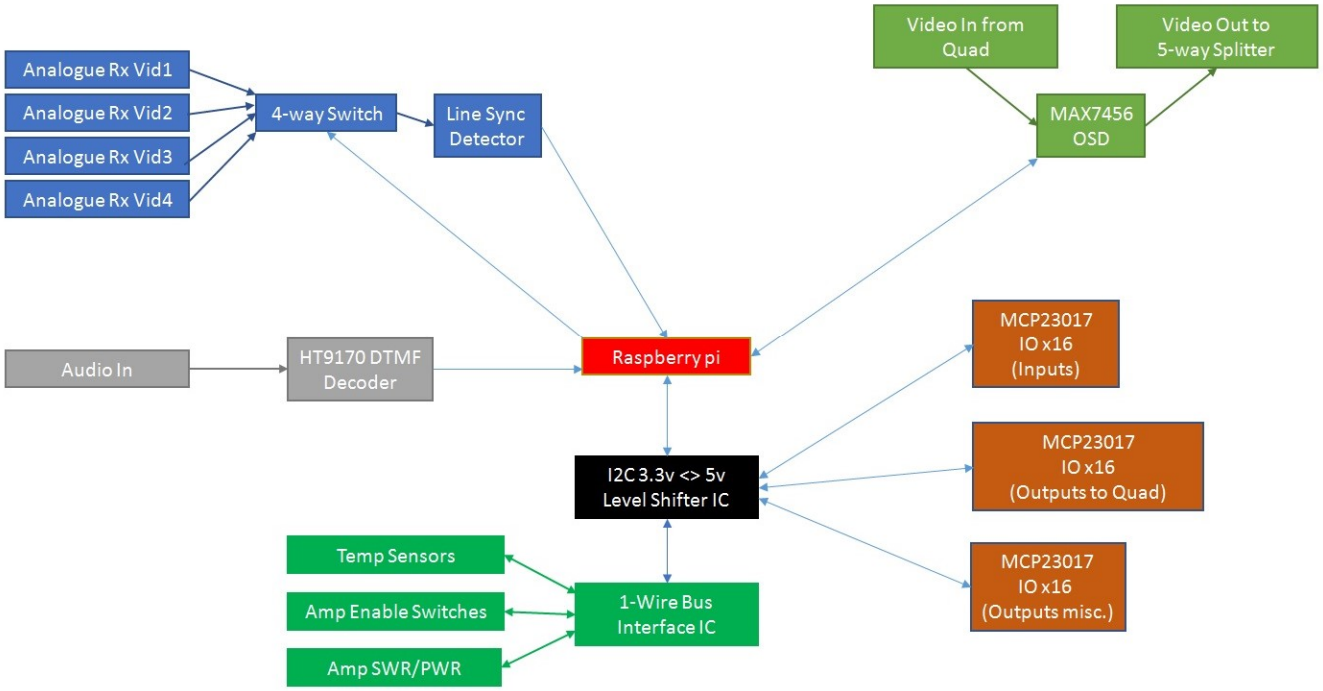
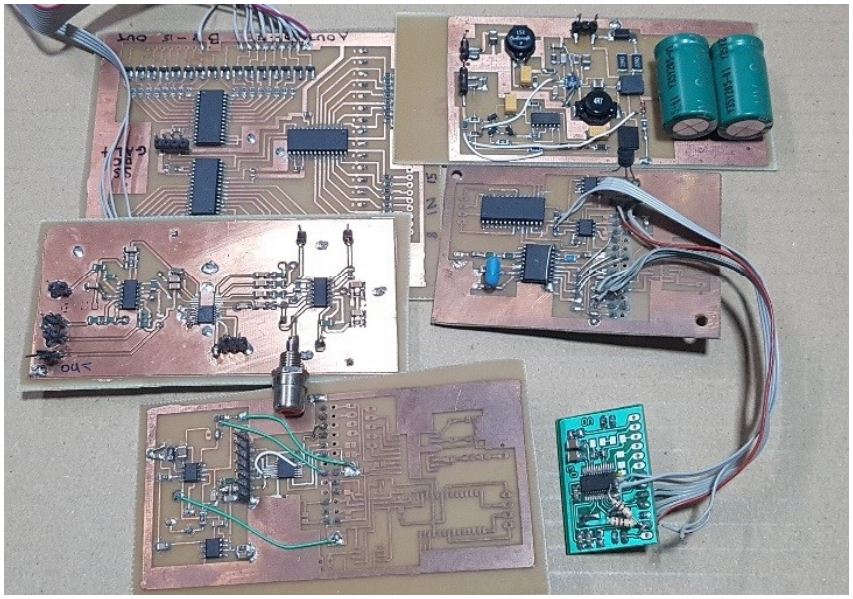
GB3KM

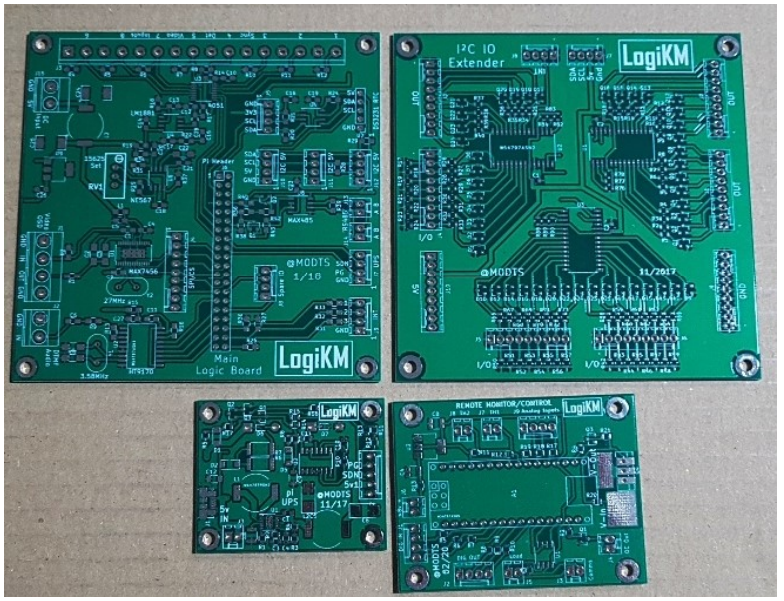
All Digital* Repeater

Back in 2014(!) we started talking about an upgrade...



Some years later...



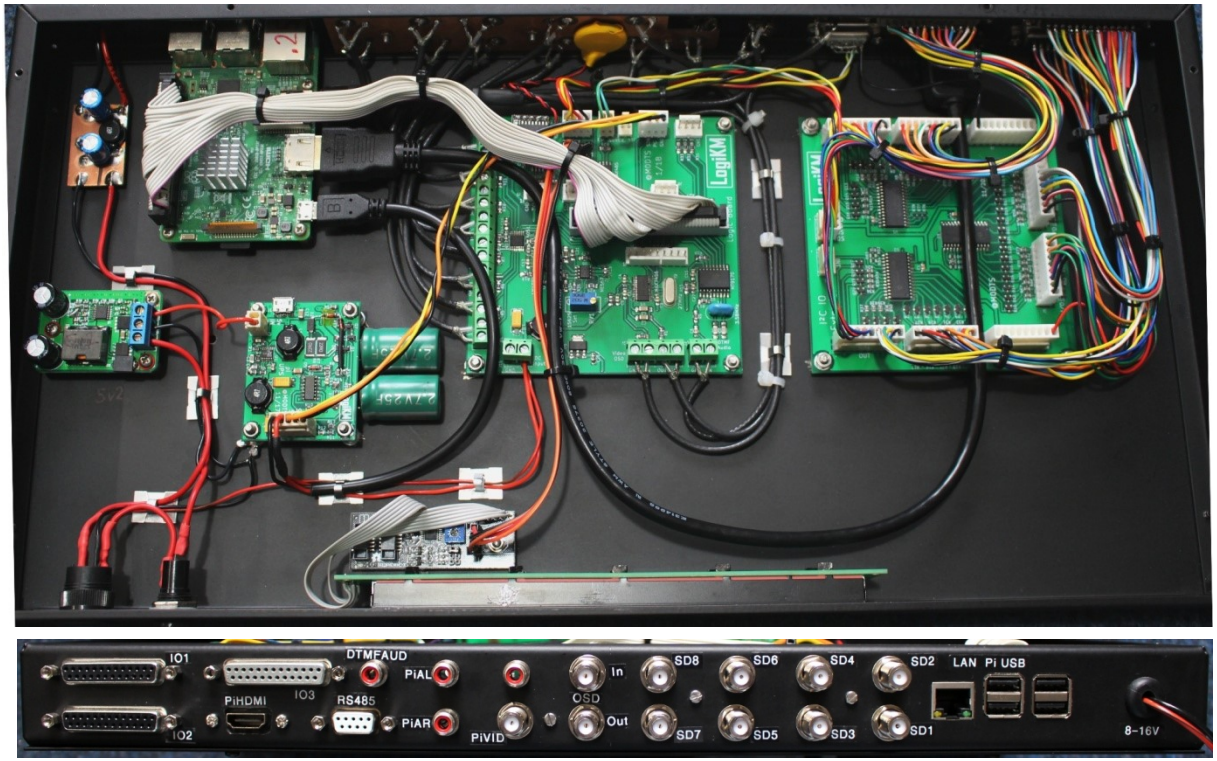


GB3KM MK3 – What's new?

- Logic Control unit - replaces a 16F84!
- 23cm Tx – ADALM Pluto with h264 265 Encoder Box
- HDMI Video switch – HD!
- Audio Mixer
- Amplifier control/monitoring
- Network router

Logic Control

- Raspberry Pi3
- DC-DC PSU
- UPS
- 8x Sync Detector*
- DTMF Rx
- Composite OSD
- Real Time Clock
- Display
- 48 Digital IO
- Lots of python code
- Basic Web GUI



Audio

Requirements:

- Many more audio inputs and outputs
- Controllable by the logic

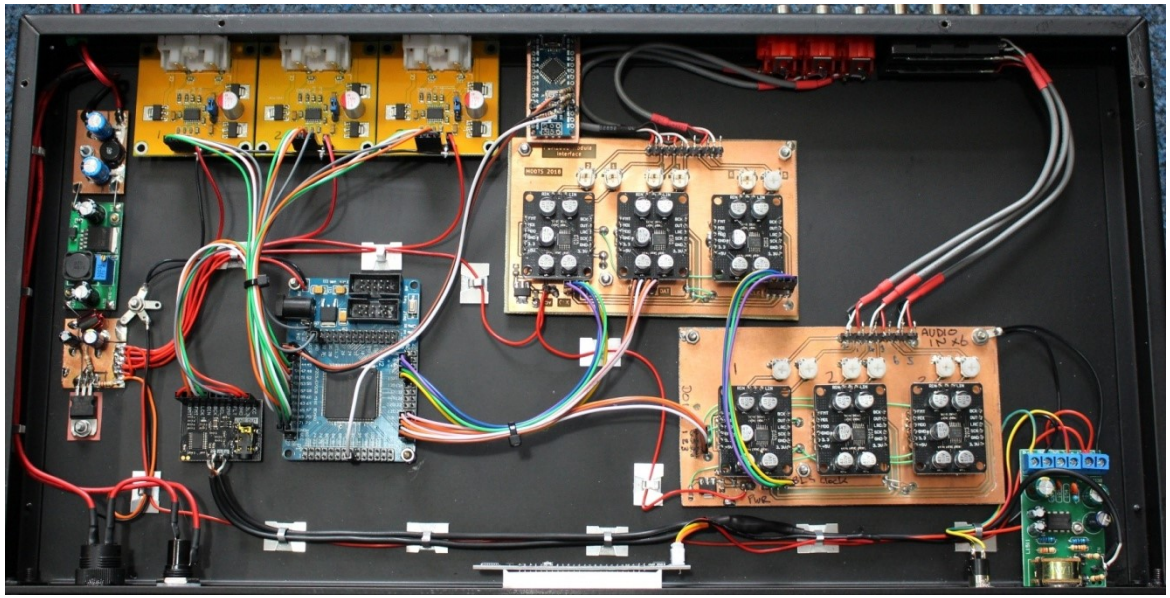
Designed a new mixer unit...

Low cost ADC and DAC boards used with an FPGA for the glue logic plus a little dsp.

- Squelch of noisy analogue sound inputs
- Any of 12 inputs can be mixed to any of 6 outputs
- Duplex operation: Users audio mixed to opposite L/R channels on Tx – user selects opposite channel to their own on receiver – You don't hear your delayed audio.
- Stream input audio could be omitted from Stream output audio for repeater linking – **no feedback**!
- More than two users – TODO: Subcarriers? Modify TS for another audio PID?
- There ARE easier/better ways to do this but I was learning new things!

Audio Mixer

- 5v PSU
- 4x Stereo DAC
- 6x Stereo ADC
- FPGA dev board
- VU Meter
- Headphone amp
- Arduino (USB Control)



Video

- New HDMI Video switch unit – A-NEU Video ANI-9MV
  - 9 inputs – already nearly full: Sysop + Slideshow + 2x Ryde + 2x Analogue>HDMI
  - 1/2/4/9/picture-in-picture display modes – Real-time live video
  - RS232 or LAN control
  - Can set each input to any segment of multi view
  - Allows us to hide analogue inputs in multi screen mode when the input is just noise – encoding noise is something to avoid.
- Ryde Rx's second HDMI port used to display easycap input for Analogue Rx's

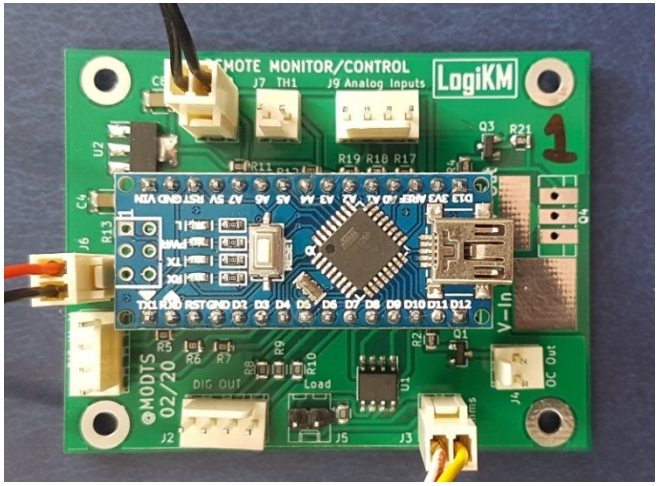
- HDMI Encoder Box
  - Cheap way to get from HDMI to h264/265 stream at 1080i
  - Easy to remote control all parameters – Pi/Python
  - Can also stream to BATC at the same time
  - Image or Text OSD feature used for overlaying active input on screen

Transmitter

- Big step forward from the MK808/PVR/DigiLite currently in use on 9cm
- Pluto uses an Ethernet adapter to accept the AV stream over LAN
- Tx parameters are configured using web interface.
- Pluto output is filtered then amplified – for now just 23cm output using Mitsubishi PA
- A future upgrade will be using the same Tx for the other Transmitters
    - Mixer and filtering to up-convert.
- Hopefully this will be reliable over the years! - tbc

Tx Control/Monitoring

- Needed a new way to control sequencing of Transmitters
  - 1304MHz, 2440MHz, 3406MHz, 10065MHz
- Ideally have monitoring as well as on/off control.
  - Temperature, Forward Power, Reverse Power
- Arduino based control board designed
  - Allows multiple boards to be daisy chained
  - 9k6 serial comms over twisted pair
  - High current DC Switch option
  - 2x Thermocouple inputs
  - 3x digital inputs/outputs
  - 3x analogue inputs – 2x 0-5v, 1x 0-15v but adjustable



Web Config

Log Out - Logic Settings - Audio Settings - Slides - Slides Archive - Upload Image - Status

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Outputs:

Associated_Port	Direction	Location	Name	Output_Type	Edit/Del
1	Output	I2C_GPIO	Video Switch CH1	Momentary	
2	Output	I2C_GPIO	Video Switch CH2	Momentary	
3	Output	I2C_GPIO	Video Switch CH3	Momentary	
4	Output	I2C_GPIO	Video Switch CH4	Momentary	
5	Output	I2C_GPIO	Video Switch CH5	Momentary	
6	Output	I2C_GPIO	Video Switch CH6	Momentary	
7	Output	I2C_GPIO	Video Switch CH7	Momentary	
8	Output	I2C_GPIO	Video Switch CH8	Momentary	
9	Output	I2C_GPIO	Video Switch CH9	Momentary	
10	Output	I2C_GPIO	Video Switch CH10	Momentary	
11	Output	I2C_GPIO	Video Switch CH11	Momentary	
12	Output	I2C_GPIO	Video Switch CH12	Momentary	
13	Output	I2C_GPIO	Video Switch CH13	Momentary	
14	Output	I2C_GPIO	Video Switch CH14	Momentary	
15	Output	I2C_GPIO	Video Switch CH15	Momentary	
16	Output	I2C_GPIO	Video Switch CH16	Momentary	
17	Output	I2C_GPIO	Video Switch PIP	Momentary	
18	Output	I2C_GPIO	Video Switch 4-Way	Momentary	
19	Output	I2C_GPIO	Video Switch 9-Way	Momentary	
20	Output	I2C_GPIO	Video Switch Select	Momentary	

Add Output

Inputs:

Associated_Port	Audio_Channel	Direction	Location	Name	Edit/Del
1	1	Input	AnalogSync	1280A	Edit
38	2	Input	I2C_GPIO	M0DTS	Edit
39	3	Input	I2C_GPIO	Ryde	Edit
26	4	Input	I2C_GPIO	1280D	Edit

Add Input

Logic:

Input	Output	State	Edit/Del
1280A	Video Switch CH4	Enabled	Edit
Ryde	Video Switch CH3	Enabled	Edit
M0DTS	Video Switch CH2	Enabled	Edit
1280D	Video Switch CH1	Enabled	Edit

Add Logic

Transmitter Timers:

Days	Enabled	Name	BeaconOn	BeaconOff	OperatingOn	OperatingOff	SignalActivated	Edit/Del
1,2,3,4,5,6,7	True	1304 Tx	18:00	23:00	18:00	23:00	True	Edit
1,2,3,4,5,6,7	False	2440 Tx	18:00	23:00	18:00	23:00	True	Edit
1,2,3,4,5,6,7	True	3406 Tx	18:00	23:00	18:00	23:00	True	Edit
1,2,3,4,5,6,7	False	10060 Tx	18:00	23:00	18:00	23:00	True	Edit

Add Timer

Video Switch Settings

Setting	Val
mode2	0
mode4	0
default_QUAD	1234
default_NINEWAY	123456789
pip_toggle_enabled	1
pip_toggle_time	20

Audio Mixer Control

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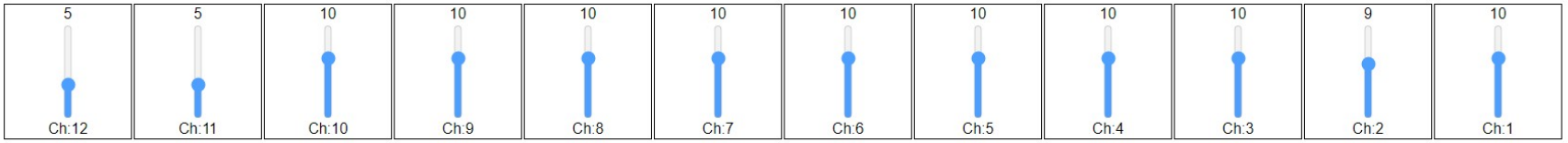
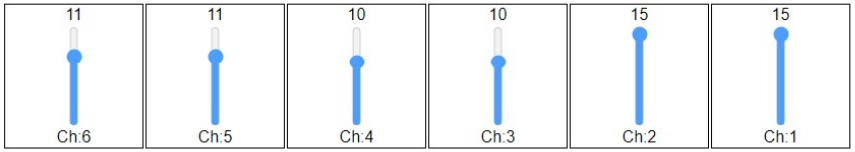
Audio Input Levels

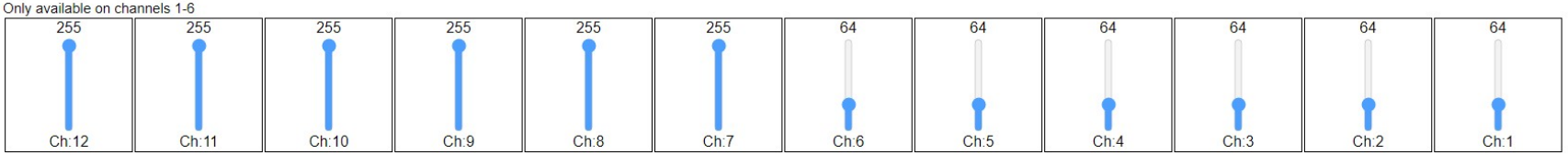


Audio Master Levels



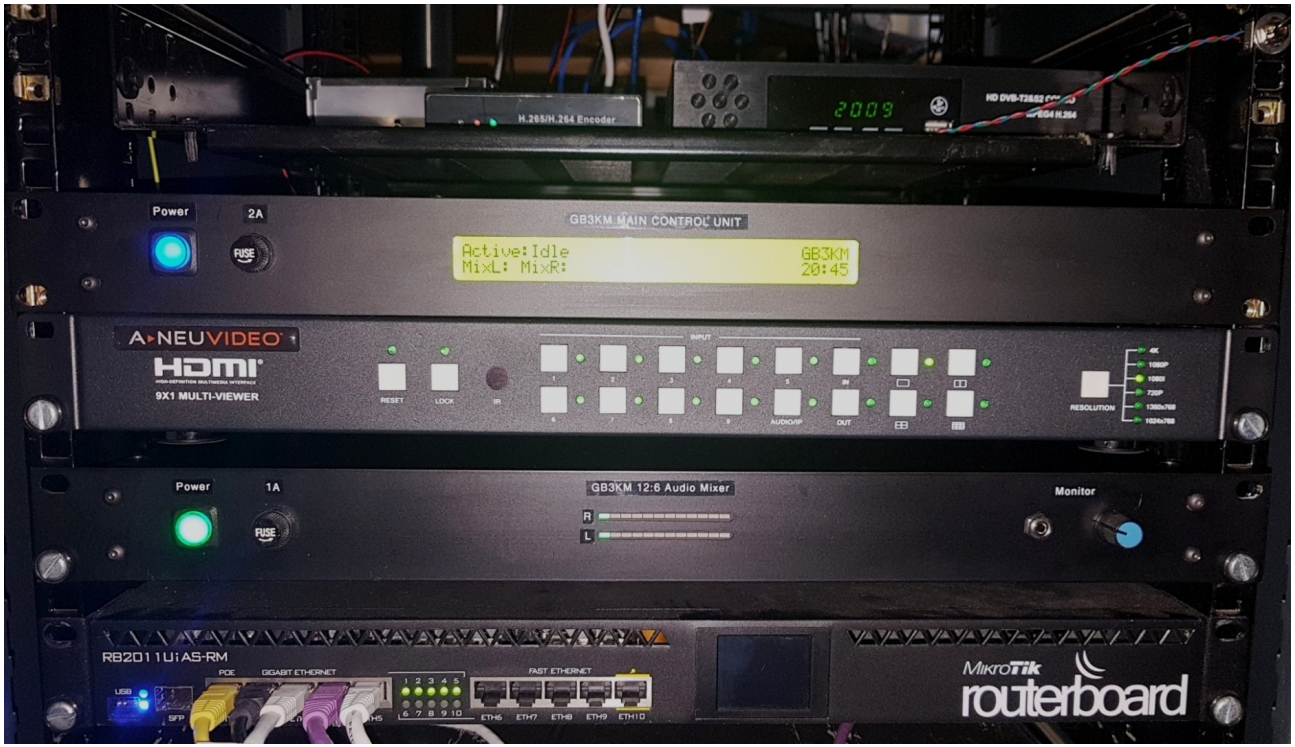
Audio Squelch Levels

Only available on channels 1-6



Save Levels

Development Rack



GB3KM – Will be back soon!

Check out M0DTS stream on the BATC website – Live development!
Thanks to BATC for the Bursary funding for some of the new equipment.

Any questions ?

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