

# Boulder Amateur Television Club TV Repeater's REPEATER

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BATVC web site: [www.kh6htv.com](http://www.kh6htv.com)

ATN web site: [www.atn-tv.com](http://www.atn-tv.com)



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## ATV News from Deutschland

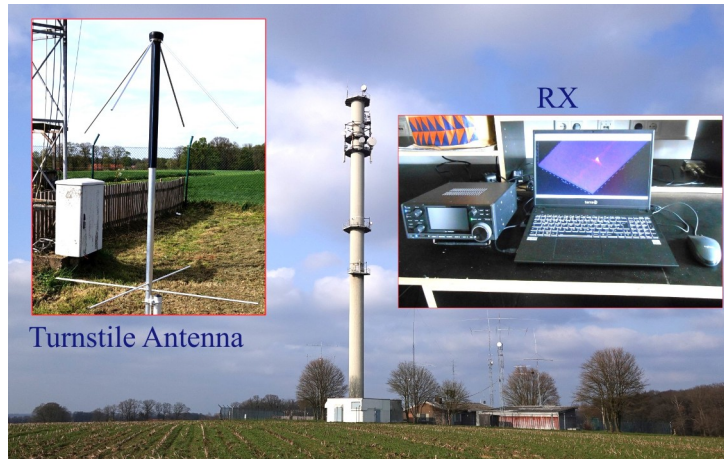
Dear Jim --- Thanks for the interesting newsletter. I am currently configuring an ATV relay with my two IC-905s. A PC is to take over the control. The idea is that with AI the content, e.g. an external camera, can be selected using gesture control. I already have some experience with AI and have written two articles in which AI is used. If you are interested, google: wilhelm sicking site: emeteornews.net. First, however, I am building an automatic transmitter station to test the remote setup. I already have a call sign for it (DM0ATV). However, I still have to wait for approval from the Bundeswehr (German army), as it is the main user of the QRG. In the case of an automatic transmitting station, this authorization is required. But that could take another six months.

73, Wilhelm Sicking, DG2YK, Gescher, Germany

## A bit of ATV tinkering with the IC-905

I'm currently configuring an ATV repeater with my two IC-905s. I want to gain experience with it and, above all, carry out range tests. Since the repeater is controlled via a PC, it is possible to test new technologies such as AI. Another reason for this post is my hope that a reader who has a good connection to ICOM will contact them about the blue screen problem, see below.

**An Automatic ATV Transmitter** --- First I will build an automatic ATV transmitter for the 23 cm band. The transmitter will transmit about 10% of the time according to a schedule. First I want to test the range, gain experience and perhaps meet other OMs. I have chosen the 23 cm band because a good antenna is already available. The callsign of the station is **DM0ATV**. However, I still have to wait for authorisation from the German Armed Forces, as they are the main users of the 23



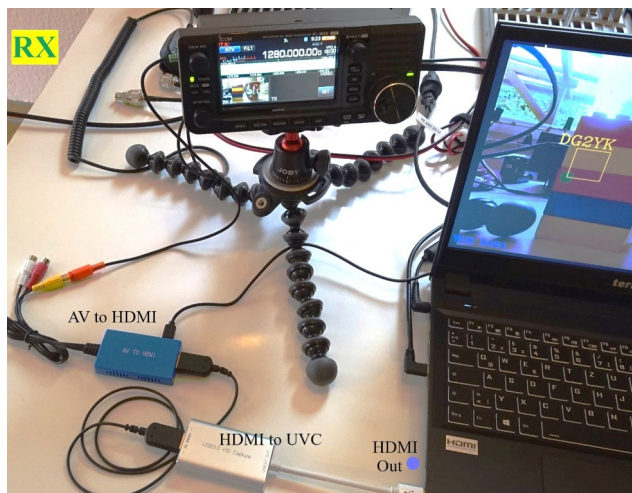
cm band. This authorization is required for an automatic transmitting station. The transmitter and later also the repeater will be installed in the clubhouse of Chapter N62 Wüllen of the German Amateur Radio Club. This is a former NATO repeater station. I already operate a receiver at this location for recording meteor echoes, see Figure 1. The tower is used by telephone providers. So far, we have only been allowed to install an antenna for a 70 cm repeater on the tower. ----- I will now describe some details about the structure of the ATV repeater.

**The Transmitter** -- In the newsletter May 2024, 3rd issue TV Rptrs Rptr-163 it was already shown on pages 9 and 10 how the HDMI output of the PC is connected to the AV input of the IC-905. The transmitter side is shown again here in Figure 2. A GoPro is used as the video camera, which is connected to the IC-905 via the HDMI to AV converter. A camera is required in test mode. Otherwise, optical feedback is generated, similar to holding a camera in front of a screen. The camera supplies the converter with power via the HDMI



cable. Later, in repeater mode, the HDMI output of the PC replaces the camera. The software then also controls the PTT function via the USB relay shown. The two cables still need to be connected to the relay for this purpose. Here the two cables are short-circuited and thus switch on the transmitter. This relay will also switch the automatic ATV transmitting station mentioned above on air. The reception result is already displayed on the PC screen.

**The Receiver** -- The IC-905 on the receiver side, see Figure 3, is connected to the USB port of the PC via the two interfaces. The screen shows how my software displays the video received by the converters. The AV signal from the IC-905 is first converted by an AV to HDMI converter. The HDMI signal is then transmitted to the PC via an HDMI to USB converter. This converter has a UVC interface. UVC stands for USB video class. The IC-905 is therefore recognized by the PC like a UVC camera. Drivers are available in the PCs and my programming software Python with Opencv can also control and read this "camera".



Now I saw a converter on the Internet that can convert AV to UVC directly. However, with these devices it is always a bit of a matter of luck whether they work well.

Image 4 shows how the "camera" is addressed: The small script shows how the resolution and other parameters can be set.

The lines

```
ret, frame = cap0.read()
cv2.imshow("window", frame)
```

read the video stream from the IC-905 and display it on the PC screen. The variable "frame" is an array in which every pixel in the current stream can be accessed or something can be written or drawn into the image.

**The Blue Screen** -- There is a flaw in the ATV firmware of the IC-905: The screen of the IC-905 shows noise (snow) or a noisy picture, but a blue screen is output at the video output from a certain threshold, see Figure 5. This is bad for analog TV. If there is noise, I want to see noise. It's no fun when the display constantly switches between noise and blue screen. I have already written to ICOM, but have not received a response yet. Hopefully they will change it.

```
# 3 or CV_CAP_PROP_FRAME_WIDTH Width of the frames in the video stream.
# 4 or CV_CAP_PROP_FRAME_HEIGHT Height of the frames in the video stream.
# 10 or CV_CAP_PROP_BRIGHTNESS Brightness of the image (only for cameras).
# 11 or CV_CAP_PROP_CONTRAST Contrast of the image (only for cameras).
# 12 or CV_CAP_PROP_SATURATION Saturation of the image (only for cameras).
# 13 or CV_CAP_PROP_HUE Hue of the image (only for cameras).

# source:https://stackoverflow.com

import cv2
cap0 = cv2.VideoCapture(0)
cap0.set(3, 1280) # HD
cap0.set(4, 720) # HD
cap0.set(10, 128) # default
cap0.set(11, 128) # default
cap0.set(12, 128) # default
cap0.set(13, 0) # -31..31, 0 = default

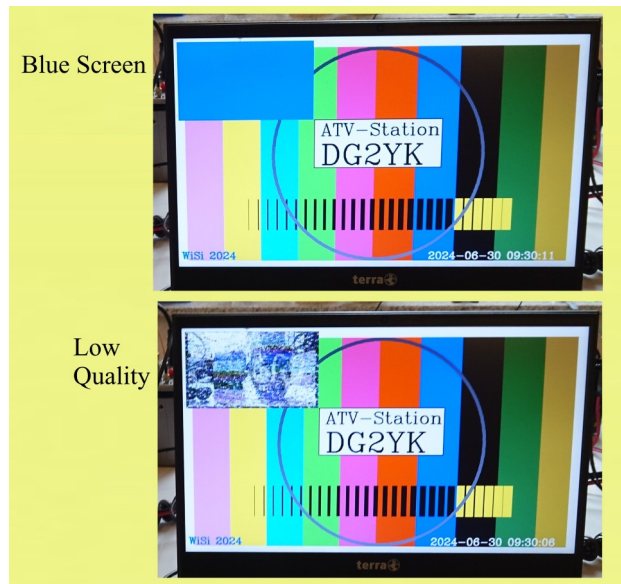
ret, frame = cap0.read() # reads a frame

while True:
    ret, frame = cap0.read()
    cv2.imshow("window", frame)
    if cv2.waitKey(1) == 27: #Esc
        cap0.release()
        cv2.destroyAllWindows()
        break
```



**Test(image)** -- In this test version, my software examines the brightness in the area marked by the square. Depending on whether a blue screen, a noisy image or a good (darker) image is detected, a corresponding video is displayed on the screen and output to the HDMI output. A test image is generated for a blue screen and a noisy image. The original video stream is still displayed at the top left, see Figure 6.

**What's next?** -- Next, I will look at detecting movements in order to influence content. One function will be switching to an external camera at the location of the repeater. It is also planned that the best meteor echoes can be retrieved. If anyone is interested in my meteor observations please google for wilhelm sicking site: [emeteornews.net](http://emeteornews.net)



73 de Wilhelm Sicking, DG2YK, Gescher, Germany

**DB0KK - Multimode Relais Berlin-Lichtenberg**

Internet: <https://db0kk.org> - HAMNET: <http://db0kk.ampr.org> - DB0KK in der HAMNET DB: <https://hamnetdb.net/?q=db0kk>

Aktuelle Seite: [Startseite](#) / (D)ATV-Relais

## Das (D)ATV-Relais DBØKK

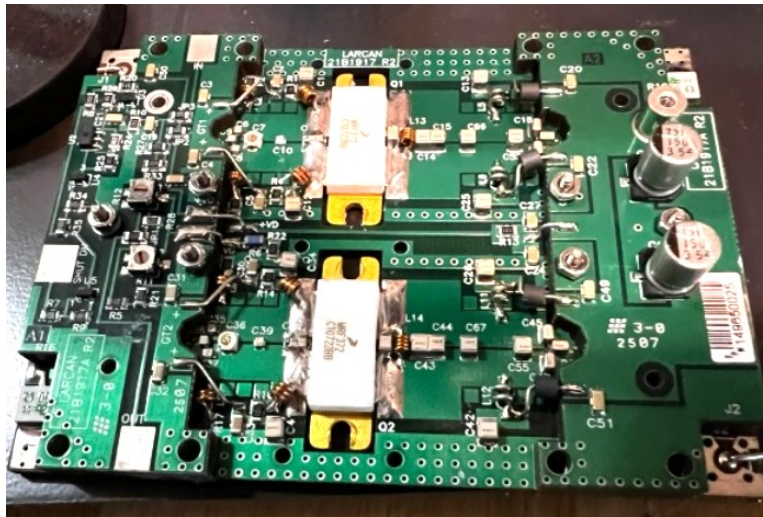
Details

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- Aktuelles
- (D)ATV-Relais

# General Observations during an ATV Pallet Amplifier Project

Dave Pelaez, AH2AR



**BACKGROUND:** Commercially manufactured, surplus pallet amplifier PCBs have become widely available, many of which have been taken out of service with the decommissioning of broadcast TV transmitters around the country. These circuit boards have been appearing in-mass on e-Bay and at hamfests for pennies on the dollar. One such pallet amplifier is a 360 watt amplifier that uses two Freescale MRF-372 N-Channel Enhancement Mode Lateral MOSFETs. The circuit board is manufactured by **Larcan**, and it provides 15 dB gain. N8KKY and WB8YIF steered me to the E-bay seller that has been offering these circuit boards for about 10 dollars apiece (5 for \$55). Go to E-bay, and use the following search term: **“Lot of 5 LARCAN 21B1917 Modules”**. Transistor Specification Data for the Larcan NXP Transistors:

<https://www.nxp.com/docs/en/data-sheet/MRE372.pdf>

ATV'ers within the Midwest region have been experimenting with a number of different pallet amplifiers. W8URI (Bill) , WB8LGA (Charles) , N8KKY (Pete) and WB8YIF (William) have been employing different pallets that incorporate dual BLF-888 LDMOS MOSFETs and are running up to 1 KW power output on 70 cm and all have achieved excellent results. The pallets they are using are Italian manufactured pallet amplifiers, (advertised by the seller as 1200 watt pallets). Measured power output is approximately 700 watts peak on A5, measured using a peak reading Bird wattmeter). Additionally, they are also employing the pallets for DVB-T and run them at 300 watts output, with minimal spectral spreading.

Other local hams within this region such as N9BNN near Indianapolis has built up high-power pallets using combiners. Recently, N8CBX, Jan, has opted for building a 1 KW, W6PQL pallet. His metal-work in fabricating the chassis for his latest project is quite remarkable.

To that end, I checked with a local ATVer (W8CWM) in the Dayton area to see if he was interested in being the owner and beta tester for one of the --smaller-- pallet boards that I wanted to experiment with to see what kind of results could be achieved at the lower output power level. His ATV system was ideal for running this particular amplifier, since the Larcan pallet I had in mind would allow for a minimal 5 watts drive (37dBm) and would provide about 160 watts output (52dBm) PEP for A5 analog TV, once the circuit was modified for its best operating efficiency. Inclusion of this pallet at W8CWM's station will provide an additional 3 dB and along with his antenna upgrades he had been working on, and the additional gain that he would realize will further enhance his ATV DX success.



**PARTS FOR THIS PROJECT:** For this project I ended up employing the following components/materials:

- Larcan pallet circuitboard
- W6PQL 4 event timer
- W6PQL High Current Switch
- Primary muffin fan with 60 Degrees Centigrade thermistor
- 2 Secondary muffin fans
- 2 Tohatsu T/R relays
- 1 SSB Electronics Mini-70 preamp
- 28 VDC to 12 vdc converter
- 28 vdc 20 amp power supply
- Hall Effect Current and voltage display/meter
- aluminum heatsink
- SMA style T/R relay (for preamp/isolation protection)
- copper spreader
- Hammond chassis
- Nuts, bolts, panel lights, switches wiring, SMA RF cabling.

After purchasing some Larcan pallets, I proceeded to determine if I could raise the efficiency of the Larcan pallet, as the circuit board was designed to operate within the 470 – 890 MHz TV commercial broadcast range. After conferring with WB8YIF and N8KKY, their focus had mainly been on working with the larger amplifiers, so I ended up making some changes ad-hoc, and was able to bring the circuit board's efficiency to within its acceptable specification range. Prior to the circuit board changes, I was only able to achieve about 10 dB gain. With some experimentation, I removed four of the SMD capacitors on each the MRF-372s' output stage and these changes reduced the total current level down and alternately brought up the pallet's output gain to 15 dB.

**HEATSINK ISSUES:** The Larcan pallet circuit board has a somewhat unusual geometry on the bottom of the board that initially made it challenging to come up with a method for mounting the circuit board and transistors to a heat sink. I ended up opting to use a copper spreader that required extensive milling to conform to the unusual board design. Knowing that K8FIX Bruce had a milling machine, I showed the circuit board and copper spreader to Bruce and he volunteered to employ his older Harbor Freight machine to mill the copper spreader. In Bruce's own words, the Harbor Freight mill was actually too small for the job, and it also had some play in its worktable that could potentially become problematic.



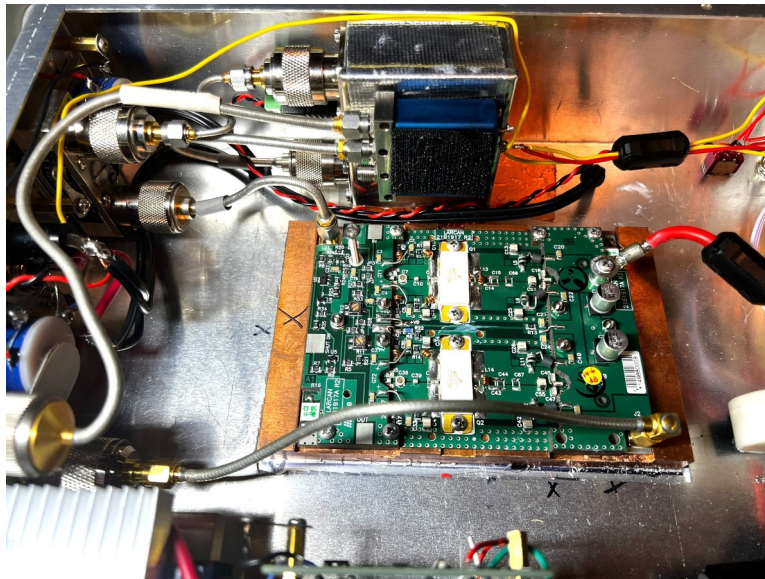
*Bruce at work with his milling machine*

After we milled the spreader, I mounted the circuit board to the spreader and the aluminum heat sink, powered up the circuit board and quickly noticed that the spreader was not efficiently transferring the heat from one of the transistors to the aluminum heat sink, as a thermal camera indicated unacceptable heating. I remounted the circuit board to the spreader after changing to a different heat sink compound but still had a heat transfer issue. Bruce was correct... the worktable tolerance issue came back to haunt me! Instead of re-milling the spreader, I opted to purchase some graphene material and placed it between the circuit board and the copper spreader. (If you have a chance, try Googling the term "graphene": the material is truly amazing!) The graphene fix immediately resolved the heat transfer issue and both transistors were now happy!

After resolving the heatsink issues, the amplifier delivers 15 dB gain and draws 11.7 amperes at 27.5 Vdc. W8CWM is driving the amplifier at approximately 6.5 watts peak (A5) and his amplifier output is measuring approximately 174 watts peak output (using a peak-reading Bird wattmeter). For DVB-T, driving the amplifier at approximately 1.5 watts input produces an output of 50 watts (measured with a Bird 43). In both instances, the amplifier is loafing at these drive levels. The headroom is definitely there for higher drive levels on A5, and possibly for D2.

The new amplifier is now under permanent-long-term test at W8CWM's QTH ! Great 70cm, ATV-DX to follow !

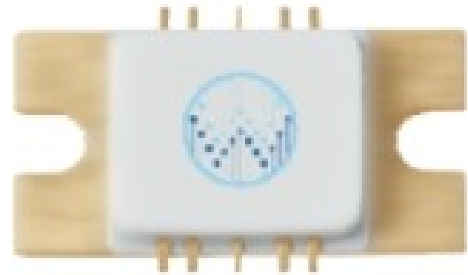
73 de Dave, AH2AR, DARA, Dayton, Ohio



*Inside view of AH2AR's new 70cm Pallet Amplifier*

## **Microwavers - Take Notice !**

The latest issue of the Microwave Journal included a new product announcement of particular interest to ham, microwave experimenters. Here is a brick amplifier module which will replace your big, bulky, rack mount, traveling wave tube amplifier (TWTA).



This is a GaN, MMIC power amplifier from WAVE PIA in Korea. [www.wavepia.com](http://www.wavepia.com)

Their web site lists several MMICs PA Bricks covering a wide band of microwave frequencies with substantial amounts of RF power. 0.5 to 8.5GHz @ 20W; 5 to 7GHz @ 30W; 5 to 7GHz @ 50W; 8 to 12GHz @ 50W; etc. Most run on 28 Vdc.

We communicated with them requesting a price quote, but guess we were not considered a viable customer as they never responded with a quote. So, I am guessing these are pretty pricey devices !

## **Partial Failure of W0BTV**

On Monday, June 24th, Bill, AB0MY, reported that the Boulder, Colorado, W0BTV, 5.9 GHz, FM-TV 24/7 beacon transmitter had gone off the air. Subsequent testing also revealed that the RF control link was also no longer functional. The DATV repeater still functioned normally when keyed up with a valid DVB-T signal on either 70 cm or 23 cm. We remotely control the repeater via a separate 2 m control frequency using DTMF (touch-tone) commands. The next day, Don, N0YE, made a quick trip



up to the repeater site for preliminary trouble-shooting. He verified that the 2 m FM control receiver was in fact functioning properly. However, he noted no activity indicated by the LEDs on the touch-tone decoder board. On Friday, June 28th, we pulled the repeater from the site and took it to Jim's QTH for repair. The T-T decoder/relay board was in fact defective and replaced with a new board. On Tuesday, July 2ed, we returned the repeater back to the site. All was working normally during on site testing. Then 3 hours later after we all went home, with remote testing, we found the repeater controller had failed again ! Lots of growling and snarling now going on ! Obviously, this story is not finished yet.

The T-T decoder/relay board we have been using all these years is a very old design from the 90s from Intuitive Circuits. It is their model DTMF-8. Costs about \$137. This is not the first failure of this board for us. Over the years we have had to replace it several times. The most recent was about 3 years ago.

## **COMBO DVB-T & DVB-S Receiver -- Programming Solution Found**

In years past, many Boulder ATV hams had acquired these low cost combo receivers from Amazon for use as 70cm ham band receivers for DVB-T. Then the Chinese manufacturer (unknown brand) suddenly changed the installed firmware program. Those receivers no longer allowed the user to install any arbitrary frequency. Instead, the F/W required the user in the menu to select a specific country and then only allowed scanning for the channel list of broadcast frequencies for that country.

Recently one of these receivers was floating around the Boulder ATV community. Several hams had tried unsuccessfully to program it for our 70 cm ATV channels. But no one was willing to toss it in the trash bin. Finally it landed in Don, NOYE's ham shack. Don persevered and finally found the solution. When he picked the country of Peru, he found that he was able to program 6 MHz bandwidth TV channels in our ham 70cm band.



## **New Name Proposed for Newsletter:**

Seems to me that it would be a good move to change to a name in order to drop the “newsletter” title, as your “publication” is over-and-above what typically would be considered a newsletter description in quality, subject matter and content. A better description falls into the category of a “journal”. My vote would be to name it so it’s immediately recognizable, even to the uninitiated...the title “Amateur Television Journal” seems far more appropriate. When I brought it up to Mike WA6SVT while we were

Hamvention, he also agreed that it would likely attract more articles and would provide a bit more visibility, not that visibility is lacking, but since it looks and quacks like a duck, identify it as a duck.

Cheers, Dave, AH2AR, DARA, Dayton, Ohio

( *Editor's Note: Dave has an intriguing idea. The current name is the "BATVC TV Repeater's Repeater". However, we often simply refer to it as our ATV newsletter. I welcome comments from our readers.* )

**WOBTV Details:** **Inputs:** 23 cm Primary (CCARC co-ordinated) + 70 cm secondary all digital using European Broadcast TV standard, DVB-T 23cm, 1243 MHz/6 MHz BW (primary), plus 70cm (secondary) on 441 MHz with 2 receivers of 6 & 2 MHz BW  
**Outputs:** 70 cm Primary (CCARC co-ordinated), Channel 57 -- 423 MHz/6 MHz BW, DVB-T Also, secondary analog, NTSC, FM-TV output on 5.905 GHz (24/7 microwave beacon).  
**Operational details in AN-51c      Technical details in AN-53c.      Available at:**  
<https://kh6htv.com/application-notes/>

**WOBTV ATV Net:** We hold a social ATV net on Thursday afternoon at 3 pm local Mountain time (22:00 UTC). 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/> Select *ab0my or n0ye*. We use the Boulder ARES (BCARES) 2 meter FM voice repeater for intercom. 146.760 MHz ( -600 kHz, 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 700+. 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**



**X-6000A**  
**2m/70cm/23cm**  
**ANTENNA**  
**for Sale**  
**\$95**



This antenna was recently removed from service as the W0BTV-ATV repeater's receive antenna. It was only in service for four months. We are selling it because we have gone to different receive antennas for our repeater.

Diamond's specs. for the antenna are: Gain = 6.5 / 9 / 10 dBi, element phasing = 2-5/8λ, 5-5/8λ & 6-5/8λ, height = 10.5 ft., connector = type N. detailed specs. at: <https://www.diamondantenna.net/x6000a.html> HRO price for a new antenna is \$190. We are offering it for sale at 1/2 price of \$95. Local Denver/Boulder, Front range sale only. Will not ship. You must pick it up. Interested ? -- contact Jim, KH6HTV, kh6htv@arrl.net or 303-594-2547

**For Sale -- DUPLEXER**  
**- or - BAND-PASS FILTER**  
**\$75 ea.**

**(includes shipping)**

**Fumei model SGQ-450A**  
**Sells for \$120 on Amazon**



In new, unused condition. I have two units available for sale. One has been tuned as an ATV band-pass filter for Ch 57 (423 MHz, 6.8 MHz BW, -1.7dB insertion loss).

The other one was tuned as an ATV Duplexer for Ch 57 (423) & Ch 60 (441). You can take them as-is -- or -- I can re-tune them to your desired frequency / application. Buy one or both. For more details about these, see ATV newsletters, April-May,2024 issues # 160 & 161.

Interested ? -- contact Jim, KH6HTV, email = kh6htv@arrl.net