In this issue

Production Team

- Ian Pawson - G8IQU
- Trevor Brown - G8CJS
- Terry Mowles - VK5TM

Contributing Authors

- Ian Abel - G3ZHI
- Trevor Brown - G8CJS
- Ken Konechy - W6HHC
- Mike Stevens - G7GTN
- Fabrizio Bianchi - IW5BDJ
- John Hudson - G3RFL
- Klaus Kramer - DL4KCK

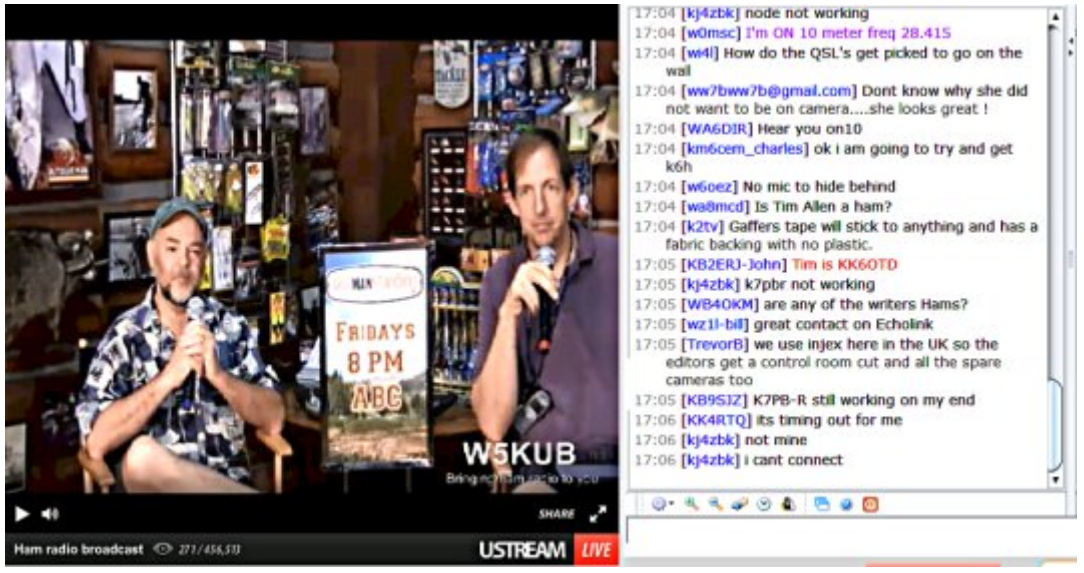
The RSGB recruitment

The RSGB have launched a new Amateur Radio recruitment publication, aimed at a younger age group, based on the 2002 publication "The Adventures of Zack and Max. The artwork and text have been full updated, the new publication can be downloaded from http://thersgb.org/publications/alex-discovers-amateur-radio/#2/z and is now called Alex Discovers Amateur Radio.

Alex discovers Amateur Radio

Ham Radio in Hollywood

September the 27 and 28th saw a special webcast by W5KUB from the Hollywood set of "The last man Standing" for those of you not familiar with this US sit com it features US actor Tim Allen who plays a character, Mike Baxter who is a radio ham with the screen call sign KA0XTT see http://tmedlin.com/mainpage.htm Tim, has just passed his ham licence in real life and now has the call sign KK6OTD.



Tim Allen
KA0XTT

Unforgettable day schoolchildren spoke to an astronaut in space

Reid Wiseman KF5LKT - Image credit NASA

The Southend Echo reports on the contact between pupils at Winter Gardens Primary School in Canvey, Essex and the International Space Station.
The contact took place on October 8 having taken two years of preparation. It was organised by the South Essex Amateur Radio Society and involved a link-up with an amateur radio station in California, W6SRJ, who relayed the signal to and from the ISS while it was traveling over the USA at 27,600 km/h. The children were able to speak to astronaut Reid Wiseman KF5LKT who was using the ISS callsign NA1SS.

The newspaper article includes a picture of the school pupils with Pete sipple M0PSX, read it at - http://goo.gl/rPnmHK
Read a report on the contact at http://goo.gl/Rr1cLi
Amateur Radio on the International Space Station (ARISS)
http://www.ariss.org/contact-the-iss.html

South Essex Amateur Radio Society

New readers to CQ-DATV may not know of the wide assortment of DATVtalk articles that have been published over the history of CQ-DATV. These articles contain an introduction to Digital-ATV as well focusing in on various aspects and areas of DATV.

The following is a list of the DATVtalks published to date:-

Series	Title	CQ-DATV Issue
DATVtalk-01	Looking at the DATV-Express Digital-ATV XMTR Project	CQ-DATV3
DATVtalk-02	ATV and the Digital Fork in the Road	CQ-DATV5
DATVtalk-03	Planning a Digital-ATV Station	CQ-DATV6
DATVtalk-04	Bench-Testing a DVB-S Transmitter – Part 1	CQ-DATV7
DATVtalk-05	Bench Testing a DVB-S Transmitter – Part 2	CQ-DATV8
DATVtalk-06	Field-Testing a DVB-S Transmitter – Part 3	CQ-DATV9
DATVtalk-07	Digital ATV – Using a Spectrum Analyzer	CQ-DATV10
DATVtalk-08	Digital ATV – Understanding DVB-S Protocol	CQ-DATV11
DATVtalk-09	Digital ATV – Understanding DVB-T Protocol	CQ-DATV12
DATVtalk-10	Digital ATV – Understanding DVB-S2 Protocol	CQ-DATV13
DATVtalk-11	Digital ATV – Overview of ITU-T_J.83B Protocol	CQ-DATV17

UK radio hams start 146 MHz development

Radio amateurs in the UK have already started testing equipment for use on the new 146 MHz allocation expected to be available at the end of October

The RSGB VHF Manager has expressed the hope that the allocation will be used imaginatively for such things as Digital ATV, Digital Voice, Spread Spectrum and new innovative modes.

Former Chelmsford amateur Charles Brain G4GUO is now developing Digital TV (DATV) for use on 146. He tweeted "Started initial testing of 146 MHz narrowband DVB-T (10 mW into a dummy load). Looks like OFCOM spectral mask will be achievable."

New UK Amateur Radio 146 MHz Allocation
http://goo.gl/MTCMNQ

Problems for ATV/DATV on 1200MHz in Southern California

At the October meeting of the Southern California committee for UHF-band-plan-coordination, called SCRRBA or Southern California Repeaters and Remote Base Association, it was reported that two "high level" (aka mountain-top) ATV repeaters that are operated by the Amateur Television Network (ATN) repeater group have been impacted with restrictions on the 1200 MHz band.

There is a RADAR installation (a joint FAA-DoD system) on St Clemente Island in Southern California (off-shore between Orange county and San Diego county) that upgraded their equipment. The upgraded RADAR installation operating at 1246.8 MHz (approx.) with about 3 MHz bandwidth was now receiving interference from the far away ATN ATV repeater operating at 1241.25 MHz on the Mt Wilson mountain-top in northern Los Angeles county. Mike WA6SVT, ATV technical guru for the ATN repeaters, explained to me that ATN was asked by the FCC to stop operating the Mt Wilson repeater on that older frequency and have moved that repeater frequency to 1289.25 MHz, pending final coordination.

The Russian GPS constellation of GPS satellites is called GLONASS. The GLONASS GPS is used (pay for use) by US construction companies for high precision land survey work. Mike WA6SVT explained that GLONASS constellation of 24 satellites operates within the 23 cm band. with 750 KHz spacing, they use 1244-1256 MHz. Satellites over SW USA are in the 1250 MHz spectrum. ATN operates a second ATV repeater on 1251.25 MHz on another mountain top called Santiago Peak. If ATN run the Santiago Peak in beacon mode it will take out site survey receivers out to about 20 miles away. FCC rules currently have no accommodation for GLONASS RX use in USA but, when the FCC called, ATN wanted to cooperate by keeping the Santiago Peak ATN repeater on 1251.25 MHz beacon mode off during working hours. Mike also reported that Trimbal (a manufacturer of GLONASS GPS receivers) is redesigning there receivers to have selective notch IF filter to notch out amateur and FAA radar.

NoV suggestion for Airborne Ham Radio

The RSGB response to the Ofcom licence consultation raises the suggestion of the use of NoV's for aeronautical amateur radio operation

The UK amateur radio licence currently prohibits airborne operation and amateurs have had to transmit using licence exempt spectrum instead.

The Society is critical of Ofcom's proposals regarding 470 kHz pointing out they do not align with the Wireless Telegraphy Act, nor are they the minimum necessary under the ITU Radio Regulations. The RSGB also say the 470 kHz proposals set a dangerous precedent in relation to interference.

Regarding the proposal to remove the 15 minute ID requirement and replace it with "as frequently as practicable", the Society say it is open to too great a range of interpretation (and in some cases might be more burdensome than the well known 15-minute rule). The RSGB also suggests there is currently an ambiguity regarding embedding callsign data in modes such as Digital Voice.

In total over 2,000 people responded which is believed to be a record for an Ofcom consultation. It is thought Ofcom may take some time to publish all the responses but when they do they should be at: http://goo.gl/EsLmlu

Read the full RSGB response, airborne is referenced in Question 9: http://goo.gl/QxSFal

RSGB - UK Amateur Licence Review
http://goo.gl/Zw7KXy

Lunar Ham Radio payload launched

The 4M amateur radio payload with a WSJT JT65B 145.980 MHz beacon was launched on Thursday October 23 at 1759 UT

The Chang'e-5-T1 mission 4M payload launched on the Chang Zheng CZ-3C/G2 rocket from the LC2 launch complex at the Xichang Satellite Launch Center, Sichuan.
The first telemetry from the JT65B beacon was received at 1918 UT.

The spacecraft will head into Lunar Transfer Orbit (LTO), before performing a flyby around the Moon. Radio amateurs are encouraged to receive and report the signals.
http://moon.luxspace.lu/receiving-4m/

See the 4M payload Blog at
http://moon.luxspace.lu/blog/

4M Lunar Payload
http://amsat-uk.org/2014/10/15/4m-lunar-payload-integrated-keps-released/

Editorial

This issue we have opened up the CQ-DATV editorial to one of our readers, Ian Abel G3ZHI, who has an interesting idea for ATV repeaters.

Increasing activity on ATV repeaters

There are some 60 ATV repeaters in the UK. All of them could benefit from remote internet access via Skype or some other software. If we could make this available nationally it would be up to the individual repeater groups as to if they want to implement it or not.

The facility initially could be available while the repeater has an operator in attendance monitoring the repeater. To add this facility in the UK we would need a Notice of Variation on the repeater license, this is a standard feature on many voice repeaters, so I can see no reason why OFCOM would not allow it on ATV repeaters, they may even be looking for an olive branch in light of the coming spectrum cuts.

Access via Skype would require users who would be licensed radio amateurs to be registered with the keeper. Using Skype with video would allow hams who at present have no ATV RF equipment to access ATV repeaters anywhere in the world that had a Skype access facility. This could be try before you buy, as DATV equipment is a considerable investment. There could be time and date restrictions to ensure this is not used instead of buying, this would be down to the individual repeater keepers.

The user would connect to the repeater by Skype and then send video which the repeater would retransmit on the RFoutput, so checks would be required to ensure the user has a valid licence. This all ready happens for voice repeaters.

If hams find ATV of interest then they may buy some ATV equipment and use it on RF. Skype is suggested as it is freely available, easy to use and many amateurs have it on different devices already, eg home computers tablets mobile phones etc. However if someone were to design some new suitable software, then that would be welcome.

TalkShow allows you to initiate or receive calls from any video-enabled desktop, laptop, mobile device, conference room, Internet TV or game console running Skype software.

This would open the door to using tablets mobiles and laptops. People could send video while they were on the move. The internet link to the repeater could be made from the home QTH of a ham providing the link, they would not have to be at the repeater site although adding direct access would be technically possible and add to the access.

Ian Abel G3ZHI

g3zhi@hotmail.com

www.qsl.net/g3zhi

New - The CQ-DATV Award

With CQ-DATV 18 being our Christmas edition it will mark the end of our first year as a monthly magazine, therefore we would like to thank everyone that has made this possible from both contributors, and those that have compiled all the various CQ-DATV magazines in all its formats. This was a tremendous leap in faith by those of us that produce CQ-DATV and for those that contribute. It has been an outstanding success and we could not have done it without you, thank you one and all.

To mark this occasion we are going to issue the first ever CQ-DATV award, which will acknowledge the person or persons who we believe has made the most outstanding contribution to CQ-DATV magazine, including CQ-DATV 18 which is still open for copy.

Running a free magazine has it's up and its downs, one of the downs being no coffers to dig into to finance this award. So it will be a certificate to the winner that can be printed out and displayed. I hope this expresses our thanks not only to the winner, but to all of you that have contributed in the last 12 months.

Please send your nomination for an award to award@cq-datv.mobi

CQ-DATV will be continuing as a monthly electronic ATV magazine through 2015 and beyond, but this will only be possible with your support. ATV needs a monthly magazine and the team at CQ-DATV are proud to have produced that.

So if you have something you have been working on that would be of interest to CQ-DATV readers and there is still time to get CQ-DATV 18 copy to the editor editor@cq-DATV.mobi

DATVtalk 11 - DigitalATV - Overview of ITU-T_J.83B Protocol

by Ken Konechy W6HHC

Reproduced from the Orange County Amateur Radio Club newsletter. www.W6ZE.org

[Please Note - This is the tenth article in a series of DATVtalk articles to introduce Digital-ATV to hams and to explain various aspects of this new area of ham radio. In the CQ-DATV5 issue, the DATVtalk02 article was the beginning of this series and presented an introduction article about Digital-ATV.]

Earlier DATVtalk articles about Digital-ATV have provided details about how DVB-S protocol works, and went on to cover DVB-T and DVB-S2 protocols. DVB-S is still currently the most popular modulation standard being used by hams for DATV. This month I will look at some of the technical details of the DATV protocol defined by the ITU-T_J.83-Annex B standard.

The complete list of commercial origins of the DATV protocols being used by hams are listed below:

- *DVB-S (satellite based)*
- *DVB-S2 (satellite for HDTV)*
- *DVB-T (terrestrial reception)*
- *ATSC (commercial terrestrial reception in US)*
- *ITU-T_J.83-Annex B (US/Canada cableTV)*

ITU-T_J.83B

The ITU-T_J.83-Annex B protocol (I've shortened to ITU-T_J.83B) is commercially used by the US/Canada cableTV industry. This standard is very closely related and similar to the DVB-C protocol used in Europe and most of the world for cable TV. One main attraction of ITU-T_J.83B for hams is that several cable channels can fall directly on the 430 MHz ham bands. Therefore a terrestrial transmission by hams can be received directly to a cable-ready TV without adding any special receiver cost (aka more money). Just connect an antenna and tune your TV to the right channel. This is the nice attraction of the old analog-ATV approach on 430 MHz band.

ITU-T_J.83B for the cable world is designed to work with strong signals and a low noise environment. The main issue with ITU-T_J.83B when used by hams in a terrestrial mode (over the air - OTA), is that the environment can change to weak signals and lots of noise. That is: the received S/N gets much worse when you leave the cable environment.

Typical Transmitter Block Diagram

Fig1 is a block diagram of an ITU-T_J.83B basic ham station for DATV using QAM64 modulation to transmit a full HD video. Hams typically use MPEG-4 encoding to achieve enough data compression to fit a full 1080i high definition signal into a 6 MHz bandwidth. Typical manufacturers of ITU-

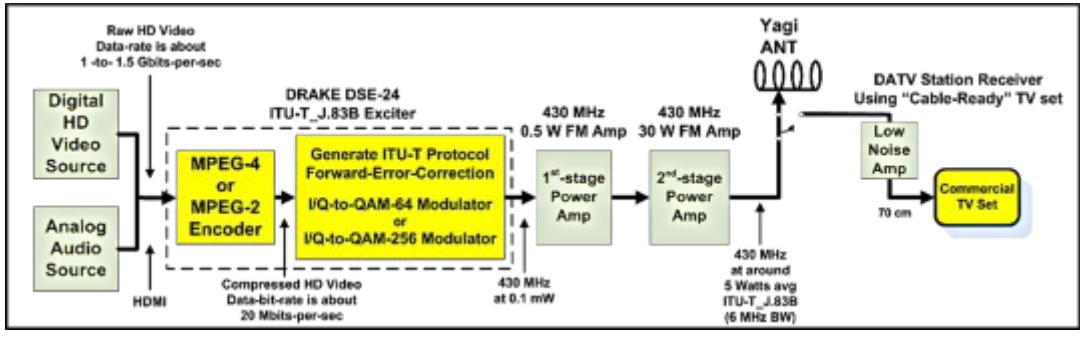


Figure 1 - Block Diagram of Basic ITU-T_J.83B Station for DATV

T_J.83B exciters used by hams (mainly here in USA) are the Drake (model DSE-24) and Thor (model H-VQAM-SD).

Typically a HDMI connector is available for HD cameras to be plugged in and composite video connectors (RCA jacks) are available for NTSC cameras and Standard Definition (SD) using MPEG-2 encoding. The DATV receiver is a commercial "cable-ready" TV set tuned to the 420-430 MHz USA cable TV channels 57-60 that overlaps the ham radio 70 cm band.

- *421.25 MHz CH-57*
- *427.25 MHz CH-58*
- *433.25 MHz CH-59*
- *439.25 MHz CH-60*

Video Data-Rate and Compression

For HD DATV, a digital camera output is compressed using MPEG-4 encoding (aka H.264 and even sometimes called Advanced Video Coding - AVC). This encoder CODEC provides more compression of the video than the older MPEG-2 CODEC. For SD DATV, the analog NTSC/PAL camera output is first digitized by the optional MPEG-2 encoder shown in Fig 1, and then compressed by the MPEG-2 algorithm. The reason the compressed video data rate varies in Table 1 is that the smaller value means little motion in the video scene and the larger value means a lot of motion. H.264/MPEG-4 can reduce the bit-rate by a factor of 50% over the older MPEG-2 CODEC.

Video Data Stream	Data-Rate	Notes
Analog NTSC camera	168 Mbits/sec	A/D digitised uncompressed
NTSC MPEG-2	2-3 Mbits/sec	compressed
NTSC H.264/MPEG-4	~1.5 Mbits/sec	compressed
VHS MPEG-2	1-2 Mbits/sec	compressed
Analog PAL camera	216 Mbits/sec	A/D digitised uncompressed
PAL MPEG-2	2.5-6 Mbits/sec	compressed
HDTV camera	1-1.5 Gbits/sec	uncompressed
HDTV MPEG-2	15-60 Mbits/sec	compressed
HDTV H.264/MPEG-4	12-20 Mbits/sec	compressed

Table 1 - Camera Video Data Streams and MPEG-2/MPEG-4 Data Streams

FEC Inflation of Payload Data Stream Data-Rate

Forward Error Correction (FEC) is a technology that not only can detect errors on the received signal, but adds enough redundancy of the data so that it can correct several wrong bits. But, there is a trade-off when choosing the amount of redundancy. Since redundancy inflates the data-rate of the output stream, the trade-off is between more redundancy or keeping the inflated data-rate smaller. As we will see a little later in this article, the larger the inflated output data-rate, the higher the required RF band-width. So at some point the FEC algorithm will not have enough redundancy to correct too many errors, and the DATV receiver screen will go blank or freeze.

The FEC technology used by the ITU-T_J.83B protocol is that same as used by DVB-S protocol. That is: the two FEC algorithms are the Viterbi coding technology and Solomon-Reed. The puncture coding value used by ITU-T_J.83B DATV is not selectable and is difficult for me to pin down in the standard, but the redundancy is something close to 7/8. The total FEC overhead produced I estimate is approximately

20%. That translates into the MPEG-4 "payload" video data rate of about 20 Mbits/sec increasing to a "gross data rate" to a value of about 24 Mbits/sec that has to be encoded into the Symbol-Rate (SR).

Digital Modulation Symbols and Symbol-Rates

Digital modulation technologies like BPSK (an example is PSK-31), QPSK (Quad Phase Shift Keying), 8PSK, 32APSK (Amplitude and Phase Shift Modulation), and QAM-64 (Quadrature Amplitude Modulation) with 64 "constellation points" have the ability to put more information into a more narrow frequency spectrum than analog modulation. The complexity of the digital modulation scheme, allows us to pack more "data bits" into each SYMBOL. Table 2 lists out how many data bits can be packed into a symbol for several well-known digital modulation technologies.

Table 2 - Symbol Bit-Packing for Various Digital Modulation Technologies

Modulation Scheme	Data Bits per Symbol (Me)
BPSK	1
GMSK	1
QPSK	2
8PSK	3
8-VSB	3
QAM-16	4
32APSK	5
QAM-64	6
QAM-256	8

ITU-T_J.83B protocol allows the use of two digital modulations: QAM-64 that packs 6-bits of data into each symbol transition and QAM-256 packs 8 bits of data into each symbol transition.

Figures 2 and 3 (next page) shows a comparison between the more simple QPSK modulation constellation and the much more complex QAM-64 constellation.

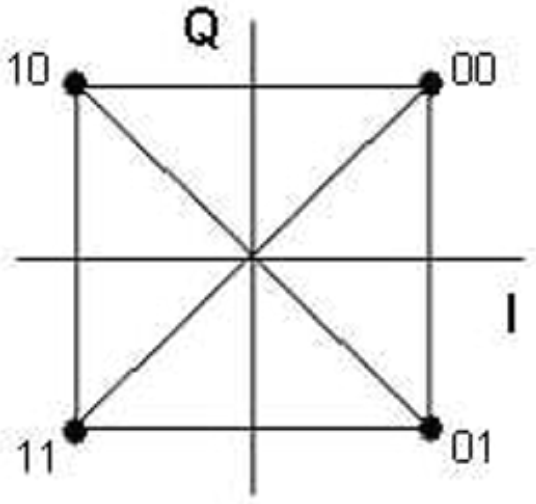


Figure 2 - The modulation constellation of QPSK used in DVB-S packs 2 bits of data in each symbol transition

The complexity of a digital modulation scheme like QAM-64 allows much more data to be carried in a defined RF bandwidth, but also carries a penalty in signal robustness. The greater the modulation complexity, the greater the signal to noise ratio (SNR and aka C/N) needs to be. Fig 4 compares the SNR needed to receive four different digital modulations, including QPSK and QAM-64. Even though this analysis is looking at COFDM world, it clearly shows that QAM-64 is less robust than QPSK. I think it is very easy to envision that the QAM-256 modulation would carry an even greater SNR robustness penalty (requires 8 dB more of SNR for a good signal than QAM-64).

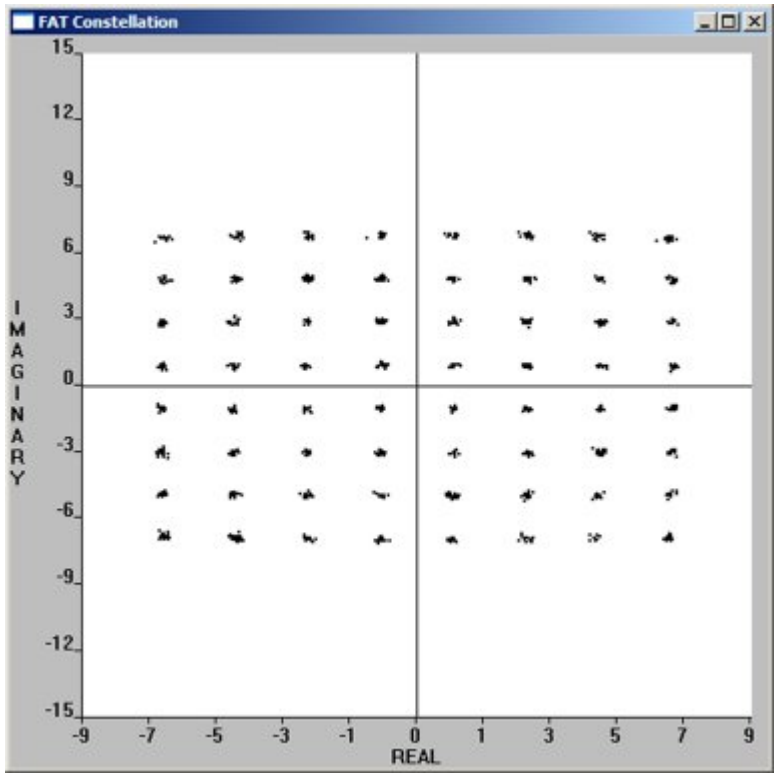


Figure 3 - The more complex modulation constellation of QAM-64 used in ITU-T_J.83B packs 6 bits of data into each symbol transition (courtesy of W6RZ)

ITU-T_J.83B Bandwidth

The ITU-T_J.83B standard defines the RF bandwidth as 6 MHz wide "channels". In a manner similar to DVB-S protocol, the RF bandwidth of an ITU-T_J.83B transmission is defined by its Symbol Rate (SR). That is:

RFbw = SR x 1.35 (roll-off factor)

So if we have a 6 MHz bandwidth, the Symbol Rate should be approximately:

SR = 6.0 MHz / 1.35 = 4.44 MSymb/s

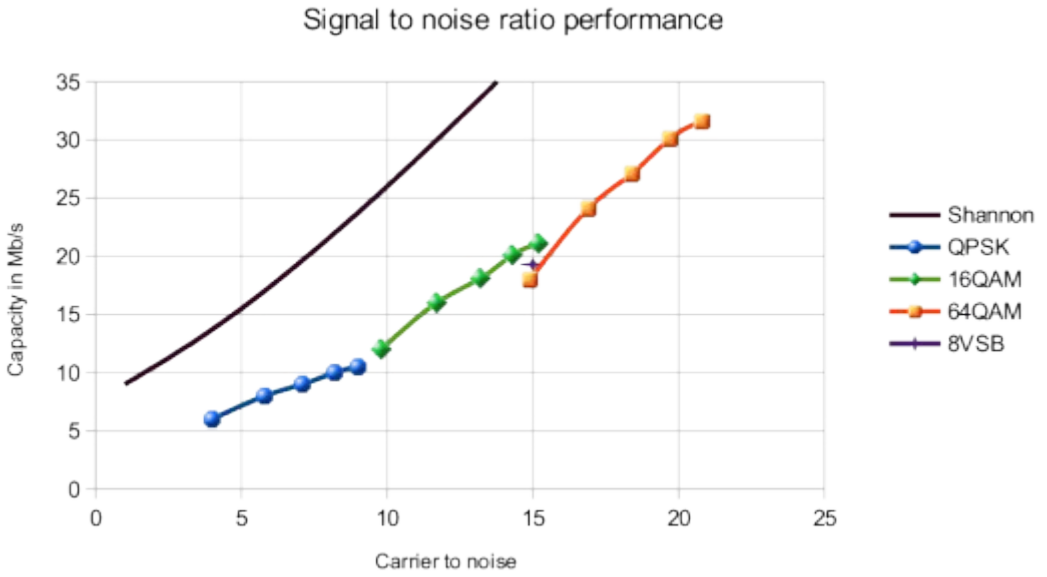


Figure 4 - A comparison of SNR of four different modulations including QAM-64 and QPSK shows the signal robustness penalty of complexity (courtesy of ZL1WTT)

The "gross data-rate" (that is: with protocol overhead) at this SR would then be ~26 Mbps. This is enough to carry a HD signal using MPEG-4 encoding with a "payload" data-rate of about 20 Mbits/sec.

The cable-ready TV receivers are set-up to receive transmissions on the pre-defined set frequencies. These channels are spaced 6 MHz apart. I have not heard of any hams being able to receive QAM-64 transmission bandwidths more narrow than 6 MHz on commercial TV sets.

Status of Ham ITU-T_J.83B DATV

One of the pioneers in US for DATV using the ITU-T_J.83B protocol is Jim KH6HTV. He participated in setting a DX record of 121 KM on the 70 cm band using QAM-64 modulation. Two ATV repeater groups in US have tested adding the ITU-T_J.83B protocol to their DATV repeaters.

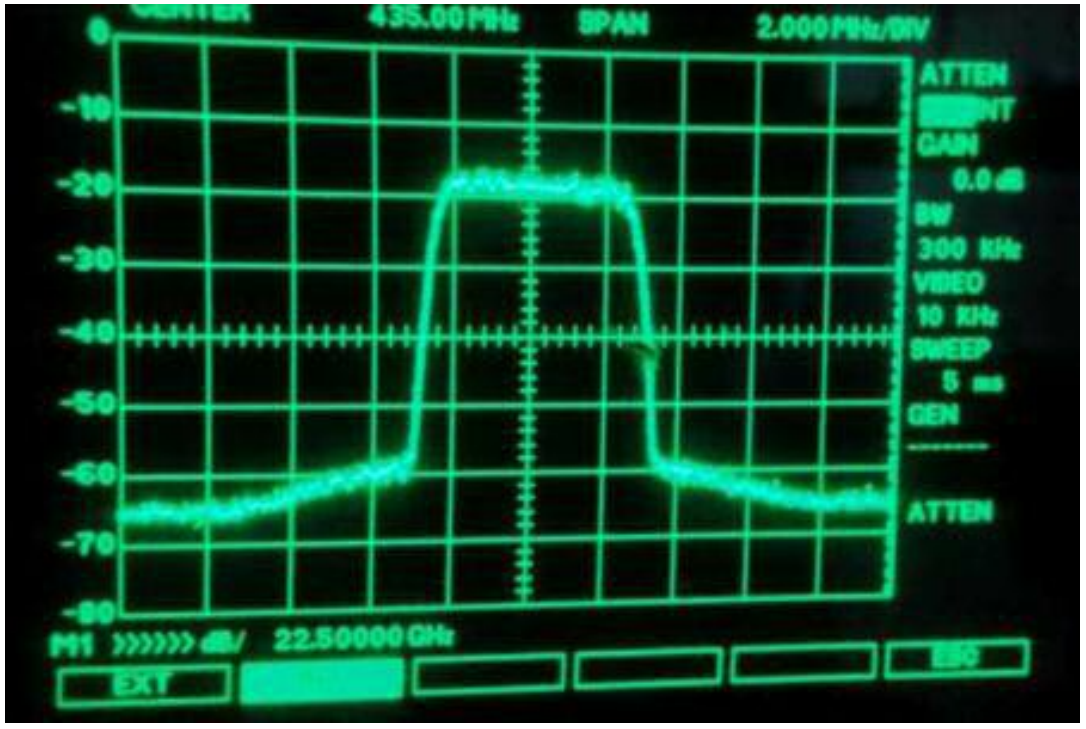


Figure 5 - A spectrum analyzer view of an ITU-T_J.83B QAM-64 transmission "haystack" on the 70 cm band (courtesy of WA6SVT)

The ATN group in Southern California tested a 70 cm DATV repeater on Mt Wilson, where uplinks were received via analog-ATV and downlinked using DATV as W6ATN. The ATCO group in Columbus Ohio (they installed the first DVB-S DATV repeater in USA in 2004) also installed ITU-T_J.83B protocol to their WR8ATV DATV repeater downlink on 70 cm.

When I first started preparing for this article, I contacted Mike WA6SVT of the W6ATN repeaters and also contacted Art WA8RMC of the WR8ATV repeater to get feedback and obtain their insights on using ITU-T_J.83B for a DATV repeater.

To my surprise, I learned that both repeater groups had stopped using the ITU-T_J.83B protocol and were installing DATV-T down-links. The W6ATN tests had signal robustness difficulty being received across the large Los Angeles basin into Orange County.

Art WA8RMC explained that nobody was using the ATCO ITU-T_J.83B downlink. Art went on to report that: "I could see the CATV QAM signal but even though a vertically polarized signal was being sent, I could only receive it with my horizontally polarized antenna". After some additional testing and assumptions we concluded, "The QAM signal suffers from multipath cancellation issues which is minimally accommodated in the receiver. Also, minimal FEC is applied to the transmitted signal because it is not needed when in a cable". ATCO concluded that because of multipath issues, DATV using this mode is not practical.

Jim KH6HTV has also redirected his DATV interests and activities to DVB-T protocol because "it far outperforms the CATV DTV 64QAM. I only used the QPSK modulation because of its superior receiver sensitivity. I found I was still able to transmit very acceptable, HD 1080p pictures using simpler QPSK compared to QAM".

Conclusion

The ITU-T_J.83B approach to DATV offers "easy appliance-like installation" for DATV and also offers the glamor of being able to transmit full 1080 HD video. But, the penalty of the higher C/N requirements of the QAM-64 modulation is too large compared to other now-available alternatives. I do NOT see ITU-T_J.83B protocol becoming a significant factor for DATV in the future.

Contact Info

The author may be contacted at W6HHC@ARRL.net

Useful URL's - see Page 16

The Summer of 1990

Trevor Brown

In May 1990 it was announced that the BATC BGM would be held at Harlaxton, near Grantham in Lincolnshire. The venue was the Brain child of Paul Marshall, and although nobody had ever held an ATV event at this venue before, Paul was full of enthusiasm. Little did we know at the time that this was going to be the best attended event the BATC ever held with free entrance for members.

The picture says it all, what a stunning venue

The gate revealed that 2,500 people attended the event and there is an interesting note in CQ-TV 148
"We are going to need volunteers as there are only 22 BATC committee members", it is interesting to read the back issue to see who the committee members were, some are familiar names.

First a little Harlaxton History

The construction of Harlaxton Manor was started in 1837 and completed in 1845 and is described as Elizabethan architecture. When the original owner died, The manor passed through several sets of hands and by 1935 it was abandoned.

It was purchased two years later by Violet Van der Elst, a businesswoman and inventor, who made her money from developing the first brushless shaving cream and made her name by campaigning against capital punishment. She restored the house and arranged for it to be wired for electricity for which the BATC is eternally grateful.
During world war II it was requisitioned by the Royal Air Force as the officers' mess and later used to house a company of the 1st Airborne Division. Today it is the British campus of the University of Evansville.

BATC were not the first television crowd to invade Harlaxton. It was the setting for many films:-

- *Australian Princess (2005) TV Series, Host Jackie O.*
- *The Young Visitors [sic]) (2003), BBC TV Christmas Special, Jim Broadbent, HughLaurie, Lindsey Marshal, Bill Nighy*
- *The Haunting (1999), Liam Nelson, Catherine Zeta-Jones*
- *The Lady and the Highwayman (1989) Emma Sims, Oliver Reed*
- *The Dark Angel (1987) Jane Lapotaire, Guy Rolfe*
- *The Last Days of Patton (1986) George C. Scott*
- *Little Lord Fauntleroy (1980) Ricky Shroder, Alec Guinness, Eric Porter, Colin Blakely*
- *Fall of Eagles (1974) Curt Jurgens*
- *Matushka (1973) Robert Aldous, Michael Deaconk, Lalla Ward*
- *The Ruling Class (1972) Peter O'Toole*

Enter the BATC

Brian Summers brought along his old BBC truck (remember Blue Bottle), a repainted , re-equipped BBC MCR 21. For those of you with long memories, it was used by the BBC for the Fanny & Johnny cookery programs, long in Televisions past, (whatever happened to cookery programs....Don't ask)

Paul had a large bus back in those days (again don't ask) which he set up with an exhibition of Marconi Camera heads through the ages.
There were various microwave TV links and copious numbers of traders selling all the things you would expect to find at these sort of events, augmented by a car boot selling area for the bargains, or just or to offload the things you bought at a previous event.

Blue Bottle and Pauls exhibition bus

There was a full lecture programme and BGM in the gold room, surroundings that would truly humble anyone.

The BATC accounts for the year 1990

Exhibition costs of £1470 and I suspect a large part of that was Harlaxton and to offset this, exhibition income was £1871 (remember members admission was free). Perhaps not the whole story, but one of the indications of the size of this event and its popularity.

Unfortunately it was back in the days of non digital photography and pictures in CQ-TV 151 do not do it justice, coupled with the print quality of the then A5 magazine. Not only did it raise funds it was the event people still talk about today, as their favourite ATV day out.

There is a full report by Jenny Hirons G7BQO in CQ-TV 151, which list all the activities, for me it was an event of events,

The ornate Cornices that gave the gold room its name.

never to be equalled and I suspect something we will never see the likes of again. My thanks to Paul Marshall, you really did us proud.

I am only sorry that more pictures from the time have not survived

http://www.movie-locations.com/movies/h/haunting1999.html#.VB_gw_RDt8E

http://en.wikipedia.org/wiki/Harlaxton_Manor

http://www.ueharlax.ac.uk/manor/

http://www.batc.org.uk/cq-tv/archive/1990.html

Useful URLs from DATV Talk 11

ATCO - Amateur Television of Central Ohio:
www.ATCO.tv

British ATV Club "Digital forums":
www.BATC.org.UK/forum/

CQ-DATV online (free monthly) e-magazine:
www.CQ-DATV.mobi

DATV-Express Project for DATV:
www.DATV-Express.com

DigiLite Project for DATV (derivative of the "Poor Man's DATV" design):
www.G8AJN.tv/dlindex.html

KH6HTV Application Notes
DATV with ITU-T_J.83B and DVB-T:
http://KH6HTV.com/application-notes/

Orange County ARC entire series of newsletter DATV articles and DATV presentations:
www.W6ZE.org/DATV/

TAPR Digital Communications Conference proceedings (free downloads):
www.TAPR.org/pub_dcc.html

Yahoo Group for Digital ATV:
groups.yahoo.com/group/DigitalATV/

Simple Microwave Detector for 10GHz

John Hudson - G3RFL

We first learnt about detectors years back in the past when communication was by letter and could take weeks to get data from A to B.

How to Detect RF

First was a coherer which was a glass tube full of sharp iron filings between two probes. On the presence of RF, they aligned themselves and created a short across the terminals. However on the RF being stopped they still shorted out until the tube was tapped by anything that vibrated, known has a de-coherer. Thus CW was born.
A more sensitive detector was required so then a vacum tube detector was born during the start of the valves/tubes days, before semiconductors.

But today we do have semiconductors and it's in this field I am interested in generating a voltage due to RF and at a certain load resistance of 50 ohms.
The reason is to make a Microwave Power Meter, in this case up to 5W

Power is the square of the voltage measured times the termination, in our case 50 ohms.

So we are looking for a diode that has a low forward voltage drop and can withstand a reasonable reverse voltage.

The power is terminated in a dummy load and the detector senses the voltage across it. 5W is a lot so it was best to distribute much of the power by adding an attenuation pad in front of the detector, say 6 to 10dB, thus not blowing the socks off the detector diode. After building several of these to try and see what was required, it finishes up I need a low capacitance diode with a low voltage drop. So I started out with a HSMS-2822 Schottky device with two diodes so we get full wave rectification of the RF. I soon found that I needed lots of values of decoupling caps with short leads, this then led on to using smd components.

Now on V5 of the power meter and I do not want standing waves on the device so its correct over a wide frequency range. First I tried FR4 D/S PCB and lots and lots of links through the PCB. At one time I even tried nuts and bolts and its input was SMA.

V8 - Now I have tried and had some success using a waveguide detector and sender with conductive material in-between to absorb the RF but let enough get through to the microwave detector.

The RAM material (RADAR Absorbent Material) was up the sealed Waveguide which burnt and put itself out, now it's just a charred mess.

This was too messy and had other problems.

The answer was to buy a 10dB attenuator (2 watts) on Ebay. A nice little brass unit, SMA in SMA out and about 10mm dia.

So we now have the power down by 90% and I fed this into a Microwave SMA Waveguide sender (actually an "N" adapter), then coupled that into a Waveguide detector. This will measure the peak V so it needs turning down by 0.707 to get the mean value. As shown in the photo from the Tx, I know I have just under 4W of RF and my detector reads 5.6V, so div that by 0.707 we get 3.9V and this works out to be +25dBm.

So the actual RF must be about +35dBm, under 4 watts, which is what I expected allowing some cable losses. It was near enough and I can now zoom in and see real RF levels on my 5W Power Meter. NOTE - at 5W you will have to restrict the time its on for otherwise the attenuator will over-heat, but you can get 1dB, 2dB, 3dB attenuators to get rid of the heat. I made a brass heatsink to slide over the 2W attenuator and it does get warm after 30 mins, about 30 Deg C. Oh, I had to turn the Detector Diode around to give a plus voltage output. Not sure about this being 100% linear but it does give a constant level to tune things up to as a Reference.

DATV-Express Project - September update report

By KenW6HHC

As predicted at beginning of September, September was a very busy month for the project team. Charles G4GUO presented at the BATC CAT14 gathering on Sept 7. Ken W6HHC provided a DATV-Express presentation at TAPR Digital Communications Conference (DCC) on September 05 in Austin, TX and a second presentation on "Recent Advances in Digital-ATV" at an ARRL Convention on Sept 13, in San Diego. Art WA8RMC had his article on DATV-Express published in the October QST magazine of ARRL.

Quite unexpectedly, BATC presented the GRANT DIXON AWARD for the most innovative contribution to ham radio ATV, to the DATV-Express Project team. The Project Team is honored and quite proud to have been selected for this award. As Ken W6HHC likes to point out, an interesting point is that none of the project team members have ever met another team member "in person". All project discussions and efforts are conducted by simple e-mail or SKYPE sessions, the internet is amazing!

The team made a difficult decision to clean up some bugs on the PC software BEFORE completing the ODROID effort. The team confirmed that the current DATV-Express v2.02 software did not work well on old DVB-S STBs with small buffers. After a few minutes of transmission the PCR timing re-calculations (needed for the old Hauppauge PCR jitter problem) could fall outside the STB buffer capacity, causing the received video to go blank-or-freeze, or causing a "popping" sound on audio. Newer DVB-S receivers with large buffers (like my SatLink) never exhibited this problem. A new draft of v2.03 software debian has been tested and is ready to be posted on our web site. BTW - previous suspicions that

The Grant Dixon award

SDT and PAT PID default values were causing the HV110 DVB-T receivers to rejects these PIDs values and declare"NO SERVICE" were incorrect. But, we are now waiting for feedback by alpha-testers who had the problem before release. Worst-case, we will begin to publish the new v2.03 software and README on Oct 09.
The changes made in v2.03 include:

- *Version 2.03 now can also run on Ubuntu V14.04 LTS 32-bit and 64-bit OS.*
- *Solves a PCR timing issue on old STBs with small buffers to freeze/blank video.*
- *Solves a software bug in v2.02 that prevented some*

Hauppauge model PVR-150 units with composite camera video from working correctly.

- *Allow table values for the network_id field and the STREAM field to be user adjustable (the real HiDes HV-110 issue).*

Finally, HiDes has updated their HV-110 firmware to eliminate the compatibility issue and DATV-Express v2.03 has been tested with old HV-110 DVB-T receivers to assure that the issue is resolved on older HV-110 units, too.

The ODROID U3 debian package build for general public of DATV-Express turns out to be more difficult to prepare than expected. Charles G4GUO explained that the utility that he uses to build a .deb package, seems to miss a lot of required software installs when the user tries to .deb install on ODROID U3. Each of these"install exceptions" can be performed with good instructions, but are a bit error prone. To make matters more complex, Charles purchased an ODROID U3 with the emmc memory option that is essentially NON-removable. So, Charles can not experience a "new user" environment anymore because he can not clear all memory and try it again. The solution for the team is that Ken W6HHC will use his ODROID U3 that uses a removable micro-SD memory and can be cleared to start all over again. Ken now has his ODROID U3 up and running and has now practiced doing fresh downloads of Ububtu for ODROID on to a cleared micro-SD or copying a useful "standard" image from one SD to another in order to have spares available if one micro-SD gets 'bricked".

The plans for October is to have Ken to test the draft .deb package builds for ODROID U3 flavor of DATV-Express (for ARM) and start preparing a draft of the User Guide focused on ODROID. In our spare time, we will post the v2.03 for PC builds of software and documentation on the web site.

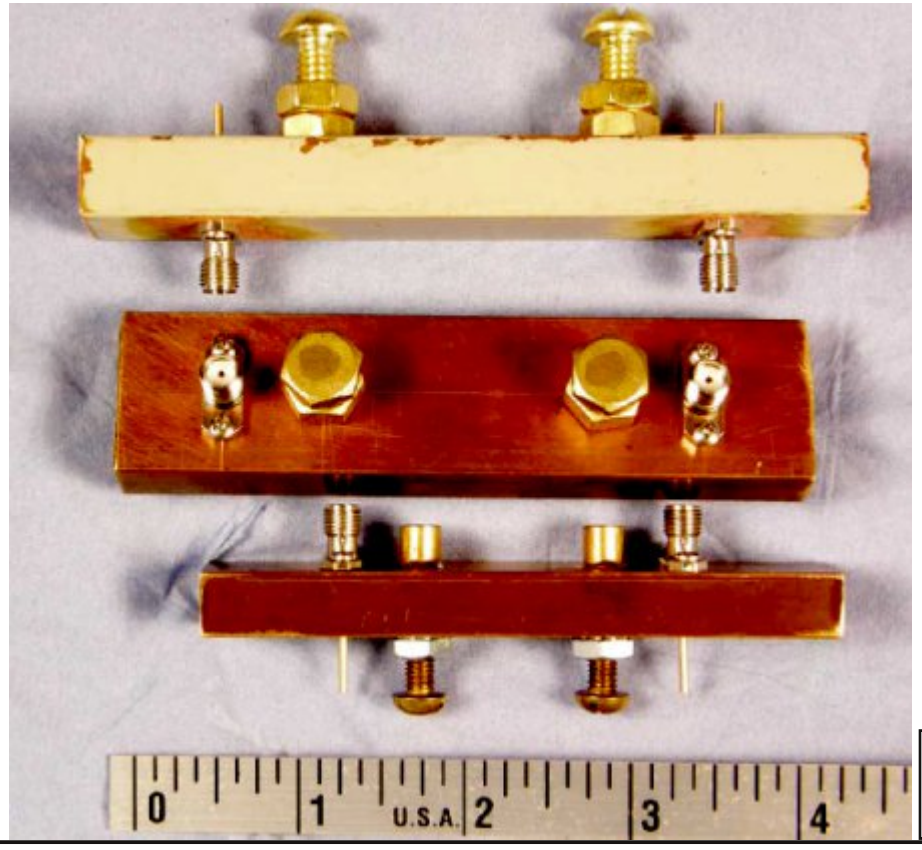
"full speed ahead" de Ken W6HHC

The Construction of 10 GHz Evanescent Filters

by Alberto IW5ECU and Fabrizio IW5BDJ

Translation done by Professor Lita Windland University of Bristol

Some years ago I was looking on the internet for ideas as to how to make some simple microwave band-pass filters that could be easy to produce without too many mechanical problems. I then came across some articles by Paul Wade W1GHZ, who devised some band-pass filters in 5760 and 3400 MHz, as well as some using lower frequencies, using the 'evanescent mode filter' technique



I was immediately intrigued by the simplicity of their construction and their small size compared to the normal resonant cavity filters and I then tried to understand how they worked. What does this technique consist of?

Starting from the premise that it is not possible to transmit frequencies that are below the cut-off frequency of a waveguide, it is possible to 'force' this lower frequency to 'pass' by inserting, after the input, a series of screws in the guide itself, making each little part of the guide resonant in between the screws. This way the signal proceeds in the guide to each screw in sequence. The screw tunes the small bit of the guide and so on till the output.

It is sufficient to move slightly the tuning of each of the single screws, to obtain the band width required.

As evident, compared to 'iris type' filters, the mechanics are much simpler.
All that is needed is to position the screws appropriately on the guide to obtain the required frequency. The enormous advantage is that the size of filter required is drastically reduced, compared to the filters made in guides of the correct frequency.

Furthermore, as already mentioned, the mechanics are far simpler.

Some time ago I bought a 5760 MHz evanescent-mode filter on EBay; when it arrived I found it to be far smaller in relation to the frequency for which it was made.

This spurred my curiosity and wish to create something similar with higher frequency.

Figure 1 - Left - Evanescent-mode filters for various frequencies from articles by W1GHZ

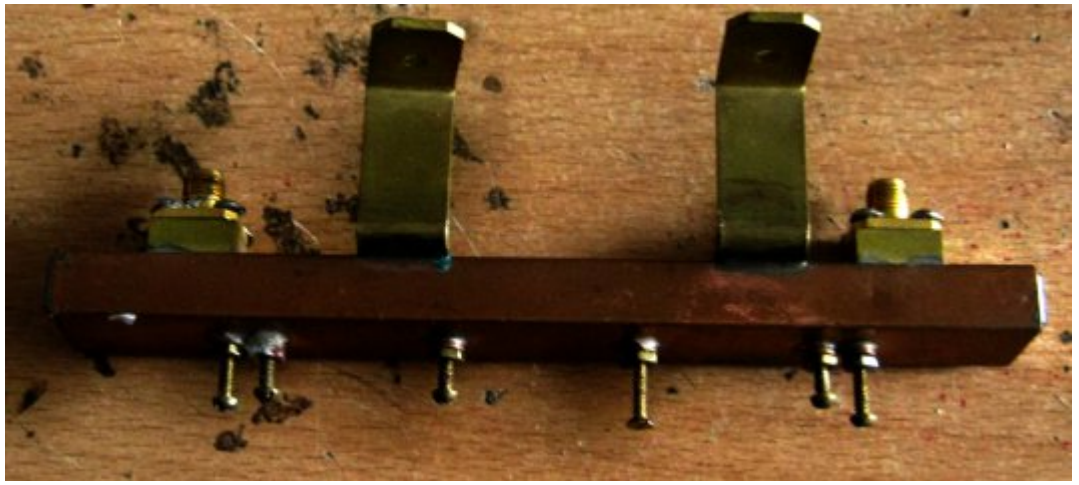


Figure 2 - Filter purchased by Alberto IW5ECU 5.7 GHz from eBay

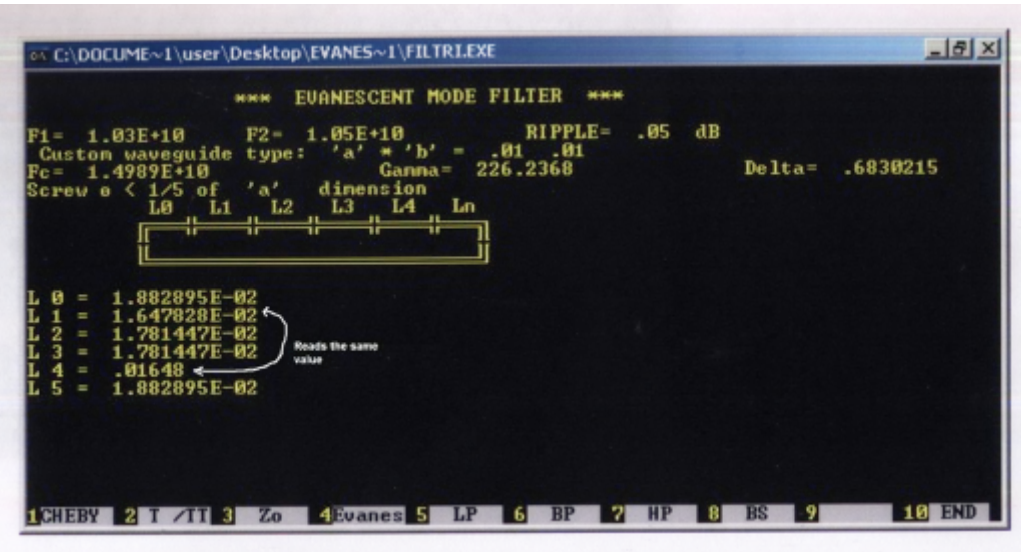


Figure 3 - The programme for the filter execution

I have to thank Sergio Mariotti nonetheless for the crucial help provided. Thanks to his publication of 1955, found in internet at this link http://www.ira.inaf.it/Library/rapp-int-2004/208-95.pdf, I managed to track him down and he very kindly provided me all the data with the right formulations and the programme to produce this type of filter even at 10 GHz.

With Fabrizio's (IW5BDJ) help, who has produced a prototype simply made utilising two thin copper sheets folded at 90 degrees and soldered together so as to obtain a square tube of 1 cm sides and 11cm length, we have already obtained good results also in line with the calculations made using formulae from Sergio Mariotti, who by the way is also a radio enthusiast going as IK4DUY.

From measurements taken from the same filter at slightly different frequencies (10390 and 14800 MHz) and with two types of instruments, Alberto's and Fabrizio's totally different instruments, two noise generators and two types of spectrum analysers, one Tektroniks and one HP, what has resulted is that the filter has the same curve and an attenuation of 6dB with both sets of instruments.
Considering that the construction of the filter does not take into account neither the roughness of the material nor the treatment which should be at least silvered if not gilt we can say we are satisfied with the results.

Following are photographs of the copper filter and the curves obtained with both sets of instruments.

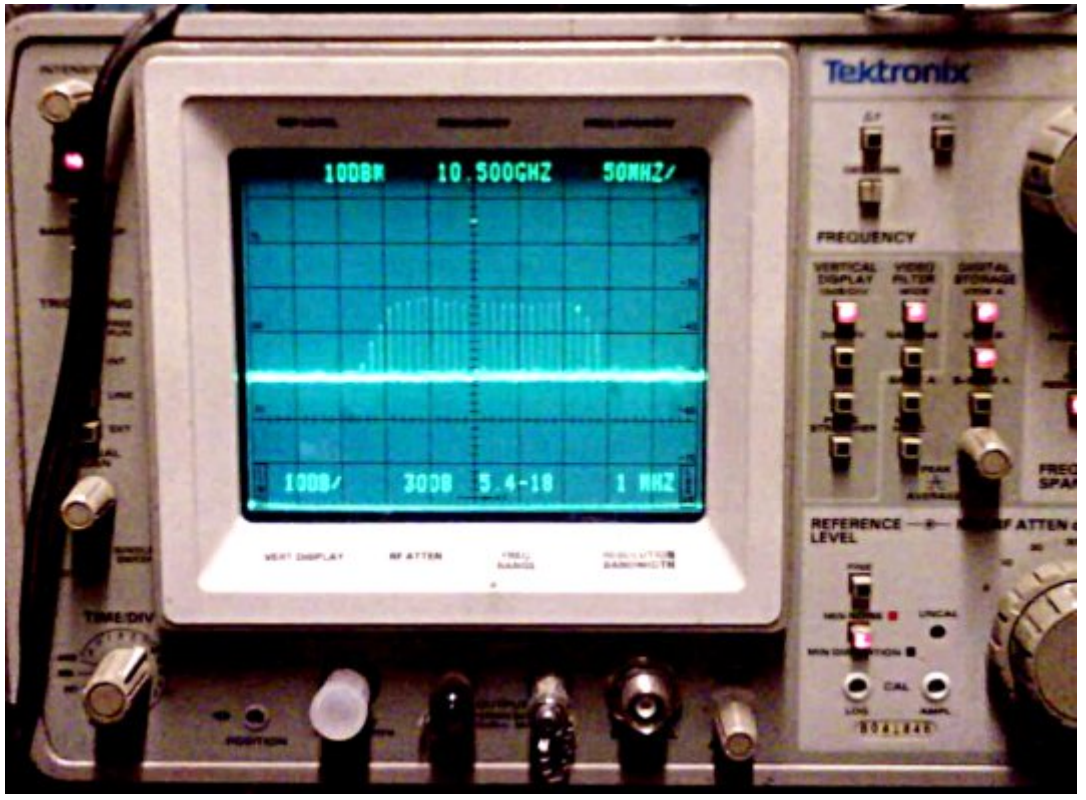
Figure 4 - Filter made by Fabrizio IW5BDJ

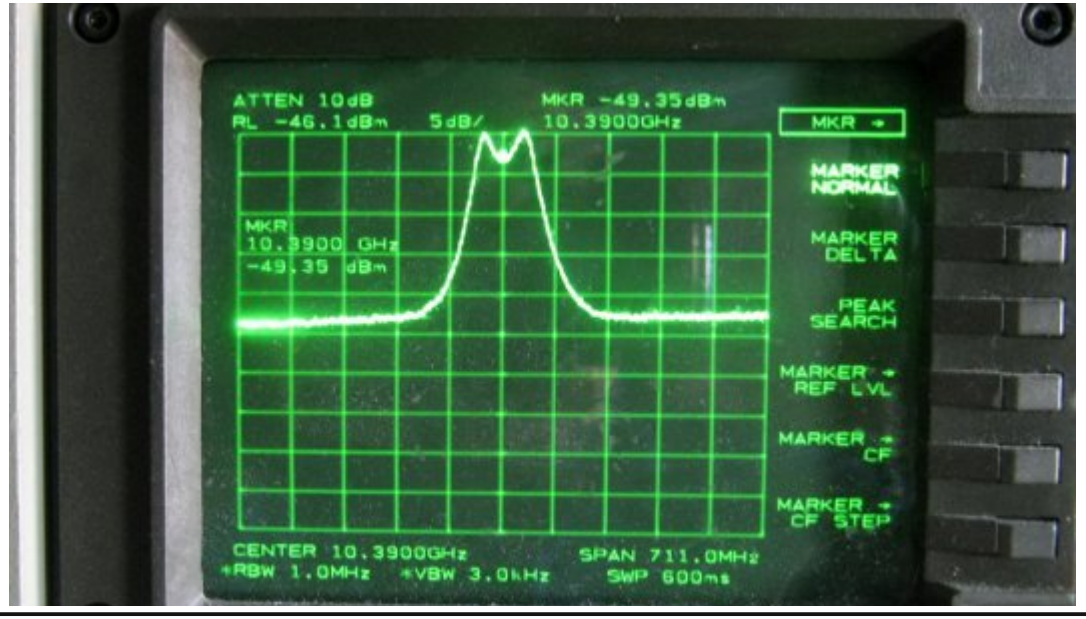
Figure 5 - Left - same filter front view

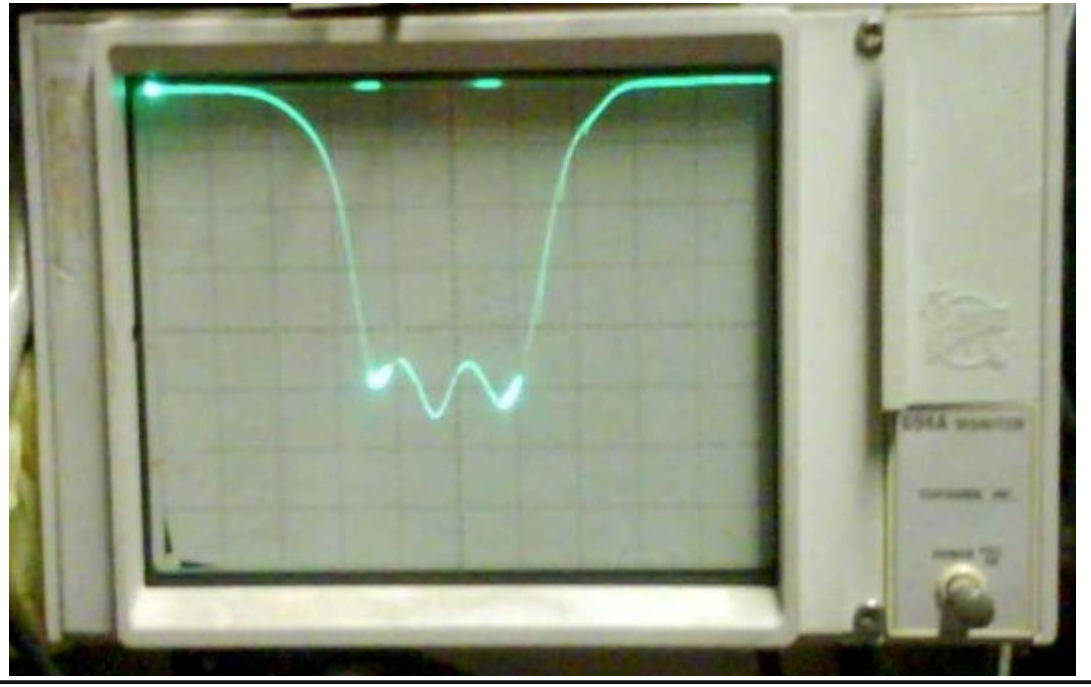
Figure 6 - Below left - Curve obtained with Alberto's IW5ECU instruments HP Spectrum analyser

Figure 7 - Right - Curve obtained with Fabrizio's IW5BDJ instruments Tektroniks Spectrum analyser

Figure 8 - Below right - Filter curve first version, obtained with Fabrizio's Sweep HP and Tektronics analyser at higher frequency







I have now acquired a square tube made of 1mm brass and I hope to have an even more precise result.
At the moment we are making two new filters with this new tubing.

Figure 9 - The new brass filters under construction.

Once construction is complete, new measurements will be taken.

The new filter manages to achieve a bandwidth of approximately 100Mhz and a limited loss of 3-4dB, better than the other for sure because of the less rough material and its uniformity of size. Unfortunately we cannot silver plate at hobby level, but it would be interesting to assess the differences that would no doubt be there.

A slight undulation of the curve is surely due to the maladaption of impedence between entry and exit cables and the connectors.

This undulation is fairly pronounced and could be a nuisance if using the filter for systems that have to have a certain linearity.

To lessen this undulation and therefore adjust the impedance, it has been proven experimentally that putting a

Figure 10 - The various pieces of HP and Tek equipment

screw opposite to the connectors, it reduces to the point that with a little patience a flat curve can be obtained though with a slight loss.

Even the sides are rather steep, we can say that the filter is perfectly suited to amateur level use to filter in this case a channel or more of digital ATV coming from a mixer of 10000 Mhz+480 MHz. The sum product of Mixer, 10480, passes directly while a signal 10000-480 MHz, 9520 MHz, has a very strong attenuation of over 60dB. Naturally with different measurements it is possible to also construct a band-pass filter for 5700 MHz. The characteristics remain unvaried, and in fact the lower the frequency the less notable the small errors of mechanical construction.

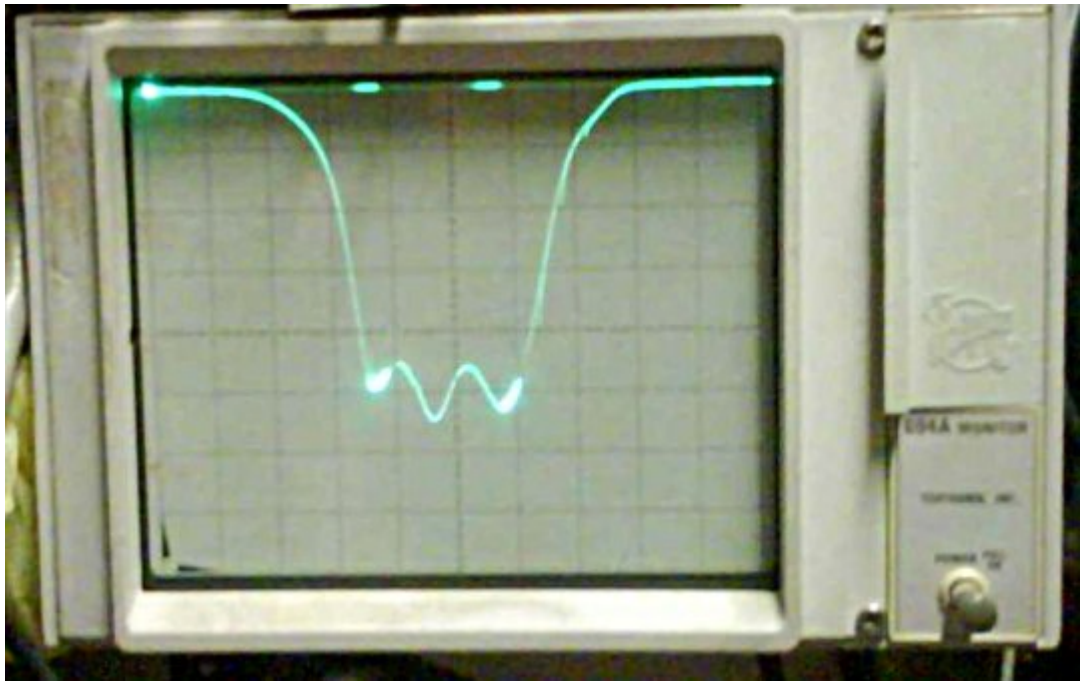


Figure 11 - The undulation of the curve prior to adaptation of impedance.

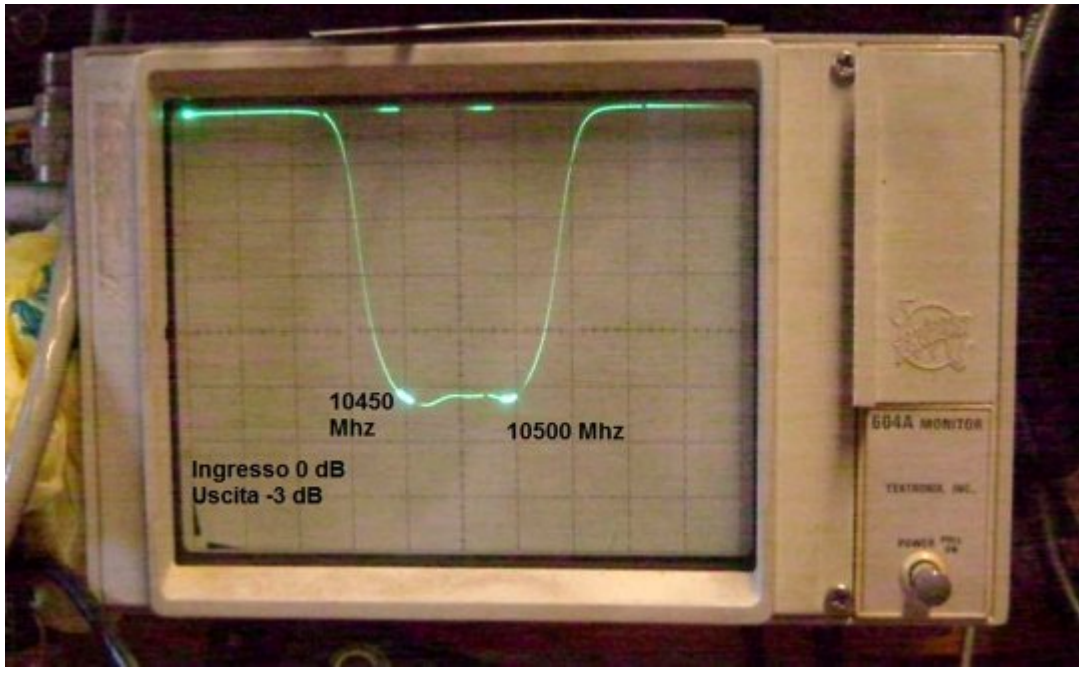


Figure 12a - Above - The curve after adjusting impedance using a screw opposite the connectors

Figure 12b - Below - The new adjusting screws

Figure 13 shows the 10 GHz evanescent-mode bandpass filter being used in the construction of a DVB-S repeater. This construction uses 480 MHz to form the RF signal then mixes that signal with a Local Oscilator (LO) of 9990 MHz using the mixer shown in the gray box. The evanescent-mode bandpass filter removes the unwanted image at 9510 MHz, while passing the desired mixer output at 10470 MHz.

This article's author is Alberto Ciampa IW5ECU (Torrita Siena), the measurements for the filter construction have been taken from the programme of Sig. Sergio Mariotti IK4DUY of the Istituto di Radioastronomia INAF (www.ira.inaf.it), who has allowed their use for amateur use. The build, initial measures and final adjustments are the work of Fabrizio Bianchi IW5BDJ (Siena). All the tests were carried out with different instrumentation in two different locations, Alberto's and Fabrizio's house with HP and Tektronix

instruments. The results from the different tests came out more or less the same, that is within the limits of the small differences in calibration of the instruments themselves.

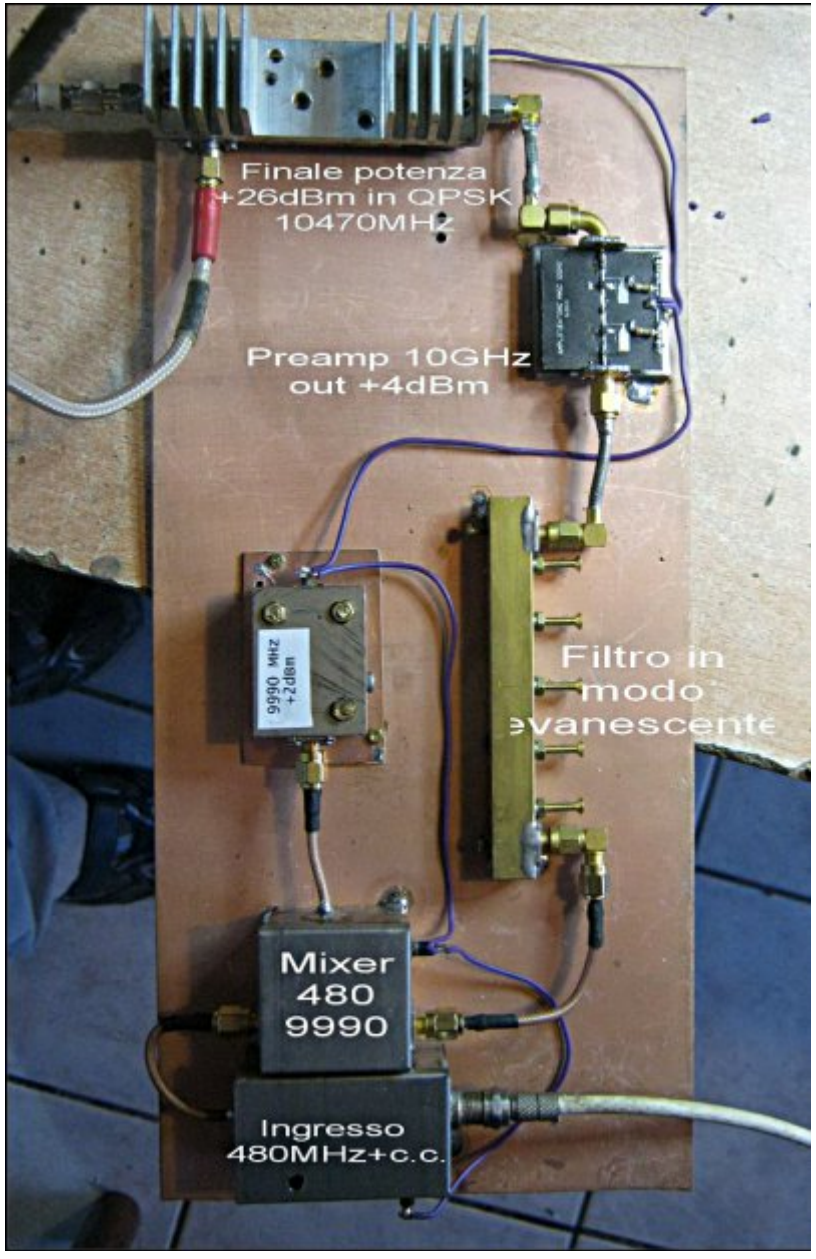


Figure 13 - This construction of a DVB-S repeater uses the 10 GHz evanescent-mode bandpass filter

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Now For Something Just Slightly Different

ITV Westcountry Studios Plympton South Devon

Mike G7GTN

The ITV name and brand is sure to be quite familiar to people that live in the UK. ITV Westcountry as a regional broadcaster was born out of the television ashes of TSW (TV South West) from the old Derry's Cross Studio complex in Plymouth which put in a bid to continue with the regional franchise but lost this in the somewhat controversial 1992 ITC bidding war. TSW were also themselves born out of another regional predecessor called Westward Television which started in 1961. ITV Westcountry finally went on the air on 1st January 1993 transmitting the very first programme from a converted industrial unit on the Language estate in Plympton. All presentation control switching was handled by HTV Wales in Culverhouse cross. In 2009 with the pressure within the whole ITV network to save considerable costs due to major advertising revenue drop, it was announced that it would be closing with the loss of over 85 jobs across the whole spectrum of talent and the final loss of the whole facility. Now our own regional segment of the television news is presented from the ITV West studios based some 120 miles away in Bristol. Some further quite informative background on this story is available from a programme made by our still local BBC Plymouth under the "Inside Out Programme name" http://www.youtube.com/watch?v=2voLvApwLo0 I have only watched our so-called local news twice since the transition, as does not quite work for me.

Whilst driving past the old studio one day, I noticed that some work seemed to be going on, so we stopped and asked if we could have a little look around. Some thirty minutes later we finally got the go ahead with strict health & safety instructions. You could actually really feel the sadness of the building; we were totally struck by this, easy to picture the previous excitement and busy activity that had happened over what is a relatively short time frame of only some 16 years in television history for this studio complex. It was a shell with little left, bar some minor technical equipment. The main and actually only studio area was still complete with the gloss black painted floor. A few wall mounted patch boxes scattered around for CCU and sound deadening panels on the walls.

The Original franchise holder before 1993, Television South West Studios in Derry's Cross

Inside the one and only studio

During our visit found no living evidence of the Bastian of Westward TV and later TSW, that of the children's favourite, Gushoney Bun (real name Augustus J Honeybun) puppet character. Further more detailed information on his exploits can be found via the link
http://en.wikipedia.org/wiki/Gus_Honeybun

In its time the complex was acknowledged to have had some of the most advanced communications and integration systems of any regional facility, including several 34 megabit CODECS installed.

It is pleasing to be able to report that a new company are

Studio floor camera patching

now operating from the old Westcountry TV studios, alas with no connection in television or video production though. So for us, ITV as a regional broadcaster finally ended with one last fade to black in 2009 after a 48 year continued joint history from three separate IBA franchise holder companies in the City of Plymouth. Each one having an individual branding, different methods & ways of working but the same driving passion and vision to deliver an exciting product for us sat at home, the television consumer.

More pictures on the following pages.

Main visitor reception area.


DANGER
415 volts
71
73
DANGER
415 volts

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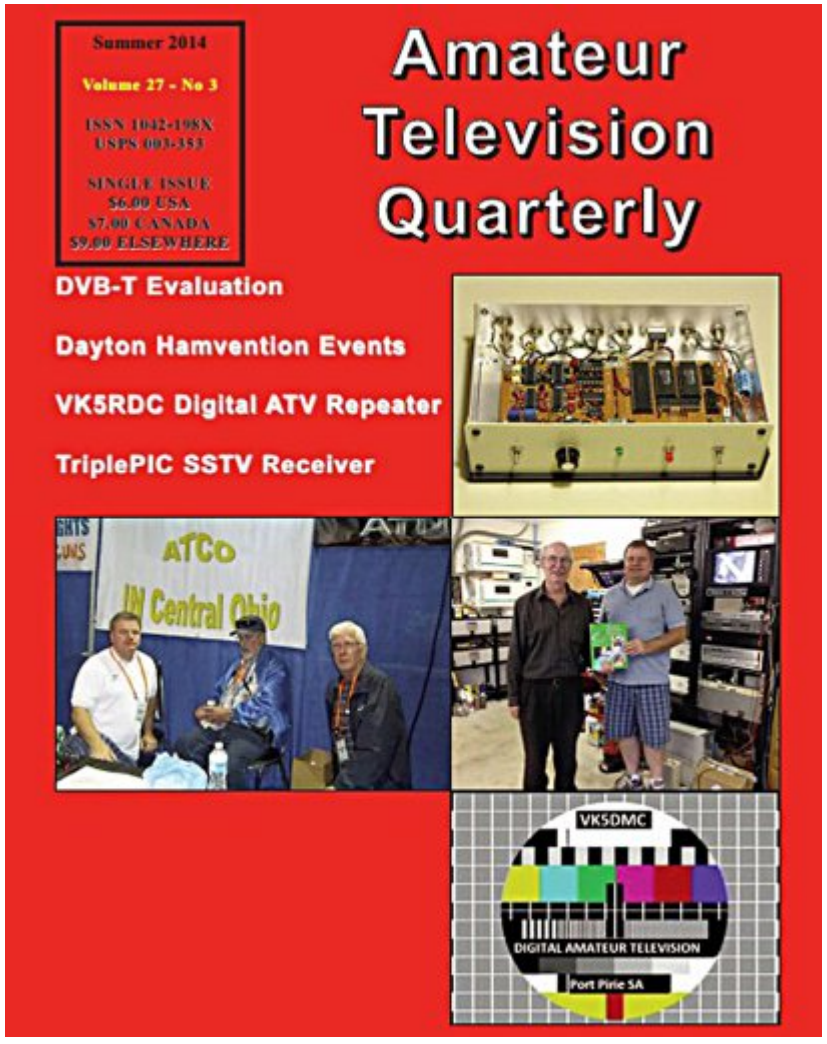
Images should be in PNG format if possible and the best quality available. Do not resize or compress images, we will do all the rework necessary to publish them.

If you are sending a construction project, please include the dimensions of any pcb's and make the pcb image black and white, not greyscale.

CQ-DATV reserves the right to redraw any schematics and pcb layouts to meet our standards.



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