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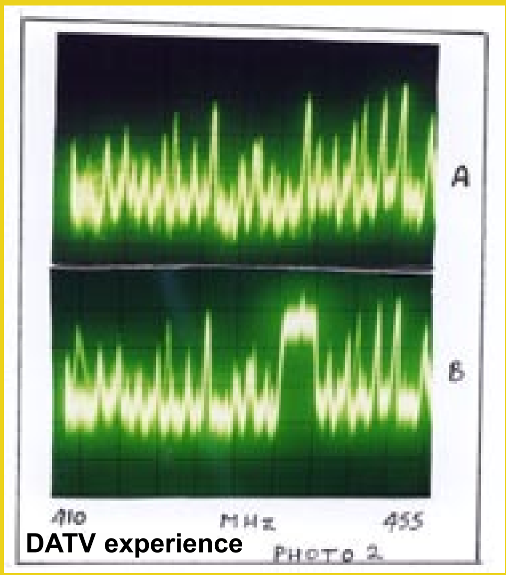
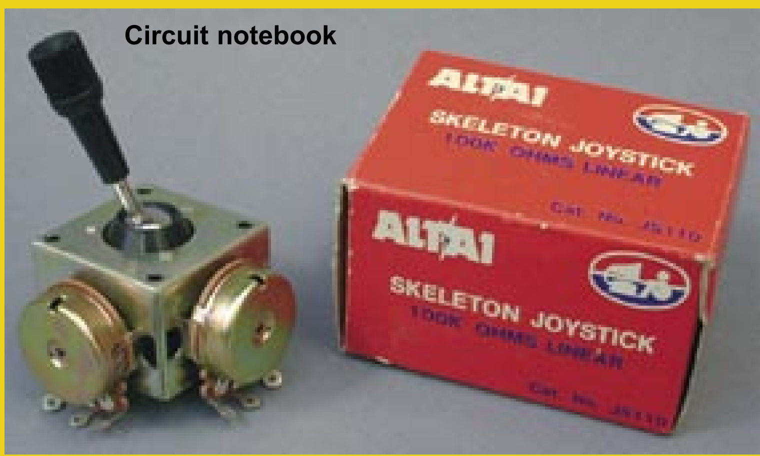
CQ-TV 212

November 2005



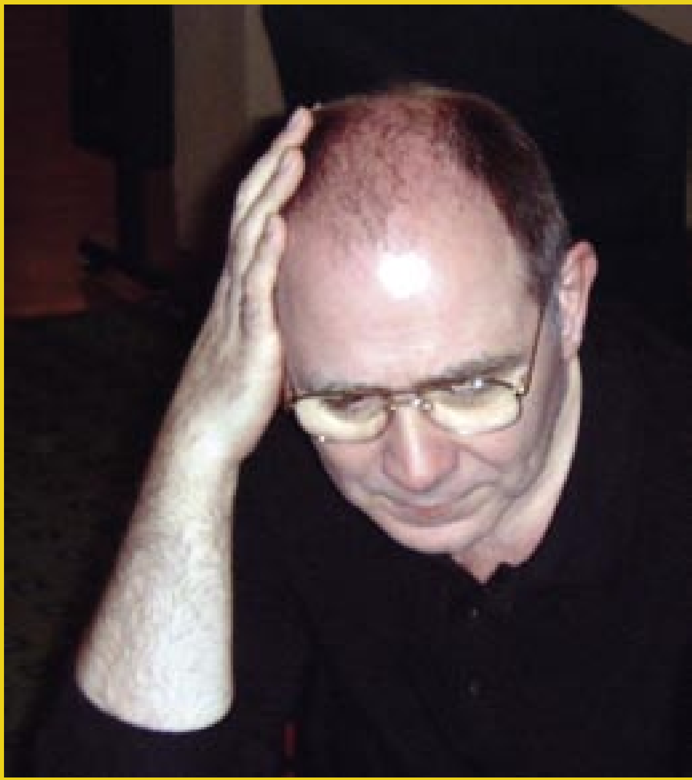
DATV experience



Circuit notebook

IBC 2005 review

www.cq-tv.com



Caption competition

Can you think of a caption for the above picture? (see page 12) If you can, then send your entry to chariman@batc.org.uk. The winner will receive a Black Box caption generator

CQ-TV 212

Contents

Edited by Ian Pawson, circuits drawn by Allan Robinson, proofread by Peter Delaney.

Printed by Clipper Print Ltd., Unit 13, East Goscote Ind. Estate, East Goscote, Leicester, LE7 3XJ, England. Telephone: 0116 260 9909.

Committee Contacts

President: Mike Cox, CEng., FIEE

E-mail: president@batc.org.uk

Chairman: Trevor Brown, G8CJS

Club affairs, Videotape library, and Technical queries, especially relating to handbook projects. 14 Stairfoot Close, Adel, Leeds, LS16 8JR. Tel: 01132 670115. E-mail: chairman@batc.org.uk

General Secretary: Paul Marshall, G8MJW

General club correspondence and business. Library queries relating to the borrowing or donation of written material. Fern House, Church Road, Harby, Notts., NG23 7ED. Tel: 01522 703348. Email secretary@batc.org.uk

Hon. Treasurer: Brian Summers, G8GQS

Enquiries regarding club finances, Donations, and constitutional enquiries. 9 Prior Croft Close, Camberley, Surrey, GU15 1DE. Tel: 01276 677879, Mobile077 4029 1191, Email: treasurer@batc.org.uk

Membership

Anything to do with membership, including new applications, queries about new and existing membership, non-receipt of CQ-TV, subscriptions, membership records etc. **Pat Hellen**, The Villa, Plas Panteidal, Aberdyfi, Gwynedd, LL35 0RF, UK. Telephone 01654 767702. E-mail: memsec@batc.org.uk

Club Liaison: - And anything of a political nature, co-ordination of ATV repeater licences. **Graham Shirville, G3VZV**, The Hill Farm, Potsgrove, Milton Keynes, Bucks., MK17 9HF. Tel: 01525 290343. E-mail g3vzv@amsat.org

Contests: - Richard Parkes, G7MFO, 7 Main Street, Preston, Hull, HU12 8UB. Tel: 01482 898559. Email: contests@batc.org.uk

CQ-TV Magazine: Editor Ian Pawson

Anything for publication in CQ-TV, Articles, Review items, Letters to the editor, and other material except as below. 14 Lilac Avenue, Leicester, LE5 1FN, England. Tel: 0116 276 9425, Email: editor@cq-tv.com

Photographs for the CQ-TV covers: - Please send any photographs by post, electronic images by email, to the editor at the above addresses.

TV on the Air: - Graham Hankins G8EMX, 17 Cottesbrook Road, Acocks Green, Birmingham, B27 6LE. Tel: 0121 706 7384

Satellite TV News: - Paul Holland G3TZO, Chatterton, Chapel Lane, Threapwood, Nr. Malpas, Cheshire, SY14 7AX. Tel: 01948 770429, Email: satnews@batc.org.uk

CQ-TV Advertising Manager: - Trevor Brown, 14 Stairfoot Close, Adel, Leeds, LS16 8JR. Tel: 01132 670115. Email: adman@batc.org.uk Members adverts for inclusion in CQ-TV should be sent directly to the editor and the above address, either by post or e-mail.

CQ-TV Awards: - Bob Webb G8VBA, 78 Station Road, Rolleston on Dove, Burton on Trent, Staffs., DE13 9AB. Tel: 01283 814582

Exhibitions

Graham Hankins G8EMX, 17 Cottesbrook Road, Acocks Green, Birmingham, B27 6LE.Tel: 0121 706 7384 Email: exhibitions@batc.org.uk

Club Sales

Members Services: - PCB's, components, camera tubes, accessories, etc. (NOT PUBLICATIONS). **Peter Delaney, G8KZG**, 6 East View Close, Wargrave, Berkshire, RG10 8BJ. Tel: 0118 940 3121. Email: services@batc.org.uk

Publications: - Handbooks, Back copies CQ-TV, and anything related to the supply of BATC publications. **Paul Marshall**, Fern House, Church Road, Harby, Notts., NG23 7ED, England. E-mail: publications@batc.org.uk

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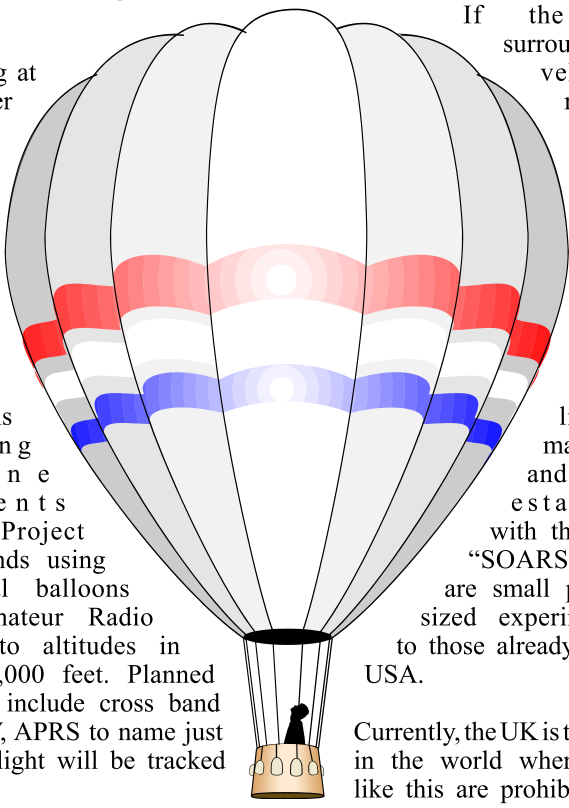
Chairman's Column

By Trevor Brown

The winner of the last Issues caption contest is Dave Long G3PTU with "You try and talk to it while we stand well back!" Thanks Dave a character generator is on its way to you.

I have also had an email from Peter Badham G0WXJ info@eham.org.uk



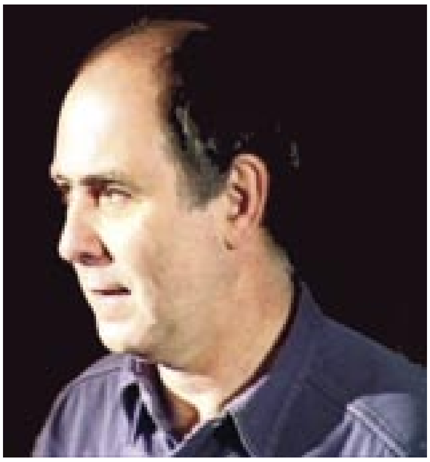
Pete is looking at putting together an Amateur Radio group called S.O.A.R (Space Observation with Amateur Radio) which is aiming to get the regulations surrounding airborne experiments changed. Project S.O.A.R intends using meteorological balloons to carry Amateur Radio experiments to altitudes in excess of 90,000 feet. Planned payloads will include cross band repeaters, ATV, APRS to name just a few. Each flight will be tracked from the ground and then recovered upon landing.

Project S.O.A.R is currently communicating with the CAA and OFCOM in an attempt to get the conditions relaxed. The group is actively seeking change that will allow experiments of this nature in balloons and other non-commercial craft.

If the conditions surrounding airborne vehicles are relaxed, it will enable the group to provide payload space to other groups for experiments. It is envisaged that strong links will be made with schools and educational establishments with the inclusion of "SOARSAT's". These are small ping-pong ball sized experiments similar to those already in use in the USA.

Currently, the UK is the only country in the world where experiments like this are prohibited. A project

You try and talk to it while we stand well back!



of this kind has great potential and will help the Amateur Radio community cement links with educators. It seems a real shame that old fashioned thinking is restricting such an exciting and important project.

The project leader, Peter Badham G0WXJ is keen to hear from any UK based groups or individuals who are interested in becoming part of the project. Contact details and further information is available on their website.

GMSK experiments

DATV is in the news again; Dr. Uwe E. Kraus DJ8DW and his team have finished the development work on GMSK and now have working modules. The two modules produce a 70 cms signal with a bandwidth of 2 MHz. Ian Waters has been in touch with Uwe with a view to BATC testing and evaluating the system. Uwe has also been in discussion with Gaston Bertels ON4WF, the ARISS European Chairman about the possibilities of DATV equipment for Columbus.

BA TC

DATV, some more experience

By Ian Waters, G3KKD.

When I submitted my article "DATV Experience so far …" published in CQ-TV 208, the position was:-

I had constructed a digital 23cm transmission system based on the AGAF encoder and exciter boards. This had been used to transmit excellent pictures to stations in the Cambridge area.

Work on evaluating these boards for use on 70cm, requested by the Club, was however on hold. The reason for this was: While the 4.5MHz output spectrum, produced by the boards default settings, was quite suitable for use on 23cm and higher bands I considered it a bit too wide to radiate on 70cm. Although AGAF had assured me that the boards could be set up to give a more suitable QPSK output, information on how to do this had not been forthcoming. It transpired that making this adjustment was not just a simple matter of setting the jumpers on the boards, but required some more fundamental re-programming that I probably could not do at home. It would not be quick and easy to change standards when changing bands and in addition it might lead to a symbol rate too low for some set top boxes to decode. In view of all this I decided to take another look to be certain that the default signal could really not be used on 70.

A QRM problem?

The perceived problem was that with the DATV carrier on the preferred frequency of 437.25MHz, the input channel to the local GB3PY voice repeater was only 200kHz below the lower edge if the digital spectrum. While the spectrum output by the exciter is very well defined and falls rapidly at the band edge, there was always going to be some spectral re-growth in the subsequent amplifier stages. With the TX producing 7W the measured signal at the repeater input frequency of 434.8MHz was about 30dB below carrier. Taking feeder loss and antenna gain into consideration this meant that, when beaming in that direction, something like 0.5W could be radiated toward the repeater at 7 1/2 miles distant. As this did not seem a good risk I decided to add a high Q notch filter at the TX output. I was fortunate in having some suitable resonators left over from a 405 line vision and sound combining unit which I had made in 1966, see CQ-TV No 66, if you can go back that far! For the record details of this filter are given in Appendix 1. The filter gave a notch more than 20dB deep resulting in the unwanted signal being greater than 40dB below carrier, or less than 5mW radiated toward the repeater. The time had come to do some tests.

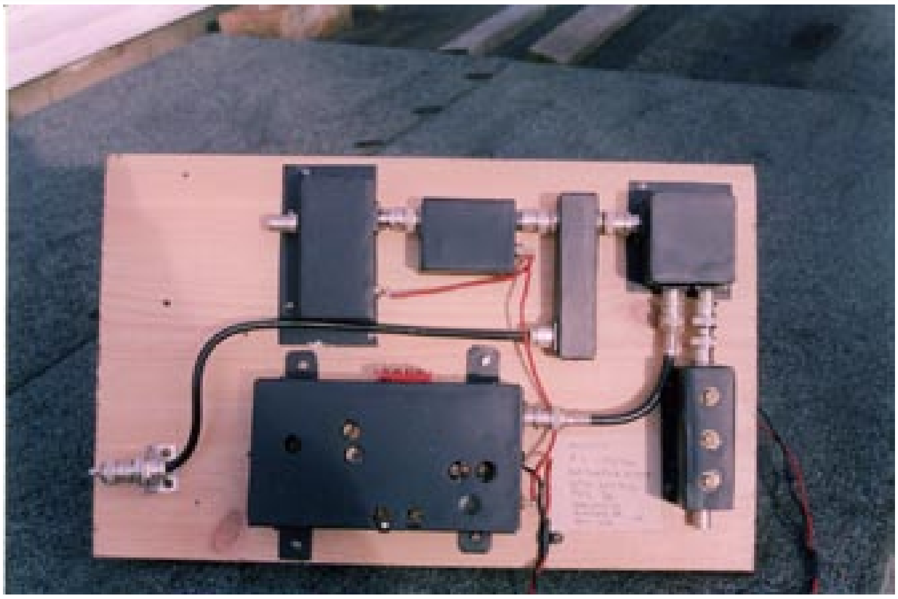


Photo 1

QRM tests

I am again indebted to Bob G1SAA and Paul G8GML for their help. First Paul, about 2 miles away, using his communications receiver, tuned over the digital signal and reported that virtually nothing could be heard outside the intended digital spectrum. Then Bob transmitted a signal from his hand held at a distance of about 3 miles into the box. The TX produced 200mW but had a 20dB pad inserted between it and its rubber duck antenna. Paul listening on the output reported a very weak signal in. I then beamed at the repeater and switched the TV on and off. Nothing whatsoever was heard. When the output filter was removed there was still nothing! The filter has however been left in circuit to be on the safe side.

There seem to be a number of factors working in our favour:-

- TV is horizontally polarised while repeaters are vertical. There can thus be up to 20dB polarisation loss.
- As others have pointed out the signal in a 25 kHz communications channel is over 20 dB below the digital signal power. Less if 12.5 kHz channelling is in use.
- Any signal that does get into a communications channel will not produce whistles or frame buzz, but will only raise the noise floor.
- We benefit from directional diversity in that we use highly directional antennas and are only likely to give problems to stations lying in the beam, or are beaming towards us.
- We benefit from time diversity; we are not all using our favourite modes at the same time.

Encouraged by this I decided to go ahead and build a 70cm receiving up-converter for use with a FTA set box and to do some on air tests.

Some 23cm experience

Before going on with the 70cm story, a diversion back to 23. I recently transmitted pictures to a meeting being held only 4 miles distant. I first used FM and the results were dreadful! Weak noisy pictures with gross chroma/luminance distortion. Typical of a highly obstructed path, not surprising as the largest aircraft hangar in Europe happened to be in the way. Before giving up we decided to just try the digital and immediately P5 pictures!

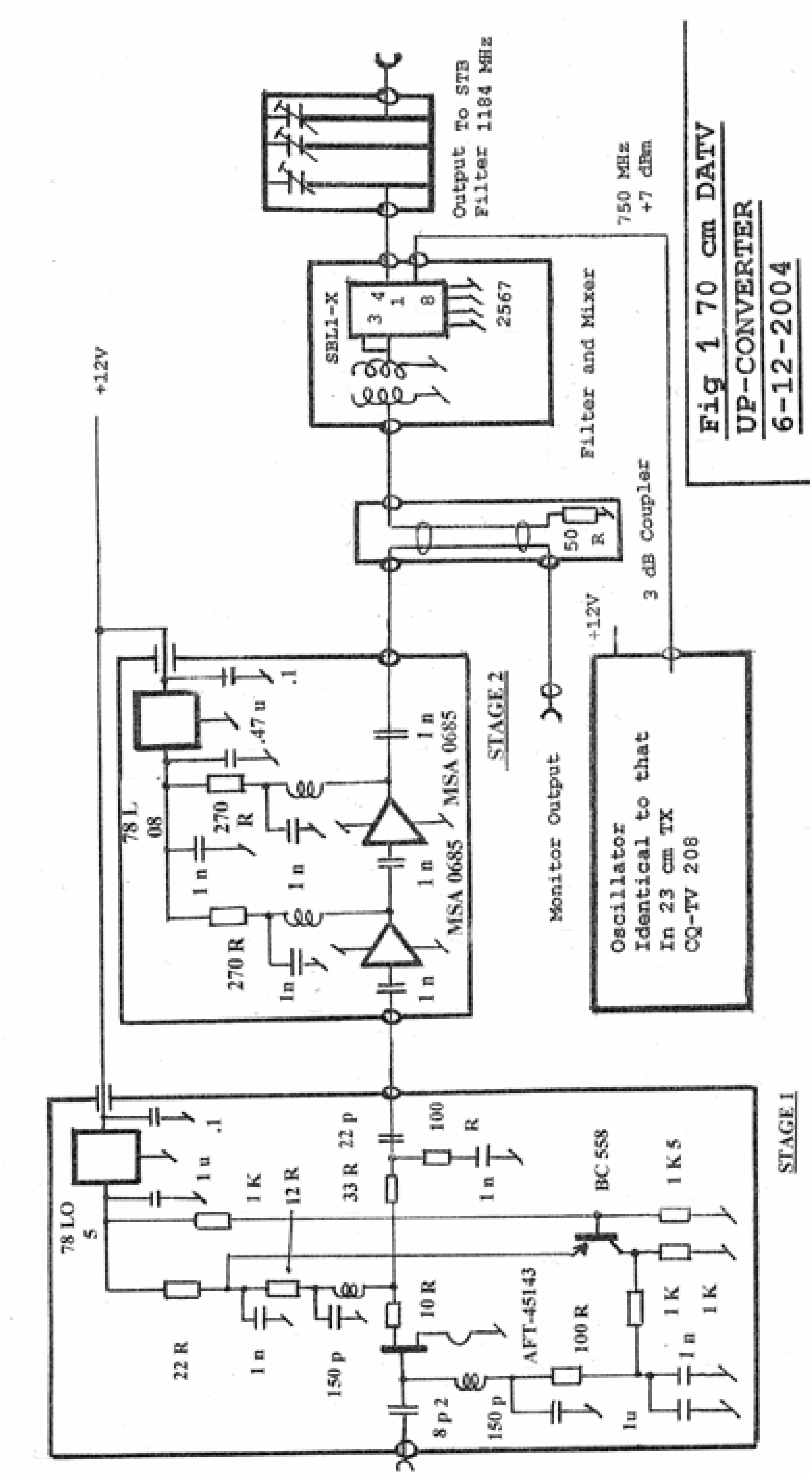


Fig 1 70 cm DATV
UP-CONVERTER
6-12-2004
Output To STB
Filter 1184 MHz
750 MHz
+7 dBm
SBL1-X
2567
Filter and Mixer
3 dB Coupler
50 R
+12V
+12V
Oscillator
Identical to that
In 23 cm TX
CQ-TV 208
Monitor Output
STAGE 2
STAGE 1
MSA 0685
MSA 0685
78 L 08
270 R
270 R
.47 u
.1
1 n
78 LO 5
BC 558
AFT-45143
22 R
12 R
33 R
100 R
10 R
1 K
1 K 5
22 p
150 p
8 p 2
1u
1 u

We have been led to believe that QPSK is rather fragile and to suffer badly from multipath. I am not so sure.

The 70cm receiving up-converter

For first test purposes the modules of the converter were assembled literally on a breadboard as shown in Photo 1. This enabled them to be rearranged easily if necessary. A proper unit has subsequently been built. The block diagram is given in Figure 1. There are three RF amplifier stages. The first uses an AFT-45143 E-PHEMT from Agilent in an amplifier design published by Ole OZ2OE. It has a measured gain of 22dB and is claimed to have a noise figure of about 0.3dB, although I can not measure this. This feeds a two stage amplifier using MSA 0685 MMIC amplifiers in cascade with an overall gain of 36dB. The gain of the first stage is such that without any feeder loss between it and the second stage, the comparatively poor noise figure of the first MMIC does not degrade the overall noise figure. The total gain is thus 58dB. The first stage will oscillate if not fed from a 50 Ohm resistive source, so the use of any filter before the converter needs some care.

The signal is then fed into a 3dB coupler. One output feeds an image noise filter and the up-conversion mixer, while the other is brought out to a connector. The purpose of this is to permit a communications receiver to be connected so that a phone signal may be passed over the circuit to permit aerial alignment etc. prior to using the digital modulation. Aerial alignment is made easy using the receiver's S meter. A spectrum analyser can also be connected to enable the incoming signal and any attendant interference to be observed. I have to admit feeling a bit lost in that we have always been able to see something in the noise to peak up and this is not so with digital. There is nothing until the signal is strong enough and then it is P5.

The coupler output also permits a 70cm AM TV receiver to be connected. This enables the TX to be switched to AM and good old fashioned pictures to be sent over the path for comparison.

The image noise filter is a two chamber design reclaimed from a PMR set. Considering the potential image frequencies I am not certain that this filter is necessary, but it was included to be on the safe side.

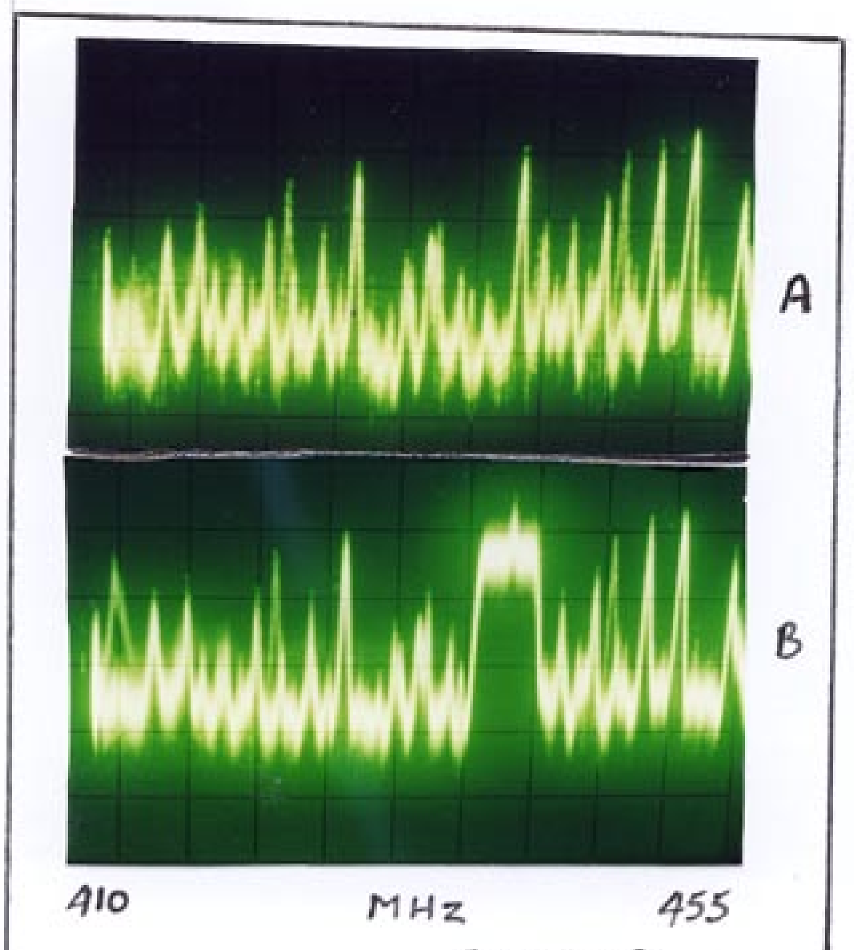


PHOTO 2

The up-conversion local oscillator is identical with that I used in my 23cm transmitter given in CQ-TV 208 with the crystal frequency chosen to give the same frequency (1260MHz) as used on 23cm so the STB does not require retuning when changing bands. The mixer is an SBLI-X. The final item is a simple output filter. It is appreciated that STBs are designed to accept a wide raft of signals from their LNB. It was however thought desirable to do some filtering to reduce unwanted mixing products.

I have tried to measure the ultimate sensitivity of this converter when used with my Technomate TM-5500D STB. I measured the digital signal from the exciter delivered to my test bench by using a thermal power meter preceded by an amplifier of known gain to bring the reading on to the lowest scale. This signal was then fed via a precision variable attenuator to the up-converter. It was found that sound decoding failed when the input signal was reduced to –102.5dBm. This must be very close to the noise floor of the system and sensitive enough to try over air tests.

Over air tests

First test

The first transmission test was carried out locally. The low power signal from the exciter was fed by a long length of coax to the top of my garden, radiated by a dipole and received on the main station antenna. The ERP was about –20dBm. The main antenna has a gain of 18dB with a quite narrow vertical radiation pattern. The dipole was well below its peak. The received signal was fed via the converter and STB to be displayed on a monitor. More interestingly the second output from the 3dB coupler was fed to a spectrum analyser. Photo 2A shows the band occupancy from 410 to 45 MHz with the digital switched off and Photo B with it on. Beaming south it will be seen that there were quite a lot of signals some considerably stronger than the digital and some actually within its passband. The photos could not show that some were being keyed on and off. One signal that appeared periodically just below the digital was probably an input to the PY repeater. Only very strong signals close to the digital caused any transient disturbance to the picture.

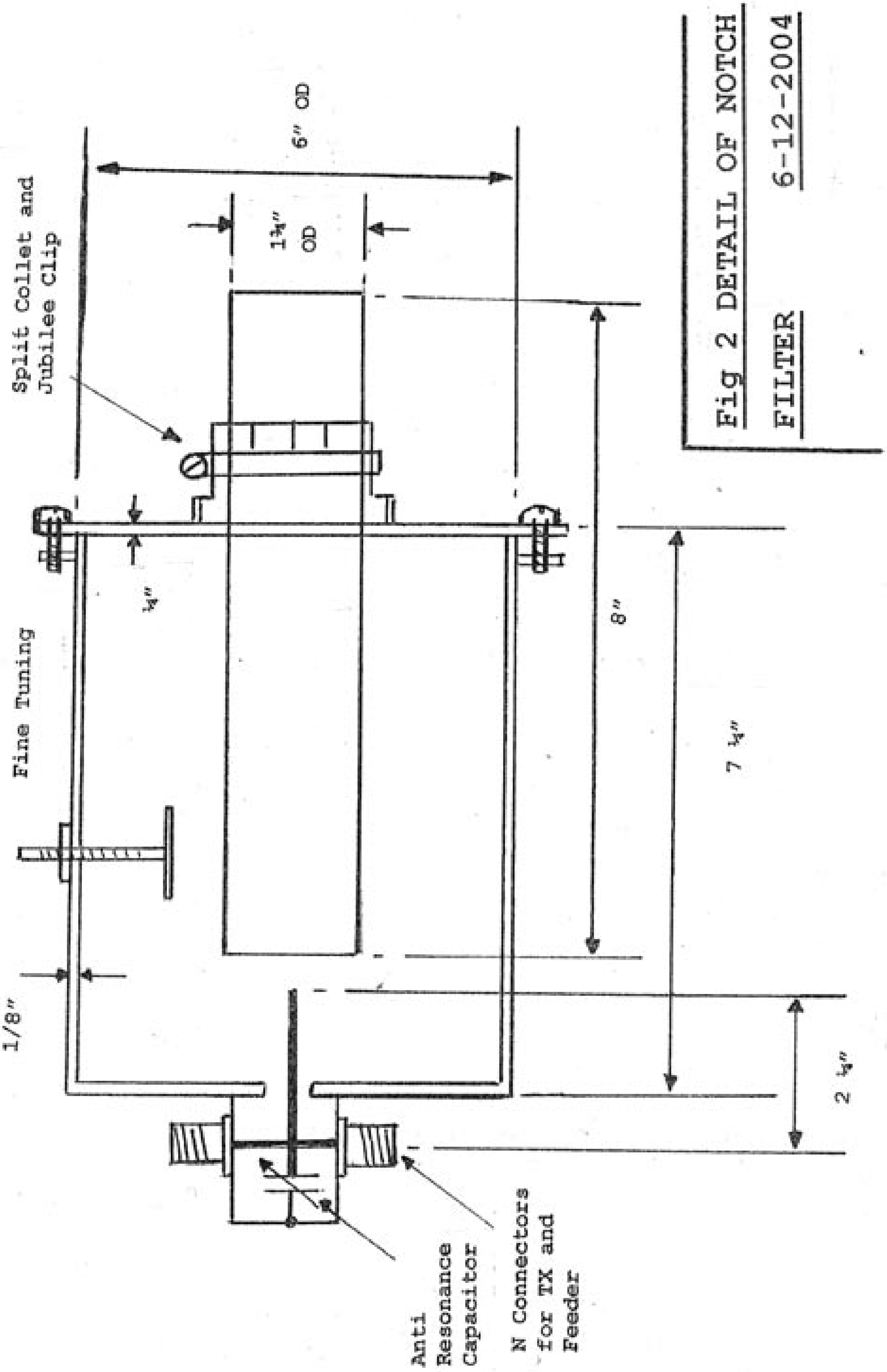


Fig 2 DETAIL OF NOTCH FILTER 6-12-2004

Second test.

To prove the transmitter PA stages a signal was sent over a short 1 1/2 mile path for which path prediction software gave a loss of 108dB. Calculating a link budget using TX power, aerial gains etc. suggested that the received signal should be 56dB above the receiver ultimate sensitivity of –102.5dBm obtained above. It was found possible to insert 46dB of attenuation in the receiving aerial feeder before sound decoding failed. The missing 10dB could be explained by the fact that the signal was passing right through a large house, which of course the software knew nothing about. All seemed OK to go to the next test.

Third test

This was to be over a 5 mile path to G1SAA. The software gave a path loss of 115dB and the link budget in this case suggested a margin of 45 dB above ultimate receiver sensitivity. Despite trying several FTA STB's no pictures could be obtained. Why? We tried two different commercial Yagi receiving aerials with a claimed gain of 10dBd. Both were working as proved by receiving the GB3BSL beacon on 432.9MHz at a distance of about 140 miles. Its strength was similar to what I was receiving at home.

We wondered if something large had been constructed in the path since the successful 23cm DATV tests mentioned in part 1. A visual check showed nothing and a repeat of the 23cm tests was OK. In desperation I transmitted AM TV with similar power. The result was a very poor P1, no wonder the digital would not work. What could be blocking 70 and not 23, when one might expect the reverse?

We conjectured that the commercial Yagis had been optimised for communications at the bottom of the band around 433MHz and that their gain was considerably reduced at 437. To investigate this, a double quad plus reflector, known to be a broadband design with a gain of 10dBd, was constructed and erected at G1SAA. The AM picture improved, but still no digital.

It was all really quite silly! Half a century ago we were transmitting 70cm ATV over a 35 mile path using 0.5W of RF, 12dBd gain aerials and receivers consisting of only a crystal mixer and a local oscillator feeding a band I TV set. Receiver RF stages were still a long way in the future.

One theory was that because my 23 and 70cm antennas are on different masts the signals depart on parallel paths some 60 ft apart. Perhaps one beam was obstructed while the other was not?

At this point problems of a domestic type intervened and for nearly 12 months it has not been possible to do any further work. Hopefully I will one day be able to solve the mystery and then go on to seek some more DX paths.

Tentative conclusions.

If not the ideal solution it has been shown that the AGAF boards, with their QPSK default settings, can be used to give good DATV results on 70cm. In the longer term GMSK will probably provide a better answer.

The arguments are:-

- In favour of QPSK. It is available now and the receiving up-converter is easy to build at home and not expensive. The GMSK receiver is still not generally available at the time of writing September 2005. If/when it becomes available it will probably not be easy to build and if bought commercially, a glance at its block diagram suggests, it will be quite expensive.

- In favour of GMSK. It requires less bandwidth and enables greater TX power without generating spectral spread. Both these factors should favour DX. The same STB will of course be required for either 70cm system and for QPSK on other bands.

Appendix 1

A TVI Problem.

In the 70cm AM TV days my transmissions interfered with my neighbour's TV. In fact my picture could be seen running through the broadcast programme. This was cured by fitting a notch filter in his feeder. Now in the DATV era we have another problem. We suffer from a rather weak signal at the top of the band on channel 67. The aerial contractors have addressed this with high gain aerials and mast head preamplifiers. Unfortunately it is not easy to put a filter ahead of the preamplifier and as inter-modulation takes place in the first stage there is no point in fitting after it. In the short term I am keeping my 70cm DATV transmissions short and avoiding peak viewing hours. I do not yet know the long term solution.

Appendix 2

Details of Notch Filter.

The details of the transmitter output notch filter are given in Figure 2. It is constructed from a piece of 6" OD brass tube with one end plate soldered into place while the other is retained by a series of screws. The inner line is a piece of 1 ¼" OD tube 8" long. Rough tuning is achieved by sliding this in and out through a split collet and once adjustment is made it is held firm by a jubilee clip. Fine tuning is by means of a disc capacitor on a threaded shaft. Coupling to the transmitter output feeder is by means of a probe that penetrates the resonator from the closed end. The depth and width of the notch are interrelated. The deeper the notch the wider it becomes. With a probe 2 ¼" long a notch over 20dB deep is obtained without the width being too wide so as to erode the lower edge of the DATV spectrum. Some slight rounding off of the spectrum has not been found to cause any problem. A small variable ceramic air spaced anti-resonance capacitor is connected between the junction of the probe and feeder to earth. This may be adjusted to optimise the match and minimise the reflected power seen by the transmitter. It also has a slight affect on notch shape. My filter is silver plated. It is probable that a suitable resonator with a square section could be made using copper clad board soldered together. The dimensions of the square box and round inner line should be such as to give a line of approx 72 Ohms impedance. This would not need silver plating. We did not have copper clad board in the 1960s and silver plating cost less then.

Appendix 3

FTA STB Bandwidth?

If one is trying to calculate a link budget for a system including a FTA sat receiver one needs to know, among other things, the receiver noise floor. To arrive at this one needs to know its bandwidth. A typical RX is specified as being able to handle symbol rates from 2 to 45Msps. To be able to deal with the upper limit implies a bandwidth of about 43MHz. But what is the situation when receiving a typical DATV signal requiring only a bandwidth of 4.5MHz? Is the wanted signal sitting in a much wider noise spectrum, or does the RX have some clever way of adjusting its bandwidth to suit the received signal? I have asked several people who might know, including my STB's manufacturer, but no one is either able to willing to provide an answer. It can easily be shown that if the bandwidth is not reduced the TX power or antenna gain needs to be increased considerably to give a similar signal to noise ratio. If anyone reading this knows the answer I would be very glad to hear from them.

ian.waters@freenet.co.uk

From the proof-reader!

By Peter Delaney

As readers may noticed, most (although not all the last minute!) articles are proof-read before appearing in CQ-TV. Your proof reader has sometimes to 'guess' what the writer intended, and the following 'comments' may help contributors in preparing their articles so that what appears in print is what they 'intended' to say.

There are several words which often appear incorrectly spelt. This maybe due to the 'spell-checker' on a computer working in American, not English, so words like programme, colour and licence appear in their American versions (no disrespects to our American members, but we are the British Amateur Television Club!). One 'notable' (and fairly frequent) 'English' error that arises in CQTV articles concerns the 'optical bit' on the front of a camera. If there is one of these, it is a lens, whilst if there is more than one they are lenses. A simple rule -- "one lens, one 'e', more than one lens, more than one 'e'".

Next come the abbreviations for units of measurement. The general rule is that if the unit is named after a 'person' (such as Volta, Ampere, Faraday, Hertz), then the unit abbreviation has a capital letter (V, A, F or Hz), but if it is not named after a person, then the unit has a lower case letter (such as m for metre, s for second g for gramme). An exception to this rule is b for 'bit' and B for 'byte'. The 'multiplier' that appears in front of this is a lower case letter for all of these that are up to and including 1000 times (ie kilo is k,), but is a capital letter for all the multipliers larger than this (ie mega is M). It gives the proof reader a smile to sometimes see a 'state of the art' computer described as having 'so many' mB of memory, or a pre-amp that consumes 10 MA of current !! .

A number of writers tend to put capital letters at the start of a word when it is not needed - apart from the first word of a sentence, only words that are a 'name' (person, trade name, etc) need a capital letter.

There are sometimes sentences that are 'rather too long', and as a result the meaning becomes less clear (the word 'it', for example, later in the sentence 'could' refer to several things mentioned earlier within the sentence). Try to keep each sentence to a single 'thought' or 'idea'. A 'suggestion' here is to read your text, as if 'out aloud', and if you find a need to 'pause' slightly to help the 'meaning' be clear, then probably a comma or semi-colon is needed, or the text needs to be broken into shorter sentences.

The aim in editing the text submitted by members is to keep as close as possible to the original text, but where needed make it more easily understood by the reader. In some cases, not even a comma is added ! We try to keep to a 'house-style', so that, for example, some amateur radio 'short-hand' is put in full (some of our overseas members may find the shortened form less easy to follow -- I once heard of an overseas tv engineer who had difficulty with 'sync' pulses, as they sounded to be something to do with 'washing facilities' !). And we would rather have your text and 'correct' it than not have it at all -- but hopefully these notes may help you to ensure that what is printed is what you meant to say.

Review of IBC 2005

By Mike Cox

IBC2005 was a full and busy show. All the 11 halls of the RAI in Amsterdam were in use, and such was the pressure on space that for the first time, the traditional IBC Party had to move off-site to the Hotel Okura. Visitor numbers were up by 5% to 42,800, and exhibitors are doing their best to book even bigger stands for next year. Meanwhile, there were six days of Conference activity together with a well-supported parallel stream devoted to Digital Cinema.

As predicted last year [CQ-TV 209], HD is everywhere, Sky have announced the launch of Sky HD for February 2006. There is silence at present on the standard to be used. In the EBU village, there was an interesting demonstration running throughout the show. We were shown two plasma displays, one running 1080i, and the other 720p.

From the same source material, presumably shot at 1080i, we saw the effect of various compression systems and bit rates. From about 5 picture heights, I could see no difference between the screens for bit rates above 10 Mb/s. It looks as if the market will decide the de-facto standard. Serious size LCD TVs seem to have settled on 1366 x 768 pixels as their native resolution.

The announcement during IBC of the launch of FreeSat early next year could speed the spread of HD. This would give a means of distributing HD to the UK that would be difficult to achieve using the present terrestrial network.

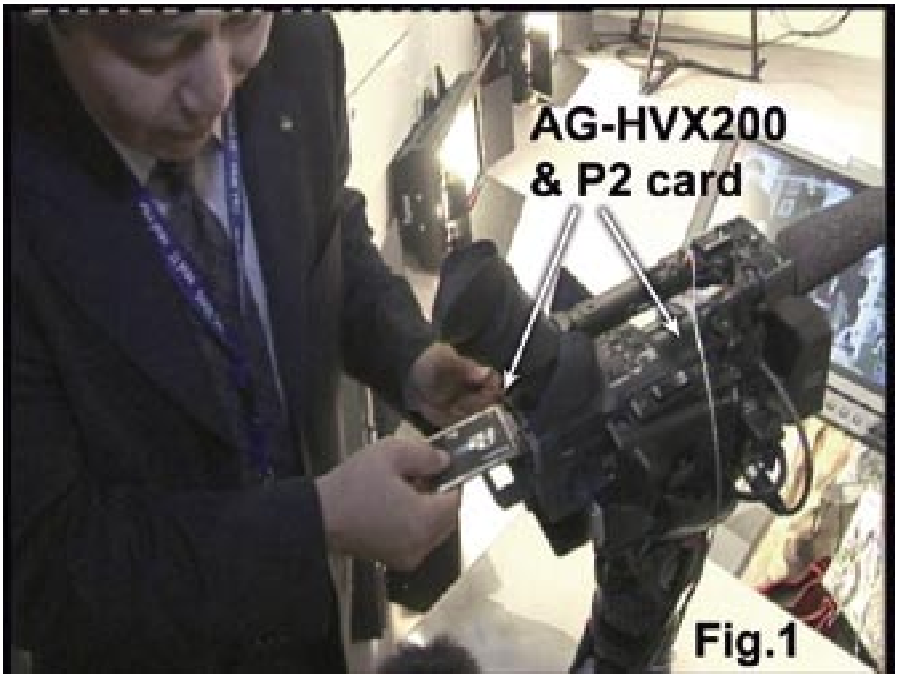


Fig.1

New this year was a Mobile Zone. Around 30 stands were showing progress in the DVB-H system [a subset of DVB-T] and DMB [a subset of DAB] as means of distributing pictorial content to mobile displays such as phones or PDAs.

Acquisition

Sony were showing a hand held HDV [HDR-HC1] camcorder as well as their established HVR-Z1. See Mark Bloor's article in CQ-TV2 11 for details of the HDV format.

They also launched XD CAM HD, recording on to a Blu-Ray DVD.

All the camera manufacturers have HD cameras in their ranges; JVC have a particularly attractive HDV camera GY-HD100E. This camera can use cine lenses for those who prefer fixed lenses. Unfortunately, it still has not got an LANC type remote control facility.

These entry-level HD cameras all use the HDV recording format which either records 720p/50 or 60Hz direct, or records 1080i. The horizontal resolution is quoted as 1440 pixels rather than the full 1920,but the results look good. The HDV format uses Mini DV tapes, and all the cameras can produce SD recordings as well.

Panasonic have not gone down the HDV route. They have introduced the hand held AG-HVX200, which records on the now well-established P2 solid state memory cards. [Fig 1]

This uses the DVCPro HD standard in a variety of formats, as well as the variable frame rate of its older and larger brother, AJ-HD27F, and the cine-type gamma curve.

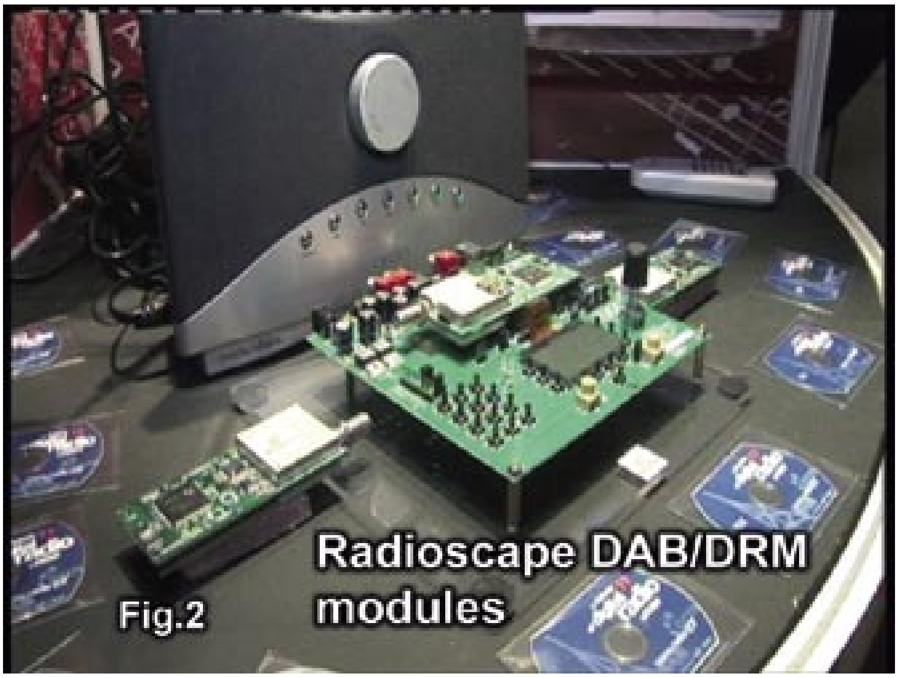
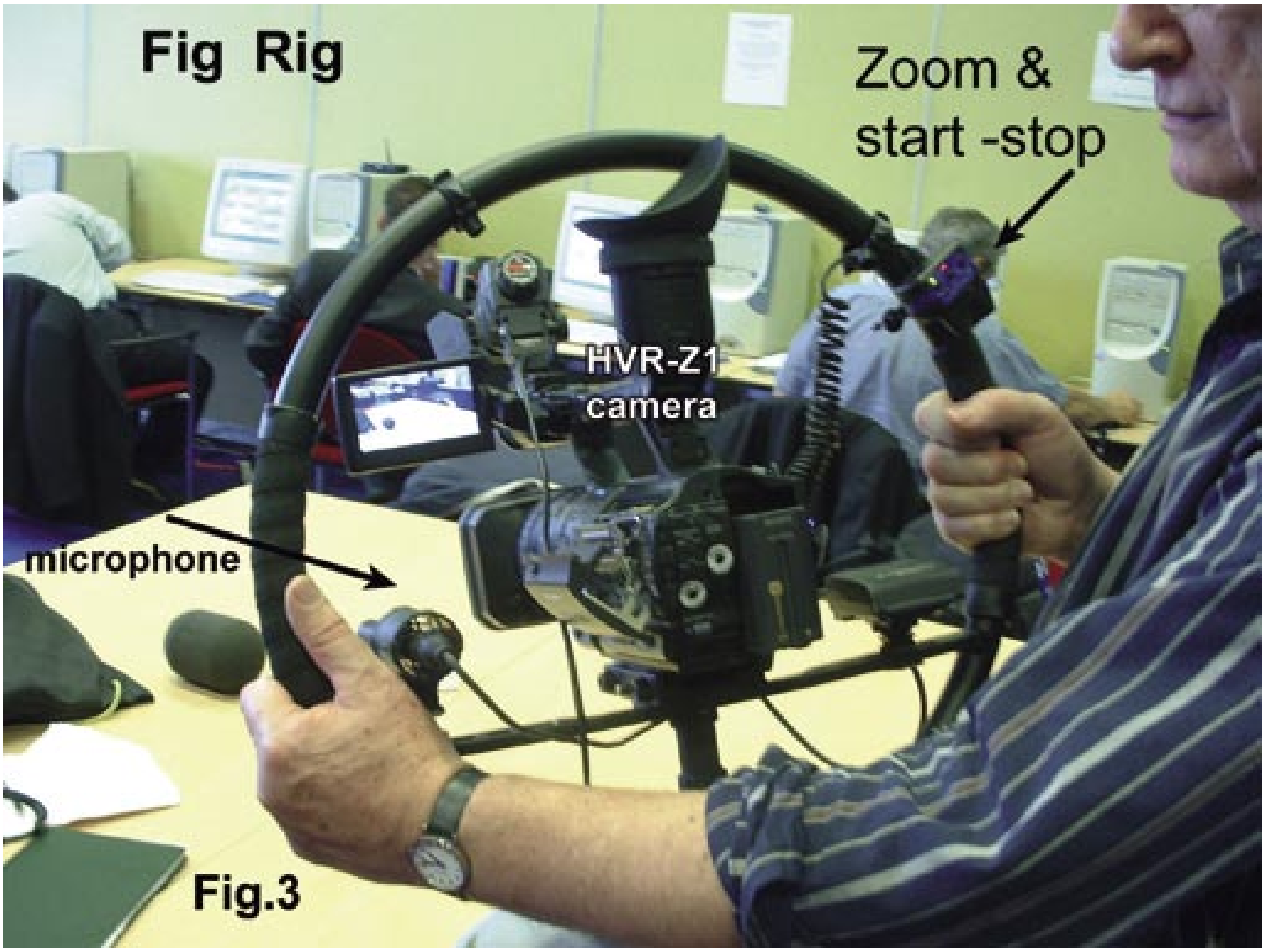


Fig.2

Radio

DAB is now a sufficiently established technology that receivers can be bought



for £49.99. Two years ago [CQ-TV 205] I mentioned DRM [Digital Radio Mondiale]. This too is now becoming established, and by Christmas, DAB/ DRM receivers should become available at a price [around 250 Euros, we were told]. [Fig 2]

This is the lower frequency complement to DAB, using the LW, MW and SW bands. Is any one experimenting with a DRM type signal on the SW amateur bands?

Other Useful Bits

Anyone who has used a camcorder hand-held will know how difficult it is to hold it steady for a long period.

There is a variety of kit around such as SteadicamTM, GlideCamTM, and various shoulder mounts at a variety of prices, but Manfrotto have come up with the elegant Fig Rig. [Fig 3]

This resembles a bus or lorry steering wheel, with a bar about 1/3 up which carries the camera mount. You hold it with both hands and use your body as the tripod. I borrowed one to shoot some material for the Info Channel, and it works!

It did show up a snag with JVC cameras such as my own GR-PD1, and mentioned above in connection with the GY-HD100. Absence of the LANC remote control port means that you have to take one hand off the steering wheel to start recording, or change lens angle. Sony or Canon cameras can have their remote zoom and stop-start controls on the wheel rim.

Fig Rig was designed by Mike Figgis, the film director, who has used it on 6 feature films so far, among them The Battle of Orgreave which some may have seen on TV. It is reasonably

Fig.5

priced, or you could go down the local breakers yard and make your own as long as you have the welding kit.

LED lights were again in evidence, with at least 4 makers of camera lights, both conventional and around the lens ring lights. [Fig 4]

Many makers were showing soft lights based on fluorescent strips, doubtless in the interest of power saving.

While on the subject of LEDs, Mitsubishi were showing a very small projector using LEDs in place of halogen lamps. [Fig. 5]

Electronic Visuals were showing an interesting 7 inch 16:9 display. It was battery powered, and had a 40GB hard drive included. [Fig 6]

Picture quality was remarkably good, and it could receive composite, MPEG or JPEG data in. Via its USB port it looks like a hard drive to a computer. It was not much more expensive than devices such as Archos or the higher I-Pods, but with a sensible size display.

IBC Info Channel

Apart from a problem with one of the character generator that would not time up with its brothers, all went well. The SDI mixer was powered 24 hours a day for 7 days, as was the SDI Router. [Fig 7]

The extra PGM bus [see CQ-TV 211] made operation much easier, particularly when going to the commercial break every hour or so. Occasional use of full screen video helped liven the presentation somewhat. The borrowed Sony monitors have left me with a deep hatred of menu driven displays. It cannot be too difficult to have a button to directly select RGB rather than YpbPr for a given set of inputs, can it?

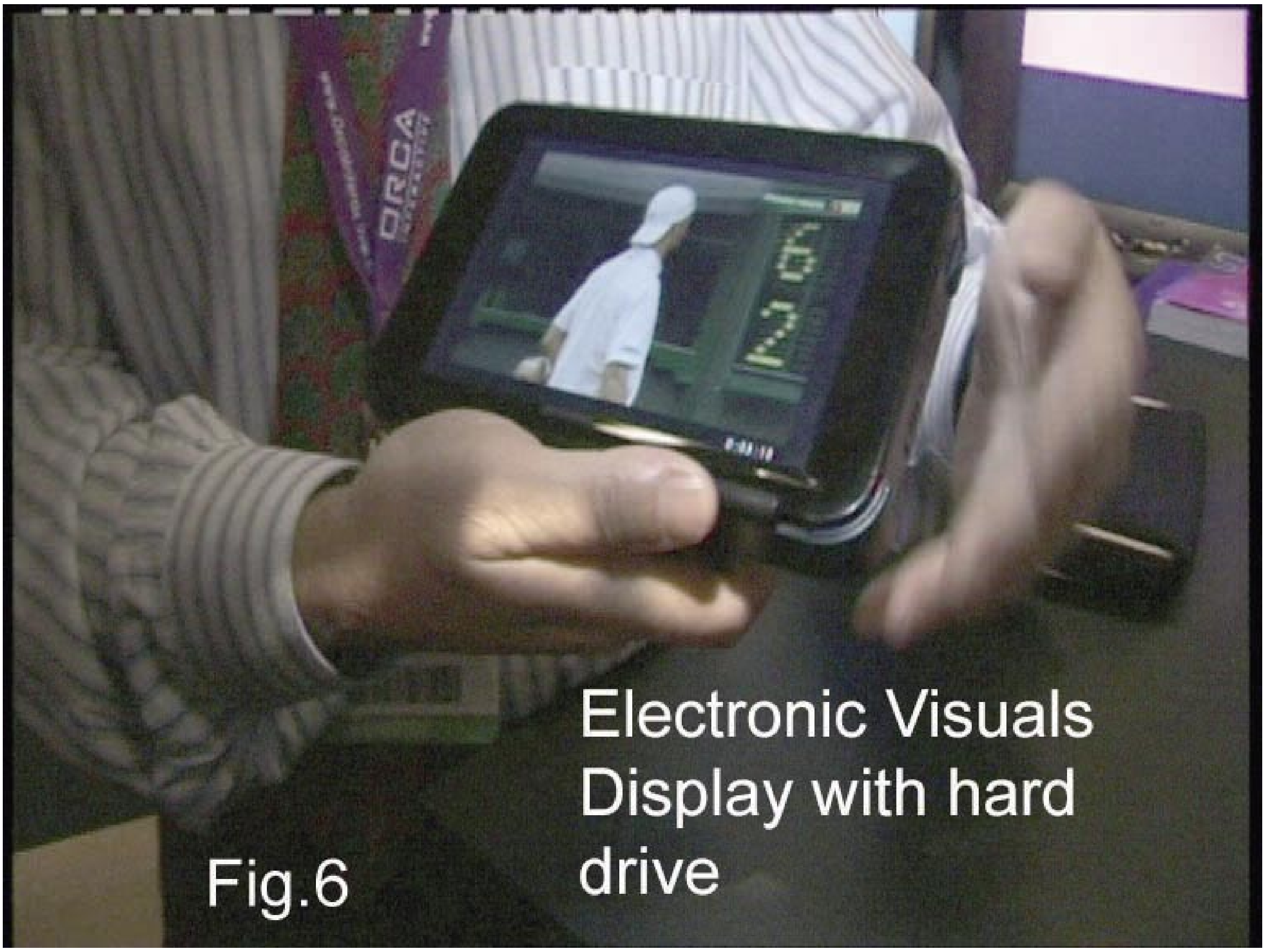


Fig.6

We are already thinking of next year' channel, which may operate in a completely different way to give a similar result.

Acknowledgment to Jonathan Marks and David Allen for Figs.1, 2, 4, 5, 6, taken from their "What Caught My Eye" presentations in the IBC Conference.

Treasurers Report 2004

By Brian Summers, Hon Treasurer

Last year I wrote that I expected to have to put the subs up to £18; things haven't quite come to that yet, but we do need to watch the pennies.

In 2004, Barclaycard insisted that we move our credit card processing into the electronic era and abandon the old paper processing system. This has many advantages and the commission is slightly less. This is a good thing but it has brought to the fore the actual cost of processing a credit card transaction.

Now don't get me wrong here, we want you to renew and if you want to use your card that's good. It's even better if you send a cheque as it's is free to process, unlike the credit card transaction, which, for a 2 year renewal, Barclaycard charge £1.12! So of the £29.50 we only see £28.38. You can see that there are big savings to be made here.

Please note that if you live outside the UK we are very happy for you to use your card, as for overseas it is the cheapest and best option.

Apart from the above, it has been a quiet year; we sold 3 of the DATV modules which made all the difference to the financial results for the year.

Rather like Gordon Brown, I can only recommend "prudent fiscal measures" and that we try to live within our means. We have another money saving scheme in hand and with a bit of luck we can avoid a subscription increase for a bit!

If any member wants more information please contact me, details in committee list.

Members Services

All prices in UK pounds (£)	Each	P&P	Qty	Total
Camera Tubes, Scan Coils, Bases & Lens Mounts				
3 .... One inch Vidicon base	£1.20	£0.30	....	....
4 .... 2/3 inch Vidicon base	£0.80	£0.30	....	....
Video and I^2C Circuit Boards/Components				
7 ...... Sync pulse generator PCB	£14.00	£0.43	....	....
40 ...... I^2C CPU PCB	£10.00	£0.43	....	....
41 ...... I^2C VDU PCB	£10.00	£0.43	....	....
43 ...... SAA5231 Genlock IC	£8.80	£0.30	....	....
44 ...... SAA5243PE Teletext IC	£14.70	£0.30	....	....
45 ...... PCF8583 Clock IC.	£7.00	£0.30	....	....
39 ...... LM1881N Sync separator IC	£3.50	£0.30	....	....
81 ...... I^2C 27256 EPROM.	£9.70	£0.30	....	....
38 ...... PCF8574P Input expander IC	£4.70	£0.30	....	....
10 ...... I^2C Relay PCB.	£6.50	£0.43	....	....
9 ...... PCF8574A Input expander IC.	£4.70	£0.43	....	....
RX, TX and SSTV PCB's and General Components				
47 ...... 70cm up converter PCB	£13.50	£0.43	....	....
50 ...... 108.875 MHz crystal	£8.20	£0.30	....	....
68 ...... 4.433618MHz crystal	£3.25	£0.30	....	....
69 ...... 5.0MHz crystal	£3.25	£0.30	....	....
86 ...... 24cm solid-state amplifier PCB	£10.50	£0.43	....	....
Stationery & Station Accessories				
73 ...... BATC blue diamond clutch pin badge	£1.75	£0.30	....	....
74 ...... BATC cloth badge	£4.00	£0.30	....	....
75 ...... BATC equipment label (6)	£0.25	£0.30	....	....
76 ...... BATC square windscreen sticker	£0.10	£0.30	....	....
78 ...... BATC test card	£0.50	£0.43	....	....
79 ...... BATC reporting chart	£0.10	£0.43	....	....

Total Goods and Postage - Amount Enclosed £...............

BATC Publications

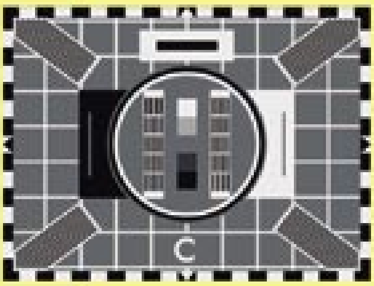
Publication	Each	Qty	Total
An Introduction To Amateur Television (225gm) The latest handbook full of detailed information on how to set up your ATV station, plus lots of new video and RF construction projects.	£5.00	....	....
The Amateur TV Compendium (155gm) The BATC handbook featuring construction articles on video units, 24cm and 3cm ATV, a Digital Frame Store, and much more.	£3.50	....	....
The Best of CQ-TV (150gm) A compilation of the best construction articles from CQ-TV's 133 to 146	£3.50	....	....
CQ-TV Back Issues: The following issues are still available. Please circle those required: 142, 143, 144, 147, 150, 153, 154, 156, 158 159, 162, 163, 164, 166, 167, 168, 169, 170, 171, 173, 174, 175,176, 177,178, 179, 180, 181. 182, 183, 184, 185, 186, 187, 188,189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208	£1.50	....	....
Special Offer: Any four of the above issues	£5.00	....	....
209, 210, 211, 212	£3.75	....	....
The BATC DVD	£5.00	....	....

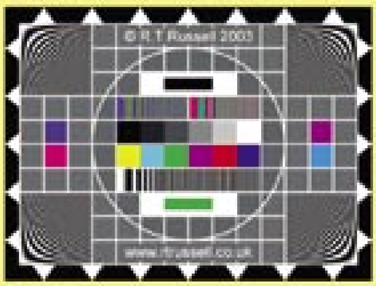
PLEASE MAKE CHEQUES PAYABLE TO 'BATC'.

Test Card Generators through the ages…

1981
(published in
BATC Handbook)

1992
(monochrome)





2003
(colour; user
programmable)

Richard Russell, G4BAU, proudly presents the latest in a series of electronic Test Card Generators spanning more than 22 years. This new model is user-programmable and has the following features:

- Digital storage, using 12 MHz sampling and 8-bits linear coding.
- 'Mathematical' PAL coding, ensuring compatibility with all 625-line PAL equipment.
- Stores any still frame (8-field PAL sequence) and four *fastext* teletext pages.
- Image and teletext are user-programmable using Windows™ software supplied.
- Supplied pre-programmed with colour test card and informative text pages.
- Integral vertical-interval test signal (pulse and bar) and line 23 signalling.
- Baseband video output on 75Ω BNC connector; BNC-phono adaptor supplied.
- Approximate size, excluding connectors, 130 x 65 x 25 mm. Weight 140 g.
- Supplied with a 230 Volt 'plug top' AC mains adaptor.
- Alternatively may be powered from 9 Volts DC at approximately 150 mA.
- Supports 405-line, 441-line and 819-line operation via future software upgrades.

The generator costs £100.00 + £5.00 postage & packing, excluding VAT (£123.37 inclusive). The units are made to order; enquire for current availability and allow two weeks for delivery. Visit our website for more details http://www.rtrussell.co.uk/ or email info@rtrussell.co.uk

R. T. Russell
19 Welling Road
Orsett
Essex, RM16 3DF

Using a domestic VCR to record NBTV video

By Steve Anderson.

Introduction

The trigger for this item was Doug Pitts' "That Missing Pulse" in the NBTVA newsletter Vol. 29 No. 1 in which he gives an insight as to why the 'missing pulse' system came into being for NBTV frame synchronization as opposed to the 'broad pulse' system used virtually everywhere else. The nub of it being the low frequency performance of the transmission or recording media. As Doug mentioned, it's not usually a problem in closed-circuit or even RF based communication, however recording the signal still remains a headache to this day.

Although the maximum frequencies are only in the order of 10-12kHz; it's the low frequencies that pose a problem. Consider a worst-case signal; say 16 lines of white followed by 16 lines of black. Ignoring the NBTV sync pulses for a moment, that's a square wave of 12.5Hz. If we take into consideration the NBTV sync pulses we also have a 400Hz square wave with a mark-to-space ratio of about 16:1.

A rough rule of thumb for passing a square wave through an AC coupled system is that the signal path should have a frequency response down to approximately one hundredth of the square wave signal to preserve the low frequency waveshape, although not the DC value, in this case either 4Hz or 0.125Hz! Few audio recording systems go below 10Hz with any fidelity. Ideally we need a recording system that goes down to DC.

Initial thoughts

One of the conventional ways of dealing with this is DC restoration; sadly this is not reliable (Photo1). This is the aforementioned 16 white lines followed by 16 black lines (top trace, this time showing the 'missing' frame sync) passed through a single CR high pass filter which is -3db at 16Hz (centre trace). The restorer just cannot cope (bottom trace) and it gets worse the more stages the signal passes through, i.e. record and playback. It's doing its job by not letting the signal go negative as can be seen in the last few lines of white, but not quite what we require. Reliable sync detection is virtually impossible and line tilt becomes excessive.

A FM sub-carrier system would seem ideal (akin to SSTV), however the sub-carrier would need to be at least 20-30kHz and the sidebands could extend well beyond 40kHz. This rules out all conventional audio-recording formats.

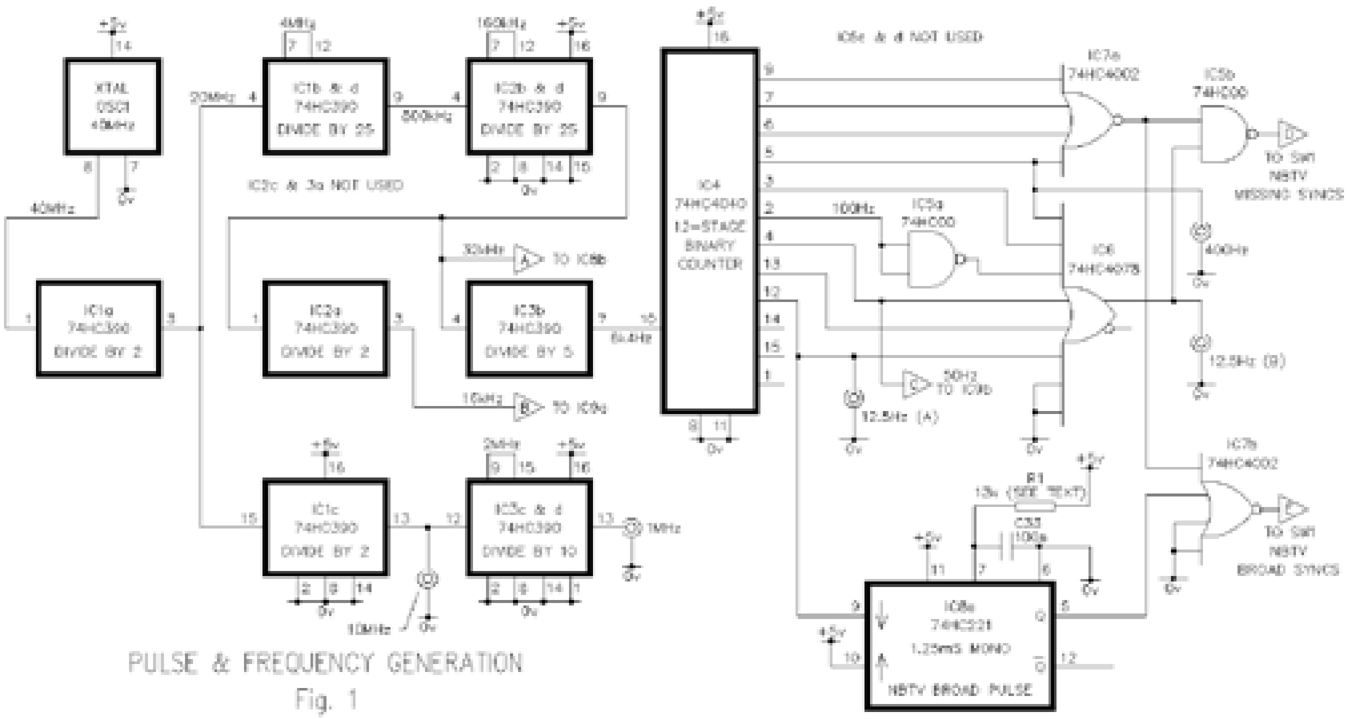
The domestic VCR has a luminance bandwidth up to some 2MHz and would seem ideal for a FM sub-carrier system. But the VCR needs as a minimum 50Hz field pulses to lay down the control track and most require the standard 15.625kHz line pulses and blanking for setting the gain of the AGC circuit and clamping. The head-switching and clamping circuits in the VCR could also corrupt the subcarrier (it was tried, and they did).

One solution of probably several…

This system retains the FSTV sync and blanking and converts the NBTV video waveform into a Pulse Width Modulated (PWM) signal. This is then inserted into the active FSTV line period, the NBTV signal being sampled at twice FSTV line rate yielding a theoretical bandwidth from DC to 15 or so kilohertz.

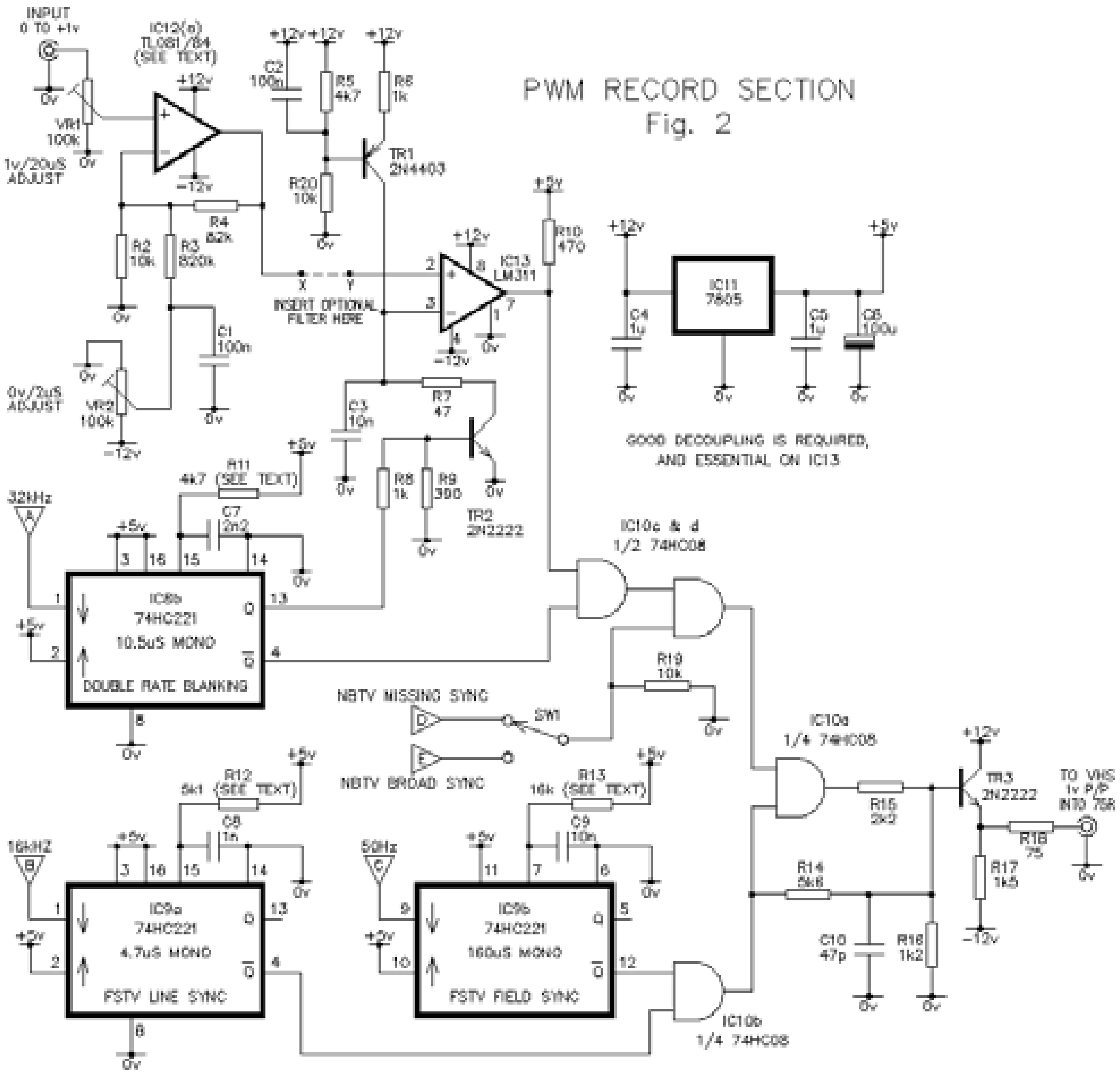
NBTV sync information is handled by simply gating the PWM signal on or off. If there's no PWM signal then this is NBTV sync, if there is, then this is video, even if it's black. This allows handling of the 'missing sync' system.

However, during the FSTV field pulse there can be no pulses present, and if the NBTV signal is synchronized to this system as it needs to be, the NBTV (missing) frame pulse would normally occur at the time of 1 in 4 FSTV field pulses. So a delayed 12.5Hz output is generated that places the 'missing sync'



PULSE & FREQUENCY GENERATION

Fig. 1



PWM RECORD SECTION
Fig. 2

pulse within the active FSTV picture area, the FSTV field pulse always being a NBTV line sync, where no pulses are required.

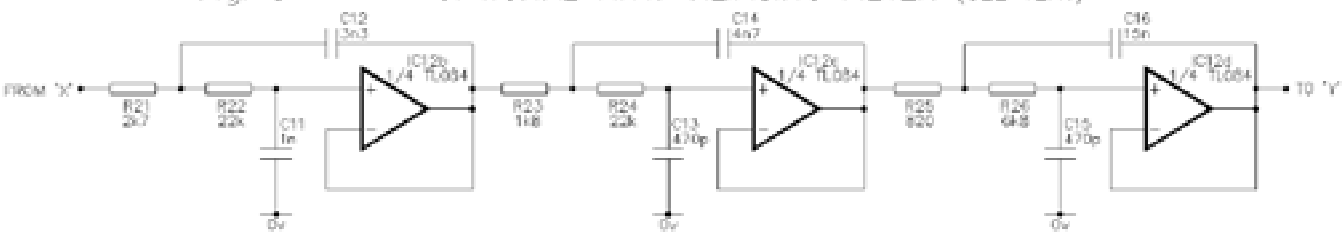
The inference is that the source follows the pulses generated by the circuits described here. With a mechanical source, it should listen to us, and follow our instructions (timing), we don't follow it. Those that have used Phase Locked Loops (PLLs) with mechanical cameras or monitors will be familiar with this.

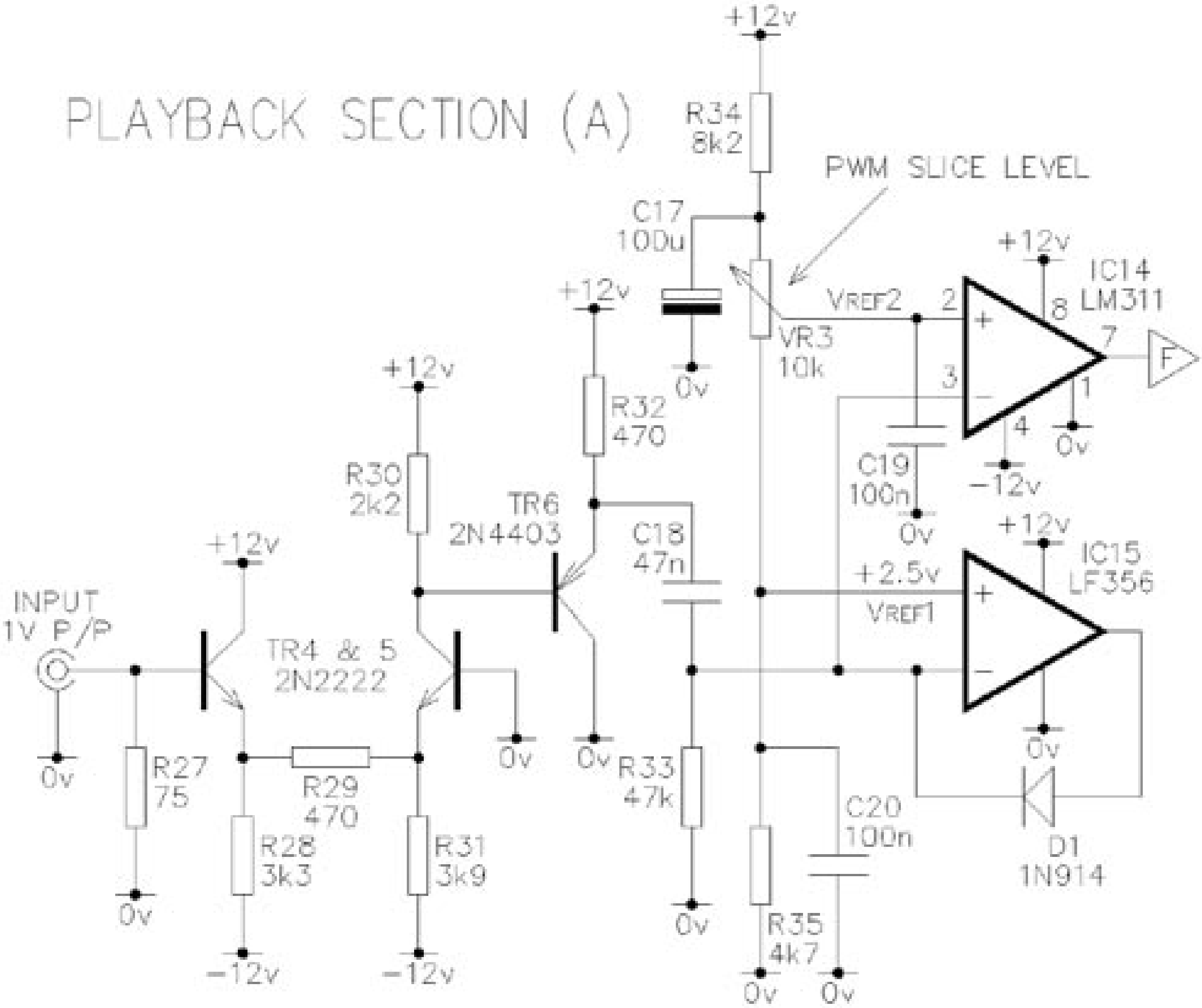
The audio tracks within the VCR, both longitudinal and Hi-Fi, are still available for recording sound.

Record section

The record section is based on a crystal oscillator module and a bunch of dividers to generate the necessary frequencies all locked together (Fig. 1). Many oscillator frequencies could be used, as this system only needs frequencies from 32kHz downwards, but a crystal-based primary source is recommended. 400Hz, 12.5Hz and the delayed 12.5Hz

Fig. 3 OPTIONAL ANTI-ALIASING FILTER (SEE TEXT)





(when required) are outputted for NBTV source synchronization. The 1 & 10MHz outputs are for future use and are optional.

The FSTV line rate is altered slightly in frequency from the usual 15.625kHz to 16kHz to keep the number of samples per NBTV line to an integer, in this case 80. At the usual line rate there would be 78.125 samples per line which could result in erratic NBTV sync handling and corruption of the first and/or last PWM pulse in a NBTV line.

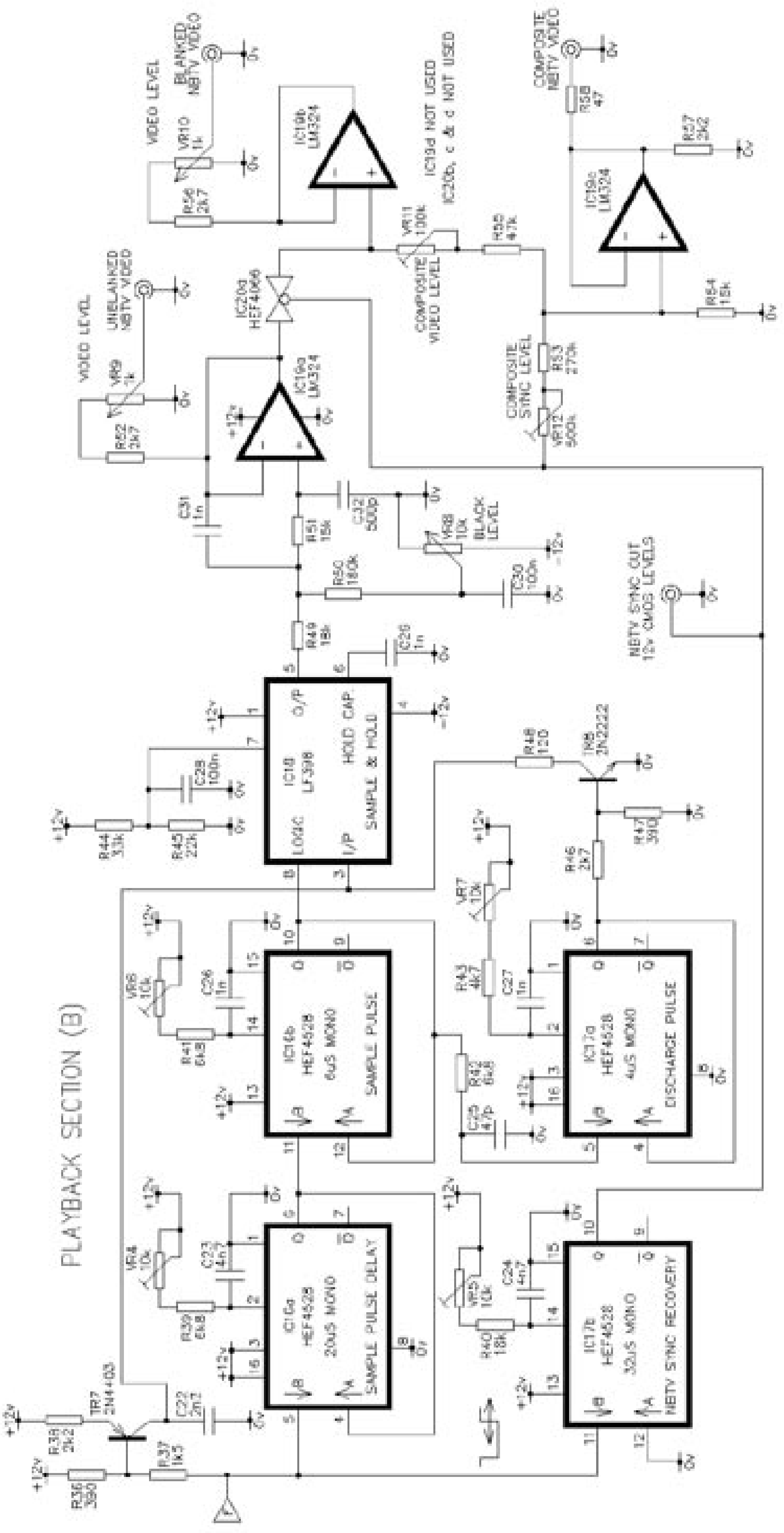
Most VCRs won't care about this as long as the field rate stays at 50Hz, this system has been tried on three basic domestic VCRs and all worked fine. High-end machines with Timebase Correctors (TBCs) might have a problem with this and the fact that the FSTV frame is now non-interlaced. In addition the FSTV field sync is just a simple pulse without the usual FSTV broad and equalizing pulses.

The delayed 12.5Hz (B) output with respect to the FSTV field pulse is generated by IC6, the delay is 5mS, placing the NBTV frame (missing) sync pulse 25% of the way through 1 in 4 FSTV fields. Synchronizing the camera or other source using the 'missing sync' system to the delayed 12.5Hz (B) should ensure that it is handled correctly. The video source doesn't have to go to black during the missing pulse, but conventionally it does. This system will output the missing sync pulse train whatever the value of the video, it's only of concern if a composite NBTV signal is required on playback.

If using the 'broad pulse' system where there would simply be a longer interval without PWM pulses, the delayed 12.5Hz (B) would not be required. In fact the 12.5Hz (A) output could be omitted, the 'broad pulse' can occur anywhere within the FSTV field as long as NTBV picture information isn't coinceident with a FSTV field pulse, phase locking the source to the 400Hz output would satisfy this requirement.

It might be tempting to use some of the other logic derived signals but caution is required as some have very narrow 'glitches' within the pulse train. This is of no concern in this system as the glitches occur at a time when the PWM signal isn't present, but might cause external logic to behave erratically. This is due to the propagation delays in the binary counter and the following gates. The 12.5Hz (A) output and the 400Hz output are glitch-free and the negative-going edges should be used for timing reference. The 12.5Hz (B) signal does have some glitches within it, but a simple low-pass filter followed by a Schmitt trigger will remove them. Changing IC5 to a 74HC132 and using the spare sections is suggested. IC10d is used to gate off the PWM signal during the NBTV sync period, the type of NBTV sync being selected by SW1.

The 0 to 1V NBTV video (only) waveform is converted into a 32kHz PWM signal that varies in duration between 2 and 20µS long, inserting two pulses into a single active FSTV line. IC12(a) (Fig. 2) amplifies the



input signal to 0.6 to 6.3V, the offset provided by VR2 & R3 ensures that there is a minimum pulse width of 2µS with a 0V input, VR1 sets the pulse length to 20µS with a 1V DC input.

As this a sampling system an anti-aliasing filter might be needed if the signal source has fast edges from logic-generated pulses, or other high frequencies within it. A Bessel or linear-phase filter as part of the record stage is suggested, replacing IC12 in Fig. 2 with one quarter of a TL084 or similar, the other three sections used for the filter proper. Fig. 3 shows one implementation of a 6-pole linear-phase version. The –3db point is about 11.5kHz, the resistors should be 1% and the capacitors 5% or better, the delay through this filter is about 40µS.

As configured, only positive input signals are handled, so the input needs to come from a DC-coupled camera or other source without sync pulses, as they are derived from this system and handled separately. However a small amount of negative and excess positive values are allowed for internally to encompass any minor ringing from within the optional filter.

IC8b is triggered at 32 kHz which in association with current source TR1, C3 and discharge transistor TR2, generates a linear ramp from 0V to 6.6V twice during the active video part of a FSTV line. The following comparator, (IC13), compares the signal voltage from IC12(a) with the ramp and produces a proportional width positive pulse that is gated by IC10c ensuring correct blanking, IC10d suppresses the PWM pulses during NBTV sync to generate the final PWM signal. When mixed in with the FSTV composite syncs by R14, R15 and R16, a composite FSTV signal is produced that is buffered by TR3 to the input of the VCR at 1V peak-to-peak.

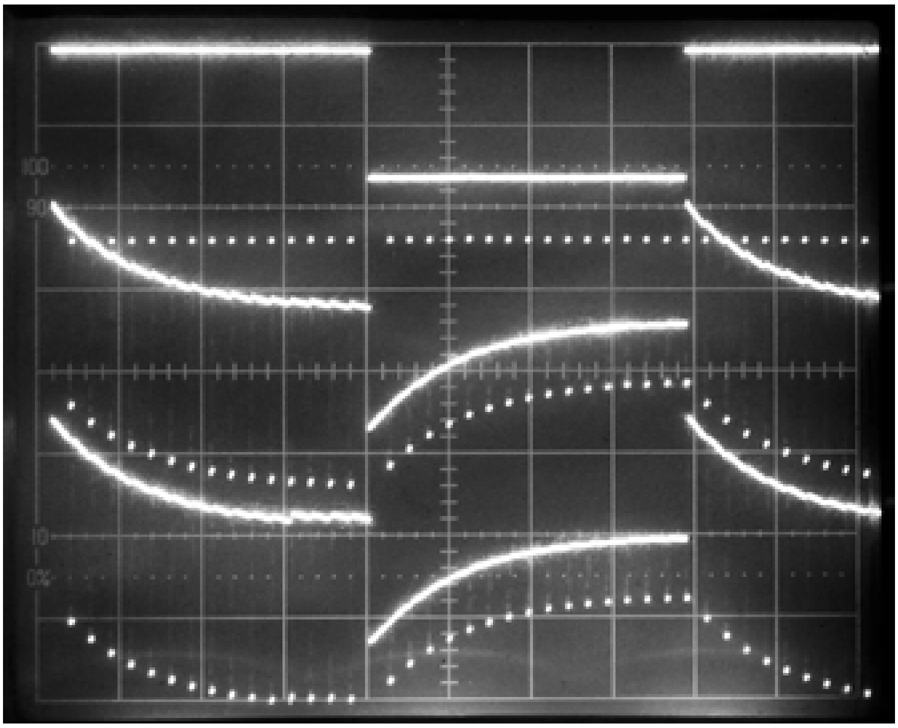


Photo 1

Playback section

The playback section starts with a 75Ω termination (Fig.4a) followed by a simple amplifier with a gain of about 4. This feeds an active clamp IC15 bolting the FSTV sync tips to VREF1, about +2.5V. IC15 is deliberately powered from only +12V and 0V minimizing the delay in the clamping action due to the slew-rate limitations of the LF356. IC14 is the PWM pulse separator using VREF2 and the clamped video waveform to reproduce a clean 12V PWM signal. It was noted that individual VCRs handled the edges of the PWM signal differently so VREF2 was made adjustable to suit the particular model being used, aiming for the cleanest recovered PWM signal.

The PWM signal varies from 2µS to 20µS at this point (when present) and the leading edge triggers IC16a, (fig 4b), a monostable set to run for 20µS. At the same time the PWM signal turns on then off a constant current source, TR7, which charges C22 to a voltage proportional to the pulse duration. At the end of the 20µS sample delay monostable (IC16a), a further one is triggered (IC16b) providing the sample pulse for the sample and hold amplifier IC18.

The ramp capacitor (C22) is then discharged by TR8 driven by yet another monostable, IC17a. The RC network at the input of IC17a is to introduce a short delay of about 500nS between the end of the sample period and the start of C22s' discharge, needed 'Aperture Time' as National call it.

The output of IC18 feeds IC19a configured as a 15 kHz low-pass filter to remove any remaining glitches from the sample-and-hold process, the residual DC offset is cancelled by VR8 and R50 to set the black level at 0V.

IC17b is a monostable set to run slightly longer than the PWM signal spacing, it is retriggered by the PWM signal and whilst the PWM signal is present the Q output remains high enabling IC20a allowing the output of IC19a to be passed to IC19b. When a PWM signal is not present the video output goes to 0V, and the output of IC17b is now our recovered NBTV sync pulses.

Using the Mark I eyeball the signal-to-noise ratio was estimated to be about -46db, not bad considering the use of VHS, but not even as good as an audio cassette. Even so, solid recovery of the NBTV syncs and video down to DC is probably worth the trade-off.

If needed, a composite NBTV signal can be generated by mixing the recovered syncs and video with R53, 54 & 55. Photo 2 shows the recovered 16 line white/16 line black raw NBTV video during playback without blanking or syncs on the top trace. The centre trace shows the recovered composite NBTV signal on playback, this time using a 'broad pulse' frame sync of 1.25mS duration. All the low frequency information is present, and as this system separately outputs the NBTV syncs, sync-stripping/detection is no longer required and is therefore no longer a problem (bottom trace). Sync separation is still required however, to differentiate between NBTV line and frame sync, but the task is now much easier with solid DC coupled pulses.

General

All of the above makes one large assumption, mentioned above, that the NBTV video source is locked to one or more of the frequencies generated

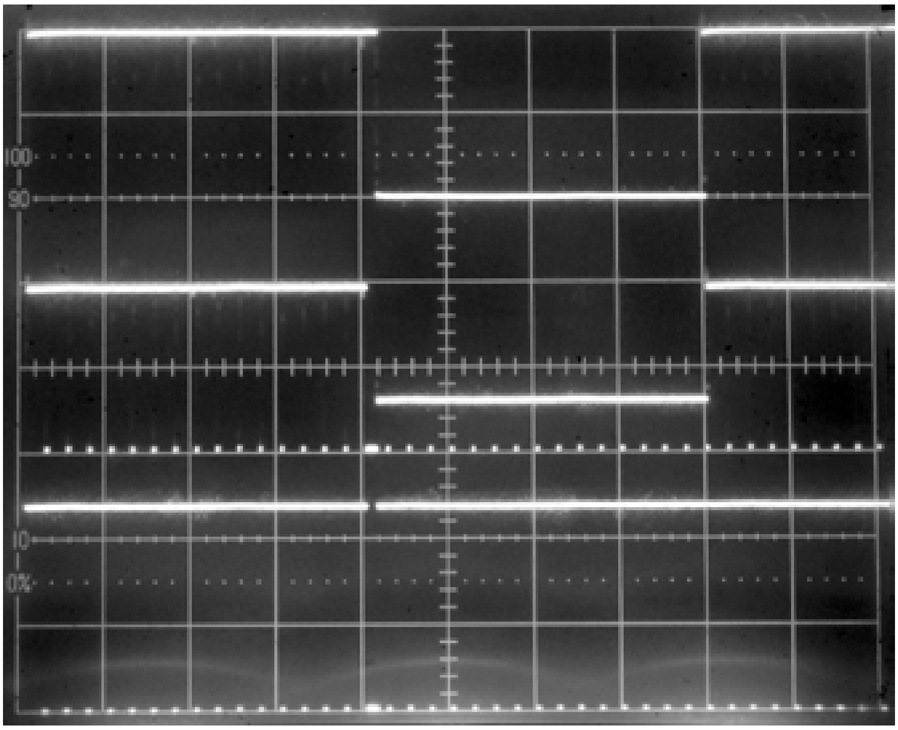


Photo 2

by the circuits above. For an electronic source this is easy, but for a mechanical camera it's a bit trickier.

If the disc or drum of the camera uses a synchronous motor similar to those used in millions of record players from the 40s to the 80s either geared down and/or cajoled to work at a frequency different to 50Hz, then a simple phase shift network would allow the matching of the mechanical to electronic phase. An alternative is a DC brushless motor (Newsletter Vol. 29 No. 1).

If this were a production unit (or if sufficient members were interested) an E(E)PROM or PAL could have saved a lot of the logic and monostable circuitry, primarily in the frequency and waveform generation. It would also remove the narrow glitches on some of the timing signals.

There is some industry confusion as to the calculation of pulse widths of the 74HC221 monostables. The formula that Philips put forward is Tw=0.7.C.R, whereas Fairchild and STM leave out the 0.7 factor. The Toshiba chips used here measured at a factor of 0.93. Values of the resistors could well be one of the few AOTs' (Adjust On Test) required in today's world.

This system was tried on basic standard analogue VHS machines; it's uncertain how digital systems like DV, VCD or DVD etc. might handle the waveform. Copying, editing or the use of LP mode has not been tried either.

At this stage it is not suggested that this system be reproduced, it is not optimal, and requires further work done on it, particularly in the playback section. Critique, ideas and suggestions are welcome.

Further thoughts

Consideration was given to using the reproduced PWM signal to gate a clock waveform into a counter, latch, and then a D-A, this would remove all the monostables and the sample-and-hold amplifier in the playback section, but it's doubtful if it would actually reduce the chip count.

Further, this could have all been done in the digital domain, converting the raw NBTV video into a serialized data stream and inserting it into the FSTV video waveform. Keeping the sampling rate the same with eight bits locked to the FSTV syncs would lead to a bit rate that would fit into the bandwidth of a domestic VCR. Something like an ADC08831 (National Semiconductor) doing it almost all in one jump, in one eight pin package.

Of concern are dropouts corrupting the data, simple parity checking would flag the majority of errors, which could then be replaced with the previous valid value. This would be particularly important where the VCR does its head switching.

Footnote

For those in the US and other 60Hz countries, you might have a problem. Unless you have a multi-standard VCR, or somehow can get a 50Hz (PAL, often 220V only) model, there is no easy way that I can see around the conflict of the FSTV field pulse rate of 60Hz and the NBTV frequencies.

Switch your Hard Drives

By Reg Moores G3GZT

I still use a BBC B computer, it does many things not possible with the Laptop or PC, and one mod I use on this can be applied to my PC.

The mod. I did on the BBC, was to switch the double disc drives (these are equivalent to hard drives), which means quick access to either drives.

This is done, by simply using a DP C/O switch, to transfer the 5 and 12 volt supplies to either drive.

On my PC, I have "2 Caddies", one was in use, the second, just used for the storage standby one.

This meant, unplugging and swapping, when required, but does cause wear & tear on the contacts, not a good thing!

So I connected both caddies, IDE wise, the power cables being cut and connected to the C/O switch. Only the Red and Yellow (5V, 12V) the other black cables, paralleled together bye passing the switch.

The C/O switch is fitted on the side, as illustrated, all HDs being "masters", it makes easy changeovers, XP-W98 SE etc. Of course with PC on standby, or off!

Circuit Notebook No. 87

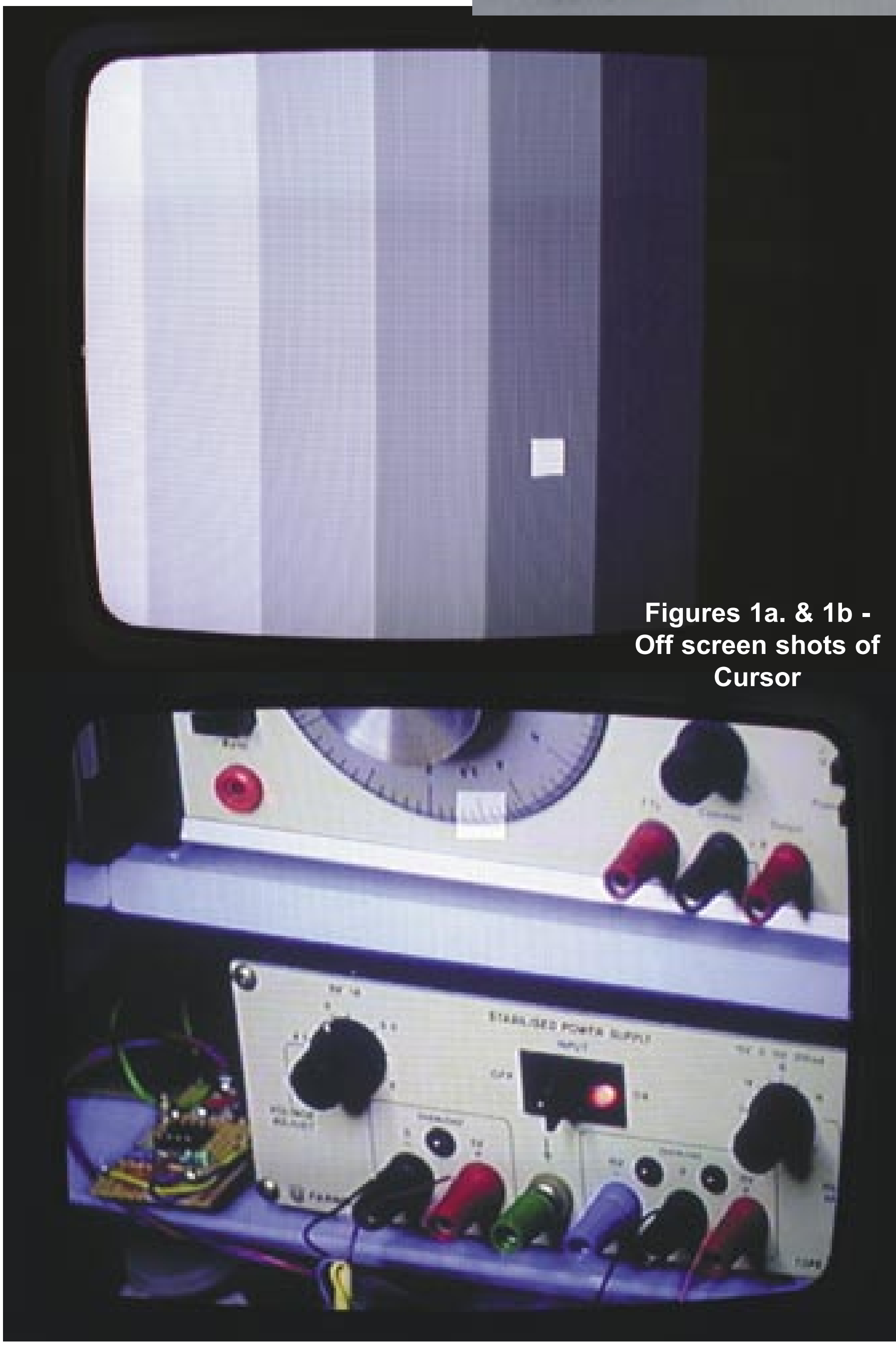
By John Lawrence GW3JGA

A Flashing Cursor for ATV

When on the air with ATV it is often useful to point to a piece of equipment, or show a circuit or PC board. This sometimes involves reaching over the camera and pointing with an out-of-focus finger to the item of interest, or when sitting in front of the camera holding up a PC board, trying to point to a component which appears upside down and reversed left to right.

This is where the ATV cursor comes in useful, you point the camera at the scene and use the cursor to highlight the item of interest. The position of the cursor is controlled by a 'joystick' and can be switched on continuously, off, or flashing. See Figs. 1a. & 1b.

Figure 3 - Altai skeleton joystick



Figures 1a. & 1b - Off screen shots of Cursor

The circuit is shown in Fig. 2. It consists of the usual LM 1881 sync separator to provide line and field pulses. Two mono-stable circuits determine the position of the cursor on the screen, in the vertical direction by IC2a, together with the vertical position control of the joystick and in the horizontal direction by IC3a with the horizontal position of the joystick.

The end of the (field) timing period of IC2a triggers IC2b. IC2b generates a pulse of about 1.2ms, equal to about 20 lines. The end of the (line) timing period of IC3a triggers IC3b, but only during the 1.2ms pulse from IC2B, the remainder of the time IC3b is held reset. As a result, IC3b generates a pulse of about 2.5µs on every line during the 1.2ms period. This appears as the block of highlight which forms the cursor. The output of IC3b is taken to IC4, pin2. The signal passes through this gate to the second gate which acts as an inverter.

Two (upper) gates of IC4 form a 3Hz square-wave generator and with S1, the 'centre off' toggle switch, the cursor may be switched on continuously, off, or flashing at 3Hz.

With the values shown, the circuit produces an approximately square shaped cursor, but it may be necessary to experiment with component values

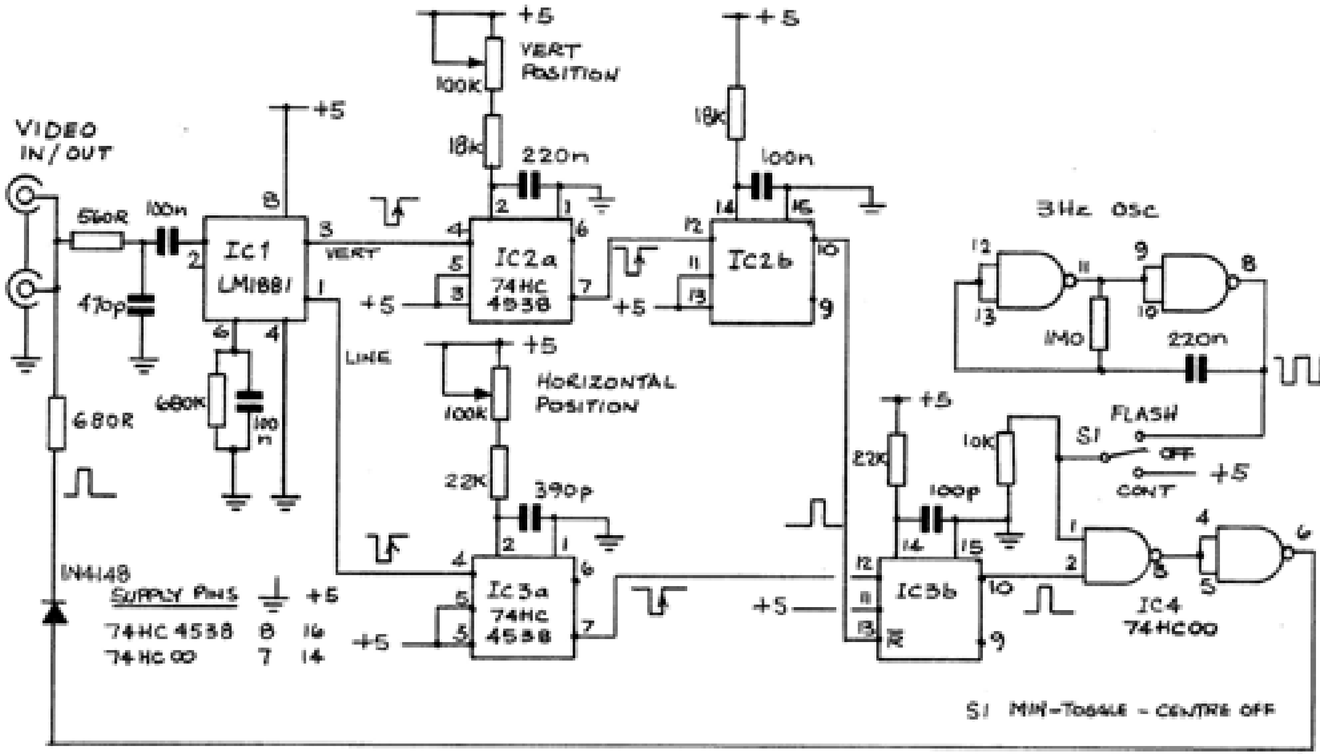


Figure 2 - Circuit Diagram

associated with IC2b and IC3b to produce the size of cursor you prefer.

The video signal passes directly in and out of the cursor unit and the cursor signal is resistively added to the through video by the 680R resistor and diode connected to the output of IC4. The amplitude of the cursor is about 0.2V. An advantage of adding the cursor signal in this way, rather than punching a hole in the picture, is that you can still see the detail of the picture through the cursor.

The joystick I used was a ‘skeleton joystick’ made by Altai, Cat. No. JS110, having a resistance of 100k ohms in each axis, see Fig. 3. This was purchased at a Rally and may no longer be available. A similar one is in the RS Components catalogue as a ‘Mini Stick Controller’ 252 series, 100k, No. 456-8235 at £4.50 + VAT, or you could make your own, see Fig. 4.

I made the version shown in Fig. 4. almost 40 years ago for a mock ‘Thunderbird’ control panel for my (then young) son (I think it controlled the thrusters). It used normal potentiometers and but as you can see their movements are restricted to about one fifth of the normal rotation. For the present application it would be necessary to use 500k ohm linear potentiometers to provide 0 to about 100k ohms variation.

References

National Semiconductor Corp. Linear Databook 3 LM1881.

Mullard Data Book High Speed CMOS logic 74HC00, 74HC4538.

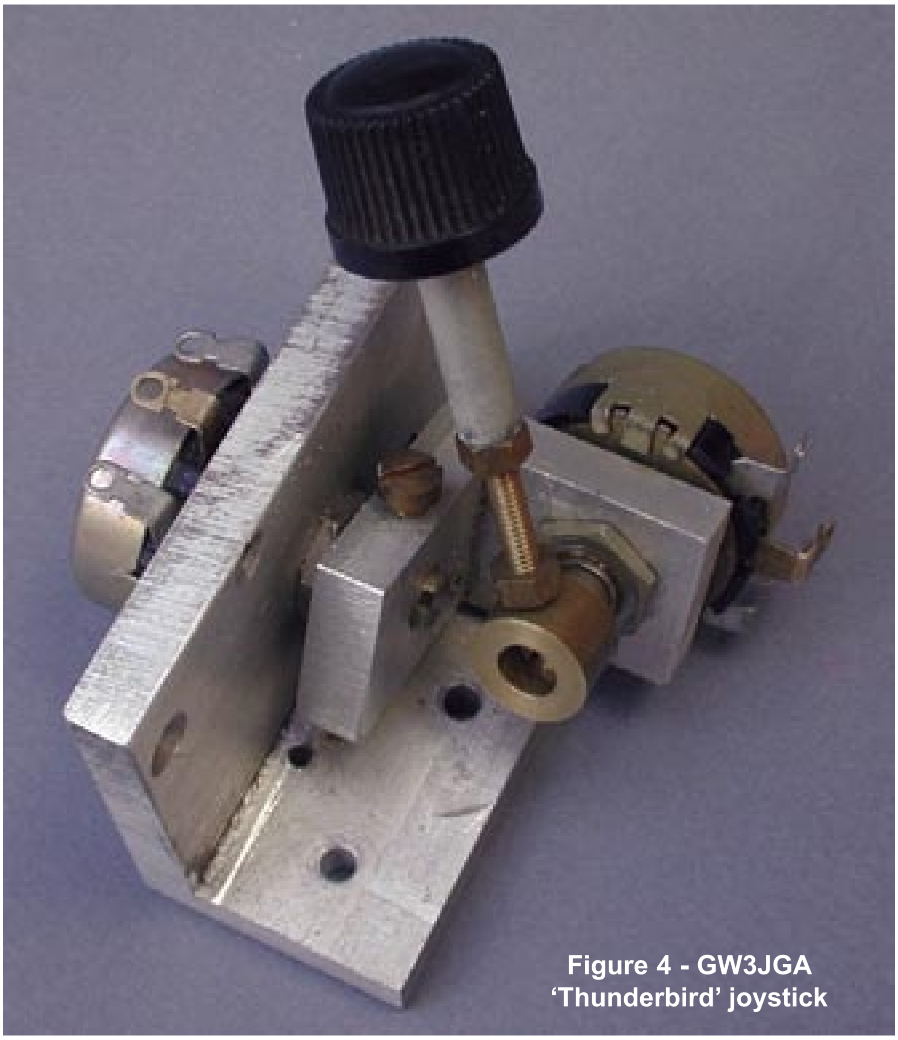


Figure 4 - GW3JGA ‘Thunderbird’ joystick

Turning Back the Pages

By Peter Delaney

A dip into the archives of CQ-TV, looking at the issue of 50 years ago.

CQ-TV 26 - "Autumn 1955"

"All those who were able to attend agreed that the Convention was a great success. In the unavoidable absence of the Treasurer, G3CVO read an interim Financial Statement ... which ... explained that the Club was only just paying its way. In fact at present rates, CQ-TV 26 and 27 would have had to be combined into one to save money. G3EKE therefore proposed that the subscription be raised to 7/6 per annum. G3CVO followed by giving some details of production costs of CQ-TV, which is the main Club expense, of course. Allowing for an expected 15% rise in printing costs next year, we should have been limited to four eight-page-plus-cover editions in 1956. The proposal to raise the subscription to 7/6 would mean that at least 2 editions could be twelve pages plus cover. At this point Mr F H Townsend MIEE of Cathodeon Ltd and one of the guests asked if might address the company. He then delivered a very forceful speech, explaining that he paid 5/- per annum to join his local village dramatic group, and he certainly did not get a quarterly journal for this fee In like manner he went on to say that he thought 10/- at least was the amount that anyone should consider a reasonable subscription. Mr Townsend's words were well received, --- and an amendment that the subscription be raised to 10/- was carried unanimously, and with acclamation - a very gratifying result for those of the BATC 'staff'.

Just before the Convention, the Committee decided that Mr Townsend should be asked to become Vice-President of the Club, in recognition of his services and help freely given to us. A unanimous vote confirmed the invitation, which Mr Townsend kindly accepted."

(To help 'younger' members, 5/- would be 25p -- but as inflation has taken effect, that is now worth 'rather less' than it was then!! CQ-TV is still the main benefit for members, and even better value.)

"Coming shortly 'An Introduction to Amateur Television' by M Barlow - 24pp with 16 circuits and diagrams. To be published soon after Christmas at 3/6d including postage."

At that time, of course, most members were 'beginners', still learning what worked best for atv. A number of articles appear in the magazine, for which the 'principles' still apply, and although the actual circuits may be out of date, the 'ideas' may help today's newer members too. In CQ-TV 26 was:-

"One of the useful pieces of equipment in the amateur TV station is the test waveform generator. The various patterns, produced electronically, can be used for test purposes, or transmission, without the use of the camera proper. Consider the most popular test waveforms used:

i. Line sawtooth.

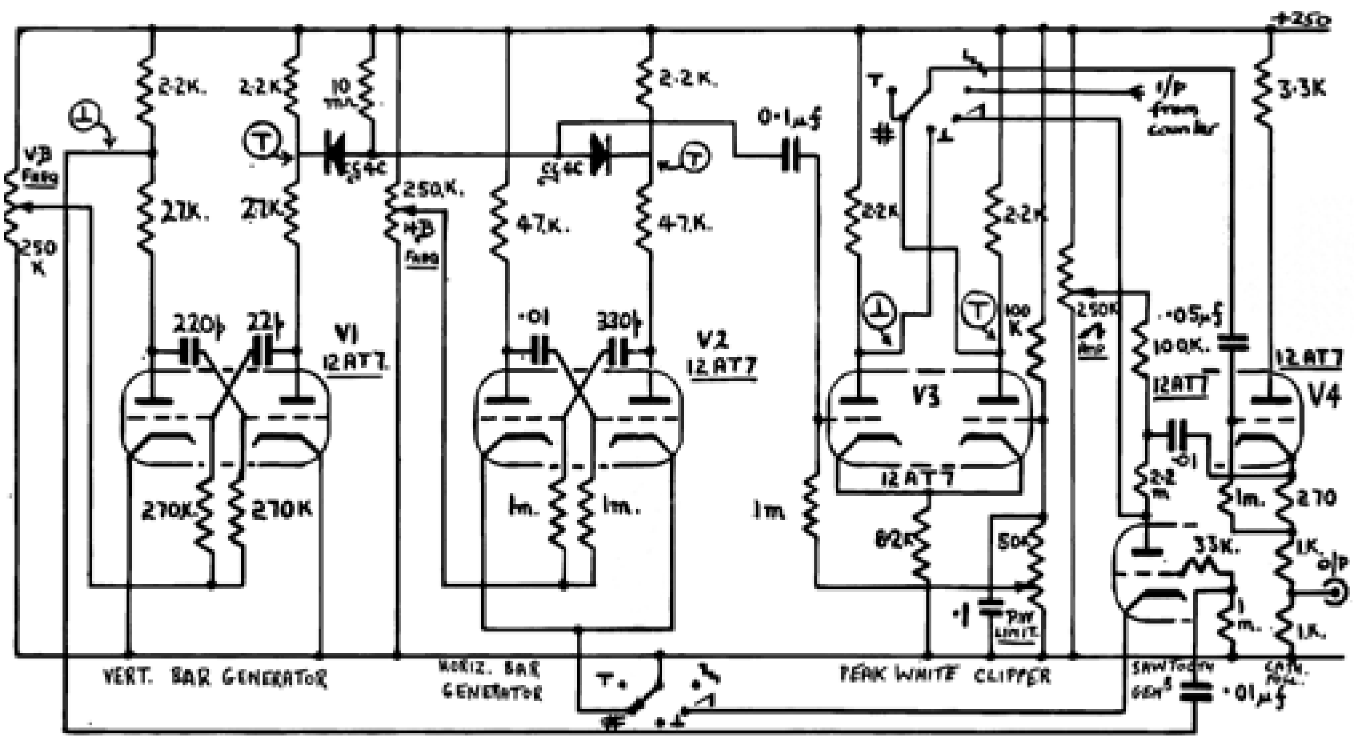
Used for checking the linearity of the various circuits; most valuable when setting up a transmitter.

ii. Horizontal bar.

For checking low frequency smear.

A TEST WAVEFORM GENERATOR

By M.Barlow G3CVO/T.



iii Vertical bar or spike.

For checking high frequency response, ringing, etc. Often combined with ii as a cruciform.

iv. Grating.

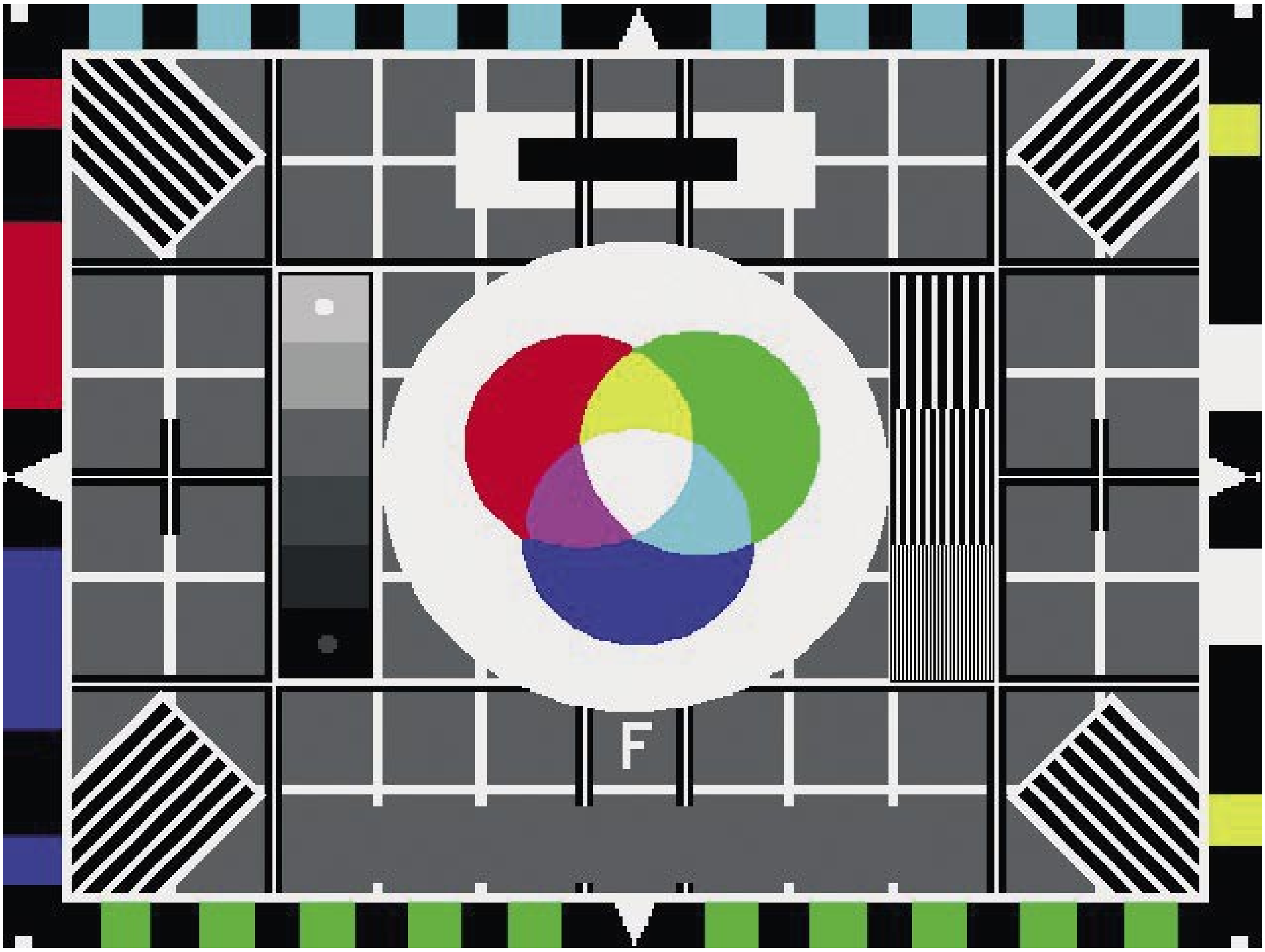
For checking picture geometry.

v. Staircase

For producing contrast bars.

Since the test waveforms are to be used for testing circuits, it follows that they should be very accurately shaped themselves, and in professional practice considerable complexity is included to attain this. For amateur use, however, much the same results can be obtained by looking carefully at the waveform before and after it has been through the circuit. Thus an increase in rise or fall time of a vertical bar pulse shows a poor HF response. Tilt or sag on a horizontal bar pulse indicates poor LF response, distortion of the sawtooth indicates clipping, etc.”

Another ‘technical’ article explained ways to scan film, with either a camera or by a ‘flying spot scanner’, using a cathode ray tube and a photocell, and several members had built similar equipment, according to ‘What the Other Bloke is Doing’.



Subscription Rates

Please note that the **surface** rate covers postage within the Europe, airmail rate is **NOT** required

If your subscription is due before the next issue of CQ-TV, you will soon be receiving a letter containg a personalised renewal form.

We hope that you will continue to support the Club and we look forward to receiving your renewal by post or via our web site.

Years	Surface	Airmail	Cyber
One	£15.00	£21.00	£10.00
Two	£29.50	£41.50	£20.00
Three	£44.00	£62.00	£30.00
Four	£58.50	£82.50	£40.00

Cyber membership is currently only available to members outside the UK. Cyber member will **not** receive a paper copy of CQ-TV, but will be able to download the electronic (pdf) version.

Please note that these files require the Adobe Acrobat reader version 7 or above.

BATC Accounts for 2004

THE BRITISH AMATEUR TELEVISION CLUB

Balance sheet at 31 December	**2003**	**2004**
Fixed assets		
Office equipment Additions	1,021	229.15
Less Depreciation	1,021	-229.15
Current assets		
Stock: - Members services	1,996	1,943.64
Publications	132	49.00
Back issues of CQTV	300	300.00
Nationwide Building Society	134	136.09
Halifax Bank	10,515	10,593.52
GiroBank current account	749	5,353.39
Bank of Scotland current account	21,677	15,090.85
Bank of Scotland investment a/c	30,040	30,039.61
Less Current liabilities		
Creditors and accruals	0	0
Subscriptions received in advance	20,876	17,471.41
	£44,667	**£46,034.69**
Represented by accumulated fund		
Balance brought forward	49,607	£44,667.05
Loss/ Surplus	-4,940	1367.64
	£44,667	**£46,034.69**

I have examined the books and records of the British Amateur Television Club and confirm that the balance sheet and the income and expenditure account are in accordance with those books and records.

Mrs T Rees
Ducklington, Oxon.

Brian Summers
BATC Honorary treasurer

THE BRITISH AMATEUR TELEVISION CLUB

Income and expenditure account

At 31 December	2003	2004
Income		
Subscriptions	16,513	15,902.58
Members services	3	1.58
Publications surplus	223	205.04
Advertising	984	1,580.00
Bank & Building society interest	728	429.49
Rally or Covention surplus/loss	-205	-801.25
Donations	31	39.99
Postages, Airmail	54	210.00
Miscellaneous	707	1,651.87
	£19,038	£19,219.30
Expenditure		
CQ-TV printing	12,627	9,986.72
CQ-TV postage	5,553	5,643.23
CQ-TV production	1,155	182.51
General Office expenditure	50	265.53
General Postage	485	610.08
Internet Web Site expenses	401	367.26
E- Mail	165	209.86
RSGB affiliation fee	41	42.50
Committee members expenses	0	97.60
Insurance & legal	126	126.00
Rally attendance	58	77.00
Recruitment	226	0.00
Adverts and publicity & Projects	2,790	0.00
Miscellaneous expenses	0	0.00
Bank charges, mainly "VISA" costs	301	243.37
	£23,978	£17,851.66
Surplus for the year	£-4,940	£1,367.64

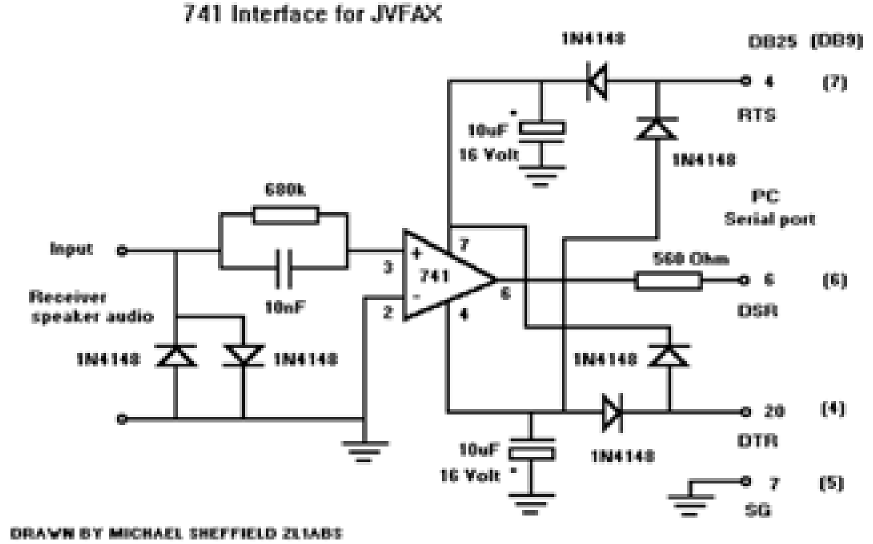
Notes

The figures in “Income” for member’s services, publications, the rallies and conventions are the net contributions or loss to club funds.

Most of the figure of £2790 in “2003 Projects" is for the DATV modules and is an exception item of expenditure. Some of that expenditure has returned in "2004 Miscellaneous" allowing for that we have a small loss on the year.

HF Weather FAX

By Michael Sheffield ZL1ABS

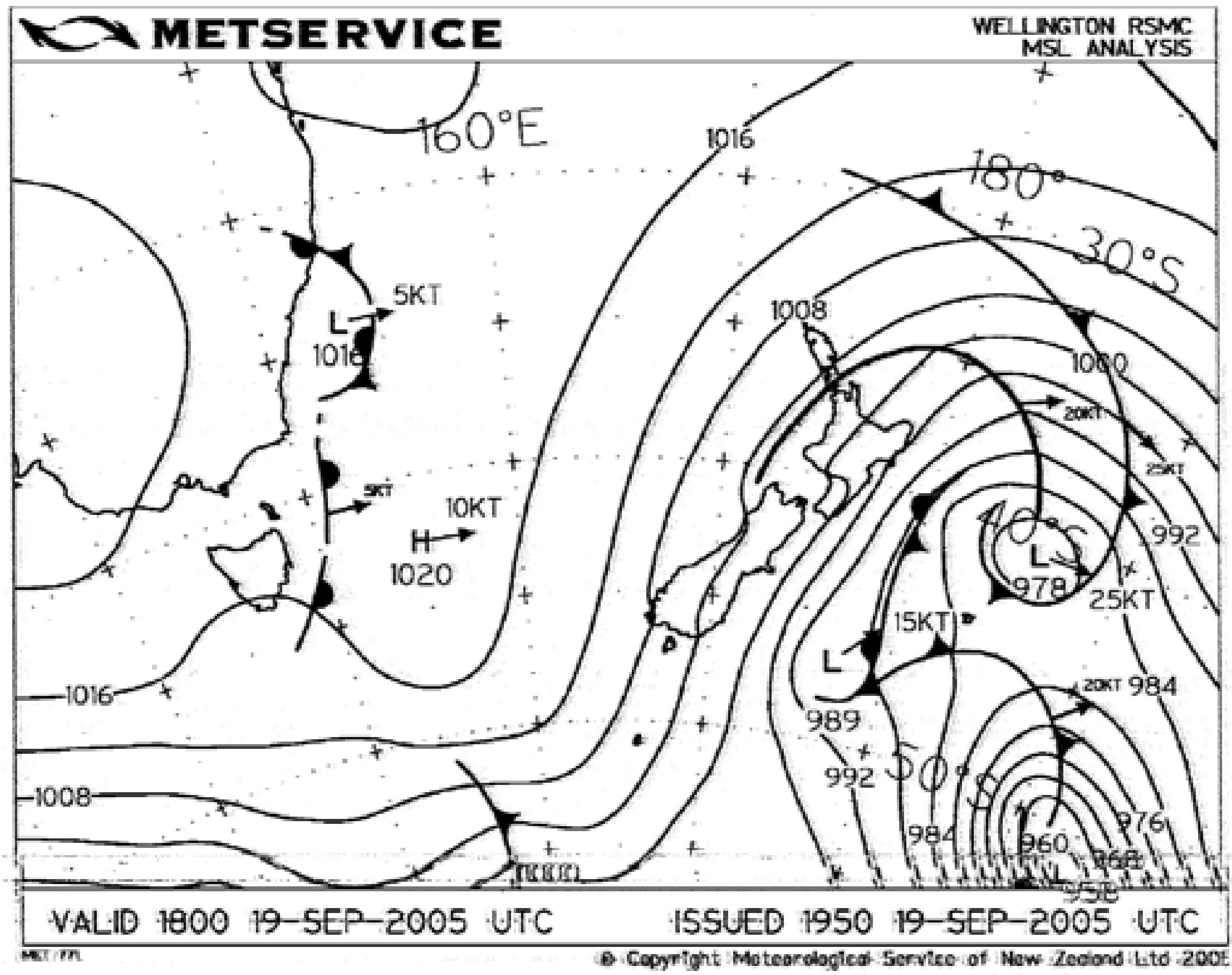


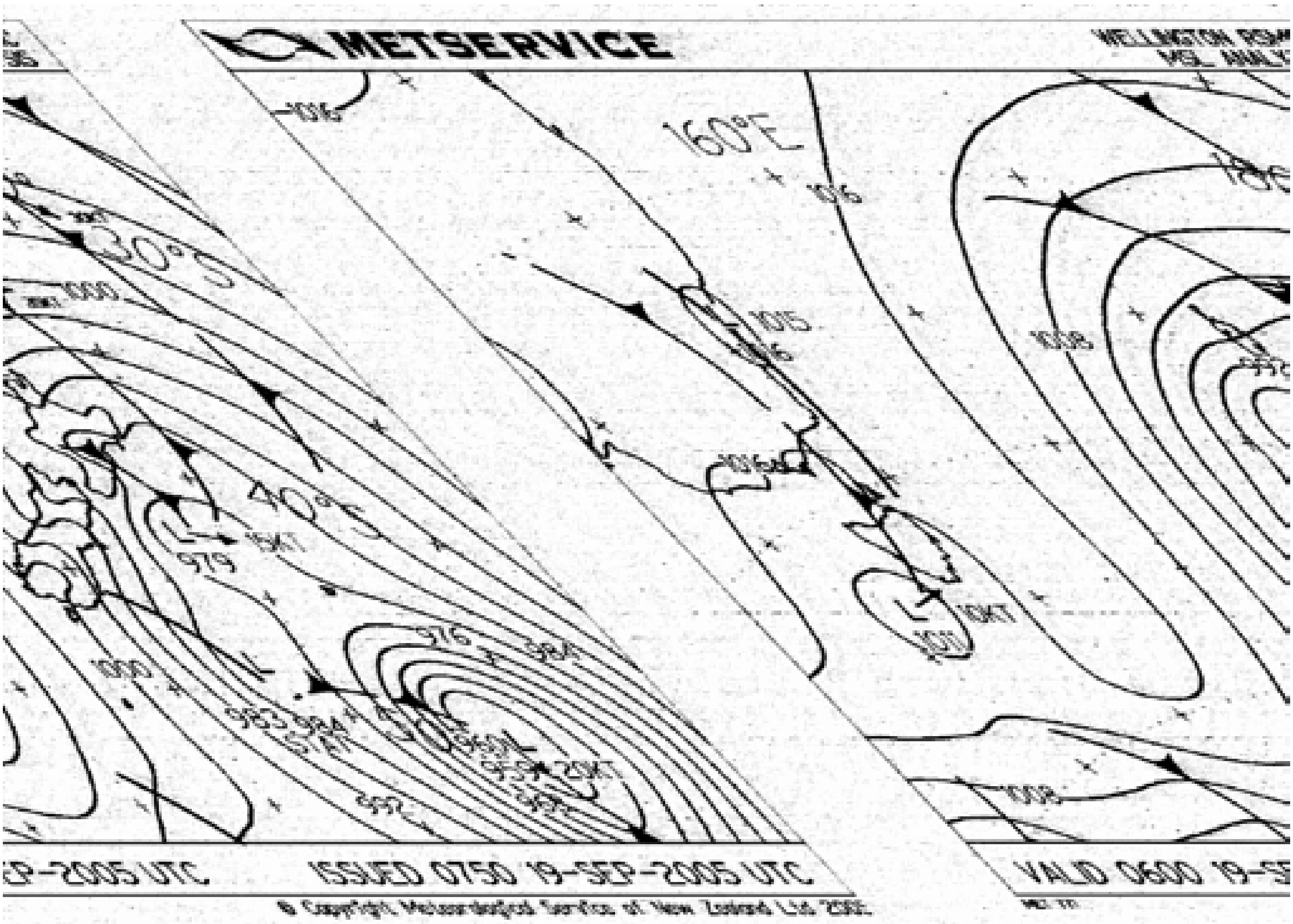
Where has the ZL spring gone?

Until last week the spring thaw seemed to have arrived and it seemed a good time to plant the peas and beans, tend to the aerial farm and so forth. Then the south-westerly blast from the Antarctic came and it seems like July again. Snow is falling in Christchurch and my outside thermometer in Auckland reads 10 degrees Celsius.

Old computers in need of a use (and new batteries).

Jumbo ZL1HV (now become SK), my mentor for 30 years, gave me the task of fixing up some old computers for the North Shore Civil Defence Communications Group EMICOMMs network. A number of them had dead CMOS batteries (The battery that keeps the internal clock going when the AC power is off and lets the computer "remember" vital data about it's hardware configuration). Others had faulty hard drives or had been robbed of parts. I have replaced the CMOS batteries in two PCs and am trying to get an ancient "used but good?" hard drive going in another PC. This has allowed Alan ZL1AUW to restore EMICOMMs to one CD Outpost and have a spare station for Birkenhead (ready for when the new library building is built). All





these old PCs run Microsoft DOS rather than Windows and the EMICOMMs software works well with a Packet TNC plugged into the serial port. The TNC plugs into a VHF radio on CD frequencies.

With all this "hands on" work involving old DOS PCs, it motivated me to have a go at making a DOS software project with an amateur radio application. My efforts at making a "Baycom equivalent" Packet modem with a XR2211 device are still "a work in progress", but my weather facsimile reception project is a success.

JVFAX

On the "Data Modes CD", from the Auckland VHF Group Inc, there are a number of shareware DOS based software programs for Amateur Radio reception and transmission. (Thanks to Doug ZL1AVY for compiling the CD). I selected the one called "JVFAX 7.0" to receive the weather facsimile transmissions made on short wave from the Auckland International airport. Ken ZL1TD informed me that 5.807 MHz USB is one of the frequencies that is used "on the hour" day and night by the New Zealand Meteorological Service station ZKLF. I am getting S7 reception on my Kenwood R1000 receiver, even with an indoor four-metre length of wire for an aerial.

The interface

These old DOS PCs do not come with "sound cards", so a simple interface device to convert the audio tones from the receiver to RS232 voltage levels is needed. There are a number of interface circuits described in the document files that come with JVFAX and another multimode DOS program called "HAMCOMM". All use a 741 Op-amp integrated circuit and a small number of other components readily available from NZART Inc. Branch's Trading Tables or electronic components retailers. I raided my junk box and located an old circuit card that had a 741 integrated circuit on it. I did some "surgery" to remove unwanted parts and rewire to the new configuration. Starting afresh with a piece of veroboard would have probably been a bit easier. I decided I liked the version of the circuit published some time ago in CQ-TV magazine. It features a diode clipper at the audio input, bridge rectifier for DC power from the PC's serial port, and a series protection resistor in the output line. Should I wish to use it with other software programs that use the serial port handshaking lines in other ways, a pair of 9 volt batteries can be connected as an alternative power source. The bridge rectifier arrangement allows the 741 to be protected if the polarity of the serial port handshaking lines changes during "boot up" or a different software program is run.

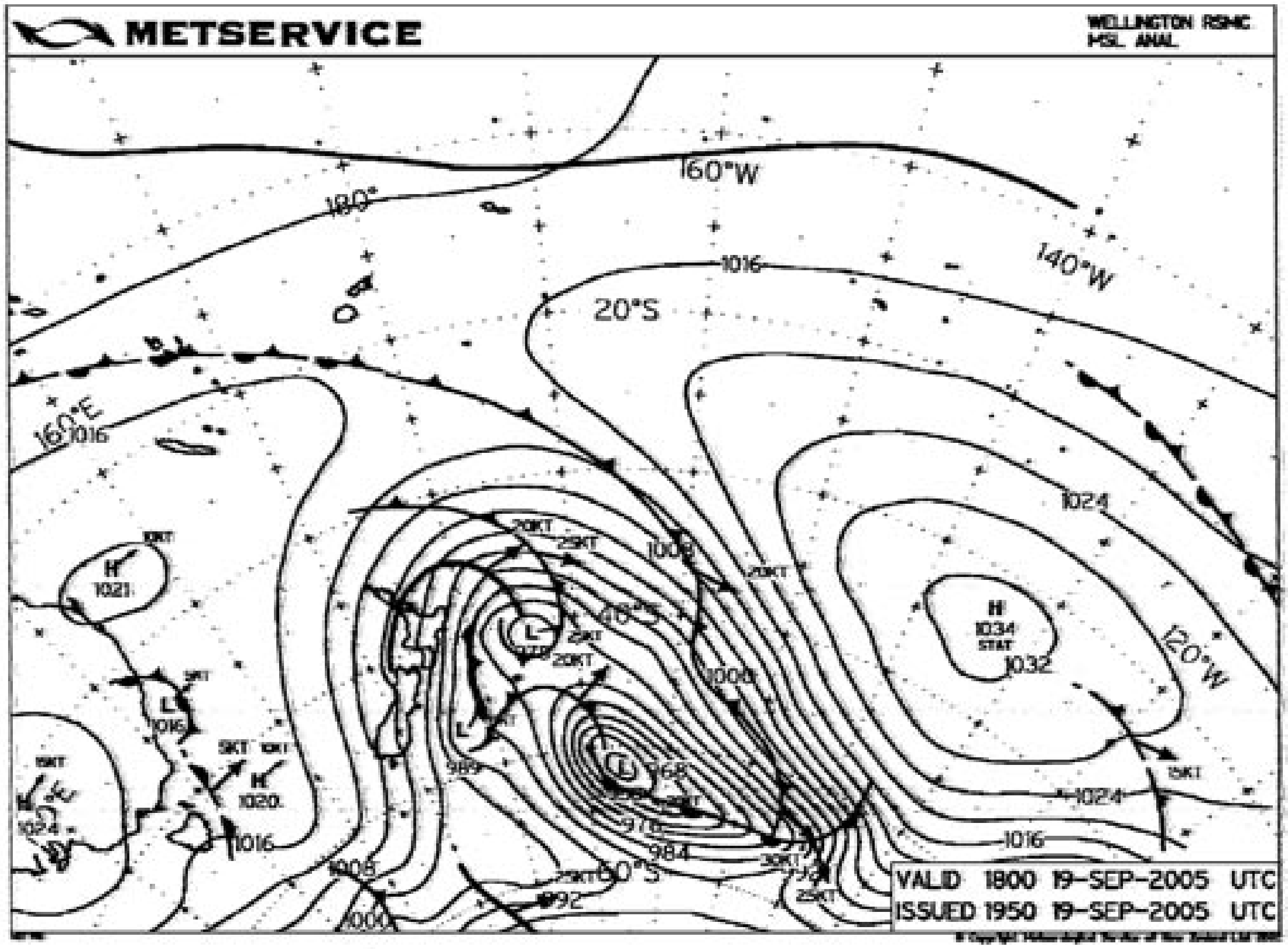
How it works

The audio from the receiver is clipped to +/- 0.6 volts by the input diodes. The 741 op-amp is used at maximum gain, since no feedback is used. The output is a square wave at audio frequency, having a signal level of +/- 9 volts. This goes into the DSR input pin of the serial port. The software counts the time periods between pulses received on the DSR pin and decides if it thinks it is seeing a tone for "black", or "white". This type of "FM" FAX does not send any type of sync pulse on each line.

The beginning and end of each picture are signalled and the program detects this most of the time, QRM and operator fiddling about permitting.

Setting up

I created a new directory on the C drive to put the JVFAX zip files, and naturally called it JVFAX. The PKUNZIP utility



was used to expand the compressed files. I found a lot of good reading in the file called "english.doc", since the main document is in German. The configuration screen provides ready access to set up the software, particularly setting the COM port to match the serial port I chose to use. Most old PC's have two sockets for serial communications and one for parallel communications (typically a printer). They can be 25 pin "D connector" or 9 pins "D connector". In my case there was one of each and nothing to say which was COM 1 or COM 2. I followed the recommended procedure of measuring the voltages on selected pins and operating the software to engage the "Transmit mode". The serial port that has the pins that change in voltage is the one that is currently selected in the software. COM 1 turned out to be the 25 pin D connector.

Operating

With everything wired up, I plugged in the serial cable and the speaker audio cable from the receiver. I selected the FAX receive mode, using the default WEFAX 576 settings and waited for a transmission on 5.807 MHz USB. The F3 key was operated to set up a "save file name". A quirk of the software makes this necessary to do before the WX FAX picture is being received. The steady tone of the FAX station appeared on the frequency shortly before the hour. I confirmed that the tuning scope box showed it just to the left of the "White" marker. Then the station tone shifted to the lower black tone on the tuning scope, just to the right of the "Black" marker. Then the "start signal" of 95% White and 5% Black was copied for a few seconds. The control box changed from "waiting" to "running". The picture began with white lines being drawn along the top of the monitor screen. The tuning scope display showed a "sine curve peak" just below the "White" marker. As the picture was drawn down the screen, it was clear that I needed to make adjustment for "skew". The tuning display vanished to make way for the rest of the picture to be drawn. It returned once the whole picture was drawn on the monitor; this takes at least ten minutes. I pushed F3 once more to "save" the picture just received. Once saved, a picture can be called up via the "show" screen. Pictures can also be printed.

Getting it straight

My pictures were skewed by forty-five degrees going down the screen. I read up on slant correction in the document file and took advice from Ken ZL1TD. Using the "/" key and arrow keys, a marker line was moved to match the slant on the pictures. This altered the "clock-timer frequency" number in the configuration screen from 1192439 to 1193300. Now my pictures are received "straight up and down". The "clock-timer frequency" number can be manually changed as well from the configuration screen. However, the result of a change can only be judged when the "next" picture is copied. Getting the left hand margin aligned was done with the CRTL key and the arrow keys. Now the pictures are correct, rather than being "shifted sideways".

Features

In the receive mode of the program there is an "automatic tuning corrector" function that can be engaged. It dynamically moves the black and white reference points in the program to match the pitch of the signal being copied. The idea is that this compensates for a drifting or slightly mistuned SSB receiver. The markers on the "tuning scope" move as the automatic tuning correction occurs.

ZKLF RADIO FACSIMILE SCHEDULE
Effective 1 MAY 2002

PRODUCT	TRANSMISSION TIMES (UTC) AND FREQUENCY				
	3247.4kHz	5807kHz	9459kHz	13550.5kHz	16340.1kHz
0000 SW PACIFIC MSL PROG H+30		00:00 - 00:15	00:15 - 00:30	00:30 - 00:45	00:45 - 01:00
0000 SW PACIFIC MSL PROG H+48		01:00 - 01:15	01:15 - 01:30	01:30 - 01:45	01:45 - 02:00
0000 SW PACIFIC MSL PROG H+72		02:00 - 02:15	02:15 - 02:30	02:30 - 02:45	02:45 - 03:00
0000 TASMAN - NEW ZEALAND MSL ANAL		03:00 - 03:15	03:15 - 03:30	03:30 - 03:45	03:45 - 04:00
0000 SW PACIFIC MSL ANAL		04:00 - 04:15	04:15 - 04:30	04:30 - 04:45	04:45 - 05:00
0600 TASMAN - NEW ZEALAND MSL ANAL	09:45 - 10:00	09:00 - 09:15	09:15 - 09:30	09:30 - 09:45	
0600 SW PACIFIC MSL ANAL	10:45 - 11:00	10:00 - 10:15	10:15 - 10:30	10:30 - 10:45	
TRANSMISSION SCHEDULE	11:45 - 12:00	11:00 - 11:15	11:15 - 11:30	11:30 - 11:45	
1200 SW PACIFIC MSL PROG H+30	12:45 - 13:00	12:00 - 12:15	12:15 - 12:30	12:30 - 12:45	
1200 SW PACIFIC MSL PROG H+48	13:45 - 14:00	13:00 - 13:15	13:15 - 13:30	13:30 - 13:45	
1200 SW PACIFIC MSL PROG H+72	14:45 - 15:00	14:00 - 14:15	14:15 - 14:30	14:30 - 14:45	
1200 TASMAN - NEW ZEALAND MSL ANAL	15:45 - 16:00	15:00 - 15:15	15:15 - 15:30	15:30 - 15:45	
1200 SW PACIFIC MSL ANAL	16:45 - 17:00	16:00 - 16:15	16:15 - 16:30	16:30 - 16:45	
1800 TASMAN - NEW ZEALAND MSL ANAL		21:00 - 21:15	21:15 - 21:30	21:30 - 21:45	21:45 - 22:00
1800 SW PACIFIC MSL ANAL		22:00 - 22:15	22:15 - 22:30	22:30 - 22:45	22:45 - 23:00
TRANSMISSION SCHEDULE		23:00 - 23:15	23:15 - 23:30	23:30 - 23:45	23:45 - 00:00
For schedule updates and changes visit www.metservice.co.nz					

There is a "show screen" that plays back saved pictures. It allows zooming and some types of editing to be undertaken.

Transmitting

JVFAX has a transmit mode too. The TX Data pin on the serial port is fed to a small filter circuit (resistors, capacitors and diodes) to convert a +/- 12 Volts square wave to a low level sine wave suitable for connection to a transceiver's microphone input. I'm not sure if I will get this going on 80 metres, but I would be sure to turn down the drive, if I did. A ten-minute over of key down picture sending will "cook" a lot of transmitters running full power. One-third normal CW mode output is a good idea. The RTS line on the serial port switches state to key a transistor to operate a PTT circuit.

Conclusion

I have now received some clear (and straight) pictures of New Zealand weather. The twin low-pressure zones off the Eastern coastline were readily seen. The isobars, fronts, anticyclones, etc are exactly what I used to see on the TV news when I was a young chap in the 1960s. Now TV weather is all high tech graphics and less scientific. Newspapers still publish the same style of weather maps receivable from short wave.

One picture I received was a "Transmission Schedule" rather than a weather map of New Zealand or the South Pacific area. It stated that frequencies of 3.247.4 MHz USB (45 minutes after the hour), 5.807 MHz USB (on the hour), 9.459 MHz USB (15 minutes after the hour), 13.5505 MHz USB (on the half hour) and 16.3401 MHz USB (15 minutes after the hour) are used. Note that there are some times of the day that there is no transmission on a particular frequency. I will be happy to supply details to anyone wants more information. If you have a "Windows PC", you might be able to run a DOS program like JVFAX by booting up to DOS with the "F8" key on power up. Accessing a "DOS Window" from Windows 98/ME/2000/XP is unlikely to be suitable. Amateur radio software is readily downloadable from the Internet and a CD ROM is available from the AK VHF Group. Happy WX picture gathering.

Once you have your 741 op-amp interface going, you can try the "HAMCOMM" program for CW, RTTY, and AMTOR modes. There is another DOS program called EZSSTV for SSTV (naturally).

I have not heard about an amateur shareware type" Sound card program" for weather FAX. MMSSTV does a lot of image transmission modes, but not short wave WX FAX. Polar orbiting weather satellites use a different modulation scheme involving a 2.4 kHz tone on a FM carrier. The 2.4 kHz tone is amplitude modulated by the data. No doubt suitable software can DSP a result without having to use the old solution of an envelope detector followed by a frequency modulated audio oscillator.

Deadlines

CQ-TV is published quarterly in February, May, August and November each year. The deadlines for each issue are as follows: -

February	*30th December*
May	*30th March*
August	*30th June*
November	*30th September.*

Please send your contributions in as soon as you can prior to this date.

Will all prospective contributors please be sure to read the 'Notice to Contributors' on page 3 so that you understand the implications of submitting an article for publication.

If you have pictures that you want including in your article, then please send them, in the highest possible quality, as separate files.

Commercial adverts should be sent to Trevor Brown, the advertising manager, at 14 Stairfoot Close, Adel, Leeds, LS16 8JR. Tel: 01132 670115. Email: adman@cq-tv.com. Members' sales and wants should be sent to the Editor. Email: editor@cq-tv.com

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Size	Mono	Colour
Quarter page	£50	£75
Half page	£100	£150
Full page	£150	£200

Index of Advertisers

We have produced a DVD containing electronic versions of CQ-TV and the CQ-TV articles index. Also included are electronic versions of our three most recent handbooks, 'Slow Scan Television Explained', 'Amateur Television Handbook' and 'An Introduction to Amateur Television'.

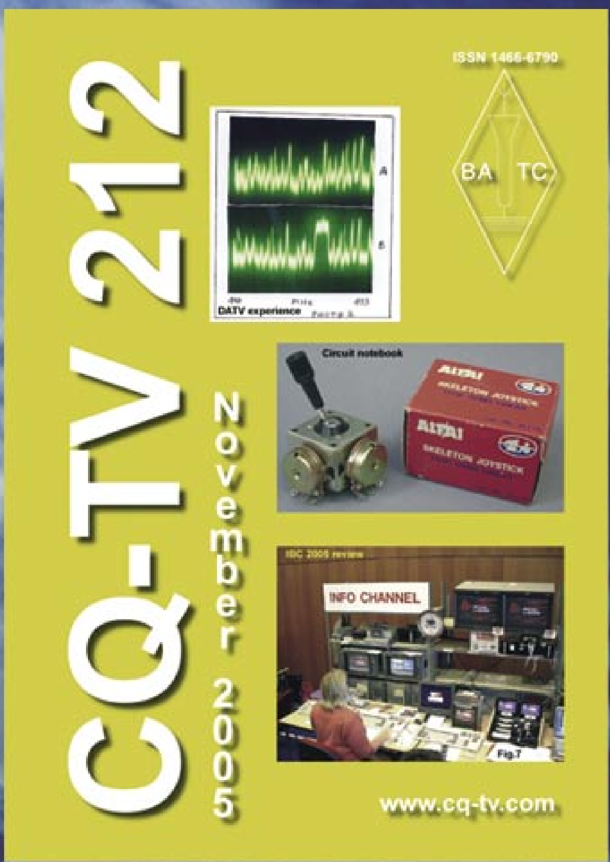
The archive is constantly being updated as more of the old paper issues are converted to electronic format. Currently issues 1 to 134 and 161 to 211 are included along with a few odd ones.

This DVD is updated 4 times a year, to include the current issue of CQ-TV.

The DVD is playable in a standard (domestic) DVD player (and on a PC with a DVD player) and the data files will 'auto-run' when the DVD is put into a PC.

The video section was prepared by Brian Kelly and contains videos from Bletchley Park 1999, one from Shuttleworth 2002 and one from 2004. The cost for this DVD is £5.00 for current members and £10.00 for non-members.

Note: This DVD is supplied on +R media only.



Cyber membership - CQ-TV beamed directly to your computer, four times a year, for only £10

Visit www.batc.org.uk