

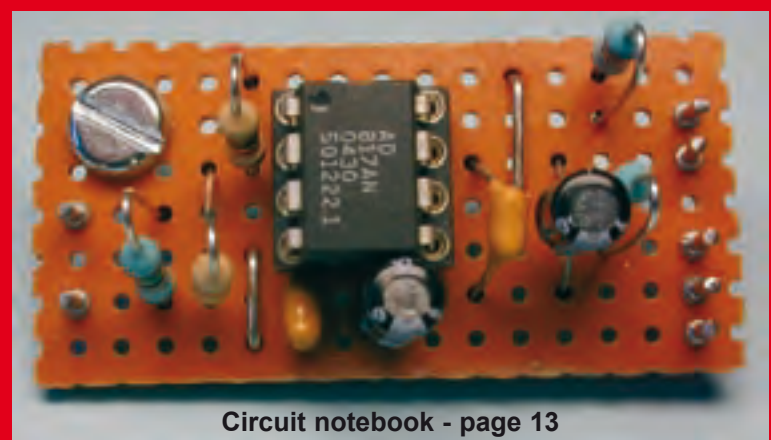
# CQ-TV 215

August 2006

ISSN 1466-6790



Flying camera - page 19



Circuit notebook - page 13



Noah part 2 - page 9

[www.cq-tv.com](http://www.cq-tv.com)



## Caption competition

Can you think of a caption for the above picture? (see page 37) If you can, then send your entry to [chariman@batc.org.uk](mailto:chariman@batc.org.uk). The winner will receive a Black Box caption generator.  
(Please - no rude comments about the President!)

## PIC On Screen Display Project Board

### The Versatile, Programmable On Screen Display System



The BlackBoxCamera™ Company Ltd. sponsors the CQ-TV caption competition. The winner will receive a keyboard text overlay unit.



Free demo code



- PIC 16F628 microcontroller
- 28 by 11 character OSD
- Fully programmable
- Demo software available
- I/O lines for sensor interface
- RS232 serial interface
- PAL or NTSC compatible
- Enclosure option available

Enquires [sales@STV5730A.co.uk](mailto:sales@STV5730A.co.uk) to [www.stv5730a.co.uk](http://www.stv5730a.co.uk)

Visit [www.STV5730A.co.uk](http://www.STV5730A.co.uk)



## Contents

214 caption competition results .....	37
A decade of change .....	39
An Improved Diplexer .....	16
BATC Accounts 2005 .....	24
BATC Publications .....	26
Caption competition .....	2
Chairman's Column .....	5
Circuit Notebook No. 90 - .....	13
Committee Contacts .....	4
Contents .....	3
Contest News .....	37
CQ-TV Commercial Advertising Rates .....	38
Deadlines .....	38
Flying camera .....	19
Index of Advertisers .....	38
Introducing our Next President .....	6
Lens to Lens - Part 3 .....	28
Members Services .....	26
Noah - part 2 .....	9
SDI Routing Switcher Part 3 - .....	34
Subscription Rates .....	7
Turning back the pages .....	22

Edited by Ian Pawson, circuits drawn by Allan Robinson, proofread by Peter Delaney. All rights reserved, all wrongs denied

**Copyright © by the BATC and contributors.**

### Legal Niceties (the small print)

E&OE. Whilst every care is taken in the production of this publication, the editor accepts no legal responsibility for the advice, data and opinions expressed. The BATC neither endorses nor is it responsible for the content of advertisements or the activities of those advertisers. No guarantee of accuracy is implied or given for the material herein. The BATC expressly disclaims all liability to any person in respect of anything and in respect of the consequences of anything done or omitted to be done wholly or partly in reliance upon the whole or any part of this magazine.

As the regulations for the operation of radio frequency equipment vary in different countries, readers are advised to check that building or operating any piece of equipment described in CQ-TV will not contravene the rules that apply in their own country. The contents of this publication are covered by international copyright and must not be reproduced without permission, although an exception is made for not-for-profit publications (only) wishing to reprint short extracts or single articles and then only if acknowledgment is given to CQ-TV.

Apart from any fair dealing for the purposes of published review, private study or research permitted under applicable copyright legislation, no part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopy, recording or otherwise, without the prior permission of the publisher. All copyrights and trademarks mentioned in this publication are acknowledged and no infringement of the intellectual copyright of others is intended. Printed in Great Britain. ISSN 1466-6790

### Notice to Contributors

Authors are alone responsible for the content of their articles, including factual and legal accuracy, and opinions expressed by them may not reflect the editorial stance of the publication. Material submitted to CQ-TV should not infringe the copyright of other writers or bodies. Articles remain the copyright of their authors and following publication in CQ-TV, they may also appear on the BATC's web site and CD-ROMs, also in other not-for-profit amateur publications. Contributions are accepted for publication on this basis alone.

Printed by Hastings Printing Company Ltd., Dury Lane, St Leonards on Sea, TN38 9BJ, England. Telephone: 01424 720 477.

---

## Committee Contacts

### President: Mike Cox, CEng., FIEE

E-mail: [president@batc.org.uk](mailto: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](mailto: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](mailto: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, Mobile 077 4029 1191, Email: [treasurer@batc.org.uk](mailto: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](mailto: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](mailto:g3vzv@amsat.org)

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

### CQ-TV Magazine: Editor ???

Anything for publication in CQ-TV, Articles, Review items, Letters to the editor, and other material except as below. ???  
Email: [editor@cq-tv.com](mailto: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](mailto: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](mailto: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](mailto: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](mailto: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](mailto:publications@batc.org.uk)

### CQ-TV and BATC web masters

Anything to do with the CQ-TV web site Email: [webmaster@cq-tv.com](mailto:webmaster@cq-tv.com) or for the BATCs web site. E-mail: [webmaster@batc.org.uk](mailto:webmaster@batc.org.uk)

### By Trevor Brown

Well here it is CQ-TV 215 and Ian Pawson's last offering. Could I take this opportunity to thank Ian for all his work. I have sat in the editor's chair not for the length of time that Ian has, but long enough to know it's the most difficult committee position. Ian has been in the chair through more change than any previous editor. The technology I inherited was type it up and stick in the pictures and diagrams to produce an A4 master that shrunk to A5 at the printers. Ian computerised it and produced the PDF files that we can now download from the web or buy on CD. Ian has also presided over the format change from A5 to A4 along with many other changes and still found time to run the BATC website. My thanks Ian you are going to be difficult to replace, as yet we don't have a single hand up for the position.

This year we also say goodbye to Mike Cox as his term draws to a close, thanks Mike I think we all now understand SDI and have enjoyed what can only be described as construction on a scale that BATC has never seen

before. Peter Blakeborough G3PYB is stepping into Mike's shoes, I have known Peter for some years and we both worked at Yorkshire Television at the same time and with his help GB3ET the ATV repeater at the top of the Emley Moor TV tower became a reality. I now know that Peter has a better head for heights than me, I only made it to the roof of the turret room for the transmitter aerial, Peter installed the receiver aerials some 80 ft higher, I never saw it but the signals came in so I always took Peter's word that aerial was in place and connected up.

Giles Read G1MFG is also on the move he is now editorial staff at RSGB and my boss for the ATV column, I think that brings home the adage never upset people on the way up etc. Sorry if my column is always late Giles it's due to the high level of time sensitive material that makes it so news worthy, unless George has left you a note that says otherwise.

BGM is as you all know on the 24<sup>th</sup> of September at Stow-cum-Quy village hall. There will be lectures before the BGM and again due to high level



of time sensitive content we will be putting the full running order on the website a little nearer the time. If you would like to give a lecture or stand for a committee post then we need to hear from you.

Looking forward to meeting you all at the BGM. Trevor Brown - BATC Chairman

*A map of how to get to the site can be downloaded from the [batc.org.uk](http://batc.org.uk) web site - ED*

**BGM location**





## Introducing our Next President

**Peter Blakeborough MPhil. C  
Eng. MIET G3PYB**

It is a great honour for me to be invited to take the post of president of the BATC and I look forward to fulfilling the role in a productive and practical way.

My association in the field of television began with a junior post in the BBC transmitter department at Sutton Coldfield, and later in London at Crystal Palace. A diverse range of test transmissions preceded the launch of colour transmissions, and BBC2. These were interesting days in the underground south London site.

BBC training at Evesham, followed by a transfer to Television Centre studios, as a result of the kind intervention of Tom Douglas G3BA.

Several years of experience followed, by which time I felt quite "at home" with a 25Kw UHF transmitter, VTRs and studio cameras.

The roof room at The Langham housed the Aerial Radio Club, I later equipped this with a home built UHF ATV Tx, providing an excellent location for ATV experiments. Not least of all the "sky line" across London, with the backdrop of the PO tower and St Paul's, gave an instant live caption for my G6ACU/T transmissions.

Newly married to Sandy, we packed our bags and headed for Jamaica for a few years. We enjoyed a most lively working and social life style. My work brief covered both radio and television studios, links and transmitters. I learn to be resourceful as a result of dealing with equipment failures under difficult circumstances. I built my first slow scan TV equipment on the island and worked ZL on the long path over the top of the UK. My first amateur beacon was assembled on the island for 6 mtrs, much later damaged in a hurricane and only replaced last year when I revisited the island on holiday.

Returning to the UK I joined the fledgling Link Electronics in Andover building up the company portfolio of systems work in television outside



broadcast units and studios. We worked closely with similar sized companies created in the same period such as Pro-West and Mike Cox.

I was the head of the System Group and the tasks were challenging and varied. The company growth rate was fast and the design issues for the very large OB scanners were immense.

I returned to the Broadcasting arena by joining Yorkshire TV and later became the Deputy Chief Engineer. My interest in the RF world had not diminished. Part of my work related to improving news gathering through semi automated injection points covering the large geographical area of Yorkshire and Lincolnshire. Using cables, fibre and microwave links, plus the extensive use of the "top of the tower" at Emley Moor, I created novel ways to get the "rushes" back to Leeds. Very early satellite news gathering became a reality after negotiating with the SIS racing organisation to re use their uplink units, and Bird at 21deg E after the last race at 4.15pm. We had plenty of racecourses in Yorkshire and the short travelling time to provide a live injection for the evening news work well.

During this time I built new north and south amateur microwave beacons for Emley Moor to replace the old wide band units.

Returning to manufacturing in the south with Drake Electronics, and later Drake Automation, I moved into a very different field of automated delivery of digital multi-channel television. I became a Director and later VP of the systems group and built some of the largest automated systems such as UPC in Holland and Sky at Osterly. One more microwave beacon was built with others for 24Ghz at Dunstable Down. More recently I became a Director at Wood & Douglas introducing digital COFDM for video transmission.

My interest in ATV has shifted in emphasis over time, I retained my activity though microwave ATV. More recently I have built equipment for 24, 47 & 76 Ghz and frequently operate in the 23, 6, 9 and 3cm bands with relatively high ERP's. With the help of like-minded amateurs in Hampshire I made the UK record of 78Km for 76GHz. Moving to Portsdown Hill overlooking the Solent, has given me access to the GB3IV IOW repeater. The low path losses have enabled me to use a full duplex system with ease.

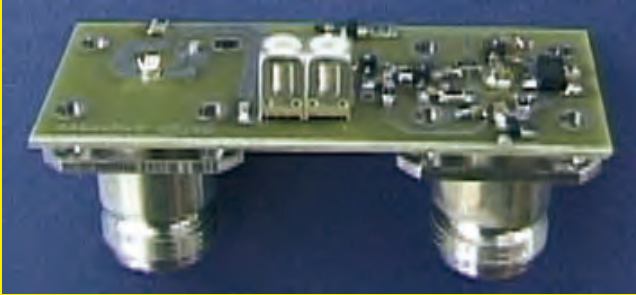
For all things CQ-TV, visit our web site at <http://www.cq-tv.com>

# Bob Platts G8OZP KITS & BITS

Just in case any of you were wondering, (Graham G8EMX), yes I am still about.

AVAILABLE AT PRESENT. (watch this space).

## 24cms PRE-AMP (uncased)



Assembled and tested.

- 1db noise figure, 40+db Gain.
- 12 – 20vDC power via output co-ax.  
(can easily be moded for separate feed).
- Silver plated N type connectors.
- Helical band pass filter.
- Ready for fitting in enclosure of your choice.

£25.00 all inclusive.

## 3cms LNB



- 0.4db (or better) Noise fig.
- Standard 40mm mount.
- Horizontal / Vertical polarisation switched by supply voltage, 12v – 14v or 16v – 18vDC.
- 9.0GHz Local oscillator.
- All brand new units.

£25.00 all inclusive.

## COMING SOON!

- 3cms DRO stabilised TX. CONTROL UNIT with inputs for Video, Line and Mic audio
- Video modulator, DC coupled throughout
- With Pre-emph, adjustable deviation and video polarity switching.
- PLL. audio subcarrier, 6MHz (5.5, 6.5 option).
- Mains or 12v DC operation.

RF. HEAD UNIT, (for above).

- Cable fed from control unit.
- Weather proof housing
- 50 X 50 X 75mm approx.
- RF output 25mW via WG16

## ALSO!

Basic version of above.  
Video only, 5mW output  
Ideal for local video links.

Bob Platts G8OZP, 43 Ironwalls Lane, Tutbury, DE13 9NH  
01283 813392 (7 - 9PM preferred). bob\_platts@hotmail.com

*Note. There is a web site for kits and bits, but it was not put on by myself and is basically history. Please ignore. (if you are the webmaster for this site, Thanks but it is now so out of date)*

## 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 containing 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.*

## **Dr Boris Townsend, MBE, PhD, B.Sc. AKC, Finst.P, FIEE, FBKSTS.**

**1919 – 2006**

Many of you will know Boris, as he was universally known, through his book on Colour Television\*, written with his GEC colleague, Peter Carnt. This appeared in 1961 and for many of us then was our bible, to be augmented by Vol.2 in 1969 covering PAL and SECAM.

Boris was President of the Club from 1960 to 1964, handing over to another colour television pioneer, Neville Watson of BBC Designs Department.

He joined GEC Research Laboratories in Wembley in 1940, working throughout the war on secret projects. In the fifties, GEC started looking at colour television, and with Boris and his colleagues built up a great deal of knowledge of the fundamentals, and the NTSC system. They collaborated with the BBC who were carrying out after-hours transmissions of NTSC adapted for 405 lines. When CFT in Paris started serious work on the SECAM system, GEC was involved; there was considerable collaboration between GEC, ABC Television [where I was working at the time] and CFT. One of my first recollections of Boris was a trip he, Howard Steele and I made to Paris on Friday 13th July 1962 to talk to CFT. Unfortunately, the wives of the CFT people were not keen on them being in Paris late on the 13th, and we were left to our own devices over the Bastille Day weekend. It was a wonderful introduction to a great man.



**Picture taken when Boris opened the extension at Michael Cox Electronics premises in 1981**

Boris left GEC in 1963 and joined Rank Cintel in Sydenham. After 3 years, he joined ABC Television as Head of the Engineering Research Department, and my boss.

In 1972, he joined the IBA at Crawley Court as Head of Engineering Information where he remained until he retired in 1983. During his time at the IBA, he gave several prestigious lectures such as the Sylvanus P. Thompson event for the IEE. This showed off Boris's presentational skills, which he had in abundance. His gift of explanation was legendary. He was largely credited for EMI winning a patent action in the 70s against the receiver industry, where he appeared as an expert witness

He had a great interest in the use of film in television, and ABC, in conjunction with its parent ABPC at Elstree, did a lot of pioneering work on the correct way to expose and process film for subsequent showing on television. For this work, he was awarded a Fellowship of the BKSTS in 1969.

After Boris retired from the IBA, he did some consulting work with John Tucker Associates, and then moved up to Lytham with his second wife Eileen. He retained his interest in photography and sundials. Every year, his friends eagerly awaited his splendidly illustrated Christmas Card, which he designed and printed himself.

All those who knew him and worked with him benefited in some way. They do not make many like Boris! Our thoughts go out to Eileen and his three children.

\*"Colour Television –The NTSC System, Principles and Practice", P. S. Carnt and G. B. Townsend, Iliffe, 1961



## Noah - part 2

By Mike Cox

Since the original article appeared in CQ-TV 214 [pages 6-11], the unit has been finished, in as much as any project is ever finished, and is in use. [Fig. 1 Front and Rear view of unit]

To the original has been added the triple Digital to Analogue Converter [DAC], and a buffer amplifier and sync adder to deliver YPbPr outputs. From this, a simple PAL coder has been added using an Analog Devices AD724 chip to deliver composite PAL as well as Y/C outputs. The AD724 takes in RGB signals, sync and subcarrier, so a converter from YPbPr to RGB had to be incorporated, as well as a "wild" subcarrier generator. Fig. 2 shows the arrangement.

The three digital outputs from the FIFOs, as well as feeding the triple DAC, feed the SDI output card [found in the Capacious Drawer, CQ-TV's passim, left over from the SDI Vision Mixer project.]

As the unit will primarily feed 16:9 displays or recorders, it seemed logical to tell downstream equipment that here is a Widescreen signal. Accordingly, a Line 23 signalling card was fitted. [Fig. 3 and see CQ-TV 210 page 35] The digital one-bit output from the EPROM is OR'ed with the most significant bit of the Y channel. Thus the L23 signal appears on all outputs, analogue or digital. Fig. 4 shows the revised block diagram.

Because, on occasions, a 16:9 picture might need to be passed through the unit, the Analogue to Digital Converter [ADC] and First In First Out memory

[FIFO] write clocks are switched between 10.125 MHz and 13.500 MHz. This removes the compression when not required. A panel switch controls this, and an appropriate bar graph indicator shows unit status.

On test, I came across a small snag. The colour difference clamps on the ADC cards were soggy to say the least. Clamp point varied with Average Picture Level [APL] of the colour difference signal.

Note that standard colour bars are no test of this point as the the waveforms are symmetrical about black level. If the generator has the capability of lower field red or blue, this will change the APL and show up clamp errors on either Pb or Pr.

Looking again at the ADC circuit showed why. The only simple way to change the clamp dc with a GB4551 is



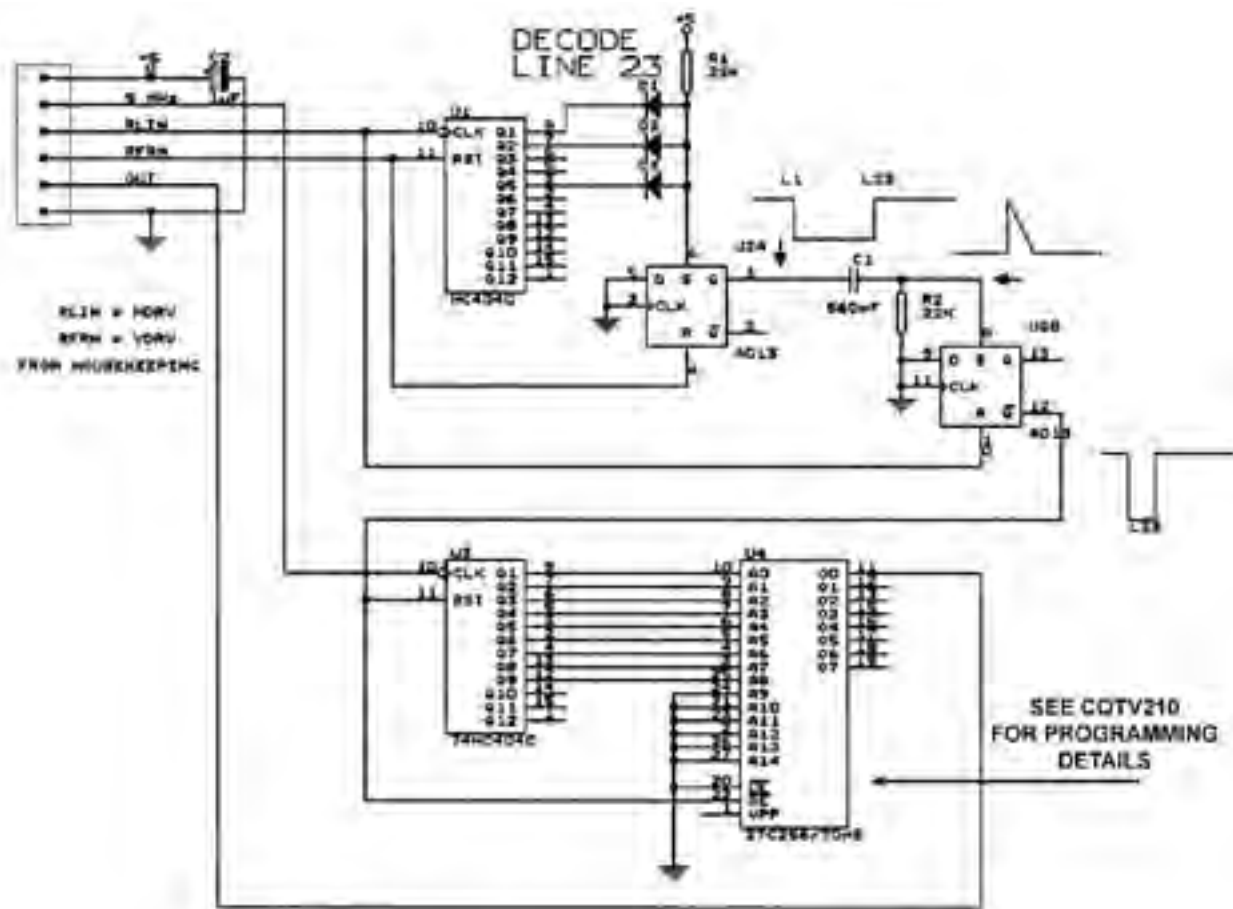
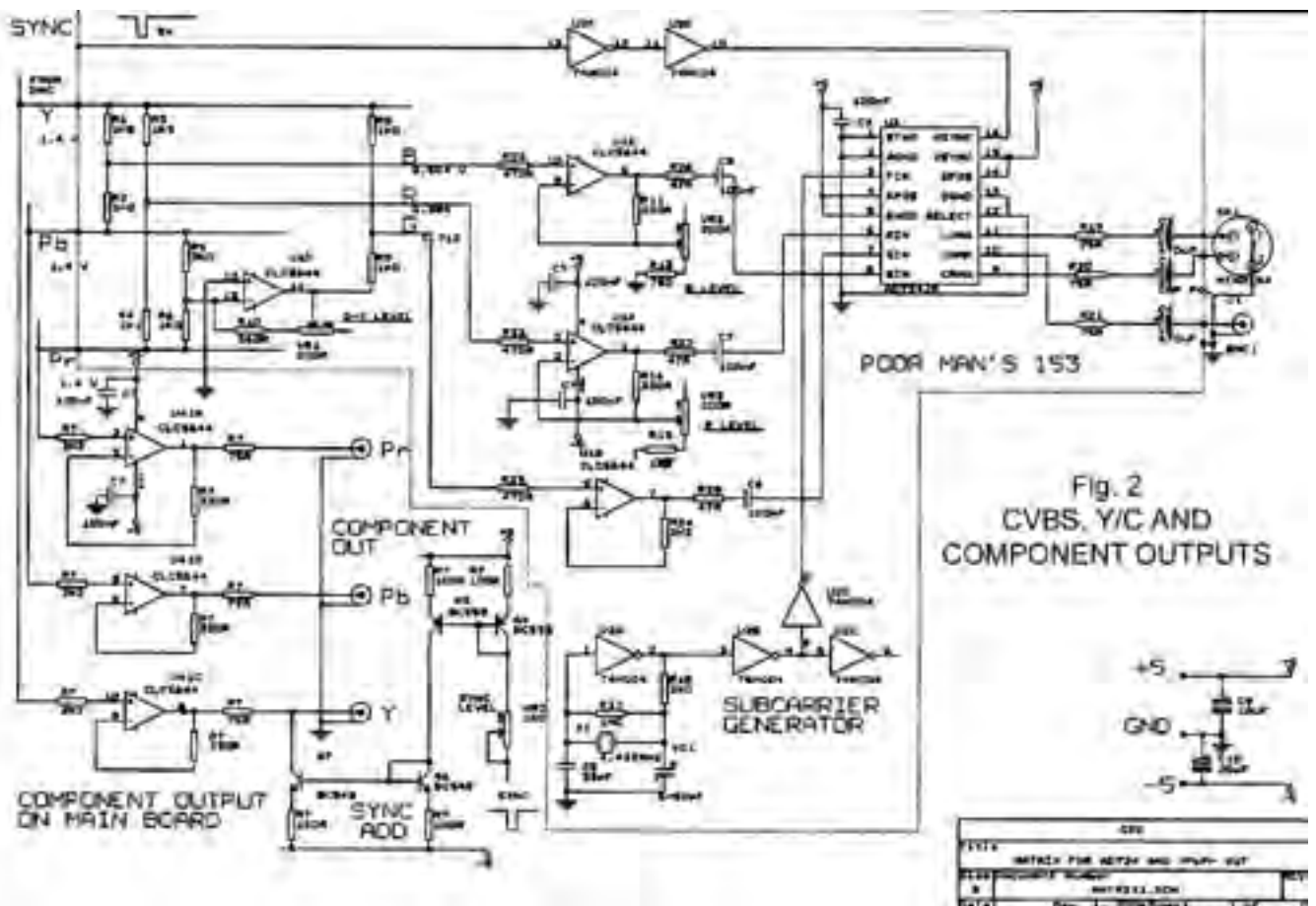
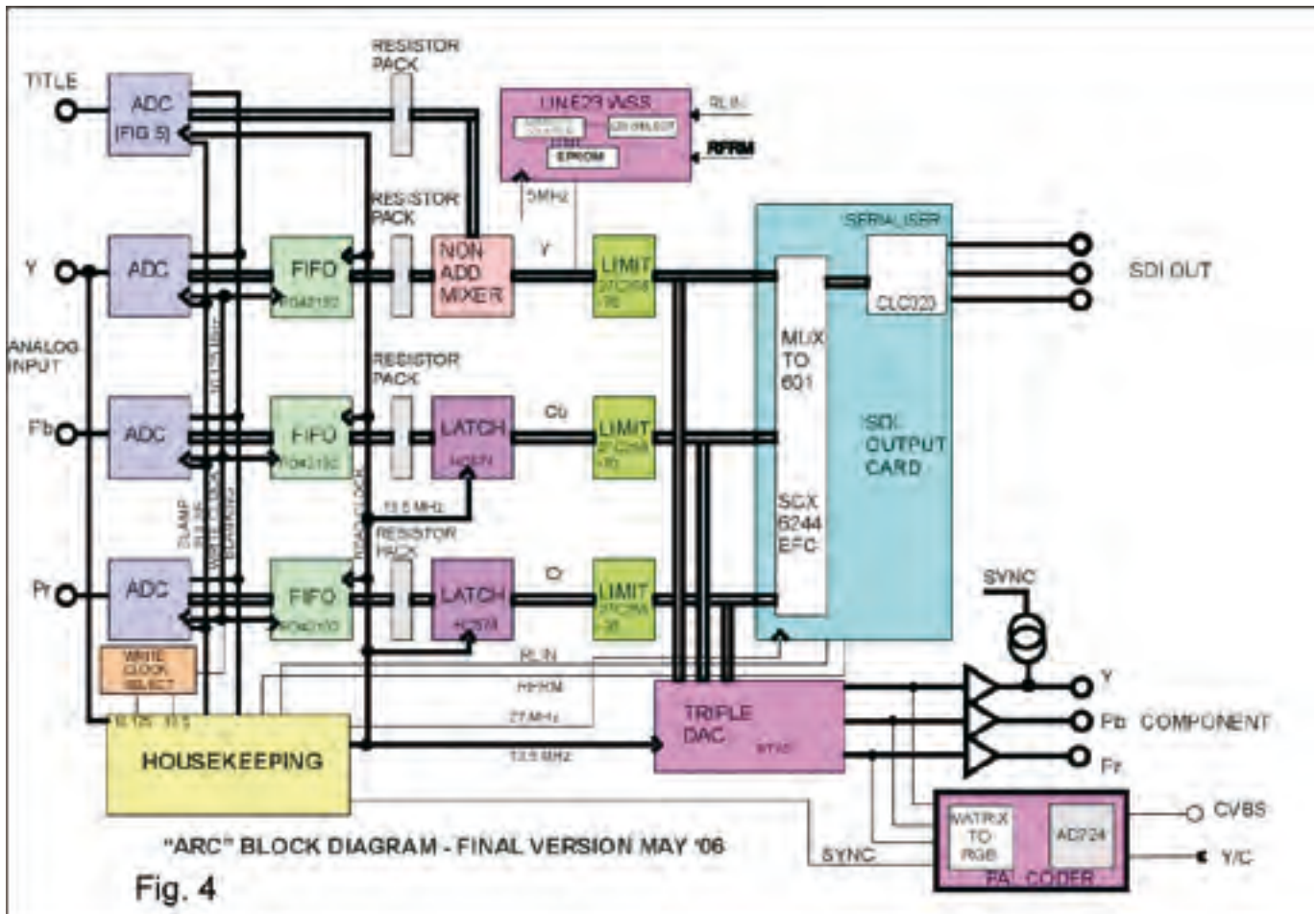


Fig. 3 Wide Screen Signal generator





to sit the ground pin up by the required amount, about 630 mV in the case of colour difference signals, to make black level 80h in the ADC output.

The pot. used is 500 ohms, with a resistor of 1K8 in series to the +5-volt rail. When set, the wiper is close to the top end, making a resistance of around 400 ohms in the ground line. Not surprisingly, the clamp point shifts with APL. The partial cure is to reduce the top resistor to 560 ohms. Thus the pot. wiper is set much lower down, the series resistance is reduced very considerably, and the change in clamp point with APL reduced similarly. [Fig. 5 Colour Difference clamp offset]

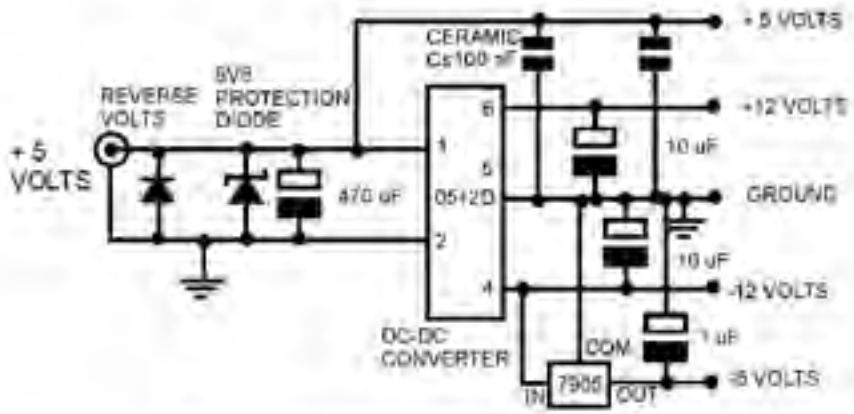
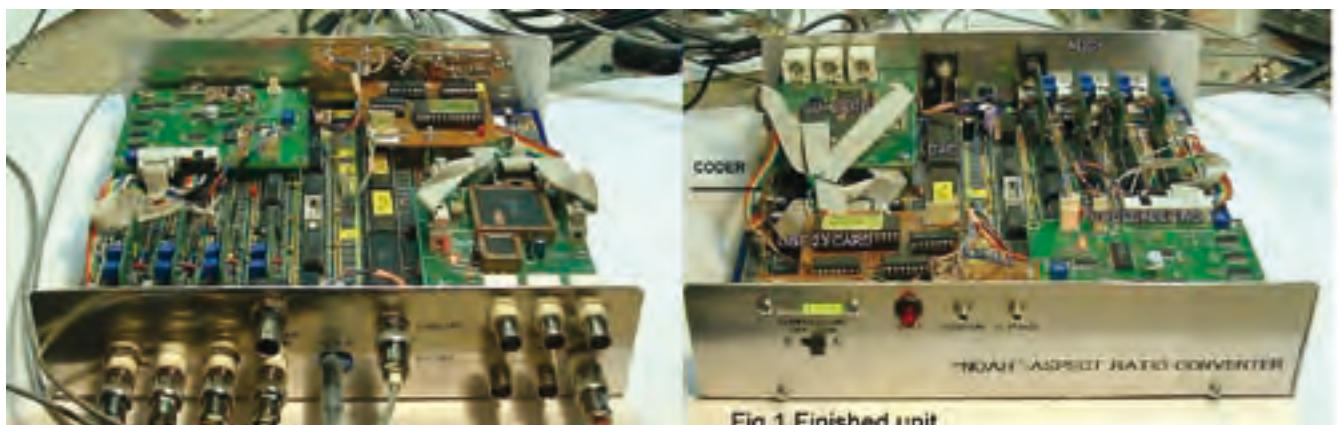


FIG 5 POWER ARRANGEMENTS





The full answer [but not yet implemented] is to drive the ground pin of the GB4551 from an op-amp, with unity gain and the input fed from the adjustment pot. There is a convenient 1.25 volt reference diode on each ADC card to provide for the ADC chip.

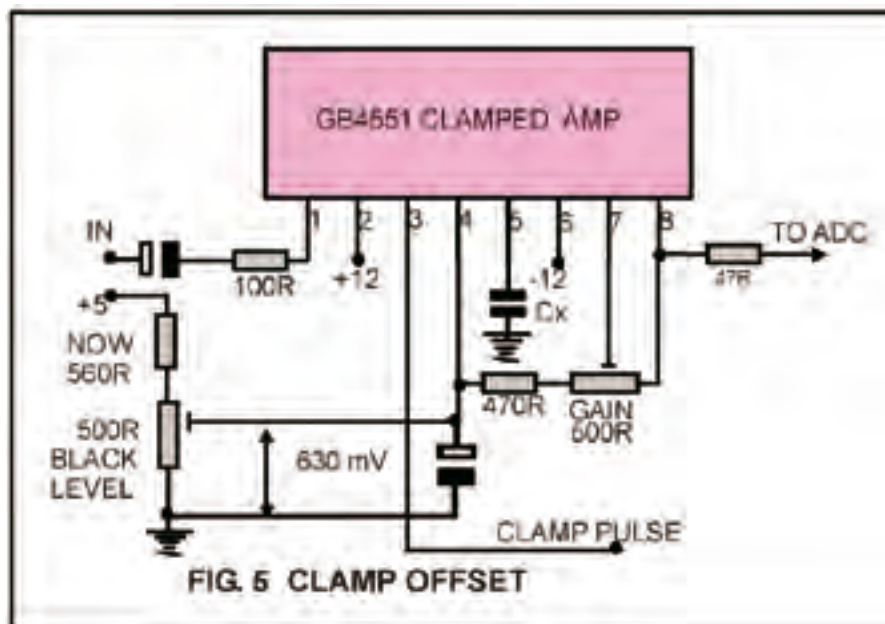
There is no similar problem with the Y ADC, as the offset is only enough to make black level 10h, about 30 – 40 mV, and the impedance is low enough not to cause a significant problem.

Power arrangements have grown like Topsy. The primary source is a 5-volt plug-top supply. The clamped amplifiers in the ADCs need 9 to 13 volts, plus and minus.

Accordingly a 2-watt dc-dc converter provides nominal 12 volts for these.

The component output op-amps [CLC5644] need – 5 volts, as does the Y channel sync addition circuit. Accordingly, a 7905 regulator is fed from the –12 volt supply. Originally I tried a 7660 to make a –5 volt rail from +5 volts, but it was not adequate for the load. [Fig. 6 Power]

All the 5-volt supplies come straight from the primary supply, with a fair chunk of decoupling scattered around. It might have been better to use a 12-volt



primary supply, with switched mode buck converter to +5 volts, and dc-dc converter for the negative supplies, but that is being wise after the event. The present arrangement works!

All in all, a satisfying project, embracing a host of analogue and digital techniques, and giving a useful piece of equipment at the end. [Fig. 7, unit in case]

If any one has ambitions for all or part of this project, you usually know where to find me if you have any problems.

As this is probably the last article I shall write under this Editor's jurisdiction, I must say a heartfelt thankyou to him for his work over the last 30 or so editions. He saw the magazine go from A5 to A4, and despite problems in getting articles, has managed to produce issues full of interesting and relevant stuff. The Club is forever indebted to him. I wish him a happy "retirement".

For all things BATC, visit our web site at  
<http://www.batc.org.uk>

## Amateur Television Quarterly

**Great articles on:**

- ATV**
- Ballooning**
- ATV Projects**
- Antenna Design for ATV**
- ATV Activities**
- Digital ATV**
- ATV On The Internet**
- WorldWide ATV Coverage!**
- USA \$20.00 year**
- Canada \$22.00 year**
- DX \$29.00 year (US \$)**

**Published by: Harlan Technologies, 5931 Alma Dr., Rockford, IL 61108 USA**  
<http://www.hampubs.com>

# Circuit Notebook No. 90 - Veroboard Video Distribution Amplifier

By John Lawrence GW3JGA

## Impedance matching

In professional video equipment all video outputs have a 75R source resistance and all inputs have a 75R input resistance. This is to ensure that when equipment is connected together using 75R coaxial cable, the coaxial cable is terminated into 75R at both ends and signal reflections are prevented.

## Distribution Amplifier

The little distribution amplifier to be described has the required 75R input resistance and has two outputs each having a 75R source resistance. It could be used to feed simultaneously a TX and video monitor, or two video monitors.

The circuit is shown in Fig. 1. The amplifier consists of a video op-amp which is connected to provide a voltage gain of X2. A 1V peak-peak signal at the input of the op-amp results in a 2V p-p signal at its output. This signal increase is necessary because the output signal is sent through a 75R source resistor through a co-ax cable into a 75R load in the next piece of equipment. This results in the signal being halved – back to 1V p-p.

The distribution amplifier uses the Analogue Devices AD817AN op-amp [1] (Rapid Electronics 82-0482). I would normally use an Elantic EL2020, but the manufacturers say that it 'should not be used for new designs'.

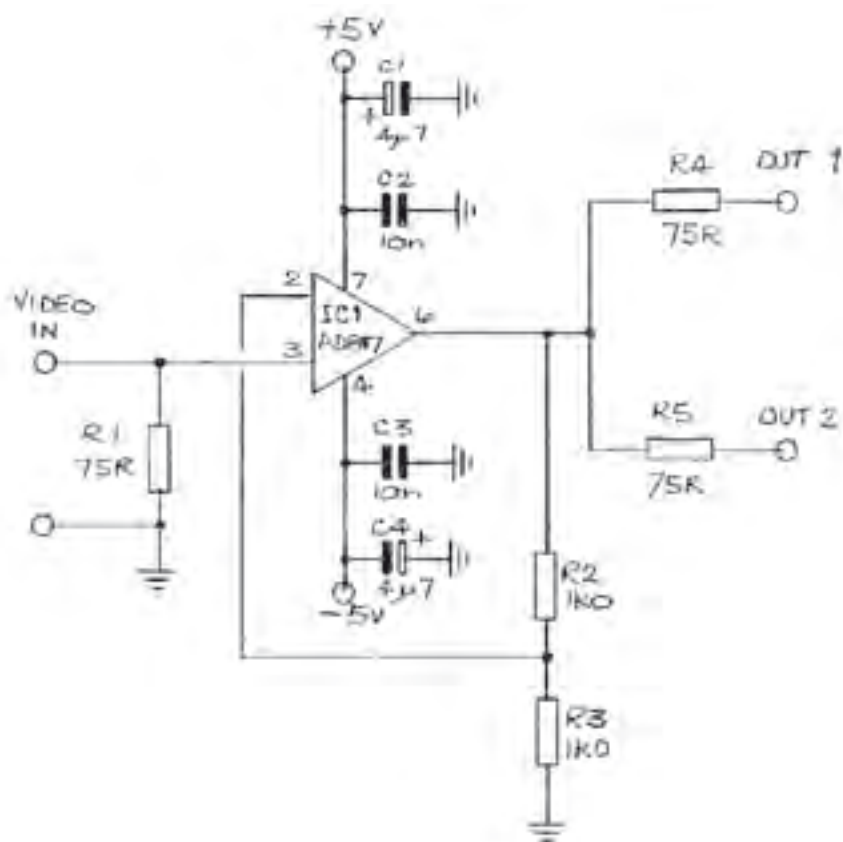


Figure 1 - Circuit of Video Distribution Amplifier

## Construction

The unit is built on a piece of 0.1" matrix Veroboard, 7 strips wide by 15 holes long. The component side of the layout is shown in Fig. 2. The overall size is 0.8" by 1.6" (17.8mm x 40.7mm). As it

is so small, it can be mounted by using a single M3 screw and an M3 mounting pillar. In the layout, an 'X' indicates a break in the copper track, a black blob indicates a soldered joint and a line between tracks indicates a wire link. I use pins to make external connections

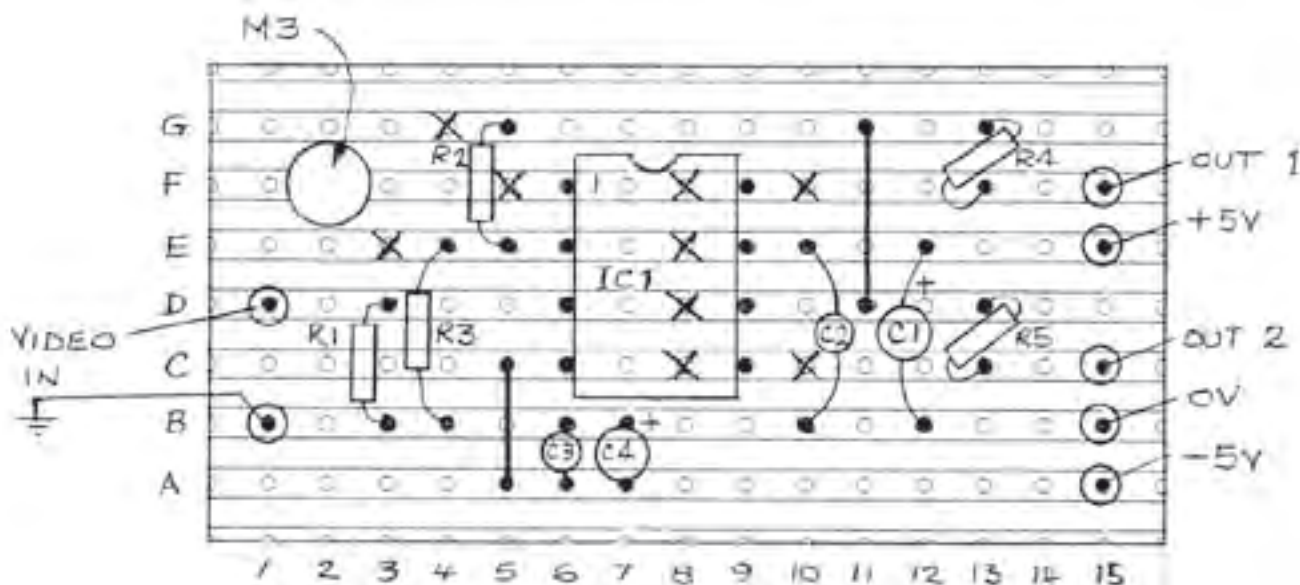
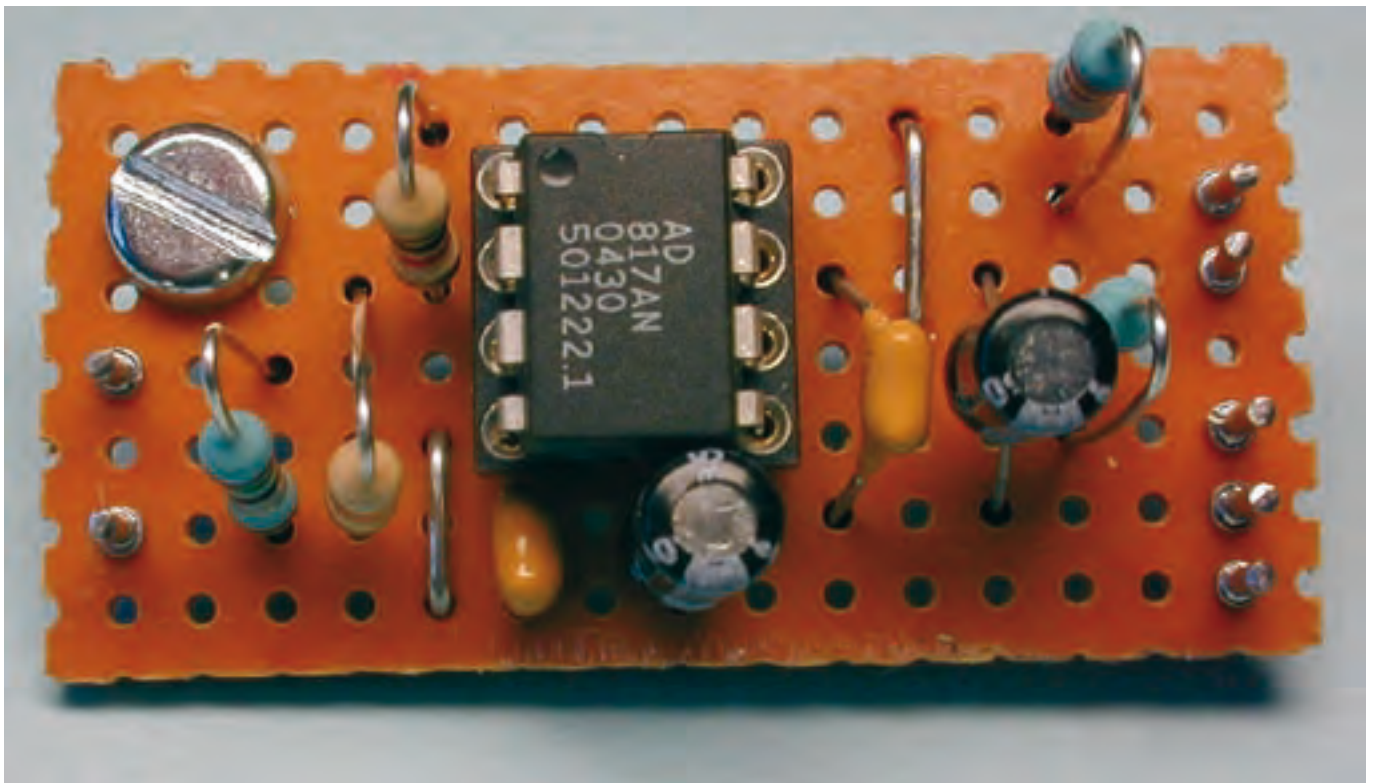


Figure 2 - Veroboard Layout, component side





**Figure 3 - Completed Distribution Amplifier**

to the tracks but you could solder the wires directly. The completed amplifier is shown in Fig.3.

### Performance

In basic tests, the amplifier using the AD817AN has a bandwidth exceeding 6MHz  $\pm 0.3$  dB when driving into two 75R loads. The performance using an EL2020 is marginally better.

### Supplies

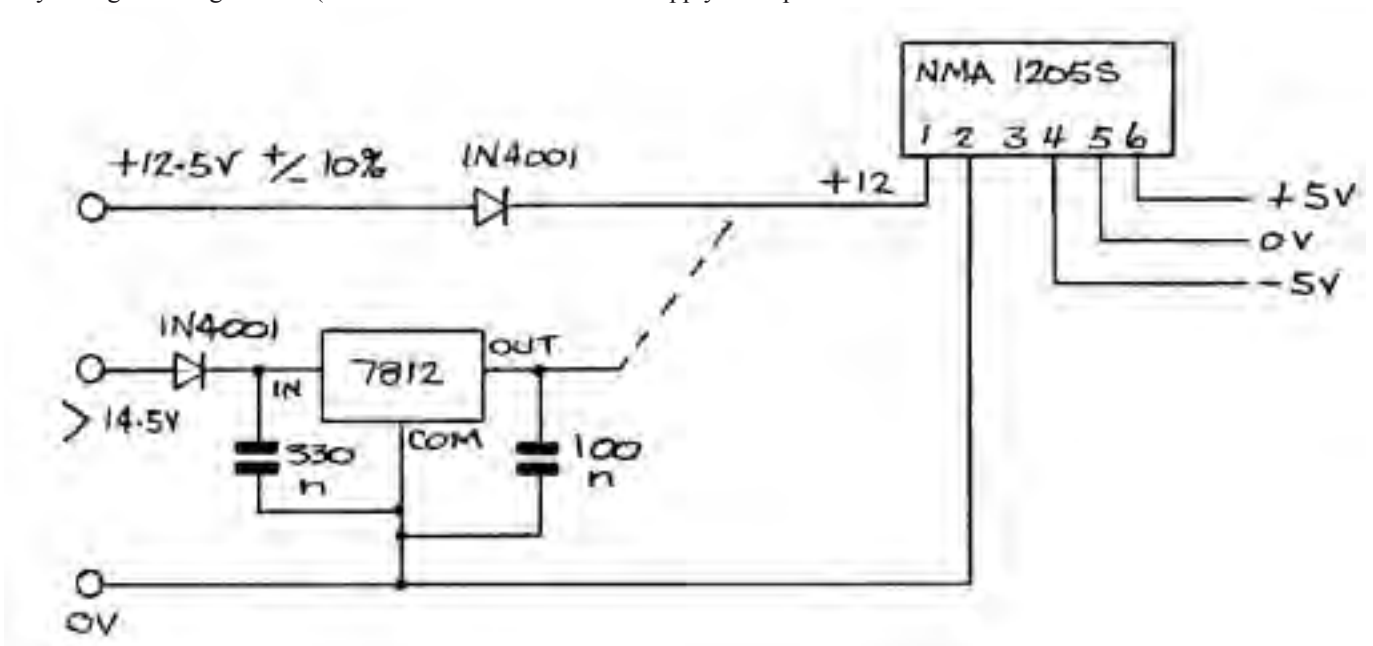
The amplifier requires supplies of +5V and -5V, both at 7mA. The easiest way of generating these (from the

usual +12V supply) is to use a DC-DC converter, 12V in,  $\pm 5$ V out, such as the Newport NMA 1205S (Rapid 84-0315). This DC-DC converter does not have an internal regulator so it must be supplied from 12V  $\pm 10\%$ . A warning – if you use a plug-top power supply, then make sure it is a 12V regulated type. Unregulated types may produce an output in excess of 20V when lightly loaded. If this is the case then the DC-DC converter could be fed from a +12V linear regulator IC, such as the 7812. To avoid damage due to the accidental reversal of the supply it is prudent to

include an ‘Idiot Diode’ in series with the 12V supply. The various options are shown in Fig. 4.

### Distribution Amplifier Application

A suggested application for the Veroboard Distribution Amplifier is shown in Fig. 5. This is a very basic video switch box (metal preferred) which could be used in a simple home station or when out portable, to avoid having to disconnect and reconnect cables.



**Figure 4 - Power supply options**



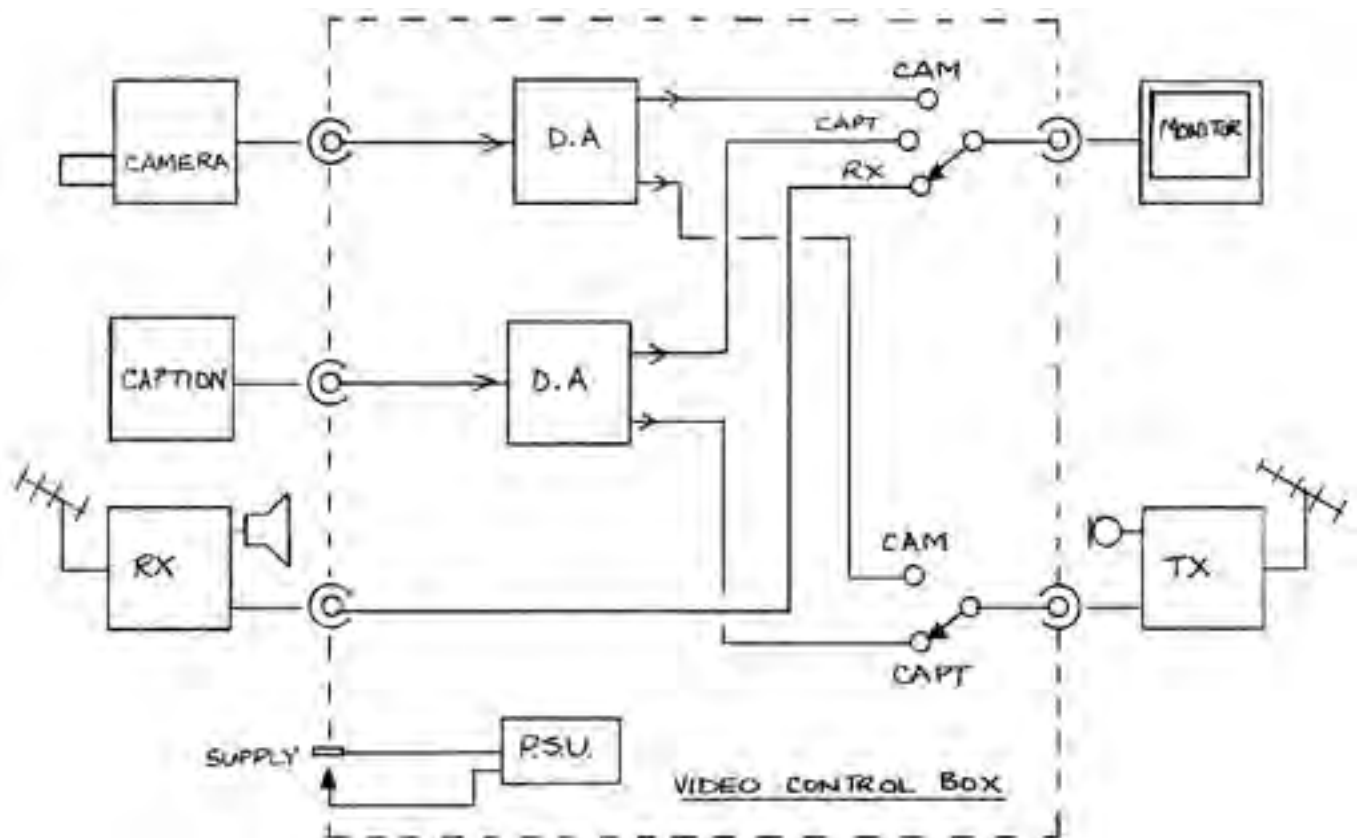


Figure 5 - Application, Video Switch Box

The three inputs are from, for example, a camera, a caption generator and a receiver. A single-pole 3 way switch routes the video signal to a monitor. The monitor can then display the camera, caption, or received signal. The other output goes to the TX. A two way switch allows either the camera or caption to be selected.

Asuitable supply option may be included in the switch box to allow shack or portable use. All coax connectors have their outer connections joined together through the metal of the box, to which is also connected the 0V of the power supply.

### Interconnecting Equipment

As mentioned previously, coax cable with a characteristic impedance of

75R and fitted with BNC plugs is usually used for interconnecting video equipment. For short cable lengths up to, say, 2 metres or so, the cable impedance is less critical and thinner cables fitted with phono plugs may be used. These cables are typical of those supplied with domestic video equipment, camcorders etc.

As domestic video equipment is often used in the ATV shack, together with some professional or semi-professional equipment, it is necessary to keep a selection of leads or adaptors to hand. For example, 'phono female to BNC male' (Rapid 16-0135) [3] and 'BNC female to phono male' (RS Components 406-470). Phono connectors of reasonable quality are much cheaper than BNC types and very much easier to fit. In

general, good quality domestic phono to phono leads are quite adequate for use in the ATV shack.

After many years of building video equipment using only BNC sockets, I am considering fitting phono sockets in parallel with BNC sockets on future equipment, to avoid having to use adaptors and converter patch leads.

### References

- [1] AD817 Data sheet - Google - type in 'AD817'
- [2] NMA 1205S Data - Google - type in 'nma1205s'
- [3] Rapid Electronics Ltd [www.rapidonline.com/components/](http://www.rapidonline.com/components/)

### Mr. Ivan Bert Howard.

It is with great sadness that I have to report the sudden death yesterday of Mr. Ivan Bert Howard, G2 DUS, of Stotfold most of his life and lately of Langford Beds. I am and have been a friend of the family for the past 20 years and I am saddened by his passing. I know he was an active member and leader in times past of all things amateur radio and television. It would be nice if you could let his many friends in the BATC know of his demise. If anyone would like more information, please feel free to contact me here and I will pass onto his family and sons any contacts. Thank you for your assistance. - Mr. C.Anderson aka Neon. Friend of the Family (CNEONLITE@aol.com)

## An Improved Diplexer

By Ian Waters G3KKD

A diplexer is a useful device. At a repeater, with limited space on the tower, it enables transmission and reception via a single aerial. Conversely at a home station, with space constraints, it can provide look thru using the transmitting aerial.

In CQ-TV 187, August 1999, I published an article "Two filters and a diplexer for 23 cm". A diplexer of the type described, which used two 5 element type B filters is in successful use at the GB3PV repeater. Further development has now enabled the improved design, as described below, to be made. There is nothing particularly new about it as units of this sort have been used in communications radio systems for a long time. This is however, as far as I know, that one has been designed specifically for 23 cm ATV.

It will be seen from the drawing and photo that the new diplexer consists of two type B filters, as described previously, constructed as a single item with a common central matching transformer which is connected to the aerial. One filter is tuned to the receive channel and the other to the transmit channel.

Power from the transmitter passes via the TX filter, with an in band loss of about 2 dB, to the aerial while a received signal passes, again with a loss of about 2 dB to the receiver. The out of band attenuation of the RX filter at the transmit channel of > 60 dB prevents any significant transmitter power from

reaching and de sensitising the receiver. Likewise the out of band attenuation of the TX filter at the receive channel of > 60dB removes any unwanted transmitter sidebands from interfering with the receiver.

Both filters are designed with a -3dB bandwidth of about 12-14 MHz and have a VSWR of about 2:1. Their characteristics are given in Fig 1. In addition to protecting the receiver from the transmit signal the RX filter, with a bandwidth tailored to suit the ATV FM transmission standard, gives protection against other high level RF fields which may be present on site. Repeaters are often installed on multi user sites where RF levels are so high that the TV receiver would be totally blocked without a filter, although its loss does slightly degrade the receiver performance. The TX filter, again with a bandwidth tailored to suit the signal, suppresses all other out of band emissions, which could cause problems for other services.

The transmit/receive cross loss is beyond the limit of practical measurement. When receiving a P1 picture it is possible to switch the associated transmitter on/off without seeing any change in the received picture quality.

### Construction

Ideally the diplexer should be constructed in brass and silver plated. However as this is expensive, a perfectly satisfactory result can be obtained by using aluminium. The mechanical details of the diplexer may be seen from Fig 2. and the photograph. It is

quite easy to construct provided that a small lathe and the usual hand tools are available, but the work is quite time consuming. If no lathe is available the services of a friendly model engineer might be sort.

The diplexer dimensions have been calculated based on a distance of 1.0" between the side plates. This enables the top and bottom plates to be made from 1x ¼ inch stock strip. It is also the reason for the use of imperial dimensions. The side plates are cut from 16 SWG or better 14 SWG sheet. The top and bottom plates should be drilled and tapped m3 or 4BA and the sides attached with screws at 1" intervals. Care should be taken to remove any burrs to ensure good contact.

The rods are turned down from the next larger size of stock rod. They should be accurate to about +/- 0.002". They are centre drilled and tapped for attachment to the top and bottom plates, using any suitable screws. The tapped ends are countersunk slightly to ensure good electrical contact at the circumference where the r.f. current flows. The centre and two end rods, or input/output transformers, are drilled to accept a stiff wire soldered to the centre contacts of the sockets. These are clamped by small screws, in radial holes at the rod ends. N, BNC or TNC connectors may be employed.

The tuning screws may be of any size from ¼ to ¾" in diameter and can use any fine thread for which taps and dies are available. I have used 32 threads per inch, which gives a very nice



The completed unit

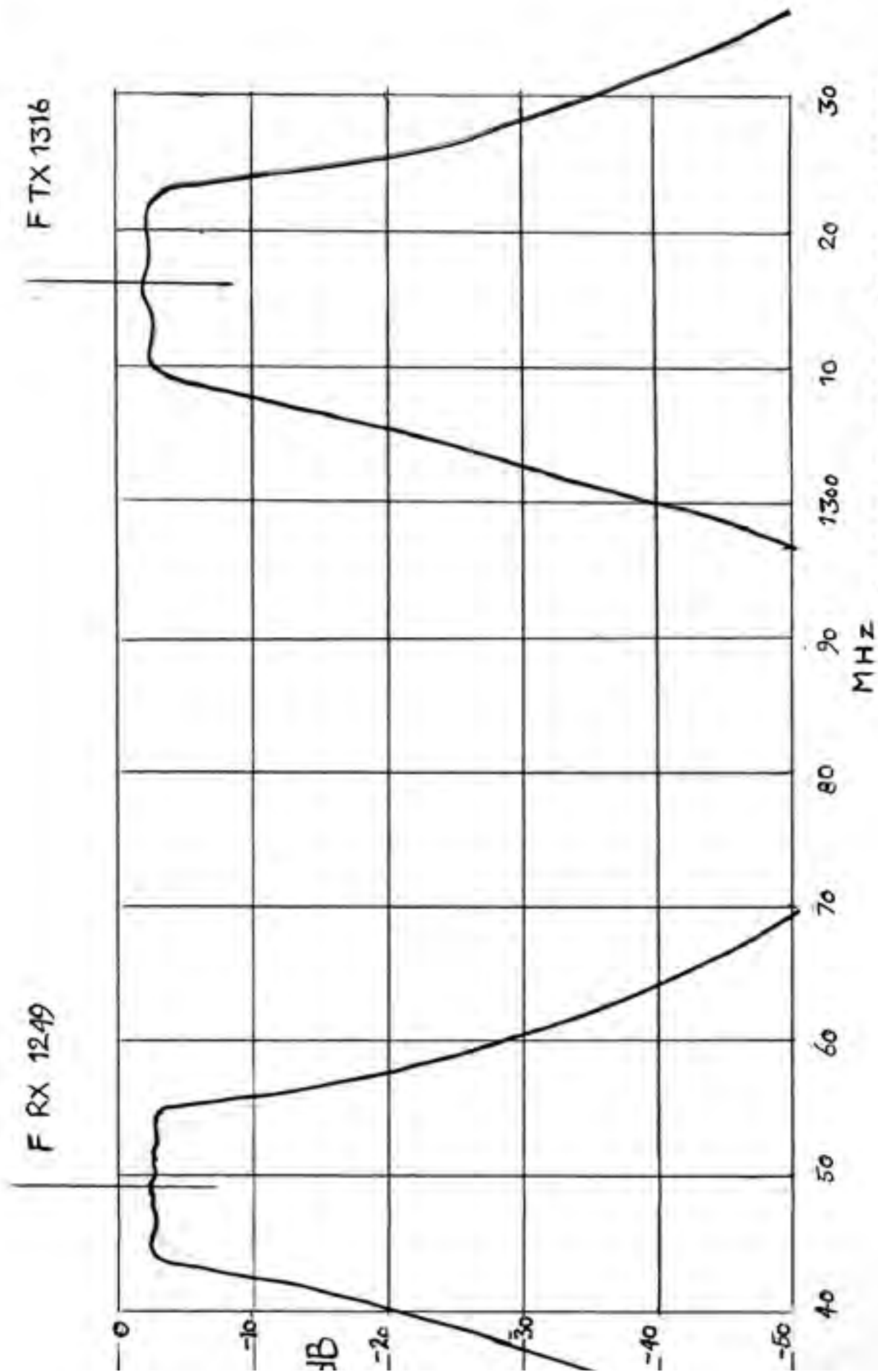


Fig 1 DIPLXER PASS BANDS



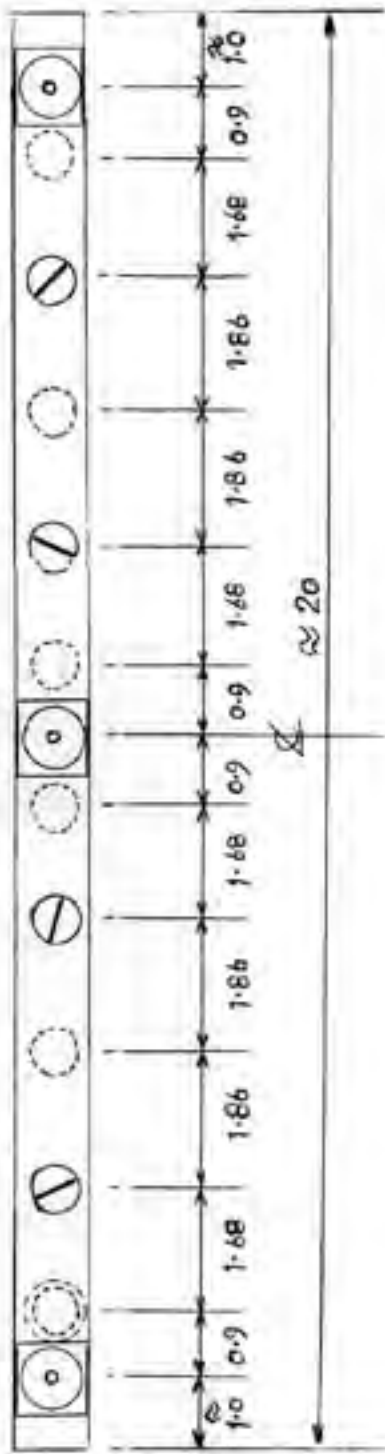
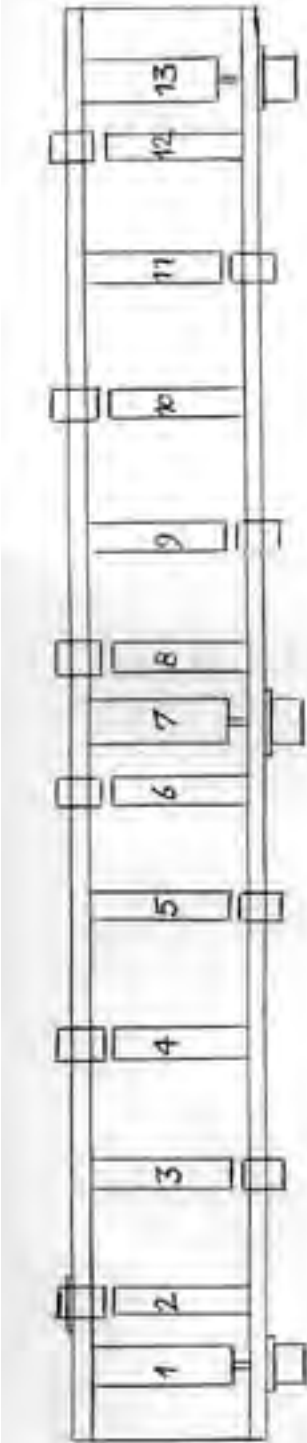


Fig 2 23 CM ATV DIPLEXER  
G-3 KKD 10-6-2006.

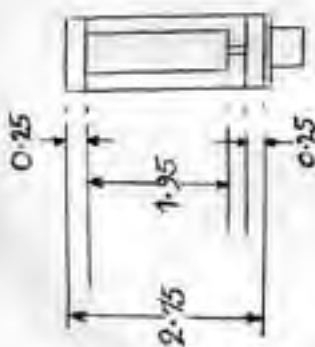
tuning adjustment. However great care must be taken as fine threads, especially if aluminium is used, can pick up and seize quite easily. Plenty of cutting paste or oil! Once both threads have been cut the screws should be lapped into their holes using fine grinding paste, which must then be thoroughly washed off.

Lock nuts are required which are tightened gently once the diplexer has been tuned. The diplexer body continues for about 1" beyond the end transformers, but this dimension is not critical. Also, if it is to be used in an environment with high r.f. fields, typical of some repeater sites, end caps although not essential, can be added to prevent unwanted signals from reaching the receiver.

### Tuning Up

I have tuned my diplexer using a sweep oscillator with frequency markers. This enables the pass bands to be set exactly as desired and the shape optimised with minimum ripple. One problem is to first tune a filter to allow enough signal through it to enable alignment to be started. I have inserted a c.w. signal at the pass band centre frequency and looked for something at the output using a spectrum analyser. Once something is seen, even at -70dB, the tuning can be quickly optimised. A communications receiver with S meter could also be employed. Another approach is to use a rhotector (reflected signal indicator), if one has one, in conjunction with the sweep. The sweep signal is applied, via the rhotector, to each end in turn. The nearest tuning screw and then subsequent ones are adjusted for minimum reflected signal. This gets the filter close enough for normal alignment to continue.

I appreciate that not everyone has a sweep generator or spectrum analyser. If anyone would like me to line up a diplexer they have made I would be glad to do so.



ALL RODS 1.95" LONG  
RODS 1,7,13 0.54" Ø  
2,6,8,12 0.38" Ø  
3,4,5,9,10,11 0.39" Ø

## Flying camera

By Tony Summerville N5RPQ

**F**ield Day 2005 - Setup is complete. The antennas are mounted. The rotors are firmly in place. The first satellite pass is a success and there's an hour or so until the next pass. What to do? Why not fly a photo reconnaissance mission? Since, I don't have Uncle Sam's deep pockets to field a Predator UAV, I do what many R/C modellers have done, I build my own. I discovered the AP forum (Aerial Photography) while cruising one of my favourite Web sites (<http://www.rcgroups.com>). These modellers have combined radio-controlled aircraft and imaging devices to capture unique perspectives unavailable to people without normal heavier-than-air transportation. For years, members of my local R/C flying club have mounted cameras on their aircraft and have taken pictures of the local flying fields, and surrounding areas. However, extra care is needed when practising AP away from normal modelling facilities. With that in mind, we can proceed.

Standard light-weight disposable cameras from the drug store will work fine for AP and the picture quality can be gorgeous. A small servo can be used to trip the shutter on command. A drawback associated with using this type of simple camera is the need to land after each shot to advance the film. Even then, only a few shots will be worth keeping and film processing gets expensive. Digital cameras allow

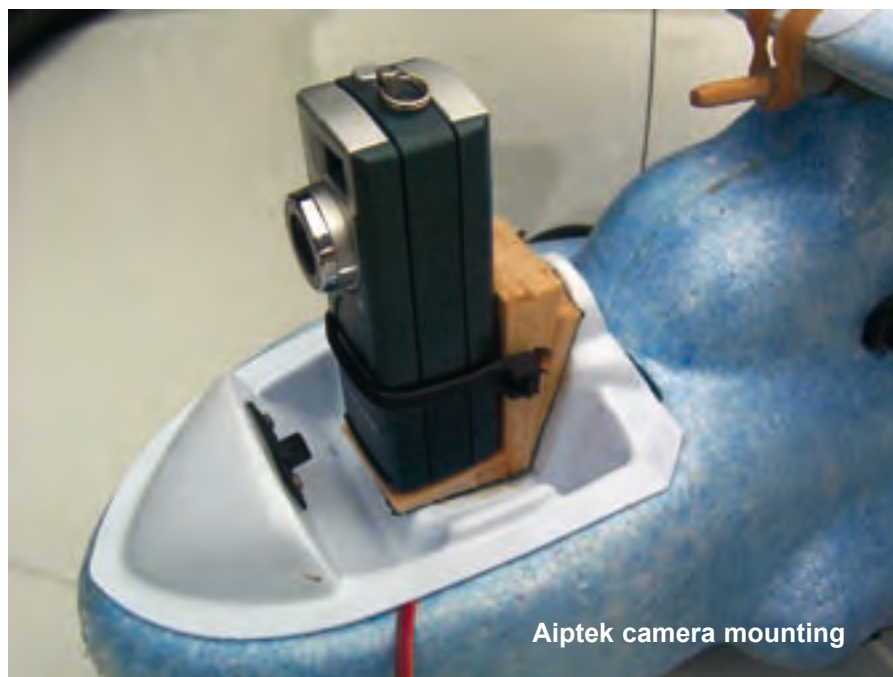


SoarStar aircraft with Aiptek camera

you to take lots of pictures, and with the click of a mouse, delete the ones you don't want. Digital cameras however are expensive! Well, not always. It depends on the quality of the image you are after. I'm using an Aiptek 1.3 Megapixel camera that I bought for a little more than \$50. I've seen them sold on eBay for less. Shop around. What you want is a device with at least 1.3 Megapixel resolution. A discussion thread in the AP forum had a complete dissertation on modifying the Aiptek camera to electrically trip the shutter and also power the camera from the

R/C flight-pack batteries. I modified my camera and purchased an electronic switch to control the camera from the R/C receiver. A quick search of the Internet located similar circuits for those wishing to build rather than buy (<http://www.uoguelph.ca/~antoon/>).

With camera and associated electronics in hand, we can look for a suitable airframe to carry it into the sky. There are many aircraft and power systems to consider. The primary nemesis of AP is vibration. Vibration can turn an otherwise outstanding picture into a fuzzy mess, and leads most experimenters to electric propulsion. Electric powered planes produce much less vibration. When it's time for a shot, the motor can be stopped, the picture taken, and the motor can be throttled up to continue flying until the next photo opportunity. I'm flying the Soarstar, an injection moulded foam ARF (Almost Ready to Fly) model. I bought it for flying in a field behind my house when I didn't feel like, or have time to, drive to my normal club field. The Soarstar flies well, came with the flight propulsion system (electric motor, gearbox, propeller, speed control, and battery), and can support the modest weight of my small camera system. Many people are also using park flyer aircraft such as the Wattage Slow Stick, suitably strengthened to withstand the extra load. The Soarstar however, has a front cockpit area that just begs for a camera. Add the R/C system, a little



Aiptek camera mounting





What more could you want? Space for antennas, tres for shade and a pool to cool off in.



QRP station under big tree - shade!!!





**QRP station under trees, satellite operations in camper near green canopy**

balsa structure for camera support, some double-sided tape, a few wire ties and it's ready to go. My entire airborne setup weighs only a few pounds.

If flying your own AP mission sounds intriguing but you're new to flying R/C craft, check out the Academy of Model Aeronautics web site (<http://www.modelaircraft.org>) or your local hobby shop for the location of a local flying club. Most clubs have flight instruction programs to help you learn how to fly safely. You will also meet a whole new group of friends.

The next time you are on the local ATV repeater or just swapping SSTV pictures, send over something interesting from an entirely new perspective. I would like to thank Andy MacAllister W5ACM for his assistance and editing the rough draft.

*Reprinted from ATVQ, fall 2005.*  
<http://www.hampubs.com> © Harlan Technologies



**Aiptek camera mount showing external shutter control wire**

## Turning back the pages

By Peter Delaney

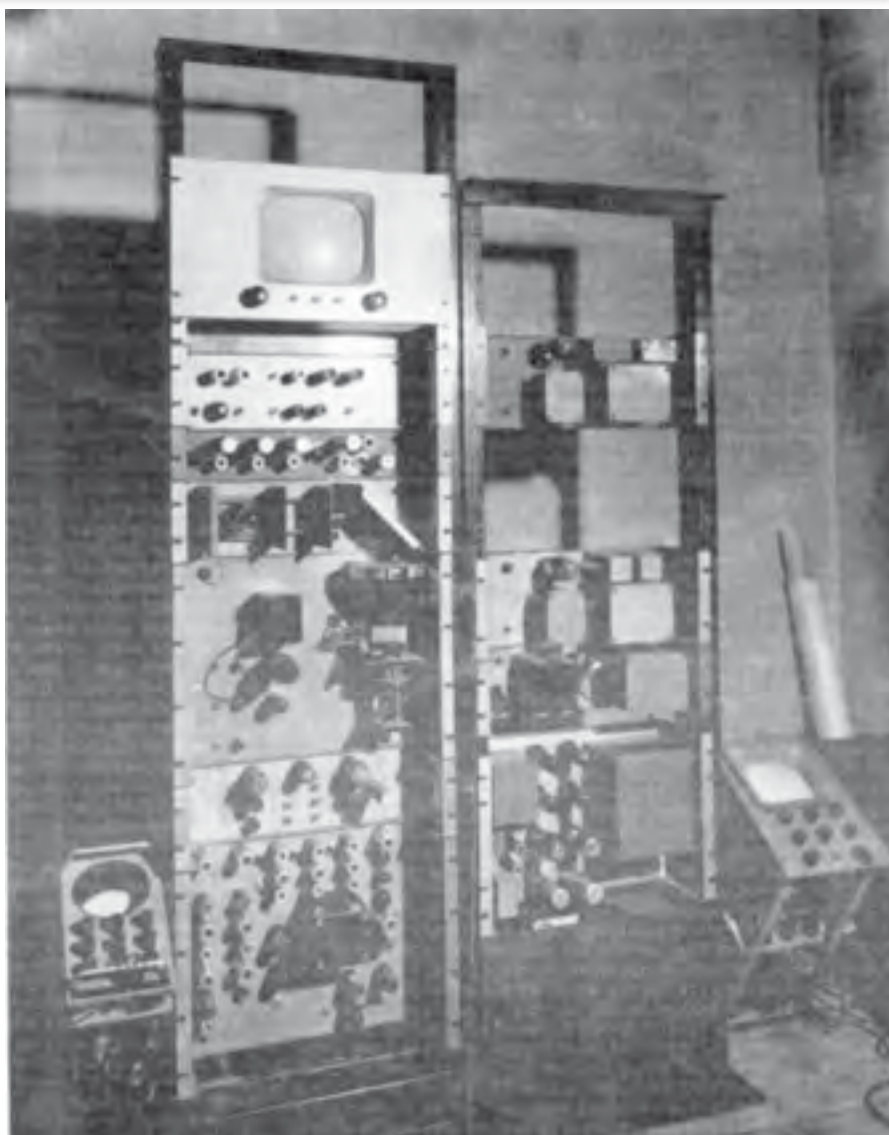
**A**dip into the archives of CQ-TV, looking at the issue of 50 years ago.

CQ-TV 29 - "Summer 1956"

The Editorial announced that the Club would be holding its third Amateur Television Convention on November 3rd, in central London, with the main accent on the exhibition of equipment, hoping that as many members as possible would bring either their gear or photos of it.

### The 'Comment' column asked :-

"Are any members working on the recording on tape of video signals? This has been successfully accomplished by several firms without using high speed tape running. By scanning the tape laterally as it moves along, a television picture can be built up in the form of a long thin "raster" on the tape. At 15" per second, scanning 10 lines across the width of a standard 1/4" tape, and using a recording area 5/1000" in diameter, it should be possible to record about 2 Mc/s without too much difficulty. With such a small recorded area, of course, signal to noise ratios will be low by comparison with sound recording, but this should not matter too much for our purposes. The biggest snag is in scanning the tape effectively. Several methods came to mind: two contra-rotating helices of Ferroxcube with their axes at 90° to the direction of tape travel; the use of magnetostriction in nickel wires across the tape; a rotating wheel with its axis parallel to the tape, with a series of recording heads around the periphery (a French firm have tried this), and so on. The problem is to track a small area of magnetisation across the width of the tape in, say, 1 millisecond. A pointed series of pole-pieces on the periphery of a wheel might do, but the recording head itself must also respond to 2 Mc/s signals, indicating the use of Ferroxcube or similar materials. If anyone has a good idea, it might be mentioned that the Ampex video tape recorder costs about 54,000 dollars, so there is room for an amateur model! In passing, it might be mentioned that you may be surprised at the results obtained with very low definition TV: G2WJ has put quite reasonable pictures through his Williamson amplifier for instance.



CQ-TV 29 cover

We look forward to having Club lecture tapes with video accompaniment."

*(\$54,000 would be at least £500,000 in today's values)*

The front cover photograph showed the two 19. racks used by John Plowman G3AST of Luton. The left-hand rack contained (from top to bottom) the 9" MW22-14C monitor, a blank panel for a G8SK-type 70cm transmitter, bootstrap modulator and mic pre-amplifier, video amplifier panel, 931A and optics (f3.5) for 2" x 2" slides, 5FP7 scanner and time bases, cathode followers for feeding scanning waveforms round the shack, and the interlace generator. The right-hand rack contains a 500V PSU, 325V PSU, 5kV EHT PSU, and three 300V regulated supplies. A double-beam waveform monitor is on the left, and a VCR97 or 517c portable picture

monitor at the right. All the rack units were made on pan-type chassis, and mounted on runners. *(Maybe modern Health and Safety requirements would preclude such an arrangement, with the exposed crt, now!)*

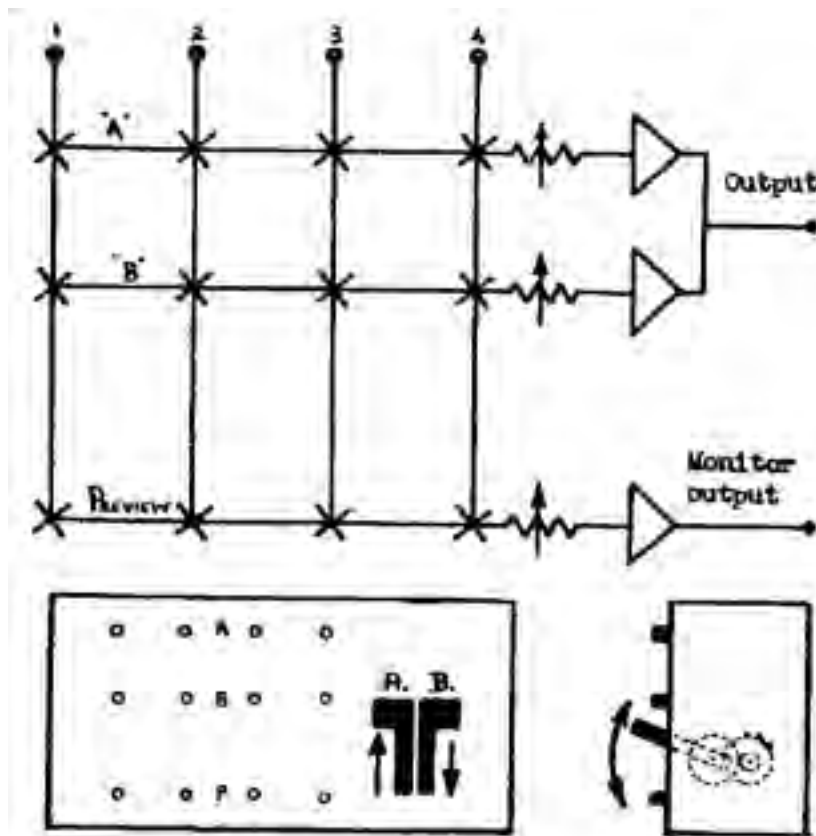
The technical articles included advice on how to set up counter chains and information for 70cm transmitters using the 4X150A and a circuit for a low power transmitter using an ECL80 and 3 6J6 valves (one of the latter as the PA.), whilst another article covered the basics of vision mixing. Although the valve amplifiers would not be used, now-a-days the basic ideas would still form the basis of a modern mixer.

"Known professionally as the "A-B Fader", this has two inputs that can be mixed simultaneously, rather than all possible inputs; in practice, however, it



is rare far more than two to be needed anyway. Normal "out" facilities are included, but in addition the fade-up-A-fade-down-B is made very easily, making for easy dissolve mixes.

Each input is brought to two sets of cut buttons (marked "A" and "B") and a set of preview buttons. The preview amplifier is a high-impedance device which is switched across the input lines. The input lines pass through the A and B buttons in turn to 75 ohm terminations. The outputs of the A and B amplifiers are commoned, but their inputs are fed from lever-operated faders. The levers are geared to the potentiometers in such a way that the sliders travel over the whole track as the lever is varied. The two levers are arranged vertically in such a way that when both levers are up, (i.e. alongside A buttons), amplifier A is at maximum gain and B is at zero, and vice versa when the levers are down. Thus by operating both levers together, a smooth dissolve from A input to B input, or back again, can be obtained. By using the levers separately, normal can be accomplished. Extra contacts on the A and B buttons are arranged to complete the cue-lamp circuits. Four inputs are shown, but any number could be used; four is quite enough for the average amateur studio."



Vision mixer

## Lighting for Television and Film

By Peter Alan Johnson

Supervisory Lighting Director, Engineering  
Manager, for Studio and Outside Broadcasts, retired



A foundation for lighting expertise

For the person who requires a practical guide on how to light for television and film, without cumbersome reasons arguments, pros and cons, etc. This book provides proven examples of everyday lighting situations that may occur in any television or film studio and outside locations. One does not need to know how a television camera works or how a film camera works, but this knowledge is helpful and some attempt must be made to understand the basic principals.

To understand how the requirements for television and film in terms of the lighting luminaries, power requirements, the light intensities, and most importantly the colour temperature of the light sources, their directional angle and their quality as hard or soft light sources. Recognise the difference between hard shadows and soft shadows.

Let it be said that one does need a keen interest in the subject in order to master it.

*This ebook is available on CD exclusively from the BATC at a cost of £5 including postage.*



# BATC Accounts 2005

## Income and expenditure account

At 31 December	2004	2005
<b>Income</b>		
Subscriptions	15,902.58	13,720.15
Members services	1.58	3.15
Publications surplus	205.04	266.87
Advertising	1,580.00	193.00
Bank & Building society interest	429.49	917.41
Rally or Covention surplus/loss	-801.25	
Donations	39.99	11.13
Postages, Airmail	210.00	36.00
Miscellaneous	1,651.87	5.00
	£19,219.30	£15,152.71
<b>Expenditure</b>		
CQ-TV printing	9,986.72	8,034.42
CQ-TV postage	5,643.23	4,240.91
CQ-TV production	182.51	253.21
General Office expenditure	265.53	12.99
General Postage	610.08	217.63
Internet Web Site expenses	367.26	305.47
E- Mail	209.86	179.88
RSGB affiliation fee	42.50	42.50
Committee members expenses	97.60	
Insurance & legal	126.00	147.00
Rally attendance	77.00	78.00
Recruitment	0.00	21.00
Adverts and publicity & Projects	0.00	41.00
Donations	0.00	341.12
Bank charges, mainly "VISA" costs	243.37	265.64
	£17,851.66	£14,180.77
<b>Surplus for the year</b>	<b>£1,367.64</b>	<b>£971.94</b>

### Notes for 2005

The figures in "Income" for members services, publications, the rallies and conventions are the net contributions or loss to club funds.

The figure of £341.12 was a donation to the ARISS Antennas on Columbus project.

**Balance sheet at 31 December****2004****2005****Fixed assets**

Office equipment Additions	229.15	91.82
Less Depreciation	-229.15	-91.82

**Current assets**

Stock: - Members services	1,943.64	1907.13
Publications	49.00	55.00
Back issues of CQTV	300.00	300.00
Nationwide Building Society	136.09	138.48
Halifax Bank	10,593.52	10,765.66
GiroBank/Alliance Leicester account	5,353.39	281.95
Bank of Scotland current account	15,090.85	17,652.52
Bank of Scotland investment a/c	30,039.61	30,540.58

**Less Current liabilities**

Subscriptions received in advance	17,471.41	14,634.69
	<u>£46,034.69</u>	<u>£47,006.63</u>

**Represented by accumulated fund**

Balance brought forward	44,667.05	46,034.69
Loss/ Surplus	1367.64	971.94
Balance carried forward	<u>£46,034.69</u>	<u>£47,006.63</u>

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.

Brian Summers  
BATC Honorary treasurer  
July 1<sup>st</sup> 2006

## Members Services

All prices in UK pounds (£)		Each	P&P	Qty	Total
<b>Camera Tubes, Scan Coils, Bases &amp; Lens Mounts</b>					
3	One inch Vidicon base	£1.20	£0.30	.....	.....
4	2/3 inch Vidicon base	£0.80	£0.30	.....	.....
<b>Video and I<sup>2</sup>C Circuit Boards/Components</b>					
7	Sync pulse generator PCB	£14.00	£0.43	.....	.....
40	I <sup>2</sup> C CPU PCB	£10.00	£0.43	.....	.....
41	I <sup>2</sup> C 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 <sup>2</sup> C 27256 EPROM	£9.70	£0.30	.....	.....
38	PCF8574P Input expander IC	£4.70	£0.30	.....	.....
10	I <sup>2</sup> C Relay PCB	£6.50	£0.43	.....	.....
9	PCF8574A Input expander IC	£4.70	£0.43	.....	.....
<b>RX, TX and SSTV PCB's and General Components</b>					
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	.....	.....
<b>Stationery &amp; Station Accessories</b>					
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					£.....

**PLEASE MAKE CHEQUES PAYABLE TO 'BATC'.**

## 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. The BATC handbook featuring construction articles on video units, 24cm and 3cm ATV, a Digital Frame Store, and much more.	£5.00	.....	.....
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, 209, 210,211	£1.50	.....	.....
Special Offer: Any four of the above issues	£5.00	.....	.....
212, 213, 214,215	£3.75	.....	.....
The BATC DVD	£5.00	.....	.....

**All goods on this page can be ordered, with a credit card, via our online shop - [www.batc.org.uk](http://www.batc.org.uk)**





## Wanted

As you will see from the chairman's column, the club is in need of someone new to edit this wonderful publication. This issue is my last, but the next one could be edited by you!!!

The job is not difficult (well I have been able to do it for several years) but it is time consuming. You will need a fairly potent PC running Windows XP to be able to use the clubs image editor (Photoshop) and DTP package (InDesign)

**All applications to the chairman - [chairman@batc.org.uk](mailto:chairman@batc.org.uk)**

## Lens to Lens - Part 3

By Brian Kelly

### From concept to DVD, a flash of inspiration to flash of laser light.

We have looked at shooting a video production and editing the clips together to make a video production. Now we will take a look at the best way to prepare the production for distribution and the final stage of making a DVD, the authoring and burning process.

To recap on where we left off last time, the clips are added to the timeline in the desired order to match the storyboard and suitable transitions between the clips have been added. Titles and captions have been added as overlays and background sounds and music has been mixed with the sound track. Basically, the artistic part of production is finished and viewable in its final form in the preview window in the editing program. At the moment though, it only exists on the computer and can only be played back from within the editor. We need to convert it to a format that allows it to be viewed on the end-users own equipment whether that be over the Internet, on a mobile phone or the most likely scenario of a DVD.

Video can use up huge amounts of disk space, full broadcast quality recording take up about 21 megabytes per second, high definition recordings take even more. That equates to about 75 gigabytes per hour! Clearly this is too much to conveniently handle, even on DVD that would imply 18 disks for a one hour long program. What we have to do is compress the video down to a manageable size, both to make it easier to handle on the computer and especially to make distribution economical and user friendly. To be fair, those figures are higher than most people will encounter because a small amount of compression is generally present inside DV cameras, between the CCD and the tape recording electronics. DV runs at about 4 megabytes per second and that makes an hour long production 14 gigabytes long, still far too big to use. Video from analogue cameras cannot be directly recorded into the computer, it has to be digitised first. Some computers have suitable video inputs as standard but the majority will need support from some sort of A to D converter hardware or 'video capture card'. With an ADC the conversion

rate decides how big the file will be so it is possible to control the size of the file by setting the rate appropriately. The penalty for doing this is that the smaller the file, the less fluid the motion in the picture will be and the resolution (clarity) of the picture will also diminish. Even at very high data rates, it is difficult to match the quality that DV gives as standard. My own preference is to use a hardware device to convert analogue to DV standard and then to capture the DV into the computer with a Firewire link. This gives me the best possible conversion quality and gives the advantage of files that match the format of my DV camera recordings.

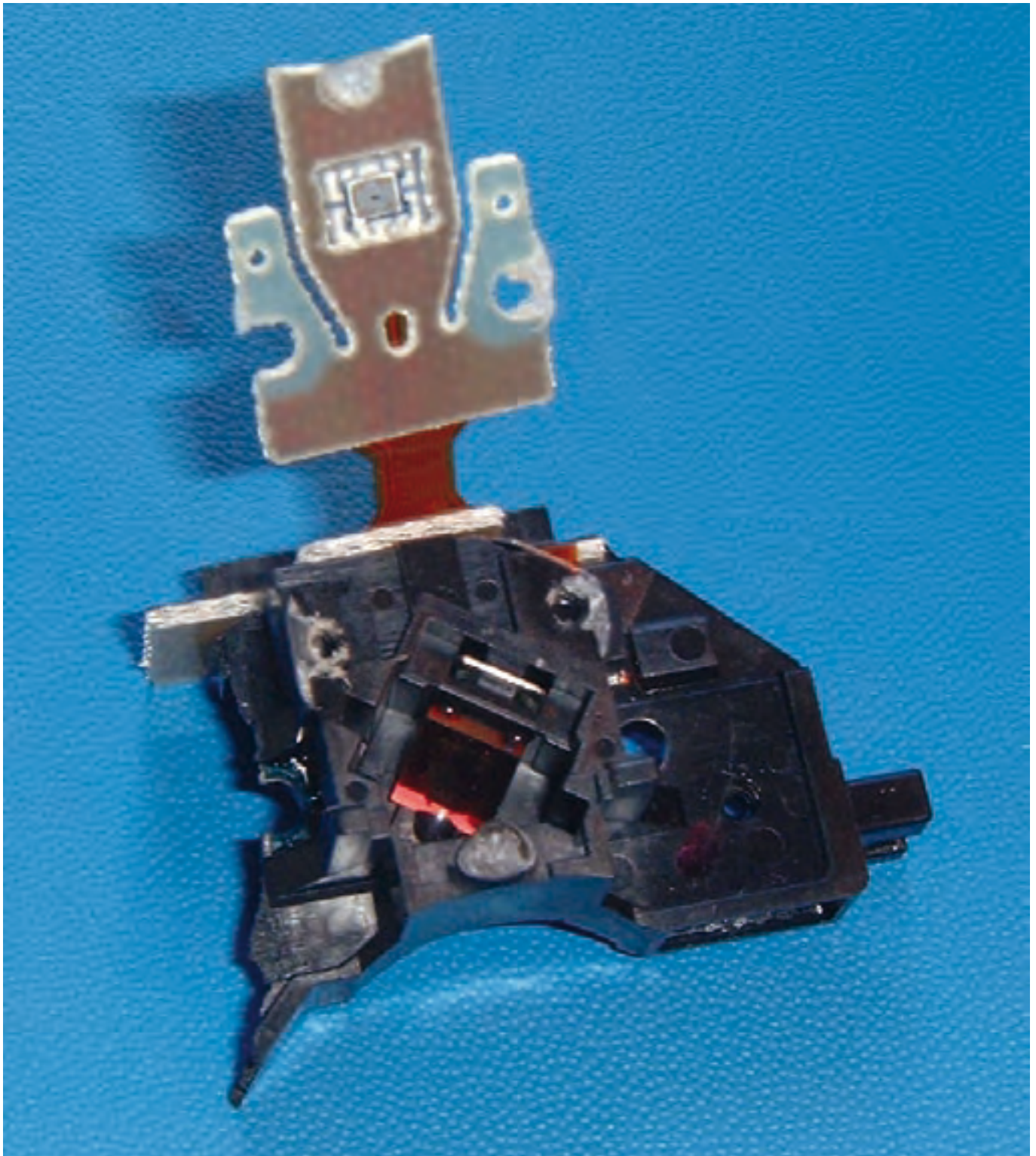
A word of caution regarding file sizes and Microsoft Windows; under Windows 95 the largest file you can store is 2Gb, far too small for video work. Later versions took the limit to 4Gb which is still highly restricting but just about usable if you split files into small chunks. To utilise files at full size you need to use either Windows NT, Windows 2000 or Windows XP and also set these to use the NTFS filing system. By default, Windows XP uses a filing system called FAT32 that still restricts to a maximum of 4Gb per file. Fortunately, the conversion to NTFS is fairly easy and doesn't lose any data but it does stop some, albeit a few, programs from running. The process cannot be reversed; NTFS cannot be changed back to FAT32 so be sure you understand the implications before doing it. The best solution is to dedicate one computer for video editing and keep all other work on another system. This will also prevent the slowing process that Windows suffers when more programs are installed. Video editing is slow enough as it is! As far as I'm aware, other operating systems, including Linux do not impose restrictions on file sizes. Bear in mind that you will probably want several source recordings, your finished production and possibly temporary work files to reside on the computer at the same time, which could take an awful lot of storage space.

Video editing imposes a lot of strain on computer resources. Quite apart from the size of files there is the mathematics of working out the picture geometry and content and deciding what and where overlays and effects are to be added. There is no substitute for a fast

microprocessor but there are a few tricks that help to speed things up. Firstly, don't run other programs on the computer at the same time. Despite the appearance of several applications running simultaneously, there is in fact only ever one at a time, modern computers run fast enough that you don't notice that all but one application is momentarily frozen. Not only are the other programs stealing time you could use for editing, the program that coordinates the task switching is also using slices of time as well. Prime suspects for slowing the computer down are anti-virus applications. Keeping a 'clean machine' for editing only means you do not need to worry about virus attacks. A virus can only be 'installed' on a computer if the virus code is executed, video and audio files are not executable, they are data files and as such are incapable of causing infection. If you are running other programs which require anti-virus protection the chances are that every single data transfer, and there could be millions in a video production, is being intercepted and checked unnecessarily which really slows thing down.

Computer hardware can also be a bottleneck in your production flow. Bearing in mind that your video files are likely to be huge, they are going to occupy quite a lot of physical disk space. Most operating systems are optimised to store as much as possible in a given disk space, they pack data into 'holes' left behind when files have been deleted. Eventually, the files you are working with will be dotted all over the disk surface and in no particular order; this is called file 'fragmentation'. As fragmentation increases, the rate at which data can be written to and read from the disk slows down. The electronics is still running at the same speed of course but because the disk head has to seek back and forth between the directory where the locations are held and the bits of file themselves, much of the transfer time is lost. Deleting unwanted files, perhaps from an old production, then running the operating systems defragmentation program will gather the file pieces together and rewrite them as a continuous block. The speed difference can be ten minutes or more in a one hour production – well worth doing. If your wallet can stretch to it, another way of greatly increasing speed is to use two or even three hard disks. With a single disk, even when





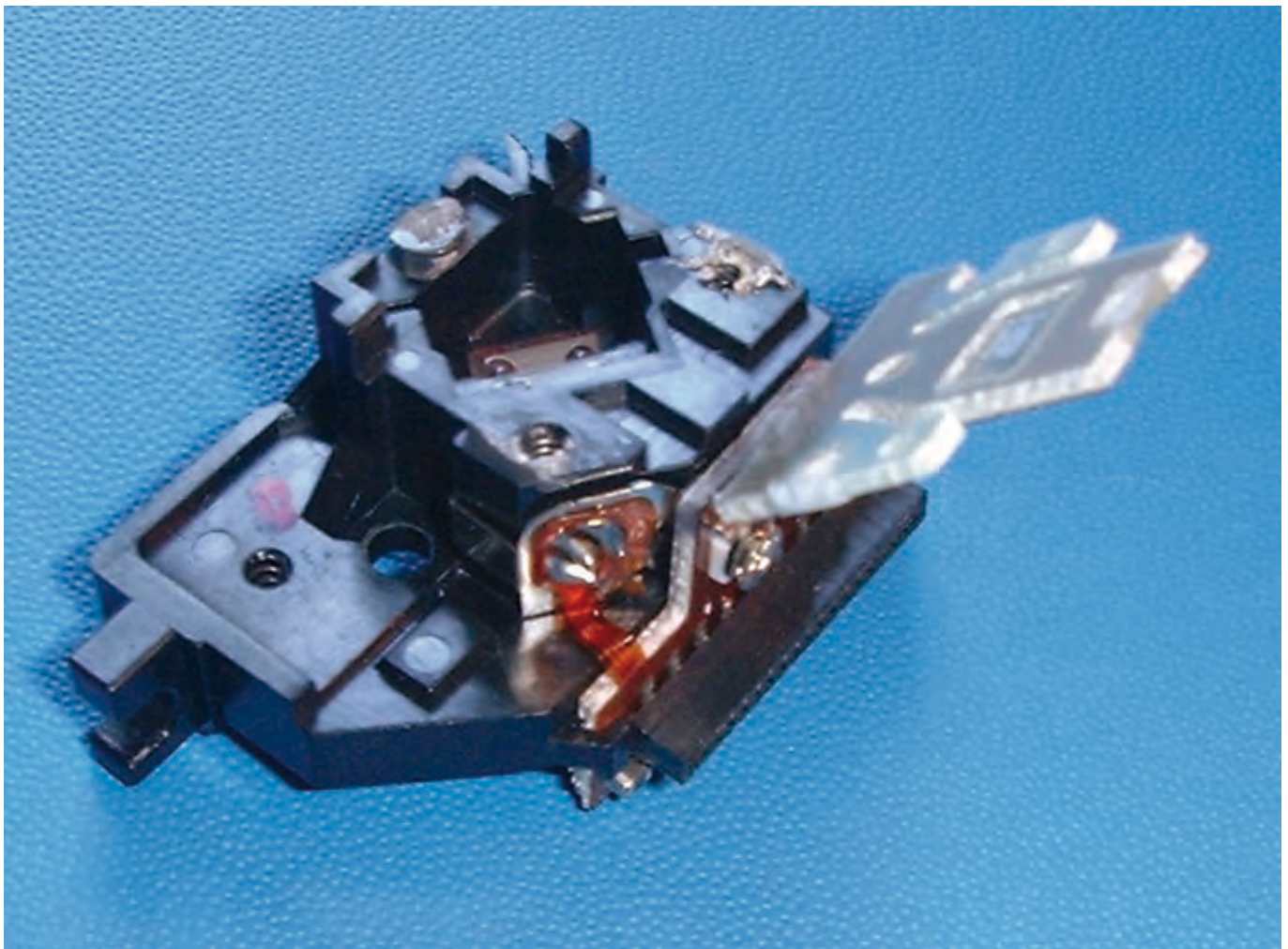
**A laser pickup assembly from a scrapped DVD player. Note the square mirror in the centre and the sensor that would normally be directly above it. The assembly is shown upside down, the disk's reflective side would be below the pick-up in this picture.**

free of fragmentation, the disk drive head still has to traverse between the source and destination files, reading from one and writing to the other. If the source material is stored on one drive and the destination on another, much of the 'seeking' time is saved, particularly on the destination drive where the file can gracefully get bigger with little movement of the head. A third disk

also helps because in almost all editing applications a number of temporary files are used. These typically are 'workspaces' or video effect clips prior to being placed in the final output file. Keeping these out of the main data flow also keeps disk activity down and hence reduces lost time. When more than one disk is used, be aware of a limitation of PC motherboards. Most have two 'IDE'

channels that connect via ribbon cables to the hard disks and CD/DVD drives. The channels work independently of each other so to maximise the data flow, keep your source drives on one channel and destinations on the other. An IDE channel is momentarily blocked while in use by a device so it pays to let them 'overlap' while fetching and storing the data. Simultaneous use of both





**The same laser pickup assembly from the opposite side. The three solder joints facing you are the connections to the laser diode and it's internal feedback sensor.**

IDE channels is possible despite what I previously said about only one task at a time running because disk data transfers are not controlled directly by the microprocessor. A device called a DMA (Direct Memory Access) controller takes care of shifting the data. SCSI drives and the new SATA are far more efficient at maintaining data flow so they are less of a problem.

### **Back to video work**

No matter how efficient the editing system is, eventually it will finish the task of creating a production, now all we have to do is find a suitable way of getting it to the end-user. In the editing suite, the video will most likely be of the best possible quality, it is easy to lose quality but impossible to put it back in so until we know its final format, don't make sacrifices. As we have seen, quality and size are closely related but some trade-off has to be made so that the size is more convenient to use. Our objective is to shrink the file so that it fits on the distribution medium, or can be streamed over a link with as little quality loss as possible. Two things decide the degree of compromise, the

amount of compression and the bit rate, in other words how much the picture and sound can be reduced in size and how quickly that data can be transferred to and from the medium. It is quite easy to fit 20 or more hours of video on a DVD for example - if the data rate is low enough, but the quality would be 'lacking' (I'm being polite!). It is also possible to store HD video on a CD, and at full quality, but the recording would only last about 10 minutes. In short, the data rate, and only the data rate sets how much you can store but it imposes a ceiling on the quality achievable at that rate. Dropping the data rate to extend the 'play' length also drops the highest quality you can expect to attain. The opposite isn't necessarily true. Using a data rate higher than necessary doesn't 'add' quality that wasn't there before, it only wastes space.

The device or more likely, the software that converts the video and sound, possibly compressing it in the process, is called a CODEC. This is a contraction of two words, 'COder' and 'DECoder' which by implication tells us that a similar device or software is needed

to recover the video before it can be used again. Some playback devices, DVD players and mobile video phones for example use a particular type of 'Decoder' so to produce material for them you must use the appropriate CODEC at the production stage. Usually, a selection of commonly used CODECs are bundled with editing software because in almost every circumstance, the edited production will need to be prepared for playback to an audience with known equipment types. There is no reason why the same edited video cannot be compressed by several different CODECs to suite more than one client. A good example of this is BBC News which is compressed to MPEG-2 for satellite and Freeview viewers and also compressed to 'RealMedia' format for viewing on their web site [www.bbc.co.uk](http://www.bbc.co.uk). The MPEG-2 broadcast runs at several megabits per second and gives very high quality and the web broadcast runs at 224 kilobits per second and 'watchable' quality. It is possible to compress video with the intention of editing it at a later date, just making it smaller for now so it is easier to store. This can be done but there are

limitations on some CODECs which need to be understood before using them for this purpose. The limitation, apart from some quality loss, is due to 'keyframes' or rather the lack of them. These are points spread throughout the production where a full picture is stored and the sound tracks are synchronised to the video. They take up more storage space so one of the ways of cutting down the size is to follow a keyframe with several partial frames which only contain incremental changes from the previous frame. In other words, the keyframe marks a full picture and everything up to the next keyframe is only a partial picture. CODECs try to analyse the picture content and if they see a sudden large change they automatically insert a keyframe so the whole picture is updated again. If no dramatic changes are detected they can run for several hundred frames before another keyframe is put in for good measure. The problem with trying to re-edit compressed video is that if you try to make a cut in between keyframes you are likely to select one of the partial pictures. This isn't good and will give very unpredictable results.

In reality, most editing packages will try to reconstruct a complete frame by searching backwards from the cut until a keyframe is found then building up the picture with subsequent frames until the cut is reached again. Doing this will inevitably be much slower than editing the source directly where every frame is complete, effectively all frames are keyframes.

The CODEC controls the data rate as well as the method of compression. Obviously, using the coding in a CODEC makes a file that needs a compatible decoding CODEC to convert it back to viewable video. On a computer this isn't a problem as the coding and decoding is usually performed by the same CODEC software. If the production is going to be played on another computer or on home entertainment equipment such as a DVD player, it is essential that a CODEC that can produce files to a common standard. By far the most commonly used CODEC is one that produces MPEG-2 as this is what most of the World use for domestic viewing, at least when digital technologies are used, A relative new kid on the block

is DIVX which uses MPEG-4 and produces smaller video files without sacrificing any more quality. A version of MPEG-4 is currently being used for HDTV broadcasts by satellite.

### Authoring a DVD

The term 'authoring' is perhaps a bit misleading as it implies something new is being created. In truth, the process is actually more akin to the work of a librarian, not creating but organising existing works. A DVD holds more than just video and audio files, it can also contain subtitle information and computer data files. Optionally, it can also hold selection menus and alternative video and sound tracks. Authoring is the process of merging all of these together into VOB files. VOB is an acronym for 'Video Object' although they also contain the audio tracks and everything else except files specifically intended for running only on computers. Don't confuse subtitle tracks with text overlaid into a video production. Overlaid video is actually part of the video image whereas a subtitle track contains plain text and time markers (cues) and is displayed



**A printable DVD loaded in a special carrier prior to inkjet printing it's top surface.**



by electronics in the playback device. Multiple subtitle tracks are often used, either to offer translation of words spoken in the main video production or to provide additional written information about the scene. Up to 32 tracks are normally available and which, if any, is displayed is decided by the viewer. The text is presented when the cue embedded in the text matches the main production time code.

A DVD can hold more than one production and each production can have up to 99 chapters. Each production is in a separate file and its chapter information is stored in an IFO file which you might think of as a list of bookmarks. As in a book, a chapter is nothing more than an entry point into the content to make it easier to find things quickly. A menu is rather like the contents page of a book except that as well as listing the files it has the capability of showing a background image or video and the selection itself can be made by picking an image or video. The menu is in fact a small video production in its own right and exists on the DVD as such but it contains links to the other files on the disk. Hidden in the DVD is a 'playlist' which is the default selection and order of files to be played. It normally starts with the menu itself so that the user can select alternative files or chapters from the selection offered. The playlist also holds the information used to navigate from one file to another when one reaches its end. It could for example say 'return to the main menu' or it could say 'play the next file in the list.'

Putting a VOB file together is a complicated process and requires specialised software. Within each VOB there is at least one video stream and optionally many audio streams and subtitle streams. The different streams are 'multiplexed', meaning they are chopped into small chunks then laid end to end and joined into a single file. The order of the chunks, their size and distribution within the VOB is decided by analysing the content of the streams. Subtitles, which may need updating only once every few seconds are sparsely spread in the VOB but picture and sound, which obviously can't risk interruption, are more prevalent. All the chunks have headers that identify the type of content they hold and allow the playback equipment to route the data to the appropriate circuitry. Video and audio go to the CODECs and subtitles go to the character generator circuits and so on. As playback equipment is selective this way, often renaming a file

ending in '.VOB' as '.MPG' will allow it to be played back as a computer file or even edited, the chunks irrelevant to the playback method being completely ignored. The software that multiplexes the VOB information normally also makes two other files, one ending with '.IFO' and one ending with '.BUP'. These hold the playlist information and lists of the location (sector numbers) where the files or entry points are physically located on the disk surface. When selections are made from the menu, the player reads the IFO file to discover where it should go to read the desired file. The 'BUP' file isn't absolutely necessary, it is identical to the IFO file in every way, in fact BUP is an acronym for 'BackUP'. It is only used if the player cannot read the IFO file and exists only to reduce the chance of the disk becoming unusable if slightly damaged. The video and audio files are to some degree error corrected and can withstand a small amount of data corruption but losing the navigation information would render the whole disk useless.

### Producing a DVD.

Let's look at the process of converting the files into a physical entity, the plastic disk itself.

Commercially made disks are actually pressed from a template or 'glass master' in a moulding machine. The process is very similar to the way vinyl LP's are (were!) made. The glass master is a mirror image of the recorded surface of the DVD and under the right conditions of temperature and pressure, it is pressed against a blank plastic ring to leave an impression of the data tracks on its surface. The plastic blanks are very thin, much thinner than the final disk will be because several have to be laminated together to make the final product. A DVD is actually made of a backing layer which becomes the printed or labelled side and is coated with a thin layer of aluminium on the 'inside' surface, one or two pressed data layers and a protective bottom layer. Some disks have additional layers that are bonded or sprayed on to the layers mentioned.

The disk production company produces the glass master from files you send them. The usual format they expect is an image of the final disk, exactly as it will be when pressed but on DLT media. This is a digital tape format, fairly common in large computer systems where it is used to back-up data from hard disks but not at all common in 'domestic' computer use. The DLT

image may also contain information to provide copy protection by inserting random video levels inside the blanking interval as an aid to deterring pirate copying. It is also possible to add CSS (Content Scrambling System) when producing the DLT tape. This is another anti-piracy protection system. Both these methods require a licence from their patent owners. The cost of adding protection is quite modest, even when only a few disks are prepared but it is by no means a bullet-proof way of stopping copies being made.

Some production houses will accept DVD-R or DVD+R master disks, the kind you can make on a computer at home but to use these for glass mastering they have to retrieve the files and rework them to change their formats. This is time consuming and costly. As an alternative to pressing disks, there are duplication houses that simply make copies of writable masters on to other writable disks. For small production runs this may be more economical as blank media is relatively inexpensive but the time to write each disk may be several minutes compared to a few seconds to press one from a blank. Writable media is also less compatible with domestic players because of its lower reflectivity and cannot have copy protection applied to it.

Most DVD production companies, whether using blanks or duplication machines will also print or label the disk top surface for you and they will normally also provide and print packaging materials as well. For this they normally work from standard JPG image files but it is worth checking to see if they expect complete images or colour separated images, it depends on their printing equipment.

If you are producing small quantities of disks or just a one-off of a home production it is certainly more economical to take a DIY approach. Blank DVD media costs (in June 2006) anything from 10p to 50p per disk. The prices drop considerably when ordered in bulk which usually means 25 or more. Many types of disk are 'printable' so if you have a suitable printer you can add your artwork or title directly on to the special disk coating. Make sure you buy the right kind of printable disk, there are three different types which are completely incompatible with each other! The first is 'inkjet' printable, these have a surface coating which is similar to that on inkjet paper and they absorb ink into their surface. The second type



is 'thermal', these use special transfers which are bonded to the surface by applying heat. They are not absorbent so using ink on them leaves a wet sticky mess – you were warned! The final type is a relatively new technology which is generally called 'LightScribe' although that name is owned by a consortium of large companies. Other names from various companies exist for the same technology. The idea is that using a special disk coating will allow the disk to be turned upside-down in a DVD writer and written to by the same laser that writes the data to the bottom layer. Clever software converts your original artwork into a spiral line, which is then fed to the laser so it prints the disk as it rotates. To use this method a compatible drive type is also required, normal drives will not work, they simply don't recognise a disk is present when they can't see the reflective surface. Laser printed disks are monochrome only, there is no colour version of LightScribe at present and the disks themselves are considerably more expensive than normal ones.

An alternative method of applying artwork is to print on paper labels and stick them on the disk surface. Special 'donut' shaped self-adhesive labels are readily available just for this purpose. However, I strongly suggest you avoid this method. In the early days of CD and DVD media the disks were expected to rotate quite slowly and the effect of poor balance wasn't too much of a problem. Modern disks spin as fast as 52 times normal playback speed and even the slightest eccentricity or imbalance can cause serious damage to the disk and the machine it is in. I have even witnessed a disk shattering in a drive. Even a lightweight plastic disk can be frightening when it breaks up at several thousand RPM! It isn't unknown for the label to detach itself and glue the drive mechanics together either.

## Lasers

I gave this series an alternate title – "A flash of inspiration to a flash of laser light". I hope I have covered the inspiration side of things, I'm now going to give a brief insight into the operation of the laser and why it is necessary to use one in a DVD or CD player.

Laser is an acronym for "Light Amplification by Stimulated Emission of Radiation", the version with a 'Z' in it is a by-product of science-fiction weaponry and nothing to do with electronics. Original lasers used ionised

gasses and specially shaped mirrors to make self-sustaining and highly focussed light beams. That technology is still used when high power is involved but for our needs we have a wonderful device called a laser diode. It is not an LED in the conventional sense as it relies upon a different shape of emitter structure and different semiconductor materials. Laser diodes are also notoriously difficult to stabilise, too little current gives a dull glow and too much burns them out. The middle region where they 'lase' is very small and feedback circuits are needed to compensate for changes due to heating and supply irregularity. Usually they incorporate a light sensing photo-diode in the same package to monitor and provide a control voltage to keep the feed current to the laser diode within acceptable limits.

What makes lasers so special is they produce light of a single wavelength, in other words of a pure colour. Most light sources produce a spread of colours, even though to the human eye they are indistinguishable from the overall hue. A green LED for example, produces light centred on the green part of the spectrum but also has a portion more red and more blue than the dominant green. If we could look at the waves we would see they were a mix of different wavelengths, all adding and cancelling each other to give an almost random envelope of radiation level. Laser light on the other hand is very pure and by combining light from a single laser source after splitting it and sending it via different paths will give a consistent result. The level will depend upon the phase shift between the light from the two paths, if they arrive in phase they will add, if out of phase they subtract. The important thing to note is that if the path distances remain the same, so will the resulting light level.

Lasers used in DVD and CD playback utilise the phase cancelling effect to read data from the disk. The laser assembly, the diode, sensor and focussing mechanism are moved across the disk by a motor. Another motor spins the disk so that from the pick-up assembly's point of view, the disk surface is whizzing past the laser at high speed. Inside the pick-up is the laser diode, a partially reflecting mirror and a light sensor. The laser light hits the mirror and some of the light is reflected directly at the sensor. The light that passed through the mirror is focussed by a lens onto the disk surface. Light reflecting back from the disk is also directed to the same sensor as the

direct laser light. Earlier I mentioned that DVDs are pressed from a master, the master imprints 'pits' into the disk surface. At the colour of the laser the pits are exactly one quarter wavelength deep. Light arriving at the sensor that reflected from the gap between pits has therefore travelled less distance than light reflecting from the bottom of a pit by the time taken for light to travel one half wavelength (down the pit and back again). When the beams reach the sensor they are therefore in phase (adding) or shifted by have a wavelength (subtracting). The effect is the sensor sees flashes of reflected light in sympathy with the pit arrangement on the disk surface. The flashes are easily converted back to voltage levels so the drive electronics can process them. All the pits are the same depth, the digital ones and zeroes are represented by the length of the pit, short or long – Morse code again!

## The future of video disks

The amount of data that can be stored on a conventional DVD is about 4.7Gb per data layer and this is fixed by the density of pits that can be impressed on the disk's surface. In order to 'dig' the pit to the right depth a certain amount of width is also necessary. This is simply a fact of physics, you can't dig a depth without an associated width and the deeper you go, the wider the width becomes. To cope with the ever-increasing demand for more data storage the only practical way forward is to make more pits and given that the disk area is fixed, each must be smaller than before. It is possible to make glass masters with smaller bumps (remember they are the opposite of pits) so that isn't a problem. The laser is the stumbling block, with shallower pits the amount of phase change can no longer cause complete cancellation of the reflected light. The solution is to shorten the wavelength of the laser light so cancellation occurs with a smaller time shift in the reflection. This is where blue lasers come into play, conventional ones are red by the way. Because of the way laser diodes are made, it is very difficult to fabricate them to give shorter wavelengths while still producing adequate power. That's why the new generation of "Blue Ray" DVD players are so expensive. It's worth remembering that the difference in frequency between red and blue is many hundreds of times greater than the difference between 'Top band' and 10GHz Amateur bands! No doubt the price of blue lasers will drop in proportion to demand just as happened with the red laser. Time will tell.

# SDI Routing Switcher Part 3 – Or Does This Man Ever Stop!

By Mike Cox

In CQ-TV 207, the basic design of an SDI Routing switcher was set out. This had pretty rudimentary Source/Destination control with buttons on the router frame. In CQ-TV 208, numeric indicators were added for each destination. For IBC2005, a single remote panel was added, and which proved extremely useful at the show.

Further thought has led to two things. First, removing the need for the take button on the remote panel, giving direct access to sources. Second, following directly on from this is to allow for all destinations to have their own remote panel, should it be necessary. The local Indicators still give a tally of the switcher state.

Each remote panel now has a BCD preset switch, set so that it controls sources for a particular destination. A standard 10-way ribbon cable and IDC connector go back to the rack unit. The ribbon cable can have several connectors on it in a multi-drop arrangement.

Because the matrix IC [GS9533] has source, destination, load and configure inputs, the new arrangement takes commands from the local buttons, but when commands are received from one of the remote panels, the source/destination lines are switched over to the remote for the duration of the strobe pulse.

This is generated by a button press, acts to latch the information and light the appropriate button LED, enables the new data to the busbar, and carries on to the rack to act as the load/configure pulse. A busy little pulse!

On each panel, a power-on reset circuit wakes the panel up to input 8.

Fig.1 shows a typical panel. The illuminated buttons are part of a range available from Rapid Electronics, at under £1. They are Diptronics TLL series, and the yellow ones used are stock no. 78-1731 for the switch and 78-1741 for the button.

All the ICs used are very standard 74HC or 4000 series parts. Fig. 2 shows the circuit of the panel. All the inputs of an 8 input NAND gate [HC30] are pulled high. A button press grounds that input, and the gate output goes high. This is the strobe pulse mentioned earlier. This latches the information in an octal D flip-flop [HC564]. The outputs feed a priority encoder [CD4532], and its BCD outputs and the BCD data from the destination switch are switched to the busbar by the strobe pulse.

Fig. 3 shows the interface card to allow remote panels.

This is mainly 2 4 x 2 selectors [HC157 x 2] taking the data from the local button system, but switching to the input from the remote panel when the strobe pulse on pin 7 of the 10 pin remote connector is high.

This philosophy can be applied to any matrix IC with source/destination control such as some of the Maxim devices. [See CQ-TV 195, p. 32], [www](http://www).

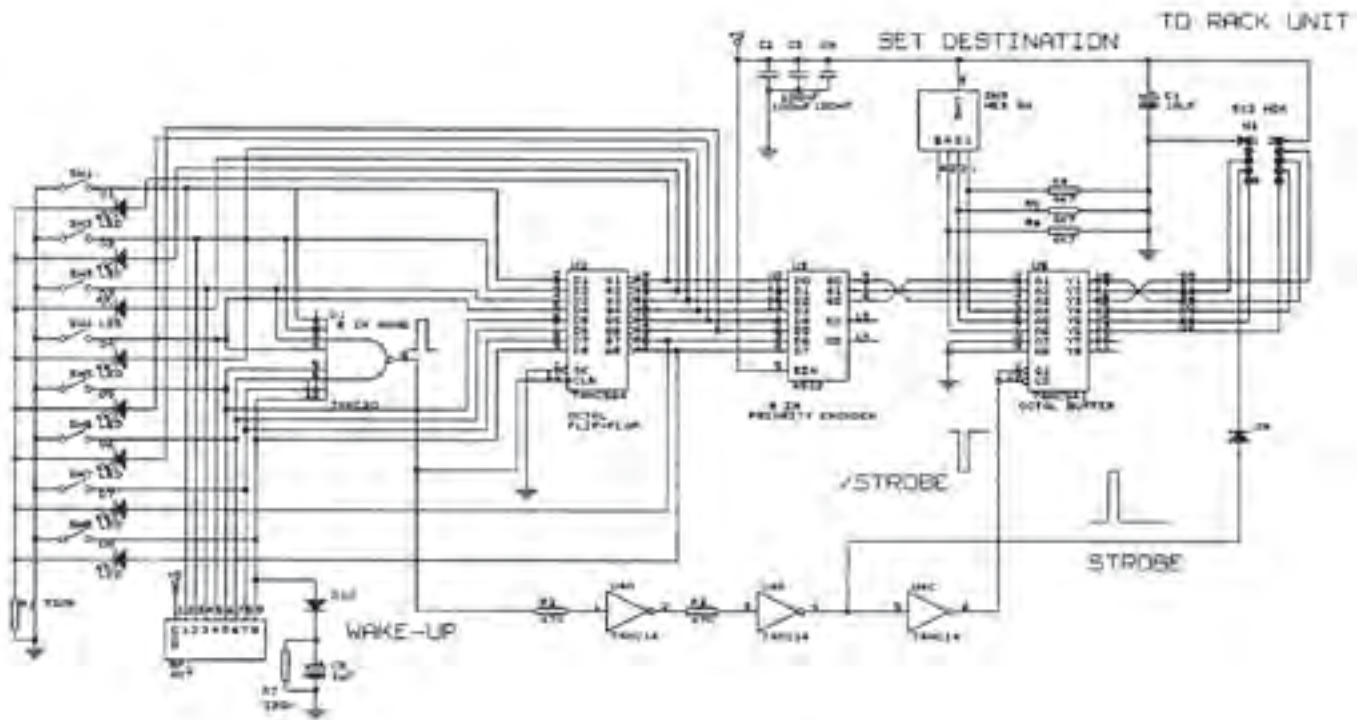
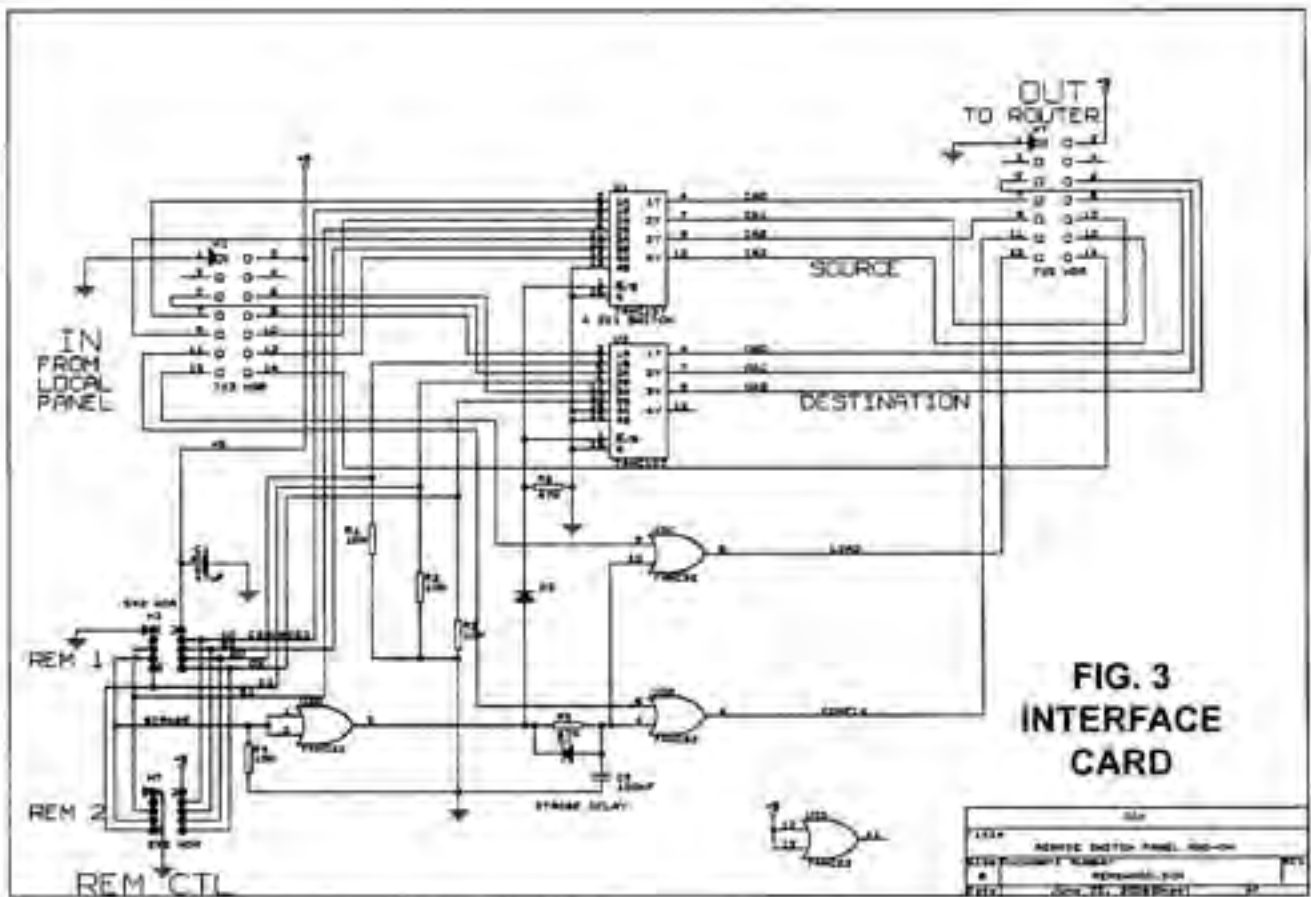
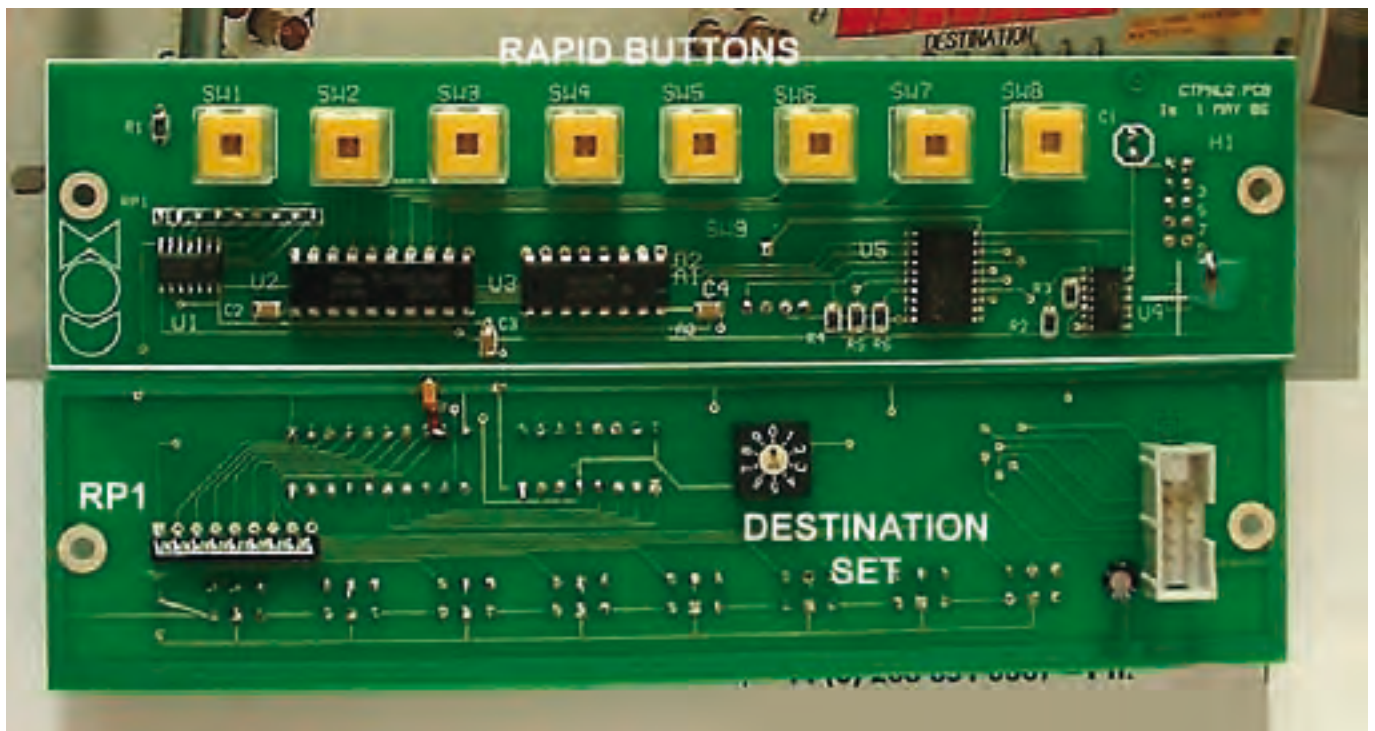


FIG. 2  
REMOTE PANEL

1114	018
SEE SH. CONTROL PANEL 2	
STATEMENT NO. 1001	
8	822402-201
0001	000001-000001



**FIG. 3  
INTERFACE  
CARD**



[rapidonline.com](http://rapidonline.com) for supply of buttons and other parts.

**The end?**

This really is the last article I shall write under Ian's inspired Editorship, and it is

nearly the last as President. At the BGM, I shall be handing over the Presidential baton to Peter Blakeborough, who I have known for many years at Link, then at Yorkshire Television.

Not only does Peter practice the Studio arts but also the transmitting arts. I cannot think of a better successor and I am sure he will do you proud.

Membership can be renewed online at <https://www1.clearlight.com/iamp/shop/shopping/?id=10>





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](http://www.batc.org.uk)**

## 214 caption competition results



Brian Kelly:-

“Amen....Now can we all sing from the same hymn book, page 625...”

Trevor Brown:-

“Which bit don't you understand Philo”

Peter Stonard:-

“Note to self. For the next BMG borrow an IPod, download some upbeat music...”

And the winner is:- Brian Kelly

Congratulations Brian.

### First Laser-ATV input at ATV repeater

The ATV repeater DB0TVH in Hannover (northern Germany) made a first with a Terahertz input, it is experimental in order to encourage trials with optical transmissions. As the detector (an emission electrons multiplier) would get destroyed by daylight after some time, it is only activated at night. Spectral selectivity spreads from 200 nm (ultraviolet) to near infrared at 850 nm. Sensivity beamwidth is 45 degrees, the detector is mounted on a remote controlled rotatable video camera, and this way any amateur can turn it towards his QTH via DTMF control on 430,100 MHz. In the laser TV transmitter a 20 MHz carrier wave feeding the laser diode is frequency modulated by camera video and audio

(FM baseband unit). The red light TX beam is produced by laser diodes from laser pointers or from DVD burners (up to 100 mW). More details see at [www.mydarc.de/dj1wf](http://www.mydarc.de/dj1wf).

### Galileo test satellite launched

Main purpose of this satellite called “Giove-A” is to safeguard the bands for the new european radio navigation satellite system “Galileo” and to determin the exact orbit parameters within the program “Galileo System Test Bed”. Until 2008 four more satellites will follow on for navigation tests, and until 2010 around 30 satellites will be used at the official start of “Galileo” services. The “Open Service” has 4 m resolution with two bands` usage and 15 m with single band usage.

“Commercial Service” will employ 1 m resolution and use three bands including 1260 - 1300 MHz.

Comment by Peter OE7PKI in a Packet Radio mailbox message:

I think, it is clearly to see now that my fears have come true and the amateur radio band 1240 - 1300 MHz will be gone in the near future. I can't imagine that a navigation system used by aviation navigation would allow to be disturbed by amateur radio services like digital links, ATV and the like.

*From TVmateur 140, translations by Klaus, DL4KCK. AGAF e.V. [www.agaf.de](http://www.agaf.de)*

## Contest News

### By Richard Parkes G7MFO

**I**t looks like the International ATV contest in September will be the last ATV contest run by the BATC, as I have had no reply back for anybody to take over the position of BATC contest manager. Please get in touch before September, as this will be the last contest that I will be invigilating.

I have just got back from Germany - not there to watch the football, but to go to Friedrichshafen radio rally. The

amount of surplus amplifiers for the ATV bands and all the components and test equipment which you cannot get back in the UK, unless you work for an ‘electronic’ company, was greater than previous years. The flights from Stansted can be picked up very cheaply if you book well in advance (February). The first day we managed to spend over 8hrs just in the flea market, without getting around the trader hall (required a new pair of legs). If you are on a tight budget, then you can camp on the same site as the rally. The airport is the other

side of the rally and has a very good bus and train service which is on time.

I think it is time another person took on the position of the contest manager - I have run out of ideas to get more people on during the contests.

Richard Parkes G7MFO 7 Main Street, Preston, Hull. HU12 8UB. England. Tel:- 01482 898559

E-mail: [contests@batc.org.uk](mailto:contests@batc.org.uk)

## Deadlines

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

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

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

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](mailto:adman@cq-tv.com). Members' sales and wants should be sent to the Editor. Email: [editor@cq-tv.com](mailto:editor@cq-tv.com)

## CQ-TV Commercial Advertising Rates

If you would like to advertise in CQ-TV, then please contact our advertising manager, Trevor Brown, 14 Stairfoot Close, Adel, Leeds, LS16 8JR, England. Telephone: +44 (0) 1132 670115. Email: [adman@cq-tv.com](mailto:adman@cq-tv.com)

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

## HS Publications

7 Epping Close, Derby, DE22 4HR.

Telephone: 01332 38 16 99

Email: [GarrySmith@dx-tv.fsnet.co.uk](mailto:GarrySmith@dx-tv.fsnet.co.uk)

- DX-TV Converters
- VHF-UHF TV Aerials
- DX-TV Publications and Videos
- Amplifiers - Filters - Hardware
- Technical Books
- BBC Test Card music CDs
- TV Clocks and Archive Publications

Send 3 First Class stamps for our latest catalogue

*Personal callers by prior arrangement only please*

## Contest Calendar 2006

IARU International ATV Contest 2006 - Saturday September 9<sup>th</sup> – Sunday September 10<sup>th</sup>

From 1800 UTC Saturday to 1200 UTC Sunday

Fast Scan ATV all Bands.

## Index of Advertisers

ACRES electronics .....	40
Amateur Television Quarterly .....	12
BATC Publications .....	26
BATC DVD .....	36
BlackBoxCamera Company Limited .....	2
CQ-TV Commercial Advertising Rates .....	38
HS Publications .....	38
Kits & Bits .....	7
Members Services .....	26



## A decade of change

By Ian Pawson

After 10 years, I am standing down as editor of CQ-TV. I will continue to look after our two web sites and producing the clubs DVD.

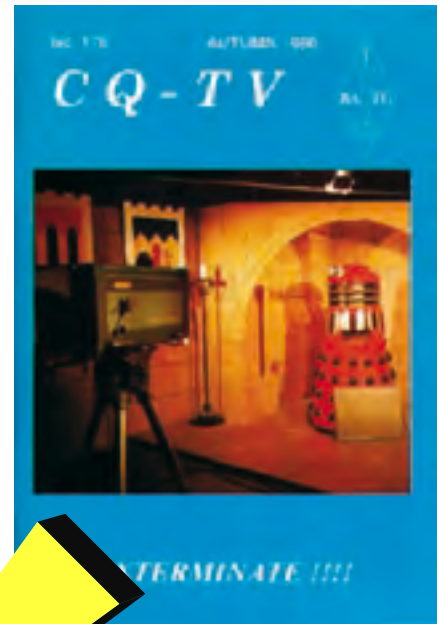
### The decade

When Chris Smith had to give up the editorship suddenly after 172, Trevor Brown stepped into the breach and produced the next three issues and I assisted by printing out the text in Word 6. During this time he twisted my arm to move from dealing with publications to take over as editor. My first solo issue was 176 – Autumn 1996.

I found that Patrick White produced the covers in the traditional manner with photographs that had to be glued onto paper.

I decided that my first task was to make it an all electronic production system. To this end, Microsoft Word was pressed into use. The ‘masters’ were laser printed onto special paper – supplied by the printer – and were then photographed, 16 pages at a time, to make the printing plates.

In 2000 a great debate raged as to whether we should change the format from A5 to A4. Eventually it was agreed to move to A4. I think that everyone would agree that this was



a good move. To help with the actual production of CQ-TV a ‘proper’ DTP package was purchased. This also made it easy to produce the electronic versions for the web and the CD. (This is now a DVD as there was too much data to fit onto a CD)

Also, during these 10 years, the membership has dropped from 2,400 to its present 800. It would seem that there is a decline in building electronic equipment in general and amateur TV gear in particular. I just hope that this decline is not terminal. Why would anyone want to go to the trouble of obtaining an amateur radio license when they could buy a webcam, attach it to a PC, and then exchange pictures with anyone, anywhere in the world has not helped interest in our hobby.

I am no graphics artist, so I settled for a ‘plain’ layout that would display the content rather than use lots of fancy graphics. No doubt the next editor will have a different approach.

I would like to say a big ‘thank you’ to all those members who contributed such fine articles over these past ten years that have enabled me to produce the magazine that you see today.

I would also like to thank the treasurer for letting me spend the money to have this edition printed in full colour.

I wish the new editor all the best and I hope that he/she can carry us forward for at least another ten years.



# ACRES ELECTRONICS - ZL4TAO



## Microwave FM video receiver

### Features

- Greater than 5MHz video bandwidth
- Low impedance balanced line level audio output
- High impedance unbalanced audio output
- Video output is black level clamped and sync tip clamped
- 2 audio sub carrier demodulator's 6MHz and 6.5MHz
- Able to be remotely controlled
- Over 120 frequencies selectable
- 10 scan channels per band with LCD control
- Positive or negative video demodulation
- Selectable on screen signal strength and A.F.C. indicators
- Portable 9v – 16v operation. Consumption 520m/a
- RS232 remote control facility

The 2.4 – 2.6GHz receiver tunes from 2.304GHz to 2.559GHz, and additional O. Band channels [6] from 2.512GHz to 2.659GHz, a total of 256 frequencies. The separate 1.2GHz receiver tunes 1240 to 1367.5MHz, 127 frequencies. *These units are built to order; please allow 4 weeks from receipt of order. More details on our web site along with other products.*



**Price is £499. (Includes air mail pp.)**

**Price will be subject to exchange rate variations. Enquire for quote at the time!**



The top waveform of each picture shows the input to Comtech TX and the lower waveform of each picture shows the output from RX.



**Acres Electronics - ZL4TAO, 124 Dasher Road – 13 D.R.D., Oamaru – Otago, New Zealand  
Tel/Fax +64 3 439 5597, Mob. +64 025 6578238, Email: [info@acreselectronics.co.nz](mailto:info@acreselectronics.co.nz)  
Website: [www.acreselectronics.co.nz](http://www.acreselectronics.co.nz)**