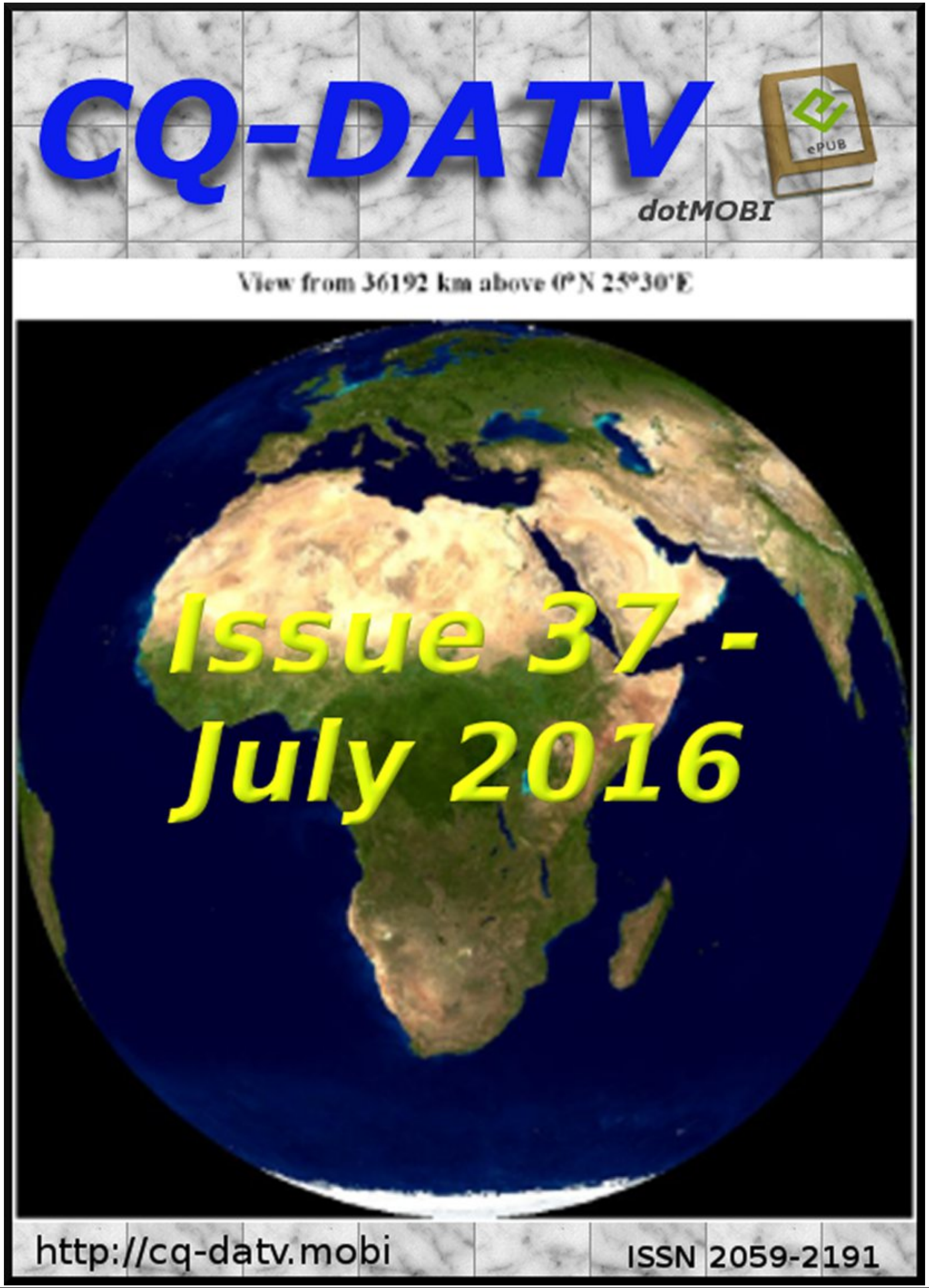

In this issue

Production Team

Ian Pawson G8IQU
Trevor Brown G8CJS
Terry Mowles VK5TM

Contributing Authors

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John Hudson G3RFL
Ken Konechy W6HHC
Klaus Kramer DL4KCK
Fred Pfost
Klaus Welter DH6MAV

Editorial

In this issue we have continued our chosen coverage of all things both amateur and professional in the world of Television.

John G3RFL has been working on his aerial farm which you may remember consisted of a partially rotatable, pump up mast with a direction readout displayed on a TFT screen. In this issue, with a little help from a scrap motor car flywheel and some brilliant machine work from Alan G3SXC, it now rotates 360°.

Ken W6HHC has finally received an H.264 transmission picture in 16:9 aspect ratio using v1.10 Express_DVB-S_Transmitter beta software and the video was received using the trusty PCI-based TuTioune software.

Armand Hoffstetter reports:- using stand-alone DVB-T transmitters with HDMI input from the Hides ATV stable.

Klaus, DL4KCK reports from an ATV meeting in Gloevzin. This was organised by Rolf, DJ9XF, assisted by Joerg, DG0CCO, and Karl, DM2BMB.

The launch of the Es'Hail-2 satellite into a geostationary orbit at 25.5 degrees East is planned for December 2016. The coverage area of the wideband transponders should extend from Brazil to Thailand, so perhaps by Christmas we could be exchanging ATV pictures via this satellite.

Trevor started to write a series of articles on the Samsung NX 500 bridge camera. The series had almost concluded when the camera developed problems (the flash gun stopped working). This was an online purchase from Simply Electronics and was returned to a UK address in early March and came back in late June with an address in China on the paperwork. It failed to function at all.

Perhaps the sea trip did not agree with it! Rather than loose it again to another world cruise, we complained to Samsung who asked for it to be returned to another UK address, they even sent post paid packaging, first class. It has been with them almost a week so I will keep you posted, but if you are looking for camera, my advice would be avoid Simply Electronics. They have the most competitive online prices, but are not in the UK, so don't expect a speedy service.

On the professional TV front, we have started a series on the development of the world's first VTR machine the Ampex VR1000. This was put together in 1956 and caused quite a stir in the broadcast industry. The article is written by Fred Pfost who was a member of the original team that produced this first videotape recorder and demonstrated it in Redwood City in April of 1956. Ampex went on to receive an Emmy in the following year for the machine.

One thing missing from this issue is the usual contribution from Mike Stevens G7GTN who normally writes articles on the Raspberry Pi Zero. Unfortunately, at the time of writing, Mike is back in hospital undergoing some more surgery.

He complains bitterly that access to R & D facilities are just not there under the latest NHS cuts! I know I speak of all our readers when I say 'get well soon Mike.'

Enough from the production team, please sit back and enjoy CQ-DATV 37

TV Amateur is a German Language ATV Magazine It is published 4 times a year and if you would like to subscribe go to http://www.agaf.de/

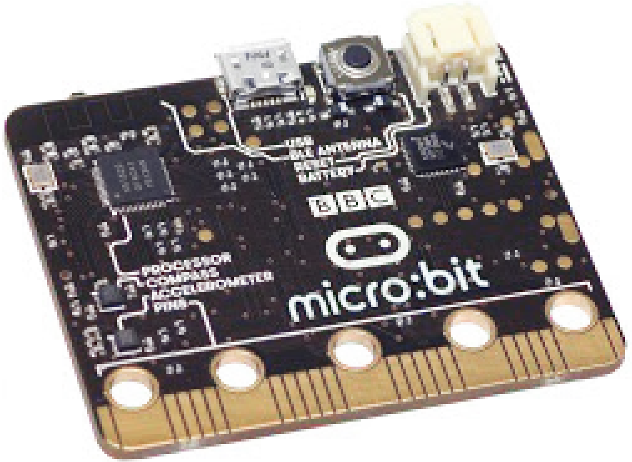
Check out the DKARS website at:- http://www.dkars.nl/

Just when you thought the BBC had left comedy

Michael Stevens reports

Whilst the BBC closed down BBC 3 as on on air presence, we can see they still have plenty of our money to burn on trying to relive past glories in the Micro field.

Might have been flushed with the success of TV Center equipment actions.



I welcome you to the BBC Micro Bit - I think they probably meant to have the B as a T and was probably just a typo that was too late to catch.

The most useless non functioning thing I have seen for ages *http://www.bbc.co.uk/news/technology-36416862*

Oh look can be programmed in Scratch as well the language of the visual jigsaw puzzle generation. So we might end up with kids that are amazing at doing jigsaws but totally hopeless at programming and getting even basic concepts in heads.

OK to a level I do get the use of Scratch for the younger kids, but very late to the party in the education market. The brand we do not mention here has a very strong grip on this already. These seem to be given away free to schools - as sure would never sell very many.

Oh no look is a deal to get one for £12.99 if you all commit to buying at least one will do the same. Everything is limited from I/O and beyond.

I do suspect that is not really BBC money technically in hardware but to provide the educational resources to a market that has already been fully taken by the Raspberry pi

Totally fabled and destined to hit the dustbin? - I will already say gets a yes from me.

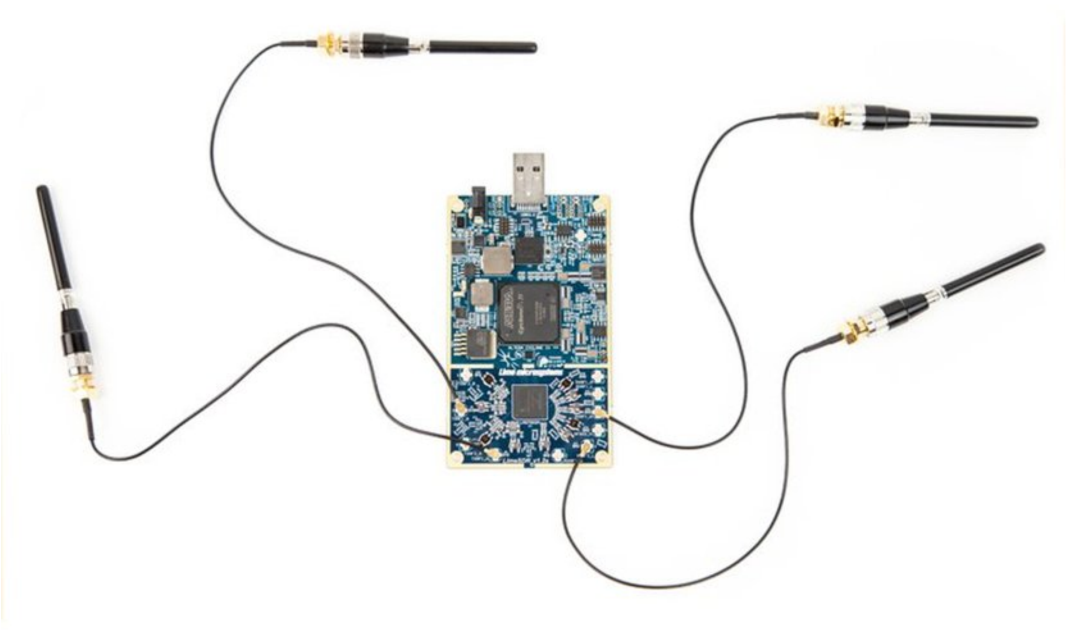
Regards Mike.

A Software Defined Radio for Everyone

LimeSDR is a low cost, open source, apps-enabled (more on that later) software defined radio (SDR) platform that can be used to support just about any type of wireless communication standard. LimeSDR can send and receive UMTS, LTE, GSM, LoRa, Bluetooth, Zigbee, RFID, and Digital Broadcasting, to name but a few.

While most SDRs have remained in the domain of RF and protocol experts, LimeSDR is usable by anyone familiar with the idea of an app store - it’s the first SDR to integrate with Snappy Ubuntu Core.

This means you can easily download new LimeSDR apps from developers around the world. If you’re a developer yourself, you can share and/or sell your LimeSDR apps through Snappy Ubuntu Core as well.



LimeSDR with four antennas attached

The LimeSDR platform gives students, inventors, and developers an intelligent and flexible device for manipulating wireless signals, so they can learn, experiment, and develop with freedom from limited functionality and expensive proprietary devices.

From Radio Astronomy to Personal Telcos

Here are just some of the applications that are possible with the LimeSDR:

- *Radio astronomy*
- *RADAR*
- *2G to 4G cellular basestation*
- *Media streaming*
- *IoT gateway*
- *HAM radio*
- *Wireless keyboard and mice emulation and detection*
- *Tire pressure monitoring systems*
- *Aviation transponders*
- *Utility meters*
- *Drone command and control*
- *Test and measurement*
- *Many more…*

With state-of-the-art technical specs, fully open hardware and toolchain, and integration with Snappy Ubuntu Core's app distribution platform, LimeSDR is limited only by our collective imagination.

Huge Application Ecosystem with Snappy Ubuntu Core

We've been working directly with the IoT team at Canonical, the makers of Ubuntu, to enable the use of Snappy Ubuntu Core on LimeSDR.

LimeSDR's integration with Snappy Ubuntu Core means that you benefit from the collective work of developers around the world.

With LimeSDR, we are laying the foundation for a world in which "there's an app for that" applies not only to mobile phones, but also to the cell towers they connect to and, indeed, every wireless device or piece of infrastructure.

LimeSDR brings with it many opportunities for educational and maker communities, empowering them to learn, and create new applications and even new markets.

LimeSDR puts serious power in the hands of anyone who wants to innovate in the world of wireless. We no longer have to wait for established interests to innovate on our behalf.

For more information see *https://goo.gl/Z4dSZA*

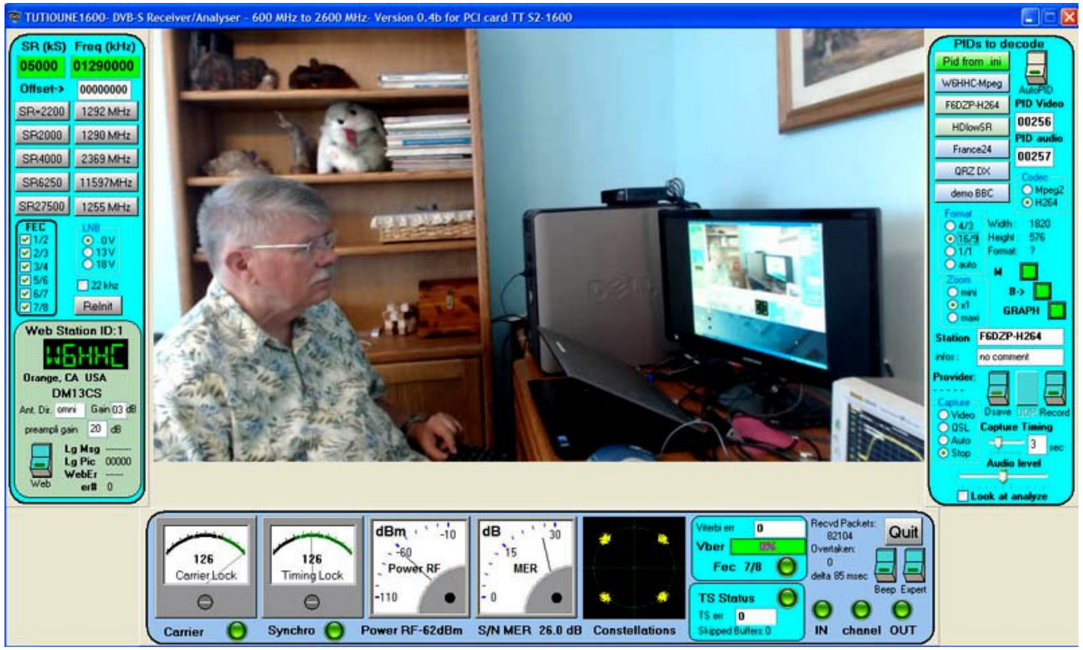
LimeSDR front view

DATV-Express Project - update report

Just a quick follow up note that I finally received a good H.264 transmission picture in 16:9 format (aspect ratio?) using v1.10 Express_DVB-S_Transmitter beta software by using the trusty PCI-based TuTioune analyzer software on my old WinXP lab computer as the receiver.

The SR=5.0 MSymb/sec and FEC=7/8 video was still somewhat jerky…so I probably need to increase SR to 6.0 MS/sec? Also note that the Express_DVB-S_Transmitter software allows you to send audio at either 64 Kbps stream or the normal DVB-S spec of 192 Kbps. The reduced 64 Kbps audio is a big asset for obtaining better video on 2M RBDATV efforts.

My multi-protocol AMIKO "mini-combo" set-top-box received and displayed the H.264 OK…EXCEPT it never would show the entire picture….it always truncated the ends off….maybe even some top and bottom, too?



The Express_DVB-S_Transmitter is sending H.264 video as payload inside the DVB-S protocol on 1.2 GHz. Received 16:9 aspect ratio video using PCI-based TuTioune from F6DZP.

The next step is to still complete a draft version of Users Guide for this Windows software (already started).

Also...
Just put an updated beta-release of the Express_DVB-S_Transmitter software (for Windows) v1.11 up on the DATV-Express web site.

The new update can be downloaded from the DATV-Express web site at *http://www.DATV-Express.com* on the DOWNLOADS page. Also available on DOWNLOADS page is a NOTES.TXT file (aka README) for v1.11. User Guide is still NOT yet available for this BETA release (in progress - 50% completed).

The main fix is that the correct the v1.10 FPGA code that was inadvertently commented-out and thereby disabled the PTT line out to connector J4 - pin 2.

73...de Ken W6HHC

Windows 10 and DVB-T

Armand Hoffstetter reports:-

I have never been an early adopter. When it comes to the bleeding edge, I prefer to let others have the "hey watch this" moment. [American slang for foolishness usually involving beer and personal injury]

Those of us using stand-alone DVB-T transmitters with HDMI input *http://www.hides.com.tw/product_HV320_eng.html* and looking to produce great 1080-P picture, need to have the great feeding devices as well.

I am a Linux user. Its attraction is "free" and while the windows-10 is also free, I upgraded where I could. The grief comes with the hardware minimums.

I found that a 5 year old 2 core cast off gamer box and video card about the minimum.

Something that will support HDMI 1920x1080 video and audio.

I eventually settled for a used "refurbished" e-bay bare bones HP Z-600. 2.9x Ghz dual quad Xeons with 32 Gb ECC RAM, [other end of the scale]

Quantities seem available under $300 USD. I replaced the video card with another gamer cast off added a HDD, windows 7 pro that I had, then upgraded to 10.

Left to right on upper shelf PA 12 volt supply 2 cameras [right is the 920] - left to right on desk cooling fan on block of wood, transmitter, box with power amp/12 V metering/antenna relay, receiver/small remote, power metering, etc

Locally, the Logitech 920 USB camera is quite popular [1080-P and inexpensive] Using the Microsoft camera utility produces a great full motion full screen picture.

When duplicating the desktop to the HiDes transmitter, keep in mind that the monitor must also be capable of 1920x1080. Using aspect ratios other than the native 16x9 are not recommended for the transmitter. Next lower and most usually supported is the 1280x720 resolution, but were going for quality not DX.

Set the microphone properties to listen and the mixer output to the transmitter and drag your digitized home movies or slides to the screen.

DATV-Express with RPI-3 and Raspbian OS

Abe JA7LGC just reported to the DATV-Express project team that he was now successfully running the DATV-Express board (DATV-Express release v2.03_ARMhf debian install software) with a Raspberry PI-3 computer that was using the Raspbian OS.

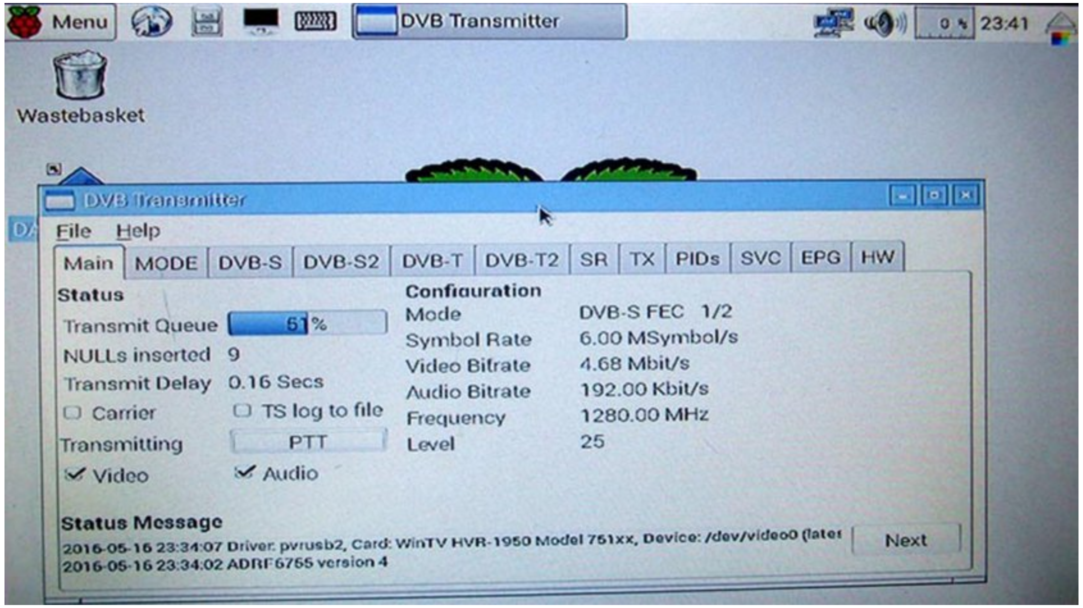
Earlier, Abe had success running DATV-Express on ODROID and also RPI-3 when using ubuntu OS…but there was no video capture when using RPI-3 running the Raspbian OS?? Charles G4GUO suggested that perhaps firmware was missing from the Raspbian distribution for RPI-3. Charles explained that the running dmesg with the PVR connected should tell which files are missing. JA7LGC was able to copy:

- *v4l-cx2341x-enc.fw*
- *v4l-cx2341x-dec.fw*

from the ubuntu working installation over to the raspbian not-working installation on the RPI-3.

With those new files added. The DATV-Express now works on Raspberry PI 3 with raspbian OS.

Abe says this is a very nice solution for running DVB-S protocol (FEC = 1/2) with HD (H.264) payload currently at 6.0 MSymb/sec. JA7LGC went on to say "maybe all JA's DATV station will USE RASPI-3 with DATV-Express".



JA7LGC success with RPI-3 and Raspbian OS using DATV-Express DVB-S transmitter

73…de Ken W6HHC

FAA Expands Drone Detection Pathfinder Initiative

The Federal Aviation Administration (FAA) is expanding the part of its Pathfinder Program that focuses on detecting and identifying unmanned aircraft systems (UAS) flying too close to airports.

Today the FAA signed Cooperative Research and Development Agreements (CRDAs) with Gryphon Sensors, Liteye Systems Inc. and Sensofusion.

The FAA will evaluate procedures and technologies designed to identify unauthorized UAS operations in and around airports. This research effort, part of the FAA's Pathfinder Initiative (*http://www.faa.gov/uas/legislative_programs/pathfinders/*), addresses one of the significant challenges to safe integration of UAS into the nation's airspace.

"Sometimes people fly drones in an unsafe manner," said Marke "Hoot" Gibson, FAA Senior Advisor on UAS Integration. "Government and industry share responsibility for keeping the skies safe, and we're pleased these three companies have taken on this important challenge."

Blighter AUDS Anti-UAV Defence System

Blighter AUDS (Anti-UAV Defence System) is a counter drone system that is designed to disrupt and neutralise unmanned aerial vehicles (UAVs), remotely piloted aircraft systems (RPAS) or unmanned aircraft systems (UAS) engaged in hostile airborne surveillance and potentially malicious activity.

The Blighter AUDS system combines electronic-scanning radar target detection, electro-optical (EO) tracking/classification and directional RF inhibition capability.

Blighter AUDS is a smart-sensor and effector package capable of remotely detecting small UAVs and then tracking and classifying them before providing the option to disrupt their activity. The system may be used in remote or urban areas to prevent UAVs being used for terrorist attacks, espionage or other malicious activities against sites with critical infrastructure.

AUDS Team

The AUDS Team brings together three leading British companies, each with the unique capabilities required to create an effective counter UAV system.

Blighter's A400 series air security radars are able to DETECT small UAVs in all weather conditions, 24 hours a day flying in urban areas or near to the horizon. The Chess Dynamics Hawkeye Deployable System (DS) and EO Video Tracker, featuring both a long range colour camera and a high sensitivity Thermal Imager (TI), along with state-of-the-art video tracking technology, is able to TRACK the UAV and, combined with radar target information, classify the target.

The operator is then able to make a timely and informed decision to use the Enterprise Control Systems ('ECS'), smart RF inhibitor to selectively interfere with the C2 channels on the UAV allowing the system to DISRUPT the UAV's mission. The smart RF inhibitor uses directional antennas to achieve maximum range of operation with minimum colateral effect.

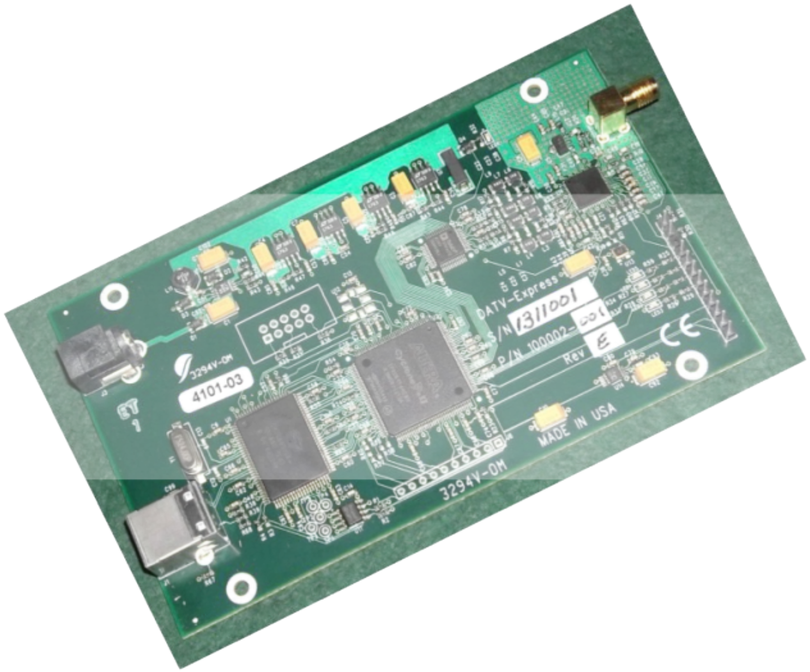
For more information, visit *http://www.blighter.com/products/blighter-auds-anti-uav-defence-system.html*

The User Guide for DATV-Express for Windows software

DATV-Express Users Guide

For running on Windows OS

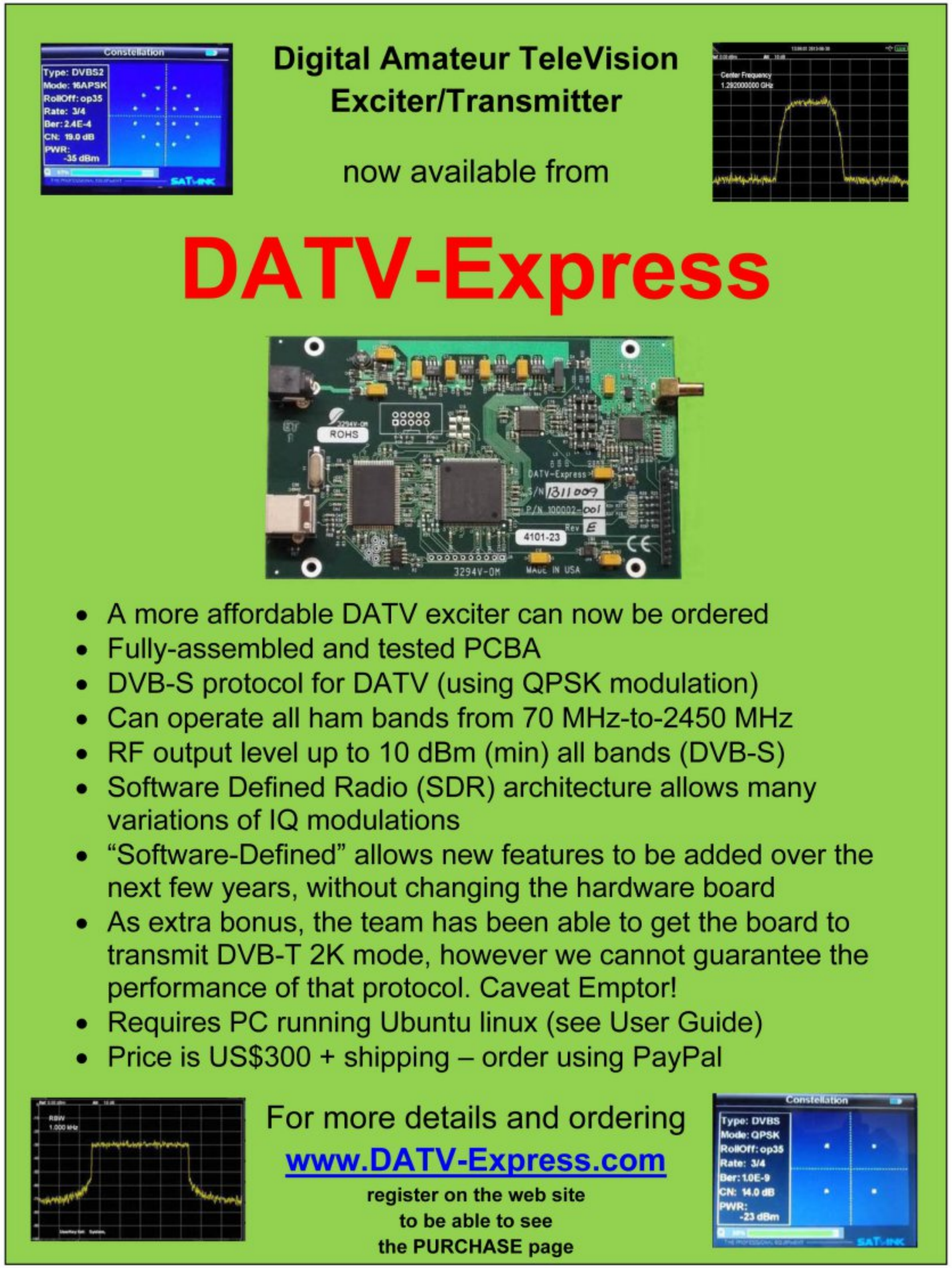
(based on Express_DVB-S_Transmitter beta software v1.11)
Draft 03



Like the beta-release software…there probably are lots of typos and mistakes. But this draft is a beginning and should make it easier to install and use the Express_DVB-S_Transmitter software. Any corrections or suggestions can be sent to me by private e-mail via *support@datv-express.com*.

Available from the *DATV-Express downloads page*.

73…de Ken W6HHC (W6HHC@ARRL.net)



Report from ATV meeting 2016 in Gloevzin

TV-AMATEUR 181 translations (Klaus, DL4KCK)

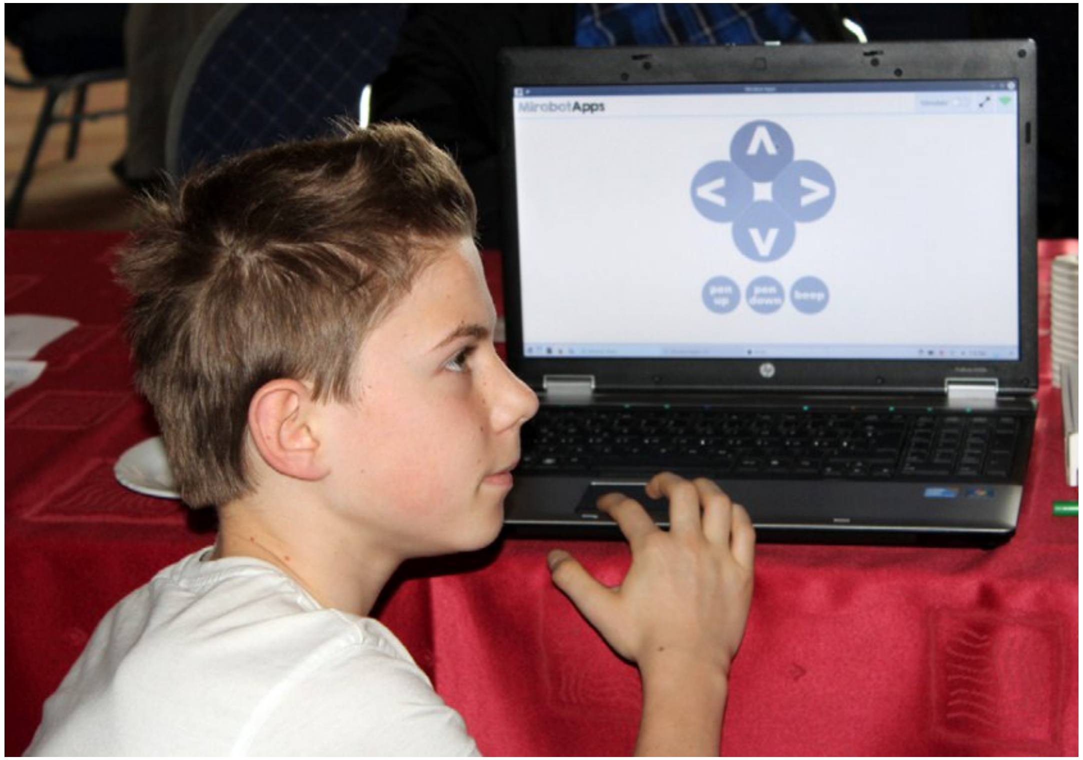
On Saturday, April 30, many ATV friends gathered at "Dahses Erbhof" in Gloevzin. Margarete, XYL of DM2CKB, and the innkeeper Mr. Dahse served for registration in the guest list and for a lunch meal. At the big hall several rows of tables were pointing to the large video screen. Some speakers prepared their lecture, of course using a laptop computer. Rolf, DJ9XF, assisted by Joerg, DG0CCO, and Karl, DM2BMB, was organiser of the event and greeted around 50 guests from Germany.

The good microphone sound was regulated again by Dan, a young schoolboy from Tangermuende. Marita, XYL of DJ9XF, organised the "alternative" program for the ladies, a short journey to Grabow to a fabrication of chocolate marshmallows. In a special workshop each attendee could create a personal version and earned a certificate for that.

In the lecture hall Uli Vogel, DK4BT, from Braunschweig (he is known from a weekly ATV news magazine on ATV repeater DB0HEX, Brocken mountain - the sys-op DG0CBP listened too) explained different usages of micro-controller ICs.

With a PIC12F690 chip Uli demonstrated programming steps for a video switcher including a 7-segment display, simulation in assembler software using PC program MPLAB X IDE and a test run on the hardware. He pointed to a useful source of PC programs at *www.sprut.de*

Our young sound engineer Dan surprised us with a short demonstration of a school project controlling a two-wheel mini-robot bearing an Arduino web-server, video sensors and a remote control port.



Our youngest participant, Dan from Tangermünde, with his robotic demonstration

The device moved autonomously following a zig-zag-pattern line on the table, and a video camera transferred the movement to the large screen and via team-talk to the HAMNET.

This packet-radio successor net was subject of the following lecture by Joerg Hedtmann, DF3EI, from Berlin. Stimulated by DL9SAU he engaged in developing a fast backbone connection from the expanding nodes in Berlin to the German HAMNET.

This was enabled by using existing ATV repeater sites like DB0BC and DB0KK, where also HAMNET user nodes on 13 cm will be installed.

The omnidirectional user antennas can form a mesh network in their neighbourhood. Another service of the HAMNET are ATV live streams from all over Germany. To enable this via RF only (instead of present web tunnelling) there are needed more GHz links throughout the country.

An overview is given online at *hamnetdb.net*

Surprise guest from Paraguay: Detlef Müssig, ZP7AEQ (DH7AEQ) on Laptop

A very special guest surprised with a short lecture: Detlef, ZP7AEQ (DH7AEQ), had a 11000km long journey from his new home in Paraguay! He showed some pictures about his big project, the first ATV repeater in Paraguay. At the envisioned ZP7ATV site on a mountain 688 m high only a lattice tower from a former FM radio station is available, and the FM ATV repeater power supply is only possible by solar panels.

The administrative problems are demanding, but Detlef will report any progress via skype at the ATV morning net on DB0EUF (Elbe river), online visible at *http://atvstream.mooo.com:8100/db0euf.ogv.m3u*

For a refreshment through food the guests walked to the rustic restaurant "Kuhstall" (cowshed) across the courtyard.

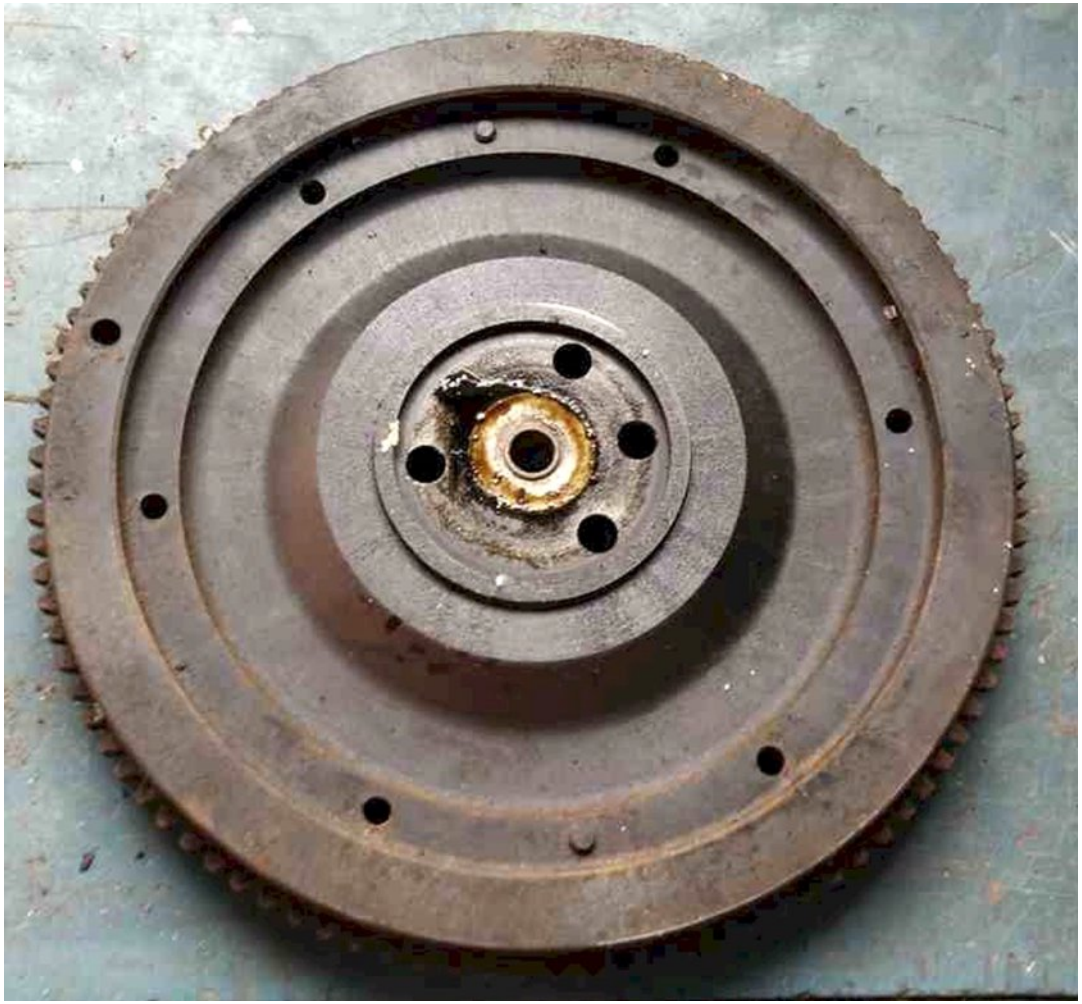
In the afternoon a stressful General Meeting of AGAF e.V. followed - after the resignation of AGAF manager (Pruski) on January 23 2016 and resignation of first chair (DC6MR) on that day, April 30, there are many problems to solve!

Luckily the new web site agaf-ev.org has lived up again and is ready to register all members who want to download new and old issues of TV-AMATEUR.

Also the lectures program of DATV presentations at HAM RADIO 2016 in Friedrichshafen (Friday, 24 June 2016, 12:00 - 16:00h - Room ;Oesterreich+), organised by AGAF, is online at *http://agaf-ev.org/index.php/6-vortraege-im-forum-digitales-amateurfunkfernsehen-auf-der-hamradio-2016*

Adding 360° rotation to my pump up mast

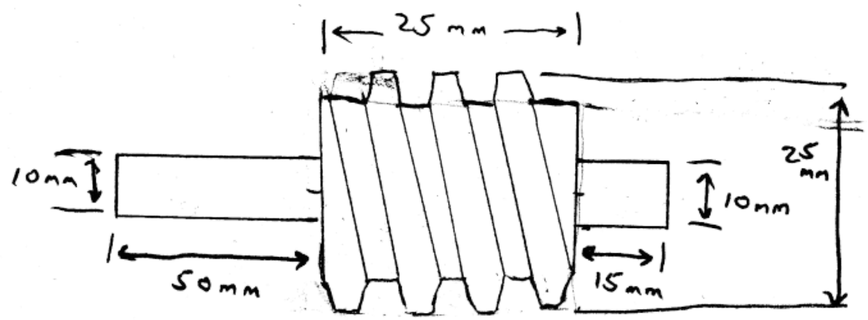
By John Hudson G3RFL



Above: Motor Car Flywheel needs machining to fit the pump-up mast

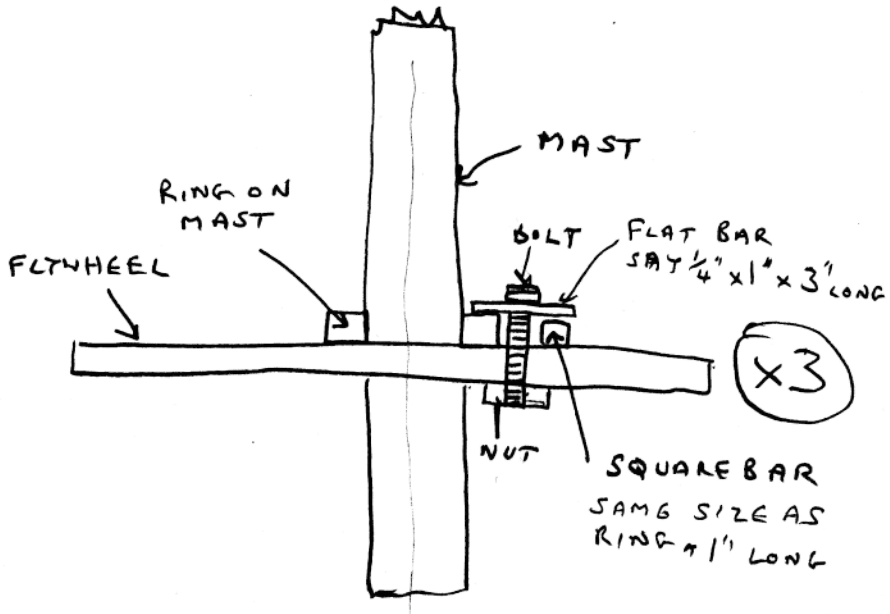
In CQ-DATV 36 I started with a look at my pump-up mast, to which is attached all the station aerials. It is, or to be more accurate, was rotated by a SAT 12 Linear Actuator which would only rotate it through 110°. I outlined my plan to use a car flywheel to extend this to 360°.

This was the actual sketch (right) I passed along to Alan, along with a flywheel and motor.

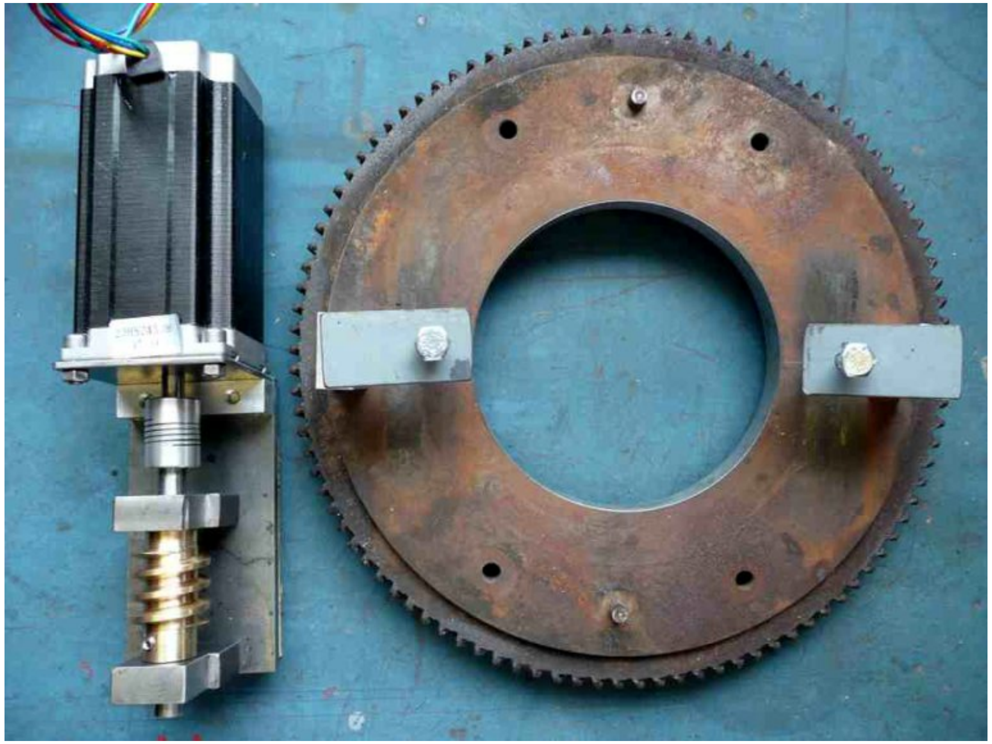


Right: Required Worm Gear to mesh with Flywheel and couple to supplied Motor

Above: Rather rusty Linear Actuator



Flywheel that will require the centre hole machining out and mounting brackets



The Flywheel now machined to fit the pump up mast along with a worm gear to drive it coupled to a stepping motor

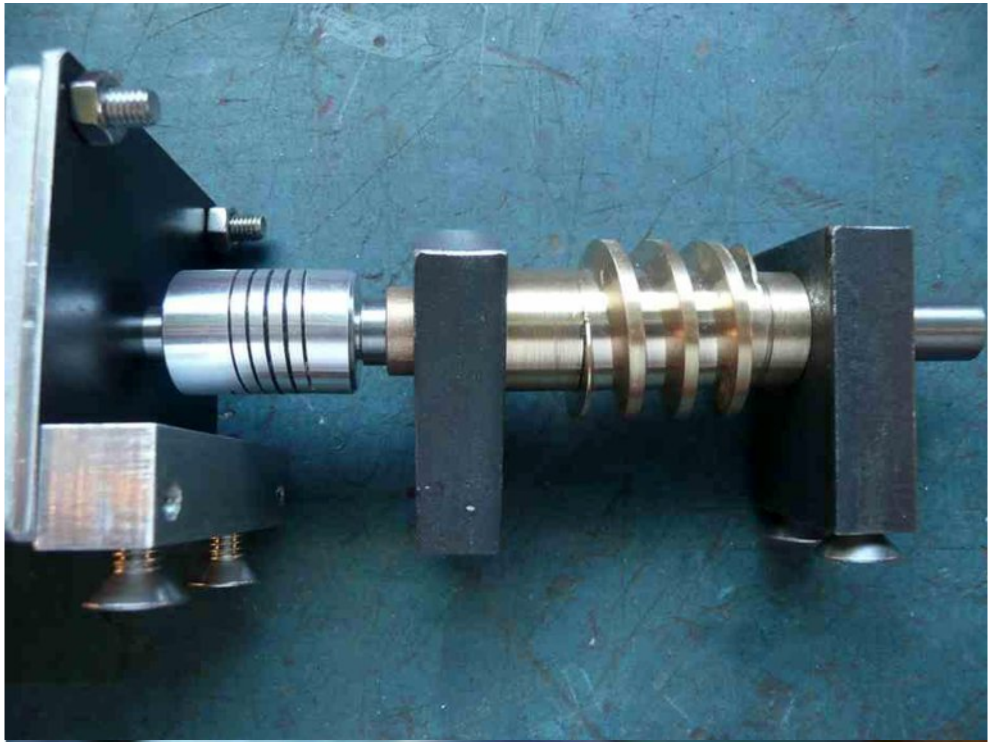
The machined parts have now returned from Alan and considering the sketch I supplied him with, well, the parts have surpassed my wildest expectations.

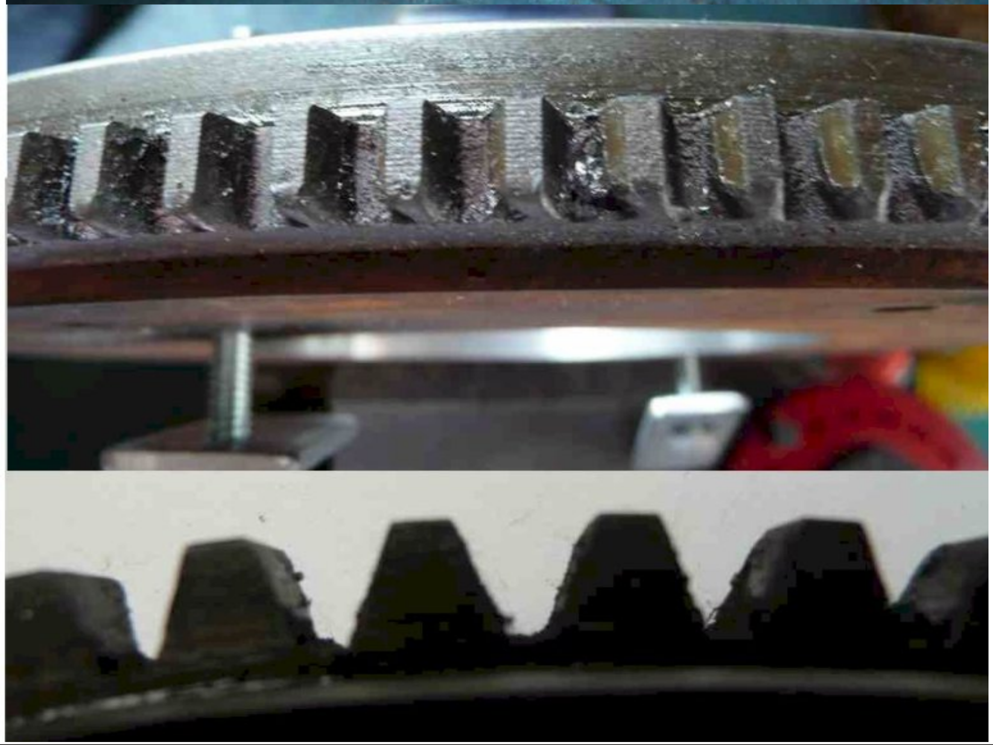
Alan has really done me proud.

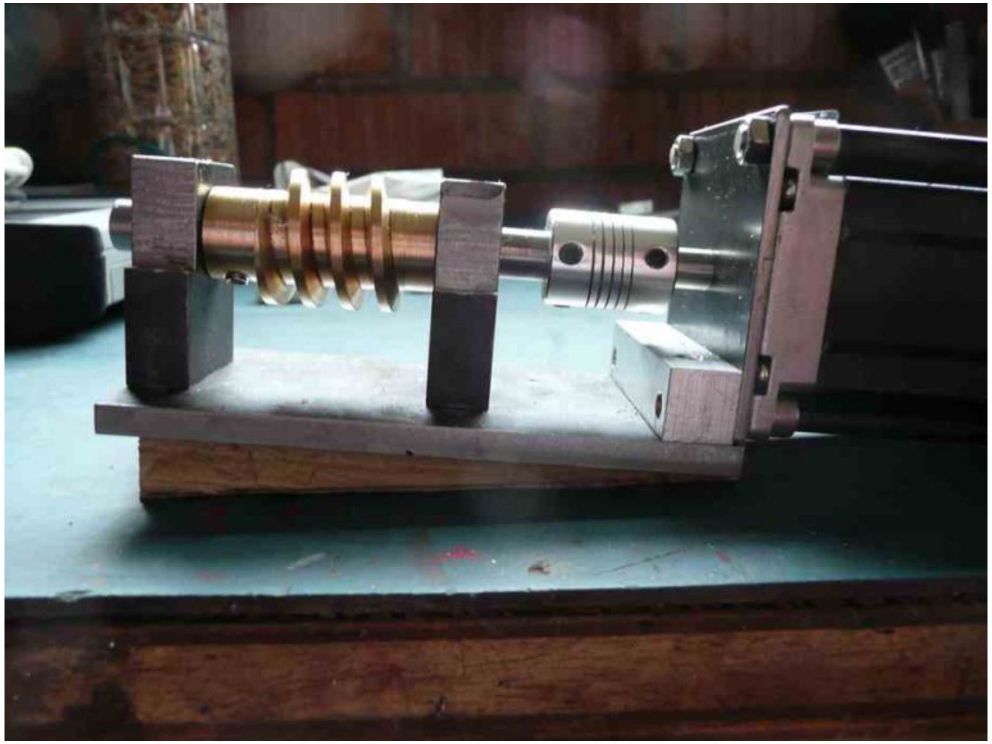
It was not plain sailing in Alan's machine shop as the close-up of the flywheel edge reveals.

The teeth are cut at an angle and ideally, for a good mesh with a worm gear, they need to be square cut.

The fix is to mount the worm gear and the motor at an angle.







The ideal angle to mount the motor so that the worm gear engages with the flywheel

If you look on the CQ-DATV Facebook page there is an mp4 video of the worm gear driving the flywheel.

Now that we have the mechanics mastered we can look at the electronics required to control the motor and interface the aerial position to our TFT screen.

The electronic control of the stepper motor was the next step (pardon the pun).

Top left: Close up of the worm gear attached to the stepper motor

Bottom Left: A close up of the flywheel teeth

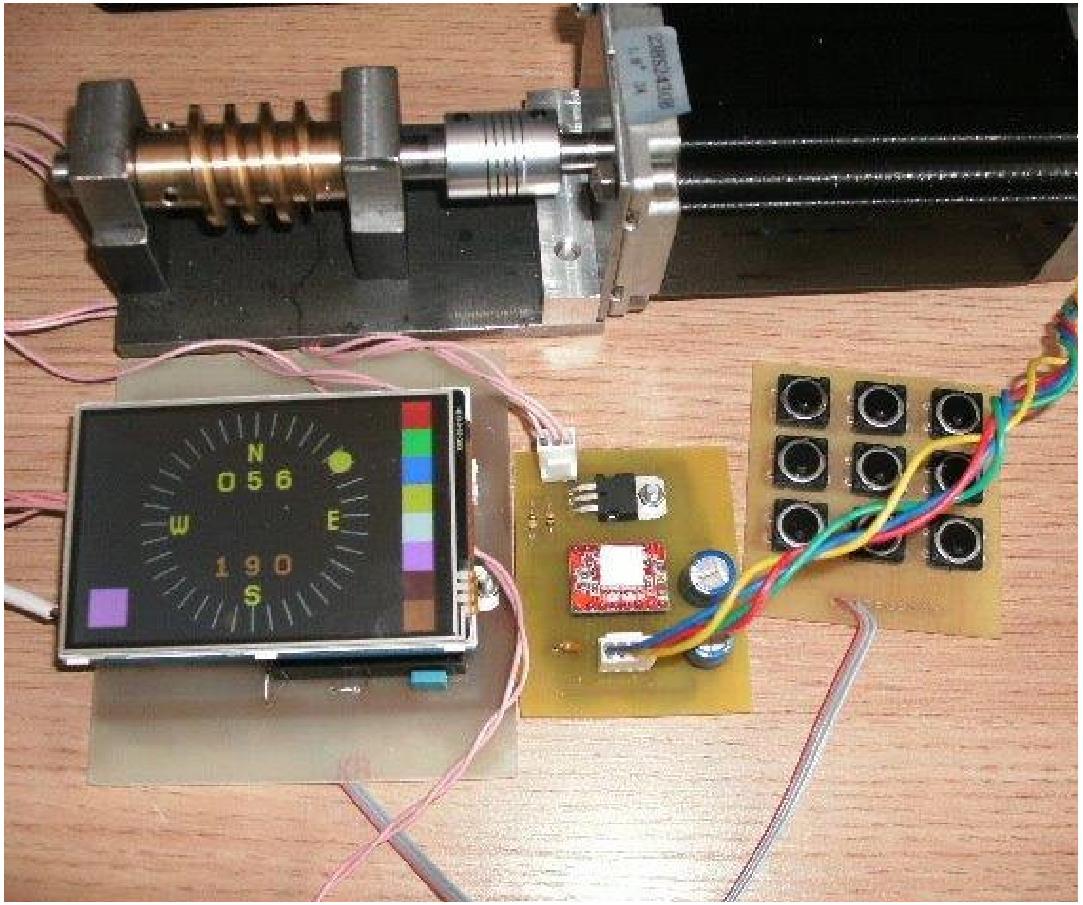
The stepper motor is 200 pulses per rev and seems to draw 300mA (inc TFT display) with a 12V supply (actually around 200mA) using single step. There are 100 teeth on the flywheel so we get 3.6 degree per revolution of the stepper. This was a brand new motor. model 23HS2430B 3amp rated current 1.6R 6.6m/H 4 wire from Ebay and is built like a tank, with a step angle 1.8 degree, 1400g motor weight.

I used a small driver PCB from Ebay just under £3 and a novel way to send direction and step speed down one wire. The A4988 chip does the job DMOS driver with current limit.

I am hoping it will have enough power with just a 12V supply. The logic needs 5V so a regulator was added to this driver PCB.

Stepper driver PCB with chip A4988 fitted

Using a stepper motor should enable accurate prediction of the aerial direction by counting the pulses, but I have decided against this and will be stopping with the magnetic sensors instead to indicate direction, as per CQ-DATV 33.



Final unit assembled and undergoing bench testing

It works and has provided some good service and at this stage I will not update it. So I just have a stepper turning control to engineer!

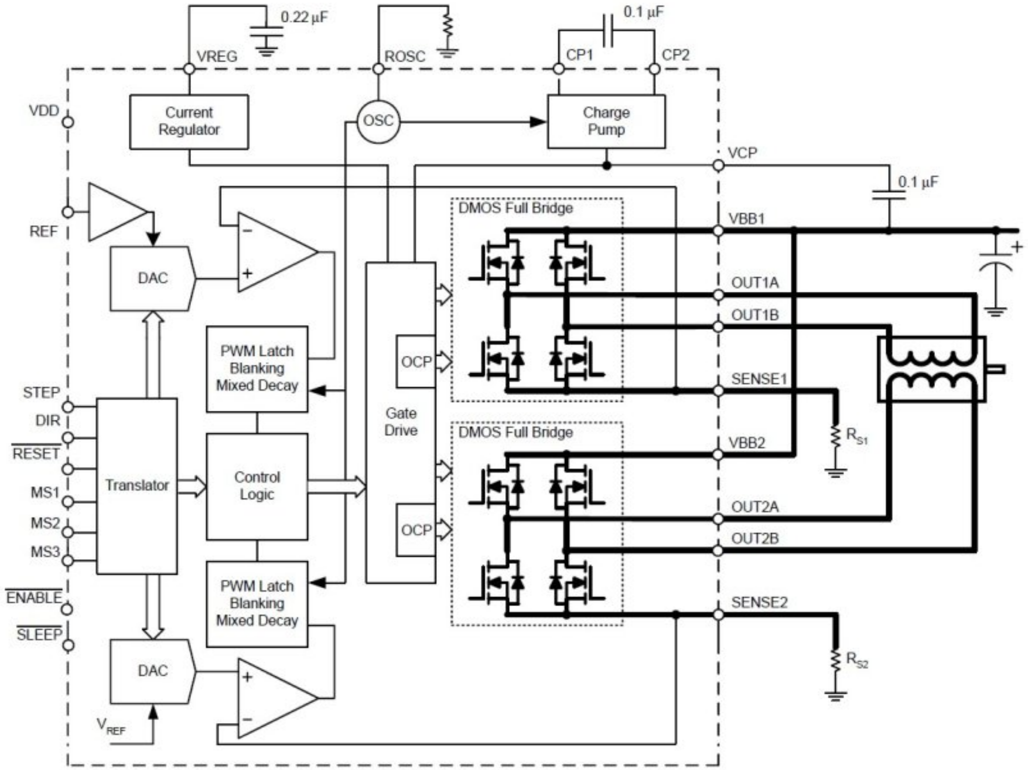
The mechanics in place and don't they look the business. My thanks to Alan G3SXC for his brilliant machining and to Dave G3ZGZ for his help and the photographs which together with Alan's tell this story.

Back into the shack to add the motor control so I can power up the motor and if all goes well, rotate my pump-up mast through 360°.

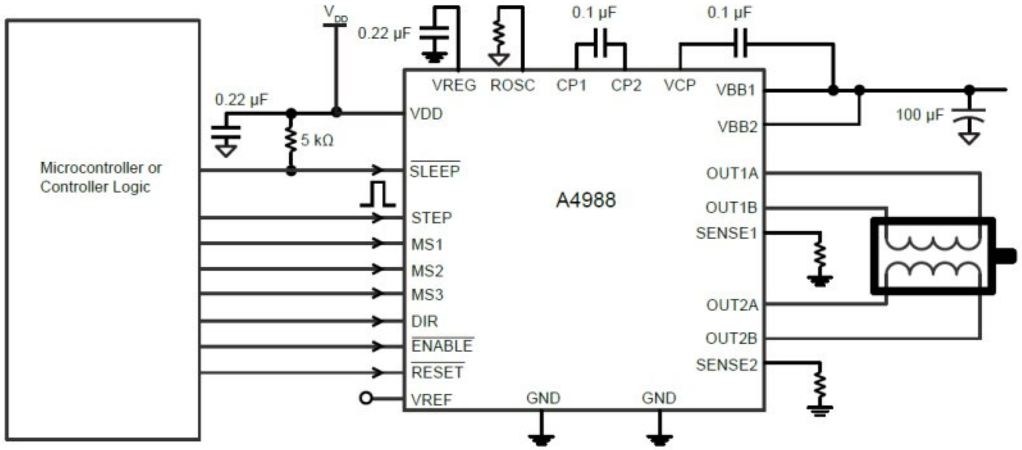
The flywheel in place

The motor and worm gear added

So how hard can it be to power up and turn the stepper motor? A good place to start is to download the data sheet for the A4988 and see what the manufactures say.



DMOS micro-stepping driver with Translator and Over-current protection



Simplified block diagram

Yes, it looks a little heavy, but then most of it is in the A4988

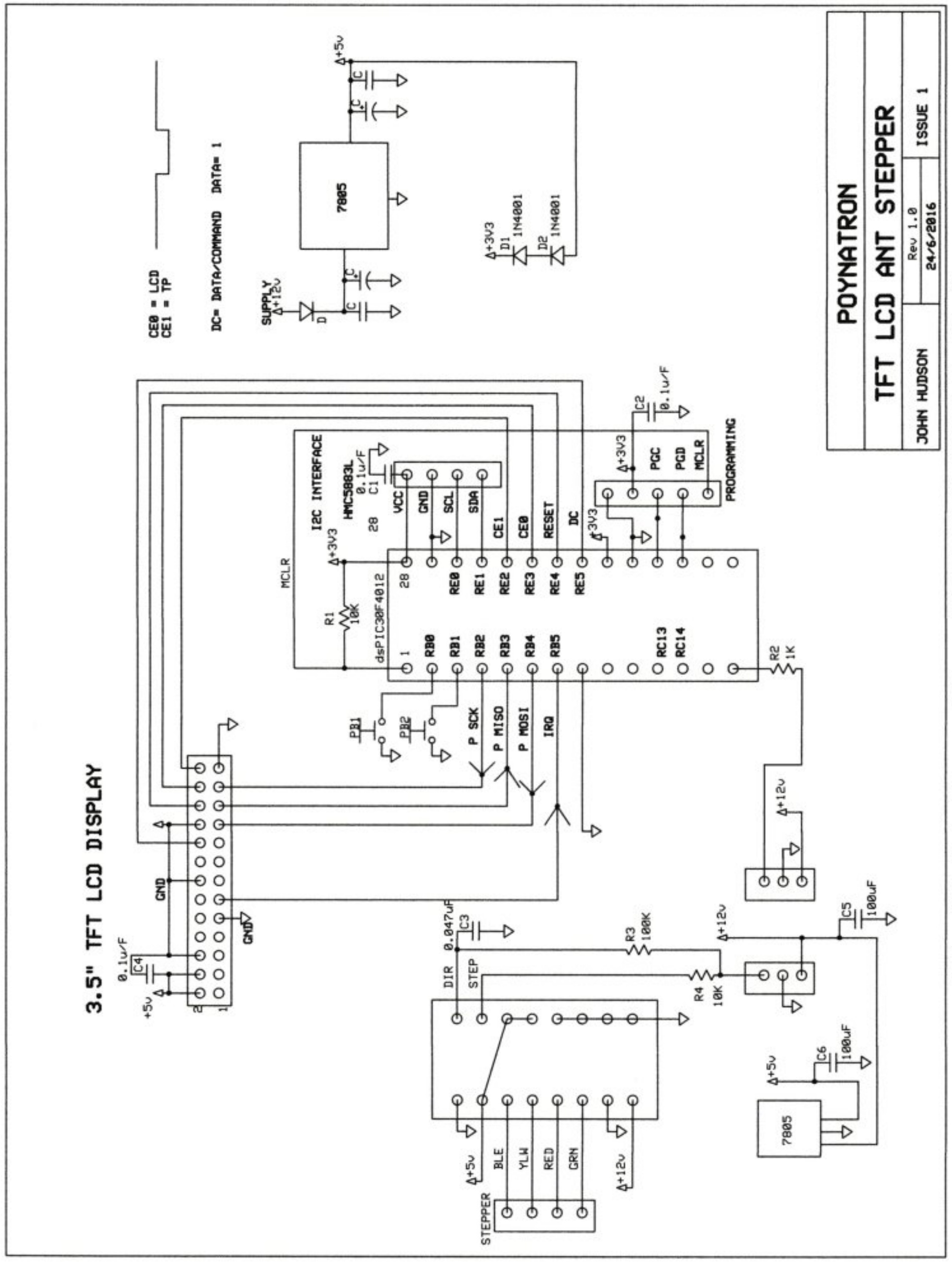
So all I have to do is build the block on the left of the diagram and this is what I came up with.

This is the circuit and yes it works! I can now rotate my aerial and see the TFT screen display update (see CQ-DATV article displaying the direction).

This really has been the engineering project of projects.

I will be adding a waterproof cover to the motor and worm gear, perhaps even a good dollop of waterproof grease to the flywheel and fingers crossed for it to last a little longer than the satellite dish mover I started with.

A hi-res version of the schematic can be downloaded from the CQ-DATV web site.



Complete rotator circuit and display driver

Revised DX list

By Ken W6HHC

This newly revised DX list added these recent DATV QSO's:

- *2 Meter RB-DATV QSO of G8GTZ and G8GKQ on 2016-05-07 (148 KM)*
- *2 Meter RB-DATV QSO of GW8VPG and G8GKQ on 2016-06-11 (121 KM)*
- *70 CM RB-DATV QSO of G8GTZ and F9ZG on 2016-06-12 (235 KM)*

It is interesting to me that when RB-DATV is using reduced Symbol Rates (to reduce RF bandwidth)...the 2M RB-DATV hams have found that H.264 video encoding provides a smoother/better video...because the smaller buffer size allowed in H.264 design works better than the standard MPEG-2 (aka H.262) when received as a payload video with DVB-S protocol.

See more details at:
www.von-info.ch/hb9afo/records/recordse.htm

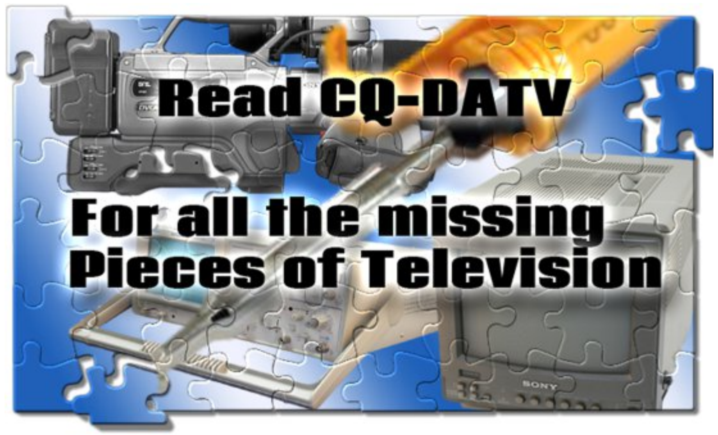
73...de Ken W6HHC, email: *W6HHC@arrl.net*

Note: The DX records table might not be viewable on your device. A hi-res version can be downloaded from the *CQ-DATV web site*.

Known Digital-ATV DX Records
updated 2016-06-21
by Ken W6HHC

	24 GHz		
124 KM	JA6DME & JA6EES	2011-11-12	Locations Mont Ten-Zan and Mont Ge-Zan
	10 GHz		
450 KM	HB9JBC & F4CXQ	2005-06-21	Locations JN40CT (Sardinia) and JN12OH (Spain)
	5.7 GHz		
341 KM	JL1BLF & JH1GED	2011-08-06	Locations Mont Chokai-san and Mont Kashimayari-gatake)
	2.4 GHz		
~ 1000 KM	OR4ISS to IØKPT (one-way)	2014-03-08	
~ 1000 KM	OR4ISS to IK1SLD (one-way)	2014-03-08	Initial DVB-S protocol live video transmissions from HamTV in orbit aboard ISS SR = 1.34 MSymb/sec and 2.0 MSymb/s using SR-Systems exciter & MPEG2 Locations Orbit to Matera, Italy and also Orbit to Casale Monferrato, Italy
252 KM	JA6SPI & JA5MFY	2009-11-03	Locations ??
	1.2 GHz		
440 KM	G4KLB to G1LPS	2010-10-11	Locations IO90BR and IO94EQ (tropospheric ducting - one-way DATV)
419 KM	G4KLB & MØDTS	2010-10-11	Locations Bournemouth, England and Yarm, England (tropospheric ducting)
379 KM	VK3RTV(RPTR) & VK7EM	2011-02-23	Locations Mount Dandenong, Victoria and Penguin, Tasmania (operators VK3BFG, VK3DQ , VK3WWW and VK3TRX)
252 KM	JA5GYU & JA6JNR	2009-11-03	(1 Watt)
	70 CM		
696 KM	F1FY to G8GTZ	2013-09-24	(DVB-S 2MS/sec FEC=1/2 - - one way reception)
696 KM	G8GTZ to F1FY	2013-09-25	(DVB-S 2MS/sec FEC=1/2 - - one way reception reported by FM) Locations IO91KH (near Basingstoke) and JN16VB (near Roanne, France)
528 KM	G3PYB & F5AGO	2013-09-24	(DVB-S 2MS/sec) Locations near W YORKSHIRE and JN06DP (near Poitiers, France)
	70 CM - continued		
501 KM	W4HTB & WB8LGA	2014-07-26	(DVB-T QPSK FEC=1/2 2 MHz Bandwidth) - Tropospheric ducting Locations Bowling Green, KY and Marengo, OH
373 KM	G8GTZ & F3YX	2013-09-25	(DVB-S 2MS/sec FEC=1/2) Locations IO91KH (near Basingstoke) and JN18AP (near Limours, France)
235 KM	G8GTZ & F9ZG	2016-06-12	H.264 video - DVB-S protocol at 125 KSymb/s using DATV-Express w/ 19-ele yagi Locations JO00HU (Fairlight near Hastings) and IN99KC (near Cherbourg)
121 KM	KH6HTV to KØRZ	2011-11-21	(video resolution HDTV 1080i - protocol ITU-T/J.83B QAM-64 - one-way DATV) Locations Cheyenne, Wyoming and Boulder, Colorado
	144 MHz		
237 KM	F3YX to F9ZG	2011-11-09	DVB-S protocol at 1000 KSymb/s using modified SR-Sys MiniMOD (one-way) on 145.0 MHz experimental license 5-Minute max Locations JN18AP (near Limours, France) to IN99KC (near Cherbourg, France)
148 KM	G8GTZ & G8GKQ	2016-05-07	H.264 video - DVB-S protocol at 333 KSymb/s using DATV-Express w/ 9-ele yagi at G8GTZ. G6GKQ used RPI w/ camera and Digithin with 5-ele yagi both produced 25W ERP. - on 146.5 MHz - UK temporary band allocation Locations IO91GI (Walbury Hill) and IO81FD (Dunkery Beacon)
121 KM	GW8VPG & G8GKQ	2016-06-11	H.264 video - protocol DVB-S at 333 KS/s - G8VPG using DATV-Express w/ 9-ele G6GKQ used RPI w/ camera and Digithin with 5-ele yagi on 146.5 MHz - UK temporary band allocation Locations IO81LS (Blorenge Mtn, South Wales) and IO91GI (Walbury Hill)
115 KM	MØDTS & G1LPS	2015-06-14	H.264 video - protocol DVB-S at 333 KSymb/s using experimental DATV-Express with RaspberryPi camera and 1W avg PWR Output to antenna (10-15W ERP) Locations North York Moors, England and high ground near Rothbury, England
50 KM	MØDTS & G1LPS	2015-02-21	H.264 video - protocol DVB-S at 333 KSymb/s using experimental DATV-Express on 146.5 MHz - UK temporary band allocation Locations North York Moors, England and Spennymoor (County Durham), Eng
	50 MHz		
64 KM	G8ADM to G8LES	2015-02-10	DVB-S protocol at 1.133 MSymb/Sec with FEC=3/4 (one-way) on 51.2 MHz using 200W avg Pwr Out and BW approx 1.5 MHz Locations North of Harrow (IO91TO) to North of Alton in Hampshire

See more details at **www.von-info.ch/hb9afo/records/recordse.htm**



CQ-DATV dotMOBI

First-Hand: My Ten Years at Ampex and the Development of the Video Recorder

By Fred Pfost

This article was first published in the *Engineering and Technology History Wiki*

Introduction

When I first started working at Ampex on February 4, 1952 (4 days after my last final at The University of California in Berkeley, California where I earned my bachelor of science degree in electrical engineering) I spent about a week being introduced around the company to various people and departments including the president, Alexander M. Poniatoff, who had started the company in about 1944 near the end of the World War II.

Ampex had been manufacturing small electric motors to drive radar antennas but found it necessary to find a new field to pursue after the war. This turned out to be audio magnetic tape recorders. By 1952 Ampex led the world in producing professional audio magnetic tape recorders. Almost every radio station in the world used Ampex professional audio recorders. It would be four more years before AMPEX's introduction of the world's first economically and technically successful magnetic videotape recorder the VR1000 (affectionately called the Mark-4 video recorder). (Fig. 1)

FM Recorders - My First Assignment

My first assignment at Ampex was to work on the assembly of the electronics for a product line that Ampex was just beginning to get into - FM recorders for data recording in the field of instrumentation. After about four months this project was transferred to the manufacturing division.

Fig. 1 VR1000 - 1956

FM Recorder at Ampex - 1952

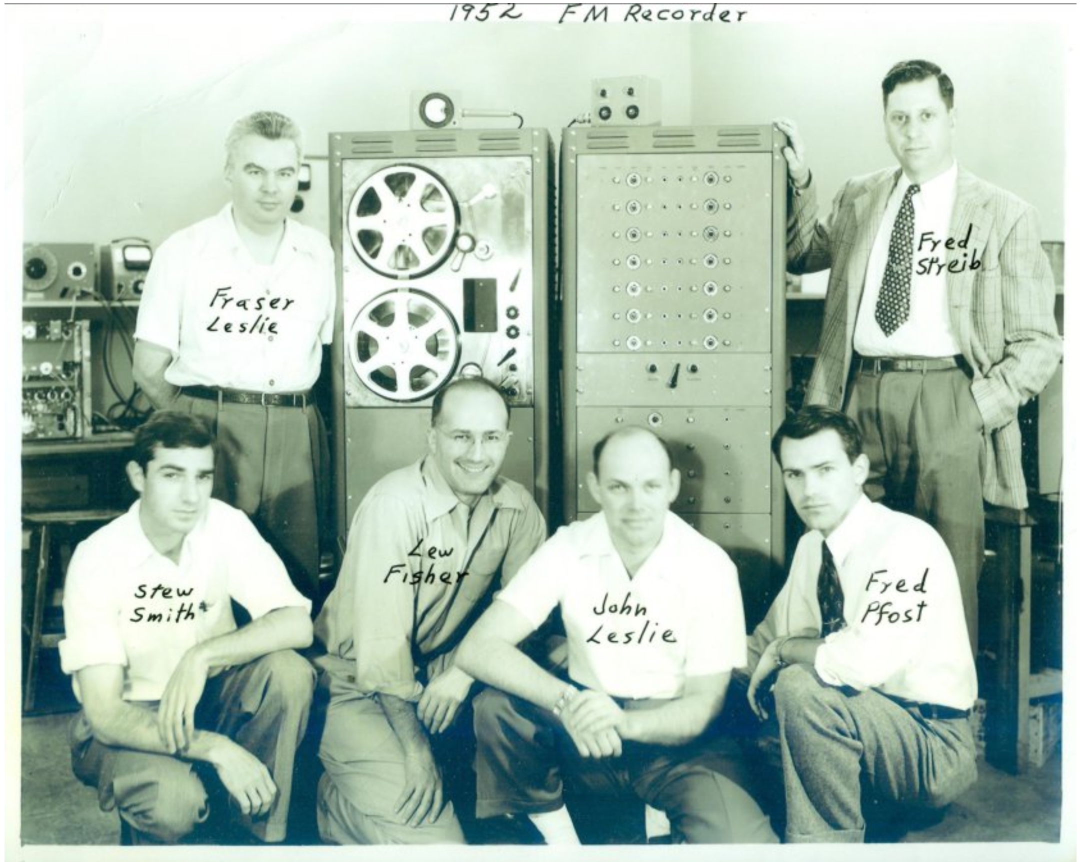
I was then assigned (along with my boss, Clarence Stanley) to develop a 21-channel instrumentation recorder for the Navy.

We modified a standard Model 300 top plate and designed and built the record and playback electronics for the 21 channels.

I built a mechanical switching device to switch, simultaneously, between record and play for all 21 channels. This 21-channel recorder project took eight months.

1957 Emmy given to Ampex for the VR 1000

I then designed, built and delivered to Texas, an oil well logging recorder. I designed and built a flux-sensitive playback head (for this recorder) to use on the rotating, magnetically coated, 12-inch aluminum disk that could read from DC to several hundred Hertz. This recorder was built for Perforating Guns Atlas Corporation in Houston, Texas.



Next, in these interesting and actually exciting projects, I was assigned to assist one George Berttell in the development of a complementary amplifier/speaker unit whose amplifier was equalized to compensate for the loudspeaker's falloff in the low- and high-end frequencies.

This unit was to be used in conjunction with a semiprofessional audio recorder (whose final electronics assembly I had made).

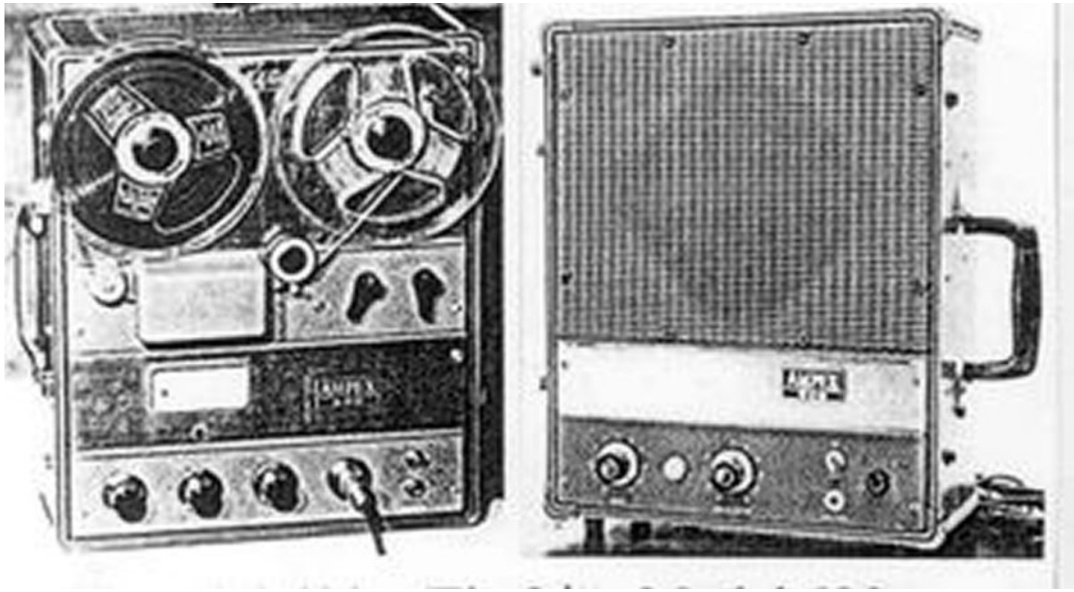


Fig. 2 - Model 600

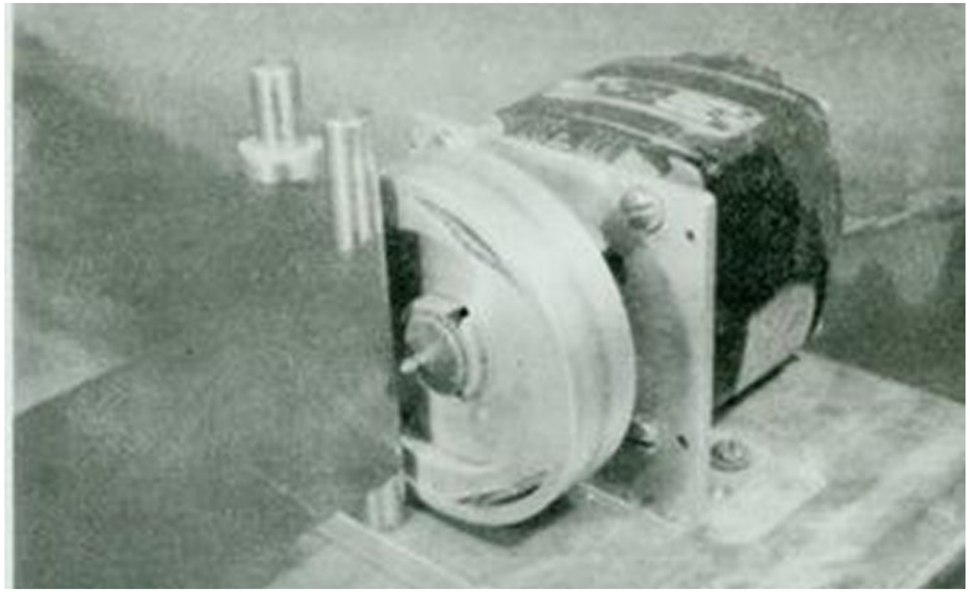


Fig. 3

This recorder was named the Model 600 and the amplifier/speaker unit we developed was named the Model 620.

They were mounted in matching, portable, light brown Samsonite cases (Fig 2). Thousands of these systems were sold and they established the standard in the marketplace for this class of audio systems.

In September of 1954 I was assigned to the Video project that had been restarted in August to further evaluate the feasibility of recording television on tape. Several other companies had developed recorders that were totally impractical and unsuccessful. A few of these were RCA, GE, Crosby Enterprises, BBC and Siemens GmbH.

Ampex had hired Charles Ginsburg in June of 1951 to manage the video development along with Ray Dolby (who was still a student at Stanford and worked for Ampex just part time) and Shelby Henderson, a machinist.

Within a year they had developed a rotating head recorder mechanism that, when used in conjunction with some 2-inch wide audiotape from Minnesota Mining and Manufacturing Co. (3M), (Fig. 3) had produced some fairly encouraging results.

However, at that time, a pressing requirement developed for an audio project (in the movie equipment field) that exhibited a higher priority than the video project, so the video project was put on the shelf temporarily.

First Effort at Video Recording

When the video project was restarted in September of 1954 it was composed of Ginsburg, Dolby, Henderson and some new members: Charlie Anderson (hired in August), Fred Pfost (transferred in September), and Alex Maxey (transferred in October). This group became the team that continued on through the completion of the first videotape recorder demonstration (outside of the lab at Ampex in Redwood City) in Chicago in April of 1956. (Fig.4)

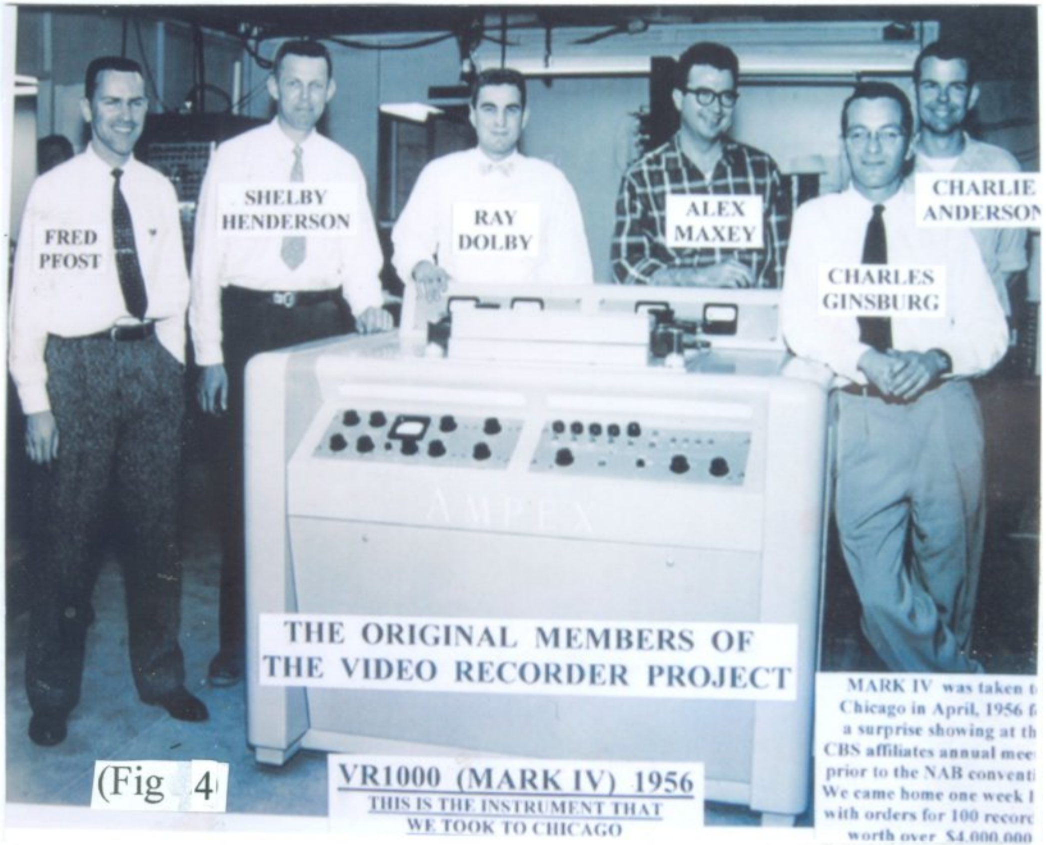


Fig. 4 - VR1000 (Mark IV) 1956. This is the instrument that we took to Chicago. The original members of the video recorder project from left to right: Fred Pfost, Shelby Henderson, Ray Dolby, Alex Maxey, Charles Ginsberg, and Charlied Anderson

Scalloped Outputs Require Automatic Gain Control

I was initially ask to develop an automatic gain control circuit to overcome the amplitude variations we were getting off tape using the recorder that had been developed in 1951-52 by the first Ginsburg group. This rotating head drum was about two and one half inches in diameter and it initially had three recording heads (transducers) equally spaced around the periphery on one face of the disc.

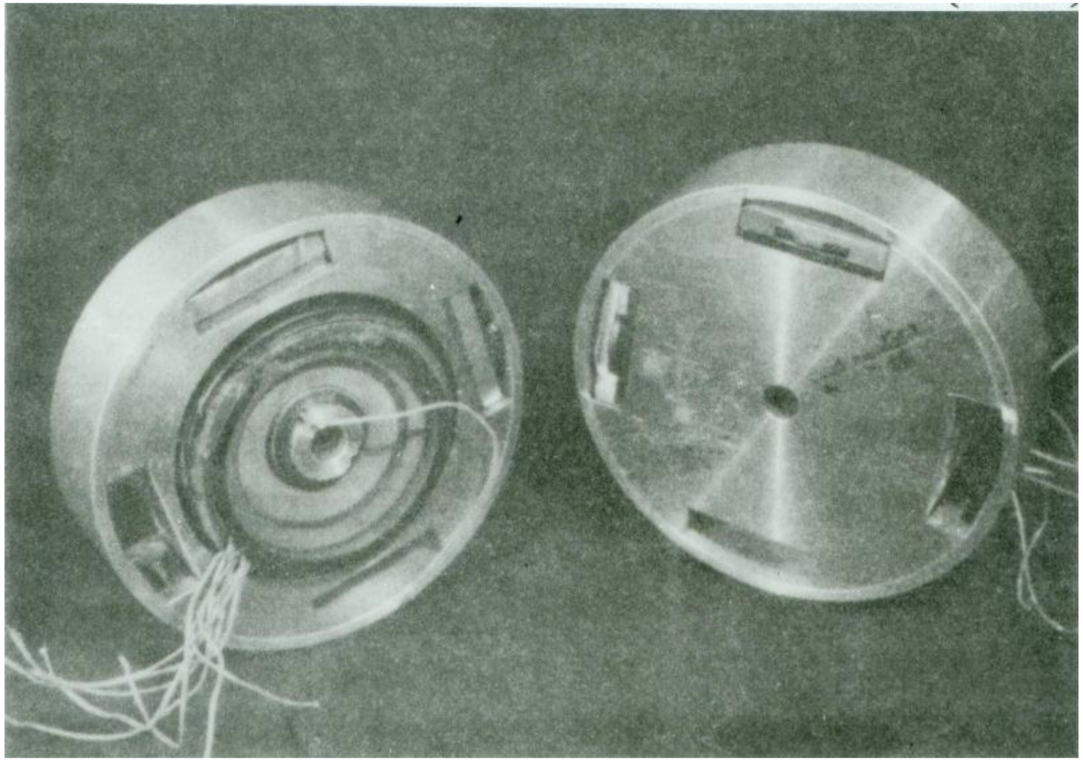
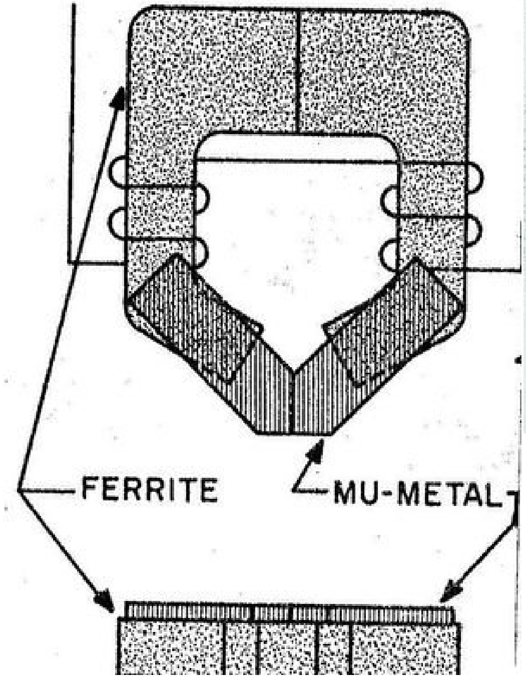
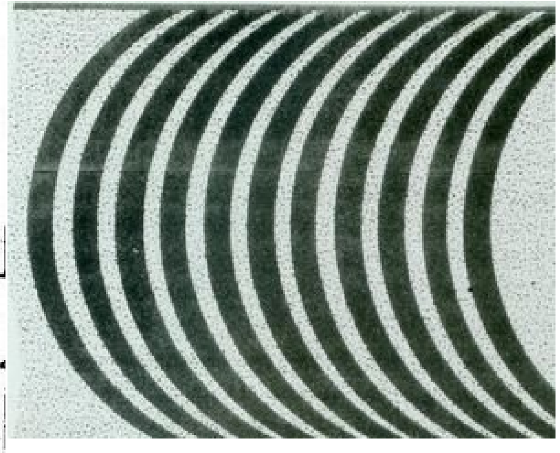


Fig. 5

The three were tied electrically in parallel. (Fig 3) The number of transducers around the head drum was increased to four shortly thereafter, with diametrically opposite transducers tied together electrically. (Fig 5) This was in order to feed the signals off the tape sequentially from the four transducers into a two-channel preamplifier.

An engineer, Duane McQueen, in the engineering head department in 1951 had made these transducers. They were composed of ferrite cores with Permalloy pole pieces to establish a gap that would ride against the tape to write and read the magnetic signal. (Fig 6) These parts were bound together with epoxy and mounted in the head drum with a metal strap around the outer edge to restrain the parts from flying out due to centrifugal force. (Fig 3 & 5).





Above: Fig. 7

Left: Fig. 6

The head drum was turning at 14,400 RPM (240 revolutions per second) with a head to tape speed of 1500 inches per second. That gave a centrifugal force of 3000 Gs at the drum periphery.

Arcuate Sweeps

Now let's look at the cause of the major signal amplitude variations that were being observed off the tape.

This was a big mystery until we determined the reason. These variations consisted of higher output near the tape edges and lower output at the middle of the tape.

We observed that the arcuate shape of the transducer path as it crossed the tape (Fig. 7) had a slight longitudinal component near the tape edge and only a transverse direction near the middle of the tape. We then recalled that the 2-inch wide tape, made by 3M, was manufactured for audio recordings.

Audio recorder transducer gaps are usually orientated to write magnetic signals in a longitudinal direction along the length of a tape. In order to give a higher output from a playback head, the oxide particles on tape can be "oriented" in the longitudinal direction. (These oxide particles are acicular in shape about 5 to 1 ratio between length and width.

With this orientation, the output off tape will be about 3 dB greater for longitudinally orientated head gaps than if the oxide particles were not orientated (i.e. random orientation).

Therefore, one could find a 6-dB difference in output if the gap orientation and the tape oxide particle orientation were at right angles to each other. We, therefore, asked 3M not to orient the tape particles (just random orientation).

This should have eliminated the transducer's major output variations that we had been observing. However, there were other, more subtle, negative considerations associated with the arcuate head tracks that influenced us to drastically change the head drum orientation.

We modified the head drum orientation by 90 degrees (making the drum surface at right angles to the tape) (Figs. 8 & 9). The axis of the head drum motor would now be parallel to the tape and the path of the transducer across the tape would be almost perpendicular to the motion of the tape.

As we suspected, the major output variations we were observing before disappeared and my original assignment of developing an AGC circuit was eliminated.

My Radical New Head Drum Design

Maxey had been assigned the job of developing a new transducer design and he had continued with the ferrite core and Permalloy tips design held together with epoxy.

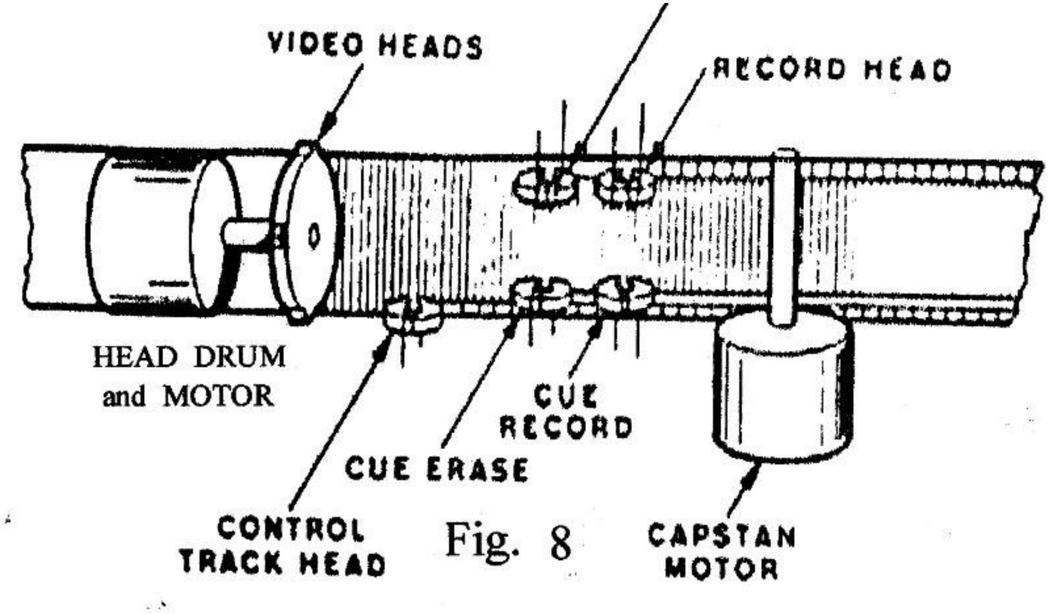
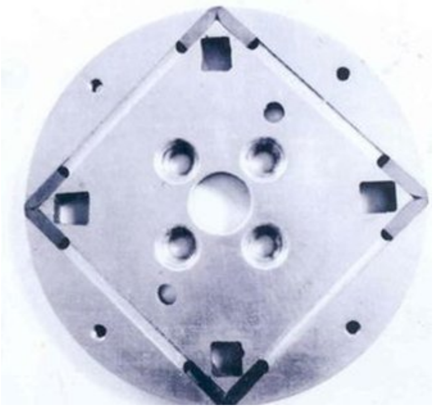


Fig. 8

With this new head drum orientation there was no strap around the drum periphery to overcome the centrifugal force on the transducers and his epoxy heads flew apart.

While I was working on the AGC circuit I was mulling over a new transducer design that would be able to overcome the huge centrifugal force at the drum periphery. I described this design to Ginsburg and he liked it and put me in charge of the video head development.



Left: Fig 11

Right: Fig 12

This design was based on the idea wherein I would bury the transducer tips in grooves cut in a disc with only the very ends coming together to form the gap at the disc periphery. (Figs. 10 & 11) Four round (donut shaped) wire-wound ferrite cores were buried in the matching, machined disc (Fig. 12) that was bolted to the first disc.

I assembled four transducers on a disc (Fig. 11) and using a slipring assembly I designed and had made (Fig. 13) I fed the head outputs to four separate preamplifiers. I was able to show this assembly could withstand the centrifugal force and could produce good outputs. It was now early December 1954 and I was able to record and play back usable signals as high as three megahertz. This was the highest frequency we had ever seen off tape (and could very well have been as high as anyone in the world had ever seen off tape).

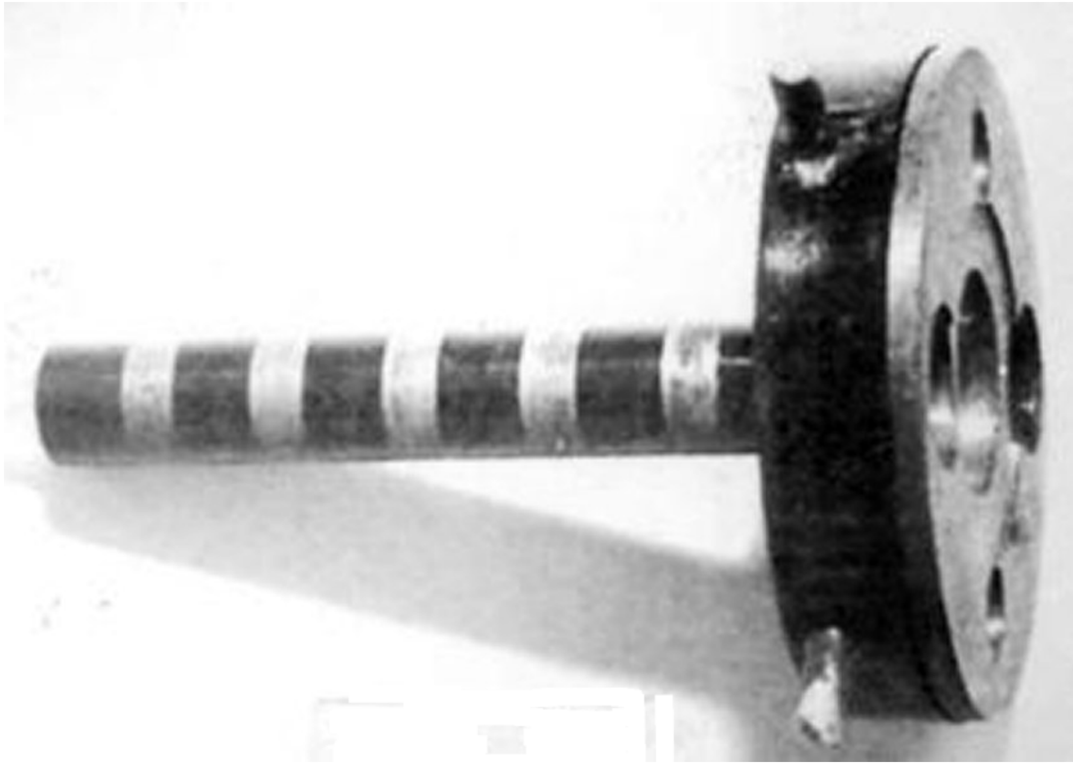


Fig. 13

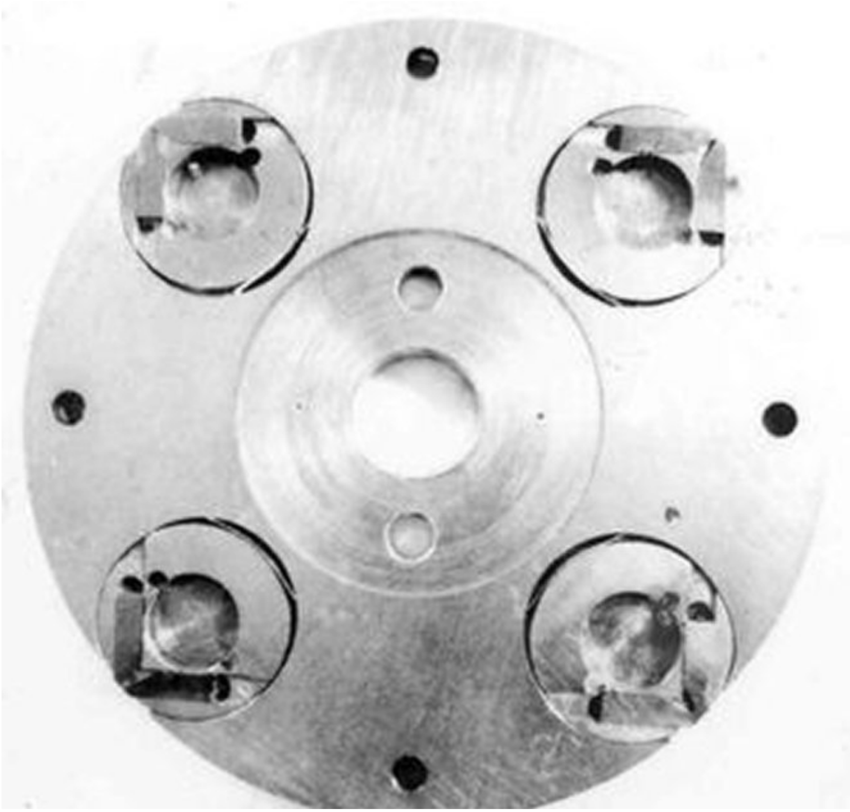


Fig. 14

It was difficult (if not impossible) to machine the grooves accurately enough to cause the four gaps to reside at exactly 90-degree locations. I machined the grooves into little discs (I called them dimes) and mounted these dimes in depressions machined into the disc. (Fig. 14) Now these little dimes could be rotated and clamped in the right angular position and held with epoxy to place the gaps at almost exactly 90 degrees.

The next modification to this design was to make the depression that located the dime, deeper and the dime thicker (now called a nickel) so I could mount the ferrite core and the tips in the same piece. This made it possible to check out each complete transducer assembly separately before mounting it into the drum.

I found some new head tip material, Alphenol, (from the Naval Research Laboratory in Washington D.C.) that had about the same permeability as the previously used Permalloy, but it was much harder and it extended the head life from around ten hours to about one hundred hours. I changed the head drum material from naval brass to stainless steel and cut four radial slots in the drum which made it possible to adjust the 90 degree position of the head gaps to within a few micro-inches of the absolute 90 degree position. This was accomplished by adjusting tapered setscrews located in each of the four slots. This made it possible to record with one video head assembly and play that tape back with another assembly (interchangeability). (Fig. 15)

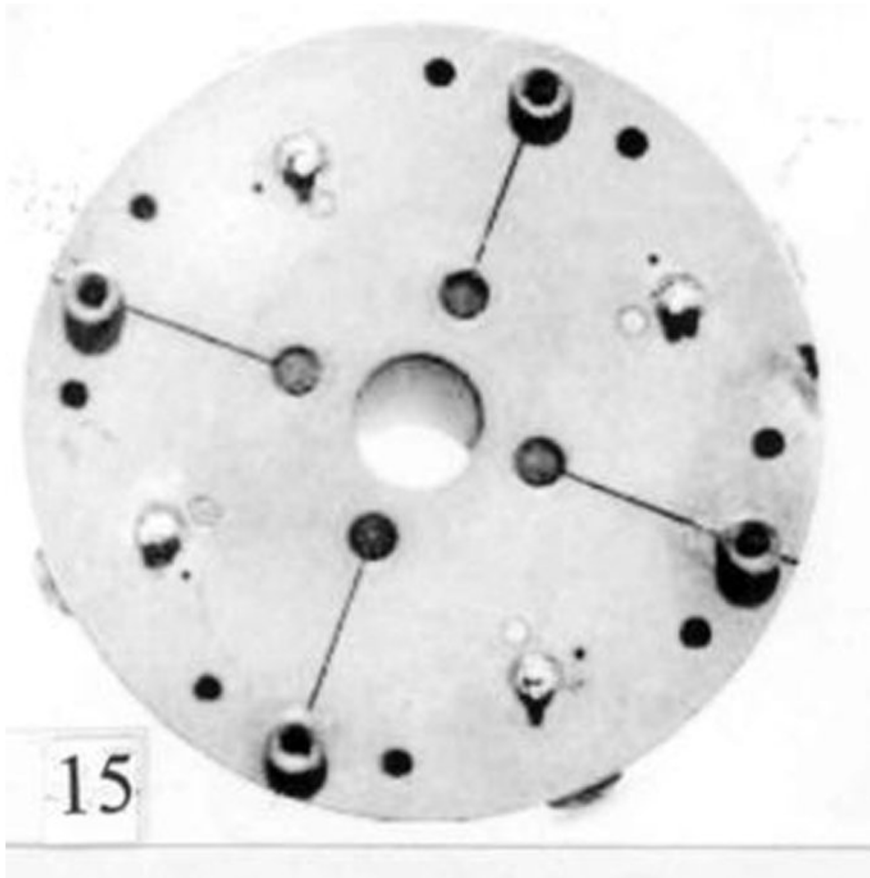


Fig. 15

To give an indication of just how accurate the 90-degrees between gaps had to be, I will put some numbers into the consideration.

Our head-to-tape velocity was about 1500 inches per second. In one microsecond a head gap would travel 1500 divided by one million = 0.0015 inch.

On a 21-inch monitor the horizontal lines are about 16.8 inches long and this distance is covered by the electron beam making the line in 53.5 microseconds.

This calculates out to be (16.8/53.5) = 0.314 inches per microsecond of gap travel. So if the 90-degree position of a gap were off by 0.0015 inch there would be an offset in the picture (when one head is switched to the next head) of 0.314 inch and this would be totally unacceptable.

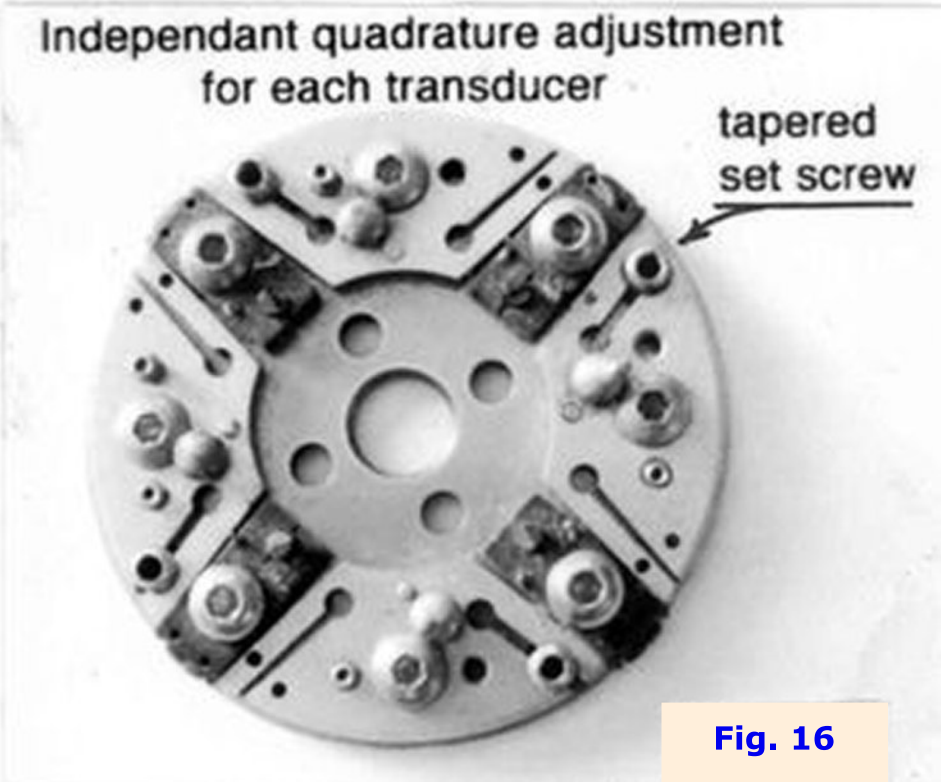


Fig. 16

Let's say we could accept a displacement on the television screen of 0.01 inch when the head outputs are sequentially switched into the picture. This would require a gap placement accuracy of (0.01/0.314) X 0.0015 = 47.8 microinches. Using the tapered setscrews it was possible to adjust the position of the gaps to less than this allowable error.

This was the video head design we used in manufacturing for a couple years (1956 - 1958) until a modified design for easily adjusting each transducer quadrature setting separately, independent of the other three transducers, was made by John King (Fig.16).

John also designed a four-segment rotary transformer to replace the slip ring assembly that could wear out and tended to introduce a little noise in the signal. This was the state of the development by the middle of December 1955

The Final Design Gets Built

On yellow tablet paper, I laid out the design of the complete video head assembly including the motor, the female tape guide, the timing ring and the associated electrical plugs, which made it possible to easily mount and remove the assembly from the recorder top plate.

A good friend and design draftsman, Nick Lasarev, converted my rough sketches into working drawings and Shelby Henderson, our machinist, made the assembly parts on which I mounted my head drum. (Figs. 17 & 18) The output of this assembly gave us the best signals off tape we had ever seen.

(Fig's 17 & 18 next page)

To be continued in CQ-DATV 38 with the 'New signal Electronics'

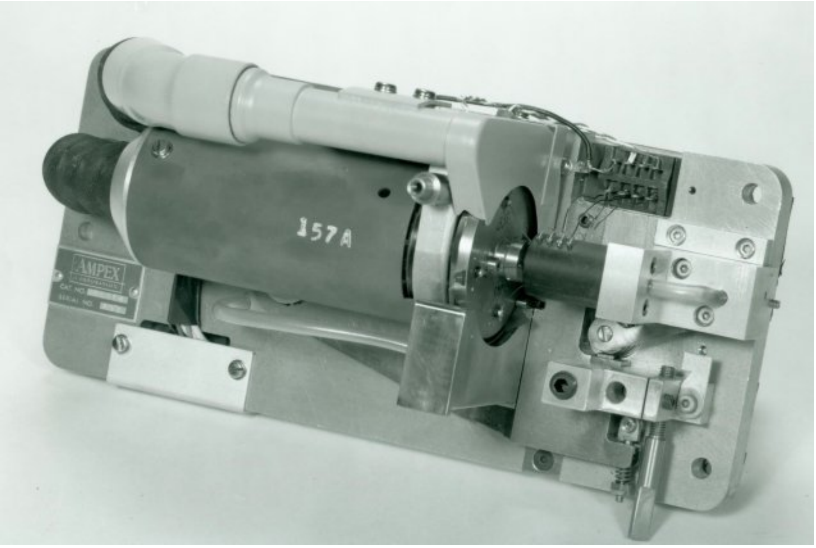
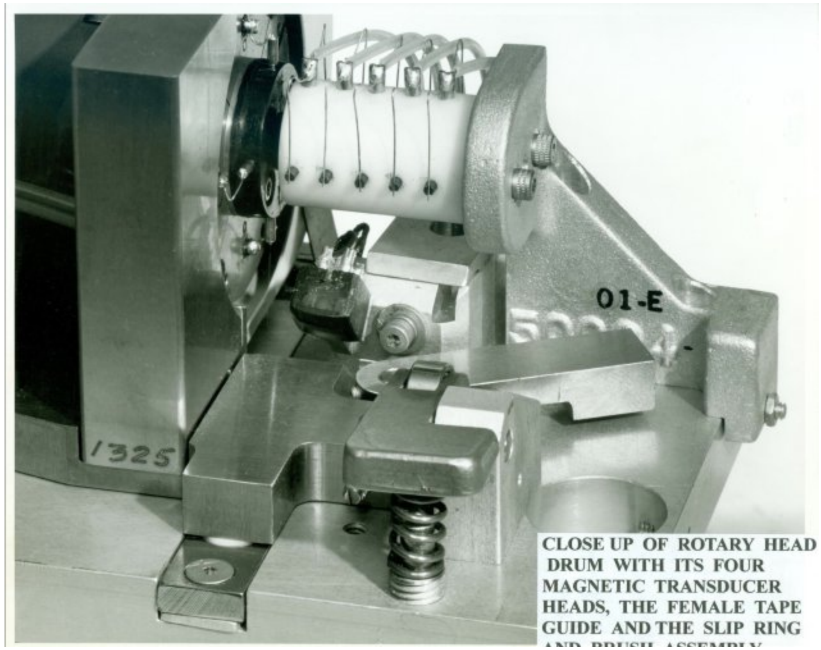


Fig. 17 - Top view of the removable video head assembly, including motor, video head drum, and four magnetic head transducers

Fig. 18 - Close up of oratory head drum with its four magnetic transducer heads, female tape guide, and the slip ring and brush assembly



Es'Hail-2 Geostationary P4-A Transponder Frequencies

The launch of the Es'Hail-2 satellite into a geostationary orbit at 25.5 degrees East is planned for December 2016. The coverage area of the amateur radio Narrowband (NB) and Wideband (WB) transponders should extend from Brazil to Thailand.

Es'hail-2 coverage area

Es'hail 2 will carry two "Phase 4" amateur radio non-inverting transponders operating in the 2400 MHz and 10450 MHz bands. A 250 kHz bandwidth linear transponder intended for conventional analogue operations and an 8 MHz bandwidth transponder for experimental digital modulation schemes and DVB amateur television.

Narrowband Linear transponder

- *2400.050 - 2400.300 MHz Uplink*

- 10489.550 - 10489.800 MHz Downlink

Wideband digital transponder

- *2401.500 - 2409.500 MHz Uplink*
- *10491.000 - 10499.000 MHz Downlink*

Equipment requirements:

X-Band 10 GHz Downlink:

- *89 cm dishes in rainy areas at EOC like Brazil or Thailand*
- *60 cm around coverage peak*
- *75 cm dishes at peak -2dB*
- *NB: linear vertical polarisation*
- *WB: linear horizontal polarisation*

S-Band 2.4 GHz NB-Uplink:

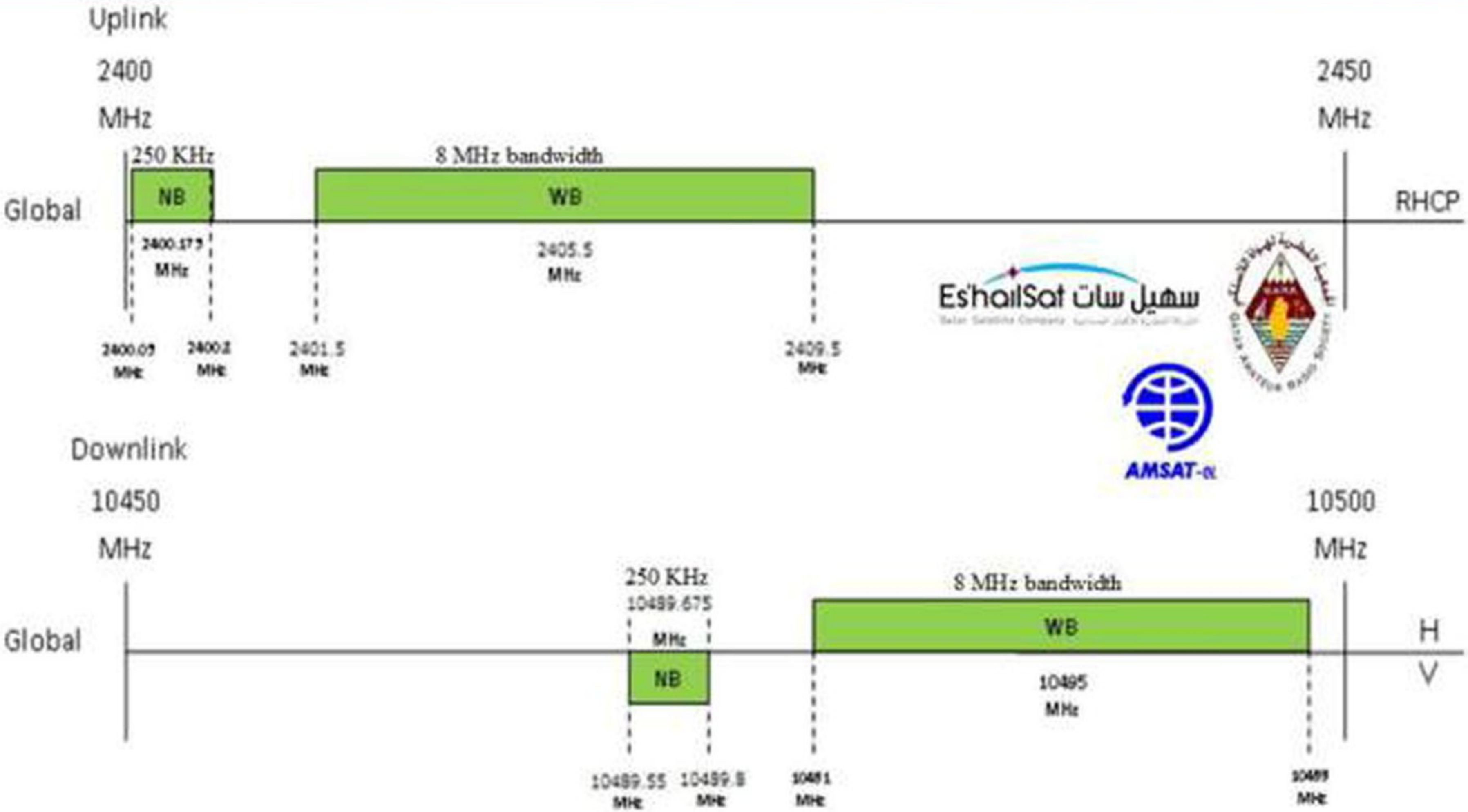
- *narrow band modes like SSB, CW*
- *5W nominal Uplink power (22.5 dBi antenna gain, 75cm dish)*
- *RHCP polarisation*

S-Band 2.4 GHz WB-Uplink (DATV):

- *wide band modes, DVB-S2*
- *peak EIRP of 53 dBW (2.4m dish and 100W) required*
- *RHCP polarisation*

Presentation on Es'hail by Peter Guelzow DB2OS, President of AMSAT-DL, at the 2013 AMSAT-UK Colloquium

http://www.batc.tv/streams/amsat1306



Xpdr	U/L FREQUENCY (MHz)				D/L FREQUENCY (MHz)				LO	BW
No	Pol	Begin	Center	End	Pol	Begin	Center	End	(MHz)	(MHz)
NB	RHCP	2400.05	2400.175	2400.3	V	10489.55	10489.675	10489.8	8089.5	0.25
WB	RHCP	2401.5	2405.5	2409.5	H	10491	10495	10499	8089.5	8

Transponder frequencies

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Smart phone reading apps are ok providing that you have a 3G data connection.

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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.

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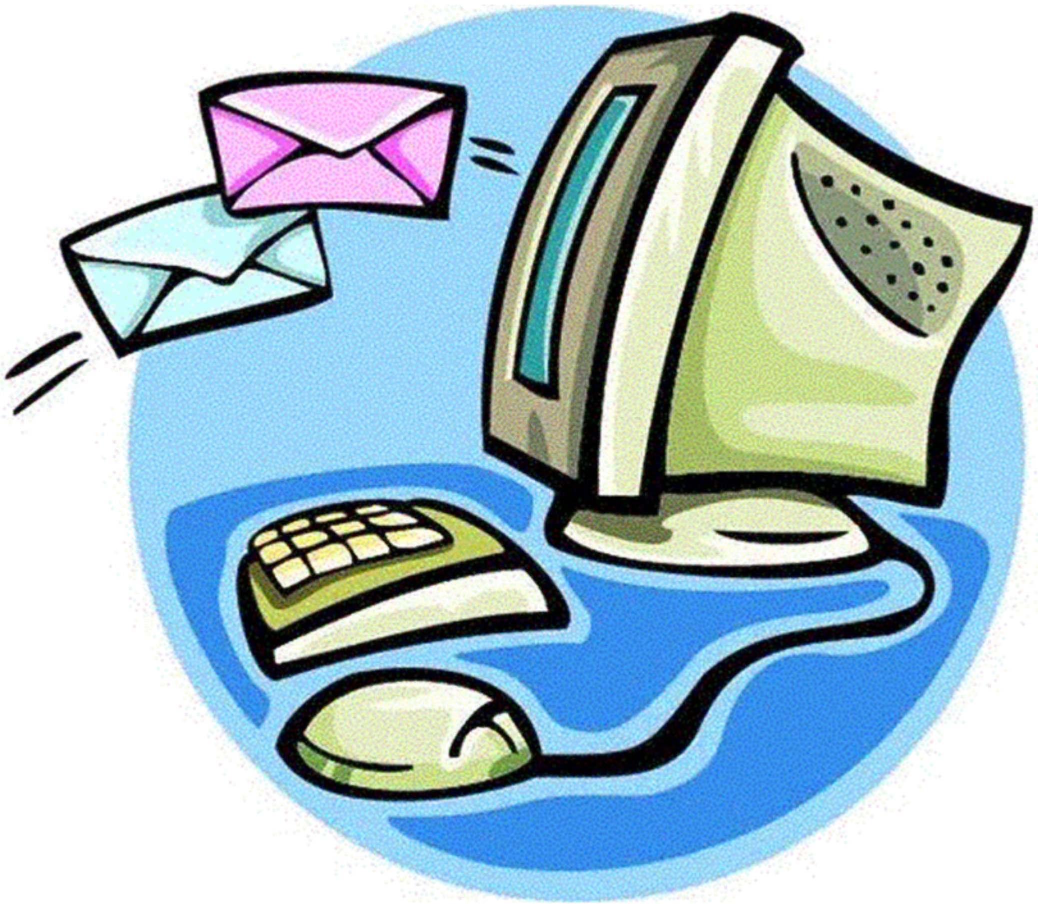

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