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## Committee Contacts

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

**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: 0797 0417875, Email: [treasurer@batc.org.uk](mailto:treasurer@batc.org.uk)

**CQ-TV Magazine: Editor Ian Pawson**

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

### Membership

Anything to do with membership, including new applications, queries about new and existing membership, non-receipt of CQ-TV, subscriptions, membership records etc. Dave Lawton, G0ANO, 'Grenehurst', Pinewood Road, High Wycombe, Bucks., HP12 4DD. Tel: 01494 528899. 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: [contest@batc.org.uk](mailto:contest@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)

## Chairman's Column

Welcome to CQ-TV 198, the spring issue. Let us hope that by the time you read this the UK weather has improved.

June 16th is our BGM, and this year's event is being held at Shuttleworth. We are looking for some volunteers to elect to the BATC committee. Ideally, we would like to bring the average age down, with some younger members. Those of us on the committee at the moment were young once; we just have been in place a long time. "What do committee members do?" - a question I often ask myself. The key jobs are editing the club's magazine and web site, updating the club database, packing and posting CQ-TV, running members' services, and keeping a watchful eye on the accounts. Most of these plush jobs are already spoken for. Committee entry level is not quite as glamorous and involves running rally stands, organising our yearly event and numerous other tasks as they arise, coming up with good ideas, and questioning why we do things the way we do (we do not know everything). This in depth training programme will hopefully qualify you for one of the afore-named plusher jobs, as our BATC committee retirement plan is implemented.

This year Paul Marshall is running Shuttleworth (yes, I know he is not a "young member" - do you want to tell him?). Besides the BGM and trade stands, we want to implement a full lecture and demonstration programme. If you would like to give one of the lectures

or bring along an exhibit, please could you contact him? There is also going to be a formal dinner (I think that means black jeans in BATC circles). For this Saturday night extravaganza, you will need to book in advance, again with Paul, as space is limited. If you want to sit at one of the more prestigious tables (that means my table) then you will indeed need to book early or risk dining with the Treasurer.

Mike Cox has been liaising with Fred Motts, the Executive Director of the SMPTE, and as a result, we will be publishing extracts from their journal in CQ-TV. Their copyright process is a little more involved than ours is and involves going back to the original authors of the articles for their permission for these reprints. This, I am afraid, means that other magazines that have permission to reprint articles from CQ-TV must not reprint SMPTE articles. Mike will select the articles and liaise with SMPTE and I hope you all enjoy your insight into this very professional magazine. My thanks go to Mike for all his work on this project.

I think I have now run out of notices and "jokes at the committee's expense" and I will leave you to enjoy CQ-TV 198 - or did you read the rest of the magazine before my bit?

**Trevor Brown, BATC Chairman**  
email: [Chairman@batc.org.uk](mailto:Chairman@batc.org.uk)

## Bob Platts G8OZP

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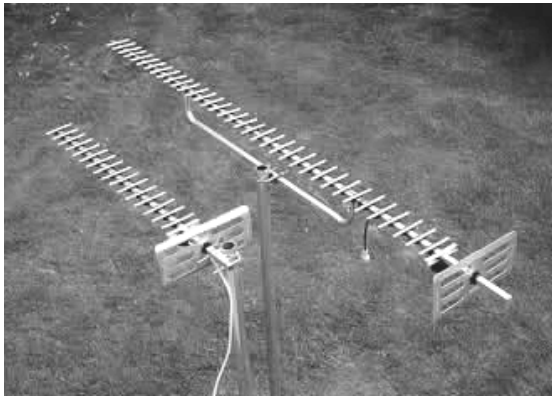
See previous adverts for details.

**Small WG16 feed horn.** Small 8db diacast horn for WG16 waveguide Ideal as feed horn for satellite dishes or as test antenna. **£1:50** all inc.



*Dicky Howett writes:  
Good luck to Brian Summers and his valiant search for a Pye Mk 6 Image Orthicon tv camera. (CQ-TV 197).  
Meanwhile, here's a photo from 1966. This particular Pye Mk 6 is being rigged for a trip on the Dart Valley Line. (Aspiring ob tv engineers please note, in transit, it's quite a good idea to keep the cameras' image gathering mechanism capped).*

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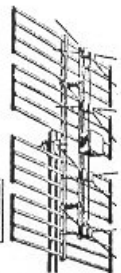
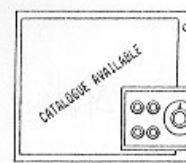
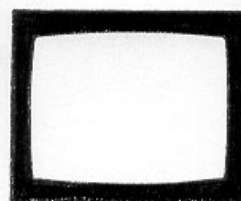
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# Setting Up Computer Graphics Monitors (XGA PLUGE Generator)

By Mike Cox

## Introduction

Most of you connect your computer up to its monitor via a 15 way lead without giving it further thought. So did I until recently when an old ABC-TV colleague asked me about a better way to set up a computer graphics monitor. Ray Knight was one of the pioneers of one-man vision control at Teddington Studios in the early 60s when ABC was still using Marconi MKIII cameras. At the time, studio control rooms had arrays of CCUs, each with a picture and waveform monitor, a central position for the crew chief, and the lighting person somewhere tucked away. The stage was set for lighting and racks to fight each other, and they did! Ray's idea was to install 4 joystick controls for the cameras next to the lighting control desk. The vision control supervisor sat next to the lighting director and they used the same monitors. Even the Mark III was found to be stable enough for this to give substantially more consistent pictures than the previous arrangement.

At the same time the BBC was having similar thoughts, and contributed ideas to give more consistent monitor setting. Remember that monitors (and cameras) were valve devices at this period.

Ray is currently writing a book about colour and graphics, with particular reference to computer graphics, and he asked me to consider making a PLUGE generator to drive computer monitors and enable the black level to be set critically.

It is also essential to set the white point of the display, to check that drive circuitry is not introducing any white crushing or clipping, and to check that the white is set to the correct colour temperature.

This is highly necessary if any serious judgement of pictures is to be made, e.g. in Photoshop. The following describes my results.

## Plan of attack

The first step was to make a back to back 15 way high density D connector pair so

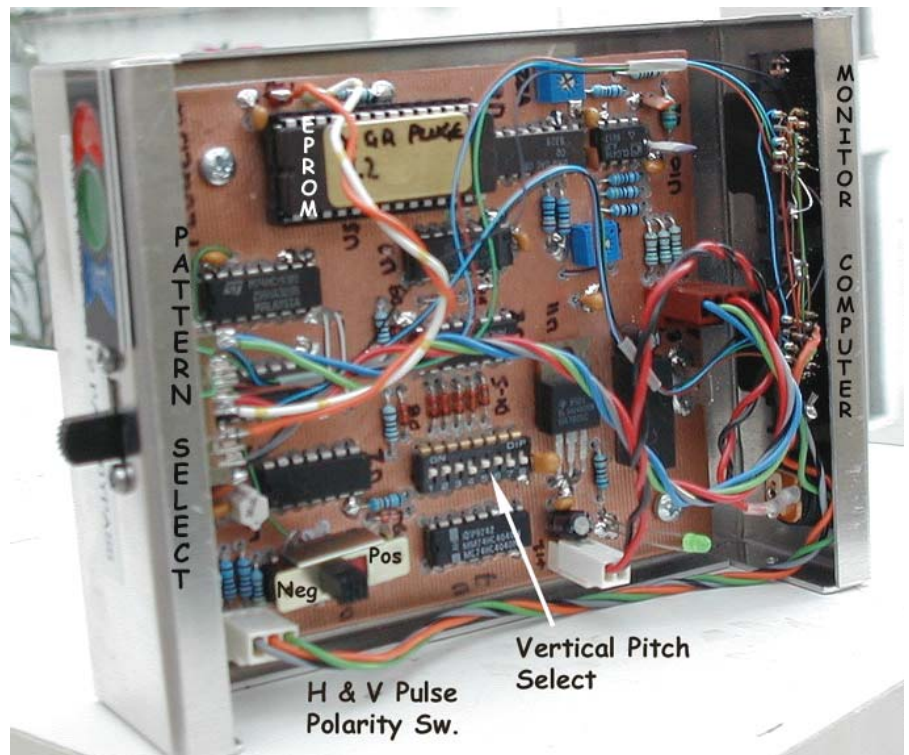


Figure 1, the completed unit

that the individual connections could be probed and examined on a 'scope.

From this and other information, the connections are: -

### 15 pin HD D connector

1. Red
2. Green
3. Blue
4. Gnd
5. DDC Gnd
6. Red Gnd
7. G Gnd
8. B Gnd
9. DDC +5v \*
10. Gnd
11. Gnd
12. Data (SDA) \*
13. H. Sync
14. V. Sync
15. Data Clock \*

On some connectors, pins marked with \* are omitted.

For my first look, the computer was running at XGA, 1024 x 768 pixels, with 60 Hz frame rate. Remember that computer displays are progressive scan devices - they know nothing of interlace. At this setting, the H and V sync pulses

are negative going. Just like television, I thought. I pressed on, and made the prototype device, which was to be used at 1152 x 864, and 85Hz refresh rate. Just a question of aiming off the H clock in the unit - my display (1024 x 768 x 60Hz) showed it a bit cramped up to LH side of screen.

On test on my friend's set up, there was nothing. We dragged up his ex car boot sale 'scope, and found that his H and V pulses were positive. The unit is now modified so that it can take either polarity, but a little investigation was called for.

I set up the link and monitored the H and V pulses at various settings (Control Panel - Display - Settings), and found that it is not necessarily the number of pixels that determines polarity, but it seems to change over at 75 Hz refresh rate. Both H and V pulses are now positive. Be careful how you experiment with this - I found a setting where the monitor (Samsung LCD) said "out of range", and no computer display! Luckily I was able to drag up a CRT monitor which got me back to an acceptable setting. Remember the "try" button before committing to a setting.

## PLUGE

A typical BBC acronym; it stands for "Picture Line Up Generating Equipment".

The basis of it is two small amplitude blocks sitting on a background which is true black.

One of these represents about 3% of the peak brightness of the display, while the other is negative, and of similar amplitude. Other blocks in the scene represent the peak brightness i.e. 100% video level, but are necessarily small in area, or a grey scale may be used.

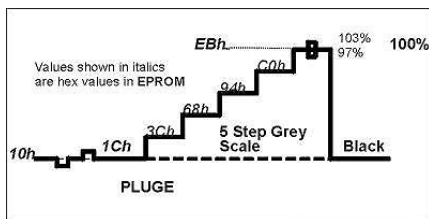


Figure 2 above shows the principle. In use, the brightness of the display is set so that only one block can be seen above black level. A little experiment shows how to just lose the negative block. This is much trickier with an LCD display, as the angle of view has a profound effect on the brightness setting.

## The XGA Generator

See the circuit diagram.

Two distinct patterns are required; one with a single set of PLUGE blocks and grey scale, the other with 5 sets of PLUGE blocks distributed around the screen.

The generator is intended to be inserted in the 15 way path between computer and monitor, and has a bypass position so that it can be left in circuit.

The PLUGE waveforms are stored as a series of bits in a high speed EPROM.

A 7 bit horizontal address counter gives fine enough detail for the pattern shown.

Subsequent addresses in the EPROM are used for vertical changes down the pattern shown above, Pages 0 and 3 are programmed to 10h (black level), with pages 1 and 2 more or less identical except for the +3% and -3% blocks on the white step.

For the standard chosen (1152 x 864 x 85), a clock speed of around 10 MHz is needed. Therefore EPROMs of 70nS or so are required. These are now available relatively cheaply. Bipolar PROMs could have been used, but require different programming facilities which I did not have.

The H and V sync signals are buffered by HC14 sections - to cope with either polarity, an extra section is added that can be selected to cope with differing conditions.

The horizontal clock oscillator uses an LC circuit built around a Schmidt NAND gate. As the oscillator is gated by H sync, it generates phase coherent output to drive the horizontal address counter, [U3, U4]. A trimmer capacitor provides a fine control of frequency, hence pattern width.

H sync is also used to drive the vertical rate counter [U7] whose output frequency can be changed by the use of diode feedback and DIP switches. It is reset by the V sync input. The output from this drives the vertical page counter [U8]. This is a Johnson type counter, which is particularly suitable as it provides 9 intervals, which are used to select pages in the EPROM. The patterns require two different sorts of paging, and a 4 x 2 logic selector is used to choose appropriate page selects for each pattern.

The EPROM 8 bit output drives a DAC [DAC08/DAC0800] with a current output into half a CLC416 as recovery amplifier. The output of this is filtered in

a Gaussian section and then the other half CLC416 drives the R, G and B feeds to the monitor.

Power is derived from a 12-volt plug-top PSU. The +5 volt rail is derived from a 7805 regulator, while the -5 volt rail comes from a dc-dc converter.

All pins on the two 15 pin HDD connectors are connected through except for the R, G, B pins (1, 2, 3) which are taken to the 3 position slide switch which selects either of the two patterns or the bypass position.

To achieve the "blacker than black" pulse, the EPROM is filled all over with 10h (16d).

Peak white is programmed to EBh (235). Note that these are the levels used in the Y component of CCIR 601 digital video. The negative PLUGE step is programmed to 04h, and the associated positive step to 1Ch. Note that the total memory used is 1k B, equal to 8 "pages" of 128 locations each.

I hope you have found this informative, first on the subject of PLUGE generally, and on the subject of computer monitor driving, about which there appears to be little written. If you want to build a PLUGE generator for conventional video, you should be able to adapt the circuit for your own needs.

If anyone wants an EPROM blowing with the PLUGE pattern, send me a blank. It needs to be a 27C64, 85nS access time device, as a minimum.

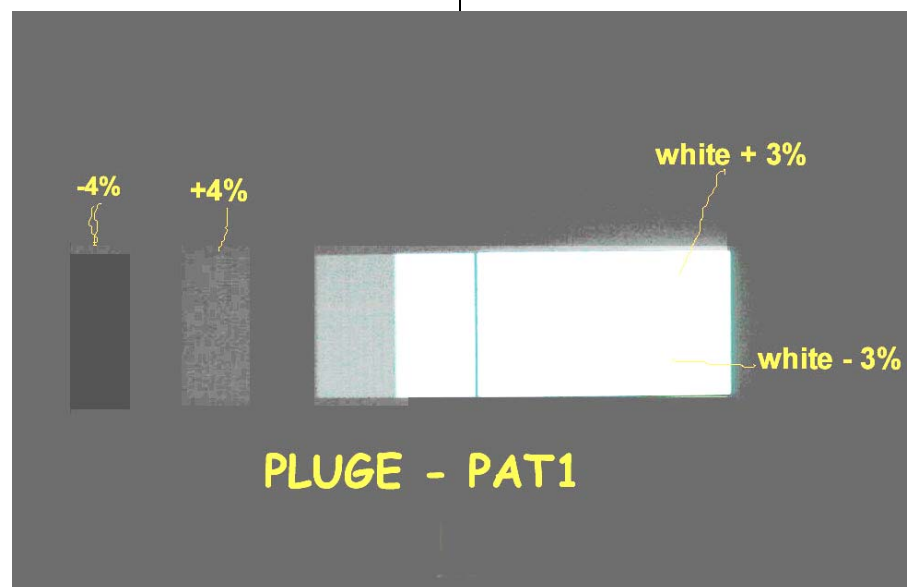
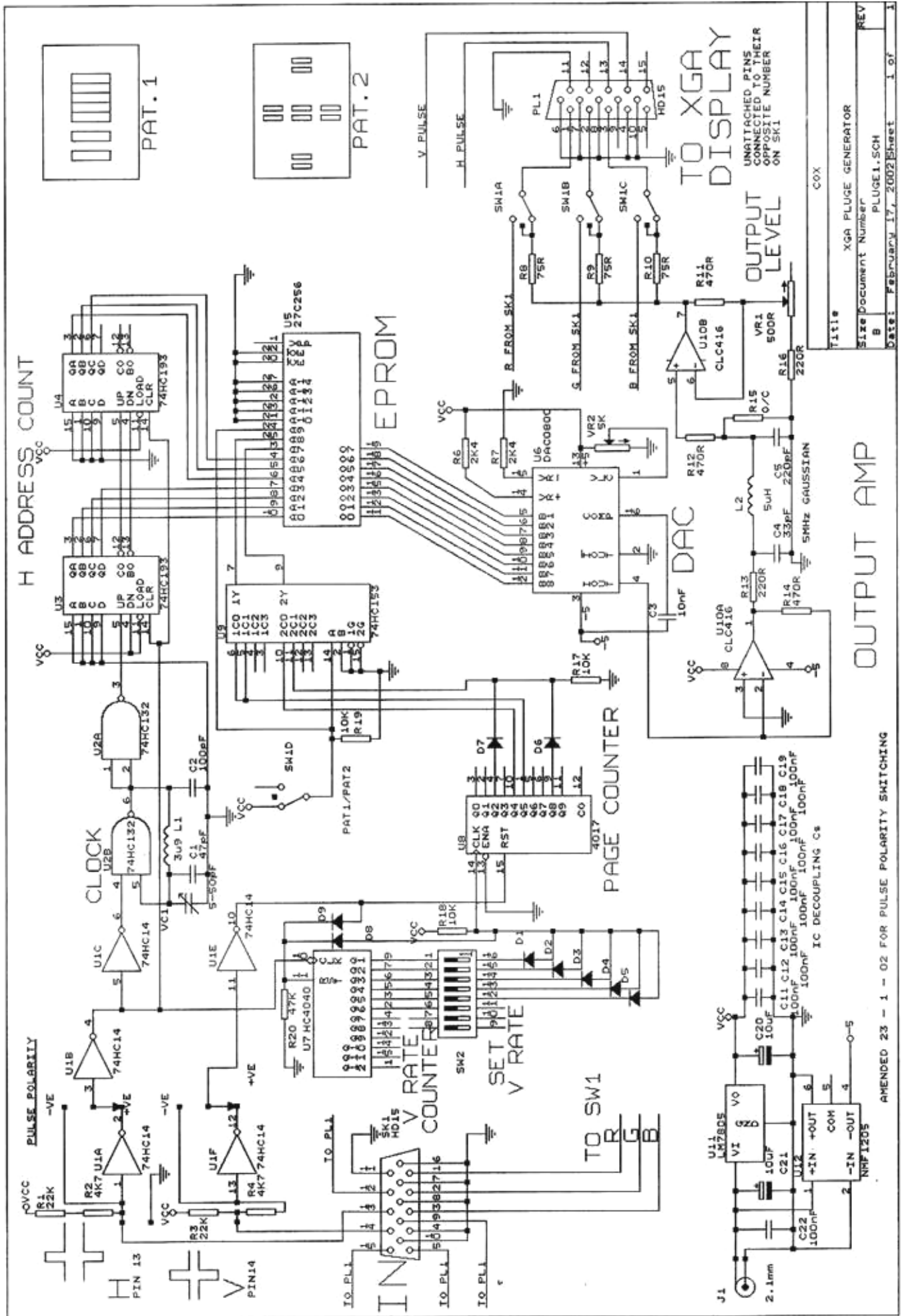


Figure 2,



REV	1
Date:	February 17, 2002
Sheet	1 of 1

Title	XGA PLUGE GENERATOR
Size	Document Number
Rev	PLUGE1.SCH
Date:	February 17, 2002
Sheet	1 of 1

U11	LM7805
U12	LM7805
U13	LM7805
U14	74HC132
U15	74HC132
U16	74HC132
U17	74HC132
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U19	74HC132
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U100	74HC132

# Contest News

## By Richard Parkes G7MFO

This year has got off to a bad start with the, non stop gales. A local amateur which takes place in the contests lost his mast due to gales over the New Year.

I would like to thank Dave G8GKQ for sending in the only log for the Winter Cumulative, Dave managed to work John G8MNY over a path of 40km with 1w on 70cm and 10w on 24cm. Dave is hoping to get a serious contest entry from a portable location later in the year with help from local amateurs and has already increased his power on 70cm to 100w.

I managed to get the wrong year published for the Spring Vision in CQ-TV 197; it should obviously be 2002 and not 2001. I'm writing the contest news a few days after the Spring Vision. Again the heaven once again let loose over the weekend with none stop rain and gales, which would have put off a lot of people taking part. I cannot remember a year like it over the last ten years I have taken

part in contests, and we are only three months into the year.

It is the BATC time this year to organize the IARU Region 1 International this September. Little did I know of all the work required to send out the rules to the other Region 1 contest managers, and societies before I took on this positions.

I'm hoping for a very good turn out this year. You have got three months to blow off the cobwebs of your ATV station and hopefully put a portable station together. I have updated the BATC web pages to include the rules for the International; basically they are the same as the BATC contest except there is an Rx section as well. You can still use the BATC Contest 'Log sheet template' as the multipliers are the same as the International; this has been updated to include the 24 GHz and 47 GHz band!

This year Summer Fun is the weekend before the BATC rally and the International does not clash with Lincoln rally this year so you have no excuse!

Don't forget to keep looking at the BATC 'contest' web page for the latest news. If you are going to be on the air over the International or going portable please get in touch with the locator you are going to operate from and bands which you hope to be on, as I will be updating the 'on air' page up to Friday before the International.

If you require any help or information regarding contest please get in touch and I will endeavour to help.

For the newcomers into the hobby I have include a cut down article from 'ATV contests the way to do em', from CQ-TV 157. I would like to thank John G8MNY for this article. The full article can be downloaded from the BATC Web page.

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

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

## Winter Cumulative Results

Place	Callsign	Locator	QSO 70cm	Score 70cm	QSO 23cm	Score 23cm	Total Score
1	G8GKQ	IO91TP	1	40	1	80	120

## Contest Calendar

**Summer Fun 2002 (Joint European)**

**Saturday June 8<sup>th</sup> – Sunday June 9<sup>th</sup>**

**IARU International ATV Contest 2002**

**Saturday September 14<sup>th</sup> – Sunday September 15<sup>th</sup>**

**Both from 1800 UTC Saturday to 1200 UTC Sunday**

**Fast Scan ATV all Bands.**



# ATV Contest The Way To Do Em ?

## John Stockley G8MNY

TV contests do not take the same pace as phone or CW contests, and can therefore be more enjoyable. Here are some tips from 22 years of contesting.

### Talkback

During contests, 144.750MHz becomes a calling channel, not a talkback channel, so please QSY ASAP. On QSYing both stations should check out the new frequency by asking 'IS THIS FREQUENCY IN USE PLEASE?', beforehand, to avoid losing the contact and causing QRM to others.

FM is the most commonly used mode for talkback but it is often difficult to find a clear channel when on hill tops. Remember the all mode section of the band has many allocated channels:

Beacons, Raynet, Packet, RTTY, etc.

Deep QSB causes difficult on FM, so why not use SSB, which won't block the ATV half as much, and give yourself a chance of maintaining contact DX! Also, don't forget to listen around 144.170 USB, as this frequency is used abroad.

### Where to Beam

With narrow beam aerials aligned on the same mast, the use of headings based on QRA locators is highly desirable, assuming you can calibrate the rotator that well, and you have an RF quiet electronic abacus!

Otherwise beam up on the 2m signal if you are the same polarization. On 70cm best headings are obtained from using a narrow band (SSB) receiver tuned into the carrier, once you can extract frequency from the transmitted station.

For 24cm and higher exchanges send the 70cm pictures first is an obvious rule, but be prepared to deviate the heading slightly, as the paths can bend and reflect differently.

### What to Send

The contest rules require a different four number code per band to be sent in vision, these numbers must not be sequential or repeating. So sending pictures of that nice tidy shack, is NOT required (that's a relief), nor is that colour test card, only the four number code.

However, one should identify the code as being yours, so also include the callsign. The numbers should be designed to fill most of the screen (allowing room for callsign). They need to be thick; this is especially true for all the vertical portions of the digits, as this is the first details to be lost.

### Viewing

Contest pictures are best viewed on a small screen 5" from a long way away 5' in subdued lighting. This is because one's brain can do a lot of 'state-of-the-art' picture processing, and act as a frame store under these conditions.

### Reports

Only the check sum (the code numbers added together) is permitted to be communicated on the talkback link, the code number itself must not be communicated on pain of disqualification! Don't forget to log the code number seen.

A report of:

**P0** means no usable picture was received.

**P1** is a picture just interpretable.

**P2-P4** increase in viewability, until:

**P5** no apparent noise.

Under contest conditions it is often possible to extract part code numbers from fleeting glimpses, where aircraft QSB just lift the signal long enough to get some of the code, several QSB peaks may be required for the whole code. Usually a P1 report is given, though P0+ would really be correct. In addition to QRA, check sum and report, the exchange needs a contest serial number per band, as with other contests this is a 3 digit number starting from 001.

### Scoring

The BATC logsheet template should be used; this can be downloaded from the BATC web page and printed out, or used 'live'. Unlike most other radio contests scoring is based on Km per direction. Bands higher than 70cm 1 point per km, 24cm 2 points per km, and for contacts on higher bands 5 points per km. One-way. Multiply by 2 for a two way contact. BATC contest and the IARU International are scored the same.

### Be Brief

Please remember also that others want to exchange pictures too, so remember to cut transmissions once the code number has been seen or when the other station is not in a position to Rx.

### Logs

Don't forget to send in your logs and cover sheets to the contest manager by the third Monday after the contest (September 21<sup>st</sup> for the International).

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

**E-mail: contest@batc.org.uk**

Visit the BATC web site at [www.batc.org.uk](http://www.batc.org.uk)

By David J. Bancroft

Two separate industries - motion picture film and television - are merging their applications and technologies. The question arises as to which industry's technologies should be chosen to solve which new problems. One issue in particular is the way in which moving images are represented electronically; should television standards such as HDTV be used for cinematographic images? Conversely, would television benefit from discarding transmission-standard-based video formats in post-production in favour of data formats developed originally to represent film frames? This paper examines these questions and offers some guidelines for determining the best answer for specific situations, rather than a blanket statement to cover all applications.

Motion pictures and television started out as two separate industries (Fig. 1) and quite naturally evolved different ways of handling technology issues. Each identified and solved its own problems without outside help. For example, the film industry replaced additive colour reproduction using three separate film rolls with an elegant triple-layer emulsion and subtractive colour reproduction system; television replaced mechanical with electronic camera scanning and learned how to record and edit. Each had a different approach to standards: as a mechanical medium, film could be quite flexible and accommodate different film gauges, shooting, and projection formats by swapping gates, rollers, and lenses. Television for the first 40 years or so, was, in comparison, hamstrung by the limited capabilities of the electronics it depended on, and so enforced a very narrow set of standards from end-to-end: NTSC and PAL, for example. This has only fairly recently begun to change.

Both industries are now maturing and looking toward each other; cross-fertilization is occurring. The television industry is attempting to break away from fixed-resolution, fixed-aspect ratio, fixed-frame-rate standards, for example, in DTV. Film is rapidly adopting electronic post-production and taking tentative steps toward electronic capture and electronic projection (Fig. 2).

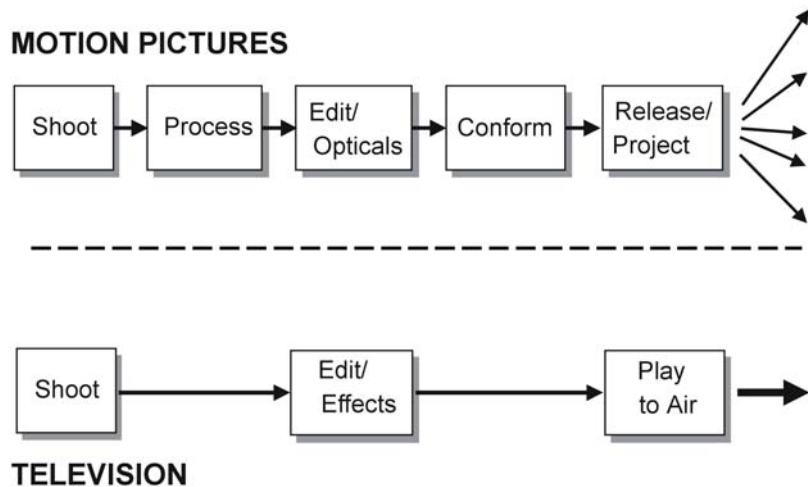


Figure 1, Film and Television as Separate Industries

These developments are not going entirely smoothly. When one industry wishes to import the features and applications of another, there is the question of whose technology should be used. In the cross-fertilization between film and television, one of the big issues, and the topic of this paper, is the method employed for representing images electronically.

It could be said that there are two major philosophical camps. In one, it is considered obvious that the guardian of electronic images is the broadcast television industry, since it invented all of the fundamental image sensing, scanning, processing, and storage methods entirely by itself. It has a vast repository of knowledge that can be exploited in new applications such as digital cinema, so obviously, video formats should be used.

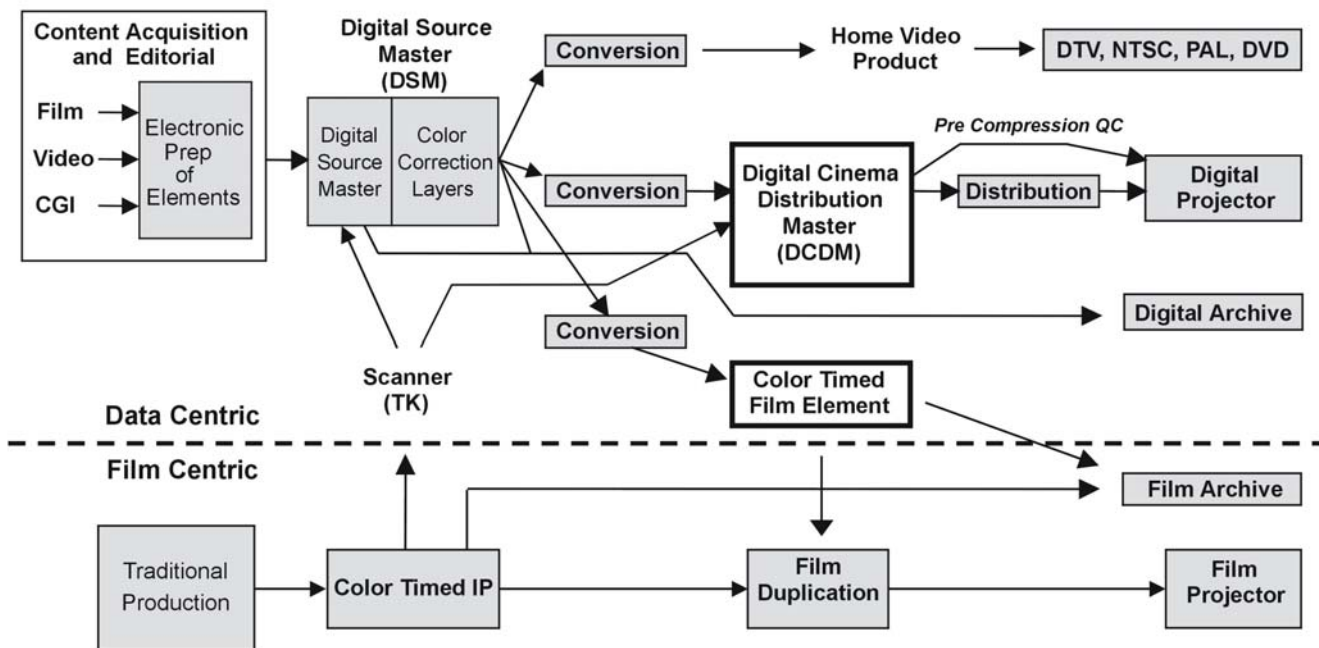
In the other camp, the larger capture range of motion picture film compared to all known television formats (expressed in resolution, dynamic range, and, possibly, colour gamut) is emphasized as a major design starting point that mandates a completely different approach. This approach, it is argued, should be the representation of the image in "pure data" rather than in "video." Taking this to an abstraction, data

models the source image, while video models the display and its observer.

## Comparing Video and Data Image Representations

The dominance of the television transmission standard all the way back up the chain to post-production is especially apparent at the interface with its great media rival film, which occurs at the telecine. Early telecines asserted the transmission video format - NTSC or PAL - right at the scanning stage. This meant that the film frame image, which could have any aspect ratio from almost square to 2-1/2 times as wide as high, somehow had to be shoehorned into the inflexible 4:3 aperture of television and at the same time have a large portion of its spatial resolution discarded.

Other, more subtle, television standard attributes also assert themselves at the interface with film. For example, the useful contrast range available to the director in the high-ambient-light home viewing environment is much less than that available in the movie theater. Not only does this impose a requirement to limit the contrast range on the film-to-video transfer, it also means that the television distribution system, for reasons of economy, will not allocate more dynamic range than actually needed by this constricted tonal range.



**Figure 1, Exchange of Technologies and Applications for Electronic Cinema (from SMPTE DC28.2 study group)**

For example, the MPEG-2 compression used for digital delivery to the home is based on just 8-bit sampling.

Another attribute is colour gamut. The early NTSC system was designed with a relatively wide colour gamut, but it soon became apparent that viewers were more than happy to exchange wide gamut for brighter pictures, and to achieve this, later CRT phosphors were deliberately made less pure. However, the result was that the analysis of the images and their representation as additive tristimulus values became definitely geared to the limited colour gamut of the target display at the end of the chain. Of course, none of this mattered as long as home viewing was in video and the cinema experience was optical film; each had a consistency of performance within its respective medium and ambience.

This is now changing as we seek to create the “ideal” media content production, post-production, distribution, and display chain (Fig. 3). In this ideal scheme, we can have a free choice of capture medium at the beginning: film camera, electronic camera, or computer synthesis. We can also have a free choice of target display medium at the end: low and high-resolution television, conventional cinema (via film recording), and digital cinema. This means introducing great variation in the parameters mentioned above, according

to both the source medium and target medium.

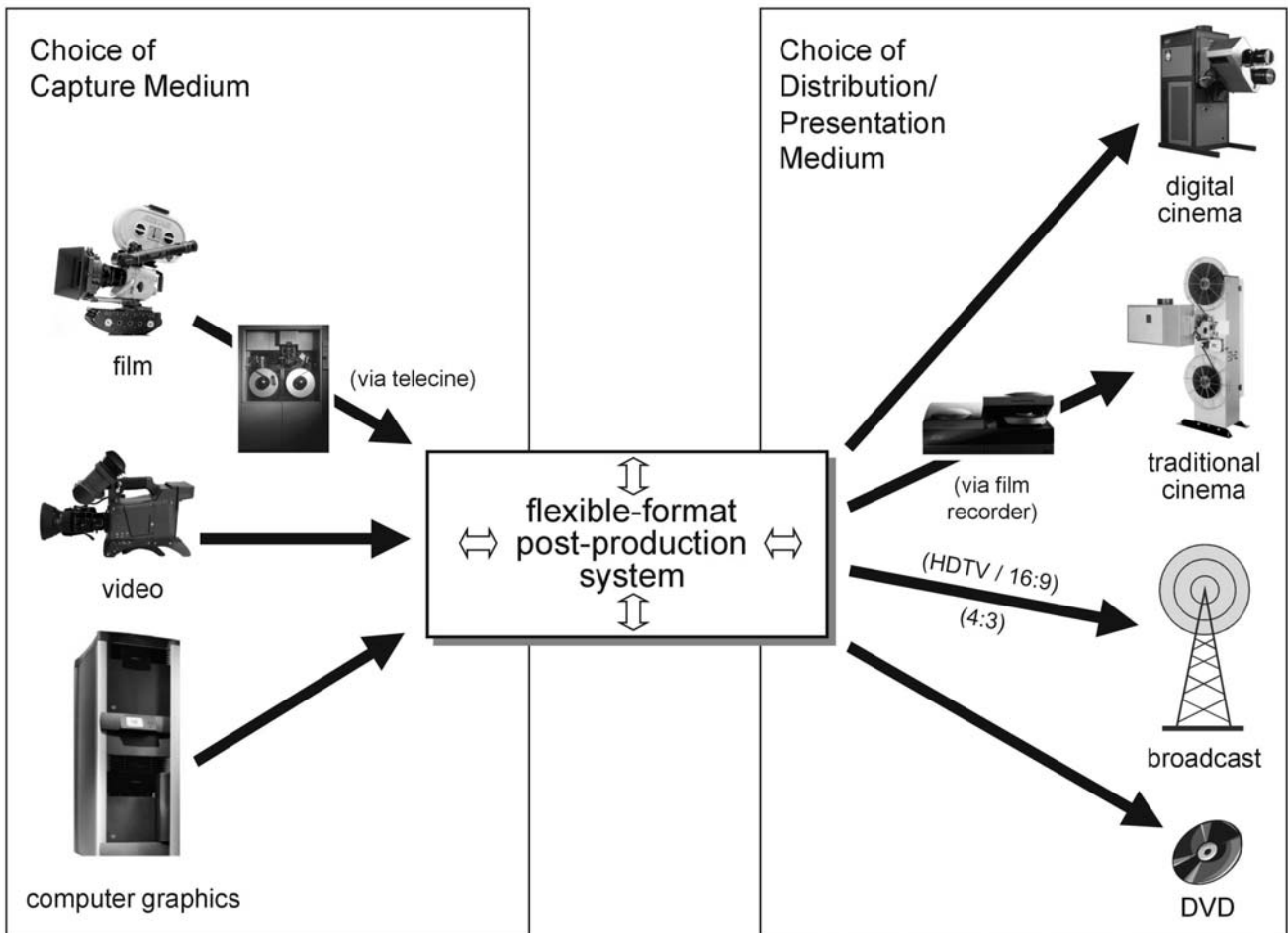
It is possible to go some way toward incorporating the necessary increase in “parameter flexibility” into a video-based media content chain. For example, upgrading the mastering from standard definition to HDTV will take care of the resolution requirement for small to medium-size cinema screens; at least until current projection technology improves further, while continuing to service standard-definition broadcast television via compatible down conversions. However, the outstanding issues of contrast range, colour gamut, and other parameters remain unaddressed in the HDTV medium, when viewing the content in a non-home environment.

In contrast to all this, when film is scanned in a “data” mode, the objective is no longer to assert a particular local television broadcast format at the capture stage, but rather just to measure the density in the film’s emulsion layers and write the numbers down in a file. In its purest form, such a process makes no interpretation of what these numbers mean; it’s just making sure there are enough numbers in its repertoire to write down every possibility that occurs in the film emulsion. This is subject, of course, to reasonable limits imposed by the human vision system and the capabilities of current and future display systems.

Some of the numbers are not actually image data; they are numbers about the numbers. The new word for this category of information is metadata. It can cover many things, but in this context it is sufficient to consider metadata used for decoding or display purposes, and this is the key to the scheme’s flexibility. While video carries “implicit” metadata (its documented television standard), data files normally have “headers” in which the metadata can be written, so that the nature of the associated image data is explicitly stated.

For example, in the SMPTE DPX format (Fig. 4), header information will include the number of pixels per line, number of lines per frame, bit depth and transfer characteristic law (logarithmic, CRT gamma, etc.), and colorimetric reference primaries, among others. This means that when one of these values changes from one transfer operation to another, the file format accommodates the change quite happily by just noting the new values in the header section. The attached image file also reflects changes in, say, resolution by shrinking and expanding to accommodate lower or higher resolutions, or re-indexing its pixel values as the aspect ratio changes. Video streams are unable to do this.

There is another big difference. Video, by its nature, has to be real-time, because it is either a capture format or a display format (reality is real-time, and



**Figure 3, "Ideal" Media Content Production Chain**

reproducing reality is real-time). It also remains real-time for all the processes in between, whether it needs to be or not. For example, why does a "video dub" have to be real-time? With digital levels and error protection, nobody needs to be looking while it is happening. Data operations can be made real-time, but don't have to be; they can run slower (to save money) or faster (to save time). This is a further example of flexibility.

There are a few more factors in favor of a data representation. An increasing proportion of the overall content in a finished product is computer-generated. This category includes cartoon characters, animated graphics, and titles. There is no inherent video representation available for these items, so at the point where compositing with real-world objects occurs, it makes sense to bring everything together in a data file format.

Finally, an increasing amount of LAN and WAN infrastructure is now being used for interconnections within and between production facilities. Special

adaptation techniques are required if these data communications-type channels are to carry video signals, because the latter assume an isochronous/synchronous environment not generally provided by data channels. Data files, on the other hand, make no assumptions about data channel capabilities, so make their own provisions, for example, time-stamping.

### **Disadvantages of Data Representation**

The following issues can make data seem to be at a disadvantage when compared to video.

When image data carries its own metadata around in the form of headers; it represents additional embedding and extraction processing overhead.

Packetisation and transmission protocols designed for data in general can be very inefficient because they are not optimized for the continuous streams of very high volume data associated with high-resolution moving images. This

often significantly reduces speed in common operations (transfer, copy, processing, etc.) compared to the video equivalents (however, this issue is being addressed in a SMPTE technology committee).

Facility staff accustomed to real-time video operations, with interactive "WYSIWYG" monitoring and control, can find data operations complex and very non-transparent, e.g., lack of monitoring during long data transfers.

However, it must be recognized that the comparison with video might be on an unequal footing because of other factors. For example, an HDTV video signal may use luma and colour-difference representation, in which the colour-difference signals are down-sampled 2:1 (a "4:2:2" representation), whereas a data representation of the same material at nominally the same spatial resolution is more likely to use a full-bandwidth RGB colour space. In addition, the video signal will be pre-formatted to a 16:9 aspect ratio, while the data representation

may be preserving the extra height of a film camera's "full aperture" frame (4:3 aspect ratio) to allow composition decisions to be deferred. These factors alone will double or triple the number of bytes in the data representation of the same frame.

## Image Data and Video - Is There Really a Difference?

Video could be described as just image data with a standardized set of metadata values that are written down in an external document, e.g., a SMPTE standard, instead of being carried explicitly in a header or a linked file as with image data. In the past, the lack of dynamic nature to this external document was not a problem, because the parameter values (for horizontal and vertical pixel count and aspect ratio, reference colour primaries, transfer characteristic, etc.) did not change.

The important point is that both data and video ultimately have to represent and reproduce hue, saturation, and luminance values at defined spatial points in a displayed image at defined instants in time. What matters is how well these respective representations can adapt to variants in the original source image from which they are derived and how well they can service variants in the target format.

That is not all: there is the question of efficiency. Video could be described as single-purpose, and therefore finely tuned to its application; data could suffer from "bloat," with its onboard metadata, packetisation and extra error protection.

An example that seems to blur the distinction a little is a current initiative within a SMPTE technology committee to document the sending of what is really data over a video interface. The "data" is film image data and the interface is an HDTV serial digital interface. The HDTV interface is normally "bundled" with an associated SMPTE studio video standard, but in this instance, it was felt that a non-video transfer characteristic, i.e., a logarithmic characteristic, would allow the subjective reproduction of a greater tonal range for the same bit depth across the interface, compared to the use of the normal, standardized CRT-gamma curve for video.



Figure 4, SMPTE DPX Format (conceptual representation)

## Parameters and Applications - What's at Stake

The following sections are not intended to be an exhaustive analysis. Rather, they aim to reveal how the choice between a data or a video representation might be made in various circumstances.

### Spatial Resolution

HDTV standards are not unified in resolution; however, the highest resolution available, and the one normally used when scanning film, is 1920 pixels horizontal by 1080 vertical. The derivation of these numbers is fairly simple: the aim of HDTV, when its parameters were being formulated, was to offer twice the spatial resolution of standard definition television in each axis. The universal Rec. 601 format for studios uses 720 pixels per line.

HDTV was also intended to get closer to the cinema experience in offering a wide screen picture, so the increase in width from the 4:3 to the 16:9 aspect ratio meant that for the same resolution per unit width, the "longer" scan line had to be factored in. This was a factor of 1.33 (at a constant height, the ratio of 16:9 to 4:3), increasing the HDTV horizontal pixel count from 1440 to 1920. The 16:9 aspect ratio combined with "square" pixels then yielded 1080 pixels in the vertical direction. So it could be said that HDTV started with the small standard-definition viewing screen and worked upward by a modest, fixed ratio.

Film, in comparison, does not operate with any "neat" numbers. Progress in film technology has been based on improving resolution, steadily, with

better optics and finer grain emulsions. The intent always was to achieve a dramatic image (where sharpness was one factor contributing to the impact) on a very large screen. Many years were to pass before there was even a measurement of just how many "equivalent pixels" could be resolved in motion picture film. What spurred such measurement was the desire to scan film electronically and, therefore, the need to find out how many pixels in the scanning sensor were required to reproduce its spatial resolution adequately. The answer to this depends on what kind of film is being scanned and where in the production chain the observer is standing.

For example, for scanning Super 16 film (even the original camera negative), 1920 x 1080 HDTV resolution probably would not limit the final performance. Scanning 35mm negative might require 4000 pixels horizontal resolution: to equal a typical 35mm release print, only 1500; IMAX might need 10,000 or more horizontal pixels. A data file can accommodate these variants within existing standards; a fixed video format cannot do so and new standards would have to be formulated and agreed.

The question then is: do we want to represent the original film or do we want to represent the capabilities of the display? At the present time, film resolution at the display stage is much less than in capture, but could improve with the advent of digital cinema (or with some kind of response from the film industry to digital cinema in the form of better duplication, print stocks and projectors). This means that a source that is inherently limited in resolution, such

as 16mm, will not look better as projection improves over time, but 35mm probably will. Therefore the decision may have to be based on the expected lifetime of the content, as well as its inherent quality. For long shelf-life content, data representation is suggested because there is no video standard higher than HDTV. For short-life material, data probably would not offer much benefit in return for the greater cost and slower workflow.

### Aspect Ratio

Since consumer television receivers are not equipped with motorized curtains, and most viewers do not view programs on a multiple window computer-style desktop, television, unlike the movies, operates with a fixed aspect ratio. It was 4:3; it is now transitioning to 16:9. This is not a problem when film is shot specifically for television because the shots can be composed for the target format. However, for a long time, cinematographers have enjoyed the benefit of being able to choose the aspect

ratio that gives them the mood and look that they want, perhaps widescreen anamorphic for great epics with big landscapes and 1.85 for tighter “people and action” productions. Thus, libraries of finished feature films contain the whole spectrum of all the aspect ratios that have ever been tried, and there are plenty of them.

The result, when one of these library films (which is almost certainly not 16:9) is scanned with a video format, is that something is inevitably lost if the scanned version is ever to be shown again on a display that could show the original film’s format. The telecine or film scanner operator can choose whether to lose picture content all of the time (impose the television aspect ratio on the film image), or some of the time (use telecine pan/scan), or to preserve all of the picture area at the expense of resolution by using letterbox or pillarbox mode. This is shown in Figure 5, which picks two extreme cases of film scanning and recording back to a conventional release print in order to make this point;

its numbered annotations are explained as follows: Part (a) of the diagram shows the Cinemascope wide-screen case with 2.39:1 aspect ratio. Scanning according to (1) means that the film is zoomed to fill the 16:9 video raster’s height, but the sides of the image are lost. However, even when a display screen is available which could accommodate the full extent of the original image (2), the sides remain lost, because they were truncated irrevocably in the scanning. A variant on this is the so-called “pan/scan” mode, in which the video raster is moved from side to side to track the center of attention in the image, but the same total amount of information is still being lost. Scanning according to (3) is the so-called “letterbox” alternative. Apparently nothing is lost by this method, but after going back to film again (4), the image has apparently shrunk; what has actually happened is that resolution has been lost in the vertical direction; this is revealed when the image is optically expanded to restore its original size. Part (b) of the diagram shows the opposite case, with a 1.37:1 aspect ratio original (i.e. an old

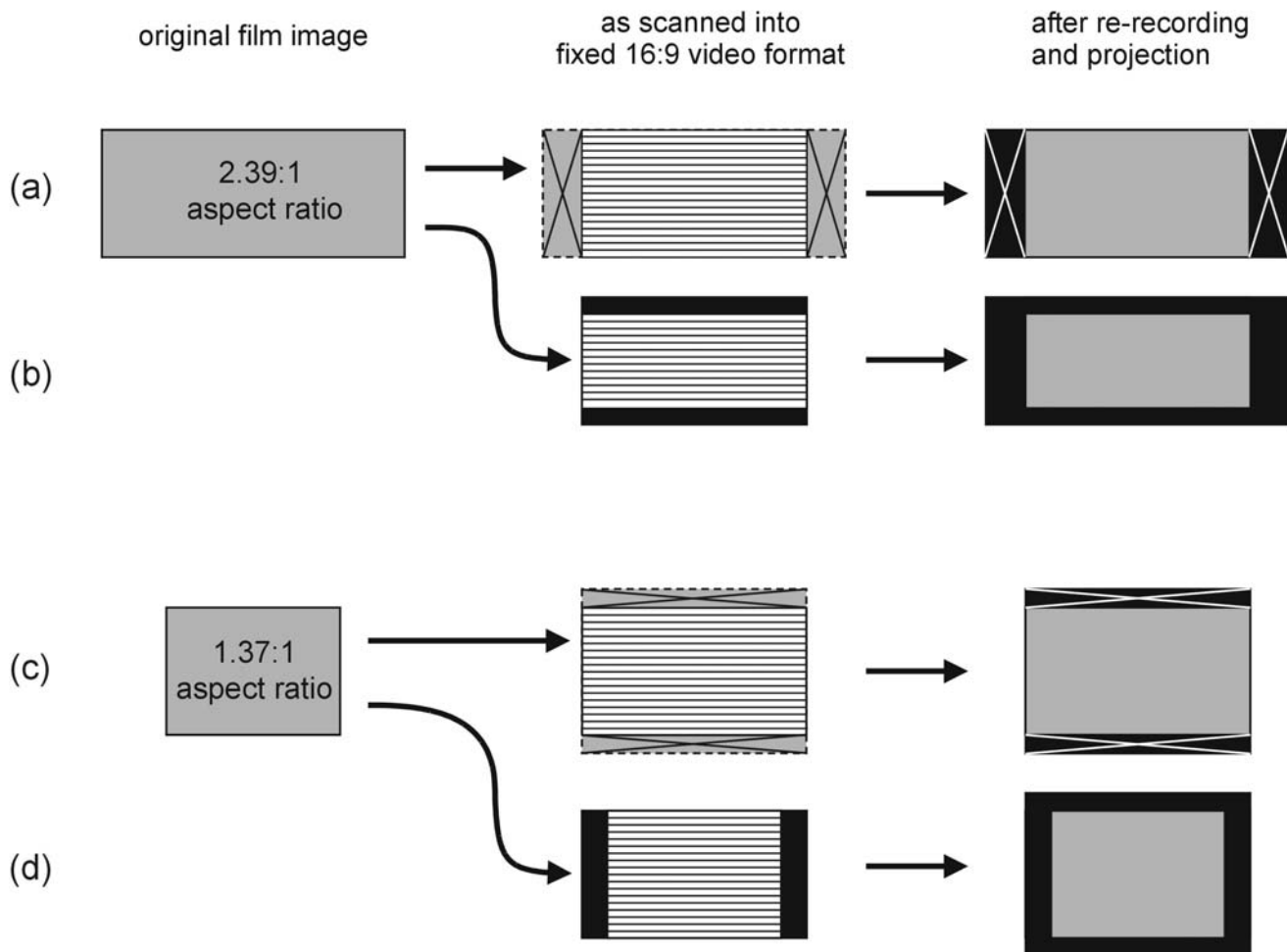


Figure 5, Information Loss Due to Fixed Aspect Ratio

“classic” movie). Here the effects are similar but opposite, but the principle is the same: information is lost one way or another when variable-aspect ratio content is shoe-horned into a fixed aspect ratio medium.

In comparison, in a data file format such as DPX, it does not matter if a pixel is still on line 1 in the scan or is now in line 2. Apart from applying labelling appropriately in the headers, the format accommodates any shape image automatically. The answer to the aspect ratio question, therefore, is that video representation works just fine if the images were composed with a television aspect ratio (or are very close to it, e.g. 1.85), but becomes far less efficient when there is a mismatch (CinemaScope or classic 1.37 on 16:9 video).

### Contrast Range and Transfer Characteristic

Starting with film images and proceeding toward a one-way transfer for television viewing, there is probably little subjective difference in the tonal range and just noticeable differences (JNDs) at the black end of the scale achieved with two different transfer characteristics: Rec. 709 CRT gamma correction as used in television, versus a logarithmic transfer curve (this assumes use of the same bit depth, e.g. 10 bits, in both cases).

The issue is when the nonlinear conversion has to be “undone,” or when transformations between different nonlinear curves have to be made. For example, processing electronic scans of film images for colorimetric masking has to be done in a logarithmic space. If the electronic scans have already been CRT gamma corrected, there will be quantizing errors at the black end of the tone range, because the gamma curve “switches off” its curvature here (to prevent infinite noise amplification) and replaces it with a linear portion, having a slope of only 4.5. These errors will then be magnified by the logarithmic processing. A “log” characteristic on the other hand can be designed for reversibility in processing, which was not a consideration in the choice of the CRT gamma curve.

Again, although there is nothing to stop a logarithmic characteristic being sent over a video interface, it would be “non-standard,” and the video has no provision

for metadata to flag this fact. In a data file, the chosen characteristic can be signalled by metadata.

### Colour Gamut and Colour Space

All practical colour reproduction systems exploit the principle of metameric stimuli. This is a characteristic of human vision whereby any perceived light source or reflected light in the visible spectrum, even if it consists of a complex combination of hundreds of wavelengths in differing intensities over a relatively broad band, can be subjectively matched by the simultaneous reception of a much smaller number of synthesis colours, known as primaries. It turns out that most of the useful colours can be matched with just three such primaries; red, green, and blue are normally chosen, so a display requires sources of these three primary colours to synthesize a rendition of the original scene. Television uses these primaries directly from camera to CRT; film is indirect, using a negative/ positive scheme in conjunction with complementary dyes of cyan, magenta, and yellow, yet still recording similar red, green and blue components in the original scene.

Analysis of the incident image is, therefore, a matter of generating the appropriate combination of metameric stimuli to feed to the display device (tristimulus values, for a three-colour system), so that the eye is fooled into perceiving the original complex light stimulus. The range of colours that can be synthesized at the display will depend on the purity of the primary light sources used in the display. Both film and television suffer limitations in this regard, although different in origin and in effect.

Current colour television systems and their associated standards embed a fixed set of reference primaries into the image analysis, based on the capabilities of the phosphors used in the CRT. The fact that CRT phosphors have to compromise between producing a wide colour gamut and a pleasingly bright image is reflected in these reference primaries: the image signal will not yield any extension of the current range when reproduced on some future display technology with a wider colour gamut. This could have implications for the use of video signals in electronic cinema systems, which are rapidly moving away from CRT technology.

Data representations of images, on the other hand, allow the user to specify, again in metadata, the set of reference primaries in use. This could become particularly valuable when telecine and film scanner outputs have to be rematrixed to suit differing display technologies, e.g., micro-mirror versus laser, such that different file versions of the same material are required.

“Colour space” is a loosely-defined term. Here, one particular meaning is considered: the distinction between an RGB colour space and a Y’PbPr colour space in a video signal. The two spaces would be colour metrically equivalent in the end result were it not for the way in which the matrixing of the Y’PbPr space is invariably combined with gamma correction in all broadcast video systems. Briefly, the two operations are performed in the “wrong” order, to bring about an economy in the circuitry of the receiver, i.e., the Y’PbPr matrixing is performed on gamma-corrected R’G’B’ components. This causes the well-documented “failure of constant luminance problem,” the end result of which is chiefly saturation errors in some reproduced colours.

It is possible to use video signals in an R’G’B’ form rather than the Y’PbPr in limited and controlled circumstances, for example, telecine colour correction suites. However, this is awkward because existing single serial link HD-video interfaces are not designed for R’G’B’; implementations generally have to use doubled-up Y’PbPr links. Again, data file image representations allow virtually any colour space to be specified and used over interfaces, being indicated by the metadata in the header.

### Conclusion

The continued existence of video standards is guaranteed by the vast number of television receivers in the world. Video is the direct electronic driver of a real-time display. Consumer camcorders will probably also ensure the survival of video, because they must connect to the television display in a relatively straightforward manner.

However, for the professional side of the industry, working in the new “matrix” of any origination source (film, video, or computer graphics) in conjunction with any target medium (broadcast, packaged-medium and Internet television,

conventional and electronic cinema), image data is already more universal, due to its flexibility in accommodating format and parameter variations. The question of whether it can overcome its present cost, speed, and usability disadvantages to become a more cost-effective medium than video will probably be answered in the next one to two years.

### The Author

Dave Bancroft is Business & Technology Development Manager for Thomson Multimedia Broadcast & Network Solutions. Based in the UK, he provides long-term strategic planning services to product development groups in his company such as the Film Imaging and Recording group based in Germany and the Camera group in the Netherlands. He is also helping develop electronic

imaging solutions more generally, for new applications such as digital cinema.

Bancroft began his career in the BBC, but left the UK to follow opportunities in a wide range of responsibilities from software testing to marketing. Over the next 20 years, these took him to the Middle East, Africa, New York, California, and Germany, as he pursued his career with RCA, Ampex, and Philips Broadcast (later to become his current employer, Thomson).

Bancroft represents his company in the standards-making activities of SMPTE, where he is a Fellow and chairman of the I23 Image Technology Committee. He is also a Fellow of the Royal Television Society and a member of the BKSTS Moving Image Society in the UK.

### References

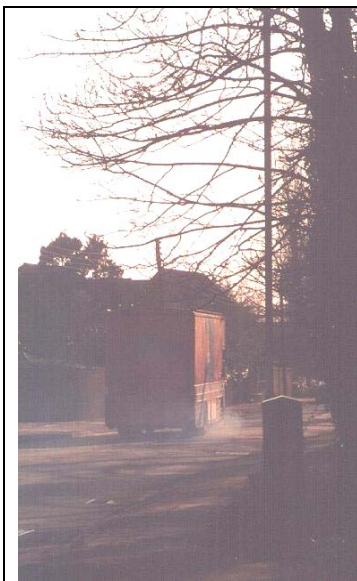
[1] Study Group DC28.2 on Mastering, part of SMPTE Technology Committee on Digital Cinema, DC28 (<http://www.smpete.org/engr/tech-scop.html>).

[2] SMPTE Standard 268M-1994, File Format for Digital Moving-Picture Exchange (DPX).

[3] SMPTE Technology Committee on File Management and Networking Technology, N26 (<http://www.smpete.org/engr/techscop.html>).

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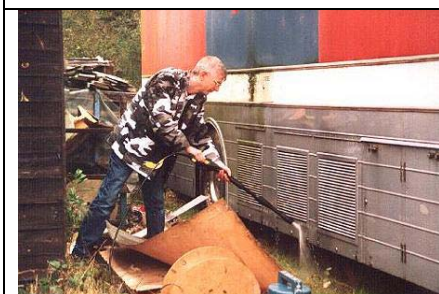
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**The 1968 Marconi CMCR on the move again after years in hospital**



**We always knew Paul Marshall was a sucker for ob van restoration**



**Jet-stream cleaning from Dave Hill  
These pictures of Paul Marshals truck recovery by Dicky Howett**



**And so as twilight settles on the road, our thoughts turn = naturally to journey ahead plus the horrendous cost of tv vehicle = restoration**



By John Lawrence GW3JGA

## Black (Blanking) Level Clamps

This subject has arisen because of the problems some local ATV Amateurs have experienced when receiving signals from 24 cms FM ATV transmitters that use an oscillator controlled by a phase-locked loop circuit.

monitor. Some satellite receivers have a built in 'clamp' for this purpose.

### Method of Operation

The principle is to repetitively stabilise one point of the video waveform to a reference voltage, e.g. 0 volts. To do this, we need to arrange for an electronic switch, to switch on for a short period at a precise point on the video waveform

sync and blanking waveform is shown in Figure 1.

### Experimental 'Clamp' Circuit

The circuit is shown in Figure 2. The input signal is fed through C5 to the output amplifier IC2. The input video signal is also fed to the sync separator IC1, LM 1881. This generates several output pulse signals one of which, from pin 5, is correctly timed to coincide with the point at which we want to clamp the video signal.

This pulse is inverted by TR1 and fed to TR2. TR2 operates as a switch which clamps the signal line to 0 volts at the correct point on the video waveform. An inductor is included in the circuit to avoid shorting out the colour burst. The video waveform and associated 'clamp' pulse waveform is shown in Figure 3.

### How it works

Consider then, at the end of one line the switch operates and clamps the video blanking level to 0 volts at that instant. Because of poor low frequency response, hum or other disturbance, the blanking level may no longer be at 0 volts by the end of the next line. When the clamp operates again any error voltage, which may be present, drives a current back through C5 until the resultant stored

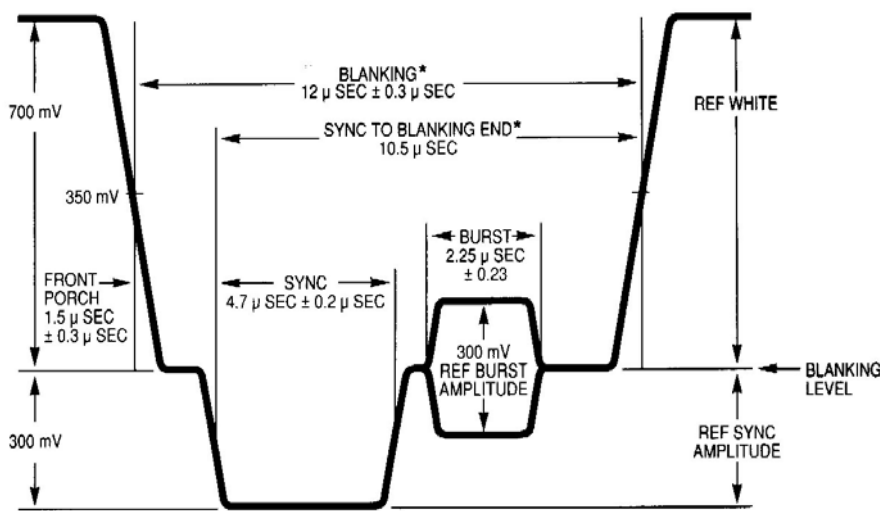


Figure 1, Line sync and blanking waveform

It was particularly noticeable with some early transmitter modules [1], where their restricted low frequency response resulted in variations in the black level with picture content, causing some monitors and receivers to display poor frame lock and picture roll.

By examining the received waveform on a 'scope, locked to the field rate, it can be seen that a period of peak white video causes the black level and the sync pulses to be depressed. But, during the field blanking where no video is present, the black level rises. The field sync separator circuit in some monitors cannot cope with this change of level and the result is poor frame lock. I have two different monitors, a Philips HCS 31, which is unaffected and a Matsui 1436 TV that rolls uncontrollably.

The answer is, I suppose, to correct the problem at the transmitter. You will have seen suitable modifications and read various discussions about this in CQ-TV. However, the symptoms can be eliminated at the receiver by 'clamping' the video signal before it reaches the

and connect the signal to 0 volts. The point chosen is at 'blanking level' on the line blanking waveform (where the colour burst sits). The 'text book' line

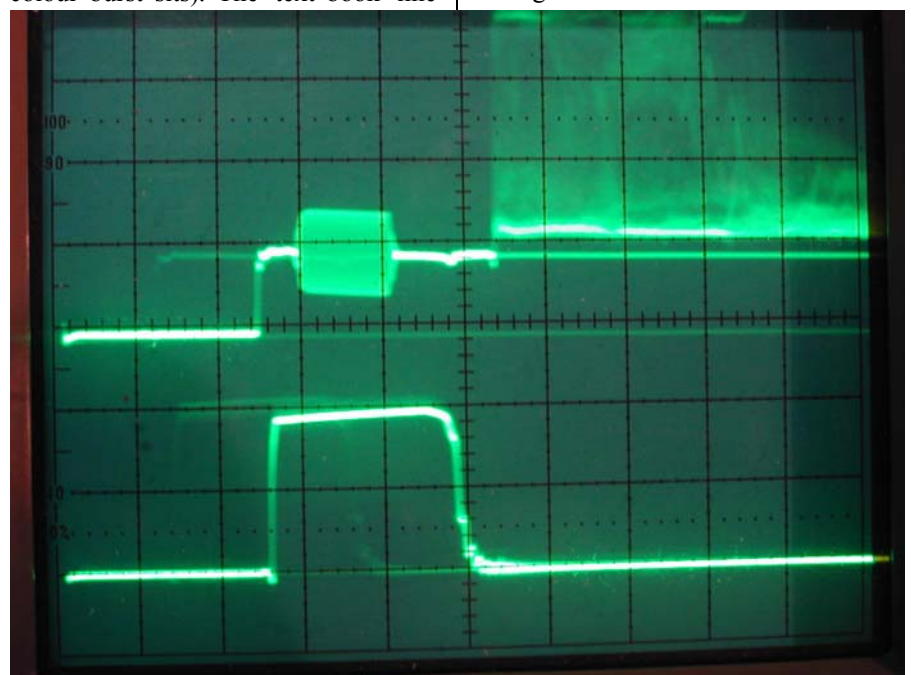


Figure 3, Video waveform and 'clamp' pulse

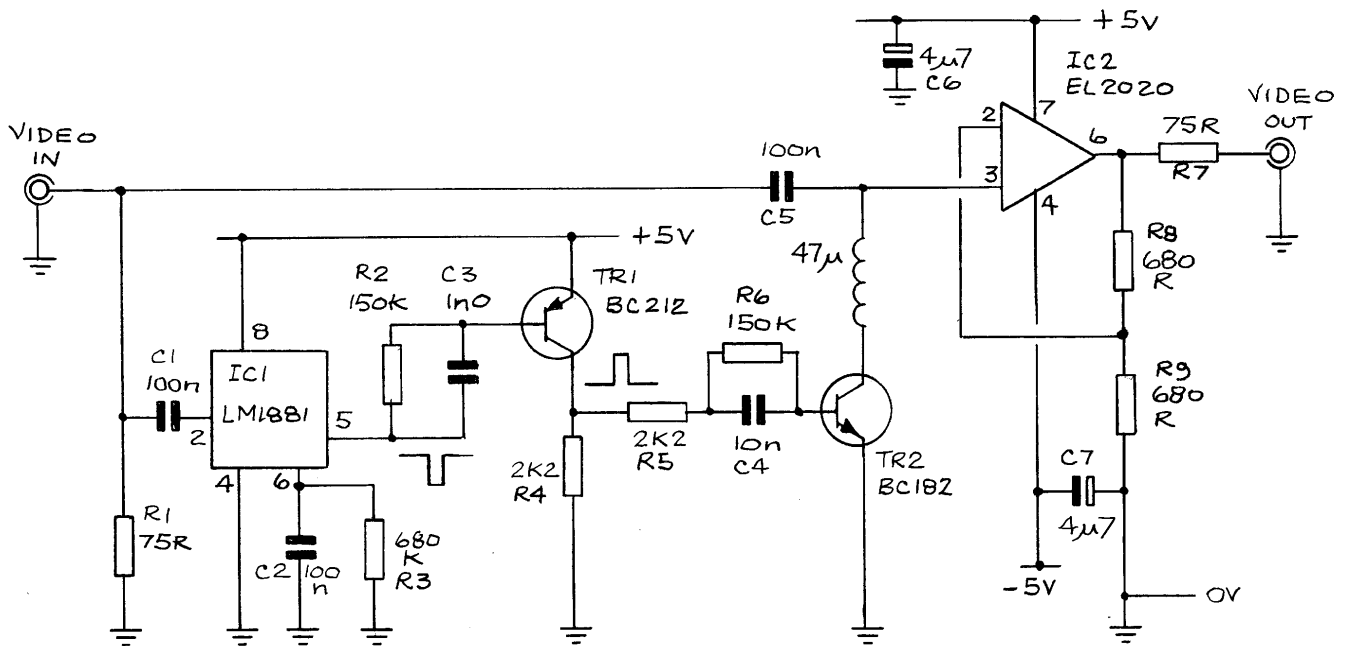


Figure2, Experimental black level 'clamp' circuit

voltage cancels the error. Thus, any error occurring during a line period is automatically corrected at the end of that line and provides a clean video output signal with the blanking (black) level clamped to 0 volts.

The upper trace, in Figure 4, shows an input video signal suffering from poor low frequency response and the lower trace shows the same signal after passing through the 'clamp' circuit.

The question we are asking ourselves is, should an ATV repeater contain a 'clamp' to clean up incoming signals or should

the incoming signals be repeated warts and all?

### References

- [1] G1MFG's ATV Modules Reviewed Brian Kelly GW6BWX - CQ-TV 192, pages 9 -11
- [2] A Processing Amplifier Bryan Dandy G4YPB - CQ-TV 136, pages 74 - 76
- [3] Processing & Distribution Amplifier John Goode - Best of CQ-TV, page 79
- [4] D.C. Clamp Circuits S. W. Amos &

D. C. Birkinshaw - Television Engineering, Vol. 4, Pages 75 - 80

[5] Television Measurements Margaret Craig, Engineering - Manager, Tektronix Inc.

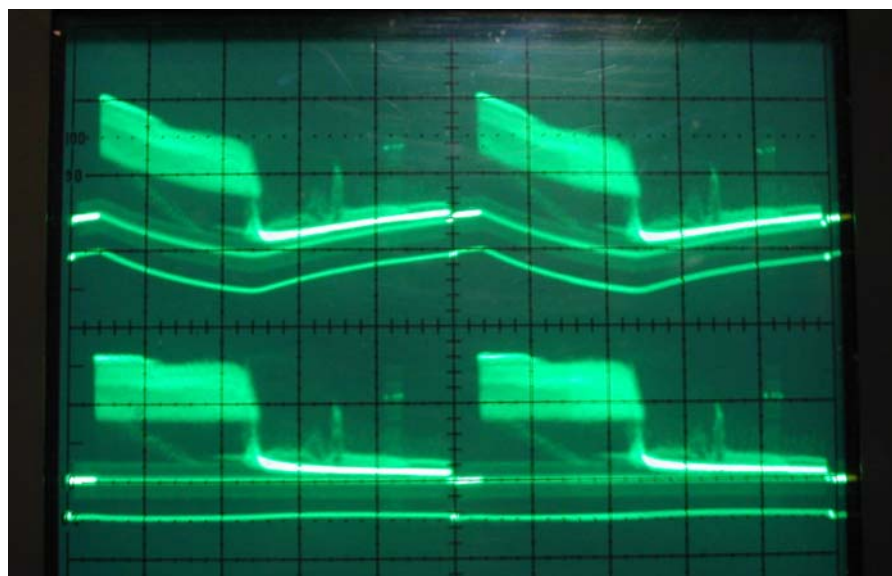
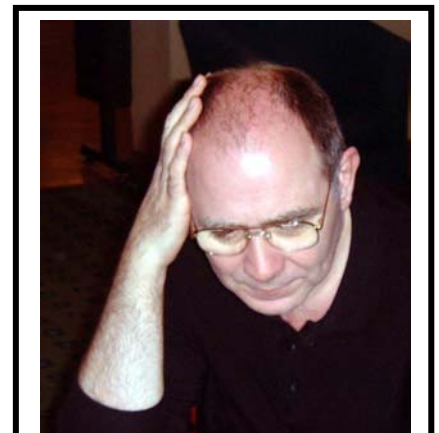


Figure 4, Video input and 'clamped' output signals



Our chairman is worried that you may not be able to attend our 'do' at Shuttleworth on the 16<sup>th</sup> June.

Please may him a happy chap, come along, and join in the fun.

All members are invited to attend our BGM in the afternoon. The BGM agenda can be found elsewhere in this issue.

# The Life and Times of Studio S

By Dicky Howett

Dicky Howett delves into the engineering logs of BBC TV Southampton.

Recently I've acquired a small set of BBC Television Engineering Logs written by BBC staff over short periods between 1986 and 1987. In this instance the logs refer to the BBC's Southampton studio centre called with faultless logic, Studio S. As a rule, BBC engineering logs were used to chart the day-to-day progress (or lack of) concerning such technical trivia as loose cables, blown cue bulbs and indeed blown entire cameras!

Studio S was (and probably still is) the studio from whence emanated such regional BBC TV delights as South Today. These BBC engineering logs (usually confidential-but not here) make interesting, pithy and occasionally arcane reading. Written by anonymous engineers, (they know who they are) the technical logs present an invaluable guide (where legible) of daily broadcast television engineering practices, plus trials and indeed many tribulations.

To set the scene, during the 1980s, Studio S was a humble BBC television regional outpost, equipped with a hand-me-down collection of recalcitrant colour kit, incorporating four sturdy examples of that much-admired camera, the EMI 2001. However, as these logs graphically illustrate, by the end of the 1980s any residual love for the 2001 camera had completely ebbed away. The reasons for this (and more) are recorded thus.....

## STUDIO S ENGINEERING LOGS (Abridged for intelligibility)

**26/8/86.**

CAM 2 Ghosting. Cable to viewfinder is faulty.

CAM 1 Zoom control is not centralised i.e.; is more sensitive one way than the other. Also tends to creep.

**29/8/86.**

CAM 4 Soft again this morning-are focus volts drifting? At lunchtime however the camera is now meshing. To



**A stout EMI 2001 gets ready to shoot a caption for 'SOUTH TODAY' down at BBC Southampton in 1986? Actually, it's down at Dicky Howett's studio in Essex (2002), an image recreated just for CQTV readers**

cure meshing I re-adjusted focus to optimum and re-registered. Now OK.

**4/9/86.**

CAM 3 Hooking slightly at top of picture. It occurs on all cameras but is worse for CAM 3

**8/9/86.**

CAM 1. Ring on Y channel. Found yolk earth strap not connected to yolk.

**15/9/86.**

CAM 1. Viewfinder low brightness. Swapped with MAINT spare.

CAM 1. Altho CAM 1 greyscales ok, on monitor it looks yellower than 2&3.

**17/9/86.**

ALL CAMERAS. An amazing increase in resolution and sensitivity achieved by cleaning the Autocue screens!

**18/9/86.**

PEDS. Tilt locks on 1 & 3 need tightening. Also pan lock on 2

**19/9/86**

CAM 3. 100Hz-ish pickup, mostly on Red, but slightly on other channels.

Not visible with fully mod pix, so they are using it for now...

**23/9/86.**

ALL COLOUR MONITORS. Colour balance appalling!

**30/9/86.**

CAM 2. Excessive ringing on Green channel. Changed head amp. This improved matters.

CAM 1. Green tube. Small hole visible at low light levels.

**2/10/86.**

CAM 1. Green tube rejected for softness. Replaced with new tube. Okay.

CAM 1. Luminance meshing. Started off slight, increased dramatically, but eventually put right.

**3/10/86.**

CAM 2. Lens pack PSU S/C blowing main fuses.

**8/10/86.**

CAM 2. Nasty slash on Y channel. Cured by tightening earth tag on tube o/p.

CAM 1. Flashing during TX. (transmission)

**9/10/86.**

CAMS 1, 2 & 3. All cameras have had ringing and noisy channels.

**13/10/86.**

TUBE CONDITIONER TURNED ON FOR TEN HOURS.

Adjusted alignment of CAM 4. A little improvement.

**29/10/86.**

CAM 1. V/f has bogey top left. To be investigated.

**30/10/86.**

CAM 2. Slightly soft v/f. Duff peaking control. Replaced.

CAM 4. Soft due to duff zoom tracking.

**6/11/86.**

CAM 2. Zoom sticking.

**10/11/86.**

CAM2. Pedestal cable clamp shattered. ("It came off in my hand, guv.."). Quite.

**23/11/86.**

CAM 1. Meshing badly. Tweaked alignment so that meshing now matches that of CAM 2.

**24/11/86.**

Slide file slides (production) mechanically bust. Screw loose. Had my attention and sympathy. Now OK. Signed (DMB). (another hand had added "God help it!")

**12/1/87.**

CAM 1. Ped gassed up.

**20/1/87.**

CAM 2. Zoom tracking control changed due to existing one being bent

Also, crap cleaned off front element of lens.

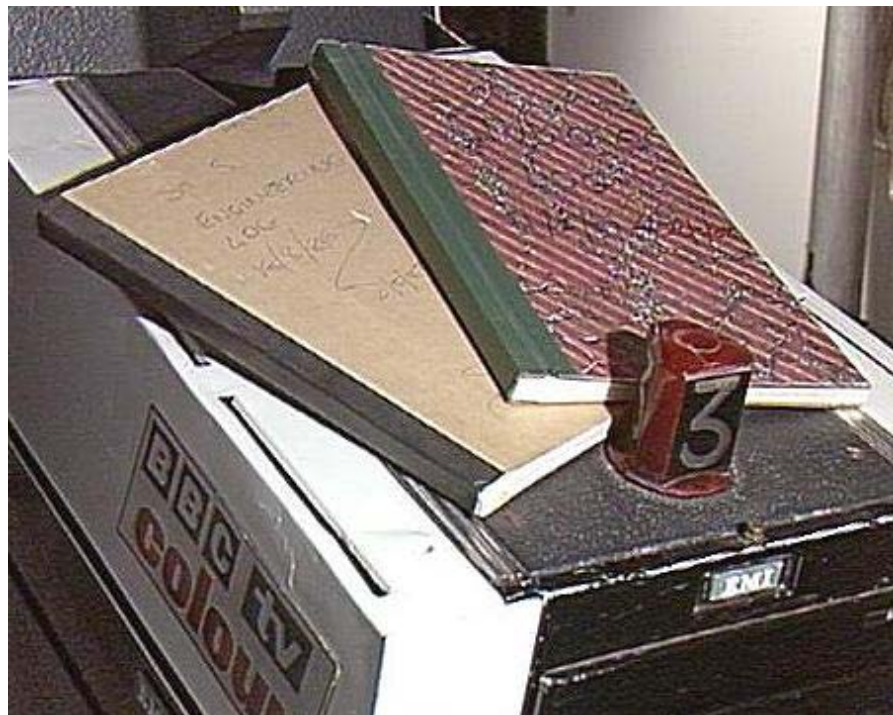
**11/2/87.**

CAM 1. Pan lock handle came loose and then came off in spigot which disappeared into its hole, with only a small bit showing. Tried unsuccessfully during line-up to retrieve spigot. Cameraman was happy to have no locking facility so left until tomorrow.

**12/2/87.**

CAM 1. Retrieved spigot from hole! Took front plate off pan/tilt head.

Replaced locking handle and now OK.



**The BBC Southampton Engineering log books, resting on an EMI 2001, after a heavy days entries**

CAM 2. Taken upstairs for major surgery. Block replaced with lovingly cleaned spare. Re-aligned, registered etc. No improvement noticeable. Bad ringing on all colour channels.

**13/2/87.**

CAM 2. Earth missing on Blue tube. Put in new earth tag and this cured ringing on all colour channels. Increased patch size. Checked beam align, focus. Still no vast improvement. Changed lens between CAM 1 & CAM 2.

CAM 1. Creeping zoom. Adjusted pot. Now OK.

**23/2/87.**

CAM 2 & 3. Both found with matrix out.

CAM 2. Blue flashing fixed.

**24/2/87.**

CAM 1. Very bad line rate shading on Red channel.

**25/2/87.**

CAM 1. (09.00) Shading on Red channel caused by viewfinder. Changed for spare.

CAM 1. (14.00). Camera died completely. Caused by new viewfinder.

**4/3/87.**

(18.45). All cameras looking naff. CAMS 1 & 2 not matching in colour.

CAM 3 sat up.

**6/3/87.**

CAM 1. Gassed up.

ALL CAMS. Yes, they do need a CCU line-up.

**18/3/96.**

CAM 4. Was seen to lose frame lock. Investigated but nothing concrete found.

**23/3/87.**

CAM 3. Pan & Tilt head locks need attention.

**27/3/87.**

CAM 4. Grey scale. Magenta cast now. Corrected. Gamma Laws don't match. Needs a CCU line-up.

CAM 3. Hair-like object in top RH corner.

**1/4/87.**

CAM 1. April Fools Day!! Out for shading corrector mod.

CAM 2. Field blanking not working. Traced fault back to shading corrector. Also failure on pulse board of field blanking o/p.

Consistent line flashing possibly from camera end rather than CCU. Luminance yolk may have been joggled. Pictures softer than normal.

13/4/87.

CAM 2. (17.15ish) Viewfinder replaced with spare in an effort to reduce ringing on all channels.

CAM 2. (18.30). Replacement viewfinder causing breakthrough on picture with smells of burning. Replaced with original viewfinder but this also failed to work.

2/8/87.

CAM 1. Picture fluttering as last week (but not too serious).

As the writer of the log indicates ironically, however bad things may seem, the day is never completely lost with BBC Engineering on hand. Regional television always had to make do with roll-in cameras and second-hand kit, so the ground-rules were laid well in advance.

By the mid-1980s, the BBC's main electronic production cameras were the Link 110 & 125 and on OBs, the ubiquitous Philips LDK5. The staunch EMI 2001 soldiered on in various BBC

backwaters, but by the end of the decade, the camera's end was very much in sight. (It had originally been installed at TV centre Studio 8 in 1967 so its design life of ten years was well into extra time). Even so, the BBC doggedly maintained the camera at one major production centre. This was Studio C at Elstree which until July 1991 recorded East Enders. And it showed.

## Thin CRT ready to see daylight

San Jose-based Candescant Technology demonstrated its Thin CRT display technology at SID. Following a joint venture agreement with Sony, Candescant anticipates producing an 8mm thick commercially viable 5 X 3m screen by the end of 2002.

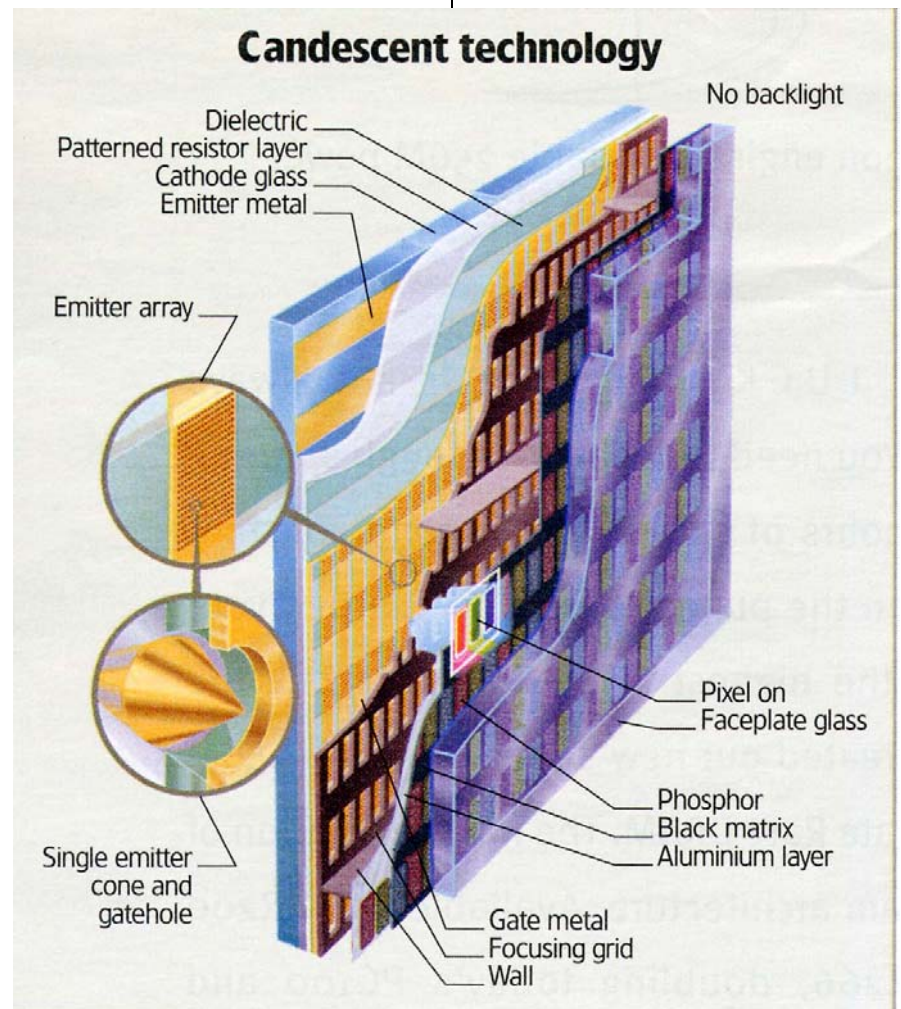
ThinCRT is based on the same principle as the traditional cathode ray tube used in standard TVs and desktop monitors. But instead of firing three electron beams, one for each primary colour, which illuminate phosphors on the screen surface, ThinCRT involves firing as many as 15,000 beams at the phosphor layer. A typical screen has at least 50,000 pixels. But the beams travel a fraction of the distance of those in traditional CRTs.

The emission array is made using a lithographic evaporation process, creating emitter cones 0.14µm in diameter. Candescant has not disclosed the material the array is made from.

Invented by Capp Spint, one of Candescant's founders, while at Stanford in the 1960s, the technology has had a sporadic development, with companies including Motorola trying to commercialise it.

Candescant is confident that, with \$600m in funding support, including \$77m from Sony as a joint development agreement, the technology is now mature enough.

Nils Welin, Candescant business development manager, said: "At a component level, the technology is less expensive than LCDs. The technology is emissive, so there is no backlight. It therefore consumes less power than an



LCD." Candescant will concentrate mainly on video applications.

Electronics Times, 18<sup>th</sup> July 2001, [www.electronicstimes.com](http://www.electronicstimes.com)



# Sony Protocol

By Trevor Brown.

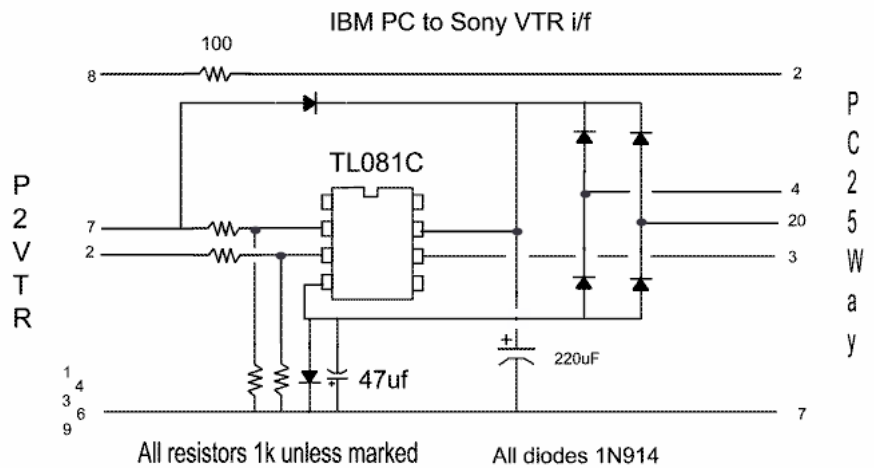
For those of you who have never heard the term "Sony Protocol", it is a communication standard using 9 pin connections and is to be found on the rear of many Sony Broadcast VT machines. These include reel to reel VT's BVH 2000 series and above. All the Beta, Beta SP, Digi Beta machines and - at the other end - one or two of the up market U-Matics. Sony were kind enough to explain the protocol, which is RS422 based, in one of their manuals. At the time I worked in Broadcast TV, and we were surrounded by this expensive hardware and it was not long before the subject of controlling some of it from a humble PC was raised.

The above was the first link in the chain. It was used to convert the PC serial port to RS422 and enable the PC to communicate with these machines.



Soon solutions were found to the software problems, including getting DOS to support 9.6K serial data. Unfortunately, the software that was produced was written in C++ and now resides on the hard drive of a broken Amiga computer.

I thought no more of this early work until the other day, when I came across a site on the internet [www.ssm.com](http://www.ssm.com). This is a commercial site, but with lots of help and tips for writing Sony Code. They even have free software down loads, one of which is a remote control for these



machines, called Wsony II.

The control panel looks very smart and runs under "Windows". The code we produced works under DOS. If there is anyone out there who likes VT machines and computer code, I have the full Sony Protocol documents - you are welcome to a copy.

5000) which uses Sony protocol, but it occupies about 4ft of 19" rack space and is Z80 based with EPROM software.

I would love to replace it with a modern PC, so if you come up with any interesting software, please don't leave me out of the loop.

Far left is a Graham Pattern audio mixer



These once expensive pieces of TV hardware are now finding their way onto the market at prices that would enable amateurs to experiment with the technology. I already have several BVH 2000 and BVW 10 and 15 machines in my den and I hope to be able to add to them as later machines become available. I control things at the moment with a commercial edit controller (Sony BVE

which is controlled by Sony Protocol; the desk in the middle is the Sony BVE 5000 controller and top right is a BVW 10, which again is a component player.

Above are 3 Sony BVH 2000 machines and the far left one is sat on top of the BVH 5000 edit controller.

It all runs on Sony protocol and not a PC in site yet!!!!





**Dicky Howett Reports.**

Take a look at my photograph. A few TV cameras with a familiar look about them. Unfortunately, it's the television manufacturing residue of the once mighty Marconi Company. To be exact, the items pictured are supposed to be an 'educational' display of television broadcasting apparatus. This collection (junk pile?) is at the Chelmsford Museum's 'Interactive Technology Store' housed in a disused pumping station at Sanford Mill. Note also that the cameras are without lenses or turret plates even. To compound matters some of the items displayed are incorrectly attributed. A Mk 3 becomes a Mk 4 with erroneous dates etc. Never mind, one might say, at least it is all preserved. Others might say it's a bit of an embarrassment all round.



**Novelty items from Dicky Howett.**

What in the world? Is it a jumbo in-car 8 track cassette or a snazzy cigarette roller?. In fact it's an Ampex Quad commercials cassette, holding a minute or two of product placement, all designed to fit into an automatic 'conveyor belt' mechanism, down at Southern Television. Well I never..

## Monitor Market

The reign of the CRT display for computer users is in decline.

Steve Jobs, Apple Computer's CEO, launched the company's latest iMac with all the expected razzmatazz during his keynote speech at Macworld Expo in San Francisco.

The company's latest computer comes with an LCD monitor, promoting Jobs to declare: "This is the official death of the CRT today." And for PC use, he might just be right.

According to Rhoda Alexander, director of monitor research at Stanford Resources and author of its 15th annual Monitor Market Trends report: "Flat panel monitors are projected to achieve a market share of 52.5% by 2007, displacing CRT monitors as the principal display type in the computer monitor market."

"The worldwide market for all CRT monitors will decline from 108.4 million units in 2001 to 91.7 million units in 2007. The CRT monitor market is dominated by the desktop computer monitor category, which will account for shipments of 94.7 million units in 2001 and will decline to 83.4 million units in 2007."

The report's findings indicate that the worldwide OEM value for CRT monitors will decline from its peak in 1999 of \$19.5bn to just over \$10bn in 2007, while the OEM market for flat panel monitors will have reached more than \$24bn.

Alexander says that sales of flat panel monitors were 13.5 million units, double the number shipped in 2000.

Last year, according to Alexander, consumers bought approximately 13.5

million flat panel monitors, more than double the 6.4 million shipped in 2000. Sales are expected to top 23 million during 2002.

From *EETimes*, 4<sup>th</sup> February 2002.  
[www.eetimes.com](http://www.eetimes.com)



**Apple's latest iMac has an LCD monitor.**

## Museum on the Move

Dicky Howett reports; The Hungarian MTV television museum based in Budapest has moved premises. Re-named the Hungarian Television Museum of Technology and Programs (sic), this museum, run by retired MTV technician Janos Koreny, has now more spacious accommodation. (The former museum was housed in a run-down area due for redevelopment). On display in the new museum are vintage video tape recorders, TV receivers, a '60s' tv studio

and 7 'working' cameras. The museum boasts also a 'display of programs' with 750 cassettes in English, German, French and Hungarian. Admission is free.

Dicky Howett adds: My visit previously to the MTV museum was well worth it. Janos Koreny has virtually single-handed, saved good examples of TV technology, but more importantly, has made them fully accessible. Nothing is behind glass and with Janos in

attendance, everything is described knowledgeably. Well worth a visit.

The Hungarian Television Museum of Technology and Programs.

Corner of the Oktober 6 & Zrinyi Street, Budapest.

Open: Monday 10-2pm, Wed 2-6pm, Sat 10-2pm, Phone (36-1) 269 2265 in service hours.



## Flexible Future

Organic light-emitting devices (OLEDs) could be the answer to cheap, flexible displays of the future. But problems with lifespan need to be addressed. OLED manufacturers believe they are dealing with the problems and that the future for OLEDs is bright.

OLEDs exploit the properties of certain organic materials that emit light when an electric current passes through them. They typically consist of a series of carbon-based thin films sandwiched between two electrodes. To observe the light emitted by an OLED, at least one of the electrodes must be transparent. Because of this, OLEDs are commonly constructed on glass and can also be fabricated on plastic and other flexible substrate films.

OLEDs, like LEDs, electroluminescent and vacuum fluorescent devices, are energy-emissive in that they emit their own light rather than modulate transmitted or reflected light. They do not need backlights, which makes them more efficient than energy-absorbing devices such as backlit LCDs.

Since only the area of the display that is actually lit up consumes power, the energy efficiency is increased. With the growing market for portable devices, this offers OLEDs an important advantage. **SUITABLE TECHNOLOGY**

Currently, the lifespan of OLEDs is not comparable with LCDs. OLEDs are not an appropriate technology for 24hr applications, but they are well suited to phones and PDAs which are used on and off for several years. The technology is best suited to applications that need low power consumption and high contrast ratio.

Dr Daniel Gisser director of strategic marketing display products at Eastman Kodak Company, said: "Kodak is



targeting mainly small, portable electronic devices that require outstanding image quality such as digital cameras, camcorders, advanced mobile phones, PDAs and portable entertainment. OLED lifetimes today are probably not sufficient for applications such as desktop computers and TV."

The technology holds promise because of the ability to tailor the organic molecules to vary colour saturation, sensitivity and other optical properties.

The colour of the light that is emitted depends on the material used to construct the OLED. One of the problems of using different materials to do the same job in a device is that the materials have varying life spans that result in colour drift.

Stuart Hough, vice-president of business development at Cambridge Display Technologies (CDT), said: "Colour drift over time can be compensated for in several ways. The device structure can be optimised, making the blue section slightly bigger."

Nick How, technical director for Densitron Technologies, added: "To even out the lifespan of the various materials [colours], we are looking at materials and the display drive electronics. I can't tell you anything too specific, but we are experimenting with materials and the packaging"

Dr Gisser points out that OLEDs are not appropriate for all uses, which means that applications need to be picked carefully: "Kodak's current OLED materials have lifetimes of between 10 000 and 40 000 hours use at reasonable conditions. Fullcolour devices have shorter lifetimes, in the range of 5000 hours. Lifetime depends on colour choice, brightness, image content and the general use profile of the device. It is important to choose applications appropriately."

### Still a lot to learn

According to Hough, there is still a lot to learn when it comes to OLEDs, and the industry still understands the chemistry and the physics of these materials.



Dr Gisser said: "As a technology, OLEDs are barely in their infancy. LCDs have been in commercial use for at least 25 years, so it is no surprise that LCDs have ironed out some of their bugs. The real surprise is how rapidly OLEDs are improving. Kodak

has several pieces of wizardry planned which will dramatically improve OLED lifetime"

Two paths for the technology are being forged. Kodak is going down the small molecule path while CDT is investing in the polymer path.

There are various differences in both the construction and characteristics of the two types of OLED. Polymer-based OLEDs are made from a plastic material which can be screen printed, contact printed, inkjet printed or spin coated. Small molecules are constructed in a vacuum. These vacuum chambers are used in the semiconductor industry and are therefore widely available.

According to Hough, polymer OLED manufacturing techniques are or soon will be low-cost and readily available, which he feels could change the nature of display manufacturing.

Dr Gisser reckons that small molecule OLEDs have been used commercially in about 15 models of car stereos and in at least one mobile phone. But the manufacturers have plenty of other ideas for applications.

How said: "An application that the displays would be particularly suited to would be in medical equipment in ambulances. Low power and readability are essential and, again, the price point is not such a barrier"

At present, no applications using polymer OLEDs displays are available, but DuPont and Seiko Epson will have products out by the end of the year

From *EETimes*, 4<sup>th</sup> February 2002.  
[www.eetimes.com](http://www.eetimes.com)

## Paul Holland G3TZO

Welcome to this shortened version of Satellite TV News, which has resulted (very sadly) from the pressures of "retirement".

As the year gathers pace there are a number of interesting launches to look forward to with new capacity for even more satellite delivered services.

## Transponder News

As usual the following snippets of news only reflect a small proportion of the many changes happening all the time. For up to the minute news of changes as always I suggest you use the Internet to visit the following two excellent sites <http://www.lyngsat.com/> (for every satellite aloft) whilst Stefan Hagedorn provides daily email updates of the changes which are taking place at <http://stefan.hagedorn.de/transpon2.htm>.

## Astra 2 & Eurobird 28.5 Deg E

**Gay.TV** is now on 12.510 GHz (SR: 2894, FEC: 3/4, VPID: 4194, APID: 4195, PCR: 4194)

**Purple Radio** has started on 11.661 GHz (SR: 27500, FEC: 2/3, APID: 2316, PCR: 2317)

**The Dream** on 11.681 GHz is now in the clear (R: 27500, FEC: 2/3, APID: 2326, PCR: 2324)

**ESPN Classic Sports** looks as if it will soon launch on Astra 2 having been observed testing on: 12.344GHz (H) (SR 27500, FEC 2/3)

## Astra 1A,B, C etc 19.2Deg E

Polonia 1 and Super 1 have left 11.992 GHz (H) on Astra 1G and have moved to 10.832 GHz (H) on Astra 2C (at the same position).

## Hot Bird 1-5 13 Deg E

TVN Siedem has replaced RTL 7 on 11.489 GHz (V) in PAL and on 11.178 GHz (H) (MPEG-2) on Hot Bird 5, where TVN has left 12.573 GHz (H).

## Sirius 2 at 4.8E:

Inter Film has started on 11766 (H)



## Atlantic Bird 2 8.0 Deg W

A Swiss TV feed can be found on 11.623 GHz (SR: 6111, FEC: 3/4, VPID: 4194, APID: 4195, PCR: 4194)

## Telstar 5 15 Deg W

Apadana TV is now on 12.608 GHz in Farsi (SR: 19522, FEC: 2/3, VPID: 370, APID: 371, PCR: 370)

## From the Post Bag

Ian F Bennett G6TVJ has emailed to ask about receivers used for news feeds that decode 4:2:2 coded DVB material. He asks whether there is a domestic type receiver which will do 4:2:2 as well as 4:2:0 and also handle broadcast feeds which are modulated 8PSK instead of the normal free to air QPSK.

For those not up on their MPEG2 theory the MPEG standard has defined *profiles and levels* of the full standard. Roughly speaking, a profile is a sub-set, suitable for a particular application, of the full possible range of algorithmic tools, and a level is a defined range of parameter values (such as picture size for instance) that are reasonable to implement and practically useful. There as many as six MPEG2 profiles though only two are currently relevant to broadcasting. The normal "main profile" is essentially MPEG-1 extended to take account of interlace scanning and encodes chroma 4:2:0. What is known as "professional profile" has 4:2:2 chrominance resolution and is designed for production and post-production. For this reason there are no domestic IRD's currently on the market which do 4:2:0 although as Ian says you can get professional IRD's

which decode 4:2:2. Ian says its very handy when you can get a colleague working on uplinks willing to change their coder to 4:2:0 so that Ian could see signals on his recently procured Nokia 9650 receiver.

A number of readers including Laurie, G3ILD, have commented on the disappearance and then reappearance of PI6ALK. Following a short period off air the Dutch repeater output is now back is back on it's original frequency of 12742Ghz (H), SR 3000, FEC 5/6 on Eutelsat W2 at 16.0 Deg E:

Alan, G3WXI, has just moved into a new QTH with mini-dish already pointed at 28.5 Deg E. Alan like many was querying whether there is any low cost option for receiving signals from 28.5 E without a subscription perhaps by using a satellite card in his PC. The key piece of information to know about all signals directed at the UK from 28.5 Deg E is that there are effectively two types of free to air signals. The genuine FTA signals can be received on a standard DVB receiver including the many PC cards now available. Services like the BBC, ITV, Channel 4 and 5 however are still encrypted using Mediaguard encryption. This is done to protect the various rights that attach to programming such as sports and films. Although there is no subscription payable to receive these channels you must use the official Sky receivers which are the only ones fitted with an embedded Mediaguard CAM together with a viewing card which is free on application to the BBC.

John Tournier writes to confirm he has now upgraded his Echostar AD3000IP to version 700 with good results by using the off air download facility mentioned in the last Satellite TV News. Having had a new PSU fitted in my AD3000IP I have also now upgraded to the latest version and am currently assessing the benefits.

## Humax 5400Z

Having finally paid off my old Pace MSS400 D2Mac receiver a month or so back I was looking for a new digital receiver to experiment with and use the spare output from my four dual output LNB's fixed on 19.0E, 13.0E, 5.0E and 1.0W. After a perusal of the current crop

of receivers available I picked the Humax 5400Z with what is known as an ALLCAM patch. Having recently installed a Humax 5300 for a friend I had been impressed by both the user friendly and flexible software and the excellent picture quality. The basic specification is as follows;

PCMCIA	2 Slot Common Interface
Irdeto Embedded/ALLCAM	1 Slot Smart card
Input Connector	F-type, IEC 169-24, Female
Frequency Range	950 - 2150 MHz
Input Impedance	75 ohm unbalanced
Signal Level	-25 to -65dBm
IF	480 MHz
IF Band width	36 MHz
LNB Power & Polarisation	Vertical : +13.5V Horizontal : +18V Current: 500mA Max. Overload Protection
22 kHz Tone	Frequency : 22 ± 4KHz Amplitude : 0.6 ± 0.2V
0/12V DC Output	Current Max. 50mA
DiSEqC Control	Version 1.0/1.2 Compatible
Demodulation	QPSK
Input Symbol Rate	2-31 Ms/s
FEC Decode	Convolutional Code Rate 1/2, 2/3, 3/4, 5/6 and 7/8 with Constraint Length K=7
TV SCART	Video Output(CVBS, S-Video, RGB) Audio Output (Resolution : 20 bits DAC, Max. 2 Vrms)
VCR SCART	Video Output(CVBS) Video Input(CVBS, S-Video, RGB) Audio Output(Resolution : 20 bits DAC, Max. 2 Vrms(fixed))
S/PDIF	Digital Audio Output, Fiber-Optic(Resolution : 20 bits)

As many readers will know it is not possible now under recent EEC legislation for retailers or magazines to publish details of how to get the best from an ALLCAM receiver. The theory

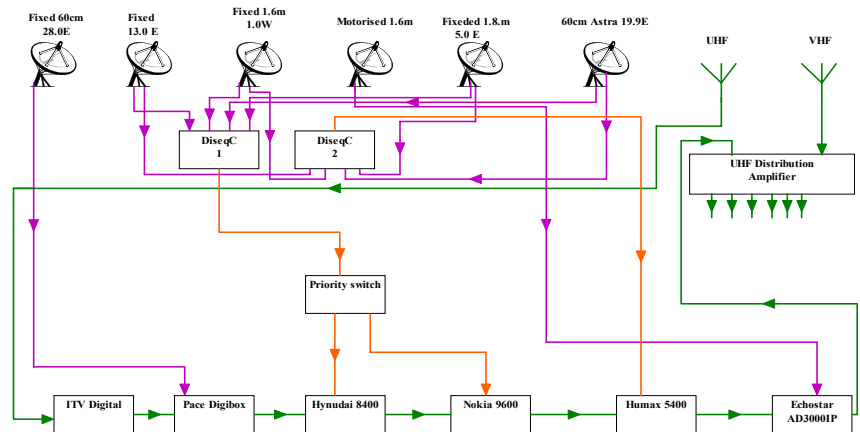
is simple in that the inbuilt CAM acts as a SECA, VIACCESS or IRDETO conditional access module, assuming the appropriate card is used. Given the number of programmers advertised in What Satellite each month it is fairly obvious that most people interested in exploiting ALLCAM technology are finding little difficulty in doing so!



**Humax 5400Z**

### Threapwood Teleport

Having included some pictures a few editions ago of the dish farm here at Threapwood I thought there might be some interest in looking at the switching configuration which allows me to select from either a motorised dish or from one



of the fixed dishes. I currently operate with 4 x fixed dishes pointed at 19.0Deg E, 13.0Deg E, 5.0 Deg E and 1.0W. These dishes have dual output LNB's which each feed an output to two DiSEqC switches. The two DiSEqC switches feed the Hyundai 8400 and Humax 5400Z respectively allowing me to select channels on all four satellites. The EchoStar AD3000IP has a dedicated feed from the 1.6m Satscan motorised dish as does the Pace Digibox from a 60cm NEC dish. All the feeds are buried in the lawn and travel into the house using plastic waste water pipes for protection. My wife keeps on suggesting each year that we use a lawn scarifier—needless to say the moss is winning!

As you can see from the diagram I am also using a priority switch which allows

DiSEqC switch 1 to feed the Nokia 9600 when the Hyundai receiver (located in the lounge) is not in use. The video distribution and switching in the shack is probably worthy of a few words in the next issue.

### Astra 3A

ASTRA 3A, the thirteenth satellite in the ASTRA constellation, will be the first SES spacecraft to be permanently positioned at 23.5° East, Astra's third orbital position over Europe. Built by Boeing Space Systems Inc., Astra 3A is the second "spinner" satellite in the Astra fleet, with 20 Ku-Band transponders in the frequency range 11.45 - 11.70 GHz and - 12.50 - 12.75 GHz. With its dedicated footprint, ASTRA 3A will notably provide follow-on capacity to Deutsche Telekom's Kopernikus satellite at 23.5° East. The spacecraft will carry cable feeds for networks in Germany, Austria and Switzerland as well as broadband and Internet services. To date

there has been no footprint published and therefore it is not known what the coverage in the UK will be like.

### Conclusion

That's its again for another issue of Satellite TV News. Thank you to those who wrote and emailed last time – its always nice to know what you are doing and passing on any tips or experiences you may have had. As usual the contact details are the same; email via [paul.holland@btinternet.com](mailto:paul.holland@btinternet.com) or phone to 01948 770429 or even fax to 01948 770476.

# 70cm ATV Transmitter - 300mW, new version

By **Amand Cauquelin F1GFF**  
and **Christian Denolle F1FAU**

The transmitter designed and described by Marc Chamley F3YX in the February 1984 issue of *REF* under the title *100mW Pocket Transmitter* has met considerable success. This transmitter was both remarkable and innovative but after 15 years of technical progress it is now possible to bring it up to date with improvements, yet without material alteration to the design. Our transmitter meets these requirements and, what's more, replication is guaranteed. The power is up to 300mW and if you are looking for greater output, the design makes a high-quality exciter for driving a valve or transistor power amplifier chain. PAs of up to 30W will be described presently.

## Characteristics and features

From the original 'pocket transmitter' we have retained the diode modulator and video amplifier. The VCO and the RF amplifier chain are new, taking shape after two years of experimentation. Our transmitter is characterised by PLL frequency locking, extremely linear amplification and the use of surface-mounted power transistors, also by eliminating can inductances, reduced audio subcarrier harmonics and a solid-state switch type 4053 instead of a DIL relay.

The assembly consumes about 350mA at 12V. For use on vehicles four regulators protect the voltage-sensitive elements from voltage variation. Finally the widespread use of surface mount (SM) components allows the PCB to be placed inside a commercial metal cabinet.

## The various elements of the transmitter

### The PLL, VCO and buffer stages

The VCO covers just 50MHz (420-470MHz). Reducing the frequency range involves the use of a variable capacitor (VC3) to centre the operating voltage to suite the frequency of ATV operation. At the output of the VCO following the BFR93 between 8 and 12mW are

available. The operating properties of a green LED are used to stabilise Q12 using its zener voltage of 2.1V. This LED fixes the collector base potential around 3V ( $2.1 + 0.7 + V$  of R45) and consequently the quiescent current of the transistor ( $8V - 3V = 5V$  divided by the 180 ohms of R56).

Communication between the PIC chip 12C508A-04P and the PLL circuit TSA5511 is via the I<sup>2</sup>C bus. The TSA5511 is referenced to a 4MHz crystal. The PIC is programmed for the two ATV frequencies in use. Connector J6 is provided for selecting frequency 438.5MHz with pin 1 in the air and 434.25MHz with a jumper between pins 1 and 2 (pin 2 is chassis/ground). To test that the 12C508 is functioning place a jumper over pins 2 and 3 of J6; the red LED will flash while it is in place.

### Amplification following the mixer

F1FAU had the idea of experimenting with transistors from the Farnell catalogue ([www.farnell.co.uk](http://www.farnell.co.uk)), in particular BFG135, BFG235, BLU86 and BFG591 (all types used in mobile phones, details on the Philips website at <http://www.semiconductors.philips.com/pip/BFG135>). Supplied in surface-mount form, they offer remarkable gain and power at a competitive price. The last three are in the 2W at 12V category.

Regulating the transmitter for 250mW output achieves extremely high linearity and stability at the same time. The BFG235 does not need a heatsink, the heat being dissipated partly through the copper tracks and at this level of amplification, a 17dBm mixer such as SRA1-H is not justified. For Class A operation the quiescent current of the transistors is adjusted as high as possible: 40mA for the BFG135 and 100mA for the BFG235.

### Bias circuitry for the BFG135 and BFG235.

The bias circuit of the BFG235 is the classic design. It uses the zener function of a green LED being 2.1 volts. The voltage drop between base and emitter being 0.7 volts, the emitter voltage is stabilised at  $2.1 - 0.7 = 1.4$  volts. On the

two emitter pins of the BFG235 we placed 22R and 33R resistors to make an equivalent resistance of 13 ohms. The voltage at the interface is 1.4V, which determines the through current ( $I=V/R$ ) at around 105mA, which is the collector current of the transistor.

### Audio modulator.

The two 7F10 inductors are replaced by two Toko KACS6184 inductors. The KACS6184 filters the harmonics perfectly and imparts a neat sinusoidal shape with straightforward tuning. The secondary of the KACS6184 coil has too many turns to pass the video signal. The components have the same values as in the TX ATV 1200 design by F3YX.

### Video modulator.

This section of the circuit conforms closely to the Pocket Transmitter. All we have done is change the DIL relay for an analogue switch (4053 IC) and at the same time added a resistor and a capacitor on the emitter of transistor Q10 to improve the crispness of the picture.

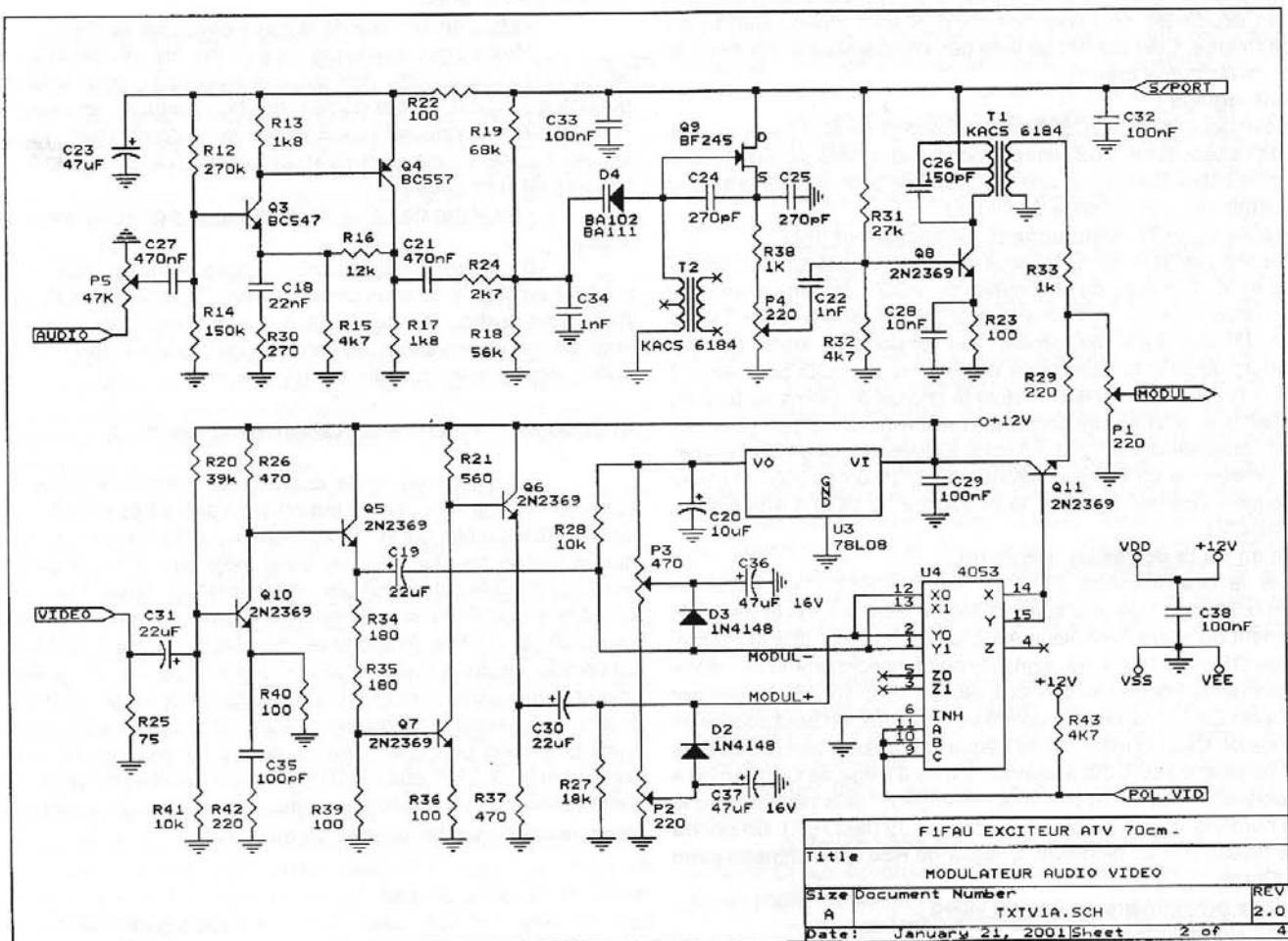
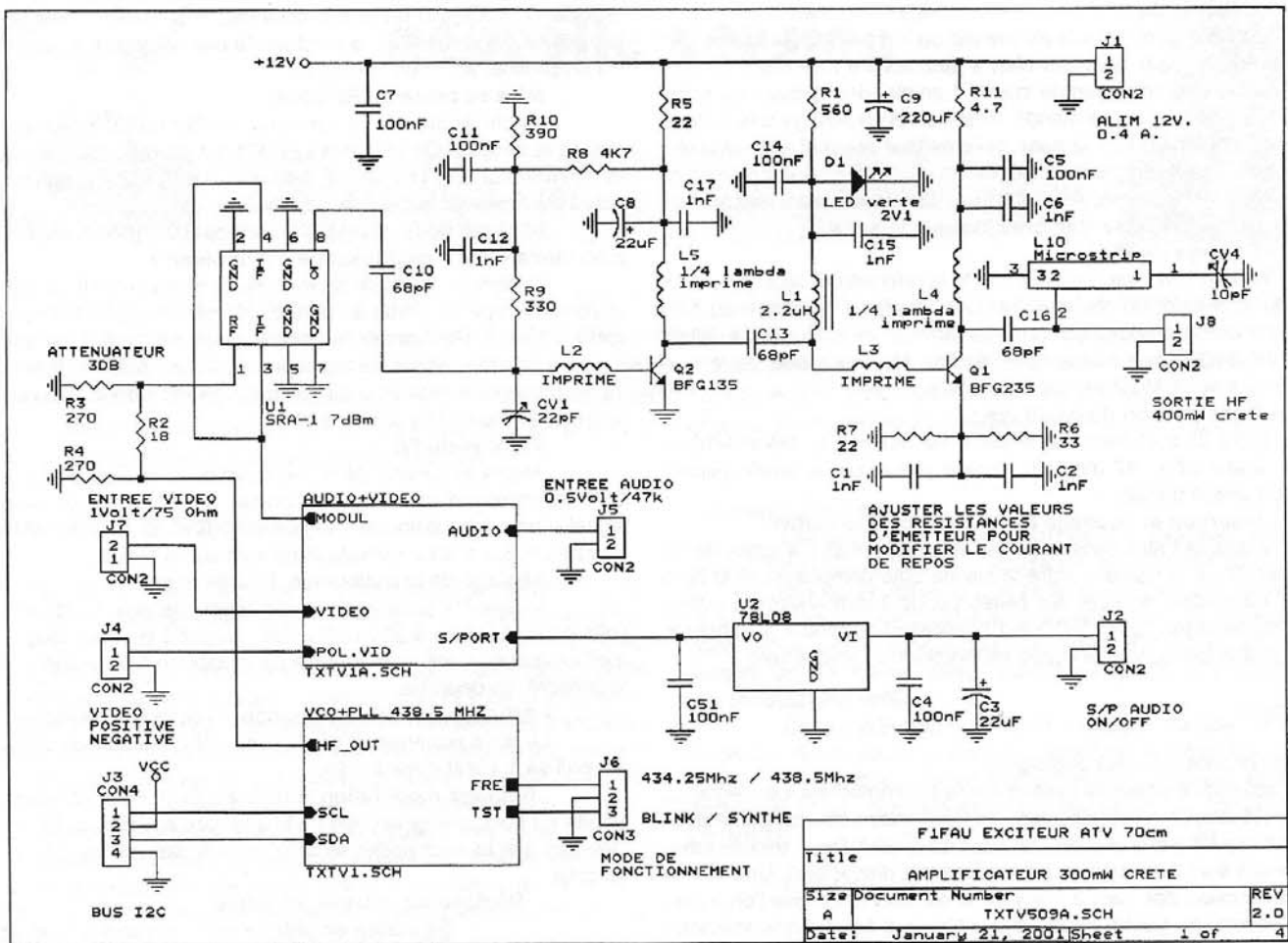
## Construction

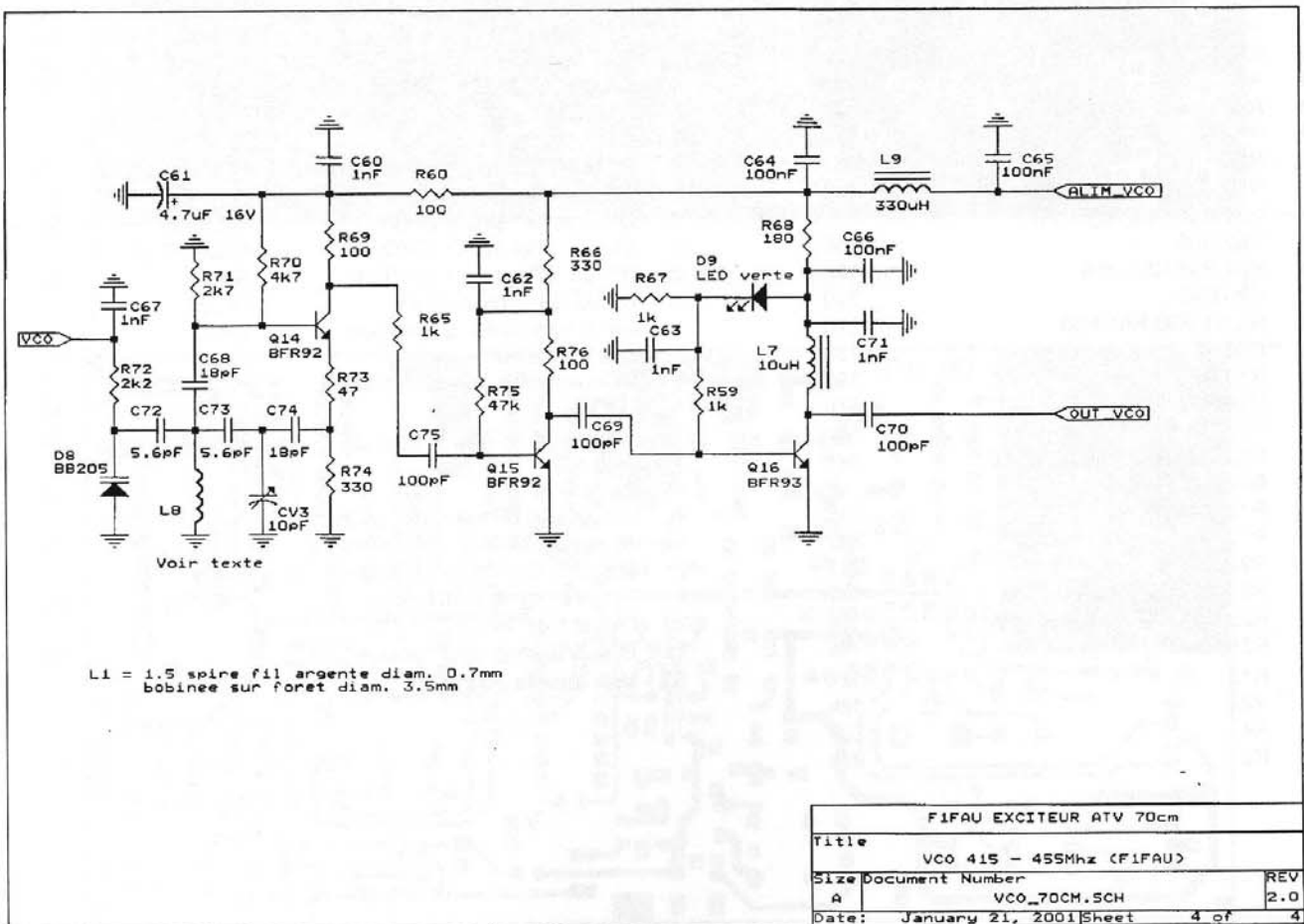
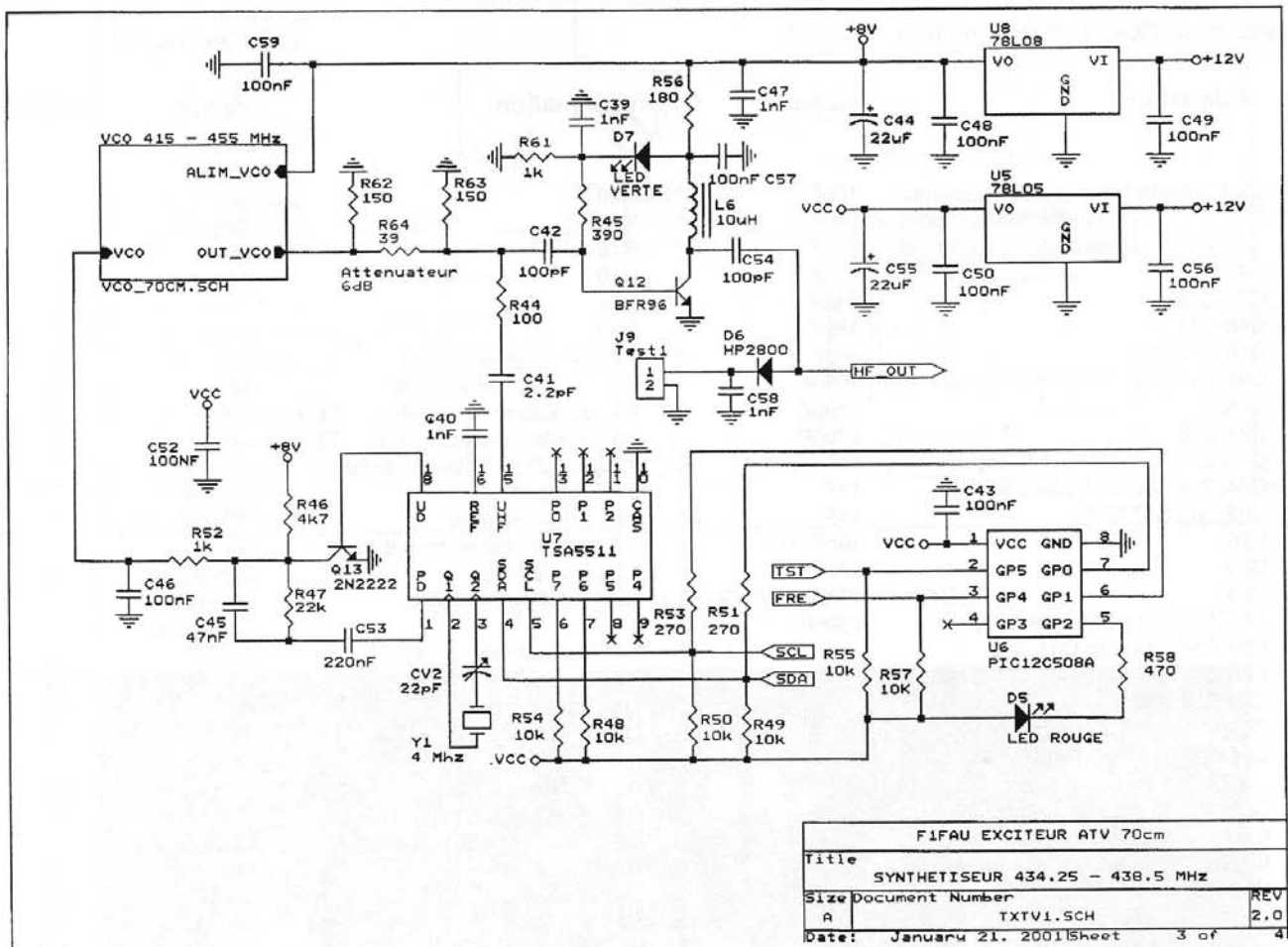
Using surface mount (SM) components means there are fewer holes to drill. This is a double-sided PCB and the SM components that need grounding are connected by tinned rivets through the board. The metal case (146 x 72 x 30mm) is an effective shield against RF from the PA affecting the VCO and against interference from the microprocessor. Leaving the lid off may affect the picture on the check monitor.

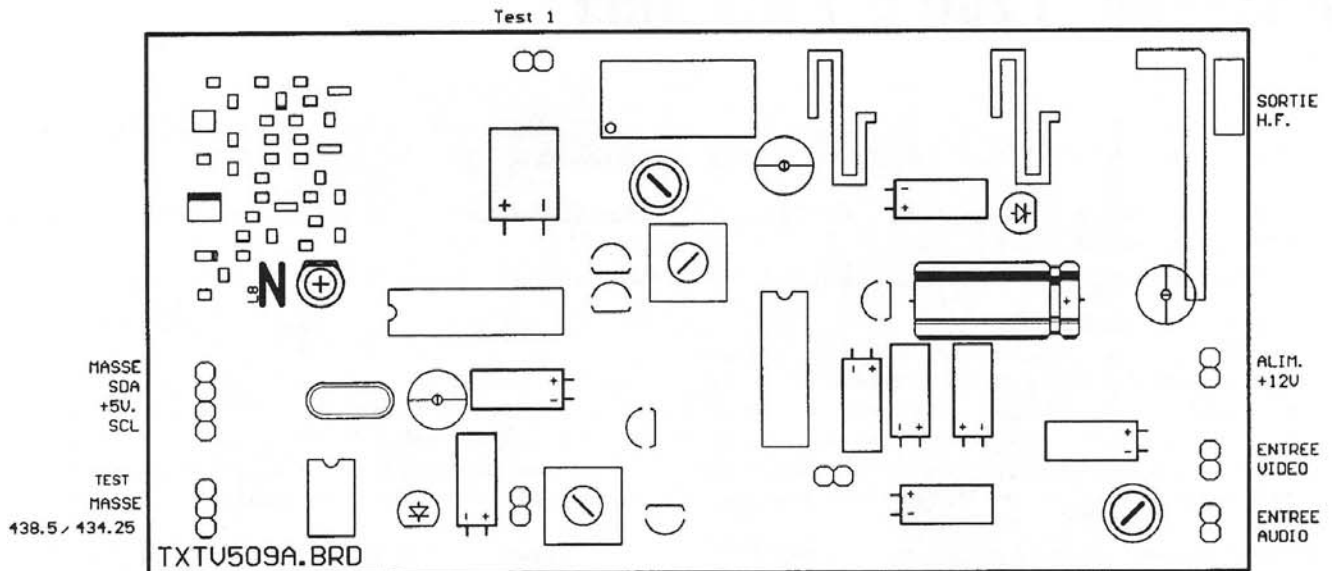
### Suggested method of construction.

The PCB layout has been checked error-free. All adjustments are simple and setting up should take no more than a quarter of an hour. To avoid unpleasant surprises when you're ready to fire it up for the first time, the use of a voltmeter and a capacitance meter are vital, as is the need to check the position and polarity of components.

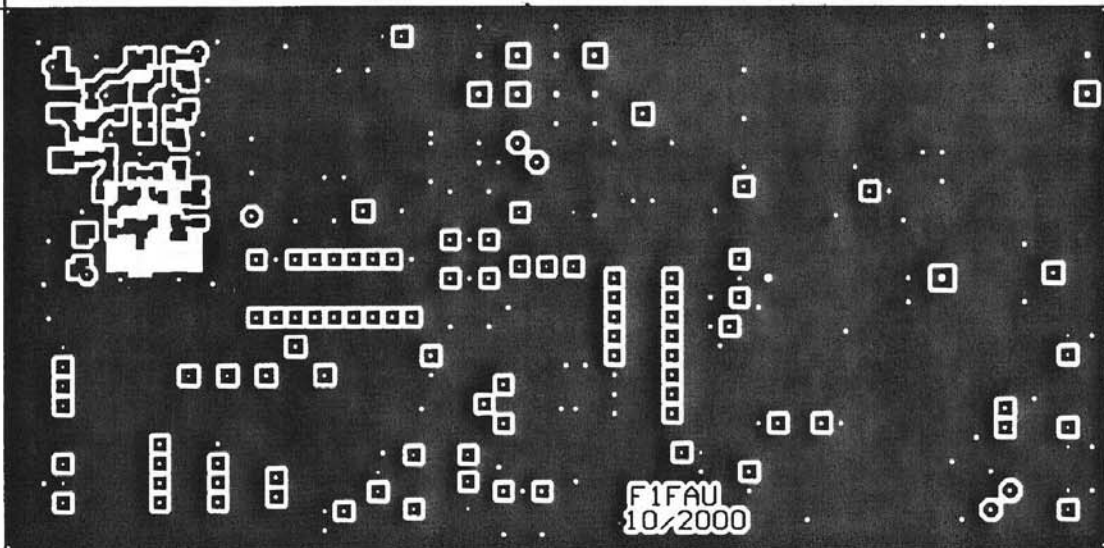
Variable capacitor CV3 (Murata or Philips CO50) should be placed so that the connection is in contact with the adjustment screw is grounded.



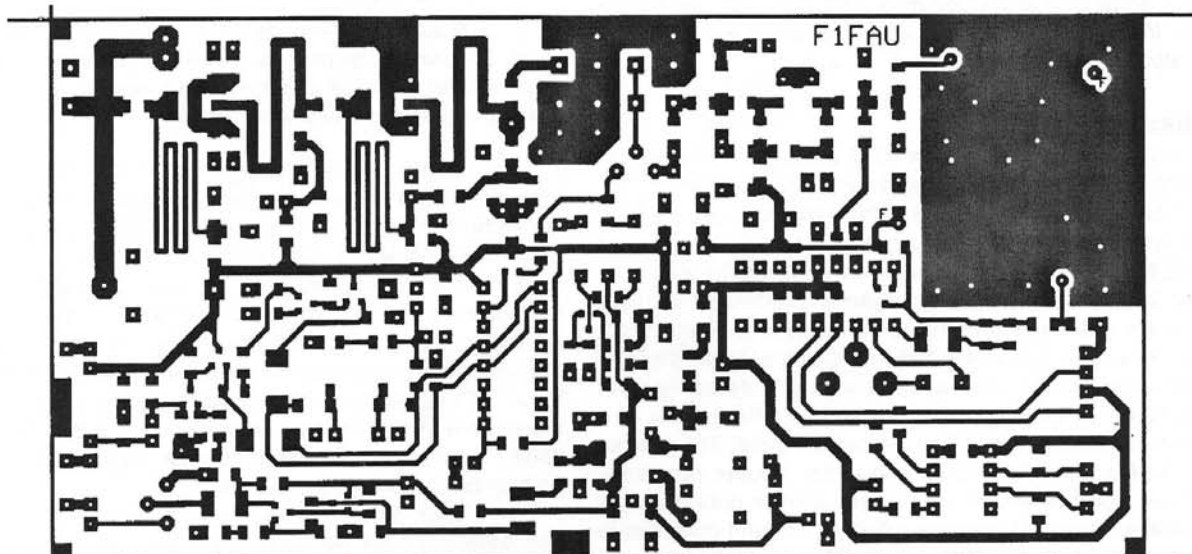




+12V S/P AUDIO VIDEO +/-  
 Component layout, groundplane side  
 IMPLANTATION COTE PLAN DE MASSE



PCB seen from the groundplane side  
 CIRCUIT COTE PLAN DE MASSE



PCB seen from the track side  
 CIRCUIT COTE PISTES

The idea of placing the PCB inside a tinplate case 146 x 72mm would have been unthinkable without the use of SM components. Their wide availability and frequently lower price make them ideal. Their use becomes easy with a little practice, also rapid and quite agreeable.

### **Order of construction for the transmitter**

Solder the tinplate case, BNC and other connectors, and the feedthroughs. Prepare the PCB, wire up the PCB, and finally insert the board in the case and solder it in place.

### **Preparation of the case**

The enclosure is composed of two parts which one puts in one of the lids before reuniting them by tinning and soldering. Holes to drill are 3.5mm for the bypass capacitors and 3mm for the BNC supplied. The square flange of the BNC must not hinder the fit of the lid. The spigot of the BNC is located a maximum of 2mm above the groundplane but by reducing the diameter of the sleeve, it will be possible to connect the spigot by moving the PCB.

### **Soldering connectors and bypass capacitors**

Positioning the bypass capacitors on the long side of the enclosure offers the possibility of mounting the TX module on either the front or rear panel of a large cabinet and having the BNC connector passing through. The video input should be made either by a ceramic feedthrough having very little capacity or else by means of a subminiature coaxial connector (SMA / SMB / SMC series), both soldered in place.

### **Preparation of the PCB**

Before making wire connections to the PCB, it should be offered up and trimmed to the exact size of the inner dimensions of the case, using a file or glasspaper.

### **Layout of the components**

Positioning the components is done using two layouts at once. I recommend photocopying all the diagrams with this article and referring both to the circuit diagram and the overlay drawings, for both the normal components (soldered to the groundplane side of the board) and the SM components (printed track side). I solder the conventional components first to give a reference point for placing the SM parts.

### **Wiring on the PCB.**

The SM components are grounded by means of pieces of wire passing through the board, linked to the groundplane. To solder the SM components flat and close to the PCB, the through wires are soldered first only on the copper side. Offcuts of resistor leads are not recommended for this task. Pay attention to the pinout of SM transistors in SOT23 style; it's easy to reverse the base and emitter. Two solder points should be provided from each side of the cover of the SBL1 to ground. Pay attention that on tantalum capacitors (normal or SM) the dash indicates '+-'.  
  
**Wiring of the VCO**  
All parts are surface mount except the self-inductance L8 and the variable capacitor CV3. A groundplane (tracks side) contributes to shielding as well as protection. The high density of components in the VCO means using a 20W or 30W soldering iron with a very narrow tip. Don't forget to provide a wire for the +8V supply.

### **Construction of the protective hood**

This piece (35 x 25 x 11mm) is made of 0.4mm brass with total dimensions 57 x 47mm. Careful marking out will make folding easier.

### **Inserting and soldering the board in the case**

Inside the case the PCB stands on four wedges 18mm tall. This is the distance between the floor of the case and the component side of the PCB. The height of the track side is about 7mm. The final operation is putting the shielding over the VCO—once you are certain it is working properly.

### **Adjustments**

#### **Instruments needed**

Assuming no mistakes have been made in construction, alignment can start immediately. This involves use of an oscilloscope, a frequency counter, a triangular wave signal generator and a high-quality video signal. Two probes are needed; these can be home-made and a design is available from F1GFF.

One probe coupled to the oscilloscope measures the peak voltage to be transformed into power. The second 'video' probe, designed specially, demodulates the RF and permits the

picture to be viewed on a colour monitor and oscilloscope. A 12V power supply limited to 0.5A avoids cremating components in case any mistakes occur. Power levels are expressed in peak power and are independent of picture content. This allows realistic comparisons of power level ( $mW_c = \text{milliwatts cr\^e}te = \text{peak milliwatts}$ ).

### **Preliminary tasks**

This is before inserting mixer, the PIC 12C508A and the TSA5511. At the output of the 3dB attenuator, between pin 1 of the SBL1 and ground connect a small Teflon-covered cable with a female BNC so that you can connect the frequency counter or a 50-ohm load.

### **Check VCO operation free-running**

Remove 1k resistor R52 to connect the centre tap of a 47k potentiometer to the input of the VCO control. The two outer connections of the pot go to +8V and ground. Connect volts to the TX; the green LED D1 should light up. Check the output voltage of all the regulators. Adjust the control voltage of the VCO to have 3V on the centre tap of the 47k potentiometer. Connect the 50-ohm load to the end of the cable. Check the VCO is working by measuring at test point J9 for a voltage between 1.2 and 1.5V. Remove the load and replace with the frequency counter, using an attenuator if necessary (say 10dB or according to the sensitivity of the counter). Bring VCO frequency to 438.5MHz by adjusting CV3.

### **Next stage of commissioning**

Remove 47k pot and replace resistor R52 (1k), place 12C508A and TSA5511 in their sockets. Apply voltage and check the microcontroller is working. With pin 3 of J6 grounded, the red LED D5 flashes at 1Hz, indicating the PIC is working properly. Select 438.5MHz frequency (no strap on J6), measure and adjust with CV2. Once these checks have been made the cover can be soldered in place at the two points. This itself will have an influence on the frequency so it will be necessary to adjust the VCO control voltage to around 3V with the aid of CV3. This stage having been reached, remove the coaxial cable and put the mixer in place, then verify with a digital multimeter that there is a good 1.5V on J9 (RF test). The RF level can be readjusted by modifying the value of R56, the margin being 150 to 270 ohms.



## Preliminary adjustment of video amplifier

### With no video signal at J7

Adjust P3 to have 5.0V at the cathode of D3. Adjust P2 to have 2.0V at the anode

of D2. For positive modulation, ground pin 1 of J4. For negative modulation pin 1 of J1 is floating. With no signal at the video input verify there is 0.93V on the emitter of Q11.

With the triangular waveform on video input (1kHz, 1V peak to peak), a signal of 4.5Vp-p should be present at the emitter of Q11. Switching from positive to negative video, the two traces should superimpose on one another and if this is

Qty	designation	Value	Qty	designation	value
1	CV3, Murata blanc (ou C050 blanc)	10pF	1	R20	39k
1	CV4 ajustable Jaune 3 broches	10pF	1	R75	47k
2	CV1, CV2 ajustable vert, 3 broches	22pF	1	R18	56k
1	C41	2.2pF	1	R19	68k
2	C72, C73	5.6pF	1	R14	150k
2	C68, C74	18pF	1	R12	270k
3	C10, C13, C16	68pF	2	P2, P4 ajustable cms	220
6	C35, C42, C54, C69, C70, C75	100pF	1	P3 ajustable cms	470
1	C26	150pF	1	P1 ajustable, vert. Réf : TY7A	220
2	C24, C25	270pF	1	P5 ajustable, Vert. Réf : TY7A	47k
17	C1, C2, C6, C12, C15, C17, C22, C34, C39, C40, C47, C58, C60 C62, C63, C67, C71	1nF	6	J1, J2, J4, J5, J7 baret. HE10	CON 2
		1nF	1	J3 barette HE10	CON 4
		1nF	1	J6 barette HE10	CON 3
1	C28	10nF	1	J9 test HF (picot diam 8/10e)	Test1
1	C18	22nF	2	L2, L3 imprimé	Microstrip
1	C45	47nF	1	L10 imprimé Sortie	Microstrip
21	C4, C5, C7, C11, C14, C29, C32, C33, C38, C43, C46, C48, C49 C50, C51, C52, C56, C57, C59, C64 C65, C66	100nF	2	L8 Fils argenté 8/10e	1/4 lambda
1	C53 Format cms 1812	220nF	1	L1 cms	4 cm
2	C21, C27 Format cms 1812	470nF	1	L6, L7 cms	2.2 uH
			2	L9 cms	10 uH
			1	L9 cms	330 uH
1	C61 Format cms 1812	4.7uF 16V	1	D1 3 mm ou 5 mm	LED verte
1	C20 Radial couché	10uF 16V	2	D7, D9 cms	LED verte
5	C3, C8, C31, C44, C55 Radial couché	22uF 16V	1	D5 3 mm	LED rouge
2	C19, C30 Format cms 1812	22uF 16V	2	D2, D3 cms	1N4148
1	C23 Radial couché	47uF 16V	1	D8 Varicap UHF BB105 (noire)	BB205
2	C36, C37 Radial couché	47uF 10V	1	D4 Varicap H.F. BA102	BA111
1	C9 Radial ou axial	220uF 25V	1	D6 schotky BAR28 ou BAT 41	HP2800
			1	Q9	BF245
1	R11	4.7 Ohms	1	Q3 cms	BC547
1	R2	18	1	Q4 cms	BC557
2	R5, R7	22	1	Q13 cms	2N2222
1	R6	33	6	Q5, Q6, Q7, Q8, Q10, Q11 cms	2N2369
1	R64	39	2	Q14, Q15 cms	BFR92
1	R73	47	1	Q16 cms	BFR93
1	R25	75	1	Q12 SOT23 ou (BFG96 + cher)	BFR96
11	R9, R22, R23, R36, R39, R40, R44, R60, R69, R76, R78	100	1	Q2 cms	BFG135
2	R62, R63	150	1	Q1 cms 1w sinon BFG591	BFG235
4	R34, R35, R56, R68	180	2	T1, T2 Pot 10/10 TOKO	KACS 6184
2	R29, R42	220	1	U1 ou SRA-1 (7dBm)	SBL-1
5	R3, R4, R30, R51, R53	270	3	U2, U3, U8 régulateurs	78L08
2	R66, R74	330	1	U4 commutateur analogique	4053
2	R10, R45	390	1	U5 régulateur	78L05
3	R26, R37, R58	470	1	U6 micropros (ou 12C509A)	PIC12C508 A
2	R1, R21	560	1	U7 PLL	TSA5511
8	R33, R38, R52, R59, R61, R65, R67, R77	1k	1	Y1 Quartz HC18	4 MHZ
2	R13, R17	1k8	6	By-pass 1 nF	1nF
1	R72	2k2	1	SUBCLICK ou traversée céramiq.	IN VIDEO
2	R24, R71	2k7	1	J8 BNC à platine 50 Ohms	
6	R8, R15, R32, R43, R46, R70	4k7	2	Supports C.I. 8 et 18 broches	Tulipe
8	R28, R41, R48, R49, R50, R54, R55, R57	10k	1	Circuit imprimé double face	F1GFF
		10k	1	Coffret 146*72*30	
1	R16	12k	1	Tôle 5/10ème pour capot VCO	
1	R27	18k	\$\$	Voir auprès de F1GFF	
1	R47	22k			
1	R31	27k			

not the case, go into negative and bring the two curves closer using P3.

### Insert BFG235

Before soldering this transistor in place check there is a good 2.1V between ground and the base of Q1, also that the LED D1 is lit. Solder in the BFG235 and measure 0.47V on R11 (4.7 ohms). The BFG235 gets hot to the point that fingertip contact is painful; this is normal.

### Adjust amplifier chain (oscilloscope essential to measure peak power)

Connect RF power probe to TX output and the scope to the output of the probe. Inject 1kHz 1Vp-p triangular signal. Position trace at foot of the scope screen; this will be the 0V reference. On the screen you will see a deformed triangle (normal without the 10k). Measure the voltage U at the upper summit of the peak and apply the formula peak power =  $(U - 0.3)^2 / 100$ .

### Adjust PA

Turn the pointer of P1 to a quarter of its travel, ground side, then CV1 to minimum and CV4 to the centre of its travel. On the 'scope you should have a deformed triangle. Adjust CV1 and CV4 for maximum power (maximum amplitude on 'scope screen).

### Set desired power with P1

Adjust P1 to have on the scope the points of the 4.5V signal corresponding to 250mW peak. P1 can be used to reduce or increase power but linearity is degraded beyond 5V (corresponding to 300mW peak).

### Refine video control using the video probe

With the audio subcarrier off, inject a normalised 1V p-p triangular signal.

### Adjust positive modulation

Set modulation to positive. Adjust P2 to place the bottom 'peak' a little above the peaking threshold so that the audio subcarrier is not pulled down by the bottom peak. See circuit.

### Adjust negative modulation

Set modulation to negative, with pin 1 of J4 floating. Adjust P3 to superimpose the new trace with that of positive modulation. Check the traces overlay by flipping the video switch rapidly.

### Commission audio subcarrier

Apply power and put P4 at centre of its travel. Check the presence of RF with audio subcarrier active. Carefully adjust the core of T2 to bring the frequency to 5.5MHz. There should be an RF signal of around 0.2V p-p at the centre terminal (cursor) of P4. Connect the scope to the secondary of T1 and adjust its core for maximum signal. You should have 3.5V p-p with P4 at centre-travel.

### Adjust amplitude of subcarrier in the video signal

Connect the oscilloscope to the junction of R29, R33 and P1. Adjust subcarrier amplitude with P4 in conjunction with the circuit diagram. To check audio operation apply audio to J5 and adjust P5 for normal hearing on a check receiver. Correct regulation of the audio deviation requires a spectrum analyser.

### Choice of components and suppliers

The complexity and density of components on the printed circuit board makes it very difficult to reproduce by amateur means. The number of boards requested up to now makes it uneconomic to order them with plated-through holes but I intend to have these made if sufficient orders are placed within two to three months of the original appearance of this article (March 2001). The double-sided PCB permits the use of electrolytic capacitors lying parallel to the board (not vertical); tantalum capacitors could be interesting but they are much dearer. Conventional and SM components are available in France from Radioson or from René F6BRV. If this project tempts you I have further documentation (*in French*) available for 12 francs in stamps (*extra postage required from the UK*).

Original author: Amand F1GFF, e-mail [a-cauquelin@worldonline.fr](mailto:a-cauquelin@worldonline.fr), address in the callbook.

Most of the extra diagrams mentioned in the text are to be found in the information pack advertised at the end of the article. It is difficult for the translator to describe graphically components and assemblies that he has never seen in his life, so readers will kindly make allowances for any vagueness in this translation.

### French expressions used in diagrams

Implantation cote plan de masse = component layout, groundplane side

Circuit cote plan de masse = PCB seen from groundplane side

Circuit cote pistes = PCB seen from track side

Ajuster les valeurs des résistances d'émetteur pour modifier le courant de repos = adjust transmitter resistance values to alter quiescent current

Alim = power feed

Con = connector (and something else!)

Crête = peak value

Emetteur = transmitter

Entrée = input

Exciteur = exciter

HF = RF

Imprimé = printed

Lambda = wavelength

LED rouge = red LED

LED verte = green LED

Mode de fonctionnement = function mode

Modul = modulation

Modulateur = modulator

Sortie = output

Synthésiseur = synthesizer

L1 = 1.5 turn of 0.7mm silvered wire wound onto 3.5mm coil former.

First published in the March 2001 issue of B5+, the magazine of ANTA (French ATV Association).

Translation by Andy Emmerson G8PTH ([midshires@cix.co.uk](mailto:midshires@cix.co.uk)); technical writing (and translation) is my business.

## Subscription rates

### By the Membership Secretary

Years	Surface	Airmail
One	£15.00	£21.00
Two	£29.00	£41.00
Three	£43.00	£61.00

Please note that the 'Surface' rate covers postage within the EEC, airmail rate is **not** required.

We have also continued to improve our web site at [www.batc.org.uk](http://www.batc.org.uk) and this has proved to be very popular and is now attracting many new members. Also, we have a web site devoted to the CQ-TV magazine at [www.cq-tv.com](http://www.cq-tv.com)

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## Deadline

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

- February ..... 20<sup>th</sup> December
- May ..... 20<sup>th</sup> March
- August ..... 20<sup>th</sup> June
- November ..... 20<sup>th</sup> September.

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

Will all prospective contributors please be sure to read the 'Notice to Contributors' on page 1 so that you understand the implications of submitting an article for publication.

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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)

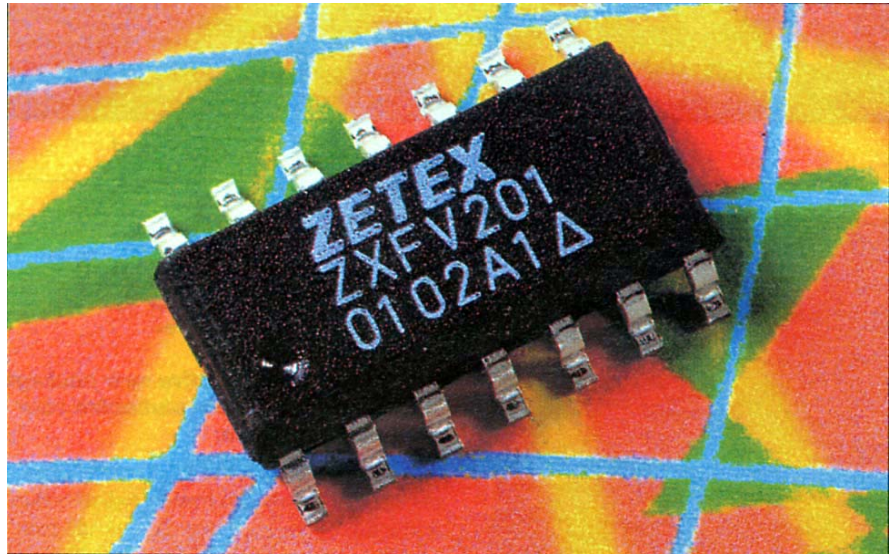


## High-speed amplifier boosts video and signal applications

Zetex has launched a high-speed amplifier designed to meet the requirements of video and high-speed signal processing applications.

The ZXFV201 offers a bandwidth of 300MHz, slew rate of 400V/ps and output drive of 40mA. The device is stable with up to 400pF of capacitance load. Differential gain is 0.01% and differential phase 0.01°. Power supply requirement is  $\pm 5V$  at a current of 7mA per amplifier. The device is characterised for -40 to 85°C operation.

Typical applications are video amplification and buffering, RGB driving, video distribution, high-frequency instrumentation and medical imaging.

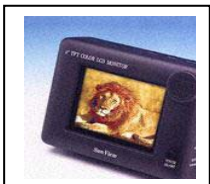


Tel: 0161 622 4422 Fax: 0161 622 4420

Electronics Times 26/3/01.  
[www.electronicstimes.com](http://www.electronicstimes.com)

For all things related to CQ-TV, visit [www.cq-tv.com](http://www.cq-tv.com)

# Video Surveillance



- C-Mos B/W Camera 15mmx15mm £29.00
- C-Mos Colour Camera 15mmx15mm £65.00
- PCB B/W Camera 32mmx32mm £24.00
- PCB Colour Camera w/Audio 32mmx32mm £65.00
- 23cm (1.3Ghz) Video/Audio Transmitter £35.00
- 13cm (2.4Ghz) Video/Audio Transmitter £35.00
- 1.2Watt 2.4Ghz Video/Audio Transmitter £120.00
- 4" TFT Boxed Colour Monitor w/Audio £110.00
- Video to VGA Converter £65.00
- VGA to Video Converter £90.00
- External USB Video Capture Box £55.00
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All prices exclude VAT.

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# Members' Services

All prices in UK pounds (£) Each P&P Qty Total

## Camera Tubes, Scan Coils, Bases & Lens Mounts

3	One inch Vidicon base.....	£1.20	£0.30	.....	.....
4	2/3 inch Vidicon base.....	£0.80	£0.30	.....	.....

## Video and I<sup>2</sup>C Circuit Boards/Components

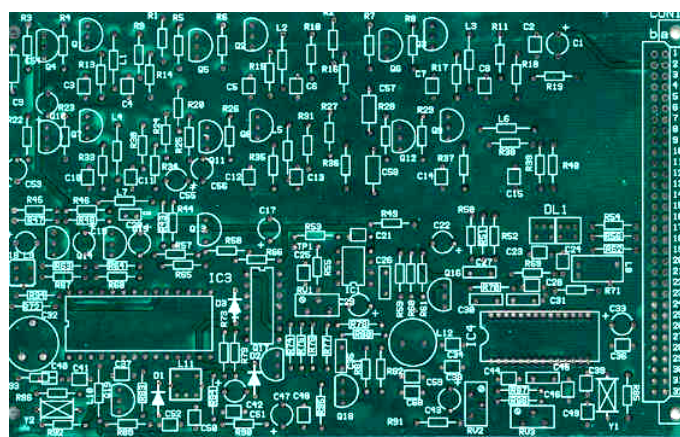
7	Sync pulse generator PCB.....	£14.00	£0.43	.....	.....
89	NBTV Scan Converter PCB **.....	£21.00	£0.43	.....	.....
40	I <sup>2</sup> C CPU PCB.....	£10.00	£0.43	.....	.....
41	I <sup>2</sup> C VDU PCB.....	£10.00	£0.43	.....	.....
43	SAA5231 Genlock IC.....	£8.80	£0.30	.....	.....
44	SAA5243PE Teletext 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	.....	.....

## RX, TX and SSTV PCB's and General Components

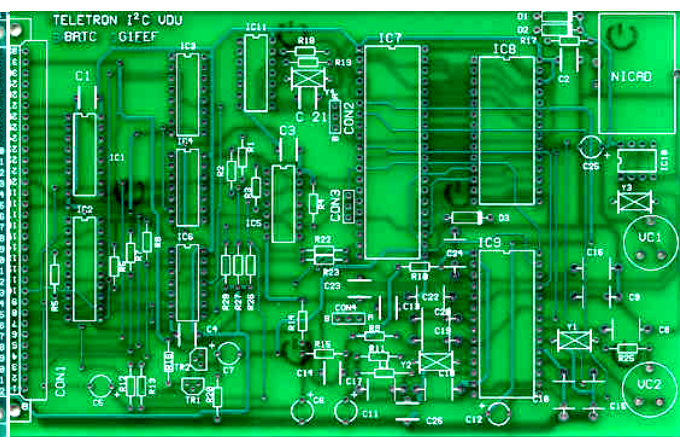
47	70cm up converter PCB.....	£13.50	£0.43	.....	.....
50	108.875 MHz crystal.....	£8.20	£0.30	.....	.....
68	4.433618MHz crystal.....	£3.25	£0.30	.....	.....
69	5.0MHz crystal.....	£3.25	£0.30	.....	.....
86	24cm solid-state amplifier PCB.....	£10.50	£0.43	.....	.....

## Stationery & Station Accessories

73	BATC blue diamond clutch pin badge.....	£1.75	£0.30	.....	.....
74	BATC cloth badge.....	£4.00	£0.30	.....	.....
75	BATC equipment label (6).....	£0.25	£0.30	.....	.....
76	BATC square windscreen sticker.....	£0.10	£0.30	.....	.....
78	BATC test card.....	£0.50	£0.43	.....	.....
79	BATC reporting chart.....	£0.10	£0.43	.....	.....



The Sync Pulse Generator PCB (item 7)



The I<sup>2</sup>C VDU PCB (item 41)

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

The indicated **P&P** prices for Members Services are for postage within the UK only. Will members outside the UK please either try to estimate the extra postage required, or write for a quotation. All cheques **MUST** be drawn on a UK bank. **Items marked thus: \*\* are available only until present stocks are exhausted.**

Members Services orders **ONLY** to: **Mr. P. Delaney, 6 East View Close, Wargrave, Berkshire, RG10 8BJ, England.** Tel: 0118 940 3121 (Evenings, Weekends only please). Email: [services@batc.org.uk](mailto:services@batc.org.uk) Items from these lists can **ONLY** be supplied to **CURRENT** members of the BATC. These lists supersede all previous ones.

A description of the various PCB's and components can be found in the 'What's What' guide, or on the CQ-TV Internet pages at [www.cq-tv.com](http://www.cq-tv.com) (A printed copy available on request, if you send a S.A.E.). Components for club projects are not available from Members Services unless contained within these lists. All club crystals are HC18/U (wire ended). To avoid delay and inconvenience, please be careful to include the correct payment with your order – please do **NOT** send stamps or cash. Post and packing costs are for despatch of one item to United Kingdom members.



**The BATC cloth badge (item 74)**

**Circuit Details can be found as follows:**

**An Introduction to ATV:** PCB's 10, 40, 41, 47, 86. **CQ-TV 174:** PCB 7

**CAMERA TUBES** A tube guide appears in CQ-TV 149 and 150. Tubes are now difficult to obtain and members requesting information on availability, prices or other types of tubes or equivalents are asked to send a stamped addressed envelope for their reply.

## BATC Publications

<b>Publication</b>	<b>Each</b>	<b>Qty</b>	<b>Total</b>
<b>An Introduction To Amateur Television (225gm)</b> .....	<b>£5.00</b>	.....	.....
The latest handbook full of detailed information on how to set up your ATV station, plus lots of new video and RF construction projects.			
<b>The Amateur TV Compendium (155gm)</b> .....	<b>£3.50</b>	.....	.....
The BATC handbook featuring construction articles on video units, 24cm and 3cm ATV, a Digital Frame Store, and much more.			
<b>The Best of CQ-TV (150gm)</b> .....	<b>£3.50</b>	.....	.....
A compilation of the best construction articles from CQ-TV's 133 to 146			
<b>CQ-TV Back Issues:</b> .....	<b>£1.50</b>	.....	.....
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			
Special Offer: Any four of the above issues.....	<b>£5.00</b>	.....	.....
195, 196, 197, 198.....	<b>£3.75</b>	.....	.....
<b>The BATC CD</b> .....	<b>£5.00</b>	.....	.....
Total Goods and Postage - Amount Enclosed.£.....			

Please note that the above books (except 'The best of') and CQ-TV issues 171 onwards are available in Adobe Acrobat format for download from our web site, [www.cq-tv.com](http://www.cq-tv.com). They are also included on the BATC CD. (The CD also contains a full keyword search index) Please note that the versions on the web site do NOT include the colour covers or any colour inserts. This is to improve download times.

The indicated prices for **Publications** include postage within the EEC. Will members outside the EEC please either try to estimate the extra postage required, or write for a quotation.

**Publications** orders **ONLY** to: **BATC Publications, Fern House, Church Road, Harby, Notts., NG23 7ED, England.** Tel: 0152 270 3348 (Evenings/Weekends only). Email: [publications@batc.org.uk](mailto:publications@batc.org.uk). Publications can also be ordered via our web site at [www.batc.org.uk](http://www.batc.org.uk)

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



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## THE BRITISH AMATEUR TELEVISION CLUB

### Income and expenditure account

At 31 December	1998	1999	2000
<b>Income</b>			
Subscriptions	17,033	17,675	18,751
Members services	305	126	109
Publications surplus/loss	201	-129	195
Advertising	595	493	1,324
Bank & Building society interest	1,991	1,348	1,563
Coventry Rally & Bletchley surplus/loss	680	-33	368
Shuttleworth Convention loss **	0	-390	0
Donations	92	12	12
Postages, Airmail	247	264	244
Miscellaneous	2	8	5
	<u>£21,145</u>	<u>£19,374</u>	<u>£22,571</u>
Less			
<b>Expenditure</b>			
CQ-TV printing	13,836	14,661	10,954
CQ-TV postage	3,415	4,491	4,058
CQ-TV production	206	367	495
General Office expenditure	303	82	70
General Postage	589	399	336
Internet expenses	472	460	498
RSGB affiliation fee	20	20	23
Committee members expenses	150	106	85
Insurance & legal	148	73	105
Rally attendance	129	242	171
Recruitment	74	86	39
Adverts and publicity	0	135	0
Miscellaneous expenses	53	22	10
Bank charges, mainly VISA costs	165	178	226
Accountancy	323	0	0
	<u>£19,883</u>	<u>£21,322</u>	<u>£17,070</u>
<b>Surplus / Loss for the year</b>	<u>£1,262</u>	<u>£-1,948</u>	<u>£5,501</u>

### Notes

The figures in "Income" for members services, publications, the rallies and conventions are the net contributions or loss to club funds. Each has it's own accounts.

\*\* The Shuttleworth convention was run as a benefit for members and was not intended to contribute to funds.



# Members only!

As mentioned previously (CQ-TV 188, page 42), we have set up a 'members' only' section on our web site. Access to

these pages requires a username and password. This quarter's codes are -

**Username:** amember

**Password:** maytime

# In Retrospect

## 197

Article **Robot v Digital TX**, page 10. There is a list of associated URLs at the end of this article. Because Word treats

these 'live' links, I was able to test them, however, in their printed form, and the actual URLs are not visible. These are shown below -

Article **TX/RX Modules Down Under**, page 5. The arrows disappeared from the transistor emitters. They were there when I received the drawings from Allan.

Initial Measurement of Tuning and Timing Parameters in HDSSTV Tx from AU to US

<http://svs.net/wyman/examples/hdsstv/papers/tuning/tuning1.html>

Propagation Delay Variations in HDSSTV Tx from AU to US

<http://svs.net/wyman/examples/hdsstv/papers/delay/prop-delay1.html>

Decoding Beyond the Designed Distance

<http://svs.net/wyman/examples/hdsstv/papers/decoding1.html>

Summary of Australia\_to\_United\_States Tests

<http://svs.net/wyman/examples/hdsstv/0a.htm>

Summary of Method Used

<http://svs.net/wyman/examples/hdsstv/0b.htm>

Coding Examples

<http://svs.net/wyman/examples/hdsstv/0c.htm>

Block Diagram of TX Side

<http://svs.net/wyman/examples/hdsstv/0d.htm>

Encoders

<http://svs.net/wyman/examples/hdsstv/0e.htm>

Modulator

<http://svs.net/wyman/examples/hdsstv/0f.htm>

Why 2 Levels of Coding

<http://svs.net/wyman/examples/hdsstv/0g.htm>

Block Diagram of Rx Side

<http://svs.net/wyman/examples/hdsstv/0h.htm>

Demodulated Waveforms

<http://svs.net/wyman/examples/hdsstv/0i.htm>

TX Operational Considerations

<http://svs.net/wyman/examples/hdsstv/0j.htm>

RX Operational Considerations

<http://svs.net/wyman/examples/hdsstv/0k.htm>

Images from Over the Air Tests

<http://svs.net/wyman/examples/hdsstv/0l.htm>

Performance

<http://svs.net/wyman/examples/hdsstv/0m.htm>

Summary of Accomplishments

<http://svs.net/wyman/examples/hdsstv/0n.htm>

Acknowledgments

<http://svs.net/wyman/examples/hdsstv/0p.htm>

Software Status

<http://svs.net/wyman/examples/hdsstv/0q.htm>

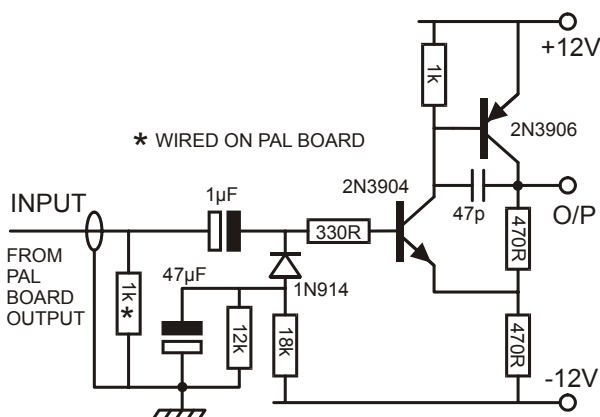
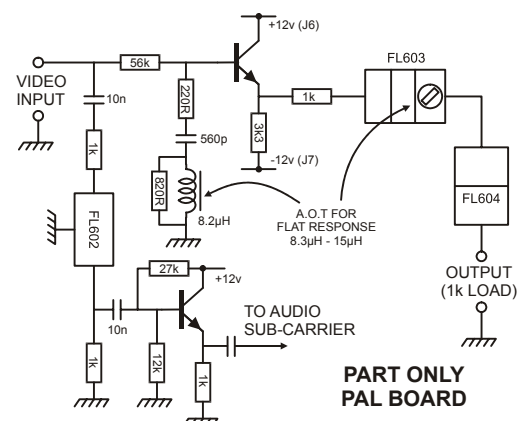


Figure 2, left

Figure 5, right



# Worthing Video Repeater Group

**GB3VR GB3RV GB3VV GB3SR GB3BR**

<http://www.videorepeater.co.uk>

## The MATRIX – A versatile and flexible switching solution

The MATRIX has been designed to provide a versatile solution to the problem of connecting video and audio equipment together in frequently changing combinations. For further details see CQ-TV 194 or for current details, our web site above.

Prices from £73 (8x8 Video) to £213 (16x16 Video + Stereo), sizes to 32 x 32 if required. P&P 2.50 per order.

Enquiries to Geoff G8DHE on Tel. 01903 237726 or Email [matrix@g8dhe.cix.co.uk](mailto:matrix@g8dhe.cix.co.uk)

## 1 Watt FM-TV 24cms Transmitter

The 1 Watt transmitter, now on its fourth version, is now on its final run after its original design in 1984. Only a small number of kits remain so get in quick if you would like to be the owner of one of the most reliable and robust ATV units. Please note the Tx meets ATV specs by DESIGN not by addons!

The price for this is **£85, P&P 2.50**.

Enquiries to Geoff G8DHE on Tel. 01903 237726 or Email [atvkit@g8dhe.cix.co.uk](mailto:atvkit@g8dhe.cix.co.uk)

### Orders should be sent to:-

Worthing Video Repeater Group, 2 North Farm Rd., Lancing, Sussex. BN15 9BS  
Cheques payable to "WVRG".

## New Product

### 23 / 24 cms Bandpass Filter.

Hand made and aligned to order.

Typical band pass characteristics:

Through loss: -1.5dB. Bandwidth @ -3dB = 20MHz.  
Attenuation -50dB @ +/- 60 MHz.

Introductory price **Only £59.95** (Plus £5 p.p. U.K)

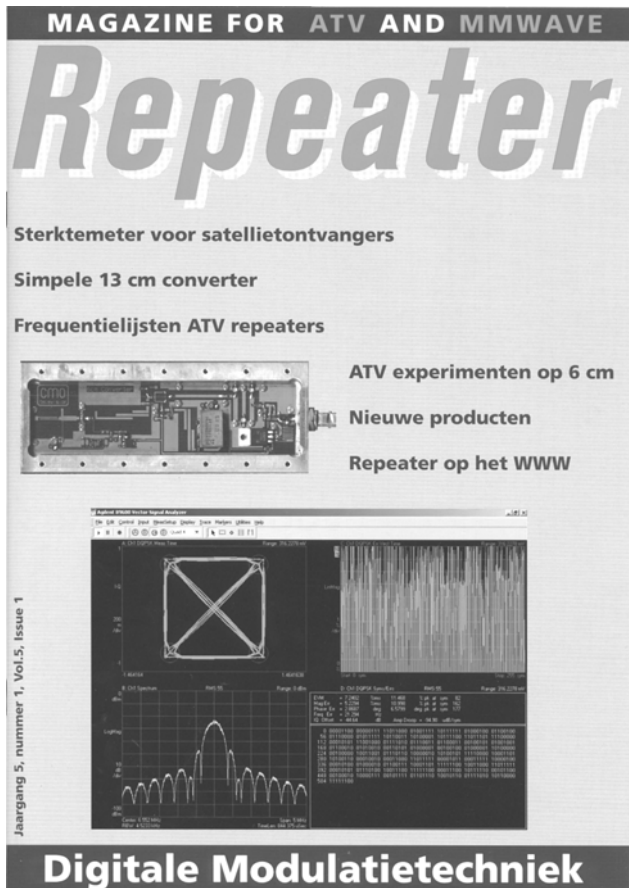
See CQ-TV 190 & 196.

Further information: <http://www.garth1.co.uk>

e-mail: [filters@garth1.co.uk](mailto:filters@garth1.co.uk)



**iBOTH ENDS OF THE CHAIN.** A Marconi Mk II, the type used at the Coronation in 1953. A Kolster Brandes console tv set, the type used to view the Coronation in 1953. (From The Dicky Howett collection)



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Visit our website on <http://www.cchmedia.nl>

## TV on the Air

### By Graham Hankins

A bit from Tony G4JZC, Brighton:

"Brighton, the new city by the sea, boasts not one, but three ATV repeaters covering 24cm, 10GHz and 2.4GHz, and two voice repeaters for 2 metres and 70cm. The credit goes to the Worthing ATV Group who work tirelessly to maintain and update the equipment located high up on Brighton General Hospital near the Racecourse.

A dedicated video repeater Web site keeps local amateurs and visitors up-to-date with developments and the web cam is updated at regular intervals. <http://www.videorepeater.co.uk>

You may ask: "Why three ATV repeaters?" There is a good deal of daily activity and the introduction of a quad video splitting arrangement which can be used to divide the final picture enables multiple access to a dedicated camera via 24cm, 10GHz and 2.4GHz simultaneously.

Looking forward to the near future, a PC will replace the tried and trusty Amiga and the newer Matrix system devised by the Group will provide a flexible switching solution.

The future looks exciting for the Group and for local amateurs.

A little bit of news...



I have just (3 days ago) received the licence for GB3YX - 10GHz ATV repeater to be co-sited with GB3YT near Bradford, West Yorks. The equipment is \*almost\* ready and we hope to be on the air in 6-8 weeks as long as everything works! There is more information on the Repeater Management Committee web pages and on [www.yorkshireatv.org](http://www.yorkshireatv.org)

# A Video Distribution Amplifier

By H R Skelhorn. G8BPU

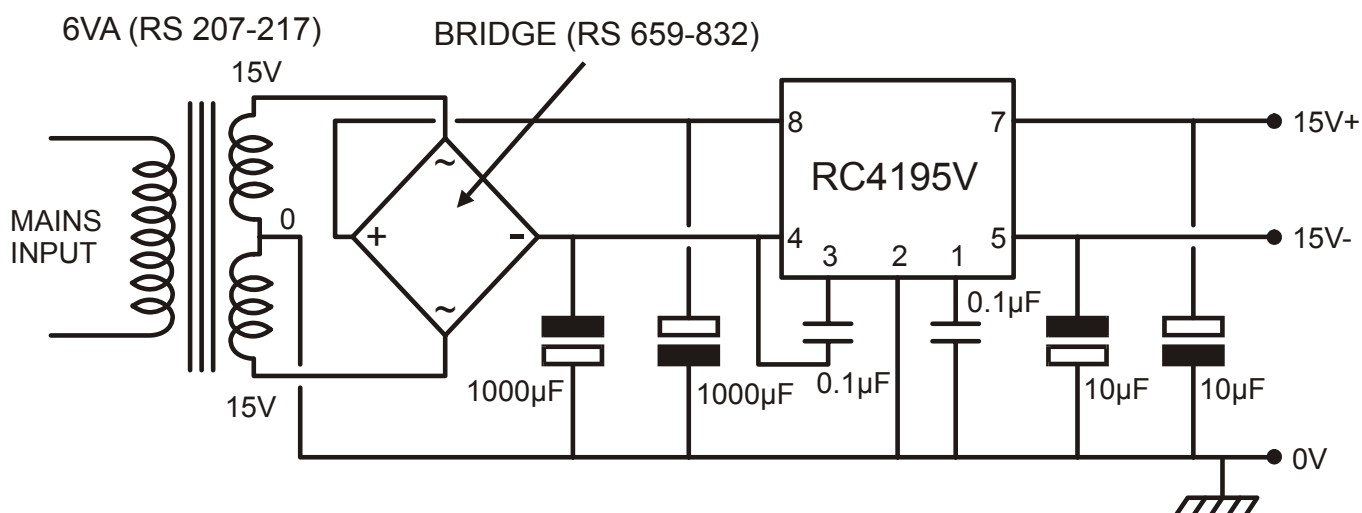
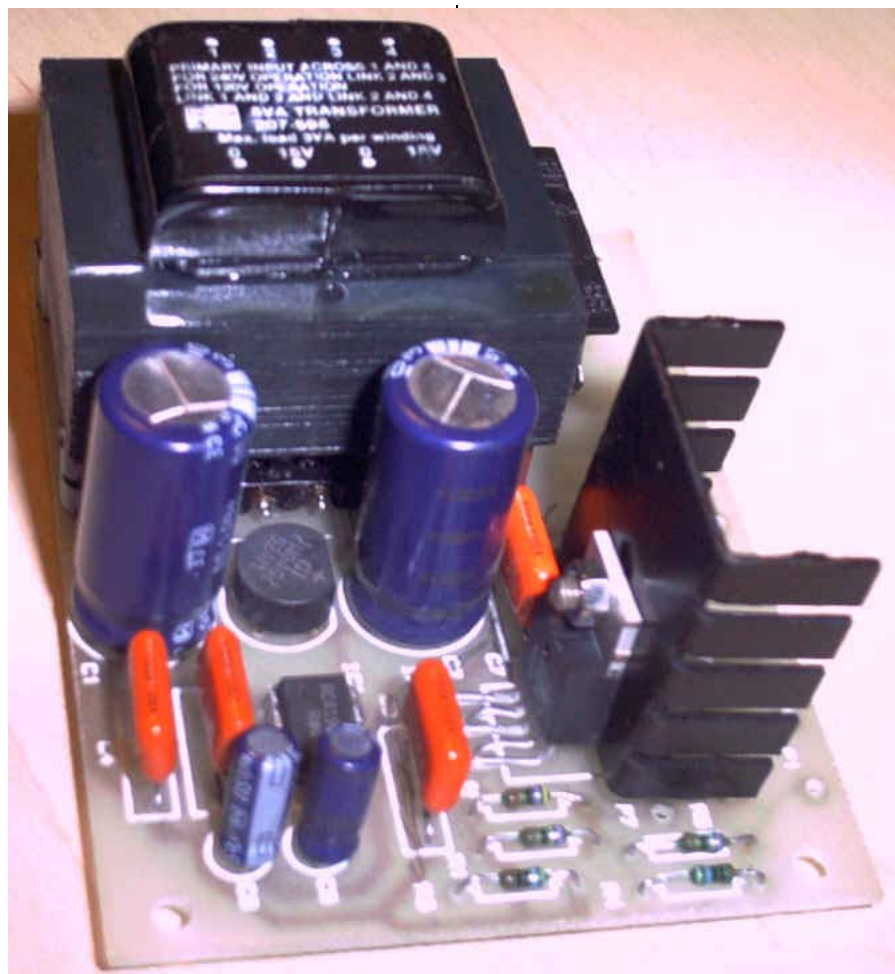
Elantec manufacture a high speed monolithic op-amp which exhibits excellent video performance and high output drive capability.

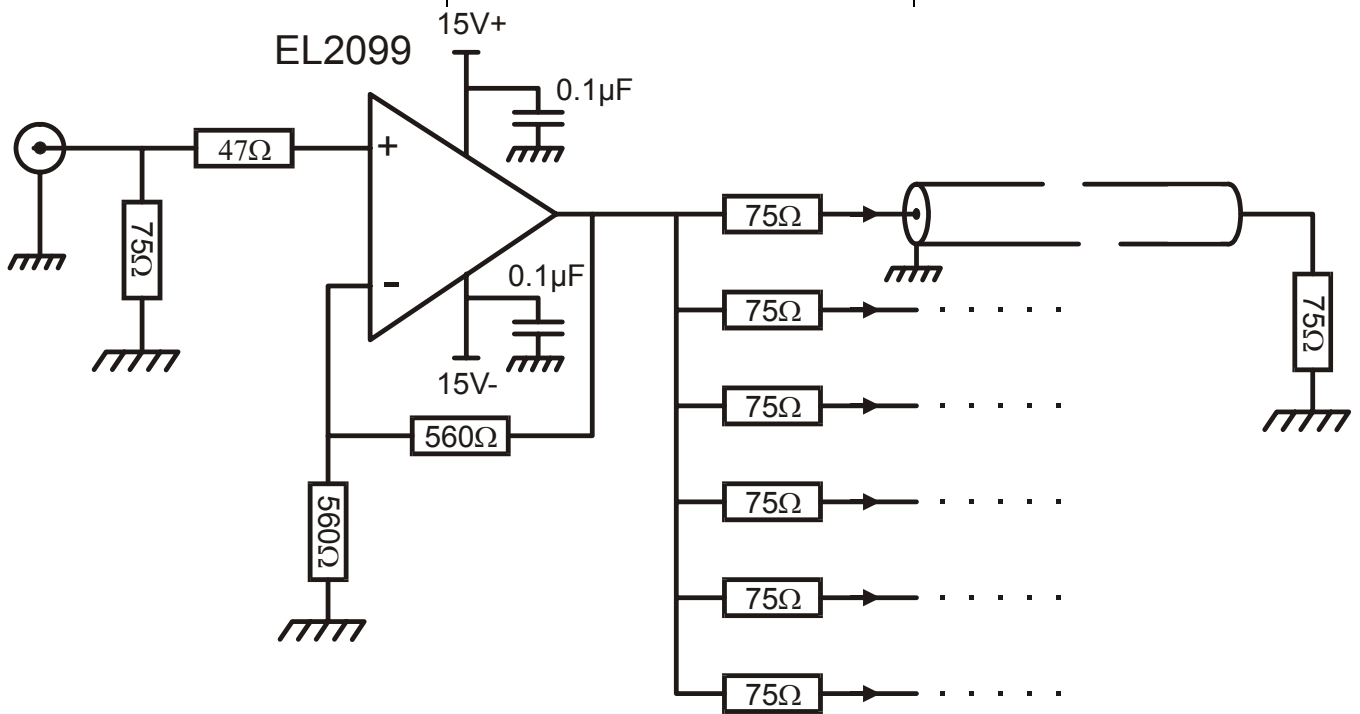
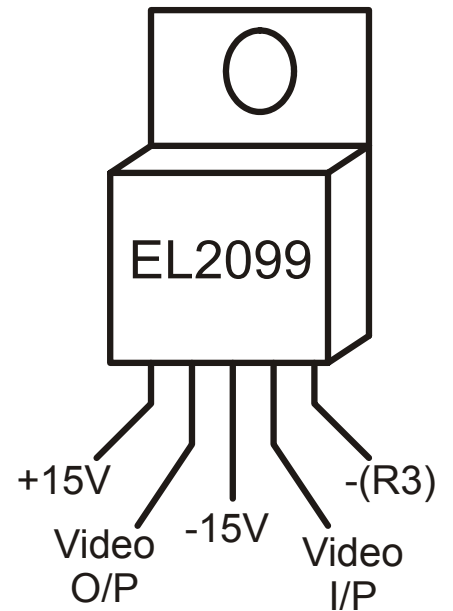
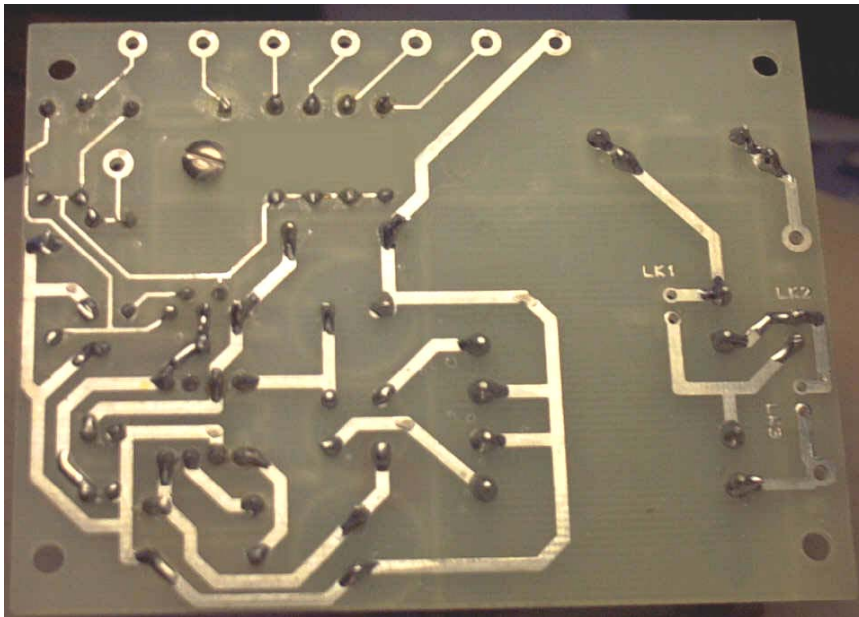
The specification sheet for the device provides all the information required to produce a video distribution amplifier.

The op-amp requires a dual rail supply of 15 volts, which can be produced very simply by using a dual monolithic voltage regulator, designed to power op-amps

Both of these devices can be obtained from Electromail. The video op-amp part number is 297-771, whilst regulator part number is 305-636.

I have made two of these, in order to give me a 12 output V DA.





**Dicky Howett presents another broadcasting hardware brain teaser.**

What is this little grey chappie then? The jolly BBC colour scheme might give you a clue. Bit of sound judgement might help also. Well, to put you out of your misery, it's a programme meter. However, not any old programme meter, this is a very special BBC-designed OPTICAL programme meter (PRM/1/151). A definite boon in dim BBC Manchester Mk 4 ob vans where things never got louder than no. 7. How splendid.

## For Sale

**PROFESSIONAL VIDEO INTERNATIONAL YEARBOOK 1985/86.** Link House 1985. Lists every pro tv item for the mid-nineteen eighties. Full of pictures, facts and figures. Invaluable reference volume. **£12**

**ITV 1981.** Good copy. **£6**

**TELEVISION ENGINEERING. Complete set. All first editions** Amos/Birkinshaw. 4 vol set. Vol 1. 1953. Fundamentals-Camera Tubes-Tv/Electron Optics. Vol. 2. 1956. Video frequency-Amplification. Vol 3. 1957 Waveform Generation. Vol 4. 1958 General Circuit Techniques. Slightly chipped d/ws. Generally clean condition apart from slight water stain on back of vol 2. **£35** the set or **£10** each.

**THE GUINNESS BOOK OF TV FACTS & FEATS.** Kenneth Passingham. 1984. Scarce fully-illustrated book on general tv technology and programming. d/w. **£5.**

**BBC TV PRESENTS.** A Fiftieth Anniversary Celebration. Nicholas Moss.

BBC 1986. Profusely illustrated large format television history book covering BBC Television from the beginning. Lots of programmes and old-time stars. **£5**

**INTRODUCTION TO TELEVISION.** A. Folwell. Chapman & Hall 1948. Nice

period 'primer' to tv inc, The Cathode Ray Tube. The Television System Modulation & bandwidth. Pictures of studios and the Emitron camera. Covers a little grubby o/w VGC. **£5**

All books in VGC. Postage minimum **£1.50.** Contact Dicky Howett. 01371 820155 Email: [dicky.howett@btinternet.com](mailto:dicky.howett@btinternet.com)

BBC GE6SM Network Clock Generator. Generates a real time clock caption with "BBC2 Midlands" at the bottom. Working Order with RGB and Component outputs. Cool peice of broadcasting memorabilia and useful as a clock-just add a TV. £Offers. Proceeds to

Severnside TV Group. Tel 0117 9793883 E-mail [ian.bennett@blueyonder.co.uk](mailto:ian.bennett@blueyonder.co.uk)

Manuals Available- Tektronix 528A, RM529 and 1480 waveform monitors. Tektronix 1422 vectorscope. Ikigami PM950 B&W Picture Monitor. £Free+postage. Tel 0117 9793883 E-mail [ian.bennett@blueyonder.co.uk](mailto:ian.bennett@blueyonder.co.uk)

**ARIEL.** BBC staff magazine 10/7/91. Souvenir Special. **THE LIME GROVE STORY.** Lots of pictures of Studio E and the 'history' of Lime Grove before demolition. **£6** post free.

**PROFESSIONAL VIDEO INTERNATIONAL YEARBOOK 1985/86.** Link House 1985. Lists every pro tv item for the mid-nineteen eighties. Full of pictures, facts and figures. Invaluable reference volume. **£10**

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All books in VGC. Postage minimum **£1.50.** Contact Dicky Howett on 01371 820155 Email: [dicky.howett@btinternet.com](mailto:dicky.howett@btinternet.com)

A good home is sought for my Quantell Mirage and Quantell Harry. Both machines have manuals with them. There is also an Encore DVE available. Please note these are BIG, no I said Very BIG Buyer collects in van. Best offer secures.

Also to go are an Ampex VPR80 and a VPR6 also with manuals. Please contact P. White on 01628 580247 Maidenhead. Office hours & leave message

### Silent Key sale

Ampex 1000c 2" VTR, very old, very rare, the first Broadcast Quadruplex machine. The down side is it is a kit of bits in poor to very poor condition. It will need considerable work to restore, but worth the effort. Few of these machines survive. Sanwell & Hutton wobulator 167.... £20.00. Marconi Pulse & Bar Generator... £15.00. Philips Valve hybrid colour monitor circa 1966 a labour of love offers. Good home sought for paper roller caption machine, Big.

The above are located in Lincolnshire but first enquires should come to me, B.Summers 01276 677879 or [Briansummers@thersgb.net](mailto:Briansummers@thersgb.net)

### Hardware for Disposal

Sony DXC M3P in very nice condition with accessories in flight case, prefer to exchange for old vintage broadcast camera, £250

Philips LDK15, head only in poor condition. Spares only Ex BBC £5.00

Marconi MK9P, head only in poor condition. . Spares only Ex TVS £5.00

Ikegami HL77 Triax system, base station and triax camera unit, alas no camera. Nice condition

Conrac 20" grade one colour monitor model 6122 Working well, with circuit. Good high definition pictures. PAL inputs and controls. Well built, heavy. £50.00

Aston Time Code reader and inserter TD20. Standard time code. Clean 2u rack unit alas no details, Free

Aston Teletext decoder TD10. Clean 2u rack unit alas no details, Free

Philips LDK5 kit:- Portable frames ( half rack size) for PSU and base station, box of spare modules for camera, Base station rack frame and some modules,

### Books for Sale or exchange

Sony BVP-330AP Operation and maintenance

Tektronix handbook for 1421 PAL vectorscope Pye handbook for LDM1911 monitor

Ikegami handbook for TM10-16 colour picture monitor Barco handbook for CM33 colour monitor

Ikegami handbook for TM10-19 colour picture monitor BBC handbook for AM7/512

Decca handbook for RU 4011 TV check receiver BBC handbook for CD3L/531

Bosch Fernseh handbook for MC37 14" colour monitor Quantell DFS 1751 Pal synchronizer

Link handbook for decoder 223 Link handbook for Video DA 280

Link handbook for coder 235

Tek 1750 Waveform monitor H/Book Seltex handbook for SPG 110P

GVG PAL ref. Generator 9560 H/Book Probel HD video switcher 6322 H/Book

Television Engineering by Amos & Birkinshaw. BBC Engineering Training manual Vol. One. £12.00 Vol. Two. £9.00. Practical television by T.J. Morgan 1959, 255 pages. £6.00

Industrial TV by HA McGhee 120 pages £3.00 Boys Book of Radio Television and radar , very nice plates of TV equipment £8.00 Practical television by TJ Morgan 1959. Nice plates, 256 pages £5.00

Basic television by "Grob" McGraw hill 1954. Detailed technical book 660 pages £10.00

BBC Features, edited by Laurence Gilliam, 1950, £4.50

Items are collect only. **Brian Summers G8GQS QTHR Phone 01276 677879 077 402 91191 E Mail [BrianSummers@thersgb.net](mailto:BrianSummers@thersgb.net)**



Bosch BCN51 very good condition complete with manuals. Much loved VT but I need the space. **Contact Trevor Brown, [Chairman@batc.org.uk](mailto:Chairman@batc.org.uk)**



## Wanted

Wanted - Information on Digital Receiver, satellite type "Comstream" CDR101 ex Reuters password and disk for computer. **Contact John on 01304 240162 or 01304 241771, email [john@jstopford.psnet.co.uk](mailto:john@jstopford.psnet.co.uk)**



### Books Wanted for my library

Documentation relating to early cameras, catalogues, Handbooks, pamphlets etc

Copies of "Marconi Instrumentation" booklets.

Copies of "Communications and Broadcasting" magazine, published by Marconi company.

Acron Genlock PAL coder 606P Handbook

Ampex Schematics for Zeus 1 Timebase corrector

Ampex VPR3 Handbooks

"Briggs" history of the Broadcasting in the UK Volume 3

BBC Year books.

Wireless World from 1960 to 1980. Also bound volumes wanted.

### Oddments Wanted

Angenieux 6X9.5 zoom lens circa 1973 to fit Marconi Mk8P.

Viewfinder for LDK 15 and mounting arm. Small viewfinder for Bosch Fernseh KCR40

The mounting rod that fits in the base of a LDK14

LDK25/15 Norelco "Round" interconnect cables CCU/PSU/OCP and CCU linear signals in/out connector

Line Scan unit for Marconi Mk5 camera

Interesting old Microphones

Any small parts that belong to Broadcast cameras to help with restoration, cue domes, handles, knobs, etc.

Always interested in old broadcast cameras, particularly keen to get a Pye Mk6 Image Orthicon

**Brian Summers G8GQS QTHR Telephone 01276 677879 mobile 077 402 91191, E Mail [BrianSummers@thersgb.net](mailto:BrianSummers@thersgb.net)**



Manual for Sony BVW 10 or switch mode power supply diagram manuals for Sony BVV-1APS and BVP-3AP Camera and VT back. Lens or viewfinder for BVP3 **Contact Trevor Brown, [Chairman@batc.org.uk](mailto:Chairman@batc.org.uk)**



# BGM Agenda

**Chairman's Report**  
**Treasurer's Report**  
**Election of Committee**  
**Standing down**

- Bob Robson

**Seeking election following co-option:**

- Paul Pitts
- Pat Hellen
- Richard Price

**Require re-election:**

- Bob Platts
- Dave McQue
- Ian Pawson
- Graham Hankins

• Paul Holland  
 • Paul Marshall  
**Still on the committee, not requiring re-election:**

- Brian Kelly
- Brian Summers
- Peter Delaney
- Dave Lawton
- Trevor Brown
- Paul Holland
- Graham Shirville

**Election of Officers**  
**Appointment of Auditors**  
**Close**

An informal discussion of matters of interest may then take place, time permitting.



**Roger Glover (G8IUC) using one of Peter Chapman's cameras at Picketts Lock**

## 'Picketts Lock' – March 2002



**North London Television Group stand, demonstrating GB3EN repeater. Vas, G0VAS in attendance.**

For the very last time, final time, the BATC put up its stand at the London

Computer and Communications Exhibition at Edmonton, north London.

No, this isn't the last time for the BATC, but the Leisure Centre is closing, to make way for, I am told, an athletics 'centre of excellence'.

Ably assisted by Brian Summers, we fielded our usual wares and spent many hours explaining ATV, taking new members monies, and shifting some 'white books'. On display was the Worthing transmitter, a 'Dove' receiver, a G8SUY transmitter under construction and a 'Powerpoint' computer presentation to explain the 'easy' way into ATV. The egg and bacon baps were



**"Why is this man smiling? Our treasurer Brian Summers enjoys a cup of tea after enrolling a new subscription"**

marvellous and a good time was had by all.

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