Equipment Update

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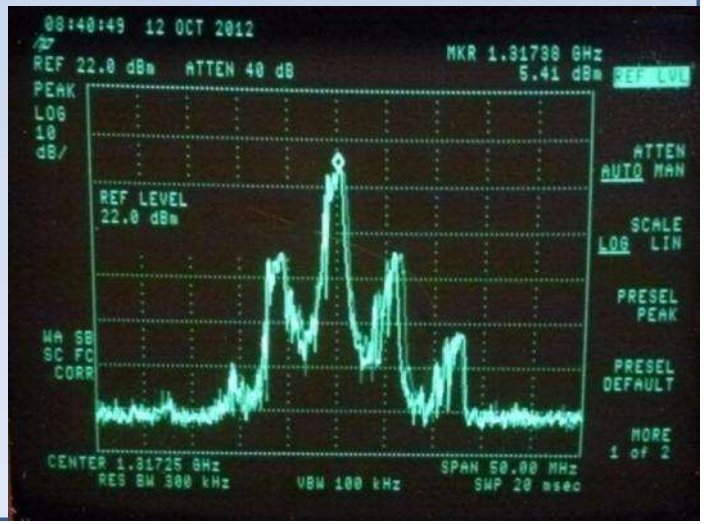
Topics

- Modes
- Current Trends
- 5.6 GHz
- DATV
- SDRs

Transmission Modes

- Amplitude modulation (DSB/VSB)
  - Now rarely used due to bandwidth
- Frequency Modulation
  - Lower Deviation still used on 23cms and 3cms
  - Higher Deviation used on 6cms
- Digital DVB-S and DVB-S2
  - All bands, various bandwidths
- Digital DVB-T and GMSK
  - Rarely used in UK
- Internet Streaming



Current Trends

- More home-built Digital Equipment
- Use of Digital to “add” path gain
- Use of drone FPV FM TV equipment
- High Definition digital (Pi Cam or Webcams)

- Existing Analogue and Digital Repeaters
- Repeater and personal streaming

5.6 GHz FM ATV

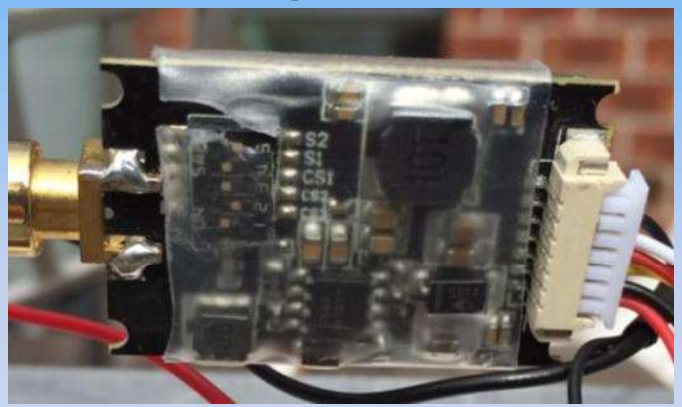
- Why
- What kit?
- How
- Aerials
- Enhancements
- Operating
- Next steps?
- Q & A

Why

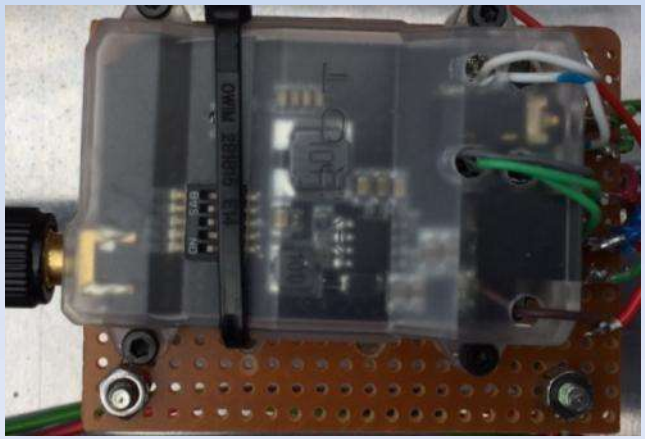
- Cheap kit available for drone FPV use
- New technical challenge
- Easily accessible
- Very simple

What Kit

- Transmitters typically 600mw output
- Video + Audio in, RF out
- Preset Channels



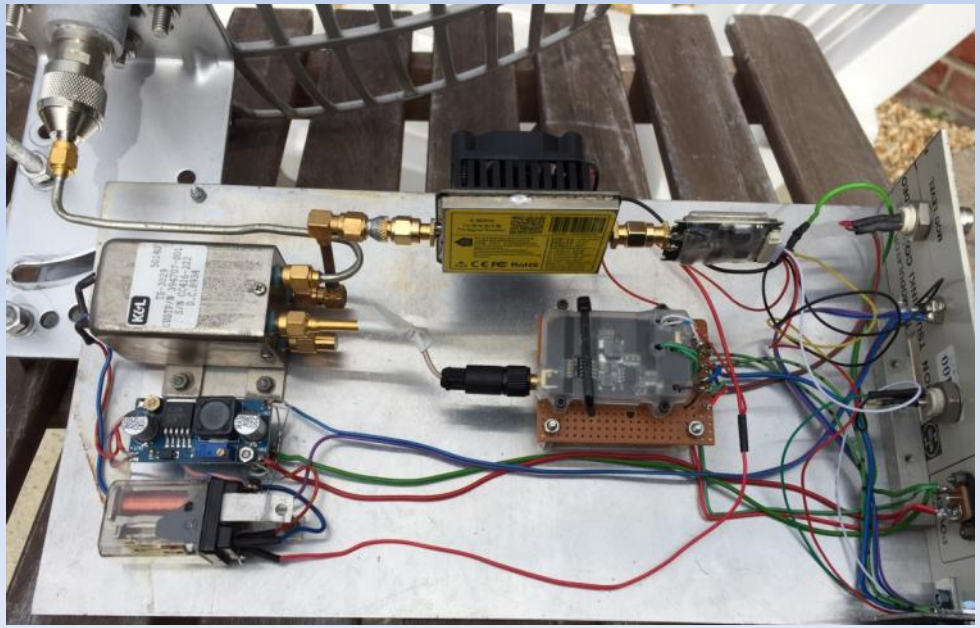
- Receivers have preset channels
- RF in, video and audio out



- All runs from 12v

How

- Wire up power, video and audio
- Connect aerial
- Changeover relay?



How

- Wire up power, video and audio
- Connect aerial
- Changeover relay?
- Point aerial
- Analogue monitors

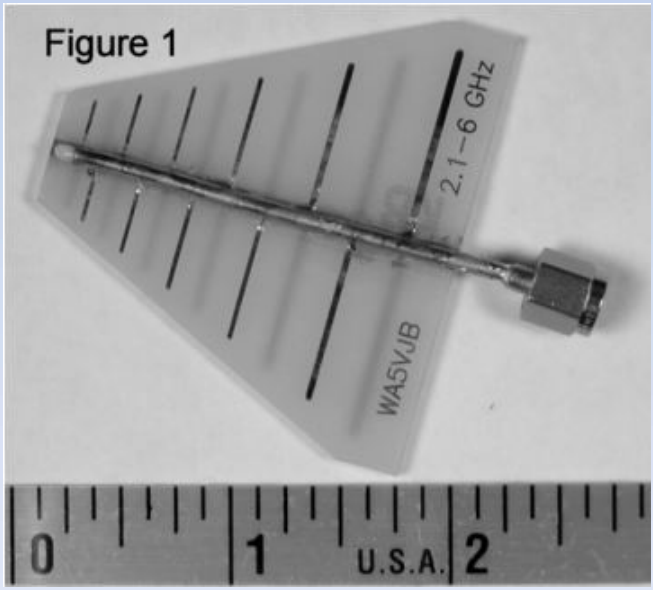
Aerials

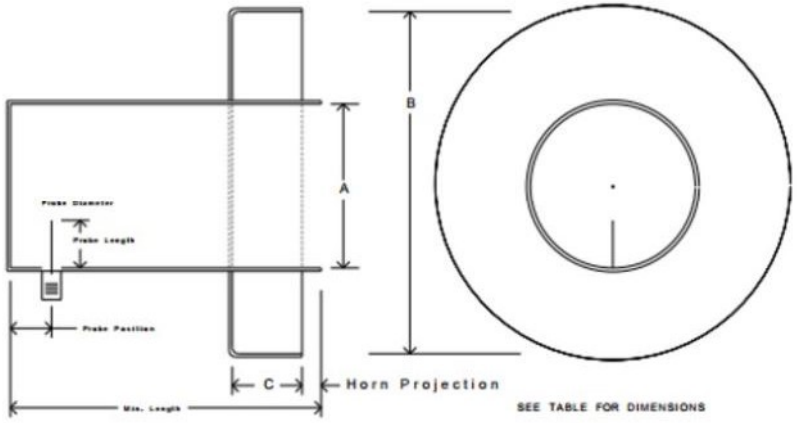
- Good selection of WiFi aerials available
- Sky dish with a WA5JVB feed
- Dipole at feedpoint of 10 GHz dish?

Dish Feeds

G4NNS

WA5VJB





Frequency	A	B	C	Reference
1296 MHz	178 mm	419 mm	121 mm	3,9
2304 MHz	100 mm	240 mm	62.5 mm	3,9
3456 MHz	66 mm	160 mm	42 mm	10
5760 MHz	39 mm	90 mm	26.5 mm	11,12
10368 MHz	20.5 mm	50 mm	12.5 mm	13

Figure 6.3-6 VE4MA (Kumar) Feed

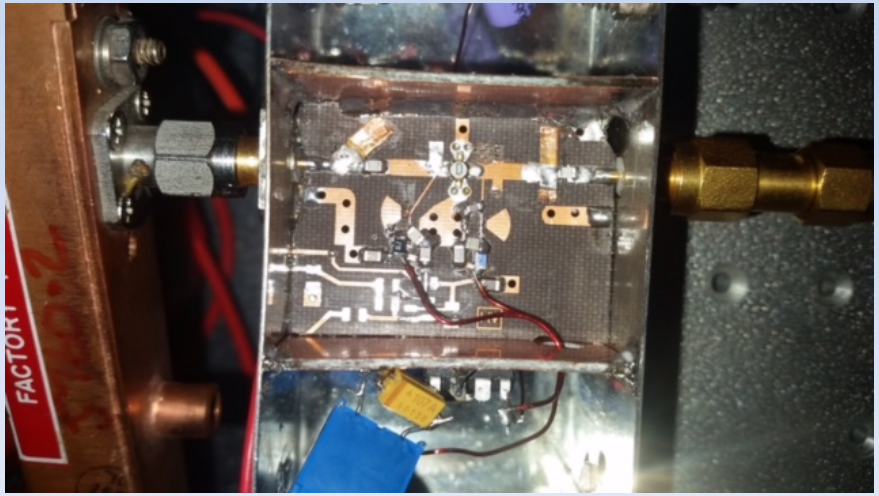
Enhancements

- Power Amplifiers available on eBay
- 600mW to 2.25 W for £20

Enhancements

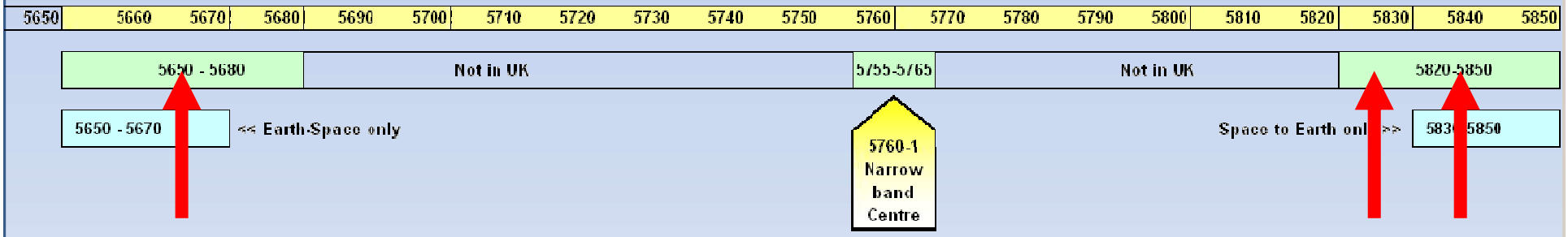
- Receive preamps
- Franco's finest

PHOTO 1: G4DDK's 5.7GHz preamp made from a 'Franco' board.



Operating

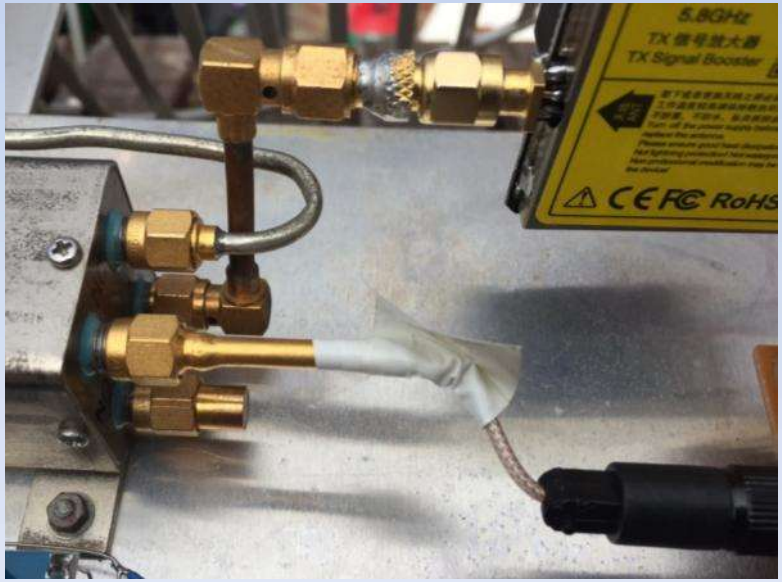
- Frequency: 5665 MHz
- Audio WB-FM using 5825 and 5840 MHz
- Some modules do not cover 5665



- No 5.6 GHz amateur satellites yet

Next Steps

- Digital: ADALM Pluto or up-conversion
- Linear amplifiers for digital?
- Check inter-carrier sound: 6.0 and 6.5 MHz
- Don’t forget: RP-SMAs

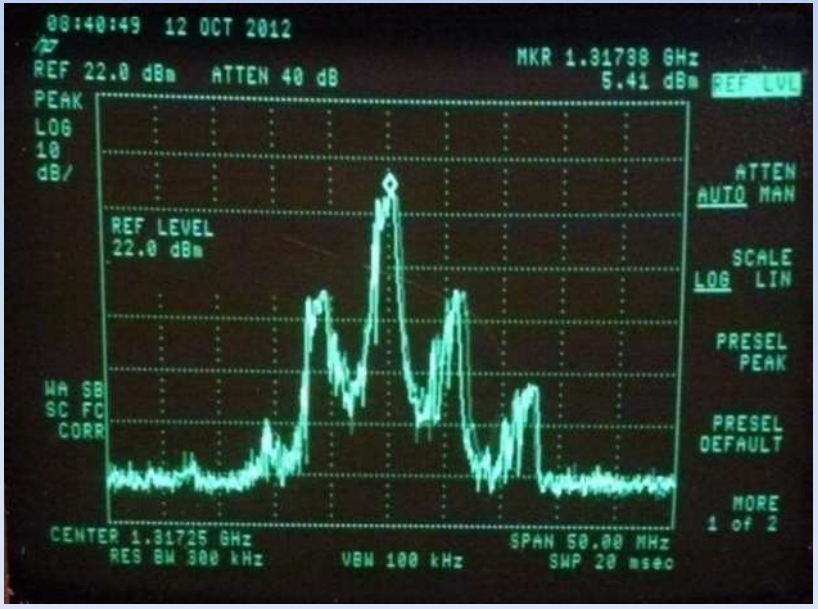


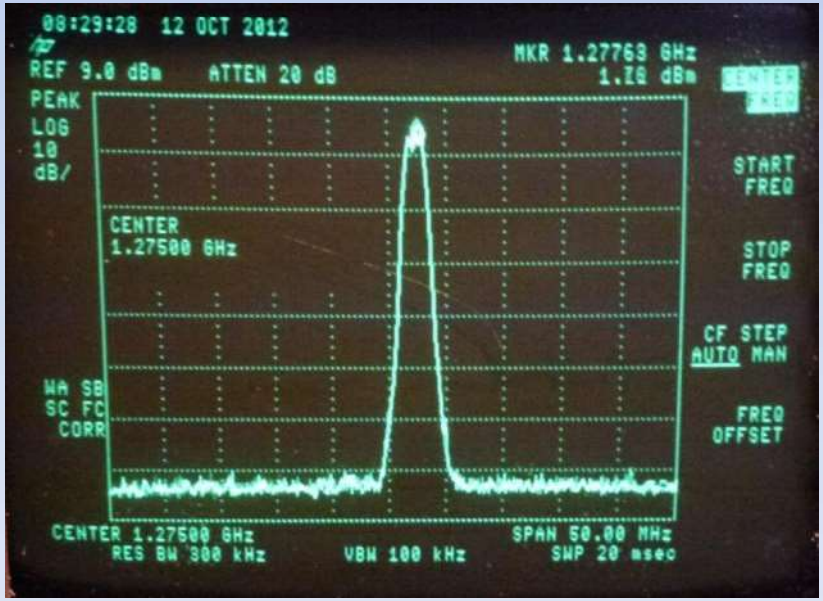
ATV is going Digital

- The move to digital is happening
  - Experiments for over past 12 years
  - Pressure on spectrum eg 13cms
  - More modern image and new challenge
- Broadcast standards are being adopted and adapted
- DVB-S at 66KS > 4 MS
  - 100 KHz > 6 MHz Bandwidth
- Significant bandwidth gains and better pictures – when it's there!

Analogue vs Digital ATV

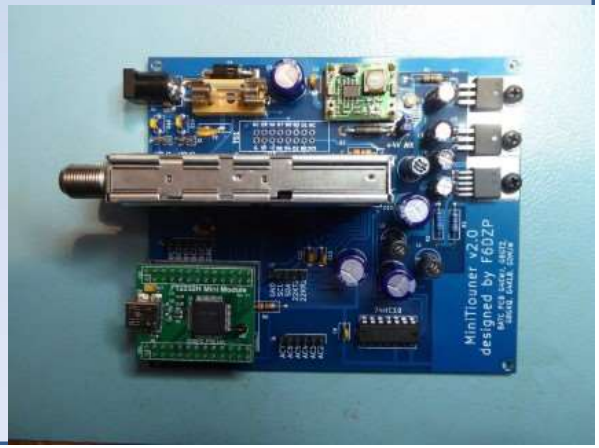
- FM analogue
  - 16 MHz deviation
  - ~ 16 MHz
- DVB-S QPSK,
  - 1.6 MS, ½ FEC
  - ~ 2 MHz





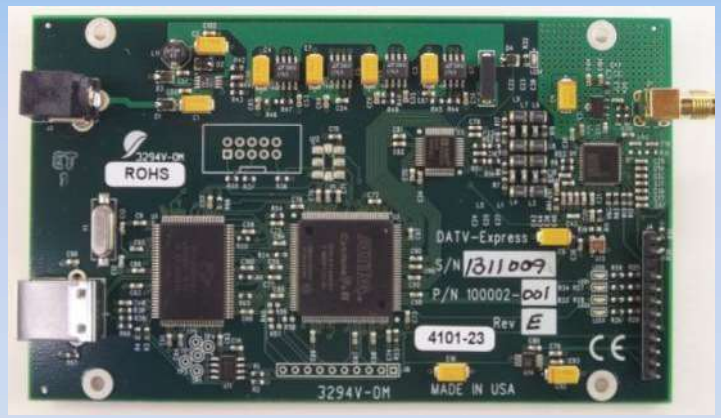
Reduced Bandwidth (RB-TV)

- Not enough space for “normal” DVB-S on the lower bands so we invented RB-TV
- RB-TV is “normal” fast scan DATV at <1 MS
- Live TV in ~450Khz bandwidth (333 Kbit/s video)
- Based on DVB-S standard BUT…
  - Benefits from MPEG-4 (or H265) encoding for transmit
  - “Normal” satellite RX won’t work below 1 MS
- So the ATV community has developed TX and RX products
  - MiniTiouner RX
  - Portsdown DATV TX
- RB-TV will go when FM signals are S9



Generating DATV

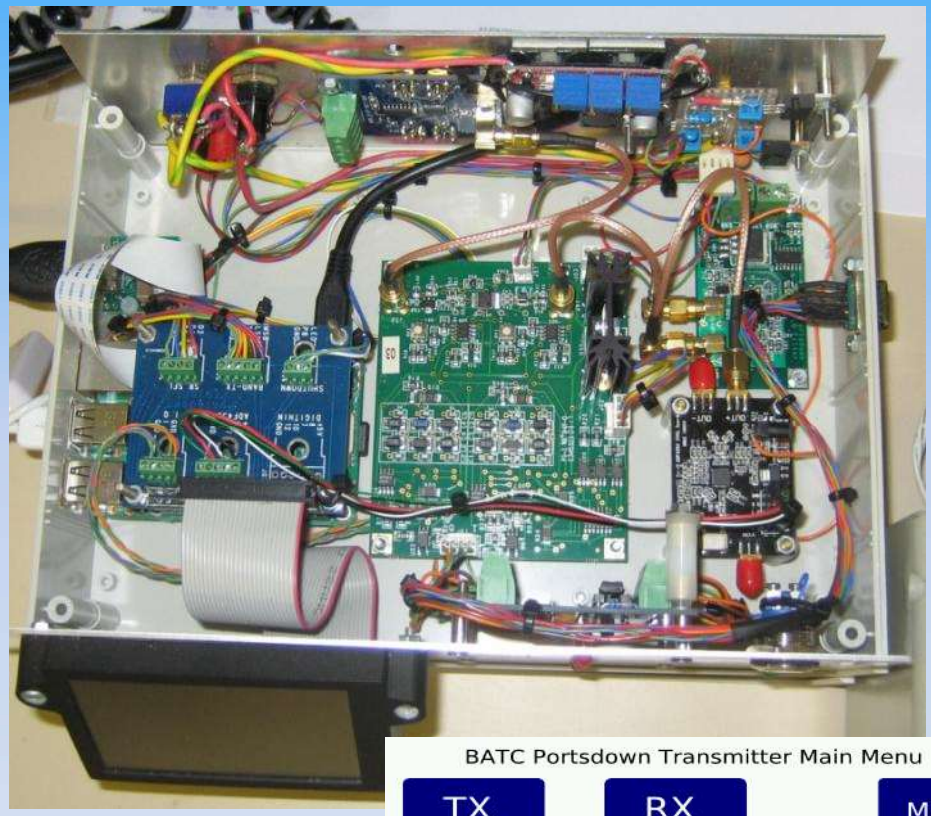
- Ex-commercial encoders
- Amateur Market:
  - SR Systems Equipment
  - DATV Express
  - BATC DTX-1

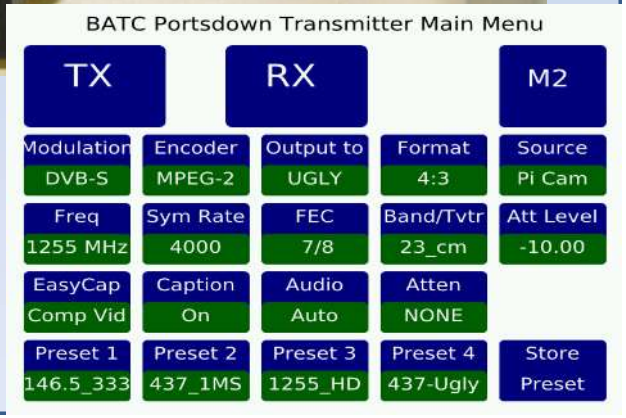


- "Homebrew"
  - DigiLite – PC-based, external modulator
  - DigiThin – RPi-based RB-TV only
  - Portsdown – RPi-based, full bandwidth

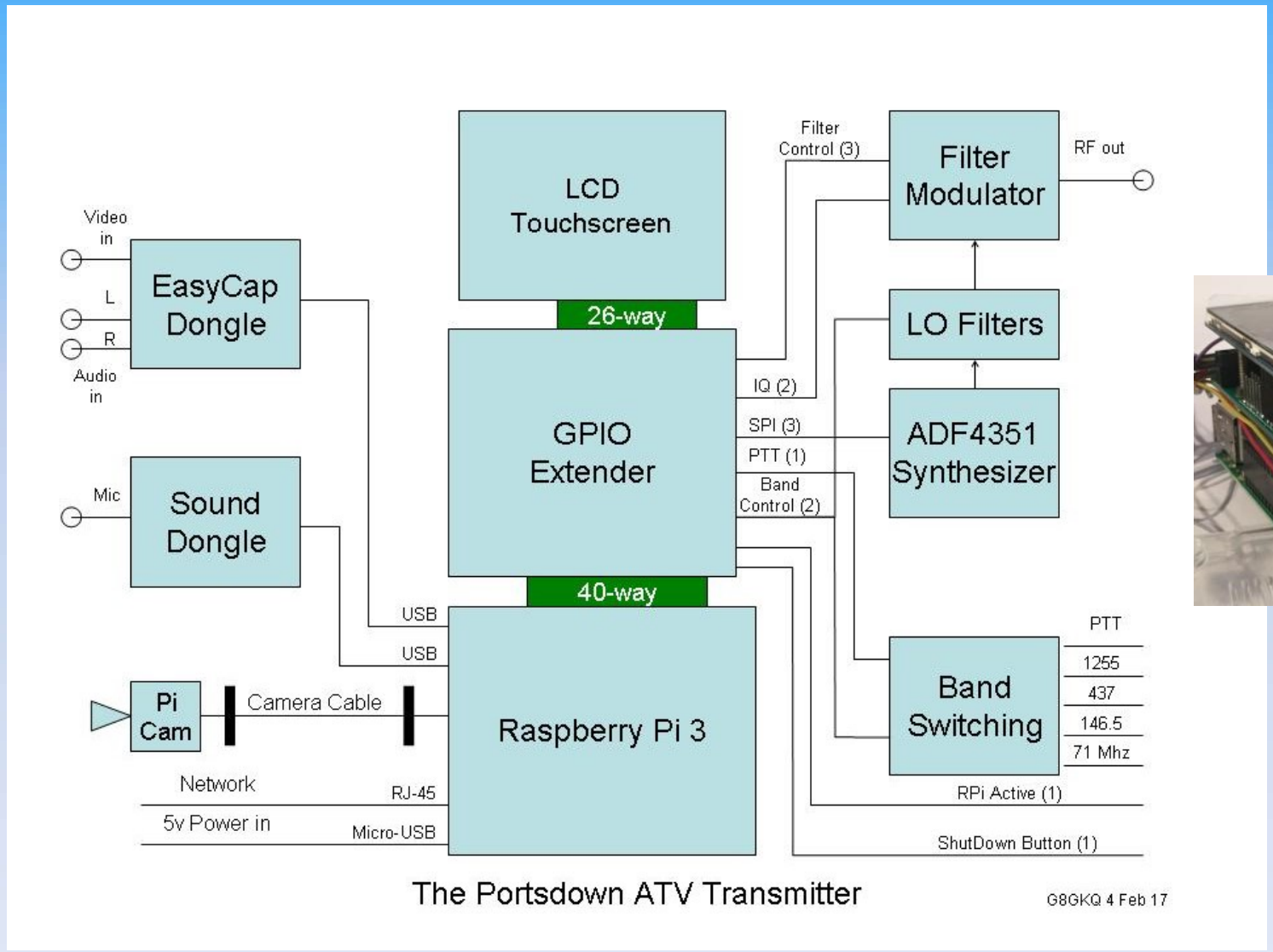
Portsdown DATV project

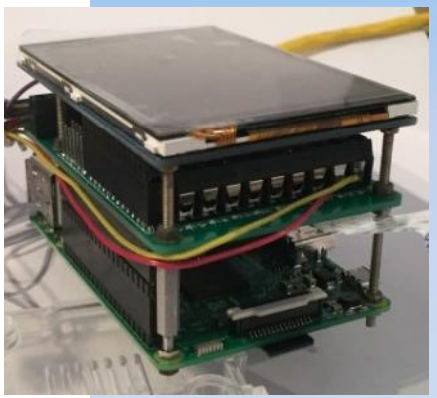
- The BATC project to bring DATV to everyone
  - All the common modes and bandwidths
- Based around a RPi3
  - MPEG encoding
  - Touch screen control
- Requires some hands on construction
  - "I made that!"
- Easy way to get on air at low cost





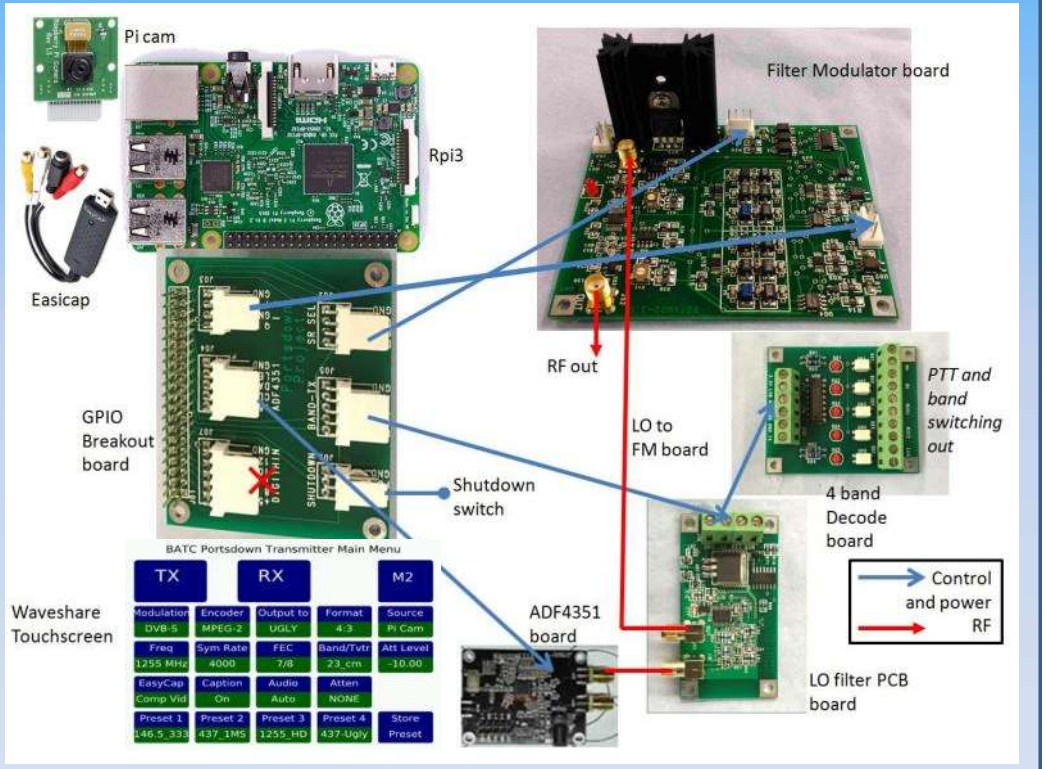
Portsdown DATV system





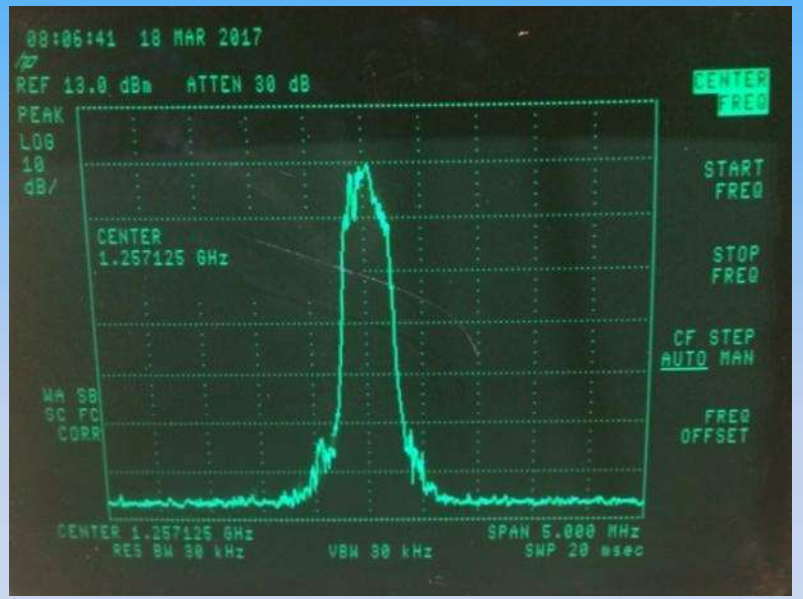
Portsdown made easy

- 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 Card from BATC shop or self-build

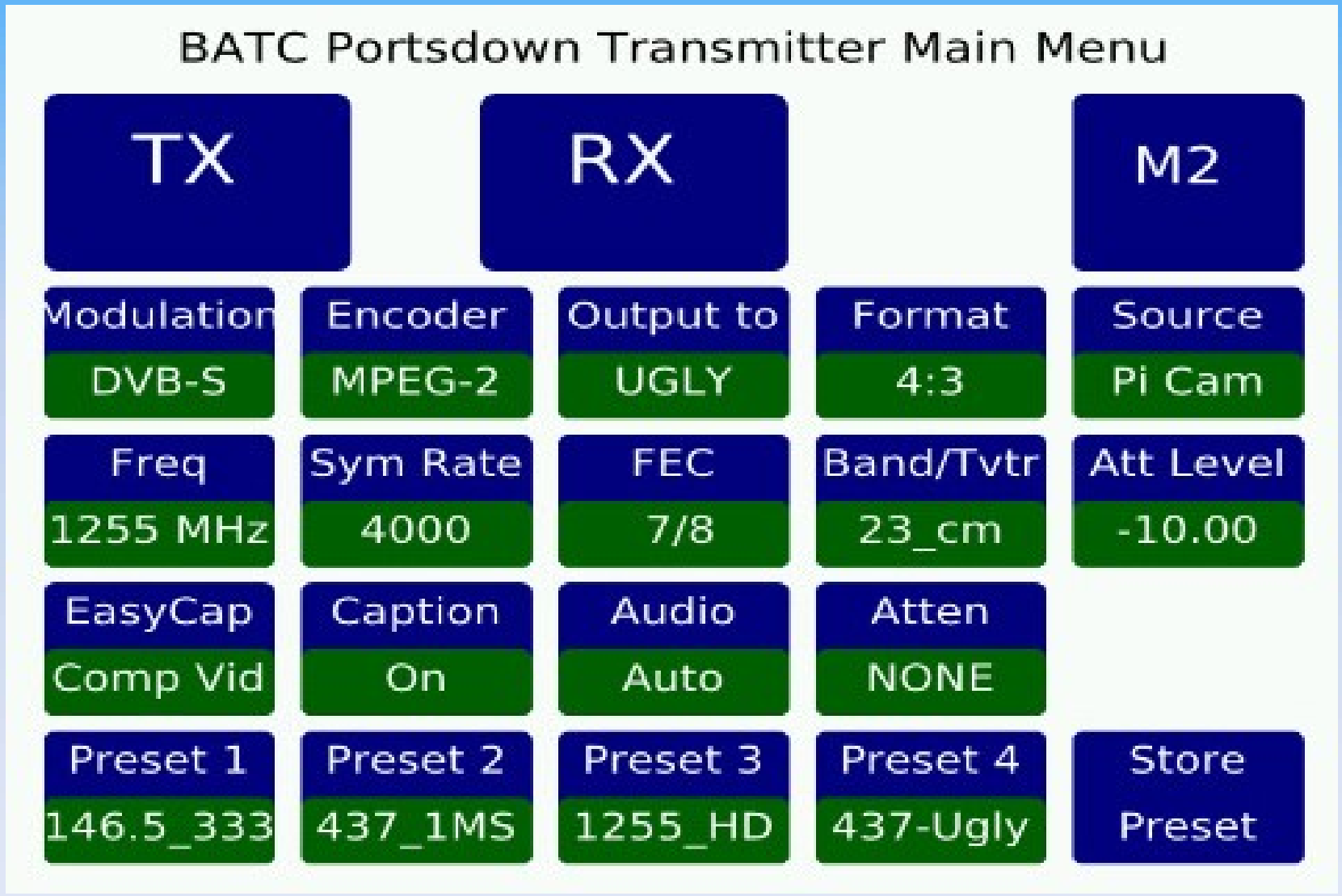


Portsdown Specs

- 71 MHz to 2400 MHz
  - ~ 5dBM output
  - -7dBm at 2400MHz
- DVB-S only
- 88KS to 5 MS
- MPEG-2 and MPEG-4 encoding
- Touch screen or PC control
- PTT and band switching control
- Analogue Video out with test patterns

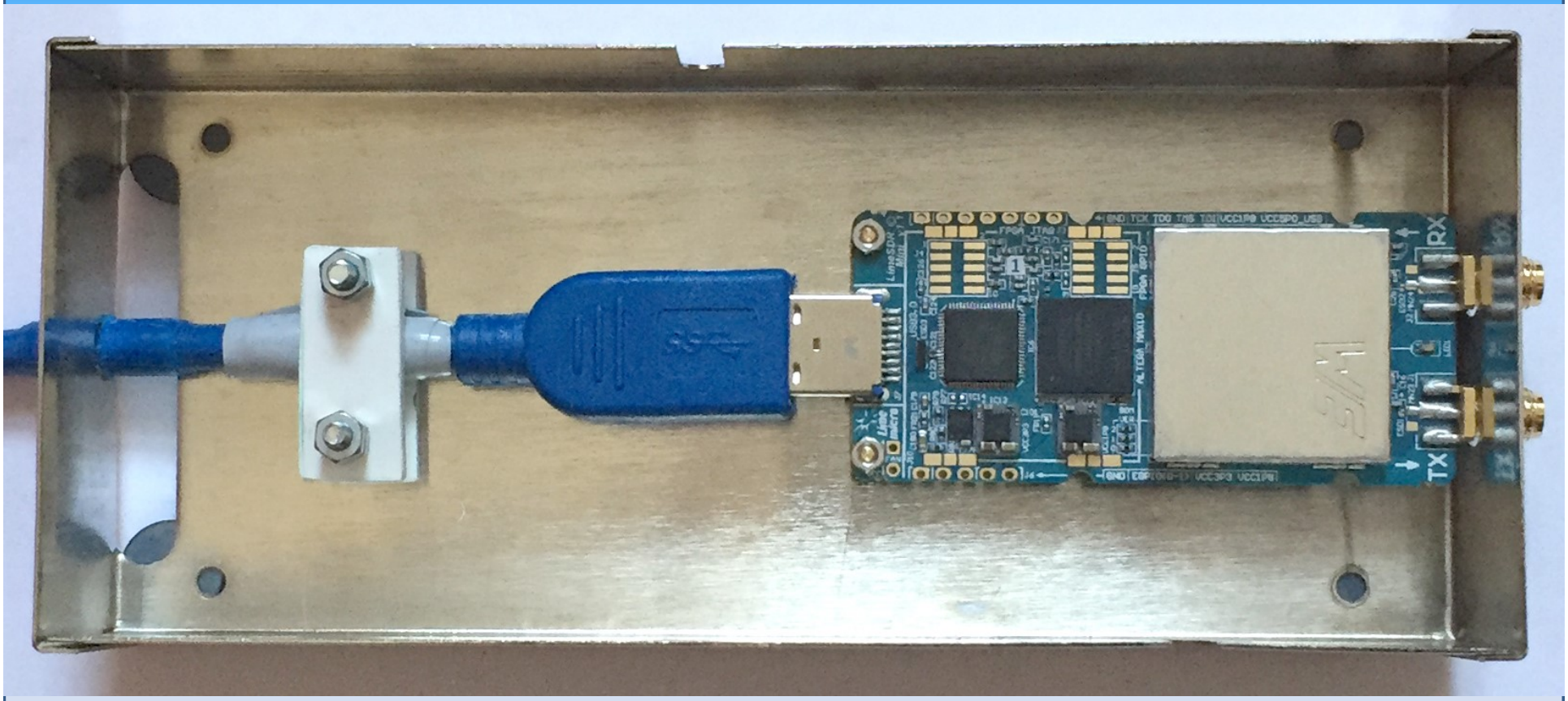


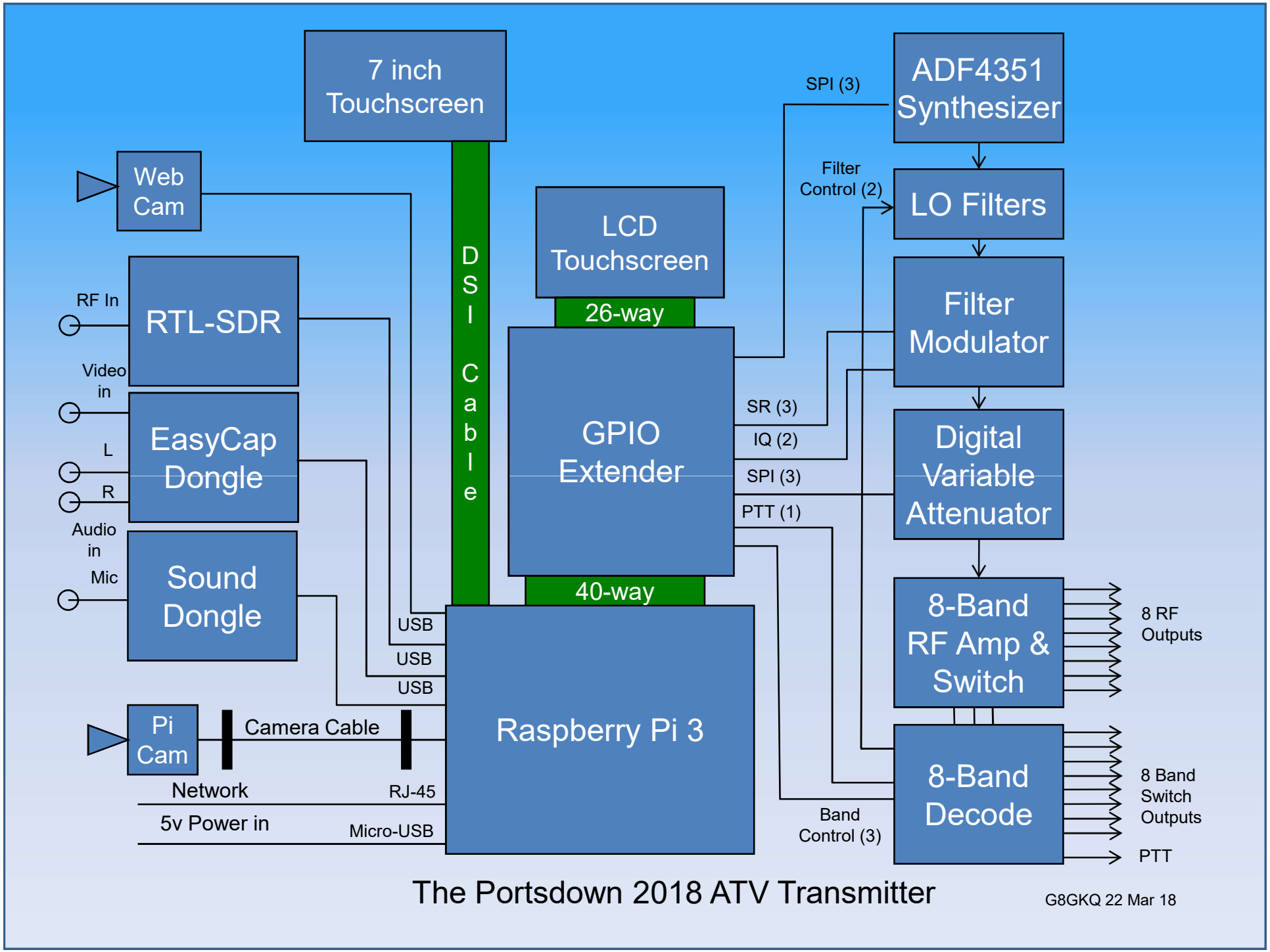
Touchscreen



Portsdown and Lime SDR Mini

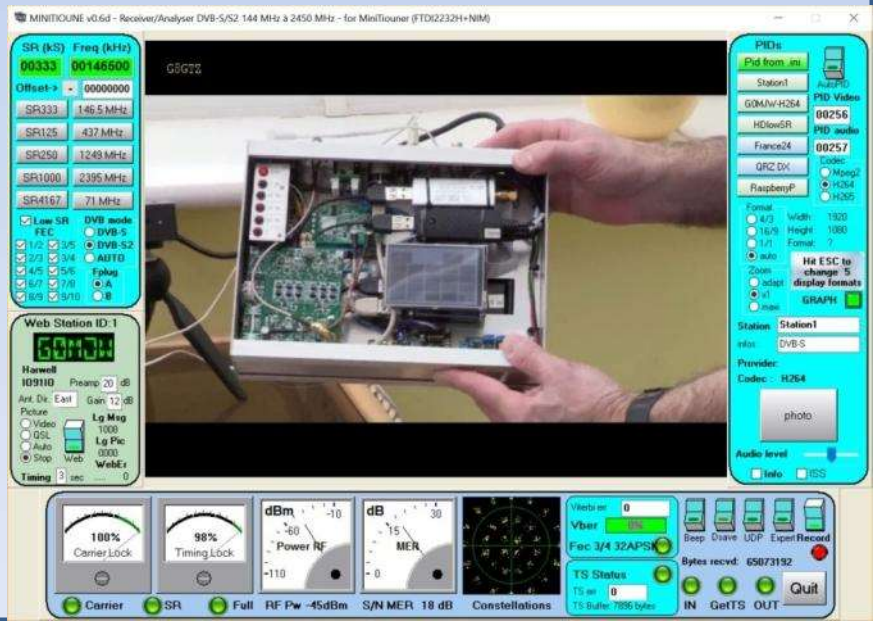
Lime SDR Mini




7 inch Touchscreen
DSI Cable
ADF4351 Synthesizer
SPI (3)
Filter Control (2)
LO Filters
Web Cam
LCD Touchscreen
26-way
Filter Modulator
RF In
RTL-SDR
Video in
EasyCap Dongle
L
R
Audio in
Mic
Sound Dongle
GPIO Extender
SR (3)
IQ (2)
SPI (3)
PTT (1)
Digital Variable Attenuator
40-way
8-Band RF Amp & Switch
8 RF Outputs
USB
USB
USB
Pi Cam
Camera Cable
Raspberry Pi 3
Network
RJ-45
5v Power in
Micro-USB
Band Control (3)
8-Band Decode
8 Band Switch Outputs
PTT
The Portsdown 2018 ATV Transmitter
G8GKQ 22 Mar 18

MiniTiouner

- Satellite TV tuner with USB interface
- PC software by F6DZP
- Latest version tunes 144 – 2600 MHz
- Symbol Rates 66 KS – 20 MS
- Kit or ready-built



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