CQ-DATV

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DKARS Magazine July 2015 is now ready for download

The DKARS (Dutch Kingdom Amateur Radio Society) issues its own free PDF Magazine once every month.

It contains articles written in English and Dutch.

If you would like to receive the free magazine, please register via: *magazine@dkars.nl* and you will automatically receive the magazine via an email with a download link.

This month on 56 pages we present you the results of the first Dutch Kingdom Contest which was held on June 6 and 7.

And lots of other news of course.

Downloading can be done direct from this link :
http://downloads.dkars.nl/DKARS Magazine 201507.pdf
And browsing online is also possible,
http://issuu.com/pj4nx/docs/dkars_magazine201507
Or go to: *www.dkars.nl*

Spreading the word

More than 200 radio amateurs visited the British Amateur Television Club (BATC) stand at the International Amateur Radio Exhibition at Friedrichshafen, in Germany, and it was a "very busy and worthwhile" three-day event promoting both amateur television and the BATC, writes club chairman Noel Matthews, G8GTZ.

Enthusiasts from across Europe, and beyond, were shown demonstrations of the latest reduced bandwidth digital television (RB-TV) project with many commenting on how impressed they were with the MPEG-4 picture quality using just 500kHz bandwidth.

The new USB tuner project Minitiouner demonstrated by F6DZP also created a lot of interest.

Phase 4 spacecraft frequencies

At the Hamfest event at Friedrichshafen in June, more information was provided about the exciting new Phase 4 amateur satellites presently under construction.

DATV News

P4A – This is a hosted payload on the geostationary spacecraft Es'hailSat 2.

This spacecraft will be located at 26 degrees east. Launch is expected in late 2016 with operations commencing shortly thereafter.

This spacecraft will carry two amateur radio linear transponders. One will consist of a 250 kHz wide linear analogue transponder and the other will be a transponder for experimental digital modulation with an 8 MHz bandwidth.

The proposed frequency plan for this spacecraft is:

Narrowband transponder:
• *Uplinks: 2400.050-2400.300 MHz*

• Downlinks: 10489.550- 10489.800 MHz

Wideband transponder:
• *Uplinks: 2401.500 – 2409.500 MHz*

• Downlinks: 10491.000 -10499.000 MHz

P4B – This is a hosted payload on a US geosynchronous spacecraft.

This spacecraft is expected to be initially located over America.

The transponder will use digital modulation schemes with FDMA up and TDMA down. In addition, there will be linear transponder facility.

Ground station hardware is already well developed and the launch is expected to take place in mid 2017.

The proposed frequency plan for this spacecraft is:
• Uplinks: 5655-5665 MHz
• Downlinks: 10455-10465 MHz

Further, similar, High Earth Orbit, projects were also mentioned during the meeting. These will also use downlink frequencies in the 10 GHz band in the Amateur Satellite Service.

AMSAT-UK *http://amsat-uk.org/*

German Ham Radio call sign list

The German regulator, the Federal Network Agency (Bundesnetzagentur), has published a 790 page PDF of amateur radio callsigns, names and addresses.

The file is available for download at:

http://www.bundesnetzagentur.de Once at the site, enter the following word into the search panel at the top right of screen: **Rufzeichenliste** (Note, stay in the German language version). Then look for a pdf file of approx 10mb with the word in the title (ninth in the list at time of publication)

Further information on this along with a request for radio amateurs to help in tracking Bats fitted with VHF transmitters can be seen in Google English on the DARC site at: *http://tinyurl.com/GermanyDARC*

DATV News

Astronaut Samantha Cristoforetti IZ0UDF with the HamTV transmitter in the ISS Columbus module

International Space Colloquium at Guildford

The AMSAT-UK International Space Colloquium will be held on July 24-26 at the Holiday Inn, Guildford, GU2 7XZ, UK. Among the speakers will be:

- *Peter Guelzow DB2OS with an update on AMSAT-DL projects, including the Phase 4 satellite*
- *Chris Brunskill, formerly of Surrey Space Centre (SSC), now working at the Space Catapult at the Harwell Campus. He will be presenting an extremely novel project aimed at schools and education*
- *It is hoped the BATC will be able to demonstrate live Digital TV reception from the International Space Station, using the Ham TV system*
- *Drew Glasbrenner KO4MA, from AMSAT North America will be attending, and presenting the latest news of the FOX satellite(s) due for launch later this year, and also on their Phase 4 project*

QSO party

The DATV QSO Party will be held on Friday 21st and Saturday 22nd of August Eastern Australian Standard Time. The preferred method of operation is to maximise the use of amateur ATV. Stations in Columbus Ohio, Southern California and the UK will work though their local repeaters, with the international connections being made by Skype through local anchor stations. Art, W8RMC will anchor in Columbus, Don KE6BXT in Southern California and Peter VK3BFG in Melbourne Australia.

The Australian connection will use DATV Repeaters in Port Pirie, Melbourne, Sydney and Brisbane. I am aware that there are technically better options than Skype, however it is a common denominator and is being improved. Any station who would like to participate please contact Peter VK3BFG at *pcossins@bigpond.com* All would be welcome.

Welcome to CQ-DATV 26. A lot has happened since our last issue. Let's start with the evening of June 29th, when one of you downloaded the 100,000 copy of CQ-DATV magazine. No, we do not know who it was, or where they live. We do know it does not have a golden cover that will take you into Willy Wonkers Chocolate factory, but from a standing start in February 2013 it is sufficient to say, "didn't we do well". So an extremely a big thank you to everyone that has contributed to CQ-DATV. Perhaps by the 250,000 issue we will have better circulation tracking in place and although we may not be able to offer you a tour of the chocolate factory we will come up with a suitable less fattening alternative.

Friedrichshafen came along and our German correspondent Klaus Kramer DL4KCK was there and has produced part one of his report in this issue.

The IARU ATV contest, was revitalised with its new date, extended window and, revised rules on roving stations. The results are out already and the winner is.... I won't spoil it for you and you don't have to close your eyes the results are in this issue.

The International Space Colloquium also took place as usual in Guilford across the weekend of July 24 -26. So much happening, but we have found time to put CQ-DATV 26 together.

In this issue John has been back in the CQ-DATV lab and has come up with a 12GHz frequency counter with Rubidium lock. Trevor bought a new camera and has been out filming his son's wedding in HD. This has also opened the door to H265, with some downloadable clips for you to experiment with. For those not familiar with H265, this is the next advance in video compression offering a 40% saving on speed or files size over H264, so is this the door into improving Reduced

Bandwidth DATV? Richard Russell G4BAU the BBC test card guru, (remember the Blue ATV Handbook design) is back explaining the developments that have led up to his third generation test card design.
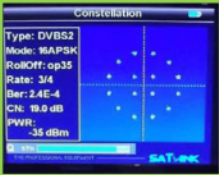
The skill test is still with us and has the answer to the counter conundrum and has a new challenge in de-bouncing switches for a logic counter.

So enough of the team, please sit back and enjoy CQ-DATV 26. The only free publication dedicated to ATV with a broad church approach that we hope has something for everyone.

The CQ-DATV Production team

12 GHz Frequency counter with Rubidium lock

by John Hudson G3RFL

Frequency counters are becoming common place even at microwave frequencies. They work buy counting cycles for a preset period of time and then converting this count to frequency. The count is only as accurate as the time period of the counting, so we strive to make the period of the count as accurate and stable as possible. To this end I used a Rubidium module which is a self contained, solid state, modular, atomic frequency standard (yes from eBay).

The actual Rubidium module
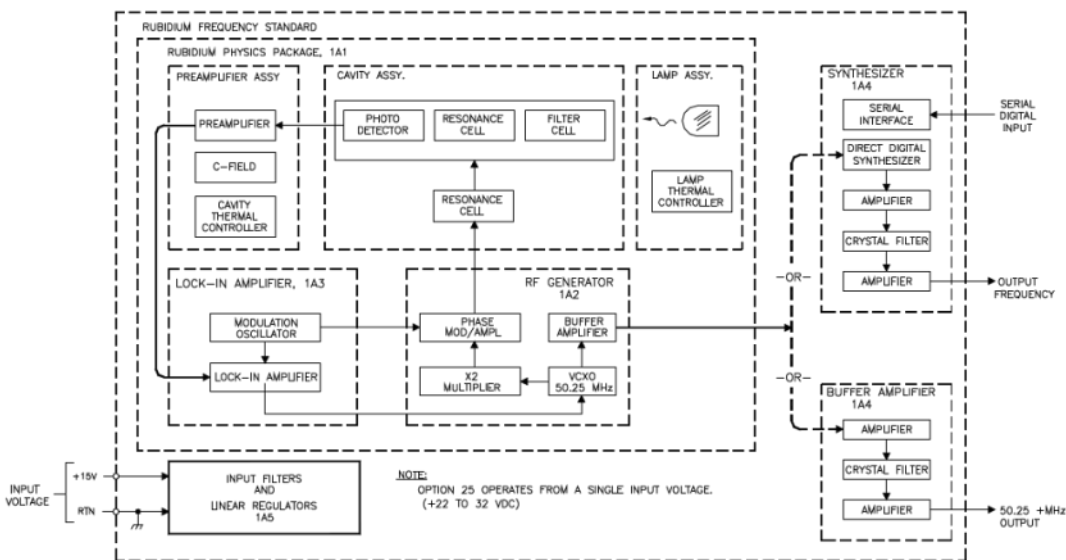
Rubidium module block diagram

These professional modules were once the province of high grade professional test equipment. The BBC used one to generate a very accurate colour subcarrier, at TV centre, no I never expected them to start turning up on eBay at prices I could afford, but they do now and well I reached for the

chequebook and a now the proud owner of a Rubidium module.

Circuit diagram

My module requires +12v and +5v and delivers a 10MHz output. Once powered up it does take time to lock up around 4 minutes, it draws 2amps, but this drops to 900mA once locked.

The module knows when it is locked and indicates this with a low logic state on pin 3, this lock information is fed into the PIC micro controller along with the 10MHz output which goes via a 74LS14 buffer.

Here it opens a gate to allow the input signal cycles to be counted. This is fed via an HMC363S8G(E).

This is a low noise Divide-by-8 Static Divider with InGaP GaAs HBT technology in an 8 lead surface mount plastic package.

This device operates from DC (with a square wave input) to 12 GHz input frequency with a single +5V DC supply. The low additive SSB phase noise of -153 dBc/Hz at 100 kHz offset helps the user maintain good system noise performance.
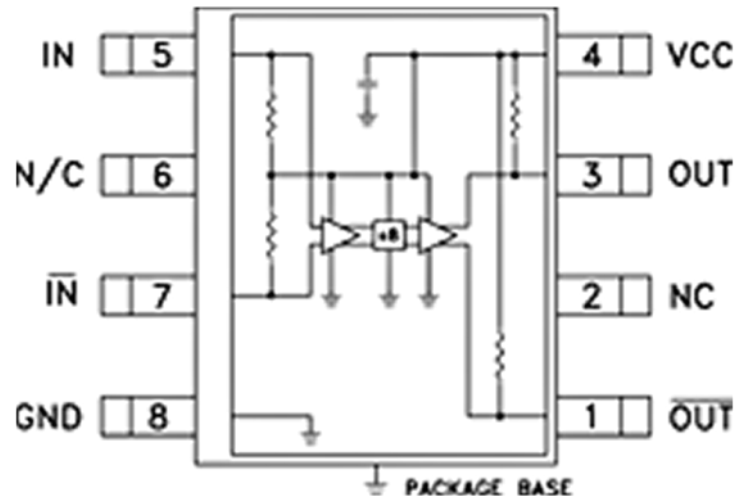

HMC363S8G(E)

The frequency is then further divided by a Fujitsu MB506 which is a high frequency, (up to 2.4GHz), prescaler used with a frequency synthesiser to form a Phase Locked Loop (PLL).

It will divide the input frequency by the modulus of 128 or 256 and the output level is 1.6V peak to peak on ECL level.

Operation in the 1.6GHz range meets the specification for applications in Direct Broadcasting Satellite Systems (DBS), CATV systems, and UHF Transceivers.
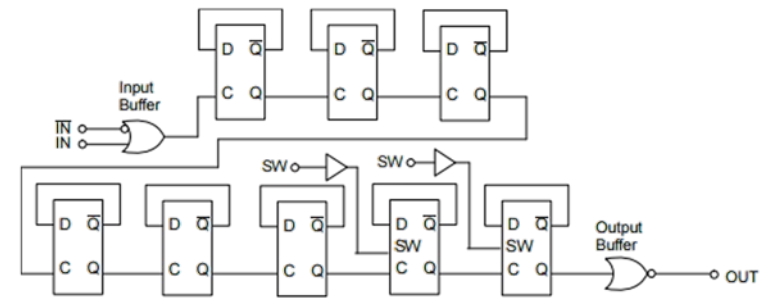
SW1	SW2	Divide Ratio
H	H	1/64
L	H	1/128
H	L	1/128
L	L	1/256

Note: H = V_{CC}, L = open

Fujitsu MB506

This prescaler provides a variable divide by virtue of two inputs that are driven by the PIC controller. It output is again buffered by a 74LS14. and fed to the PIC controller.

Because of this frequency reduction the PIC controller can open a gate for a number of cycles of our Rubidium Source, count the cycles and then mathematically reverse what the two dividers have done to our signal and come up with the frequency of our signal source.

This information is passed via an I2C bus to the display. This is again white on blue. Yes just like the YIG transmitter.

The unit has two ranges 1 sec and 10 sec gate open selected by S1.

I built the unit onto a single sided home etched PCB and it is now in a very attractive case and is proving its worth amongst my test equipment.

See the next page for schematic and pictures.

Top left: schematic
Bottom left: PCB (copper side) - NOT TO SCALE
Top right: Populated PCB
Bottom right: A sample output display

The PIC controller software is available to download on the *CQ-DATV Download site*.

IARU Contest 2015

The Region one ATV contest took place across the weekend of 13/14th June 2015. This was a departure from the previous September dates that we have all become used to.

At the same time the IARU extended the window from 1pm Saturday to 7pm Sunday UK time (1200-1800 UTC or GMT). These changes also came on the back of a considerable delay in publishing the results of the 2014 event.

The rules revisions not only moved the date and expanded the activity window it also clarified the use of what has been called rover stations, where portable stations change locations during the contest.

Some things do not change, the four digit code that must be exchanged in vision only, along with the use of non consecutive digits. The use of the familiar P scale for reception quality from P0 to P5. With P5 being the best noise free pictures.

We published the full rules some issues ago, but like the rest of the ATV community we held our breath for a good positive outcome to this revised contest and it seems all the efforts have been rewarded with a huge turnout and some good DX.

CQ-DATV congratulations go to IQ3ZB the winner on total points and the team behind this call, lead by Francesco IK3HHG, with Italian entries taking three of the top four places in the overall standing. Well done IARU Region One, a truly International contest

The full results can be seen at http://www.iaru-r1.org/images/VHF/atv/IARU_ATV_results_2015a.pdf

 A special mention to PE1NKT, PE1ASH, PA3CGG, PA3CGG, PE1CVJ, PA3BJC for their 1.2cms entries.

Top 25 were:-

1. IQ3ZB 11185 pts	14. PA1AS 2461 pts
2. PE1NKT 10623 pts	15. G1LPS 2424 pts
3. IW6ATU 5376 pts	16. PA3CWS 2295 pts
4. IW4APQ 5141 pts	17. F6ESU 2108 pts
5. F9ZG 4964 pts	18. OE6RKE/6 1896 pts
6. PE1ASH 4860 pts	19. I2MUT 1457 pts
7. PA3CGG 4101 pts	20. F6AQO 1403 pts
8. PA3DZA 3649 pts	21. F6BGR 1298 pts
9. PE1POA 3189 pts	22. IW3RMR 1184 pts
10. F8KOP/P 3022 pts	23. PE1OLR 1122
11. PA3CRX 3007 pts	24. PE1MPZ 1119 pts
12. PA7HV 2986 pts	25. A3DLJ 1079
13. M0DTS/P 2682 pts	

Write for the CQ-DATV Magazine

CQ-DATV NEEDS YOU!

Without reader input CQ-DATV would be an empty PDF file (which I don't think many people would find particularly interesting). We are always looking for articles, reports, anything! Even small things like letters and desktop screens help fill the magazine.

Guidelines

The single rule for an article is that it must somehow be linked to ATV or one of its many derivatives, CCTV, repeaters, aerials/dishes etc. Write your article in whichever software you choose. I would recommend LibreOffice (this is cross platform). But please spell and grammar-check it!

Language

If your first language is not English, don't worry. We will translate your copy using online translation software and then one of the proofreaders will smooth it into English and correct any grammatical or spelling errors that these translation services sometimes create.

Writing

There is no word limit for articles, but be advised that long articles may be split across several issues. In your article, please indicate where you would like a particular image to be placed. We will try to adhere to this, but page layout may require us to move them around a bit. Please do not use any formatting.

Images

Images should be the best resolution possible, not cropped or reduced in size and in PNG format (preferred), or JPG with low compression.Images can be embedded in the document to show their position, but must also be included as separate image files. (PNG or JPG)

Intellectual property

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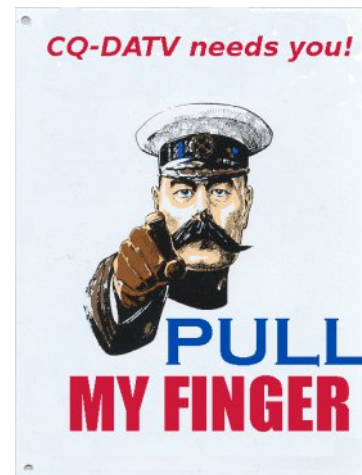
Please also check the Information page at the end of the magazine.

When you are ready to submit your article, please email it to:-
editor@cq-datv.mobi

HD Wedding Shoot

By Trevor G8CJS

With a family wedding imminent I decided to invest in a new camera, I narrowed the choice down to two cameras the Sony A7R, a full frame mirror-less DSLR and the Samsung 500 APS-C EVIL, both have advantages and disadvantages, let's start with the Sony.

First it is available from the high street stores and so I could have hands on play. I took my own SD card along and shot stills and movies under the watchful eye of the shop. assistant.

I wanted three things, RAW stills, HD, movies and full frame format. The Sony had all three, but only the A7 was available to try which has the same full frame sensor but only in a (24.3MP) version which uses a low pass optical filter.

It is a beautifully engineered, small full frame DSLR and a pleasure to use. The down side was I wanted the high resolution sensor (36.4MP) and I did not want a low pass optical filter in the path, so it meant a jump to the A7R, which was not available in the high street.

The Sony A7 uses mirror less technology and produces a very pleasing action freeze when the shutter was tripped. The cost is around £1000 for the A7 and it comes with a 28mm to 70mm zoom lens. F3.5 at its widest and F5.6 at 70mm. The A7R cost about the same for a body only option, and then you need to buy a lens and well a flash gun would be handy and around about now you are starting to need the services of a building society to finance the purchase.

Then I received a press release that the A7R II was on the radar for an imminent approach. I wanted the camera to make a wedding video and a photographer had already been retained for the stills so no mission creep, think video, think 4k, think Samsung, forget the A7 or A7R which will drop in value when superseded by the MkII

As previously explained the Samsung NX 500 belongs to a family of what is called EVIL cameras. EVIL stands for Electronic Viewfinder Interchangeable Lens IE no eye level viewfinder, if you want the viewfinder option then you need the more expensive NX1. Both the NX1 and the NX500 have the same 28.2MP sensor and will film movies in 4K.

Samsung NX 500

One the official photographer missed (my Grandson) crashed and burned

The down side is they are APS-C format. The brief was to make a wedding video, but I am always on the lookout for the stills the official photographers miss, and the Samsung has RAW, well Samsungs version of RAW, but the video was the main thrust, I settled for the Samsung, perhaps I was seduced by the 4k movie mode, or the sub £400 price tag, including a 16-50mm lens that was f3.5 at its widest and f5.6 at 50mm and it included a very small flash gun. The down-side was the was APS-C frame size

Mediuum format Camera

Popular Image Formats sizes

35mm Full Frame

APSC-H

APS-C Nikon DX

Four Thirds

CX Nikon

Two Thirds

This was only a disadvantage in shooting stills as for a given lens setting it would produce more depth of field as it is only 70% of full frame, so soft backgrounds would not be as soft as the full frame Sony, but then my mission was to make a video, stills were S.E.P. (Somebody Elsie's Problem).

For video we do not need 28,2MP and it is doubtful either the Sony or the Samsung employ all the pixels in movie mode. The problem was Samsung cameras seem to have vanished from the high street, so it was mail order from Simply Electronics, in stock and on 3 days delivery.

First mistake, it took 10 working days to arrive and was not here in time for the wedding, which I shot on a borrowed Samsung 3000, so no 4K just HD.

I had just a couple of days to get to grips with the 3000 before using it in anger. The reason for 4k was my plan to shoot part of the ceremony with the camera in portrait orientation... Let me explain..My 4 year old grandson was going to be part of the ceremony and portrait orientation would include him. The plan then was to cut the picture in two in post, rotate both halves through 90 degrees and zoom and crop them to full TV frame size.

This would effectively create a two camera shoot, so that I could cut between my Grandson and a two shot of the Bride and Groom in the edit I thought this plan up with a 4K camera in mind, would it still look OK after I had thrown away more than half of the picture. The pre-shoot camera test showed this plan could still work, it but would be safer in 4k, but thanks to Simply Electronics that was not an option.

I had to decide if I should stick with my plan using an HD camera. I decided to shoot the first half this way, smile at the minister and adjust the camera to landscape and rejoin the congregation.
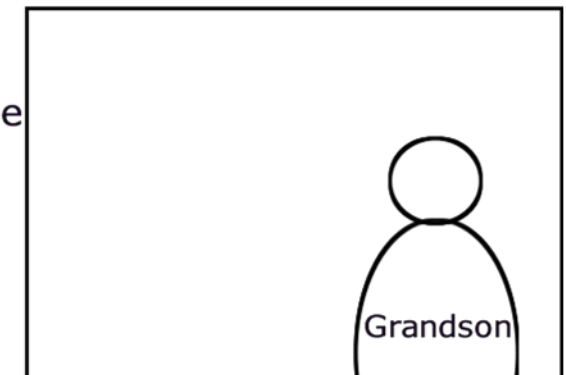
Camera Picture
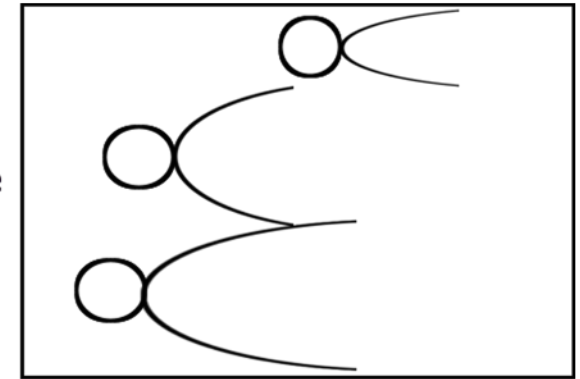
Rotated Cropped and Zoomed

Groom   Bride
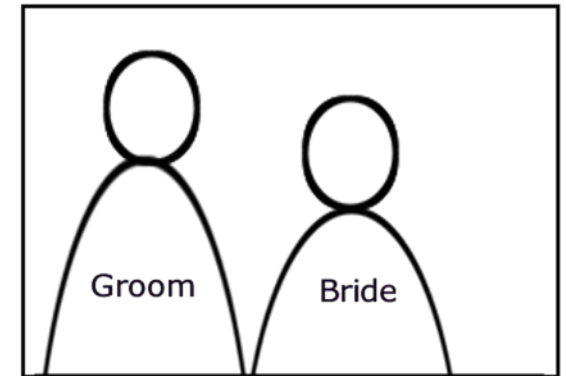
Same process but for the lower part of the frame

Grandson

There were problems, the most worrying was the battery warning message coming on about 7 mins into the shoot. I had already had a warning glance from the minister, when I adjusted the camera to landscape and decide against giving him the wind it up signal, used by floor managers.

Vows were exchanged before the Samsung stopped recording just 10 mins in, could this be a built in timer, perhaps to stop overheating? I don't know, but my thanks to the Scots for a brief ceremony that allowed an exchange of vows just before the camera stopped recording.

The sound was always going to be a worry , the Samsung only has an internal microphone, but then I was never going to get away with headphone and a rifle mic and fill my role as father of the groom.

Once the ceremony was over I switched to my back up Canon S95 to shoot sufficient shots for a musical montage, this is only a 10MP camera so no clever ticks keep it in landscape mode.

Did it work well? A couple of days in post production and yes it did, I have three camera angles, Bride and Groom or Grandson for the first 5 mins and Bride Groom and Minister only for the second part. A video only cover shot was needed for the camera re-position, Grandson to the rescue. I have 5 minutes of him to choose from.

Do the cut and zoomed pictures of the first part Jar when joined to the landscape framed second part, well actually no, when viewed on a 40" plasma. The worst picture change was to the Canon S95, that I used for the montage shots and that well just looks more filmic.

Just finished the post production when the postman knocked with my Samsung NX500 (thanks Simply Electronics). Time to see if the cameras untimely arrival would have helped, with more pixels available to be thrown away.

I carried out a test shoot in the garden and well Houston we have a problem. It is an MP4 transport stream, but an H265 codec.

The pictures cannot be viewed or put on the Speed Edit time line. There is a fix, all the clips need transcoding in Handbrake (free download).

Whenever you upgrade the camera there is always a worry that the editor codecs may prove incompatible. If only the camera manufacturers would put a down-loadable clip on their site, it's not rocket science. So let's start now. These links are to short clips I filmed in the Yorkshire Dales. I have uploaded both a three clip to a folder in my cloud
https://app.box.com/s/q2u02d6ap6e2w3c4kn4ipu9ji5jd4hat

and

https://app.box.com/s/q3ko46kqxaskukxy6zl1d18hq06ho8bz
for a single file. So now you have an H265 encoded clip and I am sure there will soon be editing software that will work with this clip in native format. For now you will need to convert it, to this end Handbrake software works well and it's a free download *http://handbrake-uk.download-assist.com/*

For those of you not familiar with Handbrake, it is a tool for converting video from nearly any format to a selection of modern, widely supported codecs. Handbrake can process most common multimedia files and any DVD or BluRay sources that do not contain any kind of copy protection.

The video is now cut and has been seen by my son and daughter in-law and everyone is happy. Nobody has asked how I cut to my Grandson a second before the flowers fell off the Anvil and were retrieved by him, but then nobody wants to know how we capture the action just pleased to see the pictures.

I have now ordered a lens adaptor and will be experimenting using a non Samsung lens to see if we can improve on the APS-C depth of field, but that will be in the next issue.

CQ-DATV report HAMRADIO 2015 (Part 1)

Klaus Kramer, DL4KCK *www.agaf.de*

This year we had a combined AGAF - BATC stand A1-246 with the usual antenna supply (from the hallŽs roof) for 2 m talkback and 23 cm QPSK reception from Uwe, DJ8DWŽs hotel in Austria near Pfaender mountain east of Lake Constance. The live camera view to Lindau peninsula alternated with a DVD video about PAL color TV development.

Heinz DC6MR (80 years), AGAF chair / Uwe DJ8W, AGAF president / Rolf DF9KH, former DB0KO sysop with the first QPSK DATV field test in 2001

Willi DC5QC and Rudolph DJ3DY (close DATV co-testers with Uwe DJ8DW from the beginning) showed their GMSK DATV 70 equipment in closed circuit operation (with many interruptions by HTs)

Willi DC5QC and Rudolph DJ3DY

At the computer table our new software and HAMNET expert Joerg DF3EI from Berlin was busy filling the AGAF members listing and his newly established website www.agaf-ev.org with current info and pictures from HAMRADIO 2015. This CMS backed portal will replace the old AGAF homepage from 1997 later, including download functions for our TV-AMATEUR PDF magazine issues. Some provisionally printed magazines TV-AMATEUR 177 were handed over to authors and AGAF members without PC.

With our AGAF beamer Joerg DF3EI displayed live connections via WLAN (free access for all HAMRADIO guests) from HAMNET webcams in Berlin and streamed his laptop camera video to HAMNET nodes showing live DVB-T reception on 436 MHz from the ATV Munic stand 100 m away.

For the first time BATC was present at HAMRADIO as co-exhibitor besides the AGAF stand. Several flat screen monitors showed examples from the BATC shop and a closed-circuit live demonstration of F6DZPŽs "Minitiouner" with low
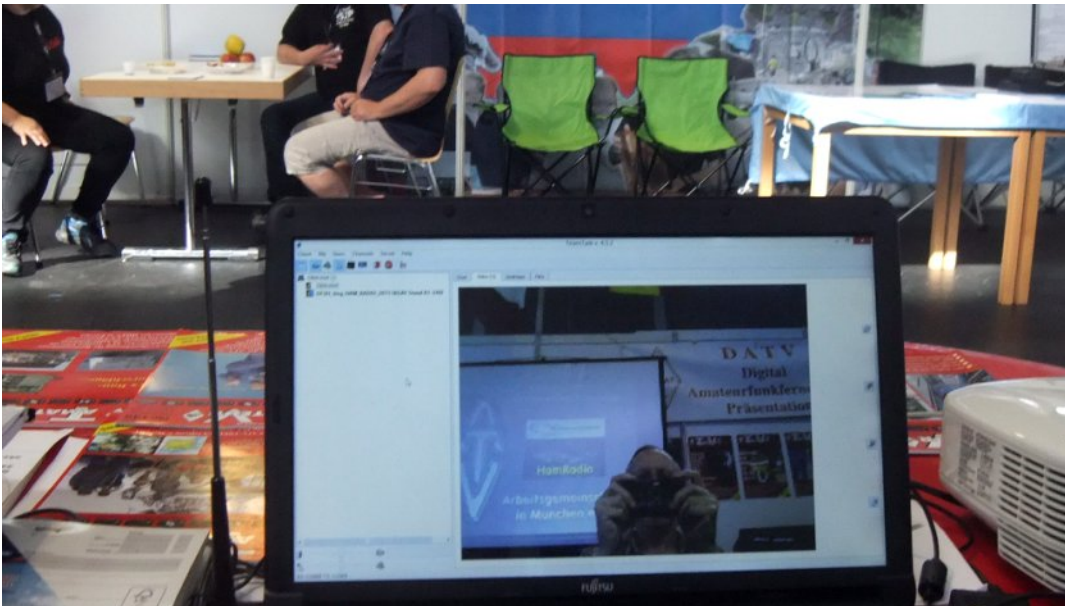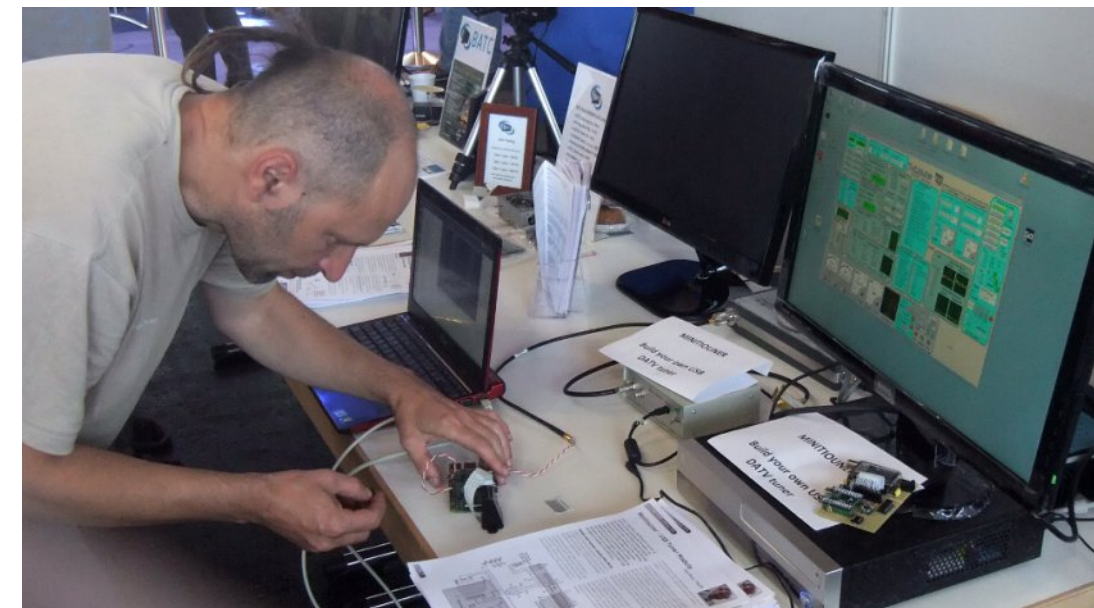
AGAF member, Joerg DF3EI, Heinz DC6MR

ATV Munic stand at HAMRADIO 2015 with many monitors, a working DATV repeater TX DVB-T on 436 MHz and antennas above right (rotating dish with DB0QI callsign for show only)

Live stream to HAMNET (return video on screen) with beamer viewing of ATV Munic DVB-T signal, Klaus DL4KCK with Fuji Stereo-3D camera below

Evariste F5OEO with low SR DATV demonstrations

SR DATV reception (250 kbit/s) from a local video camera source. Most of the time Jean-Pierre was present together with Evariste F5OEO showing a Digithin plug-in board for the newer RaspberryPi issues.

Brian G8GQS, Jean-Pierre F6DZP, Graham G3VZV

Evariste F5OEO, Jean-Pierre F6DZP, Noel G8GTZ

Noel G8GTZ (BATC chair) was accompanied by Brian G8GQS (BATC treasurer) and from time to time assisted by Graham G3VZV (also busy with AMSAT matters).

At a small meeting in a small conference room Noel offered server space for a new european ATV groups exchange platform named EATF (European Amateur TV Forum). Joerg DF3EI will take administrator functions, and Pierre-Andre HB9AZN together with Michel HB9DUG will contact belgian, french and spanish ATV groups, while Uwe DJ8DW will ask his old friends in the Netherlands (speaking their language fluently) for participation.

The big "ATV session" of four hours duration in a big conference room will be covered later on, stay tuned...

CAT15 - Sept 5/6ᵗʰ 2015

- 2 day program including talks and demos
- Test and measurement area
- Members flea market and demo area
- RF and specialist traders
- Presentation of BATC RB-TV awards

Finningley Amateur Radio Club – Sandtoft DN8 5SX
- Just off the M180
- 5 minutes from Robin Hood International Airport

Programmable Colour Test Card Generator

By Richard Russell G4BAU

The Testcard Generator featured here was the third in a series of designs spanning a period of more than twenty-two years. The first used TTL devices to generate a colour test pattern reminiscent of the PM5544; it was published in the 1981 BATC Amateur Television Handbook. The second was a monochrome generator using a PROM to hold an arbitrary image, supplied pre-programmed with Test Card C; this was reviewed in CQ-TV 166 (May 1994). This latest design is colour-capable, multi-standard and user-programmable; it was developed in 2003 and around 180 were sold over a period of about four years. The design was then licensed to a Turkish company from whom it remained available until recently.

This latest design has the following features:

- Digital storage, using 12 MHz sampling and 8-bits linear coding.
- 'Mathematical' PAL coding, ensuring compatibility with all 625-line PAL equipment.
- Stores one still frame (8-field PAL sequence) and four teletext pages with Fastext links.
- Integral vertical-interval test signal (pulse and bar).
- Integral line 23 Wide Screen Signalling.
- Supplied pre-programmed with colour test card and informative text pages.
- User programmable using Windows™ software supplied http://www.bbcbasic.co.uk/tccgen/tccgen.html#software.
- Baseband video output, suitable for feeding a monitor, VCR or TV.
- Approximate size, excluding connectors, 130 x 65 x 25 mm. Weight 140 g.
- Output on 75 ohm BNC connector. BNC-phono adaptor supplied.
- Supplied with a 230 Volt 'plug top' AC mains adaptor.
- Alternatively may be powered from 9 Volts DC at approximately 150 mA.
- Additionally supports 180, 405, 441, 525 and 819-line operation.

See page 21 for the circuit diagram.

The supplied software lets you do the following:
- Erase the image stored in the generator.
- Re-program the generator with any BMP, JPEG, GIF or raw YUV image.
- Load, save, compose and edit the teletext pages (including sixel graphics).
- Select colour (PAL, NTSC) or monochrome output.
- Enable or disable teletext, Fastext and insertion test signals.
- Program the Fastext coloured buttons.
- Configure or disable the line 23 Wide Screen Signalling.
- Select 625, 405, 441, 525, 180 or 819-line operation.

The CPLD U1 must be programmed (normally in-situ) from the file TCGEN.JED, the JTAG lines are brought out to header PL1 for this purpose.

Address generator (U1). This is clocked at 12MHz and outputs a modulo-1920000 count, resulting in a periodicity of 160 milliseconds suitable for a 25Hz frame rate. By means of link LK1 the address generator can optionally be switched to a modulo-1601600 count, which has the correct periodicity for a 29.97Hz frame rate as required for the US NTSC video standard.

Flash memory (U2). The 2Mbyte chip holds 8 fields (4 frames) of 8-bit composite video which is the length of the 'PAL sequence', i.e. it is the minimum amount of storage necessary to contain a repetitive PAL-encoded signal. The low-sequence length means that four full pages of teletext may be included, and limited animations (which repeat over a 4-frame sequence) are also possible.

Digital-to-Analogue converter (U3, U4). The device used is a TDA8702 which is a high speed 8-bit linear DAC intended for video applications; it is obsolete but a small number are available from the author. The edge-clocked latch U3 is used to ensure that the data on the input of the DAC remains stable for the full clock period of approximately 83 nanoseconds.

Reconstruction filter (C1, C2, C3, C4, L1). As is conventional, the DAC is followed by a low-pass filter which converts the discrete samples into a continuous signal; this filter needs to have a frequency response which is as flat as possible over the bandwidth of the wanted signal and an adequate attenuation at frequencies in excess of the 'Nyquist Limit' (half the sampling rate, or 6MHz in this case) to reduce aliases to an acceptable degree. An LC elliptical filter is used, designed for a 75 ohm source impedance and an infinite load impedance; a SPICE simulation can be found here:
http://www.ngspice.com/index.php?public_circuit=u0l8oI

Aperture corrector (R3, L2, C5). If no aperture correction were applied the frequency response would fall off with a sin(x)/x (so-called 'boxcar') curve, which would introduce a highly undesirable attenuation of about 2.6dB at 5MHz. The aperture correction network consists of a heavily damped series LC tuned circuit, operated over its lower skirt (the resonant frequency is around 6.7MHz), which has a response approximating the required function:
http://www.ngspice.com/index.php?public_circuit=ThMPX5

Output buffer amplifier (U6, R1). A video op-amp with a DC gain of about 1.6, in conjunction with a series output resistor, is used to deliver a nominal 1 Volt pk-pk video signal when terminated in a 75 ohm impedance. To ensure a good low-frequency response no blocking capacitor is included, which does mean that the video sits on a DC pedestal; a few receiving devices may object to this in which case a suitable series capacitor can be added.

In the next issue we will be uploading custom designs from a windows PC.

Circuit Diagram of the Test card
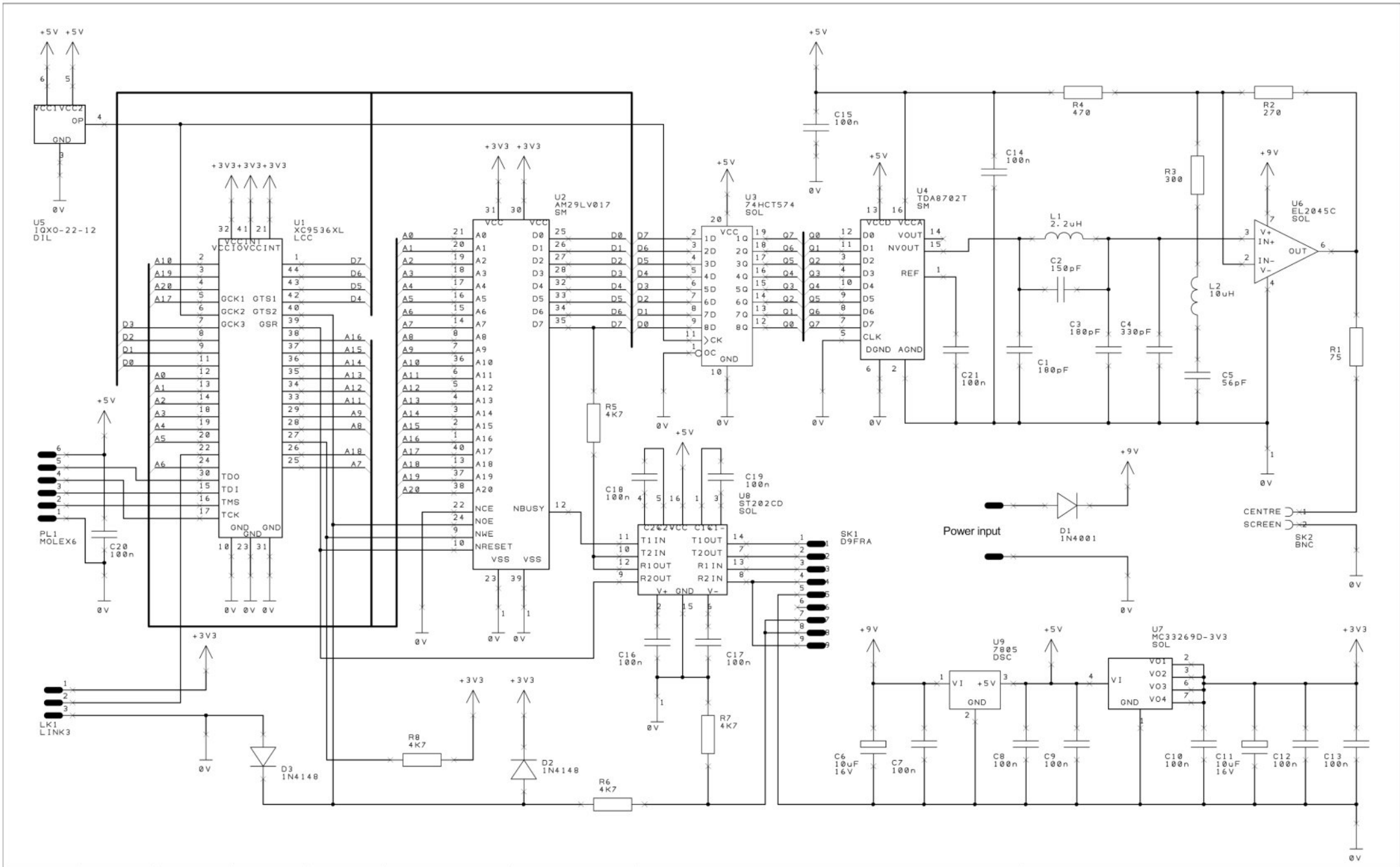
Skills test, a puzzle

In the last issue we set you a digital problem to solve. You need a 5MHz xtal locked source and only have a 10MHz xtal in your junk box, how would you add a divide by 2 stage. Well for anyone that followed our editors suggestion you might have had problems, reducing xtals in size increases their frequency, perhaps not by cutting them, but in the early days of two metre home brew transmitters, we used to etch or grind xtals to increase their frequency. So no cigar for the editor and we need to keep him cable tied to the editors chair and away from sharp objects.
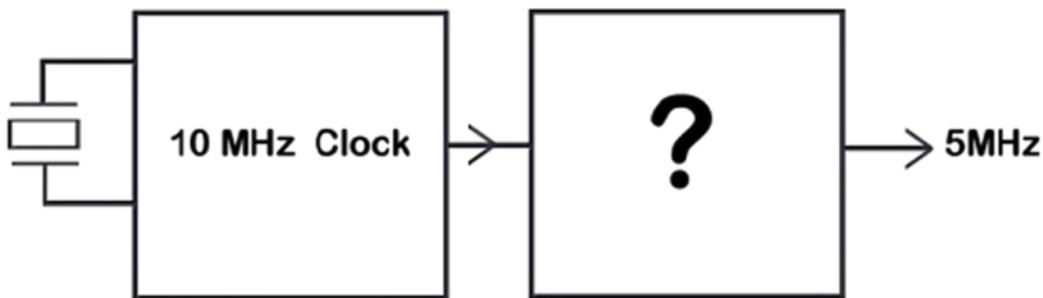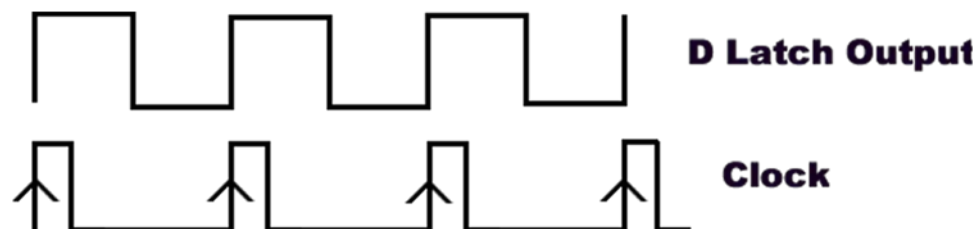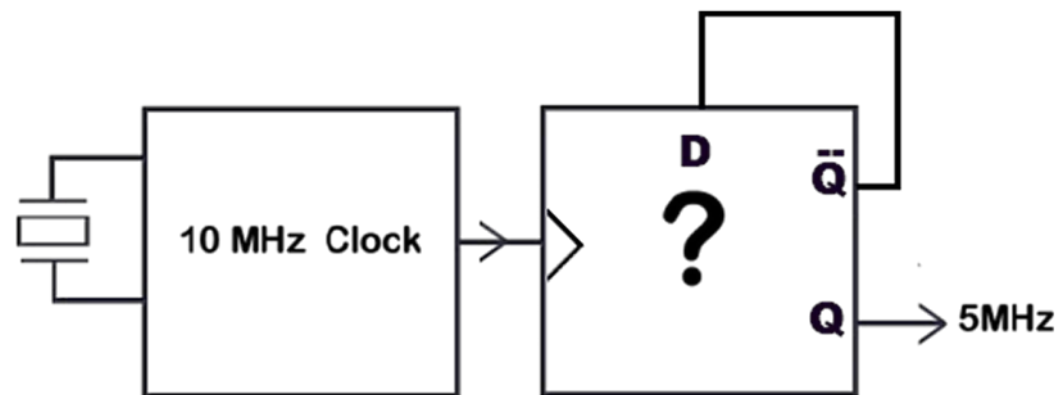
(Cut the xtal in half? - ED)

There are numerous solutions to this problem and it depends what is in your junk box. The solution we have shown here is a D type latch.
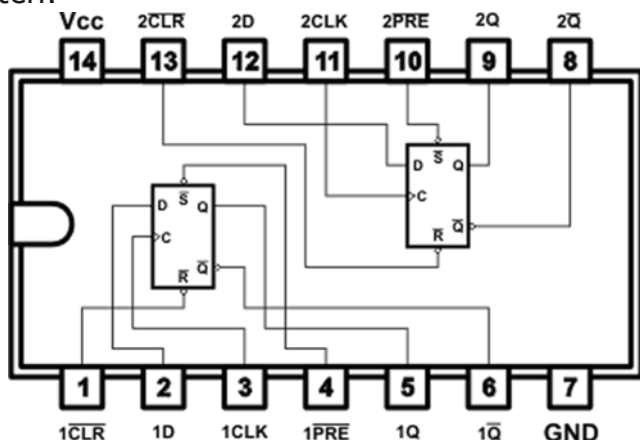
The best example in TTL is the SN7474 or SN74LS74 and if you wire it with the Q bar connected to the D input it will divide by two.

The SN7474 is triggered on the positive edge of our clock signal and will produce a symmetrical output which is the frequency of our clock divided by 2. The symmetrical output was often an advantage in some of the early microprocessors that required a symmetrical clock and this was one way to generate this.

You can repeat this process if you want a further divide by 2 stage.

This creates a ripple counter and is not the best way of doing things particularly if you want to combine the 2.5 MHz and the 5MHz as an address, because it suffers propagation delays between the two signals.
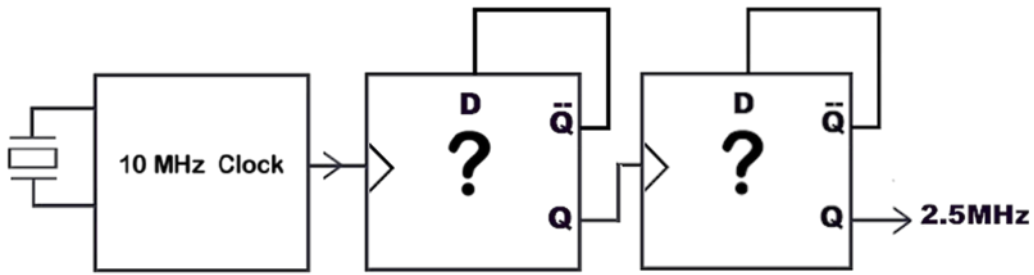
This can be overcome by a different configuration of D latches where all the clock inputs share a common input. If the individual Q outputs were required to be combined in a circuit there would be no propagation delays in the individual inputs
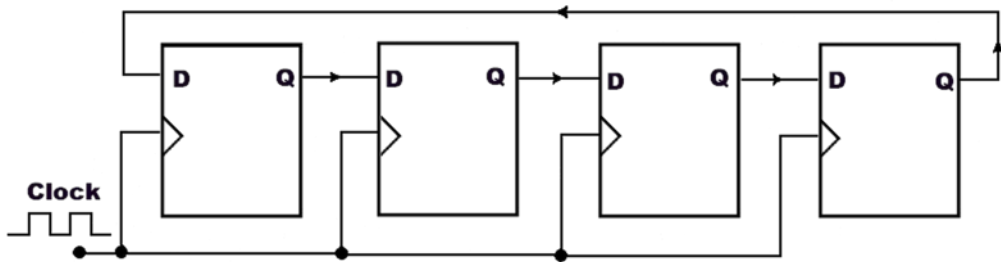
For this issues puzzle, let's stay with logic and assume you have a built a simple counter connected to set of door contacts driving a counter and decoder to display how many times the door was opened in a day.
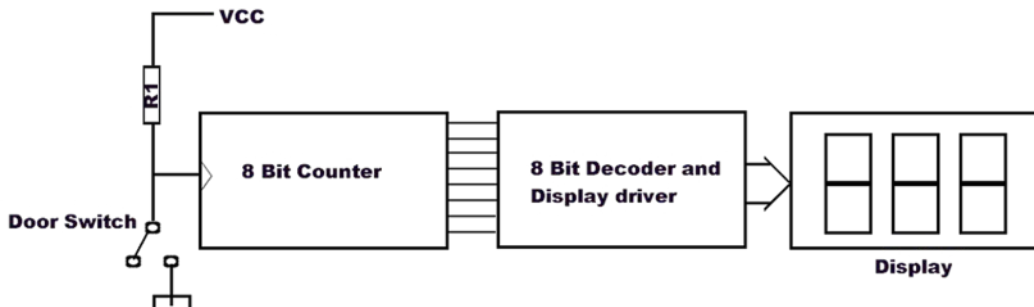
The problem is the counter is inaccurate and always displays more door openings than actually happen. You trace this down to switch bounce and need to re design the door switch logic to eliminate contact bounce.. There are numerous ways ..we will be looking for the most elegant solution.

My shack!

Now and again it becomes necessary to clear up in the shack, I often feel I am a little too close to realise this process is due, but now I have completed the task I can see it was necessary, I only wish I had taken a before picture to illustrate the improvements, but alas this after photograph will have to suffice.

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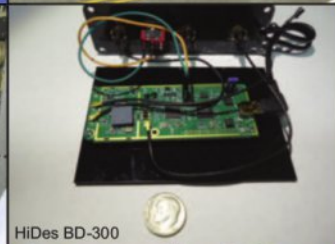
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