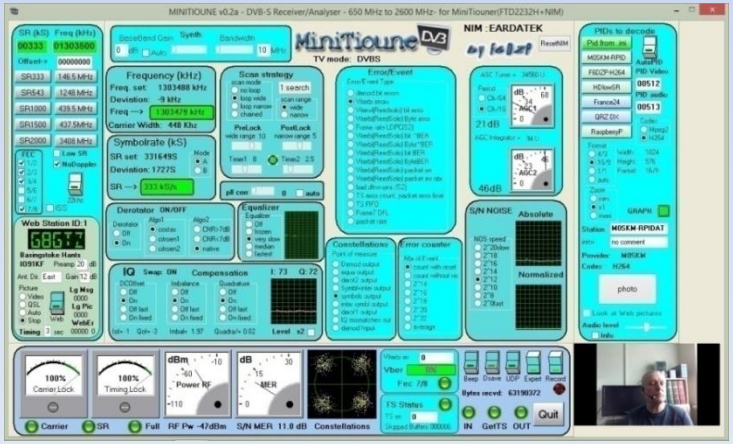
# Amateur TV update

BATC – February 2018

# Topics

- What is ATV
- Analogue vs Digital
- UK ATV and repeaters
- Easy ATV
  - Receiving GB3HV
  - 5.6 GHz ATV for under £20
  - The Portsdown project
- Geostationary satellites



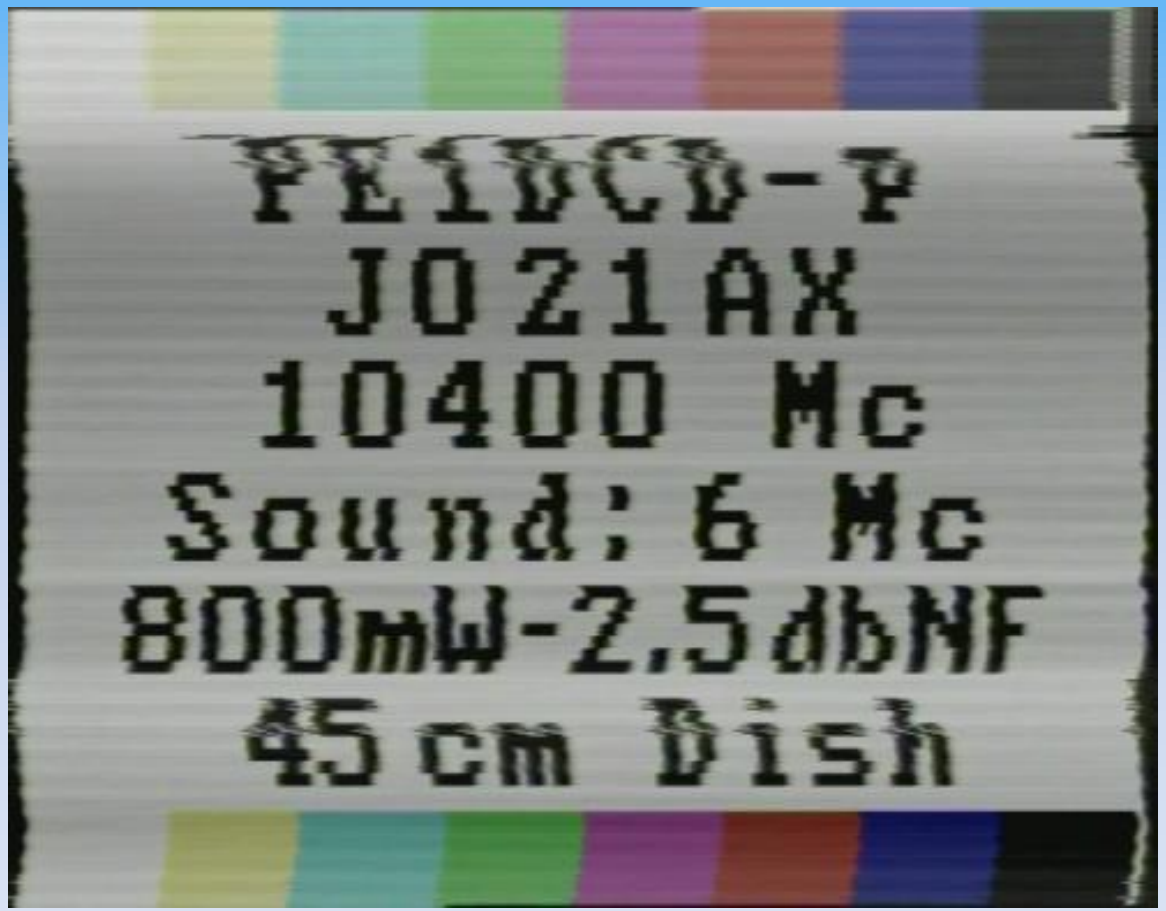
# What is Amateur Television?

- ATV is a niche area of amateur radio
- Includes video production, editing and transmission
- Covers classic camera restoration right through to transmitting live pictures using Raspberry PI from balloons!
- Real freedom to experiment
- ATV generally refers to fast scan TV

# Analogue Amateur TV

- Up to 10 years ago, everything was analogue
- Bands
  - 70cms – 8 MHz AM!
  - 23cms – 16 MHz FM
  - 3cms – 16 MHz FM
- And it still works well!

# G to PA on 10 GHz – at sea level!

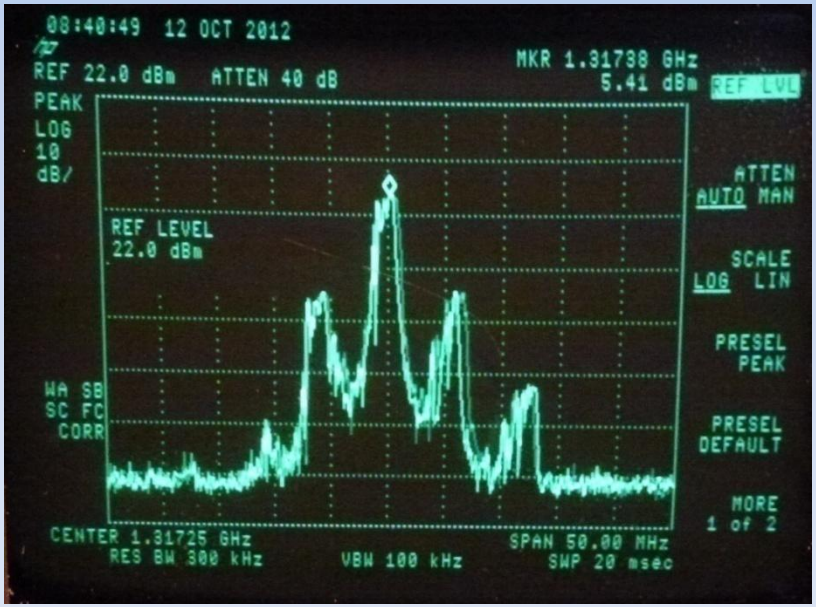


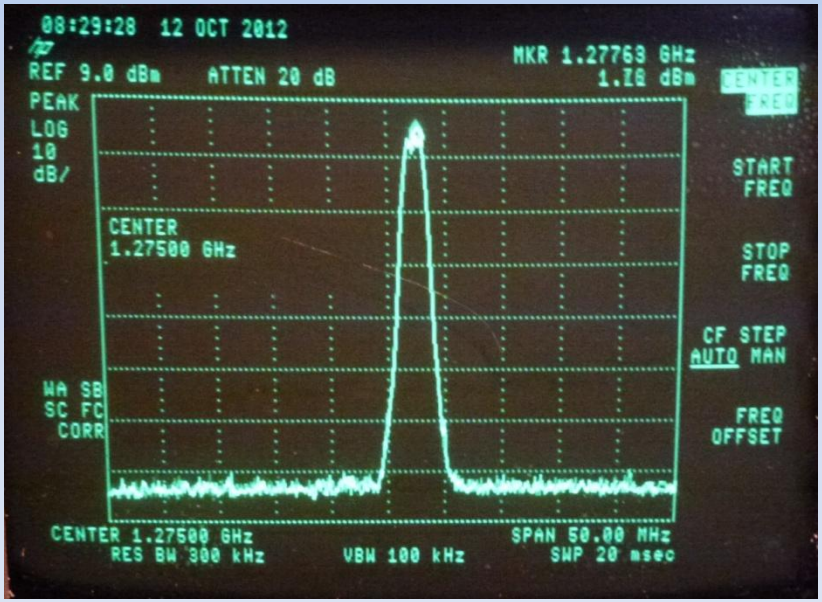

# ATV is going Digital

- The move to digital is happening
  - Been experimenting for over 10 years
  - Pressure on spectrum eg 13cms
  - More “modern image” and new challenge
- Broadcast standards are being “adopted”
- DVB-S at 100KHz > 4 MHz
- Significant bandwidth gains and better pictures – when it’s there!

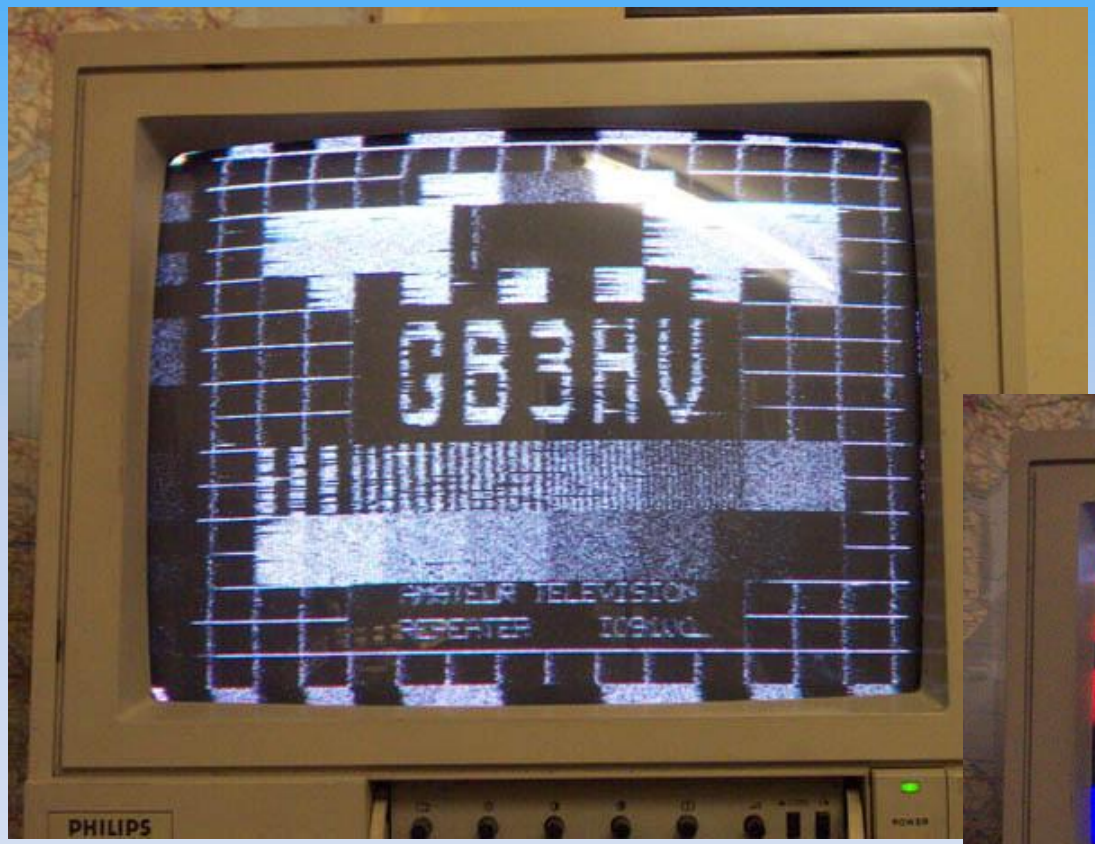
# Analogue vs Digital ATV

- FM analogue
  - 16 MHz deviation
  - ~ 16 MHz
- DVB-S QPSK,
  - 1.6 Msymbols, ½ FEC
  - ~ 1.6 MHz



# Analogue vs Digital ATV




# UK ATV overview

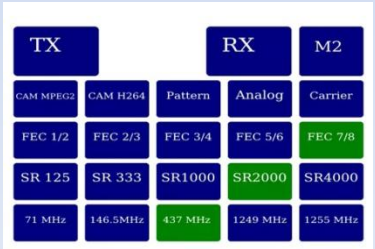
- 71 & 146 MHz
  - The new ATV bands!
- 70cms
  - Digital only on 437MHz
- 23cms
  - Analogue and digital
  - Activity on repeaters and simplex
- 13cms
  - Still room after PSSR!
  - Repeaters and simplex
- 3.4 GHz
  - Digital only
  - Excellent results
- 5.6 GHz
  - ATV for under £20!
  - Repeater inputs
- 10 GHz
  - Repeaters and simplex
  - DATV
- 24 GHz
  - 120 Kms is the goal

# Reduced Bandwidth (RB-TV)

- Not enough space for “normal” DVB-S on the lower bands so we invented RB-TV
- RB-TV is “normal” fast scan DATV below 1 Msymbol / sec
- Live TV in ~450Khz bandwidth (450 Kbit/s video)
- Based on DVB-S standard BUT…
  - Needs MPEG-4 encoding for transmit
  - “Normal” satellite rx won’t work below 1 Ms
- So the ATV community has developed Tx and Rx products
  - MiniTiouner USB receiver
  - Portsdown DATV transmit system
- RB-TV will go when FM signals are S9

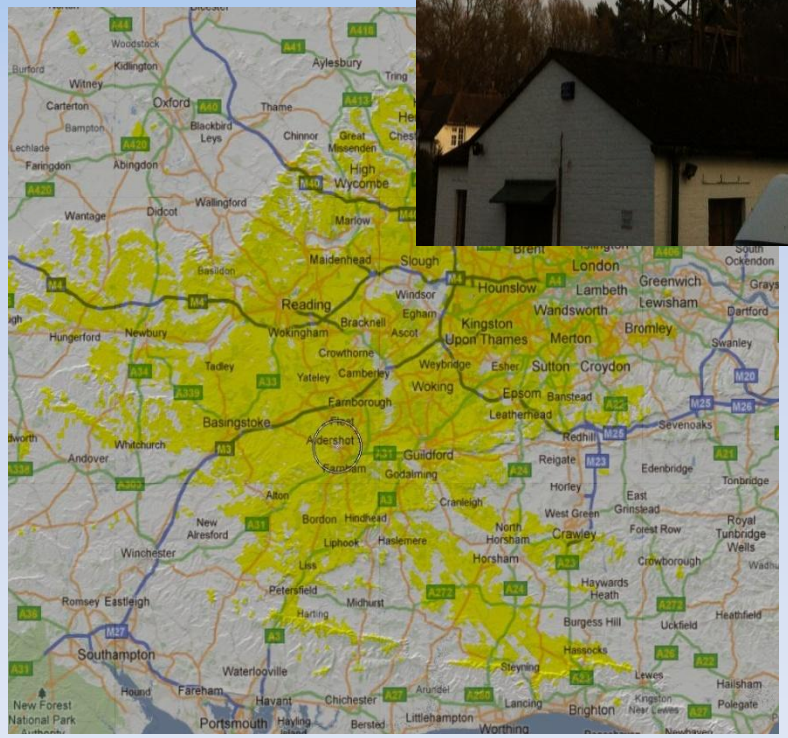
# Easy ATV projects


- Receive your local repeater
  - GB3HV at Farnham for under £40
- Spend £20 and get on 5.6GHz ATV
  - Drone downlink Tx and Rx
- Build a Portsdown DATV transmit system
  - Complete DATV system for under £250
- All would make great club projects!



# GB3HV - Farnham

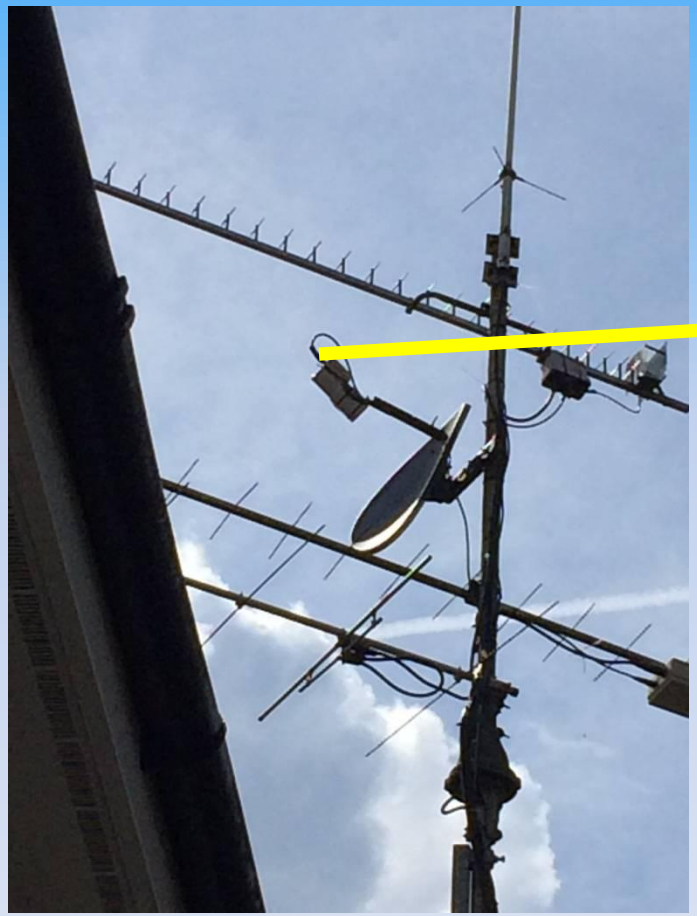
- 3.4 GHz digital output
  - Also streamed on BATC.TV
  - Is very easy to rx!
- 23cms & 70cms inputs
- Tuesday “Activity” night
  - Watch batc.tv
  - Call on 144.750



# How to receive 3.4GHz ATV

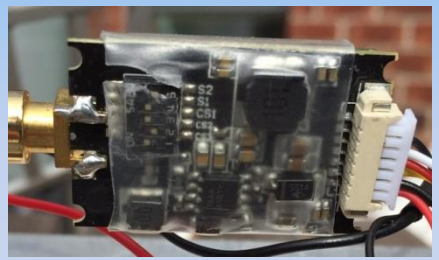
- 3.4 GHz is EASY!
- Free to air satellite box
  - NOT Sky
  - Maplin £30
  - Ebay £10
- C band LNB from ebay
  - Titanium satellite
  - £25
- Sky dish or M&S horn!!
  - GOEHV at 20 Kms

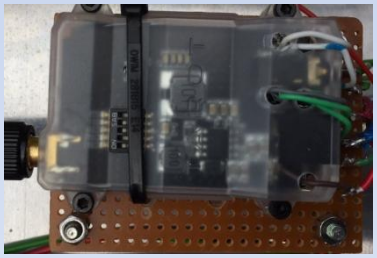
# 3.4GHz DATV receive system

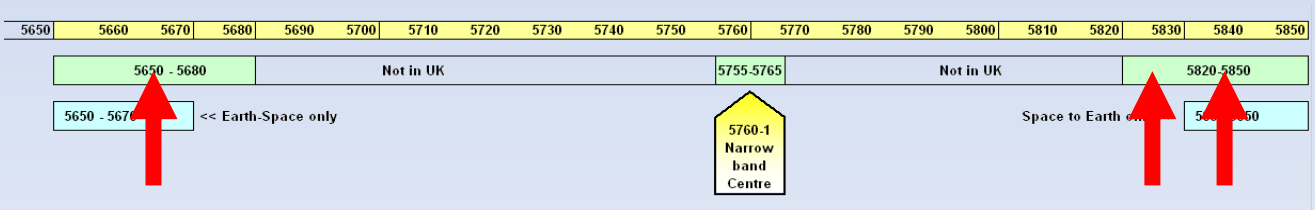



# Low cost 5.6 GHz FM ATV

- Using tx and Rx made for drone FPV use
  - Tx = 600 Milliwatts out
  - Rx = -85 dBm
  - 27MHz wide
- Cover UK amateur Band
  - 5665 MHz
- They just work out of the box!

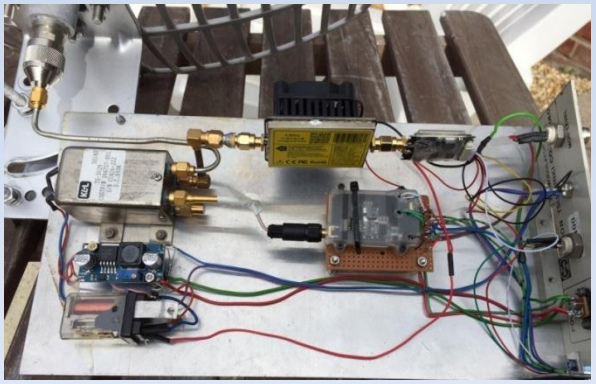






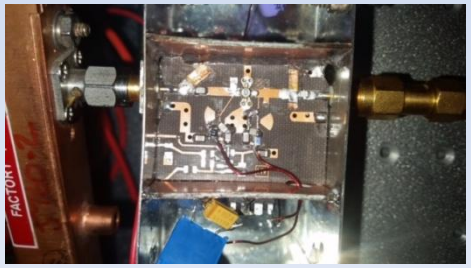
# The system

- Wire up power, video and audio
  - Be aware of the blue screen
- Connect antennae
  - 5.8 Ghz wi fi or Sky dish (available from the local tip!)
  - SMA relay is the most expensive bit!
  - Single or 2 ant working



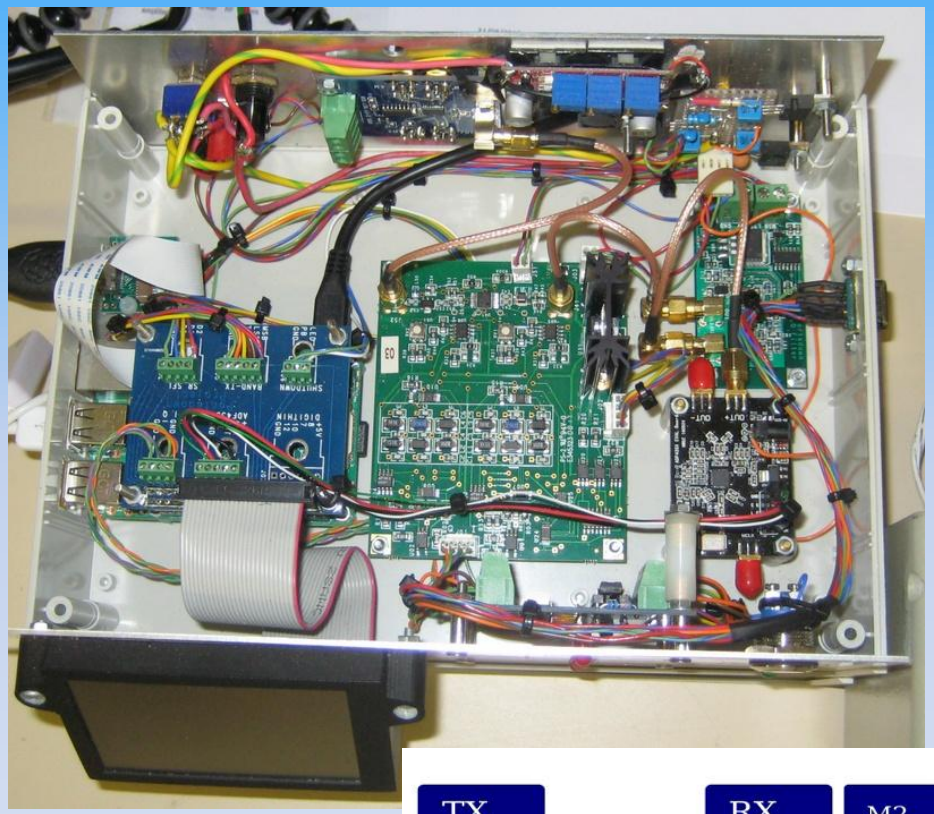
# 5.6Ghz on the air

- It does need clear line of site paths
  - 25Km easy
- Best DX so far = 138 Km!
  - Dunkery to Cleeve ☺
- Also used for WB voice
  - PW Siren project



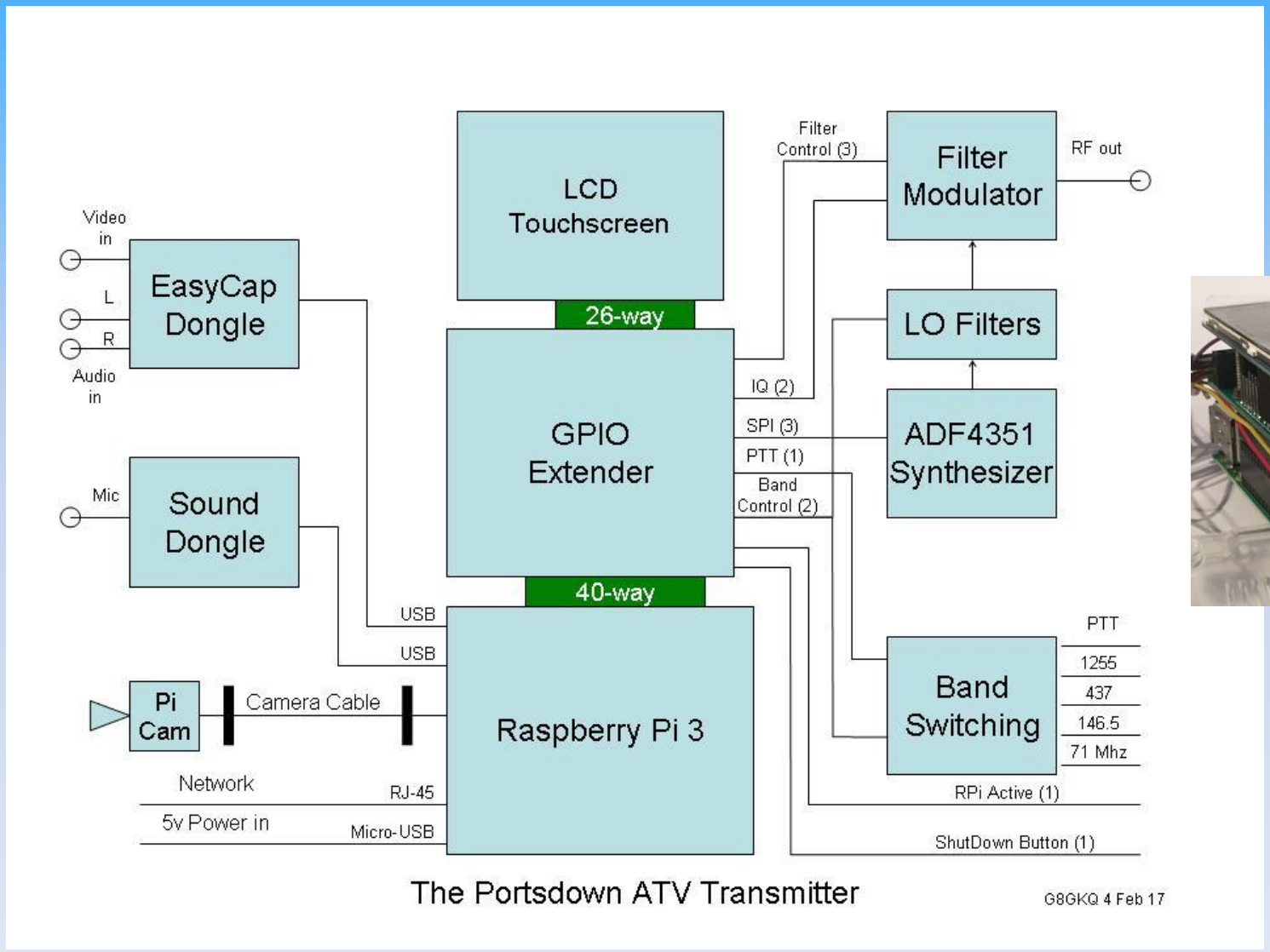

# Portsdown DATV project

- The BATC project to bring DATV to everyone
  - All the common modes and bandwidths
- Based around a Rpi3
  - MPEG encoding
  - Touch screen control
  - I & Q output
- Requires some hands on construction
  - “I made that!”
- Easy way to get on air at low cost



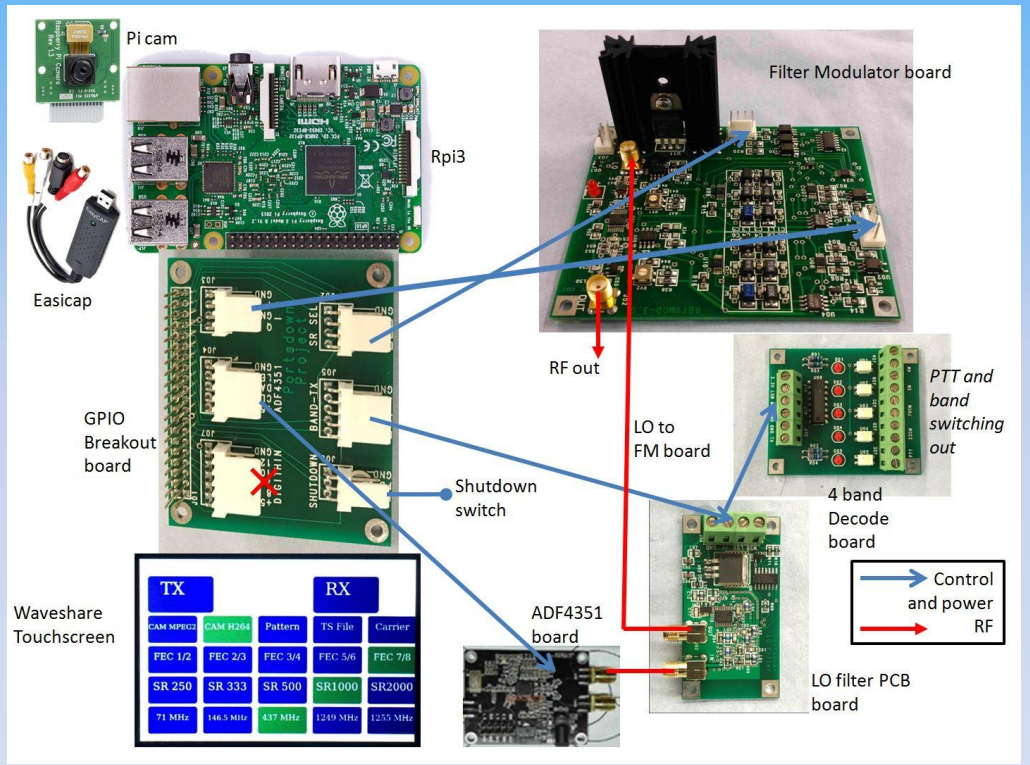
| TX | | | RX | M2 |
|---|---|---|---|---|
| CAM MPEG2 | CAM H264 | Pattern | Analog | Carrier |
| FEC 1/2 | FEC 2/3 | FEC 3/4 | FEC 5/6 | FEC 7/8 |
| SR 125 | SR 333 | SR1000 | SR2000 | SR4000 |
| 71 MHz | 146.5MHz | 437 MHz | 1249 MHz | 1255 MHz |

# Portsdown DATV system



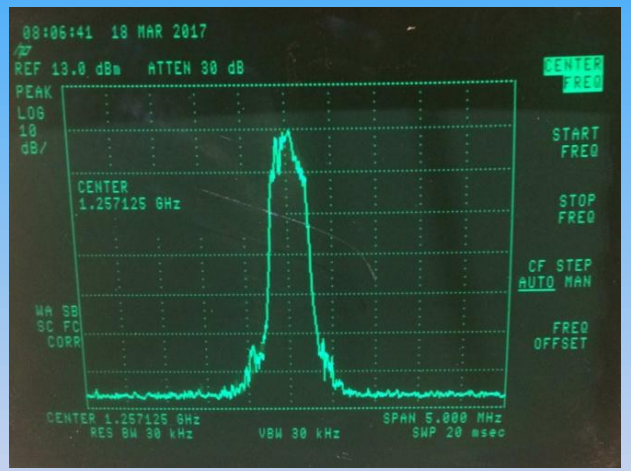

# Portsdown made easy

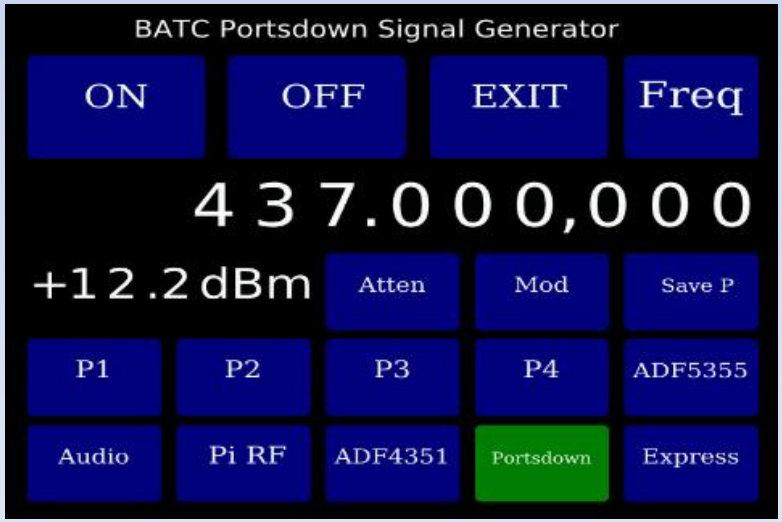
- All hard to get or critical components in BATC shop
- Full set of PCBs from BATC shop
- Main SMD board is available pre-built
- Pre-programmed SD from BATC shop



# Portsdown specs

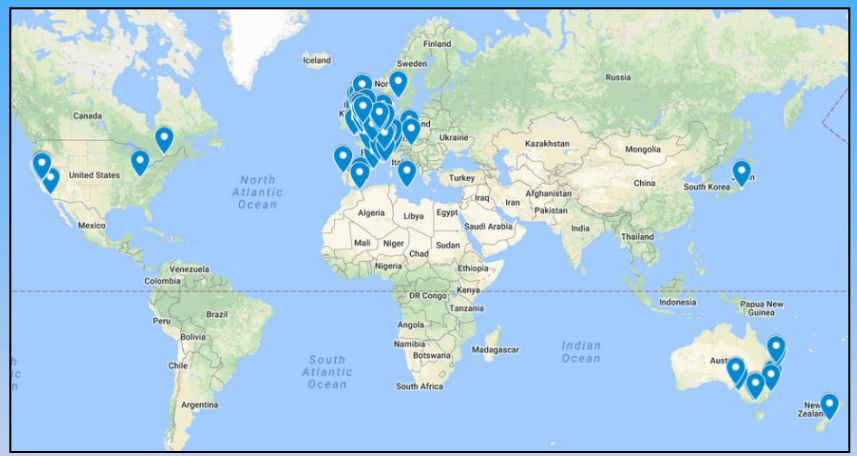
- 71 MHz to 2400 MHz
  - ~ 5dBM output
  - -7dBm at 2400MHz
- DVB-S only
- 125Ks to 5 Msymbols
- MPEG-2 and MPEG-4 encoding
- Touch screen or remote control
- PTT and band switching control
- Can drive a uwave transveter
- Analogue Video out with test patterns
- Can be used as a low cost 4.4GHz signal generator!



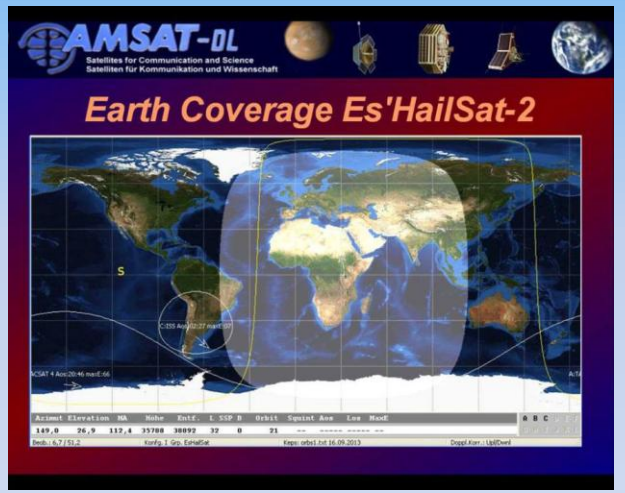
# Portsdown community

- Launched Jan 2017
- 200 users around the world
  - All building something!
  - There is someone near you
- Fully documented on BATC wiki
  - https://wiki.batc.tv/
- Community support via BATC forum
- Featured on Txfactor 15
- Featured in June RadCom




# ATV is looking up!

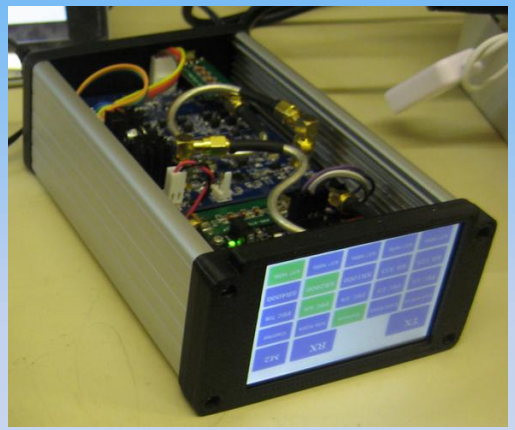
- Es'Hail-2 will be the first amateur geo-stationary satellite
- Es'Hail-2 wideband is an " 8 MHz bent pipe" transponder
  - No spot beams – covers 1/3 of the earth!
  - Dedicated to DATV use ☺
- DVB-S2 is preferred modulation
  - Occupied bandwidths could be 500 KHz – 8 MHz
- Es'Hail-2 is a fantastic opportunity for amateur TV experimentation



# The new golden age for ATV!


- ATV is undergoing a real revival
- Last area of real amateur radio
  - No commercial equipment
  - You have to build and experiment
  - Real open source
- Covers all skill levels from beginner to seasoned professional
  - propagation, antennas, RF design, studio, video editing,
- BATC is thriving
  - 25% increase in last 3 years
  - Growing a real ATV community
  - Sharing the knowledge and growing together
- Do some real radio today – get involved in Amateur TV!

# More information

- BATC wiki: https://wiki.batc.tv/BATC_Wiki
- 5.6GHz: https://wiki.batc.tv/5.6_GHz
- Portsdown: https://wiki.batc.tv/The_Portsdown_Transmitter
- GB3HV: http://www.gb3hv.com/
- Txfactor episode 15: http://www.txfilms.co.uk/