.359GHz on my 30 year old Wiltron 5447A (10MHz - 20GHz) Network Analyzer. I watched simultaneously both the insertion loss, S21 and the return loss, S11 on the Wiltron. It was quite a challenge to tune this filter. Very minute tweaks of the tuning screws moved the response dramatically. Then when trying to tighten the lock nuts, they moved again. I spent several hours trying to tune the filter. The end result is shown in the below photograph. The results were: center frequency = 10.375 GHz, mid-band S21 insertion loss = -2 dB. Mid-band S11 return loss \approx -15 dB. -3dB Band-Width = 75 MHz.

Jim, KH6HTV, Boulder, CO



10 GHz Band-Pass Filter Response for S21 & S11, Vertical = 5dB/div. Span = 250 MHz

W0BTV Details: Inputs: 439.25MHz, analog NTSC, VUSB-TV; 441MHz/6MHz BW, DVB-T & 1243MHz/6MHz BW, DVB-T

Outputs: Channel 57 --- 423MHz/6MHz BW, DVB-T, or optional 421.25MHz, analog VUSB-TV. Also, secondary transmitter, FM-TV output on 5.905 GHz (24/7).

Operational details in AN-51a Technical details in AN-53a. Available at: <https://kh6htv.com/application-notes/>

W0BTV ATV Net: We hold a social ATV net on Thursday afternoon at 3 pm local Mountain time. The net typically runs for 1 to 1 1/2 hours. A DVD ham travelogue is usually played for about one hour before and 1/2 hour after the formal net. ATV nets are streamed live using the British Amateur TV Club's server, via: <https://batc.org.uk/live/kh6htvtvr> or *n0ye*. We use the Boulder ARES (BCARES) 2 meter FM voice repeater for intercom. 146.760 MHz (-600kHz, 100 Hz PL tone required to access).

Newsletter Details: This is a free newsletter distributed electronically via e-mail to ATV hams. The distribution list has now grown to over 450. News and articles from other ATV groups are welcomed. Permission is granted to re-distribute it and also to re-print articles, as long as you acknowledge the source. All past issues are archived at: <https://kh6htv.com/newsletter/>

ATV HAM ADS

Free advertising space is offered here to ATV hams, ham clubs or ARES groups. List here amateur radio & TV gear **For Sale - or - Want to Buy.**

WHERE TO BUY CUSTOM CRYSTALS: Rick, WA6NUT, in Buena Vista, Colorado has called our attention to a QEX group web site that discusses where to get custom frequency crystals, now that International Crystal has gone out of business. Three companies are listed that still will make custom crystals for amateurs. They are:

QuartSLab in the U.K. www.quartslab.com

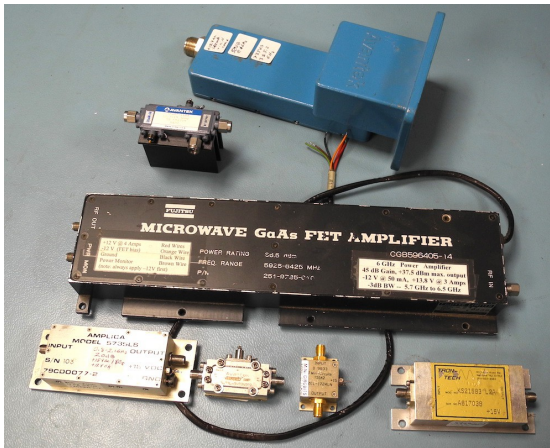
Bomar Crystals here in the U.S.A. www.bomarcystal.com

KRYSTALY in the Czech Republic www.krystal.cz

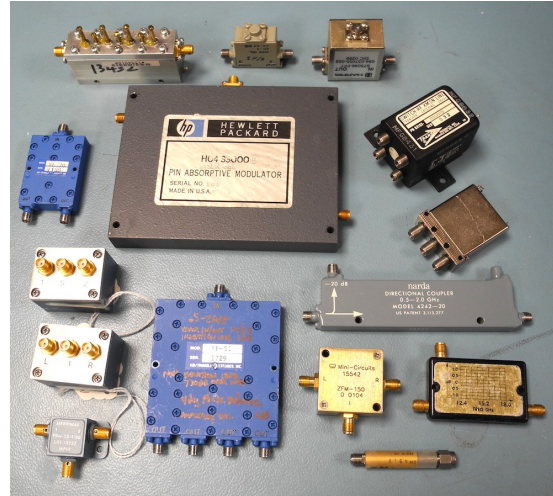
The QEX web site details one ham's experience dealing with all three vendors. It is: <https://groups.io/g/qex/message/42>

FREE MICROWAVE GEAR: Are you a Boulder County, Colorado area ham ? Have you thought about getting into microwave amateur radio ? Would you like some microwave gear to get you started ? If so, then we have an offer you can't afford to ignore. A local microwave ham has donated a whole lot of microwave goodies to be distributed FREE to local area hams interested in microwaves. The equipment includes lots of SMA microwave components, antennas, plus waveguide components in the following sizes: WR-62, WR-75, WR-90, WR-112, WR-137, WR-159, WR-187, & WR-229. WR-229 is for 3.3 - 4.9GHz, while WR-62 is for 12.4 - 18GHz. Also included are some wired equipment, such as Frequency-West brick local oscillators, amplifiers, down-converters, etc. Complete inventory lists have been prepared to itemize all of the multitude of stuff available.

If interested, contact Jim at kh6htv@arrl.net. Jim will then e-mail you copies of the inventory lists and give you details on where to pick it up. No shipping. You must pick up the items you want in person.



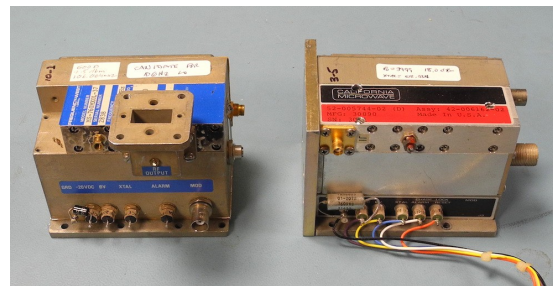
Amplifiers: 1 to 18GHz- up to 5 Watts



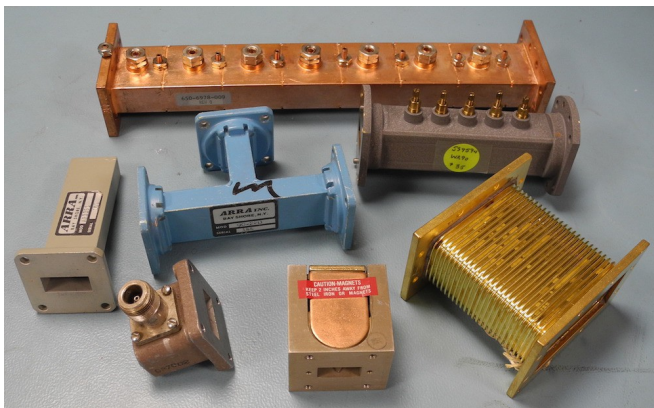
SMA microwave parts: all types



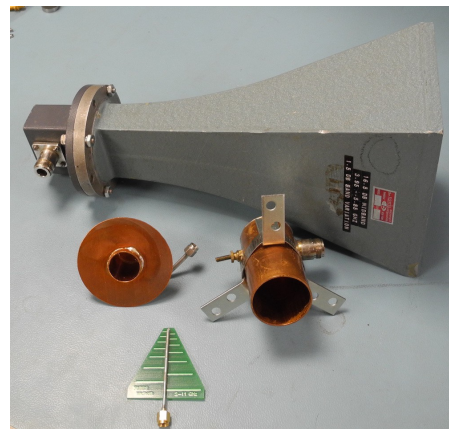
10 Watt X & S band Amplifiers



Microwave Local Oscillators: 1 - 18 GHz



Waveguide Components: 3 to 47 GHz



Microwave Antennas

2007 MAZDA MX-5 Miata Sport Convertible - \$13,000 (Boulder)

image 1 of 12



You won't believe this is a 2007 vehicle! It has very low mileage (only 34,000), and has been impeccably cared for. Garaged nearly its entire life, and comes with a custom car cover. Super fun even on those abundant sunny days in the Colorado winter, just turn the heater on your feet and roll the top back! This is a 4 cylinder 2.0-liter automatic transmission (with a manual paddle option). Manual convertible soft top, power windows/locks, heater, and air conditioning, cruise control, rear-wheel drive, 4 wheel ABS, power steering, tilt wheel, AM/FM/CD Stereo. In excellent mechanical condition with only minor cosmetic defects - the original owner clipped the right front fender on a metal storage rack in the garage (photo shown). The original owner was my father's neighbor, he owned it 2nd, and we are the 3rd owners - the title is clean. It's a great little car, and so easy to park!

Granted this is not a piece of ham radio or ATV gear, but I am the editor. So claiming editorial privilege, here is my daughter Susan's new ad on Craig's List. This was my car when Janet & I lived in Hawaii. When we decided to give up Maui and live permanently back here in Boulder, instead of selling the Miata, I shipped it to Colorado and gave it to my daughter. Her daughter is now of driving age, and Susan wants a different car for her to drive than a tiny, convertible sports car. So she is selling it to instead buy a different car for our grand-daughter.

Jim, KH6HTV