

The KISS Repeater - VK4RKC.

VK4RKC has been operational for over 10 years with an output frequency of 426.25 MHz VSB and with an input of 1250 FM. During early 2003 both Dan VK4KI and I obtained DVB-S modules from Stefan of SR-Systems, so over a period of seven years we have played with digital television. Both systems have since then been upgraded to dual transport systems. Because of this a 1250 DATV input was added to the input of VK4RKC. Also Dan VK4KI added a 2415 MHz output using DVB-S, this has since been rewired for FM to allow more stations to receive it.

Since early 2007 DVB-T modules have been purchased from SR-Systems allowing experimentation to be carried out using this mode of operation for ATV, it only deferrers from the free to air by the number of carriers been transmitted (2k instead of 8K). I first transmitted DATV to Don VK4TVD and Allan VK4YAR using around 6w from a module. This was later upgraded to 14w (-28dbc shoulders) using dual modules using a modified TEKO power amplifier were very good results have been achieved. A number of different set top boxes have been utilised for these tests and has allowed us to see what units are suitable for ATV reception. The STB's must be capable of manual tuning been set via frequency not channel. So far the Strong 5049 which is sold as a professional unit and has a signal input level from -20 to -78.5 out classes all others that we have tested. The Olin 2000B also works well were the strong 5006 is down on gain but worked fine in strong signal areas.

Dan Vk4KI has been working on the RF system but has been hampered by ill health for the past several months. However he has been working at his own pace and has a 32w power amplifier up and running using dual RD70HVFI - Mosfets. Armed with this and his DATV exciter VK4RKC changed over to digital operation several months ago from the site at Ocean View. So far good results have been obtained with a number of dormant stations now transmitting through VK4RKC as well as a few new receive only stations.



Some stations like Don VK4TVD have spent considerable time and effort in obtaining satisfactory results from the DATV repeater which has included the installation of a digital pre-amplifier as well as testing quite a few STB's we could muster, the Strong 5049 being the best by far. Further upgrades have now allowed the Olin 2000b to work without dropouts. Our gratitude is therefore extended to Dan VK4KI in spite of his ongoing medical problems to have allowed us that have retired to keep the grey calls working. Without it I wonder what would happen, thanks DAN.

In parallel to this operation we decided to replace the old vision and audio setup with a updated system to allow full dual transport operation in the future.

Brisbane is unique in that two repeaters exist. VK4RMG is operated by the SEQATV group who started ATV operations in around the late 1970's. VK4RKC started operation around 1996 due to differences of opinions as to where we were heading. Without going into the problems associated with this it is hoped that both groups due to changes of circumstances can now join forces to have one repeater in



operation.

The New AV system for VK4RKC.

The new A/V system started life as detailed in CQ-TV 211, however since then a few changes have taken place and I will attempt to bring you all up to date on where we are. Looking at the block diagram you will see a number of different blocks which I will now detail as follows;

Testcard Generator

This is based on the old CQ-TV circle testcard generator by Richard Russell. These three boards are built into a signal 1ru rack module with separate +5v regulators for each board. The one exception is the first board which as an adjustable regulator set to just under +6v for reliable operation of the master oscillator.

PAL Encoder

The first version consisted of the BATC club encoder and SPG, however when a MIKE COX 153 encoder and LEITCH 141 SPG became available these were placed into service which now supplies correct levels and sync pulses (the Cropredy didn't). The encoder output feeds a Blackbox ident keyer (modified to improve chrome response) before feeding the video switcher. The second testcard for the dual transport system is derived from the colour bar output from the 141 SPG which is in turn feed via the club ident generator before feeding into the second video switcher.

The Video Switchers

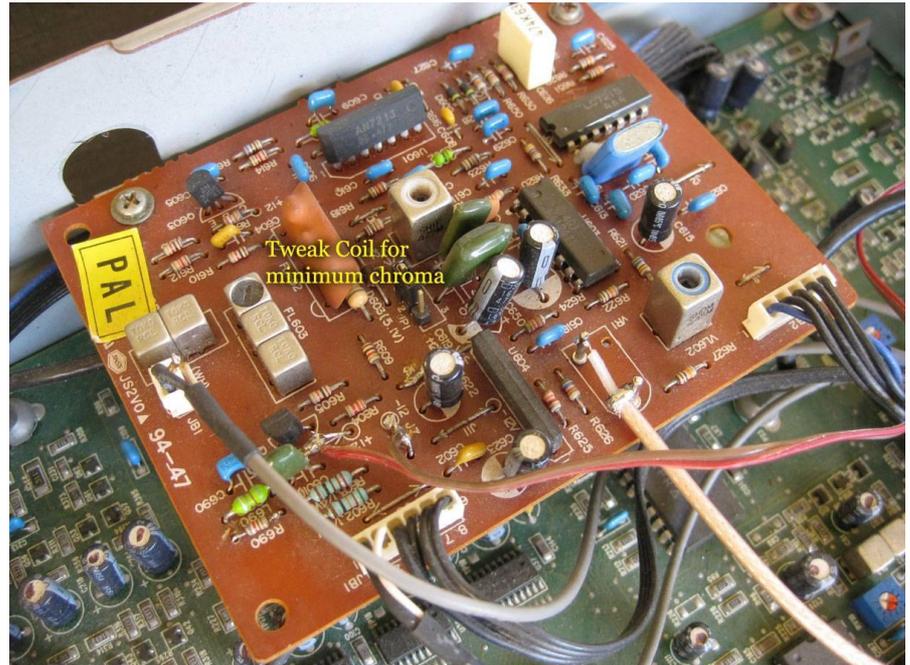
The first video switchers were based on those as detailed in CQ-TV 211, however two Sony video and audio switchers came my way and these therefore have been placed into service. The different inputs can be seen from the block diagram. The spare inputs still have to be determined and could consist of 13cm receive, computer or 3cm receive, further requirements will take place in due course. The audio inputs have been modified for unbalanced inputs and the remote switching socket was replaced with a DB9. These switchers allow remote and

local operation so improves the fault finding that maybe required at the site.

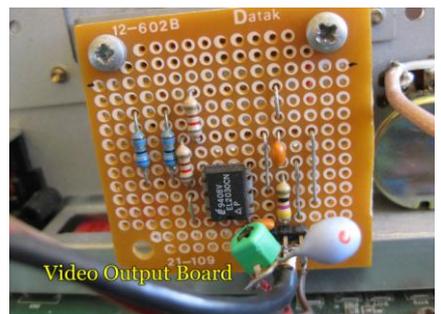
VDA's

Philips VDA's have been added to allow precise level adjustment to bring it into line with required standards. You may notice that the 1250/1283 MHz FM receivers have no VDA's external and is because we haven't been able to source anymore with backplanes

1250 / 1283 MHz FM Receivers.



These receivers are Scientific Atlanta B-MAC receivers that have a PAL board fitted. These provide excellent receivers for ATV. However with the standards that we are allowed to use for ATV on 23cm the output video level is only 1/2v P/P. Also we require two outputs, one for the video switcher and one for the video detector. This of course could be done with one output and looped through the detector but direct inputs are more desirable.



A separate video amplifier has been added to each receiver to provide the extra gain and the two outputs. Another requirement was to reduce the audio

sub-carrier on the video output (this is due to the use of 5.5/5.74mhz for the sound sub-carries on 23cm) therefore a trap circuit was included on the input to this amplifier. Some SA receivers have been modified to allow dual audio sub-carriers, however in these units the internal unit has been used allowing only one sub-carrier. The internal audio level control has been extended to the back panel to allow some adjustment for alignment.

VK4RKC-1and VK4RKC-2-outputs (Video)

Each switcher output is feed via a VDA to provide inputs to the DATV exciter, waveform monitor, vectorscope and picture monitor. Extra outputs are provided for future expansion as required.

Audio Outputs

The outputs from the audio switcher are feed via two audio DA's providing three outputs per channel. An output from the DA is internally feed to a VU LED meter circuit so that audio levels maybe adjusted within the repeater system.

Tone and audio Ident generator

This unit is mounted in a 1RU and is identical to the one in CQ-TV 211. It allows for alignment and audio Ident.

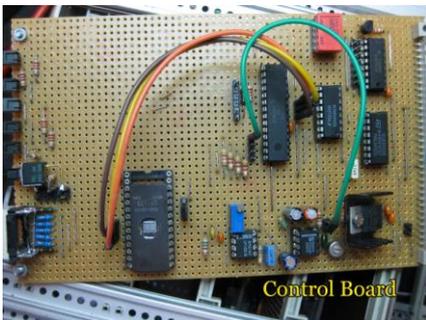
Ident Generator

For RKC-1 the ident is supplied from a WD mini Media Player and consists of different location pictures around the repeater viewing area and is switched on for 8 minutes after the received signal is dropped off and allows some time to check the receiving system if required. The Ident for RKC-2 is the Teletext Pattern Generator as found in The ATV Compendium (page 25) and switches between two idents to check if the system hasn't locked up.



Controllers

In CQ-TV 211 I used the BS2 as the controller, however these are expensive compared to the Picaxe. Therefore the controllers have now been re-built and now use a 28X1 Picaxe. Two separate controllers are provided for each transport system and switcher. The controller flow diagram will give you an idea what is involved with each controller.



A simple approach has been taken after much work and experimentation with LCD readouts for control status. LED's and a 7-segment display have therefore been selected for this function. These have been the most suitable for the application as intended. LED's give the status readout for all inputs and are 'on' (green) when activated. The TX 'on' is red when activated. The 7-segment display gives you an

indication as to what input has been switched and is set via an EPROM.



Alignment-Video

Video alignment is relatively easy. There are no adjustments within the testcard generator, however the Cox Coder has an internal bar generator so alignment can be carried out looking at a spare output from the coder. Once aligned the output VDA on VK4RKC-1 can be adjusted for 1v p/p via the waveform monitor.

The colour bars from the SPG 141 can also be checked from the second output and again once checked the output VDA can be set to 1v p/p. These then become the standards for the rest of the system.

The SA receivers can be adjusted for 1v p/p output when receiving a known correctly setup transmitter.

The DATV receiver can also be set via its associated VDA for 1v p/p. All other inputs have VDA's so again alignment can be completed.

Alignment AUDIO

The audio always causes problems and most people set for sound levels that are approximately similar when comparing them to other known reference.

What I have tried to do here is maintain a standard level throughout the repeater.

The audio oscillator is set to obtain -10 from the switcher output and then -10 from the audio DA output. The internal VU led meter is then calibrated to this level.

All other inputs are adjusted then to this level as well as the output from the voice ident generator.

The inputs to the DATV exciter are then reduced to the required level via fixed pads to set the DVB-T levels to -18dbm (0.356v p/p). The fixed attenuators are made up of a series 10k resistor and a shunt resistor of 6k8 to ground from its output. These levels have given reasonable results 'off air' and match pretty closely to those from the free to air channels.

