In this issue

The CQ-DATV editors gratefully acknowledge all those authors that have contributed articles for this free magazine.

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Editorial

Welcome to CQ-DATV 80

This month we seem to have predominance of articles with a retro feel. Ian may be responsible with his choice of "one from the vault" where he turns the clock back to issue number 6 and explains why we have CQ-DATV and why it is in electronic format only.

Ian as editor had already taken CQ-TV from an A5 publication to a A4 format and full colour, using free public domain software.

His final step was to create an electronic distribution. Popularity with the members for this electronic format grew until over 90% of the magazines reader received this format magazine only, just as well as printing costs were on the increase and this was the only solution or raise subscriptions.

Ian could go no further and left the BATC committee to start what is now called CQ-DATV and run something that everyone could benefit from. CQ-DATV was designed as a platform along the lines of social media so that everyone could share their work. This meant it had to be a free publication.

A subscription would involve policing on how funds were to be spent, that would put us back into the committee loop and as Ian said even if the tasks were background tasks , they have a habit of becoming foreground tasks. If its free then as Ian explains all hands can concentrate on the job in hand, producing CQ-DATV.

Ian has added a postscript of facts that have emerged, 17,818 downloads (excluding ISSUU readers) for the following issue (CQ-DATV 7). This shows what can be achieved if we get it right.

Ian's not the only person looking back Trevor has explained where the VCR came from, the development stages and the problems of VCR to VCR copies, which had more than analogue degeneration to contend with.

John Gebuht WB0CMC completes the journey with something all those of us that have used AM modulation for TV pictures, "how to AM modulate the MHW707-2". Perhaps the cost of the modules is now low enough to consider dissecting one, but back when AM was flourishing it would have been either a brave or a rich man to consider this surgery.

Just to show that we are in the digital age Trevor has progressed his GVG source code and added an LCD status display and camera tallies to his panel. Its uses BASIC code, but as Trevor says it is just semantics around which syntax you prefer.

Jim Andrews KH6HTV is exploring bandpass filters for 23cms as a solution to a radar problem. These filters have their problems, but when you have a world-wide recognised expert and designer of microwave filters, Dan Swanson WB9AIA on the team well, need we say more.
To show we are looking at the future too we have the inside track on ATSC 3 and ask is it the future of broadcast TV, particularly with worries over the Direct TV satellite which is in trouble at the time of going to press,
Welcome to CQ-DATV 80 please sit back and enjoy, but consider contributing, and remember this is a platform for you copy.

CQ-DATV publication team

W0BTV History

W0BTV is the new club callsign for the Boulder Amateur TV Club.

When researching available calls this past summer, we were surprised to find such a suitable call available. BTV = Boulder TeleVision. We figured that it must have recently become available again due to a silent key.

On Christmas eve, I worked an old timer, Joe, W7ISJ, in Tuscon, AZ, on 80m AM phone. He said he remembered working in years past on AM phone, W0BTV.

This kindled my interest, so I googled "W0BTV" and did get some "hits". I found that the earlier call 9BTV was held in 1922 by Alex Quirk in Livia, Kentucky. In 1923, it was held by Russell Anderson, in St. Paul, Minnesota.

Russell's transmitter put out 5 watts into an inverted L at 48 ft. Even more details about Russell are found at *http://w0is.com/history/9BTV.html* including a copy of his application to the Dept. of Commerce, Bureau of Navigation, Radio Service with a complete description of his amateur station, including a sketch of his antenna. There are also copies of some of his QSL cards on this site.

The call 9BTV eventually was changed by the govt. to W9BTV, and then after WWII with the reorganization of call districts, became W0BTV.

From the 1954 Call Book, our new call was then held by Claude Sweger right here in Colorado. He was listed as living in Yuma. The 1960 call book showed Claude to then be in McCook, Nebraska. W0IS says that Claude later relocated to Corpus Christi, Texas.

With further research, I found that Claude graduated from the Lone Star high school in Yuma, Colorado in 1924. There were 12 in his class. Thus we are least keeping the call sign, W0BTV, at home again here in Colorado.

Claude - W0BTV

Source: Boulder Amateur Television Club
http://www.kh6htv.com

Great Program for Filter Design

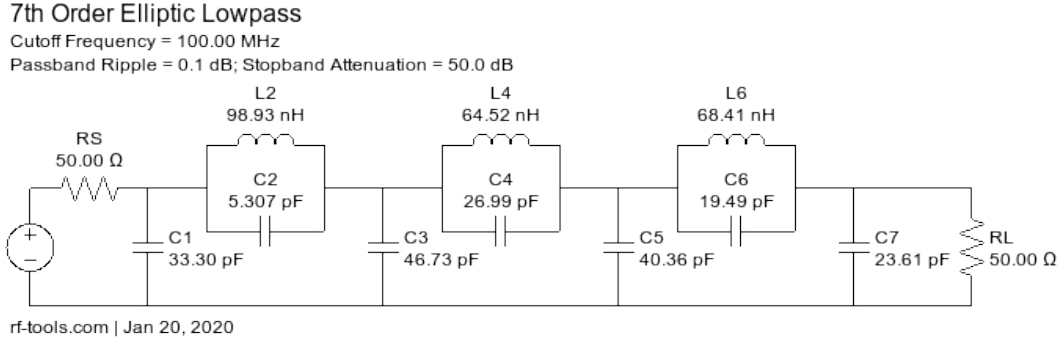
I have discovered a great, FREE, on-line, filter design tool.

It calculates L-C filter circuit values for low-pass, high-pass, band-pass, or band-stop responses.

You have a choice of Chebyshev, Elliptic, Legendre, Butterworth or Bessel filter types, with filter orders up to 20, and arbitrary input and output impedances. You can also chose to have the results in exact values, or in standard EIA, 5% component values.

After entering your desired design parameters, clicking on the "Compute" button, the program immediately displays the schematic diagram with component values. It also displays an inter-active graph of either Insertion Loss & Return Loss, S-Parameters, or Phase and Group Delay.

Moving your mouse cursor over the traces on the graph gives a readout of the parameter value and frequency.



Check it out at: *https://rf-tools.com/lc-filter/*

Source: Jim Andrews, KH6HTV

Going, going, GONE?

DirecTV fears that one of its satellites in orbit might blow up soon, and it's gearing up to move it to safety. Due to a problem with the satellite's batteries, the satellite might burst apart at the end of February. If it did explode while in its current orbit, there's a chance it could damage active satellites nearby, which is why the company would like to get it out of the way.

The satellite on the verge of bursting is Spaceway-1, a vehicle built by Boeing launched in 2005, as first reported by Space News.

Spaceway-1 has been orbiting along a path known as geostationary orbit, 22,000 miles above Earth. There, satellites match the orbit of the planet and appear to hover over the same patch of sky at all times.

For most of its life, the satellite provided high-definition television coverage. But it has recently been used as a backup, so it hasn't been providing any coverage for customers.

Apparently, something happened to the Spaceway-1 satellite in December that caused "irreversible" thermal damage to the vehicle's internal batteries, according to a filing DirecTV sent to the Federal Communications Commission.

Because of this damage, Boeing decided that the batteries could burst when they're in use. DirecTV has been avoiding using the batteries by relying solely on Spaceway-1's solar panels to gather power. But soon, the satellite will enter eclipse operations — when it is within Earth's shadow — and the batteries will have to be used.

"Use of the batteries during eclipse is unavoidable and there is no ability to isolate damaged battery cells," DirecTV wrote in its FCC filing. "The risk of a catastrophic battery failure makes it urgent that Spaceway-1 be fully de-orbited and decommissioned prior to the February 25th start of eclipse season."

With eclipse season looming, DirecTV turned to the FCC to get permission to move the Spaceway-1 satellite earlier than planned. When it's time for satellites in the geostationary belt to be retired, they're moved to a higher orbit known as a graveyard orbit. Satellites in this area, 300 kilometers higher than geostationary orbit, are far enough removed that they are usually no longer a liability to active satellites. But in the case of Spaceway-1, making that move is complicated.

Typically, satellites are supposed to get rid of all their propellant before they move to the graveyard orbit. But because of the explosion risk, DirecTV doesn't have time to empty Spaceway-1's tank entirely. The company noted in its filing that only a "nominal portion" of the 73 kilograms of propellant within the satellite and requested a waiver of the rule.

Ultimately, the FCC granted DirecTV this authority on January 19th. The company is also looking at other ways to minimize how much propellant is on board Spaceway-1 before it's moved, according to the FCC.

In the meantime, none of DirecTV's customers need to worry about this potentially explosive satellite. "This satellite is a backup and we do not anticipate any impacts on consumer service as we retire it," AT&T, the parent company of DirecTV, said in a statement. "We are replacing it with another satellite in our fleet."

Source: Microsoft News.

My look at the ATV.

The greatest success in ATV was in analog. After the analogue, digital conquered us. First DVB-S, then DVB-T, … We can't talk about progress, which has brought us digital. Digital is not very suitable for laptops, nor for contests. Digital has brought us new investments, which have not given the expected results.

Now who calls the "satellite"?

The satellite is a ....? What about progress? And a new hole to put money in? To me, personally, the satellite does not attract. I don't know English. I believe that the contests are still divisive and that working through repeaters, and the satellite and a repeater, is not a step in the future ATV. We have an ATV repeater, which works in analog and also in DVB-T. Not all ATV frequencies are occupied but it works and satisfies several of us.

In the past years we thought of connecting the Slovenian ATV repeaters but the difficulties of the terrain and the disposal of the repeaters (Before there were about 11 repeaters, now only two.) Have precluded this project. The Austrian friends invited us to join their project, to connect the repeaters via the internet, which we have not accepted. The idea of connecting Slovenian RAs via a repeater is today more feasible if we take the satellite as the central element. My idea is to implement our RPT with a new TX to transmit on the satellite. For the accommodation we should all have their own RX. The expense would be a little more contained but a new segment of the world would also open up for those who, like me, have no intention of selling me to the "satellite".

Rudi Pavlič s58ru

Grass Valley Mixer Conversions - Part 13

Written by Trevor Brown G8CJS

I have been refining the GVG code, which was based on a series of subroutines, that if they could be made to work, were implemented. I have now been revisiting them and trying to add a little panache.

All the earlier versions of the code used the soft latch mirrors N to W to store the value of the GVG lamp latch data. These soft stores were manipulated by button presses and then the individual GVG latch was updated to match. This was necessary as it is not possible to read the GVG lamp latches.

In the earlier version of the code I added a common latch update routine called by various subroutines that ended with an I2C routine called strobe plus the last letter of the latch. This only updated a single 8-bit latch to match the changes in the soft latch made by button presses. This has now become a routine called latches and updates all the latches whenever a single button is pressed. I am not sure if I have slowed the code down or speeded it up as I have removed 9 subroutines that were used to carry the specific lamp latch address. We now have less code controlling more lamps, but at the expense of flexibility in that we cannot update a single latch.

I have also made code changes to the I/O which used to eavesdrop on the button presses and direct the required traffic to the I/O ports provided by ICs 4 and 5. The revised software looks at the soft latches and directs traffic from a single routine called IO. PGM and PST now share the same I2C latch (PCF 8574) with PST using the four least significant lines and PGM the four most significant lines.

The numbers make sense for the PST (low nibble) and the revised I/O logic is not inverted as it was on the earlier code and connects to tally light with slightly less head pain.
The routine looks like the following and sits at line 437 for code revision 14.

```
IO:
'I/O for PST bank to control 4 bits of IC5
if (r and 64)   <>  0 then let a= 01  'PST 0
if (r and 16)   <>  0 then let a= 02  'PST 1
if (r and 4)    <>  0 then let a= 03  'PST 2
if (r and 1 )   <>  0 then let a= 04  'PST 3
if (n and 2)    <>  0 then let a= 05  'PST 4
if (n and 8)    <>  0 then let a =06  'PST 5
if (n and 32)   <>  0 then let a =07  'PST 6
if (n and 128)  <>  0 then let a= 08  'PST 7
if (n and 64)   <>  0 then let a =09  'PST 8
if (n and 16)   <>  0 then let a =10  'PST 9
if (r and 2)    <>  0 then let cc=16+a 'PGM 0
if (r and 8)    <>  0 then let cc=32+a 'PGM 1
if (r and 32)   <>  0 then let cc=48+a 'PGM 2
if (r and 128)  <>  0 then let cc=64+a 'PGM 3
if (o and 32)   <>  0 then let cc=80+a 'PGM 4
if (o and 128)  <>  0 then let cc=96+a 'PGM 5
if (o and 64)   <>  0 then let cc=112+a 'PGM 6
if (o and 16)   <>  0 then let cc=128+a 'PGM 7
if (n and 1)    <>  0 then let cc=144+a 'PGM 8
if (n and 4)    <>  0 then let cc=160+a 'PGM 9
i2c.begin IOa       'I/O port a i2c routine
i2c.write cc
i2c.end
return
```

Remember anything after the ` is just a comment to help human understanding and is not used by the micro
This delivers two 4-bit words from an 8-bit port by multiplexing.

E.G.

160	144	128	112	96	80	64	48	32	16	High Nibble
10	9	8	7	6	5	4	3	2	1	Low Nibble
HLHL	HLLH	HLLL	LHHH	LHHL	LHLH	LHLL	LLHH	LLHL	LLLH	Logic states

The top row shows the high byte data address, the next row the low byte date address and the third row the logic states produced.

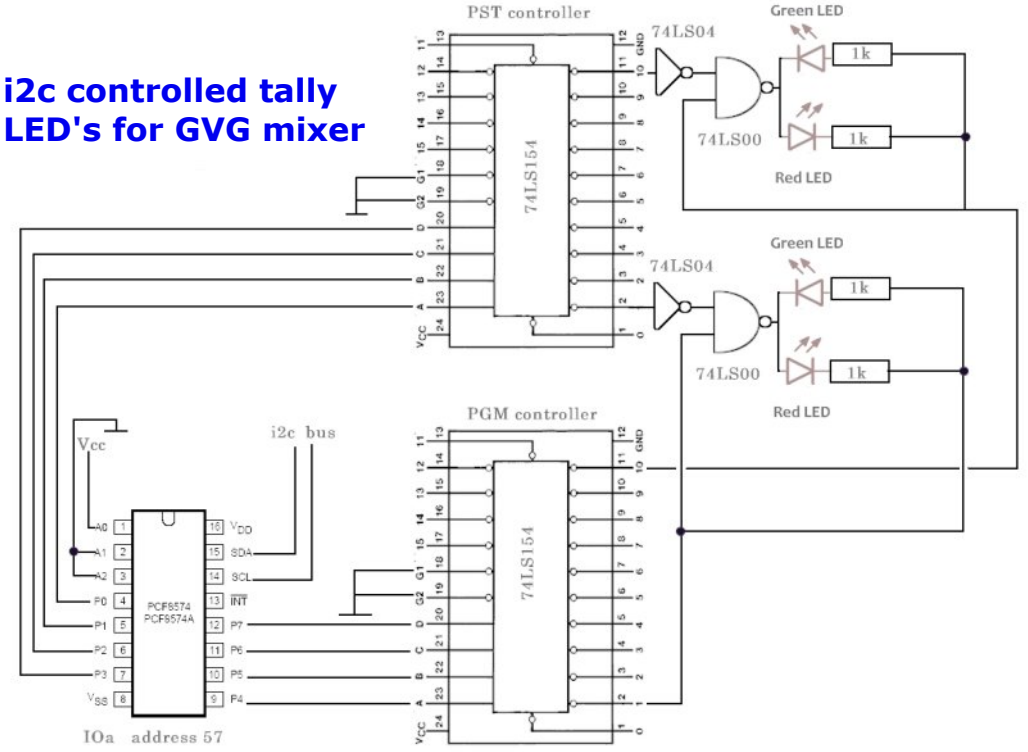
The numbers may seem a little odd, but they are binary numbers, converted to decimal.

This port can now be used to drive camera tally lights or external video circuitry. The reason that I have chosen to share the same port is so they can be decoded to produce Green lights if the camera is selected on the PST bank and Red lights if it is selected by the PGM bank.

To minimise the camera cabling I have used two wires to carry this information out to the cameras and used polarity to select if it is the Red or Green LED that needs illuminating. The logic needs repeating for each tally. The diagram only shows the first tally light and last tally light. I have drawn it as two LED's although you can buy units that combine a Red and Green LED that will perform with the same polarity logic, the choice is up to you. Remember that there are limits to the current a LS TTL gate will sync and more importantly source.

I built the example from my junk box which was full of standard TTL gates which perform better as LED drivers. If do you need to source some serious current for either LED then you could add emitter followers and keep the two-wire interface, PNP ones worked the best.

i2c controlled tally LED's for GVG mixer



It's all down to preference and the style and number of cameras in use. The modern approach is to use LED's and keep it all solid state. The original concept was probably relay controlled tallies as this panel dates from the mid 80's

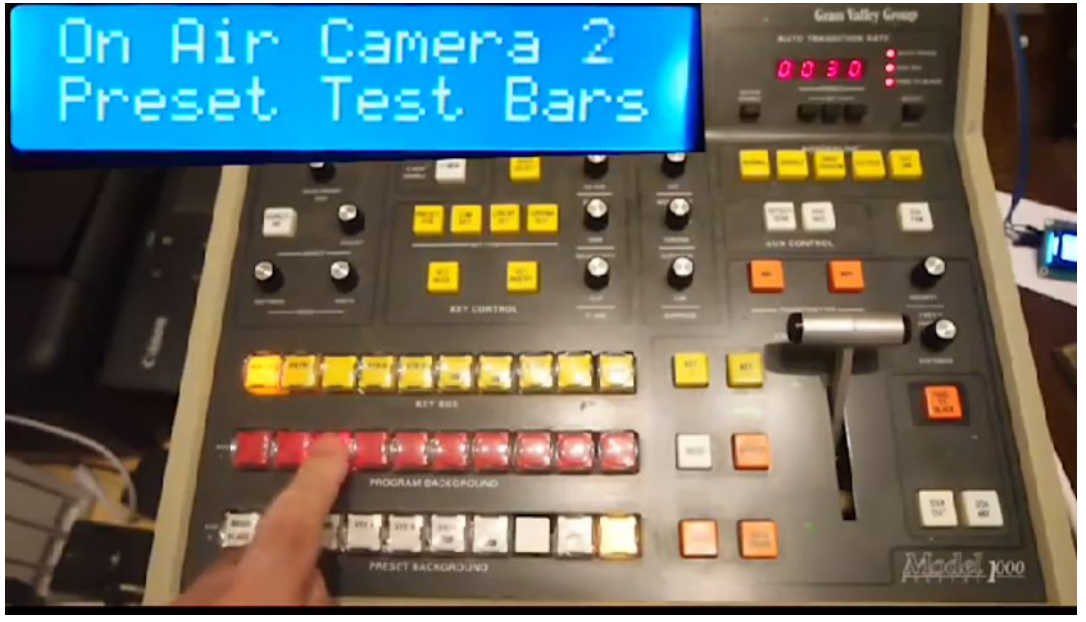
The next development was to make better use of the LCD panel. The original mixer did not have an LCD panel, but they are now a part of all modern mixers and very simple to interface to an I2C bus. The one from my junk box has two rows of 16 digits and maps onto the I2C bus at address 63. The code to set it up is at line 29.

```
I2C.SETUP 4,5              ' SDA  &  SCL Pins
LCD.INIT 63, 16, 2         ' PCF8574 Backpack Address 0X3F
hex  16 digits 2 lines
LCD.CLS
LCD.PRINT 1,1, "G8CJS software "
```

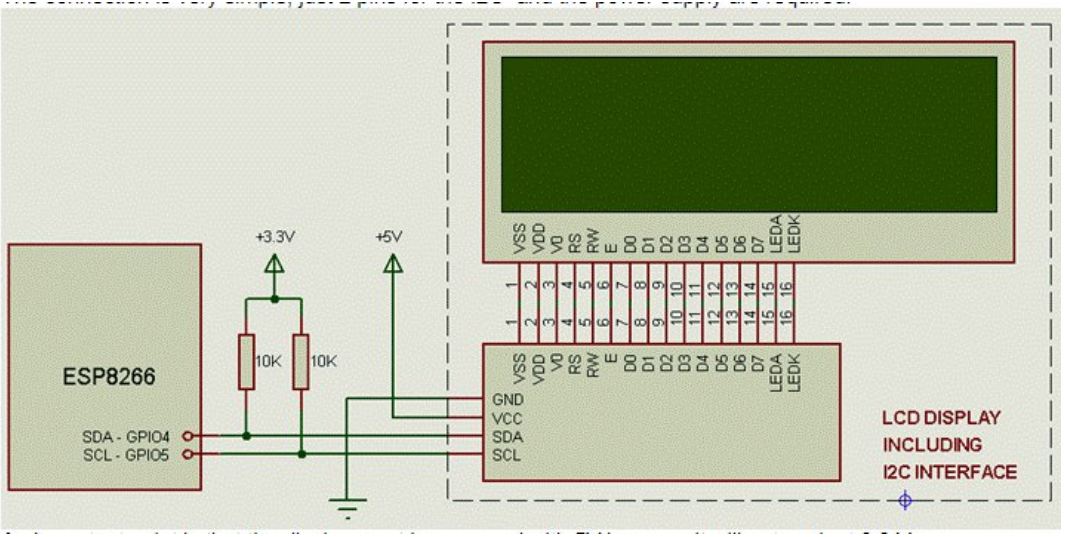
```
LCD.PRINT 1,2, "Revison 14     "

The display is poled as a gosub in the button scan loop at line
102
gosub LCD
the subroutine is at line 415
LCD:
if (r and 2)    <>  0 then  LCD. PRINT 1,1,   "On Air Black    "
' PGM 0 LCD Legend
if (r and 8)    <>  0 then  LCD. PRINT 1,1,   "On Air Camera 1
"     ' PGM 1 LCD Legend
if (r and 32)   <>  0 then  LCD. PRINT 1,1,   "On Air Camera
2 "     ' PGM 2 LCD Legend
if (r and 128)  <>  0 then  LCD. PRINT 1,1,   "On Air Camera
3 "     ' PGM 3 LCD Legend
if (o and 32)   <>  0 then  LCD. PRINT 1,1,   "On Air Camera
4 "     ' PGM 4 LCD Legend
if (o and 128)  <>  0 then  LCD. PRINT 1,1,   "On Air Caption
1"     ' PGM 5 LCD Legend
if (o and 64)   <>  0 then  LCD. PRINT 1,1,   "On Air Caption
2"     ' PGM 6 LCD Legend
if (o and 16)   <>  0 then  LCD. PRINT 1,1,   "On Air VTR 1
"     ' PGM 7 LCD Legend
if (n and 1)    <>  0 then  LCD. PRINT 1,1,   "On Air VTR 2
"     ' PGM 8 LCD Legend
if (n and 4)    <>  0 then  LCD. PRINT 1,1,   "On Air Test
Bars"     ' PGM 9 LCD Legend


if (r and 64)  <>  0 then  LCD. PRINT 1,2,    "Preset Black    "
'PST 0 LCD Legend
if (r and 16)  <>  0 then  LCD. PRINT 1,2,    "Preset Camera
1 "      'PST 1 LCD Legend
if (r and 4)   <>  0 then  LCD. PRINT 1,2,    "Preset Camera 2
"      'PST 2 LCD Legend
if (r and 1)   <>  0 then  LCD. PRINT 1,2,    "Preset Camera 3
"      'PST 3 LCD Legend
if (n and 2)   <>  0 then  LCD. PRINT 1,2,    "Preset Camera
4 "      'PST 4 LCD Legend
if (n and 8)   <>  0 then  LCD. PRINT 1,2,    "Preset Caption
1"      'PST 5 LCD legend
if (n and 32)  <>  0 then  LCD. PRINT 1,2,    "Preset Caption
2"      'PST 6 LCD Legend
if (n and 128)<>  0 then  LCD. PRINT 1,2,    "Preset VTR 1
"      'PST 7 LCD Legend
if (n and 64)  <>  0 then  LCD. PRINT 1,2,    "Preset VTR 2
"      'PST 8 LCD Legend
if (n and 16)  <>  0 then  LCD. PRINT 1,2,    "Preset Test
Bars"      'PST 9 LCD Legend
return
```

The LCD display will show the top line as the source selected on the PGM bank and the second Line as the source selected on the PST bus.

The labels I have given are just arbitrary and the programme can be user edited to the required Legends (one of the advantages of BASIC).



Video Panel with LCD screen inset



LCD screen connections

The GVG bank buttons also have legend printed on the actual buttons. These are simple pieces of overhead projector gels that can be printed cut and fitted inside the GVG buttons. Match them up to your sources and then there is no excuse for getting the wrong source on air. I have put a video on the CQ-DATV Facebook page showing this working.

The last thing I have done in the revision 14 software is to add some of the analogue controls and T-bar position. I have increased the Analog routines to 4 and polled them from within the button scan at line 97

```
gosub  analog1 ' Tbar value"
gosub  analog2 ' softness
gosub  analog3 ' hue"
gosub  analog4  'Chroma"
```

The subroutine is at line 520 and uses the wlog command to show the analogue value of the selected pots and T-bar. This will print out on the control panel of the editor and keep constantly scrolling.

```
analog1:
i2c. begin PRT3
i2c. write  tbar       'tbar address
i2c. end

i2c. begin PRT1
i2c. write conv        'line low
i2c. end

i2c. begin PRT1
i2c. write tristate   'high again
i2c.  end

i2c. begin PRT1
i2c. write  analogue  'analogue line low
i2c. end

i2c.reqfrom PRT4,1
Tbarpos = i2c.read         'tbar value
i2c.end
wlog "           " , "Tbarposition", Tbarpos
return

analog2:
i2c. begin PRT3
i2c. write  soft       'soft address
i2c. end

i2c. begin PRT1
i2c. write conv        'line low
i2c. end


i2c. begin PRT1
i2c. write tristate   'high again
i2c. end

i2c. begin PRT1
```

```
i2c. write  analogue  'analogue line low
i2c. end

i2c.reqfrom PRT4,1
softpos = i2c.read         'soft value value
i2c.end
wlog "softness", softpos
return


analog3:
i2c. begin PRT3
i2c. write  hue       'hue address
i2c. end

i2c. begin PRT1
i2c. write conv       'line low
i2c. end

i2c. begin PRT1
i2c. write tristate   'high again
i2c.  end

i2c. begin PRT1
i2c. write  analogue 'analogue line low
i2c. end

i2c.reqfrom PRT4,1
huevalue = i2c.read        'hue value
i2c.end
wlog "                              " , "hue", huevalue
return


analog4:
i2c. begin PRT3
i2c. write  chroma       'chroma address
i2c. end
```

```
i2c. begin PRT1
i2c. write conv       'line low
i2c. end

i2c. begin PRT1
i2c. write tristate   'high again
i2c.  end

i2c. begin PRT1
i2c. write  analogue 'analogue line low
i2c. end

i2c.reqfrom PRT4,1
chromavalue = i2c.read        '
chromar value
i2c.end
wlog "                          " ,"           ", "Chroma",
Chromavalue
return
```

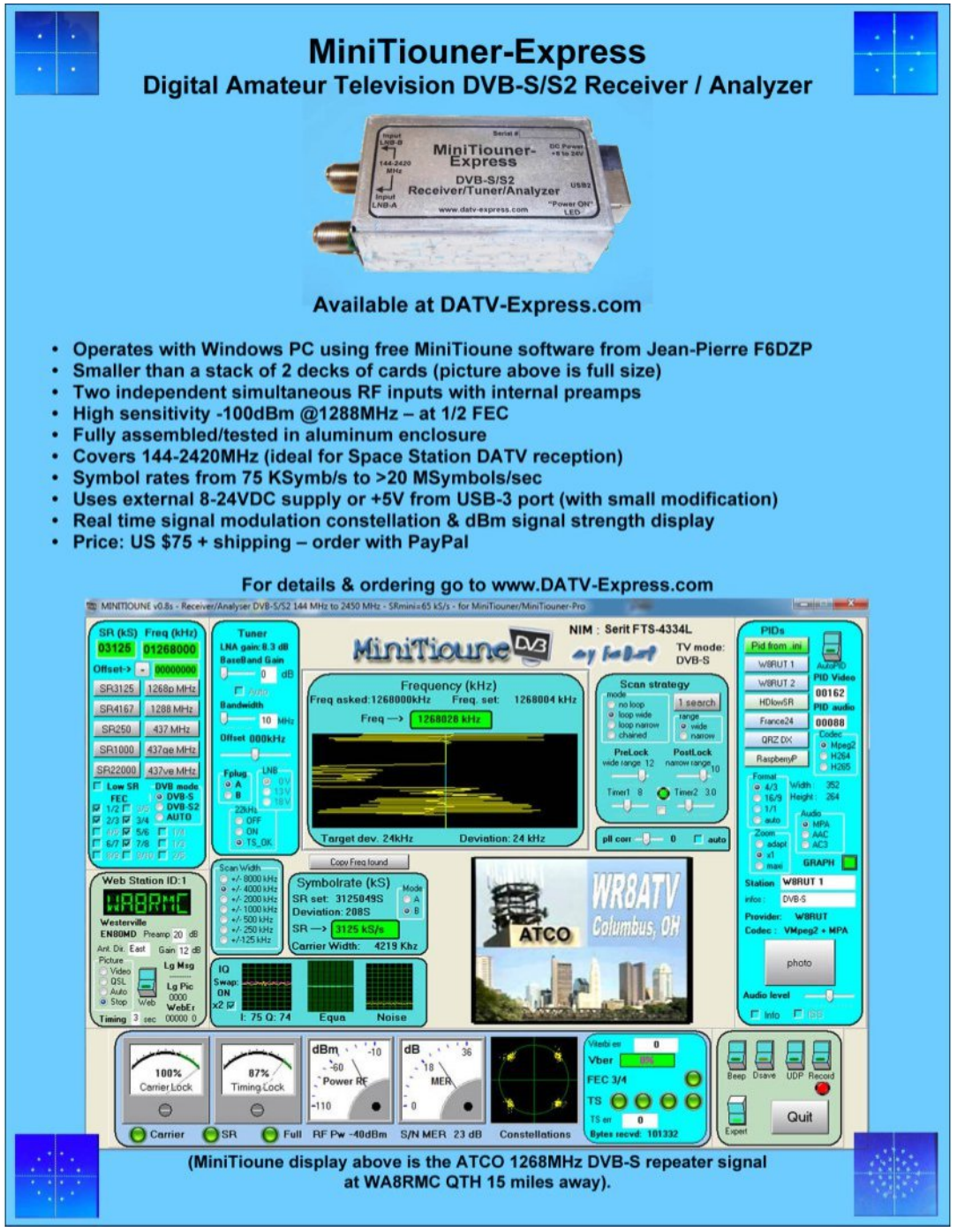
These can be changed to I2C routines if we add some more IO or you can just remove the gosub to remove this function or add extra subroutines if you want. The analogue addresses are all declared in the table that starts at line 43.

```
softness    0
                                    hue    255
                                           Chroma    255
            Tbarposition    0
softness    0
                                    hue    255
                                           Chroma    255
            Tbarposition    0
softness    0
                                    hue    255
```

Just move the knobs and see the display update itself.
Sorry that this project revolves around a piece of surplus equipment, but if you keep looking on e-bay they do turn up.

A panel alone costs around £50 and the complete mixer e.g. with composite crate, turn up for around £150. My crate is in the loft and will probably never get connected to my panel again. I have kept all this engineering as reversible, should it be needed as a complete unit again.

The CQ-DATV stats show that lots of you have downloaded the full code, either for curiosity or in the hope of buying a panel or perhaps some of you already have a panel. As with all CQ-DATV articles feedback is always welcome.

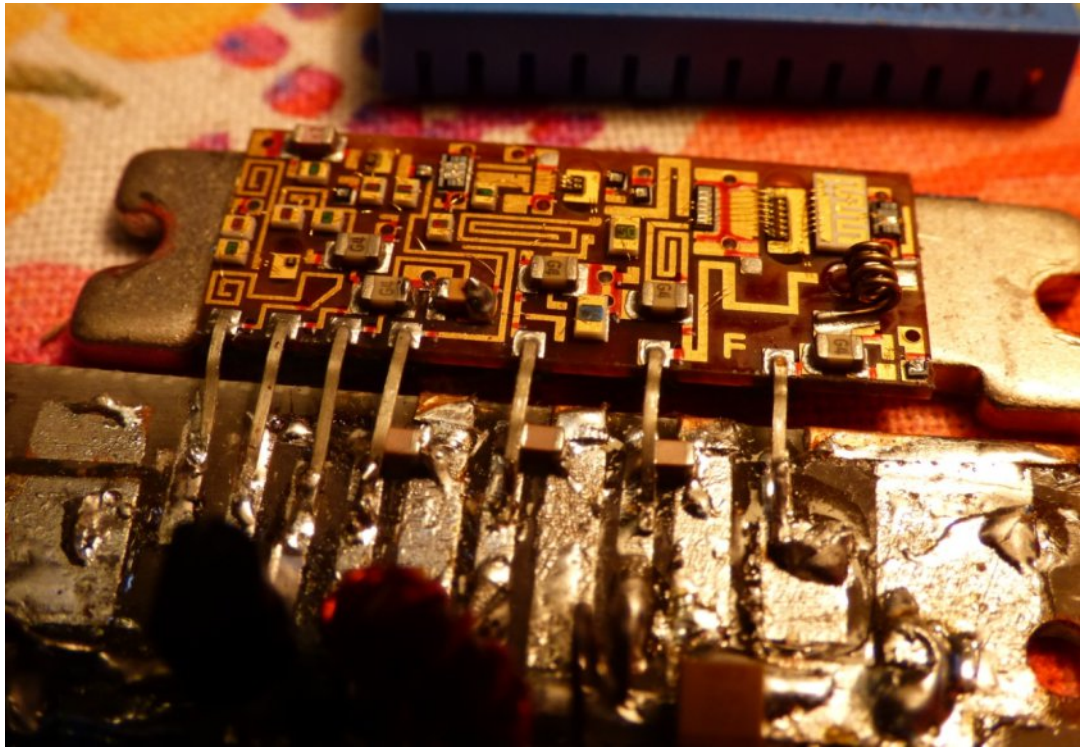


A 420-440MHz ATV 7Watt Transmitter

Written by John Gebuhr - WB0CMC

A few years ago I acquired several MHW707-2 RF amplifier modules. About a year ago I thought I'd try and see if they could be used for ATV. They have a power control pin which turns out to be perfect for feeding video and subcarrier in producing broadcast quality signals. It takes a minor modification to the amplifier which requires some dexterity and care to do. The first time I tried putting video in the power control pin it produced very good B&W video. No color at all. All the DC pins are bypassed with .02mfd chip caps.

The one on the power control pin can be removed by carefully prying off the plastic blue cover and using a pencil iron to remove the chip cap, being very careful not to disturb the fine platinum wires nearby.



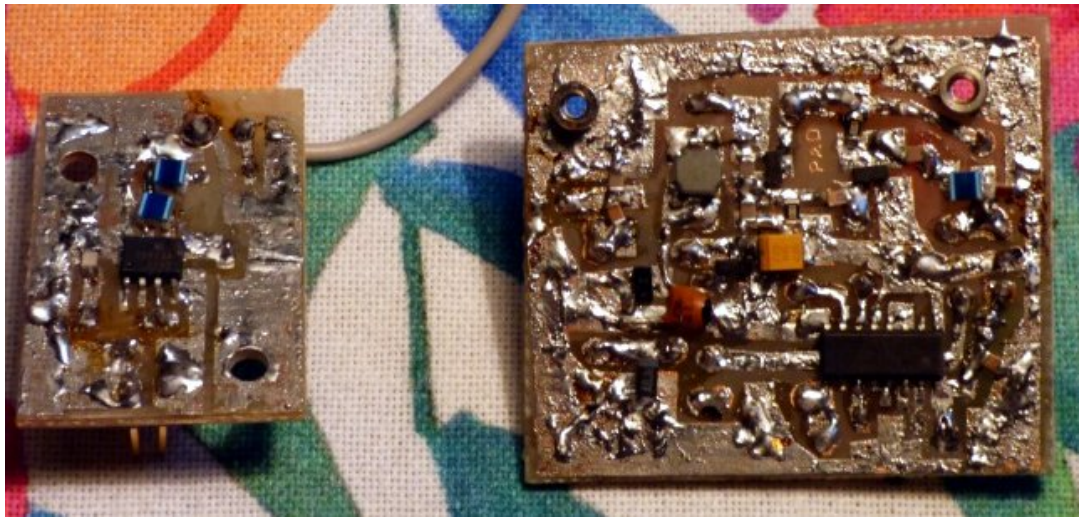
It can be replaced with a .001 or .002 chip cap. There are 6 of these .02 chips in there, labeled "G4". With the pins toward you it is the 3rd from the left. There does need to be some capacitance on the pin or it gets a bit squirrely. This allows a nearly flat response out to about 5 MHz for a modulation frequency.

The amp requires a 0dBm signal to drive. My exciter does a 3dBm output which seems perfect for a 7 to 9 watt output at 434 MHz depending on the device. All that I tested did at least 7 with a supply of 7.8 Volts. Replace the plastic cap to keep out dust, critters, fingers and prying eyes. It probably doesn't need to be re-epoxied. It snaps in place mechanically. In the pic left you can see the replaced chip cap. This one has a little extra solder blob (ooops) on its right side. Chip caps on the external board are .1mfd. There is also a 10 mfd chip (not shown) in parallel with the .1 on the left.

I have done a sweep on these and they do cover the entire ham band with room to spare, 380-470 MHz. There are still lots of these available on line from many different sources.

Next, the exciter. I used a Melexis chip: MLX72013.

Top side of exciter left and sub carrier modulator right



Bottom side of the same boards

The output is programed in 4 steps controlled by an external resistor. -9, +3 (56K), +7 and +11dBm.

Finished amp section. Note KSC1008 transistor

Top view of the transmitter

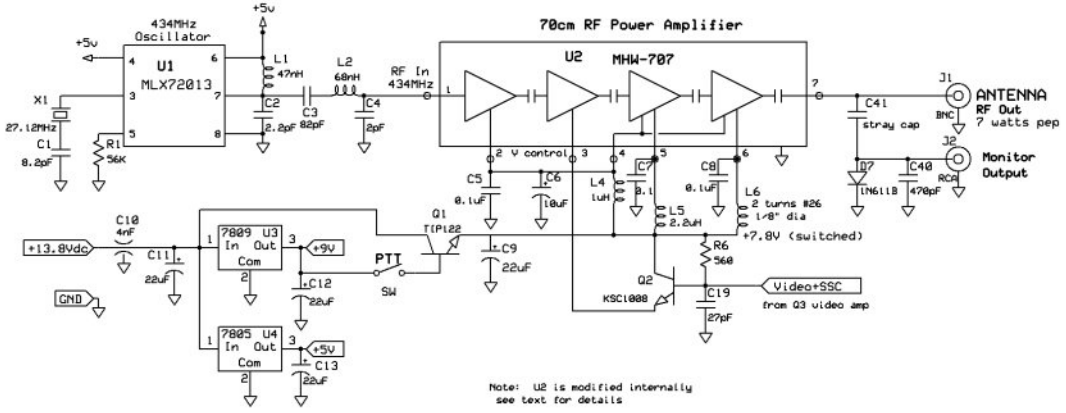
They are controlled by a divide by 16 crystal available at most supply houses.

One can download the Melexis data sheets for this. The crystal capacitance "CBO" is 8.2 pf and it puts the frequency right on 434.000. 27.120 is a standard frequency available at many distributers and the 8.2 pf is small enough to warp it up to 27.125 for the 434.0 output. I see no reason it wouldn't work elsewhere in the band, 420-440 with the proper crystal.

I did have a crystal on 25.837 which worked fine with an output of 413.394. Out of the ham band but proofed how low it could go. Getting one at the right frequency might be a problem as there are few crystal manufacturers who do custom work anymore.

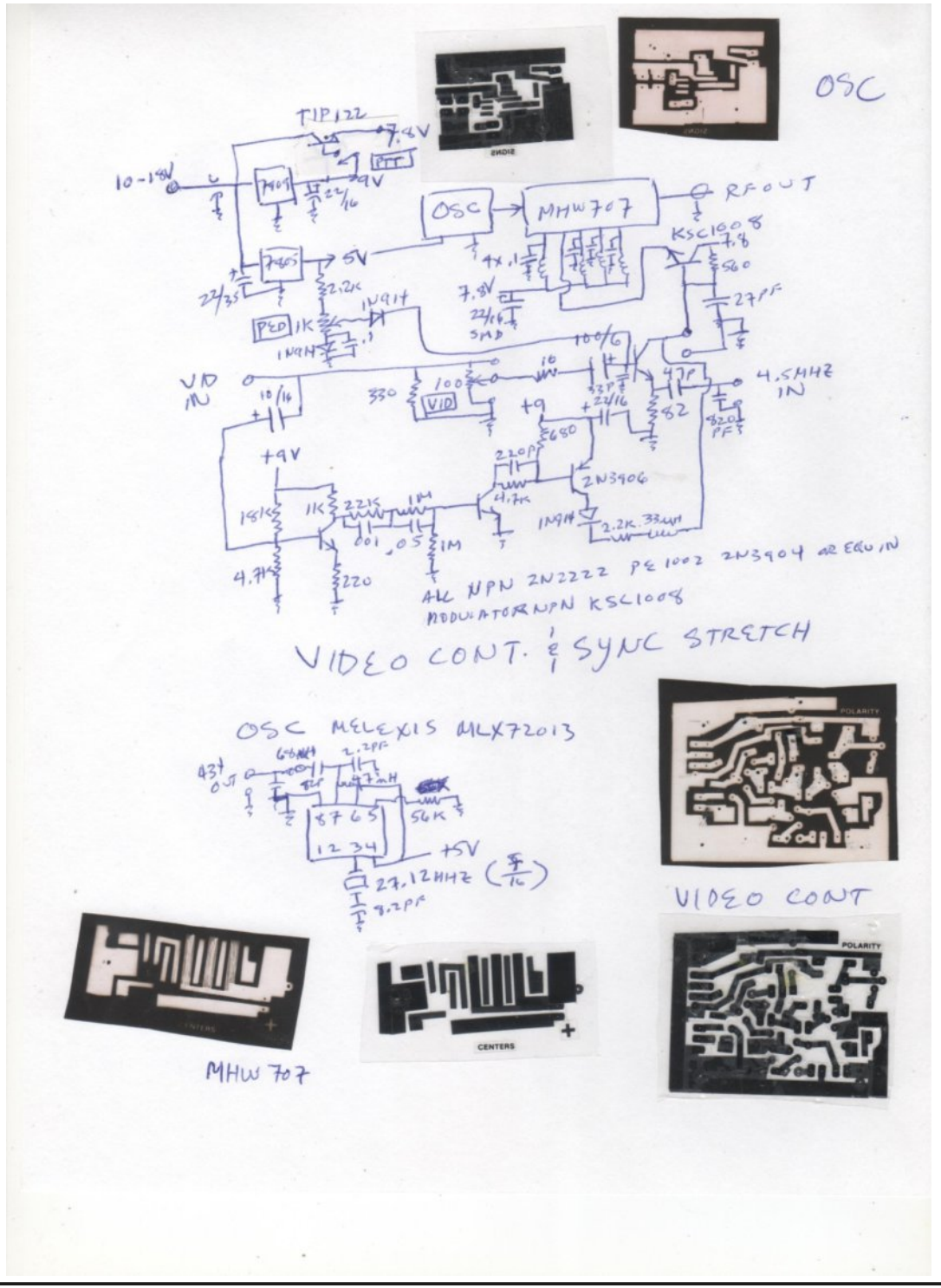
Pick one that has the highest load capacity as it makes it easier to warp on to 434.000. The schematic and layout are below as are the video processor and sync stretcher. The sync stretcher is a modification of a PC electronics circuit driving the KSC1008 transistor which is mounted on the MHW707 board. That board should be double sided. All the rest of the boards are single sided G10 or equivalent.

I have included the art work for both boards, both positive and negative. The TIP122 switching transistor can be seen just to the left of the subcarrier board. It is a Darlington which provides 7.8 volts for the RF amp, its recommended operating voltage, two junction drops from 9 volts. There is also a point contact microwave diode next to the output connector which provides a scope output to see the video wave form. The scope needs to be terminated in a 50-150 ohm resistance to read properly.

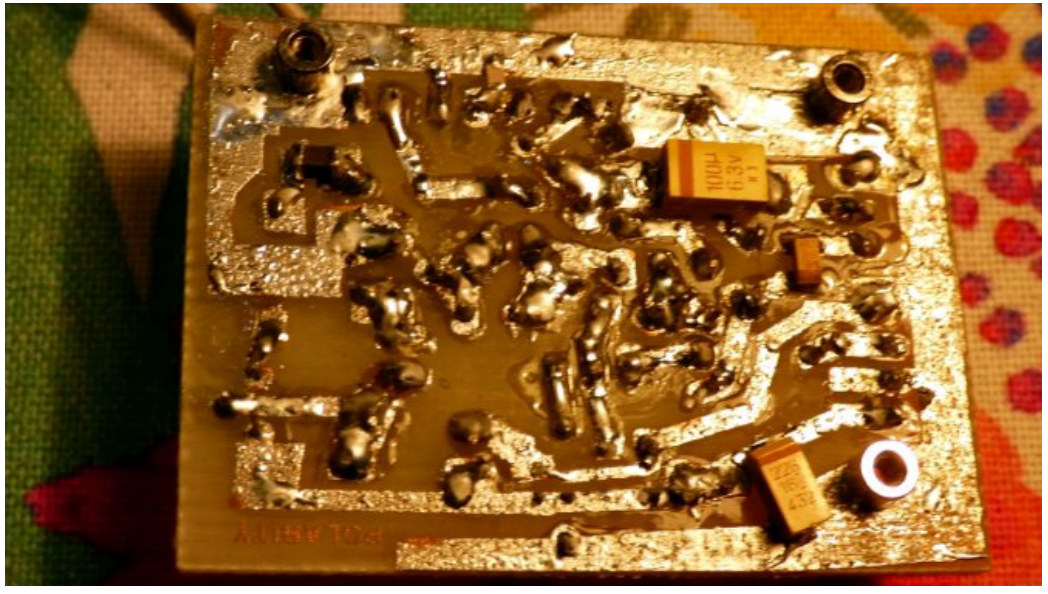


Oscillator and RF amplifier

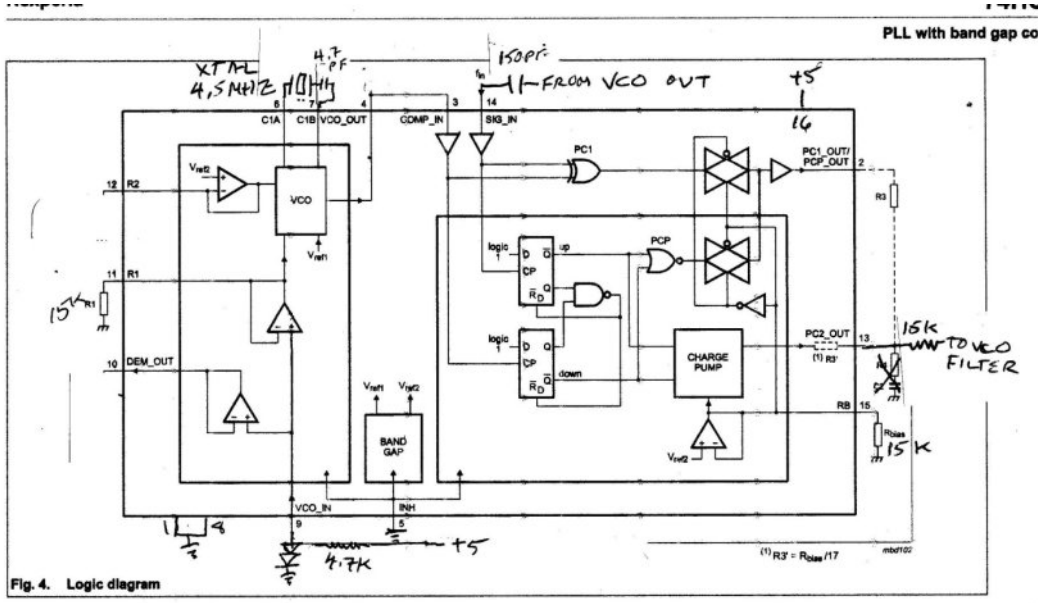
The two coax leads are 4.5 MHz input and video out to modulator transistor base on RF amp board. The subcarrier generator uses a 79HCT9046A chip. It is functionally the same as the CD4046 family but has a much higher frequency capability as well as some bias differences.



Video and sync stretcher with pedestal adjust pot. Headers are +5, +9 and ground and video pot



Back of board showing 100mfd video cap, 22 mfd bypass cap, 33microhenry choke and the 10 mf cap

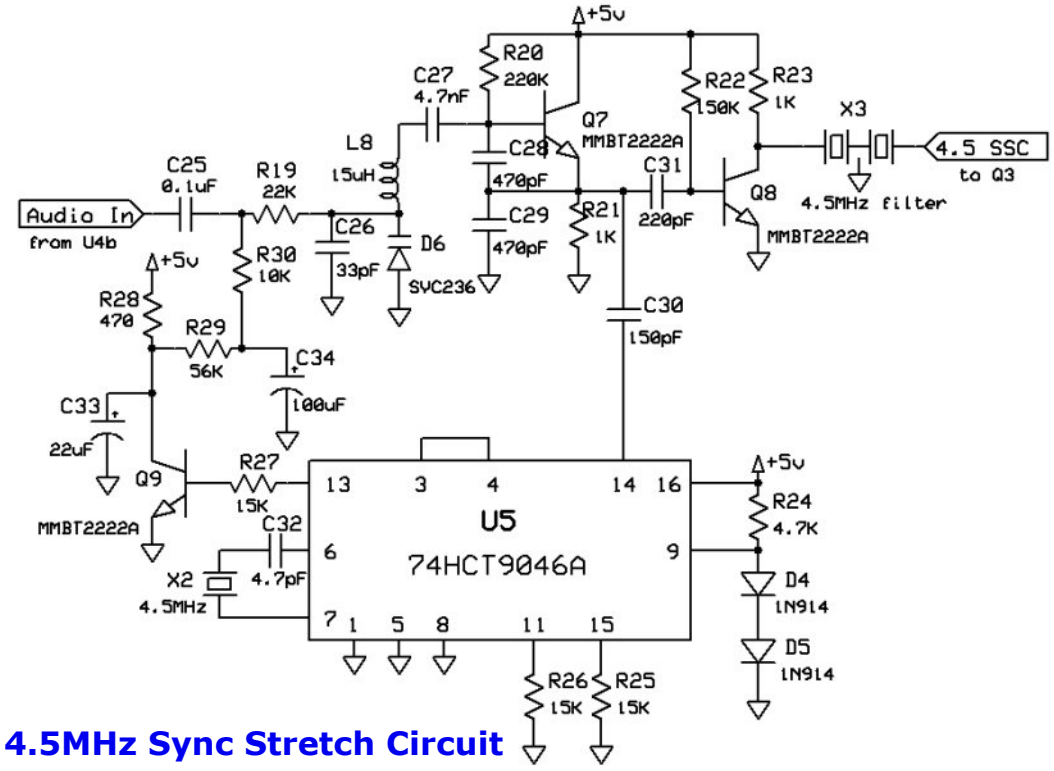


The subcarrier generator is a PLL controlled by a crystal so needs no tuning. It uses this chip as reference oscillator and phase comparator.

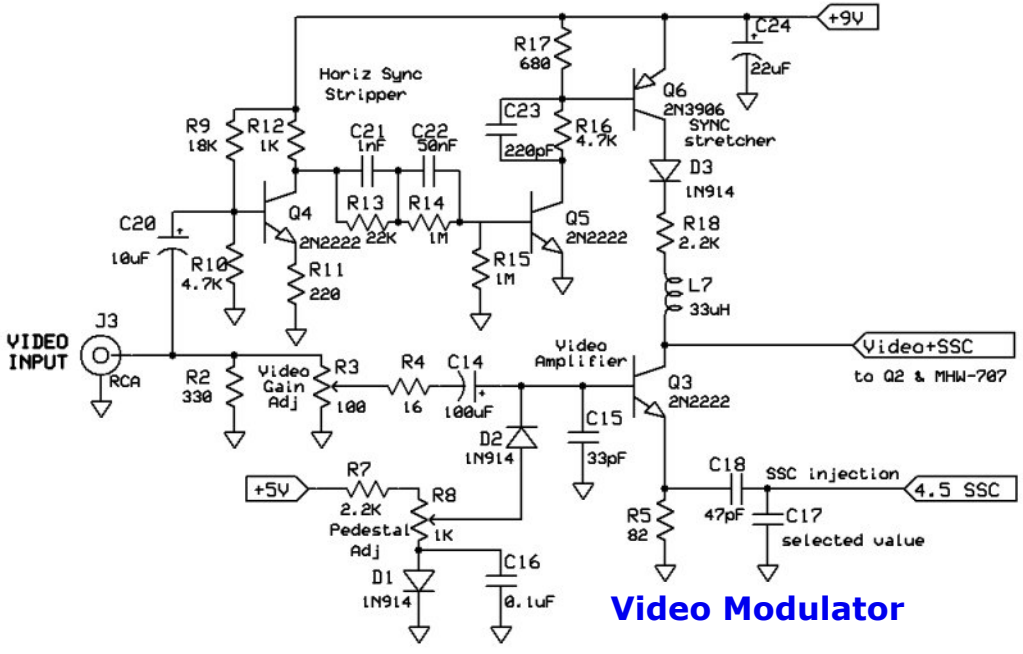
The VCO is a modified Colpits (Clapp) with a fixed inductor and a dual varactor diode. Varactor voltage is around 1.2 volts without the 33 pf in parallel, 2.1 with it. Its range runs from about 3.5 MHz to about 5.4 MHz with from zero bias to about 4.5 volts on the varactor (control line disconnected).

When locked, the apparent frequency will go a few KHz low due to the non-linear response of the varactor at high deviation levels.

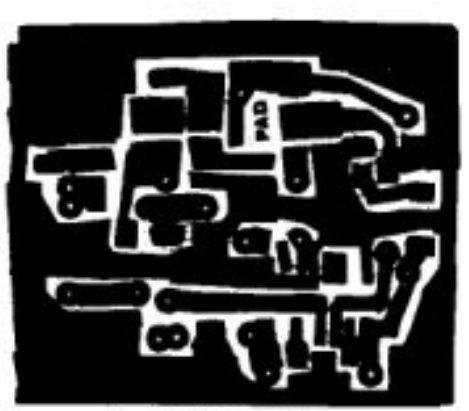
At normal modulation levels it will be barely noticeable. There is some natural pre-emphasis in this circuit so the audio on a TV set sounds great. The board runs off the +5 volt line and is bypassed by a .1 mfd chip cap. The output is nearly a square wave so has lots of harmonics. Hence the 4.5 MHz filter.

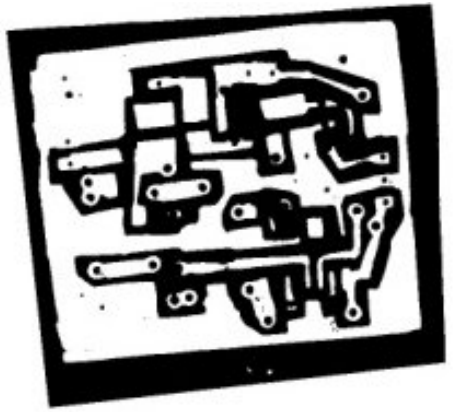


4.5MHz Sync Stretch Circuit



Video Modulator

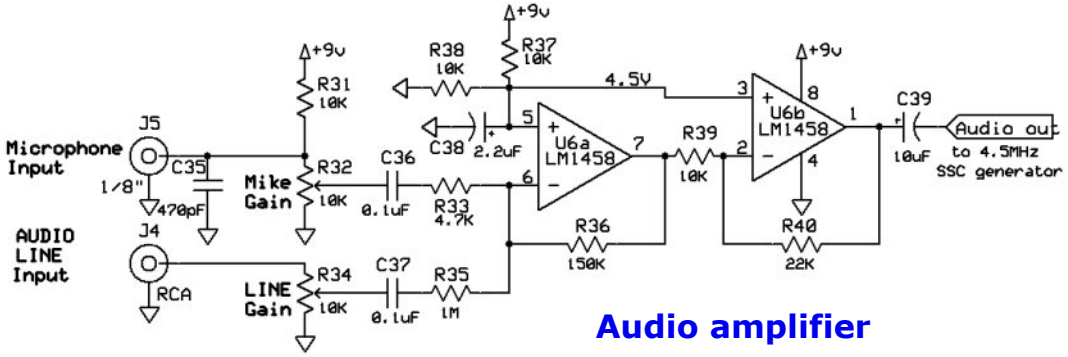




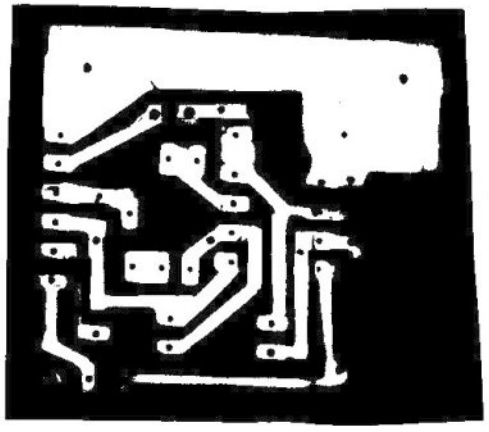
Lettering indicates foil side

Front and rear of aural subcarrier generator

I originally tried using the IC and modulating the VCO line. Too much distortion. There is something in the chip that modulates the output. With pure DC on pin 9 the distortion is still there so I had to go to the above circuit. It has a higher sensitivity for modulation than the original but that's adjustable. It required one resistor change on the audio board. The audio amp provides separate controls for both mic and line audio with bias for an electret mic so either that or a dynamic can be used with no further modification. IC is an LM1458 or LM1558.



Audio amplifier

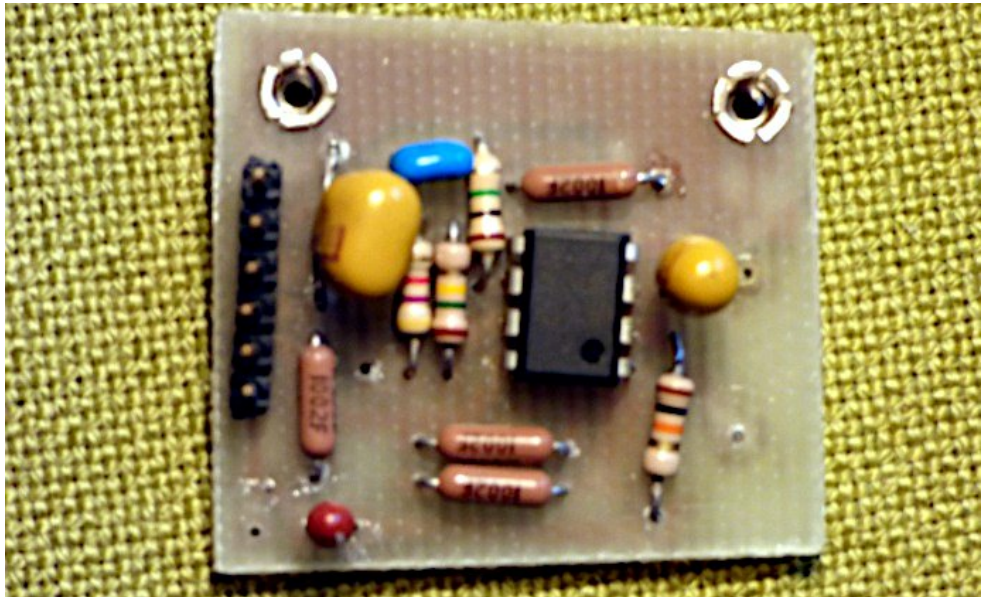


Art work shown is from component side. 9 volt line 22 MFD by-pass, not shown. Pin out from top,1 Gnd, 2 line in, 3 mic in, 4 +9 volts in, 5 mic power, 6 output to modulator. Line in is +4 dBm, Mic -50 dBm for 25 KHz deviation, nominal

Mic and line pots are both 10K audio taper. Both inputs are bypassed by a 470pf cap at their respective jacks visible in the picture below. The aural can be turned off so that only video is transmitted. This is useful when looking at the demodulated wave form on a scope.

For those new to TV: To use the scope output, set it for DC and set the trace at the top of the screen. This is zero power. Turn off the aural subcarrier and key the transmitter and remove the video line to the RF amp board.

The 5 individual boards sort of together



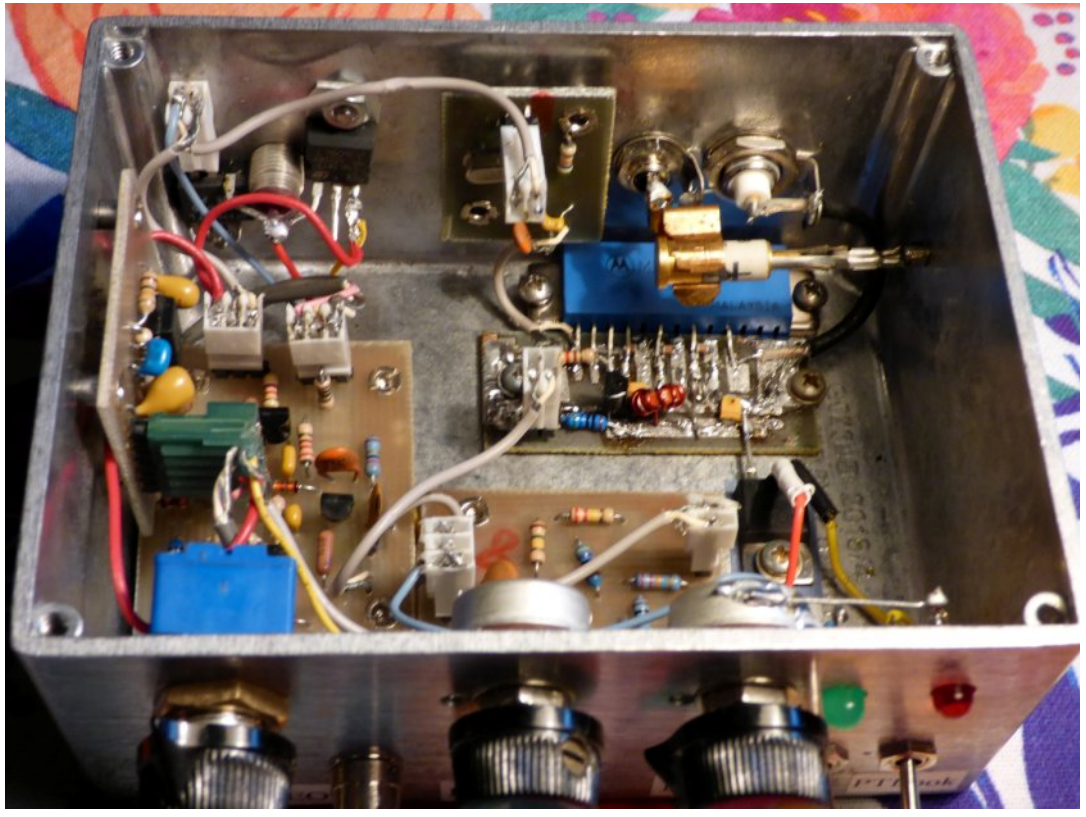
Top of audio amp

Front of the finished transmitter

Rear of the transmitter, note the feed-thru cap
DC ground connection is the lug below and to the right of the feed through cap.

Set the vertical gain so the trace is at the bottom of the screen. This is the sync power as well as CW power. It will not change when video is re-connected. Sync will be at the bottom and the rest of the video can be adjusted as needed. One can turn the aural back on and see the difference. There will also be a slight increase in power out (typically, ½ to ¾ of a watt) if there is a watt meter on it. Keep in mind that the diode detector for the scope output is not perfectly linear so there will be some differential amplitude distortion seen below in the wave form monitor with the stair step display.

Note the point contact diode next to the output connector. Its proximity is sufficient to give a good display on a scope. Its RCA jack is bypassed with a 470 pf cap to keep RF off the scope lead.

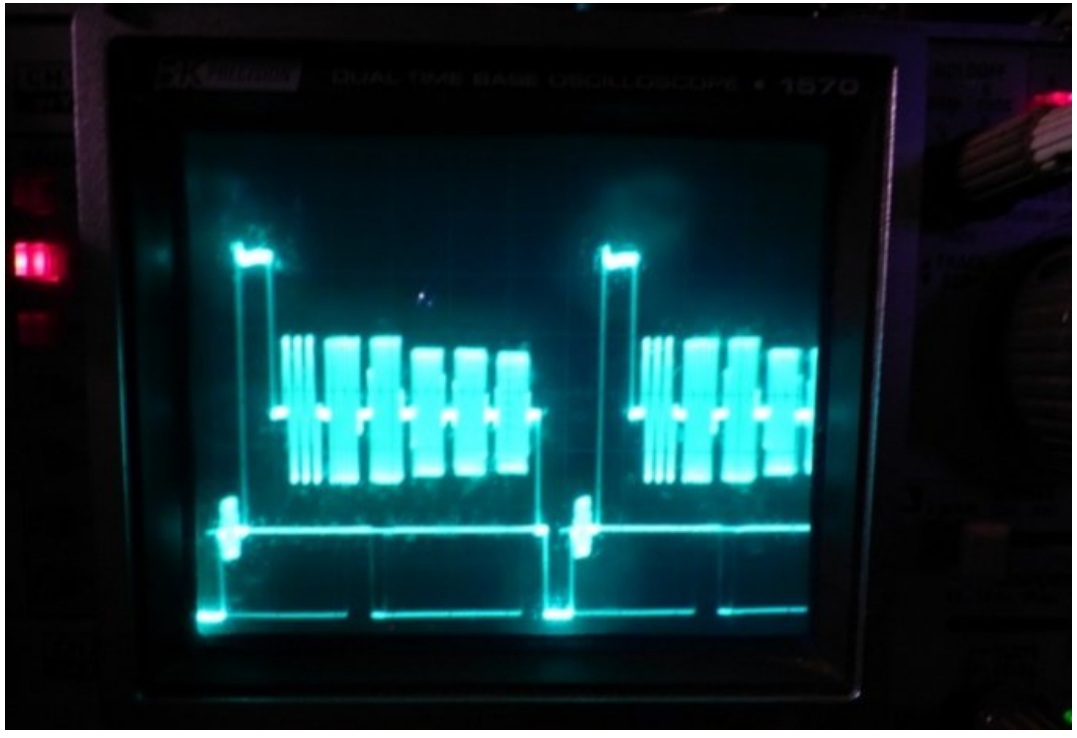


View inside

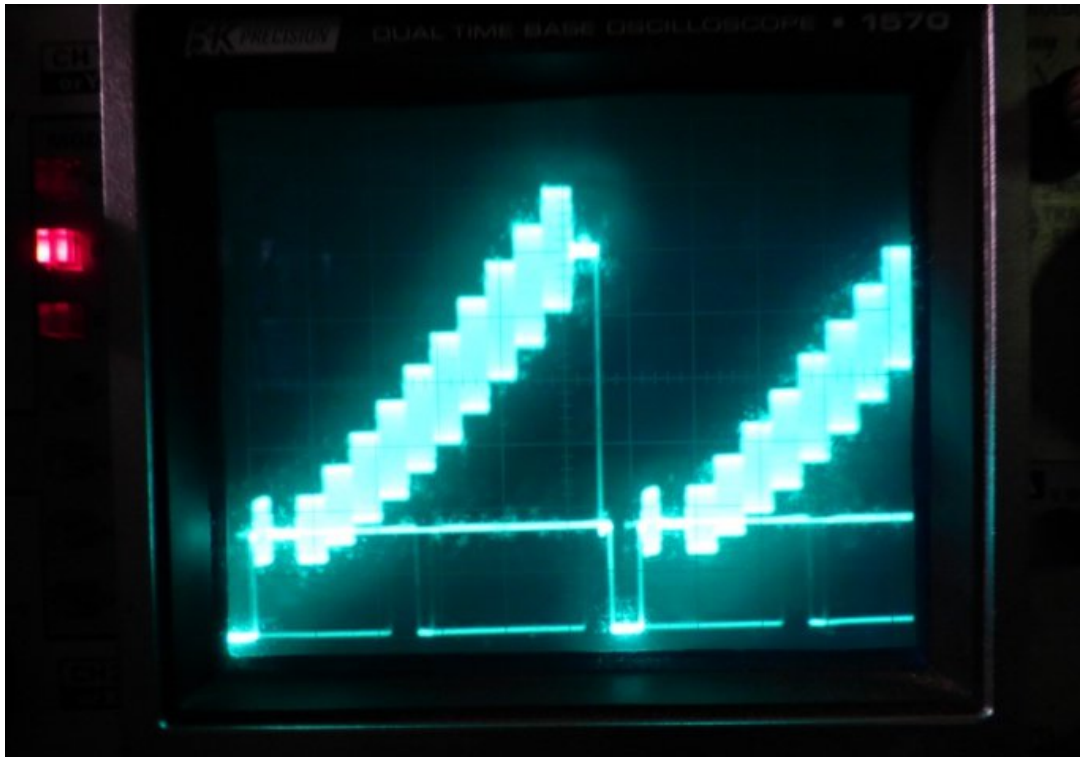
The feed thru on the left is a .004 but most anything over a .001 should be adequate. Total current demand for CW is just under 2 Amps so it should be able to handle that. The TIP122 keying transistor is visible under the white piece of insulation on the red lead.

The 9 and 5 volt regulators are on either side of the feed through, left side of the box. Green LED is aural on and the red LED is TX on. Video input can be BNC or RCA.

Since everything is regulated to 9 or 5 volts except for the collector of the TIP122, the transmitter will run on anything from about 10 volts minimum to 28 volts or so. At the high end it may need some additional heat sinking under the TIP122. It says 10-18 on the diagram but the two regulator ICs are both rated at 35 volts input. Note the 22 ufd bypass on the RF amp board next to the toroid.



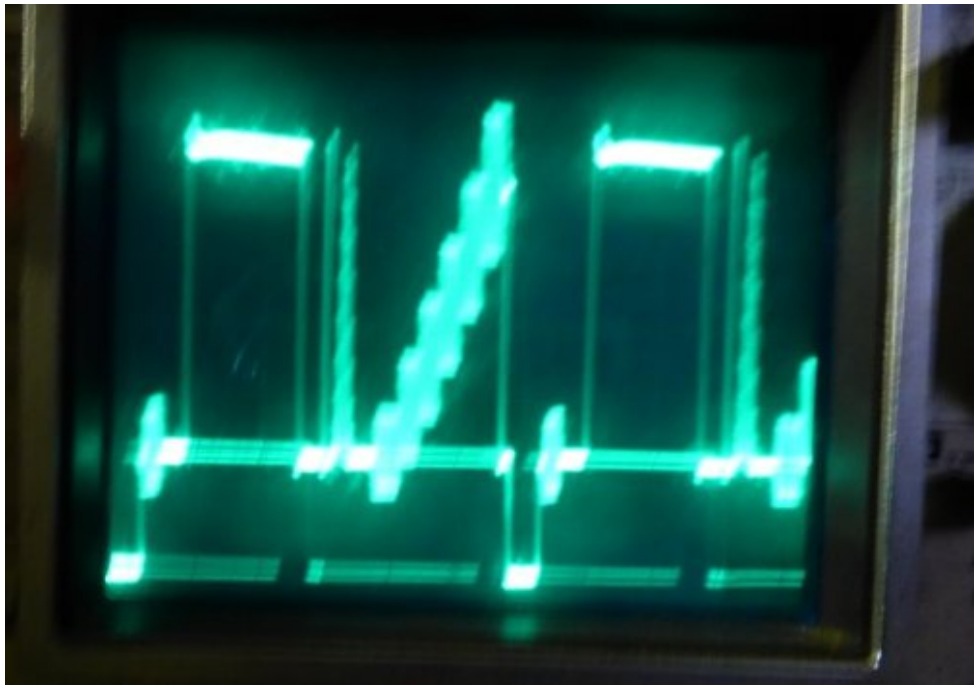
Video frequency response



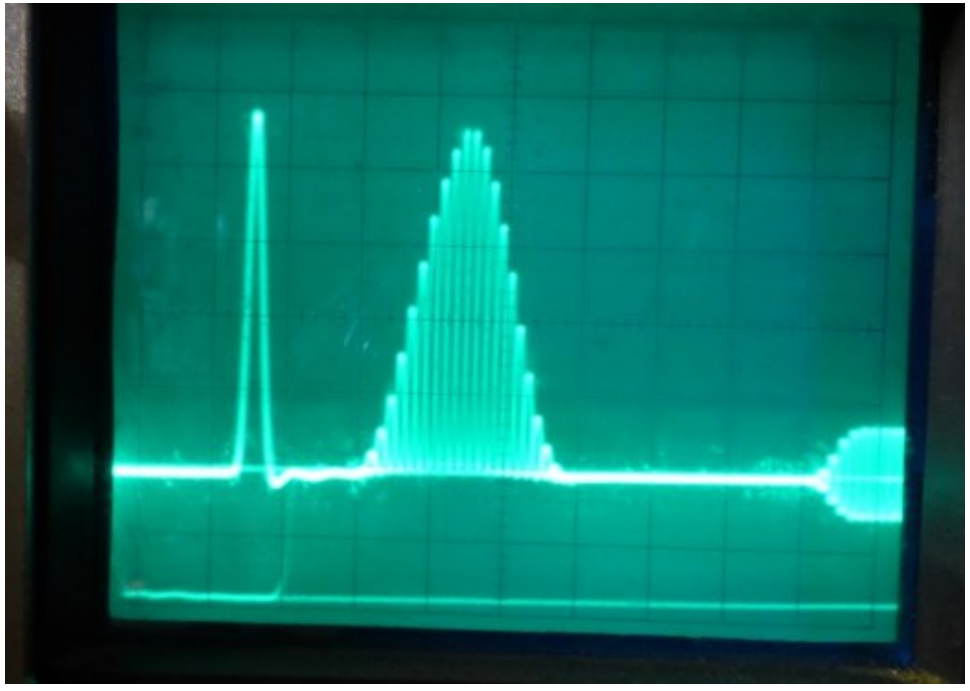
Differential gain, some of the error is the diode

I originally used a tantalum cap and had some slope to the bars on a color display. Swaping it for a surface mount got rid of the slope.
It seems there was enough inductance in the tantalum cap and its leads that produced the slope. One can also see the 10 ufd/10 volt bypass not visible in the way above pic. Also suface mount. Now some wave forms using the scope output. The point contact diode isn't a precision demodulator but is pretty good.

I don't have a good way to measure it exactly but one can see it in the picture below showing both phase and gain (last pic). Phase differential is the end dots above and below the burst and is about 6 degrees, gain error is the dots spread out to the left of the burst. Again, some of this is nnlinearity of the detector diode.



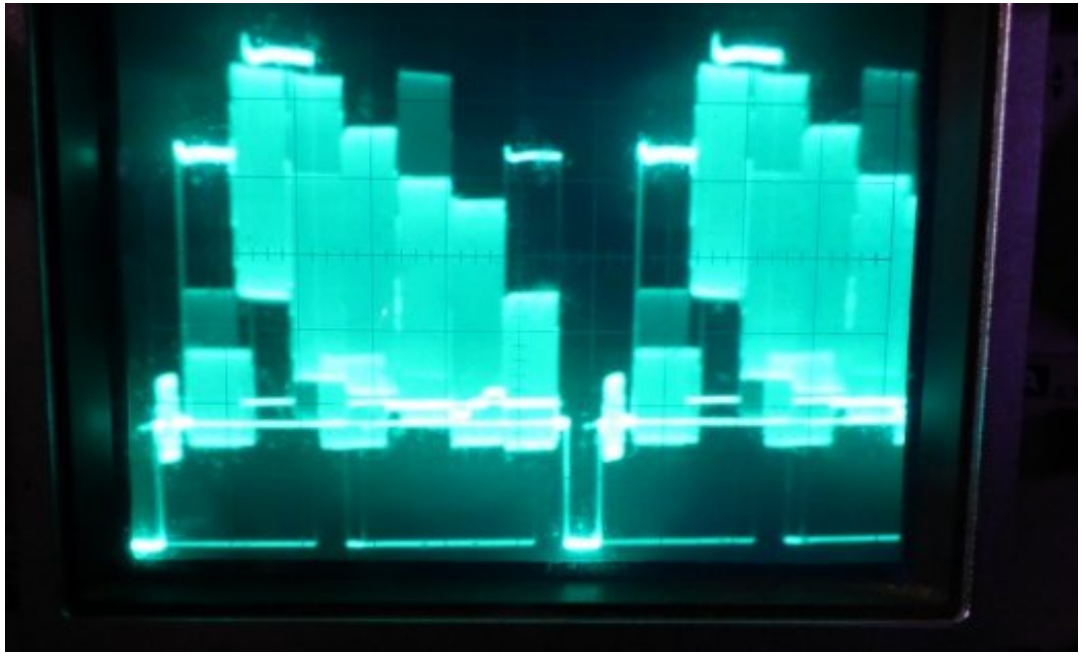
NTC 7 Overall response including the 12.5t pulse



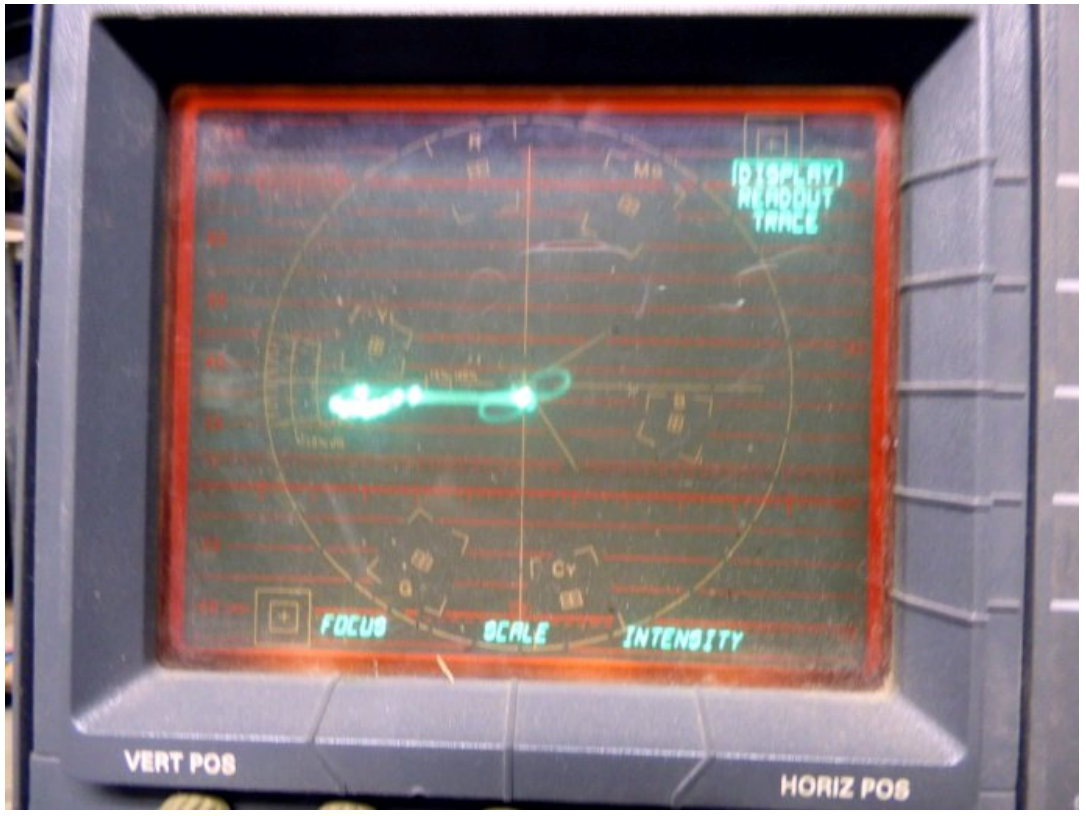
NTC 7 expanded display showing the 12.5t pulse

This pulse tells one the phase between luminance and chrominance as well as amplitude error between them. Ideally it should be flat on the bottom as this one is.
I don't have a good way to do ICPM measurements. It's pretty close to broadcast quality and the transmitter seems to be able to work for long periods without overheating or degradation. The box does get a little warm but seems to be an adequate heat sink. The first few seconds of transmitting, sync is a bit high but settles down fairly quickly. The other quirk is when the aural is turned on it may take a few seconds or so to acquire lock and may sweep across the video.

It doesn't hurt anything but it may be noticeable in the received picture. The 56K in the loop filter controls lock-up time (about 4 sec.) and may be reduced to 10K (about .5 sec.) with the trade-off of higher noise floor (pulsing from the phase detector). It's about -60 with the 56K, -45 or so with a 10K.



Color bars on a garden variety scope (B&K)



Differential phase and gain

A note on the subcarrier generator: Nearly all of them run about 1.5-2 KHz low. With 25 KHz as the maximum deviation, it isn't a big issue. It is possible to bring it within a few hertz. A 4.7 pF cap can be put in series with the crystal as shown above.

2.2 pF may work to raise it even higher but is a bit unstable and may go out of lock. Evidently the chip needs a series resonant cut crystal rather than the stock ones I have which need an 18 pF load capacitance.

I would like to thank Jim Andrews KH6HTV for his efforts in converting Johns hand drawn schematics into 'proper' ones. Jim also comments: The Motorola MHW-707 is an obsolete part dating from the early 80s.

4 of the 5 finished transmitters on my well used work bench. The fifth is out being tested over the air

However, it is still available new from the USA distributor, RF Parts for about $30. (*www.rfparts.com*) I have also found it listed several places on E-Bay for $15. ED

50 Years Ago - The Domestic VCR

Written by Trevor Brown G8CJS

THE 1970s

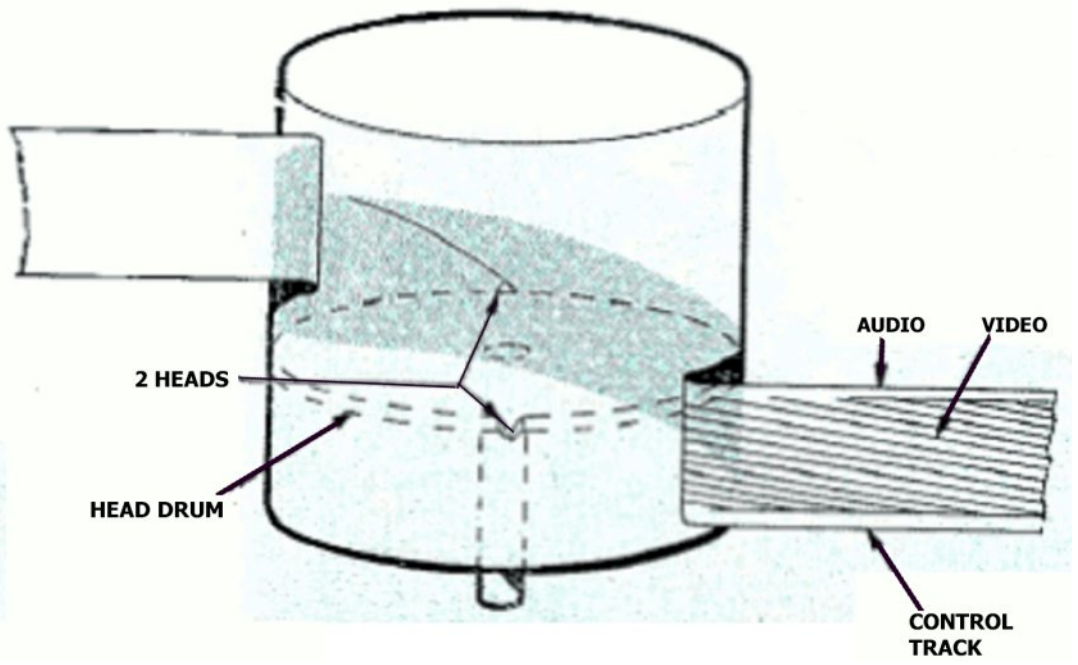
In the last issue we wound the clock back 50 years to the decade starting 1970 and focused on the Micro Processor and its humble beginnings. This was a rich decade and this time I would like to look at VCR's (Video Cassette Recorders).

Videotape had already made an appearance, before this decade, but the technology had not been aimed at the domestic market, all this was about to change.

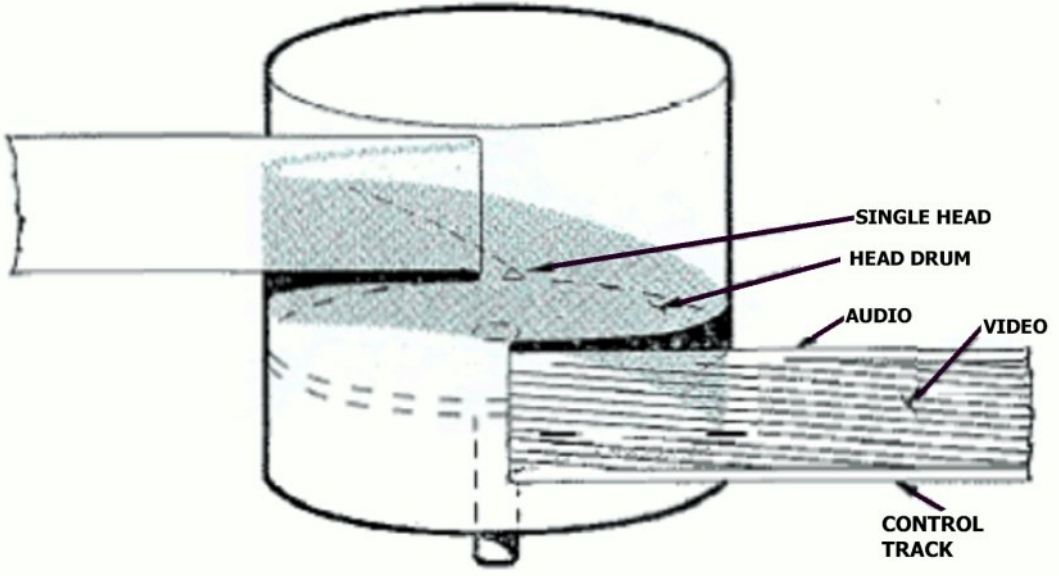
Helical VTR's were well established on the on the scene, but were all reel to reel based machines, using one of two format wraps, full Helical which was either Omega wrap or Alpha wrap, where a single video head laid down a single frame diagonally across the tape.

The alternative was half helical where two heads diagonally opposite to each other laid down one frame each, with a tape wrap of just over 180°.

The half helical became the choice for all the video cassette formats as it was much simpler for automatic loading.



Half Helical Wrap, Twin Heads



Full Helical Omega Wrap (always one head in contact with the tape)

Philips LDL 1000 suitcase version

Phillips produced the first VCR the N1500 in 1972, they already had a similar reel to reel recorder the LDL 1000 in production and it had a reputation for being simple reliable technology. It was only black and white with no in-built tuners or timers, just video and audio in and out so there was more work to do than just converting it from reel to reel to cassette.

I did own an LDL 1000 at the time and used it with a small dedicated B/W portable TV which was adapted to supply both audio and video to and from the video machine. There were no TV's sets around with AV connections back then. The recording time was short, but it was amusing to be able to record TV programmes in the home. It was reliable and was the talk of the neighbourhood, people always asking to see TV programmes replayed, such was the 70's.

The N1500 used a lot of the technology of the LDL 1000, the head drum looked identical.

The LDL 1000 also used eddy current braking for the drum servo EG free run the drum at about 110% of the required speed and then pull it into frame servo lock with the electrical brake, much simpler than using a motor drive amplifier to accelerate and de-accelerate the head servo.

The N1500 was also a colour machine, the LDL 1000 never was and although both machines were on the market in the early 70's a colour LDL 1000 never appeared and soon production ceased.

The major differences between the machines was the N1500 had an off-air tuner, cassette loading, timer, RF output, and was colour. The colour was the big step, all the reel to reel VTR's had been B/W with the exception of an early alpha wrap 1"machine from IVC, (the IVC was a direct colour record machine with the promise of a colour replay board at some time in future).

The N1500 did what it said on the tin, recorded and replayed colour, by using colour under, let me explain. Most of the reel to reel VTR's of that era limited the video bandwidth to exclude the colour subcarrier, this was often an exercise in reducing the picture noise. If this had not been done the colour would still not work because of servo jitter.

The Philips N1500 VCR

The drum servo has inertia, the servo samples the drum position once per revolution and then decides if it needs to speed it up or slow down for the next revolution, thus keeping frame lock by varying the current in the brakes. This produces servo jitter, that TV sets do not like.

Most TV time bases have inertia (fly wheel sync) to keep line lock should a sync pulse, be corrupted by noise. My portable set was no exception and I did spend time in the line time-base sorting the problem. The experience came from a day job working in an educational TV studio that used helical VT's and many monitors all had the same problem.

The TV sets soon changed, most used push button channel change and had one button reserved for VCR. The VCR button was also connected to the TV time base to remove flywheel inertia and stop line jitter on the picture (showed mostly at the top of picture).

The VCR had a TV modulator so it could appear as a TV station and providing you selected it on the dedicated button, it worked. The picture looked stable as the TV tracked the timing of the off-tape sync pulses. The jitter remained, but was now hidden, but not so for the PAL/NTSC decoder which could not cope with a signal containing tape jitter (SECAM was more tolerant) a solution to remove jitter to the colour signal in the VTR had to be found.

This was a two part solution, the colour was stripped off the incoming video and heterodyned down to a lower frequency, 565.5KHz. The video modulation was FM which suffers from reducing energy in higher frequencies hence pre emphasis, so at this lower frequency we will get more energy and better chroma noise.

The colour bandwidth was also reduced at the same time to help chroma noise, on replay this signal was heterodyned back to the original subcarrier frequency and combined with the luminance replay. The N1500 did this combining in the TV modulator, annoying if you wanted to add a video output, but it could be done.

This frequency changing would not normally correct the jitter, but if we jitter modulated the heterodyne VCO (Voltage Controlled Oscillator) then we could cancel out the jitter and have a stable colour signal.

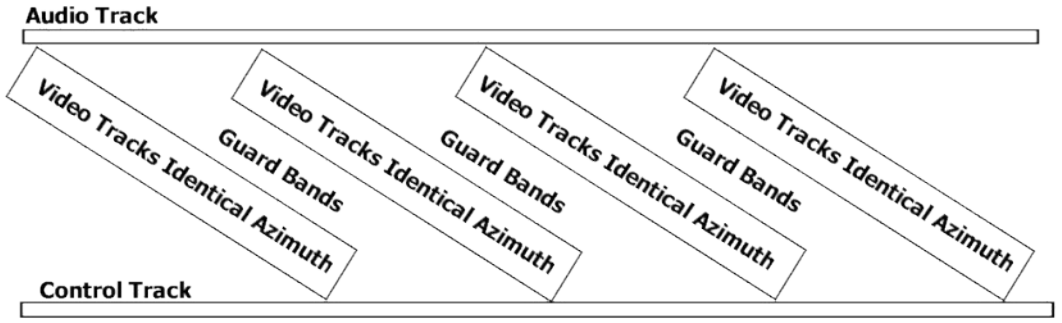
The colour content could be decoded, pictures weren't brilliant, they were nowhere near full bandwidth, which was always a trade-off between definition and noise, but this technology introduced time shifting, storing and even buying or renting pre-recorded tapes and connected with the public. As a result the technology flooded the market.

The cassettes were big and clunky, and recording time was short, improvements were made to make the tape thinner (LP long play) that extended recording times, but not enough.

I never investigated adding colour under to my LDL 1000 set up, I had built several for friends, similar to my own, but the market was dwindling so I sadly parted with my own equipment and invested in an N1500, probably not the best move at the time.

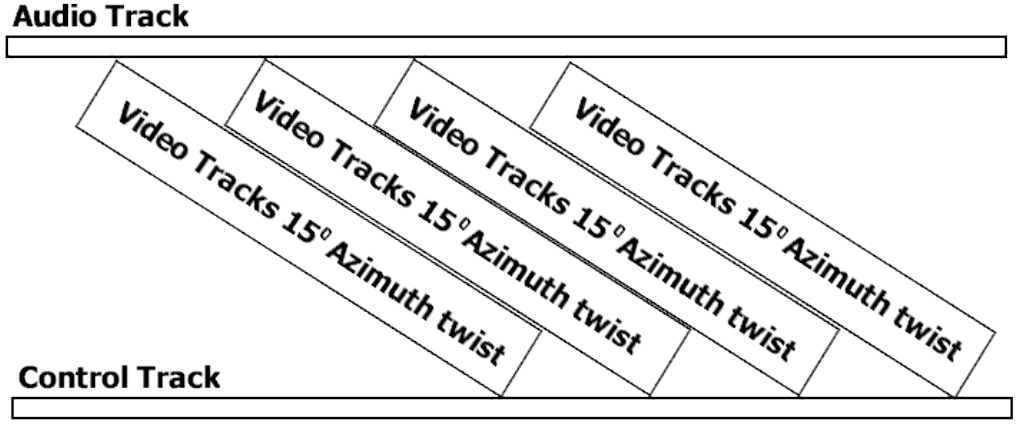
The next technology was Betamax and VHS, which came up with a trick Phillips missed. The video tracks on the tape had been traditionally separated by a guard band which was necessary to ensure the head only scanned the desired track or at worst a track and some guard band, if it scanned any of the track laid down by the other head then the picture was servilely impaired. The tracking control function was to centre up the head on the scan and avoid this.

The guard band was necessary, but also wasted tape, or shortened recording time, whichever way you look at it.



Guard Band Format

Betamax and VHS removed the guard band, so the tape could move slower and make longer recordings, instead of a guard band to stop head one seeing head two tracks or vice versa, they set the heads at different azimuths typically 15° in opposite directions. If you have ever adjusted azimuth on an audio tape machine you will know how very minor adjustments cause lack of HF, well the FM carrier was around 3 MHz and 15° was enough to eliminate the need for a guard band, each head could not see the others tracks so the Betamax and VHS cassettes could be smaller and record for longer.



Non-Guard Band Format

N1700 VCR 5 years after the N1500 Launch

Philips had missed a trick, their cassettes were big and played for half the time, they revised the N1500 some 5 years later to introduce the N1700 (with azimuth twisted heads and no guard band) the same cassette played twice as long, but although the N1500 and the N1700 used the same cassette they could not play each other's recordings.

If I had not parted with my LDL 1000 then it would have been interesting to see if a N1700 head assembly would fit, but it would have then needed the capstan to run at half the speed, to reap the benefits of this no guard band format and this was not a servo controlled capstan machine, just a mains driven motor. A lot of investigative work would be needed that I could not roll out to any of the LDL 1000 set ups I had put together for interested neighbours , there machines would belong to VTR heaven and be replaced by VHS or Betamax machines.

The introduction of the thinner LP tape extended recording time (EG more tape in the cassette), but thinner tape often caused tape damage. Interchange on the N1500 was not good and the machines often developed stiffness in the head bearings, so the drum speed fell below 100% and did not lock.

Recordings were then made where the head switching at the bottom of the picture would revolve through the picture.

The 70's started TV time shifting and the video rental industry, the technology improved with bar code reader to select recording times and on-screen menus to help the viewer.

While all this work to improve video performance was happening, I was asked by a work colleague "how do you stop video copying", "I don't think it's possible for a VCR to know it is recording another VCR" was my answer, at the time the technology was analogue, so the second copy was subject to considerable degradation. What was interesting was the R&D engineer behind the question, John Ryan who eventually did come up with a solution.

Johns solution accepts that it is not possible to easily detect that the incoming signal is a VCR, (I got that bit right), but it is possible to add a signal to a VCR recording to stop it being recorded by another machine, but at the same time does not upset a TV receiver.

This works by inserting a signal in the vertical blanking, which is a fast-moving fake test signal. Since the TV is not displaying anything during the blanking interval, nothing shows up on the screen. This was called Macrovision copy protection.

The VCR is different during vertical blanking, where there is no picture it measures the video level and sets the AGC (Automatic Gain Control) this signal corrupts that process and can really mess up a recording with level fluctuations.

If you look at the LDL 1000 picture it has a manual video level control so it would defeat this anti copying. This was the case for several machines that unintentionally defeated this video copy protection.

There were also devices to remove Macrovision copy protection and circuits available on the net for the keen constructors to build, until the USA introduced the Millenium Copyright Act under which no analogue video recording devices may be manufactured that does not contain Automatic Gain Control circuitry.

Macrovision had already become a corporation in 1983 with John as chairman and CEO and today has more than 1000 employees.

So perhaps I had the right answer and was just asked the wrong question, I will never know. John was one of the brightest engineers I have met and helped no end of bumbling circuit designers like myself on numerous occasions, it was really pleasing to see one of his ideas hit the big time.

The 70's was rich time for inventions :-

- Apple II. …
- Sony Walkman. …
- C (programming language) …
- TRS-80. …
- Digital Camera. …
- Atari 2600.

To mention just a few and I hope we can look at some of them in a future edition of CQ-DATV.

BREAKING NEWS! – We have a NEW 23cm BPF!

Written by Jim Andrews, KH6HTV
Reprinted from Boulder Boulder Amateur Television Club TV Repeater's REPEATER January, 2020
https://kh6htv.com/newsletter/

Our ATV repeater has suffered from RFI issues on the 23 cm input. In 2012, the FAA installed a new radar at DIA. At the time our input frequency at 1277 MHz was quite close to the radar's frequency and it totally clobbered us. We received permission from the CCARC, the Colorado frequency coordinating body, to move to the bottom end of the 23 cm band.

Don, N0YE, scrounged thru his microwave junk box and found a 1.5 GHz band-pass filter that he modified down to the 23 cm band. With it we were able to suppress most of the radar energy. But not enough. Boulder ATV hams with weak DVB-T signals into our repeater have been suffering from loss of audio and lots of freeze frames.

Monitoring the signal to noise ratio on incoming signals shows a definite fluctuation in S/N. Even for very strong signals showing S/N of 23dB, (the max. with QPSK), we see a periodic drop in S/N. The S/N drop rate corresponds to the rotation rate of the radar antenna. Tests with a spectrum analyzer show the radar energy was spread from 1259 to 1269 MHz with dual peaks at 1261.25 & 1266.5 MHz.

What we really needed was a much better filter on our receiver. But where to find one? Fortunately, within our Boulder ham community we have a Fellow of the IEEE who is a world-wide recognized expert and designer of microwave filters. Dan Swanson, WB9AIA is our man! To find out more about Dan, check out his web site: *www.dgsboulder.com*.

Dan offered to design a custom, 23 cm Band-Pass Filer (BPF) for our ATV repeater. The key specs. for Dan were a pass-band from 1240 to 1246 MHz for our DVB-T signals and ultimate rejection of the FAA radar from 1259-1270 MHz.

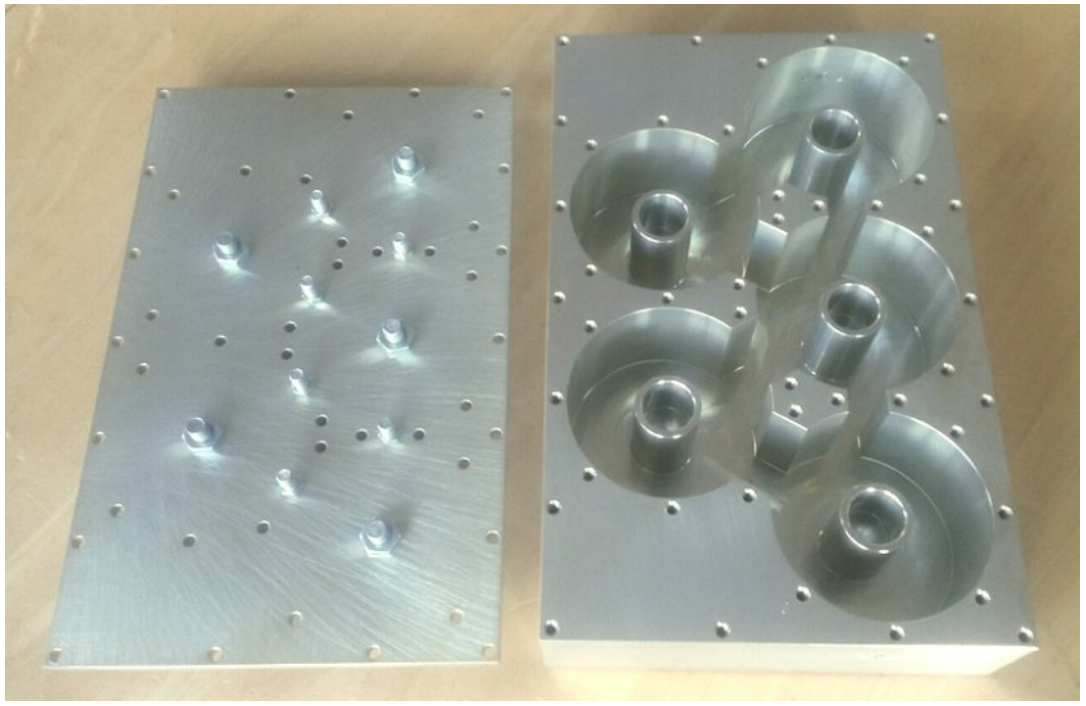
After Dan came up with a design, the next question was how to build it. Dan's design required the services of a precision machine shop. Don, N0YE, said he knew of just the place and it was run by another ham. Don and Dan then contacted Mark Lewis, N0IO, in Grand Junction, Colorado.

Mark's company - Jabil Lewis Engineering, is a precision machine shop specializing in aerospace products, including custom microwave parts.
Their web site is:
https://www.jabil.com/contact/locations/grand-junction.html

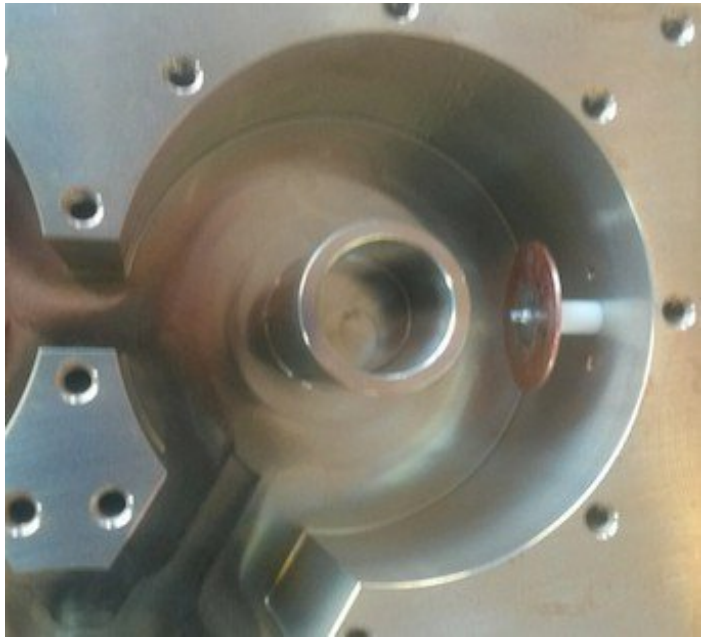
The BPF Dan designed for us is a 5th order, comb-line, cavity filter with two inductive cross-couplings. The cross-couplings put "zeros" on the high side of the pass-band. Mark then fabricated it by machinging it out of a solid piece of aluminum of 8 1/4" x 5 1/4" x 1 5/8".

Dan pre-tuned the filter by setting the tuning screws to his design dimensions. He then tested the BPF on a vector network analyzer. His predictions were extremely close. The initial passband was only about 4 MHz too high. The plot (next page) of S21 and S11 shows the results after he then fine tuned the filter. The traces in blue are the theoretical predicted responses while the red traces are the actual measured performance after fine tuning.

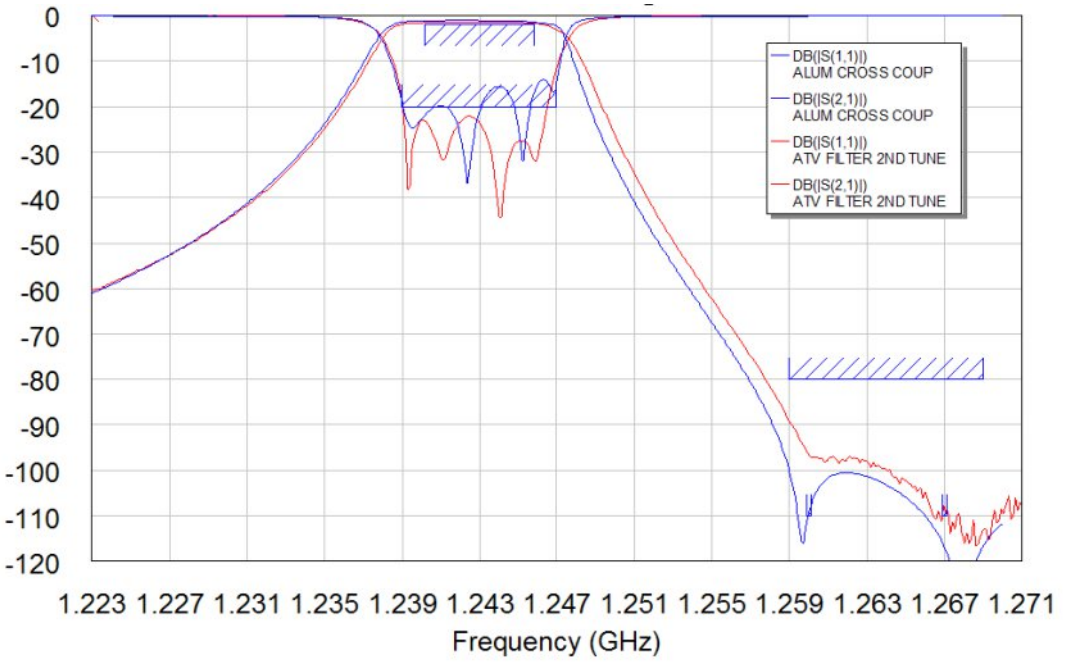
After receiving from Dan, the finished filter, I (Jim, KH6HTV) then measured the filter using my Rigol spectrum analyzer with a built-in tracking generator. The dynamic range of my measurements with it were only about 70dB, thus I was unable to see the really deep rejection notches for Dan's filter.

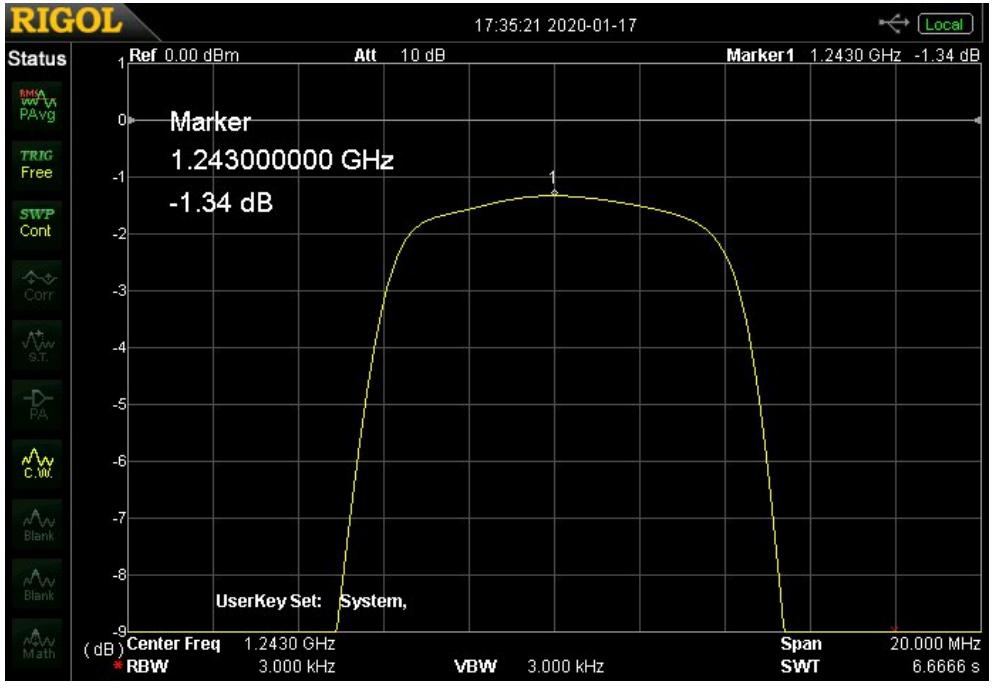


The interior along with the cover plate. The tuning screws are in the cover plate

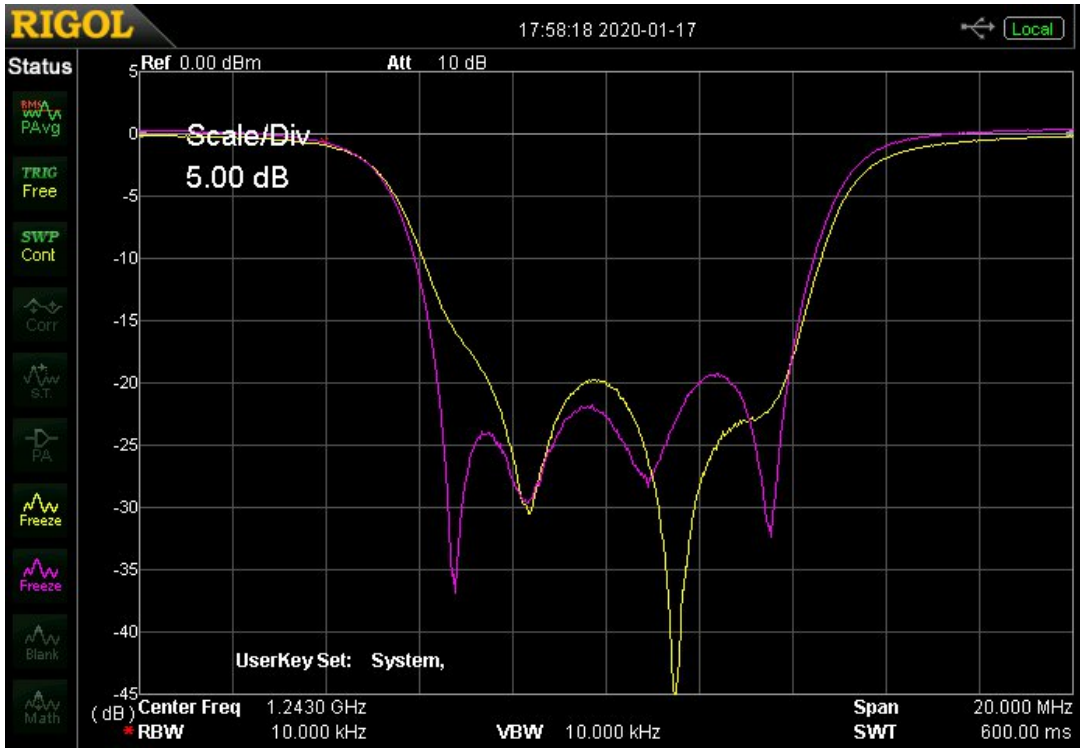


The input coupling from an SMA connector





S21, pass-band Insertion Loss of the WB0AIA, 23cm BPF. center frequency = 1243 MHz, 20 MHz span 1 dB/div & 2 MHz / div



S11 (magenta) & S22 (yellow) Return Loss of WB9AIA 23cm BFL center frequency = 1243 MHz 20 MHz span 5 dB/div. & 2 MHz/div

I did however confirm them to be what Dan measured by then doing CW measurements with a signal generator and the spectrum analyzer. My measurements showed that the insertion loss in the center of the pass-band at 1243MHz was -1.3dB with a very flat reponse across the desired 6 MHz pass band.

The -3dB bandwidth was 9 MHz. For -10dB, it was 11.1 MHz. For -20dB, it was 14 MHz. For -30dB, it was 17.5 MHz. The above photos from the Rigol are my measurements of the S21, S11 and S22 for the pass-band.

They confirm Dan's results.

The next step is for Don & I to make a trip to the repeater site and remove the repeater. I will bring it to my QTH ham shack and make the necessary modifications to install Dan's new filter. Plus we have some other mods we want to do at the same time. Hopefully it will only be off the air for about a week or so.

The next newsletter will report on our success dealing with 23cm radar RFI (Hopefully??!!).

ATSC 3.0: The next-gen TV update is coming in 2020

You might not have heard about it much yet, but 2020 will be the year that ATSC 3.0 begins to reshape the TV landscape in the U.S. It's a massive overhaul for antenna-based TV, also known as over-the-air (OTA) TV. If you think the days of paying attention to broadcast TV are over, you should read on.

ATSC 3.0 (which also goes by the more catchy "NextGen TV" moniker) may sound like the name of a new Star Wars vehicle, or possibly a standardized test required to get into grad school. But in fact, it's a major upgrade for antenna TV, designed to allow for 4K resolution and even a major sound upgrade to broadcast TV.

The switch could be as significant as the transition from analog broadcasts to digital HD — except this time it's going to be a whole lot easier. Follow us below to find out all you need to know about ATSC 3.0.

What is ATSC 3.0?

ATSC 3.0 is the latest version of the Advanced Television Systems Committee standards, defining how exactly television signals are broadcast and interpreted. OTA TV signals currently use version 1.0 of the ATSC standards, which were introduced all the way back in 1996, initiating the switch from analog to digital TV that was finalized in the U.S. in 2009. Unlike the current standard, ATSC 3.0 makes use of both over-the-air signals and your in-home broadband to deliver an experience closer to cable or satellite.
If you're wondering what happened to ATSC 2.0, it was basically outdated before it had the chance to launch. All of the changes that were added in ATSC 2.0 have been integrated into ATSC 3.0, which is now close enough to launch that ATSC 2.0 was essentially skipped.

What are the benefits?

The first major benefit is picture quality. While the current ATSC 1.0 standard caps out at 1080p — and even that is rare to find when it comes to OTA TV — the new standard allows 4K UHD broadcast. That's not all either. Other picture quality upgrades, including high dynamic range (HDR), wide color gamut (WCG), and high frame rate (HFR) are all part of the new provision. The standard also allows for possible extensions later on, which could enable additional benefits to picture quality, possibly including 8K resolution.

ATSC 3.0 also includes benefits for reception, meaning you should be able to receive more channels in higher quality without the need for a large antenna.

Audio quality is increased as well, using Dolby AC-4 instead of AC-3, allowing for broadcasts of up to 7.1.4 channel audio to support object-based sound formats like Dolby Atmos and DTS:X. AC-3 is limited to just 5.1 channel surround.

In addition to the picture and audio improvements, ATSC 3.0 also makes it possible to watch broadcast video on mobile devices like phones and tablets as well as in cars. Advanced emergency alerts are also part of the standard, including better geo-targeting, which means advancements like the ability to broadcast evacuation routes to areas that need that information.

What are the downsides?

ATSC 3.0 is not backward compatible with ATSC 1.0, which means that if your TV doesn't include an ATSC 3.0 tuner, you'll need an external converter to make use of those signals. Fortunately, due to the way that the newer standard works, you would only need one converter box no matter how many devices you're watching on, meaning it won't be nearly as much of a hassle as the move from analog to digital.
One other possible downside, depending on how you look at it, is that the same geotargeting that allows for advanced emergency alerts can also be used for targeted ads. This means that the ads you see on TV will start to more closely resemble what you see online. If this doesn't bother you on the web, it shouldn't bother you on your TV, but it is something to be aware of.
How does it work?

As mentioned above, ATSC 3.0 combines OTA broadcast signals with your home internet. At the base level, actual programming like shows and movies are broadcast and received over the air, while commercials are provided over the internet. Three different video formats are supported: Legacy HD, which supports resolutions up to 720×480; Interlaced HD, which supports signals up to 1080i; and Progressive Video, which supports resolutions from 1080p up to 4K UHD.

An ATSC 3.0 tuner will have two connections: One to your antenna, and another — either via Wi-Fi or Ethernet — to your Wi-Fi router. The benefit here is that you'll only ever need one antenna in your home, since other set-top boxes, smart TVs, and mobile devices in your home will receive the TV signals over Wi-Fi. This is somewhat similar to the way master DVR and satellite boxes are employed by cable and satellite companies, only without the need for specialized equipment.

Am I going to need a new TV?

The short answer is no. As explained above, if your TV doesn't support ATSC 3.0, you'll be able to get by with an external converter box. That's if you want to receive ATSC 3.0 signals at all. This time, it's your choice. At CES 2020, Madeleine Noland, president of the Advanced Television Systems Committee, announced that there will be 20 models of external *ATSC 3.0 tuners* coming to market in 2020.

The switch from analog NTSC video to digital ATSC video was a mandatory one, with a plan for a full switchover and a deadline for that switch from very early on. When the Federal Communications Commission (FCC) approved *ATSC 3.0*, it did so in a way that allowed stations to broadcast in the new format on a voluntary basis. This is not a mandatory switch. More to the point, stations that do voluntarily broadcast in ATSC 3.0 must continue to offer ATSC 1.0 signals for at least five years after the switch.

That said, newer TVs that include ATSC 3.0 tuners will be able to make use of all the benefits of the new standards by default. If your current TV doesn't support 4K or HDR, you'll need to upgrade to view that programming. Then there is the matter of the future. As mentioned earlier, unlike ATSC 1.0, the new version allows for extensions, which could mean eventually you may need to upgrade to an 8K TV to take advantage of everything the standard has to offer.

At CES 2020, several TV makers, including LG, Sony, and Samsung, announced ATSC 3.0-compatible TVs for the U.S. market. LG, which has been a co-developer of ATSC 3.0, will sell six compatible models including the 55-, 65- and 77-inch class GX Gallery Series 4K Ultra HD models, the 65-inch class WX Wallpaper 4K model, and 77- and 88-inch class ZX Real 8K models.

When can we expect ATSC 3.0 to arrive?

Various television stations have been conducting test broadcasts of ATSC 3.0 since 2014, but this was before the standard was even fully finished. In October 2018, major station groups including Fox, NBC, Tegna, and Nexstar Media Group announced their support for a *2020 rollout* of ATSC 3.0, at an event tellingly titled "Monetizing the Future." By then end of 2020, we can expect up to 40 markets across the country to get ATSC 3.0-broadcasting stations, according to industry source *TV Technology.*

These include Fox television stations, NBC Universal Owned television stations, Univision, SpectrumCo (whose members include Sinclair Broadcast Group and Nexstar Media Group), and others.

Is anyone already broadcasting in ATSC 3.0?

In the U.S., test markets have begun rolling out using the finalized version of the standard. In November 2017, the *National Association of Broadcasters* was granted a license to begin operating a "living laboratory" in Cleveland, broadcasting ATSC 3.0 in full power.

Similarly, seven broadcasters are preparing to launch a *"model market"* in Phoenix. More recently, a single station has begun broadcasting the standard in *Chicago* and another four-tower installation in the Dallas-Fort Worth area of Texas began broadcasting in *March of 2019*.

Outside of the U.S., the standard is already being adopted. The three major local broadcasters in South Korea — MBC, KBS, and SBS — began broadcasting ATSC 3.0 in May 2017. The 2018 Olympic Winter Games in South Korea was broadcast using the new standard.

So when will I be able to use it?

Now that the first NextGen TV broadcasts have begun and a limited rollout planned for 2020, and ATSC 3.0-capable TVs and tuners are beginning to trickle into the market, the earliest adopters can start watching ATSC 3.0 signals this year. For the rest of us, it could be a good deal longer.

As for a full switchover, that will be a long time if and when it even happens. Since this isn't a mandatory switch, broadcasters can continue to use ATSC 1.0 for as long as they like.

Even on a station-by-station basis, with the mandatory five-year period that stations must offer ATSC 1.0 signals, a station that started broadcasting the new standard in 2018 wouldn't be able to drop ATSC 1.0 entirely until 2023.

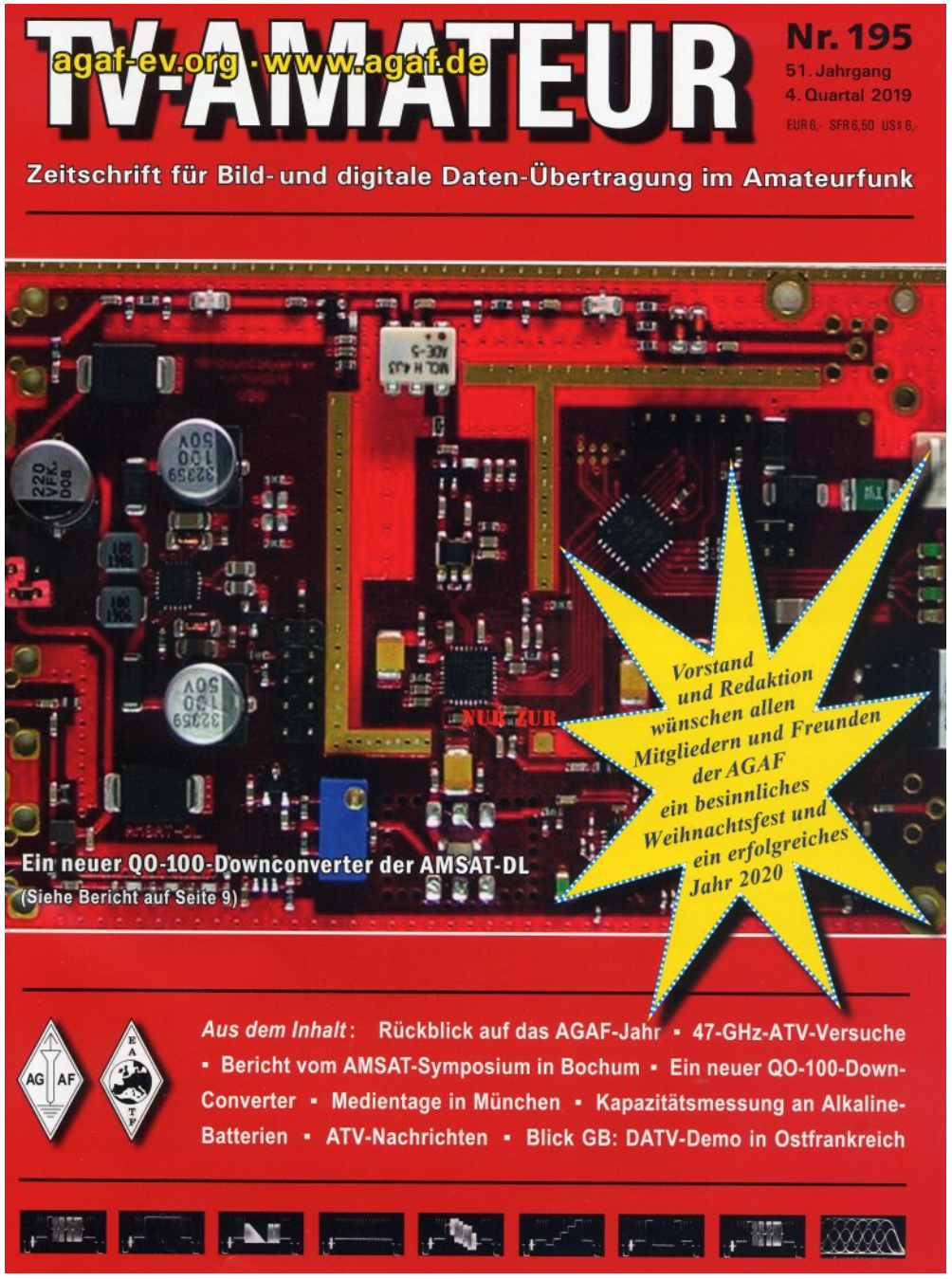
Of course, there is always the possibility that something else may come along and replace ATSC 3.0 before it gains a foothold. This has happened before as described above with ATSC 2.0 which was superseded by ATSC 3.0 before it even had the chance to be finalized.

Your first ATSC 3.0-compatible device may not be a TV. Depending on how recently you bought your last TV, your next phone might be the first device that lets you watch broadcasts in the new standard: *ONE Media 3.0*, a subsidiary of Sinclair Broadcast Group — big backers of the ATSC 3.0 standard — introduced new mobile receiver chips in January 2019, which it intends to provide on a subsidized basis to smartphone manufacturers.

Of course, watching free OTA TV on your phone would require the cooperation of companies like Apple, which have so far expressed no interest in integrating ATSC 3.0 chips into its devices. Given its investment in its own paid streaming platform, Apple TV+, it doesn't have a lot of incentive to provide customers with a free, high-quality broadcast option. Assuming it does take over, the adoption of ATSC 3.0 will likely be a slow one. If you're jumping at the chance, you don't have to wait for too long, but if you're put off by the idea, it's something you can safely ignore for at least a few more years.

References:

The Advanced Television Systems Committee, *https://www.atsc.org/*



TV Amateur is a German Language ATV Magazine.
It is published 4 times a year.
Please note the website is currently off-line.

What is wrong with ATV today?

First published in issue 6

I think the short answer is not a lot we are progressing on the digital front with the introduction of DATV systems that will deliver better picture quality from lower transmitter powers that use less bandwidth. At the same time we have seen a growth of ATV use of the Internet for repeater monitoring and communications such as the recent ATV QSO party.

What is failing is the traditional ATV magazine and this is due to a number of reasons, the first being lack of copy, many of the people who used to write copy for ATV magazines now operate their own websites and use them to directly publish their own work.

The second reason is cost, there is no getting away from it, printing and postal cost for traditional paper based magazines is at an all time high, BATC membership with printed magazine subscription for an overseas member outside the EU is £27, this was expensive when 4 magazines a year were being delivered, but now in the third quarter of 2013 and only two magazines appearing (only one printed) it means CQ-TV is becoming one of the world's most expensive magazines to produce and deliver.

Here at CQ-DATV we have tried to buck that trend by delivering an eBook magazine that is free to all ATV enthusiasts. Yes we have chosen an unusual format but one that we feel will grow.

The original format experiments were done by myself producing eBook versions of CQ-TV, but converting an existing magazine is harder than creating one in that format from scratch. BATC looked into automating the process by buying expensive new software indesign 6, but it would seem there are difficulties as the eBook versions are not being expanded. It does not help when Amazon, who has been famous for producing the non standard format of eBook file (mobi) introduced the additional format AZW3, at a time when the industry is trying to standardise on ePub.

We also had concerns about if we could support serious constructional projects on the small screen of an eBook, but having looked at the last 5 issues, all of which have had technical changes in the way they are produced, I think we can stand back and say it works, the only criticism is that we do not produce a 4th format PDF version.

While this would be desirable there is no simple solution, all the three eBook files we produce are created in a similar way to web pages, so they can flow to create the best format for various mobile screens. We use free software to produce CQ-DATV, but even if we threw money at it there is not a better solution. The PDF format is a more rigid on screen sizes and although it can be read by a modern tablet, it does not perform well on differing screen sizes.

So is the answer to ATV magazine distribution the eBook?

Well it's electronic, so we can produce and distribute it free and you can read it away from your PC, this has to be a start in the right direction. I also believe electronic publication might be the door to producing what ATV needs and has never had, a monthly magazine, something that is topical and up-to-date.

If it is distributed free and available on the first of every month as a download, it could have a more topical content to its news section and coming events but still retain that mainstay of any ATV magazine the constructional article. CQ-DATV is produced by a team but that team has only one

task and that is to create copy for our magazine and this is the only way we have been able to create the number of magazines we have produced this year.

There are no background tasks for the team and this is important because background tasks always get elevated to foreground task, we have all seen it happen and the only solution is to minimise the tasks or better still eliminate them all together.

CQ-DATV works, our first issue had 1654 downloads, that's more than twice the number of people subscribing to CQ-TV, but then we are delivering a no cost magazine and price has always been and always will be an issue.

So here at CQ-DATV we have taken the giant leap of faith in ATVer's by producing an electronic only magazine in the belief that this is the future and all ATV enthusiasts can read the format. Yes there is effort involved and at different levels, the PC only reader needs to download free reading software such as Calibre. The owner of a WI-FI less tablet has to use a PC download and USB transfer lead to load CQ-DATV on to his or her tablet, again through software like Calibre. The Wi-Fi equipped tablet can just be pointed at our site and our publication downloaded, perhaps the winner being the iPad which then opens the correct software iBooks so you can start reading.

Even easier, with no specific software required, is to use your favourite web browser with an ePub reader 'plug-in'. These are available for Firefox, Seamonkey and Chrome (I use Readium™)

One thing all these systems have In common is the HTTP link that enables articles to be written in a different way to deliver a more interesting article with links to open detail for those that require it.

What is stopping us becoming a monthly magazine? Well the short answer is you the reader. No magazine can survive if it has no contributions from its readers and to this end we are looking to expand our editorial team.

Writing articles for CQ-DATV is not daunting, either let us have an outline and we will discuss it or go for a full head on contribution, we can polish it if required, but most of all we can fly your article to our readers and we hope by doing this to pull the ATV community together with a common purpose under a common banner sharing designs thoughts and ideas through a free ATV magazine that we hope will be read by all ATV enthusiasts, we just need a common purpose and we can grow this hobby of ours.

Continued next page

..and today...

The above is a reprint from a CQ-DATV when we were still pondering our future.

Now with hindsight we know:-

It is possible to produce an electronic magazine, the largest download of a single issue of CQ-DATV is 17,819.

PDF downloads are more popular than ePub, but when Ian was out of action over Christmas, we were late with the ePub version and it was missed by our readers.

Copy has always been a problem and you do keep seeing the same names behind lots of the articles.

The download site, which is mainly software, is very popular.

The article mix we have adopted is wide and we hope that this means there is something for everyone inside every issue.

The electronic only format has been essential and without it http links would be problematic.

PCB support for projects has not been implemented, but we have ideas that might yet come to fruition.

Ian Pawson, Editor CQ-DATV

This is your free ATV magazine.
Please consider contributing an article!

WELL READ THE WORLD OVER

CQ-DATV

External links

If you have an eBook reader that does not have WiFi then you will not be able to use the hyper-links in this publication. If you have an eBook reader that has WiFi then you will be able to providing you are in a WiFi zone.

But if you have a Kindle 3G then yes, but only to Amazon, and there is not a lot of ATV material on their site.
Smart phone reading apps are ok providing that you have a 3G data connection.

Note: These links will fire up your devices browser and if you are using 3G/4G then you will incur data usages charges.

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dotMOBI publications - *https://cq-datv.mobi*

Author Guidelines

CQ-DATV welcomes contributions from our readers. It does not necessarily have to be on ATV, as long as it is of interest to our readers.

Although a formatted article showing the layout can be sent, we prefer an unformatted text file of the script, along with annotations of where important images should be placed. All images should be identified as Fig 1 etc and sent seperately.

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.

Coming up in CQ-DATV

Is this the latest issue of CQ-DATV? *Click here* to go to our web site to check to see if there is a later edition available.

CQ-DATV is published on the last day of the month. The cut-off day for submissions/corrections/alterations is 5 days before the day of publication.

Please note that this mailing list is only used to advise interested people about the availability of new issues of CQ-DATV magazine. The list is not, and never will be, shared with any other organisations.

Want to be notified when issues of CQ-DATV are published? Join our *mailing list*.