

## Contents

Contents .....	1
Committee Contacts .....	2
Chairman's Column.....	3
Circuit Notebook No.71 .....	5
“ATV meeting Ruhrgebiet” with Digital-ATV topic.....	7
Constructing the FIGE 13 cm Television Transceiver .....	8
Subscription rates .....	11
CQ-TV Commercial advertising rates.....	11
An introduction to PIC programming - Part 3 .....	13
Deadline.....	19
20 years ATV repeater DB0CD.....	19
A New Aerial for GB3TM .....	20
Members' Services .....	21
BATC Publications.....	22
Control Signals on Satellite Feeder Cable.....	23
Digital Video - Questions and Answers – part 2 .....	26
Technical Facilities at IBC .....	30
Movies tell a digital story .....	34
Members only! .....	35
TV on the air .....	36
Satellite TV News.....	37
British Amateur Television Club Contest Rules For 2000 .....	42
Contest News .....	43
Post and News .....	45
Members adverts.....	47
For Sale.....	47
Wanted.....	48
Index of Advertisers.....	48

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## Chairman's Column

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In CQ-TV 190 we announced the forthcoming Rally at Bletchley and it was a huge success, if the emails are to be believed; the event was smaller but it seems size isn't important after all. The event was more focused and perhaps a little reminiscent of the older style rallies we used to hold before they grew in size at the Post House, Crick and moved on via Harlaxton and various other venues to end up at the Sky Blue Connexion where they have been for the last few years. The attendance has been dwindling, not I hasten to add through anything we have been doing wrong, but as part of the general rally scene decline. I think to hold a successful event on the same day as Drayton Manor and to draw the attendance figure we did says something about the Club, also putting us well into profit.

The indoor stands were well attended and all the products were TV related. The sun shone on the outside flea market and money was seen to change hands. Ashley Booth linked the events up to satellite (36E) and Rens Mass relayed them on PI6ALK and (W2 16. E). The end result was down linked by both Paul Pitts and Tony Kempton G1BYS back into the main hall. The returning pictures were delayed by over 2 seconds due to, I suspect, the Mpeg coding and of course the two satellite links.

All we lacked was some production facilities to feed the link with. Paul Pitts did his best with a small hand held camera and pictures should have been seen over a large part of Europe via PI6ALK and its satellite link. I am not sure everyone knew what they were seeing, but if we can repeat the link next year and build on our success with some production facilities, it should be possible to display our email address or even host questions via a phone in; its something we need to think about.

Besides Ashley and the ITN uplink we had Paul Andrews G6MNJ and his newly acquired terrestrial link vehicle. Again this is not a piece of amateur maintained yesteryear equipment, but a new business venture by Paul, who had to leave early in order to set up for a GMTV link the next day.

To complete the outside display Ian Waters brought along the 24 cms relay built into his family saloon, that was used to relay pictures into Shuttleworth last year, very nice Ian but I still prefer the one you built into the London Taxi.

The Cryptography trail was also opened just for the BATC visitors that day. Many of those that attended took advantage of the guided tour and explanations of just what was achieved at Bletchley and how it was done.

Visitors came from all over the UK with Hans PE1ECO, Fred PE1EXM and Jan PA0VHF from Holland and one unconfirmed report that Gary G4CRJ was flying in from Sweden for the event. My thanks go to all those that made the event work and especially to Dave McQue and Tom Mitchell who planned and organised the event. Here are just one of the comments received so far,

*."A few comments on the rally itself. I had heard through the grapevine that it would be smaller than usual, but that didn't deter me from coming. One's initial reaction upon entering the hall was "cor where is everyone!" However, as it seemed that the traders "missing" were the ones dealing mainly with computer bits or tools or cheap ghetto blasters they were not missed. I don't think the rally was any worse off for their absence, despite the odd comment or three that I heard about it not being very big. It's the size that matters and that aren't always biggest! I met lots of old faces, and my son and I came away with some goodies, so we were happy.*

*The boot sale area was good too, the only thing missed were the members OB vans. Almost best of all was the venue itself. Full marks here for finding such an amazing place. I/we enjoyed very much the cryptology trail and just being in a place where so much of great importance happened. The computer museum brought back nostalgic smiles as well! Look forward to next year." Chris Gibbs G8GHH*

The venue has been provisionally booked for May 6 next year. This date should not clash with Drayton Manor so keep it clear in your dairies.

The CQ-TV CD is growing, not only with the new issues but also, thanks to David Andrews, we have now added CQTV 172 and 171. The paper issues were scanned in and converted to text files and any scanning errors corrected by proof reading against the original copy. Ian Pawson has coded them into Acrobat and added them to the index and word search.

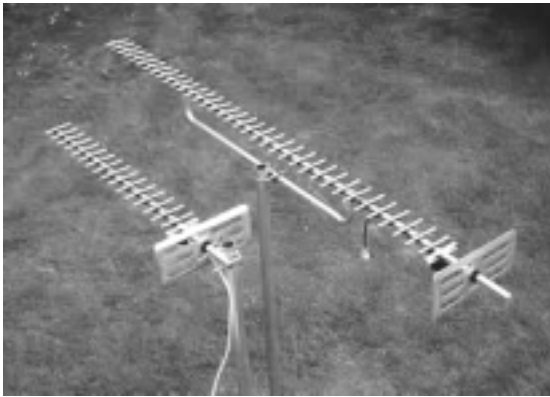
The ATV bi-monthly column in Radcom is back and under new management. Roger Jones G3YMK has taken over from Dave McQue and needs to be kept up to date on anything relevant to ATV that can help sustain this column. Roger can be contacted by email [G3YMK@aol.com](mailto:G3YMK@aol.com). His first column is full of nostalgia and recaps on the early days of ATV 405 line standards and 931 based flying spot scanners. I have met Roger and he does not look that old so he must have started at an early age - not quite sure how you plug the soldering iron in from a high chair, but he must have found a way.

Roger also looks at 2.4 GHz and what he predicts for its future, with the advent of inexpensive commercial equipment for this band - primarily for wireless communication within the home for security cameras and DVD players. These devices have four wide-band channels of which two are located at the top of the 2.4 GHz allocation, the only problem being that this is the space allocation of the band, so some engineering work will be required to adapt these off the shelf units to Amateur use.

The contribution made by advertisers is growing in CQ-TV with WYZCOM moving to a full-page advert and Giles Read (see inside front cover - ed) advertising in this magazine for the first time. Feedback from all those that advertise with us is encouraging. The charges to these people only cover the cost of printing the page at present so they have to be seen as a contribution to what you would like to see in the magazine and not as extra income to the club.

**Trevor Brown, BATC Chairman**  
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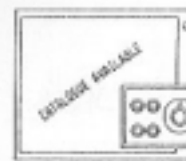
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# Circuit Notebook No.71

By John Lawrence GW3JGA

Circuit Notebook 71 relates to an ATV 24cms driver unit and the Mitsubishi M67715 Power Module.

I have just completed building the 24cms ATV transmitter/driver kit, as described in CQ-TV 185, pages 22-28, [1] and it is now up and running. The RF unit is connected to a frequency control and display panel which has an LCD readout of transmit frequency. The RF output is via an SMA connector and the video input is through a phono socket.

## Adding an Audio Sub-Carrier (ASC) input

No provision is made for an audio sub-carrier and although this signal could be added to the video input signal, a preferred point of connection would be immediately after the pre-emphasis network. A suitable connection point is to the live end of the deviation (video gain) potentiometer P1, (CQ-TV 185 p.23) In my arrangement, the audio sub-carrier is taken to this point through a 6MHz series resonant circuit, adequate signal injection without loading the video signal itself.

The series resonant circuit consists of a



Fig.2. Photograph of ASC modification

47uH inductor/choke (MaplinWH39N) and a 65pF trimmer capacitor (Maplin WL72P) An extra phono socket is fitted in the side of the tin-plate box and the components are supported between the socket and the end of P1, as shown in the photograph, Fig.2.

For a source of Audio Sub-Carrier, I used a Bob Platts Phase-Locked ASC

Generator (CQ-TV 173, Pages 46-50) [2]. The output, when connected through the series circuit, provided more than enough audio sub-carrier for correct operation. To set the trimmer capacitor, I monitored the live end of P1 using a 'scope with a low capacity probe and adjusted the trimmer for maximum 6MHz signal. The level of ASC is set by VR2 on the ASC Generator board.

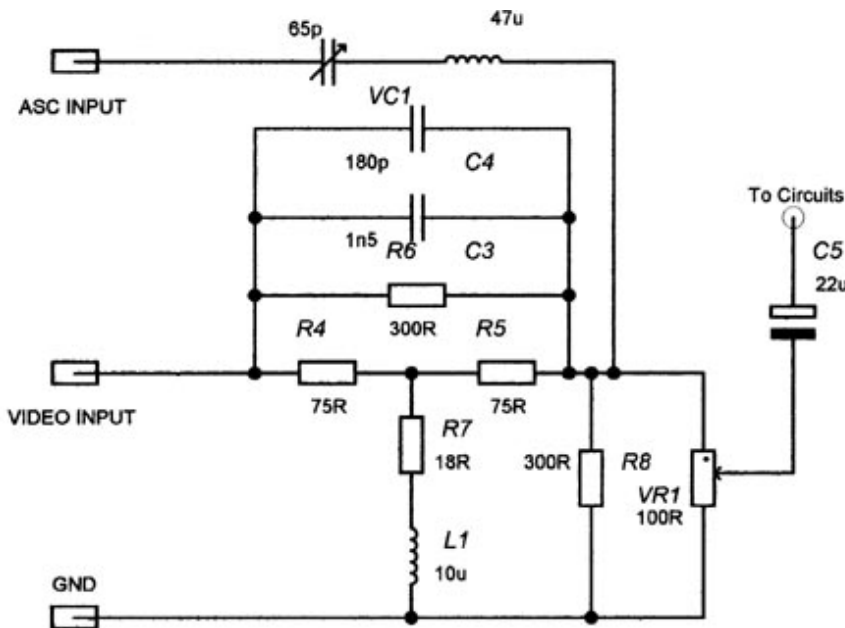


Fig.1. Modification for ASC signal input

## Measuring the transmitter/driver output

The transmitter/driver unit has an internal attenuator to set the level of the RF output. The values of the (surface mount) resistors supplied with the kit provided an attenuation of 8dB. The actual output was measured using an H.P. 432A Power Meter. As it was anticipated that the output might be higher than the power meter could accept, a 30dB attenuator (Bird 8305 DC - 4GHz) was connected to the meter input. The measured output power was +12dBm (16mW). The output remained constant within +/- 0.5 dB over the frequency range 1240 - 1320 MHz. The transmitted signal with video modulation and ASC was monitored within the shack with excellent results.

## Raising the power output.

The simplest way to obtain more power is to use a Mitsubishi RF Power Module. The Mitsubishi M67715 is particularly suitable for this purpose; it will provide up to 1.5W output for about 10mW input across the nominal

chokes. The circuit is shown in Fig.3 and a photograph of the general arrangement is shown in Fig.4. C1-C3 are 4.7nF surface mount and C4-C5 are 22uF electro. The chokes L1-L3 are 5 turns of 30swg enamelled copper wire wound on a 3mm drill shaft. To

this could be obtained from a 7808 I.C. regulator.

As an alternative to the die-cast box approach, constructional details and a p.c. board kit for the M67715 are available from Charlie G3WDG's Development Home page <http://www.g3wdg.free-online.co.uk> [4]. This kit is also mentioned in the June 2000 issue of RadCom [5].

More information on drivers and power modules can be found on G1MFG's website at <http://www.g1mfg.com>

## Test results.

The M67715 power module was supplied with +8V and fed with 10mW of input signal over the frequency range 1240 - 1320 MHz. The output power was measured using the same equipment as before. The results were plotted, on a Log scale, against frequency and are shown in Fig.5. The current drain was 700mA with the input signal applied.

Out of interest, I used my little M67715 p.a. to transmit to my local ATV repeater GB3TM (38 miles away) and was pleased to receive a P4 return picture with noise-free sound. The M67715 would be ideal in a portable TX, having a reasonable power output and not too thirsty in the battery department.

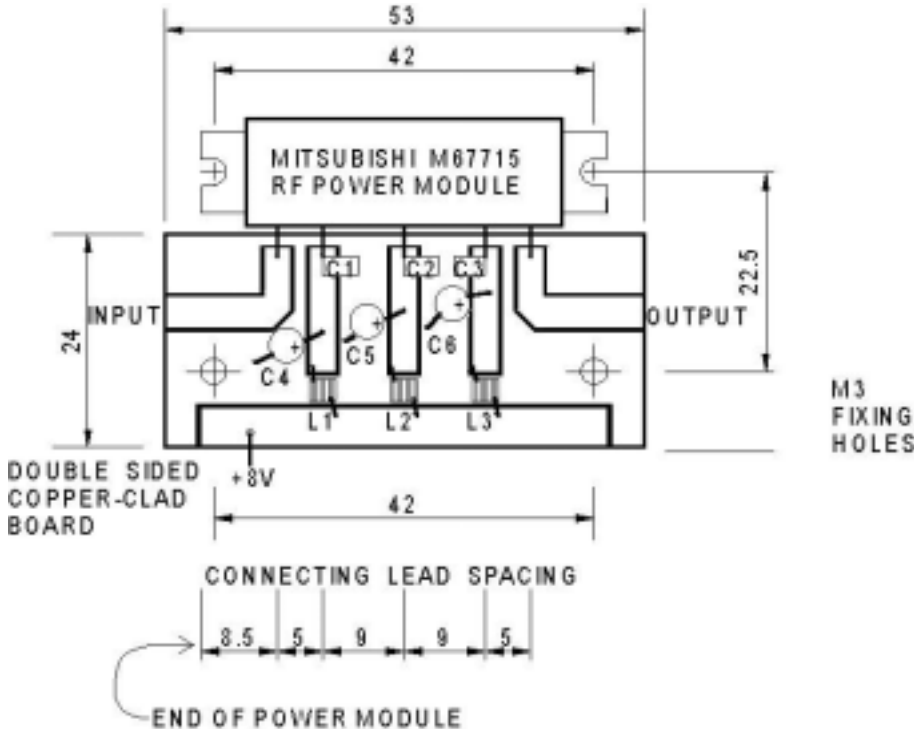


Fig.3. Diagram of M67715 connections

frequency range of 1.24 - 1.3 GHz. A full data sheet can be viewed at <http://www.mitsubishichips.com> - the Mitsubishi web site [3].

To make the connections to the M67715, I used a piece of double-sided copper clad board and cut away the surface copper to produce isolated islands of copper which formed the input and output stripline and supply feed points. The cutting between the islands was done using an engraving machine, although it could have been done quite easily using a craft knife.

I mounted the module and my board in a small die-cast box (RS 225-142) and fitted SMA connectors on each edge for input and output. The die-cast box is mounted on a heat sink, having a rating of 4 degC/Watt, (probably not necessary if the box was bolted to a chassis). In addition to making connection to the module, the board carries decoupling capacitors and RF

improve earth bonding, I fitted two solder tags to the M67715 fixing screws and soldered these to the copper-clad board. The M67715 requires a regulated +8V supply and

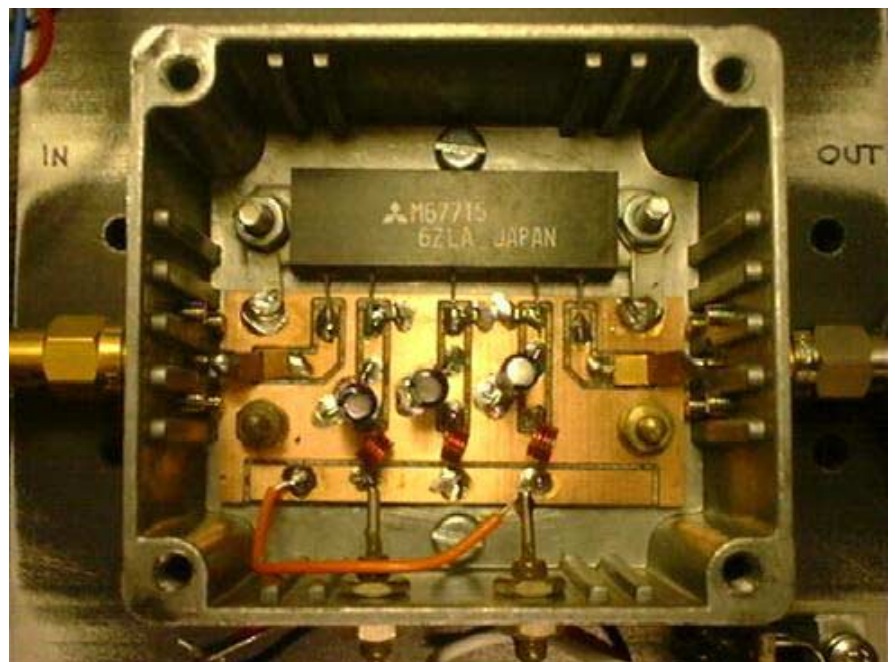


Fig.4. Photograph of M67715 in die-cast box

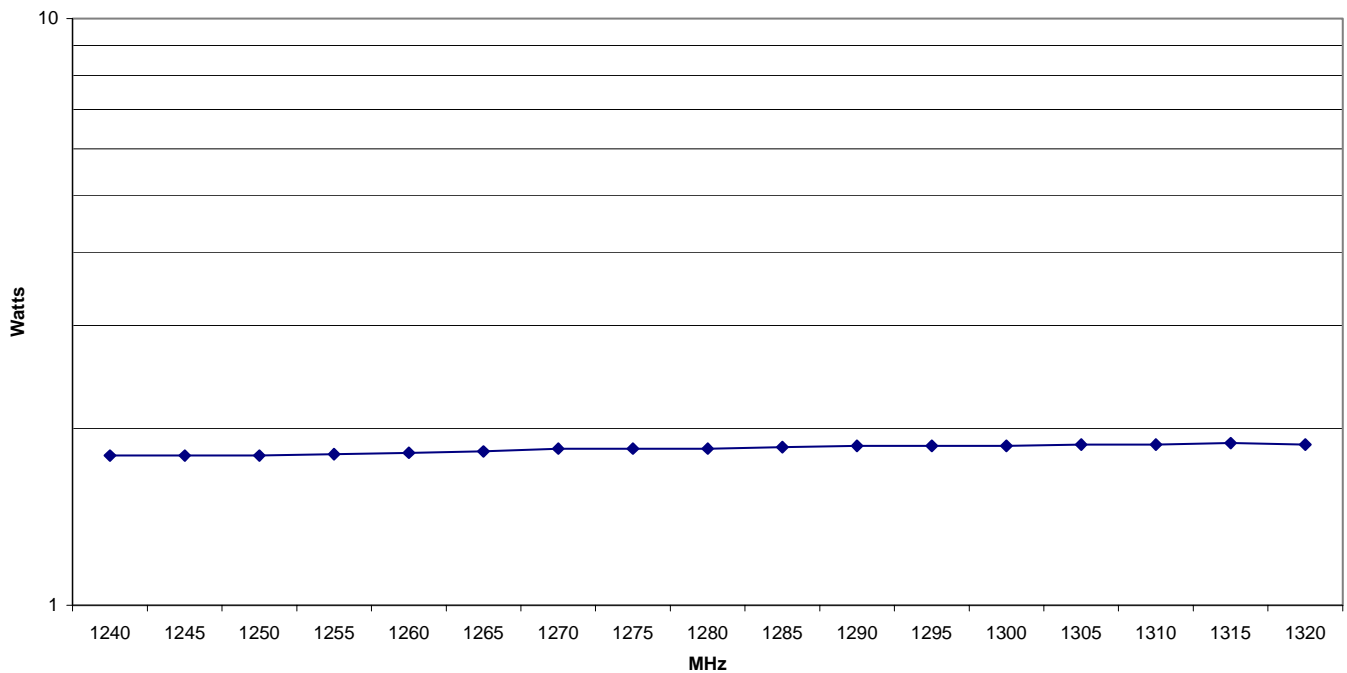


Fig.5. M67715 Output Power

## References

[1] Tuneable TX for 23 & 13 cm. Rob Krijgsman PE1CHY, CQ-TV 185, p.22-28

[2] Phase Locked ASC Generator. Bob Platts G8OZP, CQ-TV 173, p.46-50

[3] Data Sheet, Mitsubishi RF Power Module M67715

<http://www.mitsubishichips.com>

[4] G3WDG's Development Home Page at

<http://www.g3wdg.free-online.co.uk>

[5] High Performance 23cm Transverter, GM4PLM, RadCom June 2000, p.30-32

## "ATV meeting Ruhrgebiet" with Digital-ATV topic

On the first of April 2000 about 40 amateur television enthusiasts met in the "Albert-Schweitzer-Schule" in Gladbeck (Northrhein-Westphalia) at the club station DL0GL of L03, invited by the DARC district Ruhrgebiet. Peter, DL9EH, the special modes expert, presented as usual. Attraction of the day was digital ATV reception "live" from the repeater DB0CD in Gelsenkirchen (about 8 km away). A 30 MB file with MPEG1 data containing computer animations, photographs of the DATV equipment and sound commentary was received and stored in the PC harddisc, then played back by Windows mediaplayer on the PC monitor.

The "father" of the Digital-ATV development in Wuppertal, Prof. Uwe Kraus, DJ8DW, from the "Bergische Universitaet" explained the latest facts showing overhead foils in english originally planned for the ARISS

meeting in Nordwijk/NL (6 MB PDF file: [www.darc.de/distrikte/g/datv/ariss.pdf](http://www.darc.de/distrikte/g/datv/ariss.pdf)).

In the future also OFDM modulation will be an option with higher picture quality claims besides the GMSK now in use. A PAL/MPEG2 converter and modulator for really live camera views is in the making, and a remodulator on DVB standard rf signals will enable the usage of any digital satellite TV receiver behind the 70 cm DATV RX and close the live TX-RX chain. DJ8DW showed some concern about the missing mention of a Digital-ATV section 433-435 MHz in the proposed IARU region 1 bandplan for 70 cm.

The four district DATV groups active since December 1999 in Koeln-Aachen, Nordrhein, Ruhrgebiet and Westfalen-Sued reported about first experiences with the test units from Wuppertal. Most activity is coming

from DB0CD with nearly daily test transmissions on 434 MHz in GMSK. At the Ham Radio meeting in Friedrichshafen there will be shown a demonstration link between the booths of "DARC-Distrikte" and the "AGAF e.V." in order to prove practically what Prof. Hermann Gebhard, DF2DS, will explain in a lecture held on Friday morning in the Friedrichshafen fair building.

Alfred Reichel, DF1QM, the district chairman Ruhrgebiet, thanked the active OM for all the effort until now, above all Volker, DJ1CU, who developed smaller printed circuits for the DATV units which could be easier in duplicating. But it will last some time until complete sets can be ordered because of problems with the availability of some special IC.

Klaus, DL4KCK

# Constructing the F1GE 13 cm Television Transceiver

By Roger Jones G3YMK

After a number of years lobbying, the Radiocommunications Agency accepted last year the provision of frequencies for “licence free” low power equipment in the 2400 MHz band. Strict conditions apply regarding ERP and the devices are sometimes referred to as “LIPD’s” (Low Interference Potential Devices). The frequency allocations include part of the amateur band and late in 1999 various units started to appear in the retail trade. Applications are many and various; wireless interconnection of boxes to the domestic television set via SCART connectors becoming increasingly popular. The price of a complete transmit-receive pair is under £100 and on the basis of “you get what you pay for” a closer look was called for.



The receiver before the LCD and rotary encoder fitted.

## Just what do you get?

Opening the box, it was a little surprising just what was included. The transmitter and receiver units are typically enclosed in plastic cases with phono sockets for video / stereo audio, power supply of the wall mount variety and leads complete with Scart adapters. On the whole, reasonable value, as the accessories alone would probably cost £25 or so if bought alone. The transmitter and receiver can be set to any of four frequencies using dip switches and within minutes the link was operational. Pictures within the house were stable and clean, bearing out the claimed range of about 100m in free space. The lower two channels are actually in the amateur band so thoughts immediately turned to ways of improving the output power and receive sensitivity.

## What's inside?

The rubber feet on the bottom of the cases were removed and the four screws holding the thing together were revealed. Inside there was surprisingly little; a PCB which has a few components mounted on it together with a tin-plate module not dissimilar to the modulators in domestic VCR's. First thoughts were that a free-running oscillator generated the channels and it would only be a simple job to bring all

four into the amateur band. Wrong! Close examination after opening the “sealed” RF unit by de-soldering the top revealed a myriad of surface mount components crammed inside. Sure enough there is a free running oscillator, but that is locked via a divider to a reference frequency. In the case of the receiver this is a 4MHz crystal external to the module. All we have to do then is replace the crystal with one of a lower frequency and we are in business? Whilst that is so for the receiver, the transmitter proved to be a problem. The designer of the module has been very clever here. The frequency reference seems to be taken from one of the sound sub-carrier oscillators internally. That in turn is referenced using a ceramic filter. Cunning, but very difficult to change.

Why would we need to change the frequency when 2 channels are well within the amateur band anyway? Unfortunately for the ATV enthusiast, the section of the band 2400-2450 MHz is allocated to space communications. Whilst 10mW wideband devices are unlikely to cause interference to satellite enthusiasts, the imminent launch of Phase 3 does not bode well for any ATV activity in this part of the band being popular! Desperate for

information on the modules, I turned to the Internet to see if the original manufacturer had a site. No luck with putting in to the search engine any of the markings on the module but on entering “2.4 GHz “ a number of references were returned including “modules”; are we in luck? Well - in a way...



The heart of the receiver; the pre-programmed PIC chip

## The F1GE Page

Obviously our colleagues in France had been having similar thoughts and F1GE had on offer similar basic modules but with one major difference; the frequency is programmable externally using an I<sup>2</sup>C bus. Further, Marcel and his colleagues have developed a pre-



programmed PIC chip that allows frequency setting in 250KHz steps throughout the band - and beyond; more of which later. A complete kit is also offered including an LCD readout and PCB. Abandon thoughts of modification to domestic modules; this really looks good!



### The transmitter operating on 2375MHz

A quick exchange of e-mails and prices were established; about 900FF each for the TX and RX. Marcel has a good command of English. Credit cards are not accepted and an International Money Order was preferred. The Post Office no longer supplies these but I was told "You can get them from any bank". Wrong again. All sorts of international services are available but each is relatively expensive. However Barclays do offer the service and only charged £8 for a non-customer.

Two days after posting the money order a parcel arrived via registered airmail. Fantastic service. Opening the parcel revealed what the xyl described as "dinky little plastic suitcases" containing all of the components for the TX and RX. Most of the construction information was in French but there is an English version of the operation instructions. Clear circuit and board layout diagrams are provided so only the parts lists needed translating.

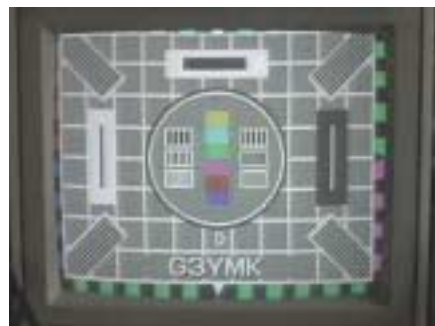
### Construction begins.

Experience warns that before starting to build any kit the instructions should be carefully studied and understood before commencing construction. Bearing this in mind an evening was spent carefully studying the documentation and identifying the components. The transmitter board has fewer parts so was attempted first. It is as well to position major components first so that a reference for smaller parts is provided later. The component overlay was

reasonably accurate but the location of the coils in the pre-emphasis stage was somewhat misleading. Tracing out the tracks along with the circuit diagram was relatively easy. All components are normal wire ended types so no surface mount technology is required. The good quality fibreglass PCB is treated with solder resist and a length of suitable fine solder is supplied. Slightly puzzling were the connections to the rotary encoder used for frequency setting. The encoder has three connections; a common and A and B. There appeared to be 4 connections on the board. Eventually a little hand drawn diagram was found on the supplied data sheet which indicated the common connection should be connected to -ve. Provision has been made on the PCB for optional use of an optical encoder needing +5v.

Most components are easy enough to identify; nowadays I always check resistors with a multimeter before fitting; maybe I am developing colour blindness with old age but brown and orange look awfully similar at 11:00 at night! The markings on small capacitors are also difficult, but luckily a process of elimination by comparison with the parts list is straightforward.

I considered the poorest part of the kit was the interconnection of the LCD display to the PCB via a short length of ribbon cable. It would have been better to have fitted suitable plugs and sockets as the ribbon easily breaks. Provided it is treated carefully however, it works and cost is reduced. Suitable plugs and sockets are available from Maplin if required.



Test Card D through the system

### Testing it out.

After carefully checking all soldering for dry joints or solder bridges (we all do, don't we?) power was applied.

Nothing seemed to happen. The LCD contrast pot was tweaked from end to end with no avail. Time to get the scope out and see what was wrong. Looking at the data and clock pins of the PIC with an oscilloscope revealed activity on various pins. The Module had power and video getting to it so another careful look at the PCB was needed. After putting in the missing wire link (!) on re-powering the board the LCD read-out indicated 2430MHz. With great excitement the shack RX was fired up (a modified Drake MMDS LNB) and a clear picture as displayed in full noise free colour. Remarkable, as neither the TX or RX had any form of aerial attached! Frequencies from 2100 to 2700 MHz could be selected and according to the shack Optronics frequency counter (accuracy unknown but a close enough indication) were rock steady to within a few kHz. Flushed with success on to build the companion receiver.

### The receiver.

Having learned from my errors on the TX, the documentation was very carefully studied before construction was commenced. Just as well, because it became apparent that 5 components and a wire link were to be fitted underneath the module. It would have been impossible to have fitted these afterwards. There are considerably more components on the RX board; most of these associated with the sound sub-carrier demodulators. The transistors used in the video amplifier were type 2SC945. The board was designed for 2N2222's. No problem, except they needed turning half a turn from that shown in the layout. Check three times and apply power. 2430MHz immediately shows on the display and all looks promising. Adjust the rotary encoder to 2355Mhz and examine picture. Dreadful. Something strong there but what is wrong? Quick engage of brain and swap the video polarity link over and full colour rock steady G3YMK test card displayed on the monitor as if it were straight out of the generator. Again no aerial connected. A retune to 2416MHz revealed a very acceptable picture from the DVD son was playing in another part of the house. Wonder where he got that disc from? Sound good and clear too. Words very rude. Must have a meaningful discussion with him.

No technical adjustments were needed other than video gain to produce a nominal 1V pk-pk.

Provision is made for dc feed via the RX feeder for a pre-amp. A Down-East Microwave LNA13 improves sensitivity even further.

### The Measurements.

Since leaving work I have come to realise just how handy it was to have access to professional test equipment. Measurements now require thinking about and a pragmatic approach is needed. Available video test sources are cross-hatch, colour bar and test-card generator, together with an off-air receiver from which reasonable ITS can be extracted. On the basis that the incoming distortions are known, a reasonable estimate can be made of the link performance. A Goldstar OS902 oscilloscope is available in the shack.



Colour Bars through the system

From these the following measurements are estimated: -

Linearity (Differentiated method)	staircase	5%
Differential gain		8%
Lum/Chrom gain		-5%
Ringing on HF pulse		+/-3%

For amateur purposes this performance is very good. Obviously Marcel and his team have worked hard on the equalisation and pre-emphasis/de-emphasis networks. Much better test gear would be needed to improve on these results, which may be possible, but for our purposes this is unnecessary.

following the diagrams construction of a low power 2.3GHz ATV transceiver is quite straightforward. All of the microwave bits are done for you and the results are excellent. There is sufficient power out to drive a G3WDG power amplifier to 1 W which, when fed to even a modest gain aerial system should give performance equal to a similar 23CM system. The knowledge that the frequency transmitted and received is exact removes some of the traditional hit and miss associated with microwave operation. Also, one's conscience is clear that operation is in the "right" part of the band. Possible uses for the link, as well as simplex operation, are as repeaters for both sound and TV.

The transmitter is able to operate up to 2.7 GHz; using a frequency quadrupler and reducing modulation should produce a stable 10GHz output. The PIC is programmed to enable direct readout at 10GHz.

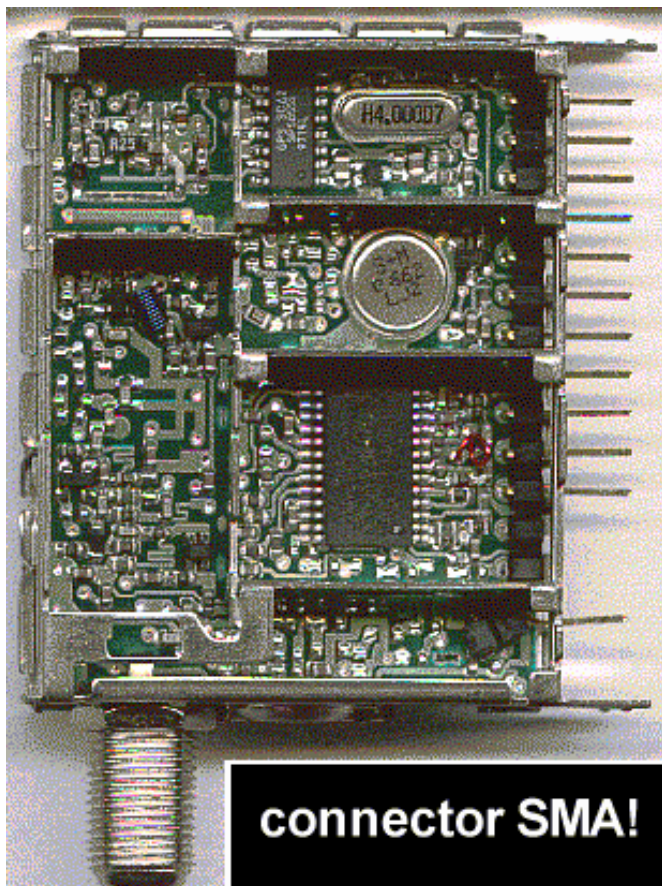
Thanks go to Marcel Gibelin F1GE and his team for permission to publish the photographs of the insides of the modules. Marcel can be contacted for latest pricing and delivery information at 39 Av. De Savigny, F93600 AULNAY sous Bios, France. E-mail [Ma1ge@aol.com](mailto:Ma1ge@aol.com).

### On Air Results

The only on air testing to date has used simple yagi aerials, leaving the TX on in the shack and taking the RX out in the car locally. Range is about half a mile in these crude conditions and will be much improved when the big 2.3GHz aerials arrive and are erected. (Don't tell the xyl).

### And finally...

The kits supplied from F1GE are not for those with no experience; however, with care and carefully



connector SMA!

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The subscription rates to the BATC for the year 2000 are shown below. This is the first price rise in many years but, with the continuing rising costs of production, printing and postage, a price rise was inevitable.

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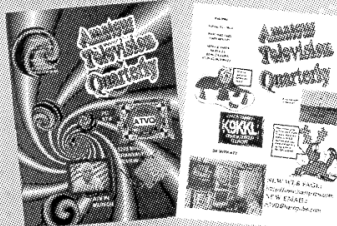
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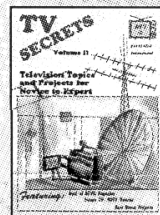
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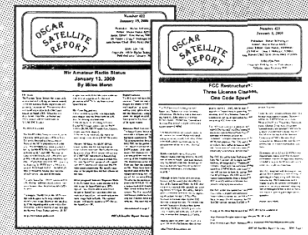


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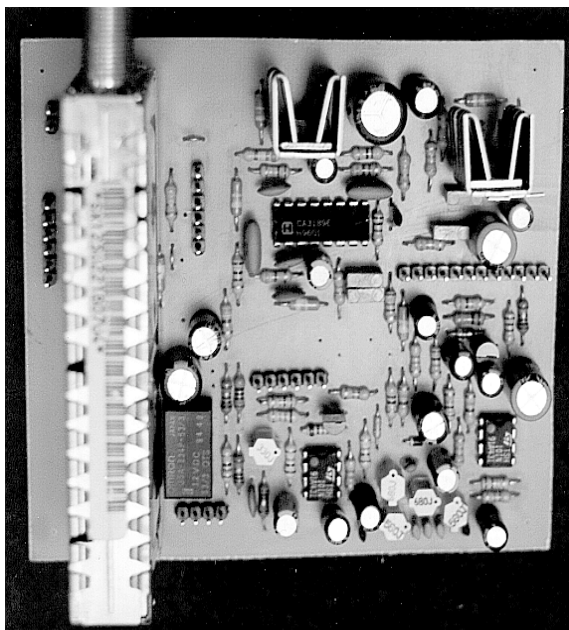


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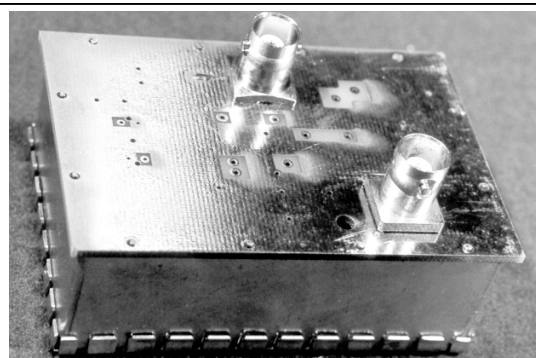
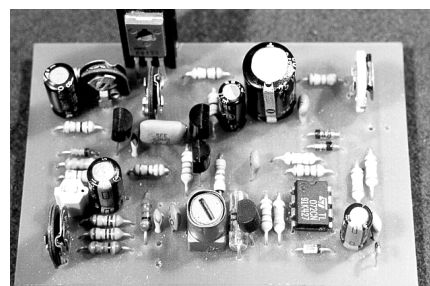
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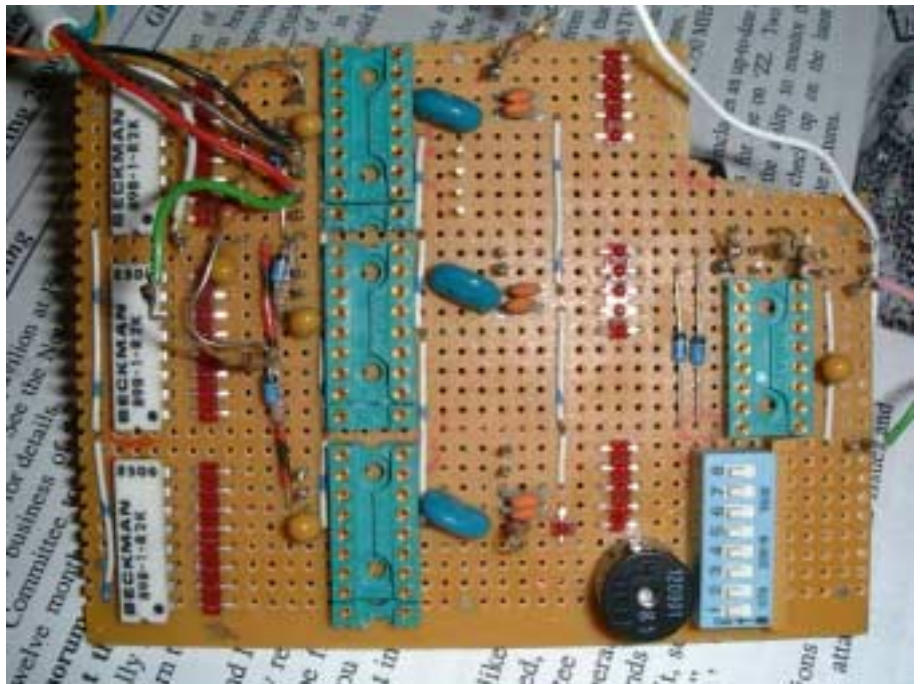
## An introduction to PIC programming - Part 3

By Brian Kelly

At the end of the last article I said you would see your call sign in lights - I never said how many lights though. Looking back in the parts list you will note that I only specified eight LEDs in the design. You are probably wondering how on Earth you can display several characters with only eight points of light. The trick is to use a technique called “spacewriting” which uses an optical illusion to turn a single line of lights into a 2D pattern. It works by slicing the characters into vertical strips and then flashing the lights in the pattern of each strip while switching strips in sequence from left to right. Figure 3.1 shows the general idea. We are doing it on a small scale but I’ve heard of the same trick being used to write advertising slogans across the sky by flashing spotlights into the propeller of a moving helicopter!

The full PIC program is shown in figure 3.2, I’m sure our trustworthy Webmaster will add it to the BATC Internet site for those who prefer not to type it in. You should be able to recognise the different parts of the program from the descriptions given in earlier articles but here we will walk through it line by line. Several nice features of the MPASM assembler are demonstrated; I’ll mention them as we encounter them.

You should immediately see that the program is in three parts, at the beginning is a list of definitions, in the middle is the working part of the program and it ends with a data table. The first line uses an assembler directive called “list” - don’t ask me why this name was chosen, it seems silly to me too. It actually tells the assembler which type of processor is being used, so it knows to use the correct instruction set and checks the register numbers are within range. The “w=0” sets the warning level to show all possible warnings, setting it to higher numbers will restrict the assemblers ability to point out possible errors. “r=hex” advises the assembler that, unless specified otherwise, it should treat numbers as hexadecimal. Other number bases are available so forewarning it should prevent the



**The author’s prototyping board, this can accommodate three 16C84 chips with individual clocks and an RS232 level shifter. Each of the PIC IO pins has its own LED so its logic state can be seen easily**

wrong one being assumed. In reality, the program explicitly states the number base (also called Radix) in almost all cases.

The definitions section simply associates a meaningful name with a number to make the program easier to read. If masochism is your style, you can leave this section out all together and replace any references to the words with the numbers to the right of the “equ”. Doing so will slightly reduce the amount of typing required but will make the program very difficult to understand. It makes no difference at all to the PIC which way you do it but, in my books, the more readable the program style is, the easier it is to write and debug afterward. Note that each of the numerical values is preceded by “H” and enclosed in single quotes; this is how we tell the assembler we mean hexadecimal has been used. We could equally have used “B” for a binary representation of the number, “O” for Octal (base 8) or “D” for decimal, each has its merits and applications. In this case I chose hexadecimal, note that because of the radix being set by the list directive, the “H” and quotes could have been omitted as the assembler was told to assume hexadecimal anyway. I

prefer to be doubly safe in case I forget to specify it somewhere - at least it uses the radix I prefer to use rather than an undefined one.

The second section of the program starts with two macro definitions. A macro is to an instruction what an “equ” is to a name - it provides an alias by which it can be recognised. Where a macro differs from an equ is that it can mean more than one item, in fact it can refer to any number of instructions that collectively have the name of the macro. Wherever the macro name is encountered in the program the set of instructions are substituted instead. This is not the same as using a subroutine where the same set of instructions may be called from different parts of the program; a macro is replaced by the full set of instructions at each of its occurrences. Macros are defined by giving them a name in the first column, the same way a label is defined, then enclosing the instructions between the words “macro” and “endm”. They can be a single instruction long or can contain many instructions. In the example program there is only one instruction that resets the page 1 bit in the STATUS register in the “page\_0”

macro and sets it in the “page\_1” macro. Effectively, whenever one of them is used the page bank is switched accordingly. I could have used the instruction “bcf STATUS,RP0” instead of “page\_0” and the “bsf” instruction in the same way in “page\_1” but the macro names are more descriptive and make the intention of the program easier to comprehend. If you assemble the program and look at the listing file you will see how the original instruction is actually being used.

program to divert to a fixed address in the program. That address is 4 and is where the code for servicing the interrupt would normally reside. This program doesn’t use interrupts but to be safe I always put a “return from interrupt” at address 4 so if one accidentally occurs, maybe while debugging, the program follows a safe escape route.

The label “setup” is where the real action starts and we are almost half way down the source code already!

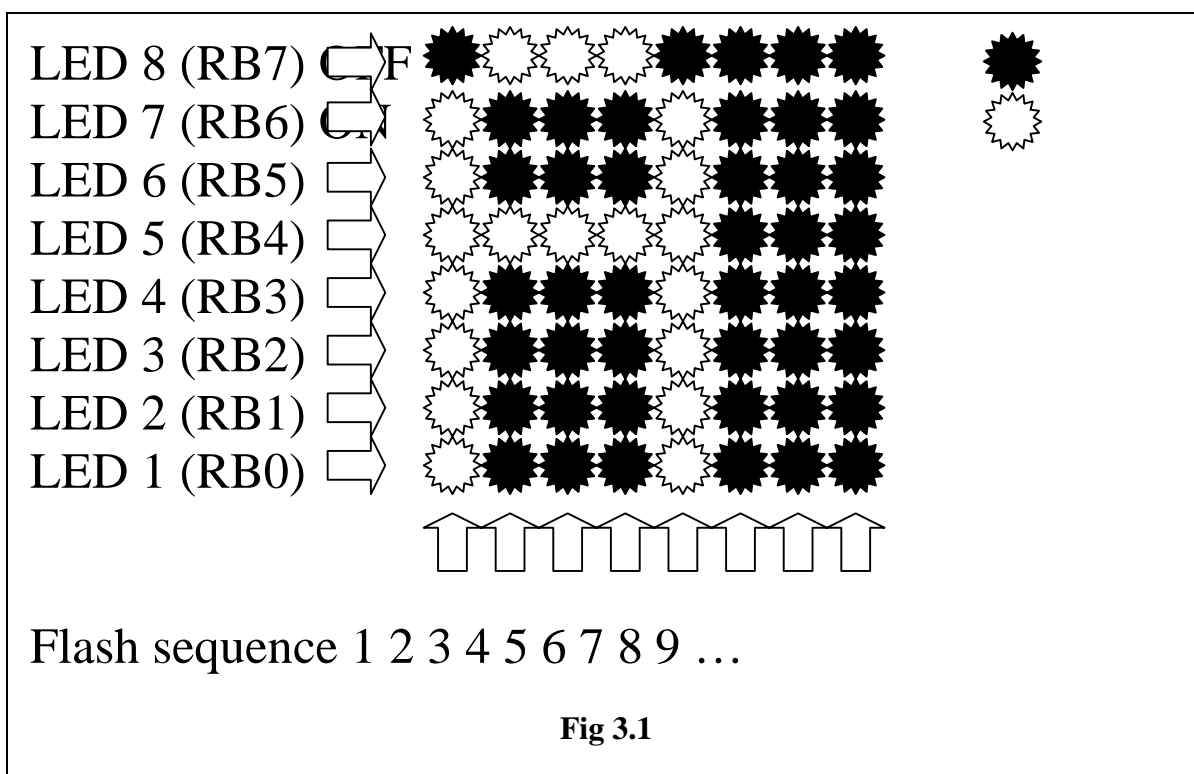
program should the need arise. As we are now in the “thinking” part of the program I’ll explain each line in turn:

### **Movlw H’FF’**

This instruction moves the literal value FF (in hexadecimal) to the W register. All bits are set to 1.

### **Movwf PORT\_B**

Our defines at the top of the program tell the assembler that for “PORT\_B”



Following the macro definitions there is an “org” directive followed by the digit zero. Org is short for “Origin”, the starting point to assemble from; it sets the assemblers memory counter to zero, the first address in the chips program memory, so it can track the positions of all the subsequent instructions and evaluate the addresses of any labels you placed in the source code. Like all directives, org doesn’t generate an instruction; it simply gives information to the assembler. The first real instruction is “goto setup” which resides at the origin and tells the processor to jump to the place in the program where the “setup” label was found. There is then a second org statement; this one isn’t essential; it moves the assembler along to address 4 which is the interrupt vector. An interrupt is a mechanism triggered by some event happening and causes the

Remember that labels always start in column 1, right up against the left margin. My preference is to use the [TAB] key to move in a few spaces when typing the instructions themselves. Using the space bar to move in from the margin is perfectly acceptable but modern word processors tend to use proportional spaced fonts which makes the columns zigzag. The tab key always moves a fixed distance across the page keeping it neat and tidy. If in doubt, use the DOS “EDIT” program, which uses a fixed font and is compatible across all versions of DOS and Windows (to date!).

At “setup” we set-up the internal organs of the chip. This step is necessary so the pins on the chip can be switched to work as outputs or inputs as appropriate. It is perfectly acceptable to switch their directions in mid

we mean register 6 and the instruction moves the value in W to it. W was set to FF in the previous instruction so now PORT\_B has all its bits set to 1.

### **Page\_1**

This translates to “bsf STATUS,RP0” because of our macro definition. It selects registers in bank one instead of bank zero.

### **Clrf TRIS\_B**

TRIS\_B is defined to mean register 6 and the CLRF instruction means “set all the bits to zero” so register 6 is cleared. A zero in this register makes the pin on PORT\_B an output.

## Movlw H'01'

Puts the bits 00000001 (binary representation of "1") in the W register.

## Mowwf TRIS\_A

Like the previous TRIS instruction this sets all pins to outputs except the least significant bit, it works on the PORT\_A register unlike the previous instance where it set PORT\_B.

## Page\_0

Macro that switches back to page zero so we can access registers 0 through 2F again.

## Movlw (table\_end - table) - 1

This is another "put the following number in W" instruction but uses a neat trick in the assembler. You remember that I said that the assembler works out and stores the addresses of

all labels it finds - well it also allows you to use the addresses in calculations. The "table" and "table\_end" labels are before and after the table at the end of the program. By subtracting them we get the length of the table. Note that we subtract a further one from the length because the table starts with an instruction that is not part of our data. The result is that W is filled with the length of the data part of the table.

```
; swrite.asm
    list          p=16c84,w=0,r=hex
w EQU H'0000'
same EQU H'0001'
;----- Register Files-----
RTCC EQU H'0001'
PCL EQU H'0002'
STATUS EQU H'0003'
PORT_A EQU H'0005'
PORT_B EQU H'0006'
timeout EQU H'000C'
scan_pos EQU H'000D'
scan_len EQU H'000E'
OPT_REG EQU H'0001' ;following registers are in bank 1
TRIS_A EQU H'0005'
TRIS_B EQU H'0006'
;----- STATUS Register Bits -----
RP0 EQU H'0005'
Z EQU H'0002'
C EQU H'0000'

page_0 macro ;macro to reset the page bit (page 0)
    bcf STATUS,RP0
endm

page_1 macro ;macro to set the page bit (page 1)
    bsf STATUS,RP0
endm

org 0 ;start at address zero (reset vector)
goto setup ;jump to the real start of the program

org 4 ;address 4 is called by interrupts
```

---

```

interrupt
    retfie                ;just return if an interrupt occurs

setup
    movlw H'FF'          ;set all RB high (LEDs off)
    movwf PORT_B
    page_1              ;RB pins to output mode
    clrf TRIS_B
    movlw H'01'         ;RA0 to input, others to output
    movwf TRIS_A
    page_0
    clrf timeout        ;count before shutting off
    movlw (table_end - table) - 1 ;calculate table length
    movwf scan_len      ;count of character raster lines

wait_for_go
    btfsc PORT_A,0      ;skip next if start pin has gone low
    goto wait_for_go    ;hop on the spot!
    clrf timeout

spacewrite
    decfsz timeout,same ;skip next if finished
    goto sw2
    movlw H'FF'         ;switch off all LEDs
    movwf PORT_B
    goto wait_for_go

sw2
    movf scan_len,w
    movwf scan_pos

sw3
    decf scan_pos,same  ;
    movf scan_pos,w
    call table
    movwf PORT_B       ;set the LEDs
    movlw H'FF'        ;turn of again
    movwf PORT_B
    movf scan_pos,same ;set flags
    btfss STATUS,Z     ;skip next if scan_pos = 0
    goto sw3
    goto spacewrite

; led pattern data. 0 = led ON, 1 = led OFF
table

```



```

    addwf PCL,same                ;jump to table offset by value in w
    retlw B'10000000'            ; *****
    retlw B'01101111'            ; * *
    retlw B'01101111'            ; * *
    retlw B'01101111'            ; * *
    retlw B'10000000'            ; *****
    retlw B'11111111'            ;
    retlw B'11111111'            ;
    retlw B'00000000'            ; *****
    retlw B'01101110'            ; * * *
    retlw B'01101110'            ; * * *
    retlw B'01101110'            ; * * *
    retlw B'10010001'            ; ** ***
    retlw B'11111111'            ;
    retlw B'11111111'            ;
    retlw B'10000001'            ; *****
    retlw B'01111110'            ; * *
    retlw B'01111110'            ; * *
    retlw B'01111110'            ; * *
    retlw B'10111101'            ; * *
    retlw B'11111111'            ;
    retlw B'11111111'            ;
table_end
end

```

This program listing is available for download from the CQ-TV web site, [www.cq-tv.com/software.htm](http://www.cq-tv.com/software.htm)

Fig 3.2

### Mowwf scan\_len

Having used W to perform the length calculation, this instruction moves the result to a register defined as scan\_len (actually register E), freeing W for other work.

### “wait\_for\_go”

This is a label, it will be used shortly as a landing point for a jump instruction.

### Btfsc PORT\_A,0

Here bit 0 of PORT\_A is tested to see if it is a zero or one. As PORT\_A is connected to to the RA pins on the chip and bit 0 was set to be an input, we are actually making a program decision based on the voltage at one of the pins. The BTFSC instruction will skip the next instruction if the voltage is zero, otherwise the next instruction will be executed as normal.

### Goto wait\_for\_go

This is the next instruction mentioned previously. If bit 0 of PORT\_A was NOT a zero, this instruction is executed and the program returns to the label called “wait\_for\_go”. In other words, we go around in a loop forever until bit 0 goes to a low voltage state. When it does this instruction is jumped over and the loop is broken.

### “spacewrite”

Another label, this is the entry point for the loop that checks if time out has occurred and if not it proceeds onto the LED flashing routines.

### Decfsz timeout,same

Remember the register defined as “timeout” was set to zero earlier. This instruction first decrements (subtracts 1 from) the value in the register then skips the next instruction if zero was reached. Because we initialised it to

zero, when counting down it rolls backward from 00000000 to 11111111 and doesn’t reach zero again for another 256 (FF) counts. The “same” in the instruction is defined at the top of the program to mean “put the result back in the source register” so the register holds the new value. We are using this count to automatically shut the space writing off after a few seconds.

### Goto sw2

This instruction will have been skipped if “timeout” reached zero. It is a jump to the code that flashes the LEDs.

### Movlw H'FF'

We can only have arrived at this instruction if “timeout” counted to zero and the previous instruction was skipped over. It must be time to finish so all the bits in the W register are set to 1 in readiness for writing them to PORT\_B.

---

## Movwf PORT\_B

Actually write the “all ones” bit pattern in W to PORT\_B so all the RB pins go to a high voltage state.

Because the LEDs are connected between the positive supply and the RB pins, this makes 5V appear at both ends of them so they all turn off.

## Goto wait\_for\_go

Having turned all the LEDs off, this instruction returns us to the stage in the program where we wait for another start signal.

## Sw2

If this label has been reached, we are committed to running the display routine.

## Movf scan\_len,w

The length of the data in the table worked out earlier is copied to the W register.

## Movwf scan\_pos

The data length is now copied to the register defined as “scan\_pos”. Note that sometimes it is necessary to use the W register as a temporary store like this when moving data from one register to another.

## Sw3

Another label, the code that actually flashes the LEDs is in the following 8 lines of code.

## Decf scan\_pos,same

Decf is the instruction that simply decrements the contents of a register. It doesn't cause a program jump as the decfsz instruction would. The value in the “scan\_pos” register has one subtracted from it and the result is put back in the scan\_pos register.

## Movf scan\_pos,w

The new value in scan\_pos is now copied to the W register. Note that this could have been done by using the W register as the destination in the previous instruction but if we had done that, scan\_pos wouldn't hold the new value for the next time it is needed.

## Call table

The call instruction causes a jump to a subroutine with the address of the next instruction stored so it can be executed as soon as the subroutine finishes. The reason for using this instruction will become apparent when we reach the table itself.

## Movwf PORT\_B

On returning from the subroutine “table”, this instruction is run. The table routine loads the pattern of the LEDs into the W register before it returns so here they are sent to PORT\_B and hence RB and the LEDs themselves.

## Movlw H'FF'

It is necessary to turn the LEDs off after their brief flash of the pattern. Here the “all ones” pattern is loaded into the W register ready for writing out to RB in order to turn the LEDs off again.

## Movwf PORT\_B

Transferring the “all ones” pattern from W to PORT\_B turns the LEDs off.

## Movf scan\_pos,same

Moving the contents of scan\_pos to scan\_pos isn't quite as mad as it first appears. Although the instruction doesn't change the contents of the register, it does update the bits in the STATUS register. In particular, it sets the “zero” bit (bit 2) if the scan\_pos register contains the value zero.

## Btfss STATUS,Z

Now we can see why the previous instruction was used. This instruction tests the zero bit in the status register and skips over the next instruction if it was set. If it wasn't set (scan\_pos held something other than zero) the next instruction is executed.

## Goto sw3

This instruction is reached if the end of the table wasn't reached, it jumps back to the instruction marked with the label sw3.

## Goto spacewrite

We only reach here if all the entries in the table have been sent to the LEDs. In order to maintain the illusion of writing the whole sequence has to be repeated several times. Going back to the place marked by the “spacewrite” label will first check to see if we are finished (checking timeout) and if not it will repeat the whole table scan again.

## Table

The label marking not only the entry point of the subroutine but, as it holds the value of the program counter at the next instruction, it is used in conjunction with “table\_end” in the length calculation.

## Addwf PCL,same

PCL is the program counter, adding the content of the W register to it causes the program to jump ahead by “W” places and get its next instruction there.

## Retlw B'xxxxxxx'

These are the new instructions to be executed when W causes sufficient displacement to reach them. Each of the “retlw” instructions causes a return from the subroutine, back to the place it was called from but with the value in the instruction returned in W. I've used binary to set the values as the pattern of ones and zeroes shows up the shape of the characters well.

## Table\_end

As described earlier, this label is used in the table length calculation.

## End

The MPASM assembler requires this to tell it there is nothing more to do. If you omit it, the assembler will issue a warning that the end of the code can't be found.

The table holds lots of values that make up the shape of the characters (the font). You can define your own characters that are to show your name or call sign as promised earlier. The values in the program listing should show the message ABC; you need to change them to say something more meaningful. A “0” in the binary number turns the LED on and a “1”

---

turns it off. You need to put a few blanks made from data containing all ones to space the letters out. The maximum length of the table is about 200 lines. You can go much longer but the result of the table length calculation will no longer fit into 8 bits so a more sophisticated routine would be needed.

You need to assemble the program in order to generate the ".hex" file that the programmer unit uses. First, save the file as "myprog.asm", you can call it whatever you like but end it in ".asm" to identify the file type. Then type: "MPASM myprog" and if it was typed without mistakes you should find a new

file called "myprog.hex" has been created. You need to select "RC" for the clock type and disable the watchdog timer and power-up timer when programming the chip; the programmer software takes care of this.

If all goes well when powered up, none of the LEDs will light up. When the start signal is sent by grounding RA0 (pin 17) the LEDs should flicker, don't worry if they are differ in brightness, this is normal. The LEDs will go out by themselves after a few seconds but before then, try waving the circuit board from side to side. If it doesn't fall apart you should see your message

magically appear in thin air! One of the oddities of this simple program is that the message appears normal when you move the board in one direction but reversed when you move it the other way. I leave it to you to find a solution to this effect. Although the program is very short, it can with care be made even smaller; see if you find out how.

That ends part 3. In the final article we will look at some hardware aspects of the 16C84 and look at the more advanced features of the registers and how they interact with signals from the outside world.

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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.

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## 20 years ATV repeater DB0CD

From DB0CD in Gelsenkirchen, Germany the first Digital-ATV motion pictures in GMSK modulation were transmitted on April 2nd 1999. The video ran from an MPEG-1 video CD, but nobody was able to decode it at this time (only watch the eye diagram after FM demodulation). The regular test transmissions at three days a week went on until June 18th, then the video CD had reading errors.

Working report 1999: new video/audio controller installed; both 3 cm and 23 cm inputs have equal rights, the first detected signal is put onto both outputs on 13 cm and 3 cm.

The 3cm input has text inserted "3 cm-Eingabe". DTMF control is reactivated

with some functions like test beacon on 70 cm or 13 cm for 15 minutes, 23 cm directional receiving antenna active and turning left or right etc.

In 1999 we had to switch off the 13 cm output several times, as the primary user announced TV transmissions from bicycle races and from a helicopter night fly around the "Arena Oberhausen".

On December 16th 1999 Prof. Uwe Kraus, DJ8DW, at the "Bergische Universitaet Wuppertal" handed over Digital-ATV equipment to teams from the 4 DARC districts G, L, O and R.

The DATV TX for district L is to be used from the location at DB0CD, but

these units are not remote ready yet (for use at repeaters) and have to be completed for this.

DB0CD usage data 1999: 33 working actions of 4 supporters, 276 different users received (and 40 repeaters with manual RX handling on location), around 54 per week, 39 repeater openings per day. 70 cm-AM-ATV TX active 1512 hours, 13 cm-FM-ATV TX active 1916 hours, 3 cm-FM-ATV TX active 8708 hours.

(from TV-AMATEUR 116, page 29 with pics, translated by DL4KCK)

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## A New Aerial for GB3TM

---

By John Lawrence GW3JGA

GB3TM is located at a remote site, exposed to westerly gales from the Irish Sea. The aerial at '3TM consisted of a home-built dual Alford Slot housed in a plastic tube and mounted at 10m height above ground on two support arms fixed to the side of a lattice tower. The aerial was installed in July 1994 and had worked reliably until recently.

During February, this year, the received signal from '3TM became intermittent under windy conditions in both beacon and repeater mode. This led us to suspect that the transmit section of the aerial was faulty. This was confirmed in March when the transmitted signal from '3TM dropped dramatically in strength and remained very weak. Tests were carried out on site and a temporary 'bow-tie' transmit aerial was installed at low level in order to maintain repeater operation.



Fig. 1. Testing Alford Slot for GB3TM

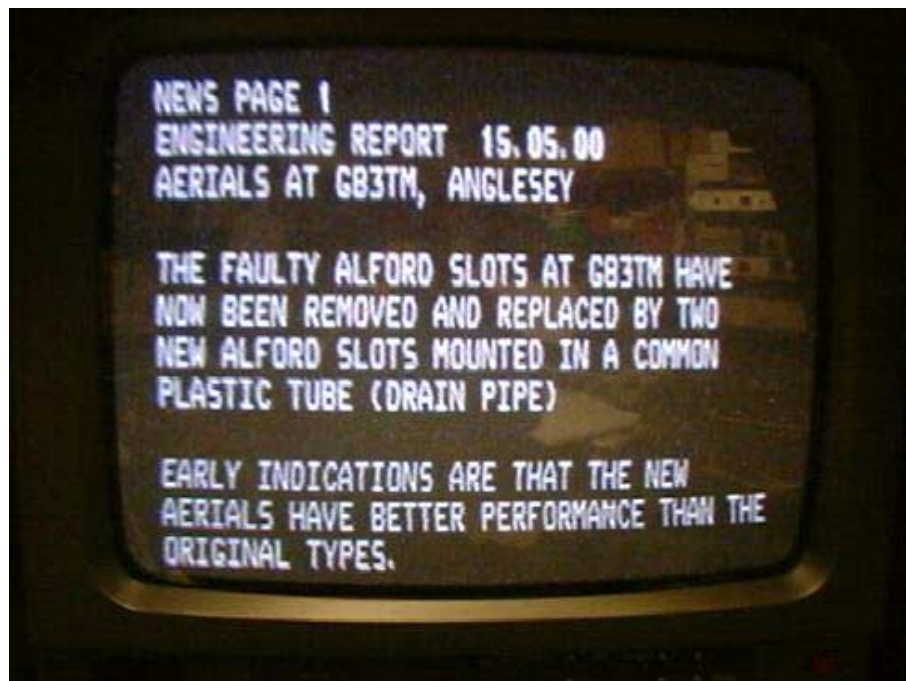


Fig. 2. News Page from GB3TM at 38 miles

Work commenced immediately on building a new dual Alford Slot and each section was carefully tested before, during and after assembly. See

Fig.1. On the 5th of May the new aerial, housed in its new white drainpipe sleeve, was taken to the site and fitted in place of the old aerial.

Since its installation, stations at the edge of the '3TM 'service area' have all reported a significant improvement of about two 'P' points over the old aerial. Several contacts with EI stations have been made during relatively flat conditions, with others reporting that '3TM had been received for extended periods. Fig. 2 shows the News Page received from GB3TM at 38 miles under flat conditions.

The old aerial was brought back to 'base' and dismantled for examination. Tie-Wraps had been used to hold the internal co-ax leads in place, but with temperature changes and wind vibration the co-ax leads had crept slightly within the tube. This produced an increasing stress to the soldered connections on the upper (TX) balun and one of these eventually fractured. Initially, this resulted in an intermittent connection that was followed a few weeks later by complete failure. The RX Alford Slot was not affected and continued to work normally throughout.

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**Revised ATV Handbook (vol. 2):** PCB's 21, 22. **An Introduction to ATV:** PCB's 10, 25, 36, 40, 41, 47, 85, 86. **TV for Amateurs:** PCB 19. **Slow Scan TV Explained:** PCB's 59, 60, 61, 62. **Amateur TV Compendium:** PCB's 12, 27, 54, 55, 56, 57. **CQ-TV (Issue No. in brackets):** PCB's 7(174), 13(128), 20(130), 26(142), 58(139). Item 46 is supplied with circuit details, etc

**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.

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# Control Signals on Satellite Feeder Cable

By **Günter Sattler, DJ4LB**

Reprinted from *TV Amateur*, Nr 116.  
Translation by [G8PTH \(midshires@cix.co.uk\)](mailto:G8PTH@midshires@cix.co.uk); technical translations and instructions for demanding commercial users a speciality.

The coaxial cable that links LNC and receiver in satellite receiving systems need not serve only for carrying the IF signal current and power supply feed. Additional control signals can be overlaid, for instance for switching between polarity planes, frequency ranges or satellite positions and relieving the need for additional cables.

## Switching between 14V and 18V

Commercial 11GHz LNCs available currently use the level of the supply voltage as the criterion for switching between polarity planes. Around 14V always sets vertical, whilst at around 18V horizontal is activated. This is arranged in the LNCs by an integrated voltage detector, which recognises the switching point between 15.0V and 15.5V. The necessary voltage change in the LNC supply voltage is provided for on virtually all satellite receivers or else can be added with minimal effort. The disadvantage of this scheme is a problem in detecting the voltage threshold, caused by component tolerances, voltage drop in the feeder cable and connectors. For this reason manufacturers don't risk additional switching by using a third voltage level.

LNCs in current production require a supply voltage of around 5-10V, so the 18V required for switching is an overhead as far as manufacturing is concerned. All the same, this voltage-switching scheme has advantages for individually designed satellite and ATV systems, particularly as all the elements can be made and tested easily.

## 22kHz control signal

Eutelsat introduced the 22kHz signal, albeit not for the purpose that it is used for now. The new so-called universal LNBs switch, with the help of

integrated 22kHz detectors, from Low Band (10.7-11.7GHz) to High Band (11.7-12.75GHz) when a 22kHz switching signal is overlaid on the 14/18V supply voltage. Originally the 22kHz signal served to switch between two satellite positions (Astra and Eutelsat) and this application remains to this day. For that reason users must decide whether the 22kHz signal is to be used for switching the frequency range of a universal LNB or between two LNCs of the older pattern; the two applications cannot be supported together at the same time. All the same trick circuits can be employed for some restricted applications.

## 22kHz relay

The trade offers some so-called 22kHz relays, some being shown in fig. 1. All these relays contain 22kHz detectors, which draw around 5mA from the 14/18V supply. The models using RF printed circuit board relays (you can hear them clicking) draw an additional 30-40mA when operated. Versions using purely semiconductor devices can be recognised by their voltage drop of around 0.8V across input and output connectors.

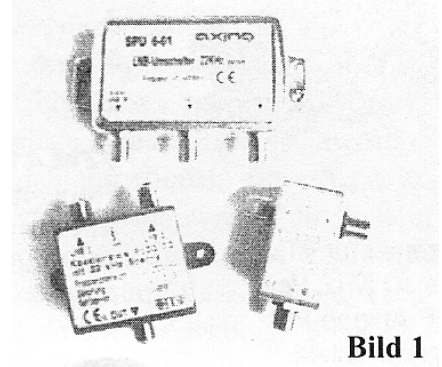


Bild 1

There is little frequency selectivity with all 22kHz relays, simply because they contain no tuned circuits. For this reason it is not feasible to use neighbouring frequencies for additional switching functions. The detectors operate in basic fashion when AC voltages in the kHz region are present and these signals can range to well into the hundreds of kHz. According to Eutelsat's recommendation these relays should operate reliably with signals in the frequency range 18-26kHz down to AC voltages of 0.3V peak. Voltages of 0.5-0.6V are required at the LNC

connections of the satellite receiver and peripheral capacitive loads at this interface should not exceed the boundary value of 250nF. With ATV (home-constructed) receivers it's important to check that the capacitance here (electrolytics connected to the 14/18V voltage) is not so large as to attenuate the 22kHz signal too much. Higher capacitive loadings are permissible at frequencies around 60Hz as these are used for controlling commercially available 60Hz switching relays (e.g. from Conrad Electronic).

## 22kHz applications

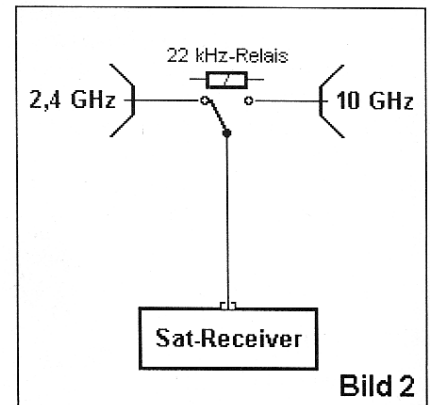


Bild 2

Hermetically sealed 22kHz relays are ideal for the application shown in figure 2; they should be installed close to the antenna. Their changeover function allows existing ATV systems to be extended for receiving a different band without needing to fix an additional coaxial cable between receiver and antenna. Fig. 3 illustrates

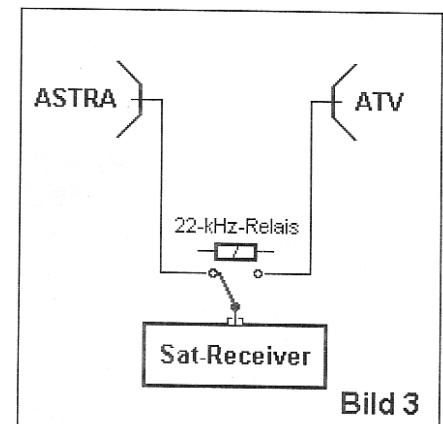


Bild 3

an alternative application; a 22kHz relay is used indoors immediately at the LNC input of an analogue Astra receiver. By activating the 22kHz signal when programming ATV (repeater) frequencies into the receiver,

you can now 'zap' between Astra and ATV signals with your remote control.

## DiSEqC

DiSEqC (pronounced di-seck) is an abbreviation for Digital Satellite Equipment Control. It's a digital communication system developed by Eutelsat in conjunction with Philips on a 22kHz technology basis that in the long term should supplant the analogue and proprietary control systems used in satellite receivers. DiSEqC works on the 'single master, multiple slave' principle, in other words commands always come from a single master (the satellite receiver) and are fed to peripheral slave devices, such as relays, multi-switches, LNCs and rotators.

## DiSEqC data

The bits that form the DiSEqC data are transmitted as on-off pulses of the 22kHz carrier; 1ms on followed by 0.5ms off represents logical zero, whilst 0.5ms on followed by 1ms off signifies logical '1'. A DiSEqC data word is composed of several 8-bit groups (bytes) followed by a parity bit (uneven) for error detection. Recent models of satellite receiver can produce DiSEqC data words (which consist always of a control byte and additional data bytes) by extending the existing microprocessor control. All DiSEqC-capable peripherals are equipped with small micro controllers and have their address set by linking the appropriate pins. A changeover relay (also designated as a Y-relay) has, for example, the address 15H and responds to control transmissions containing this address byte in the data word.

## DiSEqC level

Various 'levels' of DiSEqC are distinguished, according to the functional capabilities of the DiSEqC system. Simple (Mini) DiSEqC is a proprietary halfway step between a continuous 22kHz signal and 'genuine' 22kHz full data transmission. Correspondingly equipped receivers or upgrade components send pulse sequences (bursts) in the 22kHz frequency band; these are nowadays tagged 'tone bursts'. Extended (enhanced) switching capabilities are also possible but caution is advised, since there is no guarantee that

components from different suppliers will work together properly.

DiSEqC receivers specified to Level 1.0 can transmit a maximum of four different commands that can be carried out (but are not acknowledged) by the slaves.

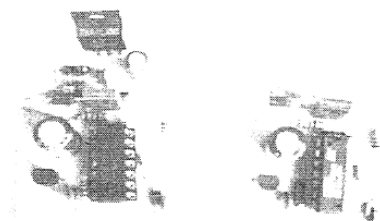


Bild 4

Level 1.2 includes additional commands for controlling motorised systems. In this case the coaxial cable to the LNC must be looped through the motor block to allow the control signals (and power supply) to reach the motor.

From DiSEqC Level 2.0 onwards bi-directional data traffic is possible. Peripherals acknowledge received commands with a start byte (header) and report their status to the receiver upon request with additional data bytes. Since a stabilised LNC supply voltage

from the receiver's power supply would 'flatten' the responses from the slave devices, Level 2.0 works only with modified hardware. Thus a prescribed R-L-C combination having a 15-ohm impedance at 22kHz must be inserted between the power supply and receiver output. DiSEqC Level 2.1 allows four further commands. Additional programming interfaces are available with Level 3.0, for example for controlling the receiver via the antenna cable.

## Future prospects

DiSEqC will find increasing application as a vendor-independent, low-cost, mass-market system for controlling enhanced satellite-receiving systems. For people prepared to get involved in its hardware and software, DiSEqC may also turn out preferable in amateur radio systems (multi-band and contest set-ups) to the usual 'spaghetti junction' array of control and coaxial cables. DiSEqC is at everybody's disposal as an open-standard, licence-free document and all specification documents can be called up on the Internet at <http://www.eutelsat.org>

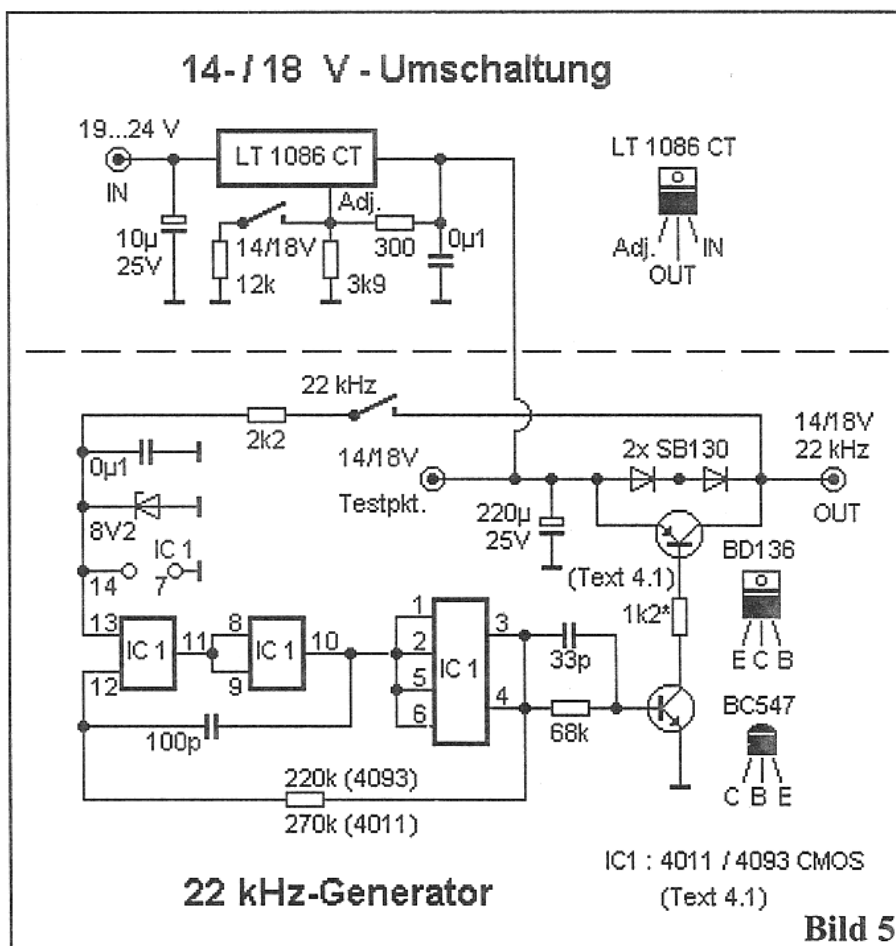


Bild 5



## Construction modules for incorporation in equipment

### 14/18V switching + 22kHz generator

There are a number of advantages that mean older patterns of satellite receiver are still commonly used for ATV reception and these do not produce a 22kHz signal. Retrofit 22kHz generators are readily available commercially, however, and these are easily connected between the receiver and the LNC. All the same it is more favourable to build the 22kHz generator into the receiver, because it is not then in the RF path. In fig. 4 can be seen two modules designed for this purpose. The one contains just the 22kHz generator; the other is additionally equipped with a low-drop voltage stabiliser for the 14/18V switching. To conduct away the heat produced, this should be screwed to an insulated surface of the receiver casing.

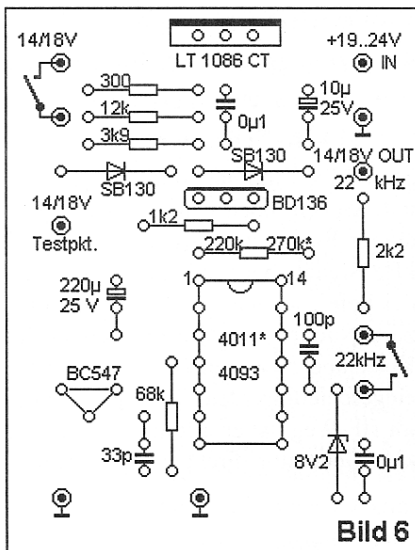


Bild 6

Fig. 5 shows the circuit of this combined 14/18V + 22kHz module (Testpkt. = test point), whilst fig. 6 shows the component layout. Two Schottky diodes are inserted in the connecting wire between the 14/18V voltage source and the appropriate connection pin of the tuner, although if these diodes are hard to find or funds are tight, a universal diode such as 1N4001-4007 will work, although it is not designed for 22kHz operation. There will be a voltage drop of between 0.6 and 0.7V across these diodes, determined by the current drawn by the LNB and other peripheral components. The PNP transistor BD136 connected in parallel with the diodes reduces the

voltage drop at 22kHz by around 0.1V. In this way a square-wave 22kHz signal of about 0.5-0.6V is superimposed on the 14/18V voltage. The 1.2k resistor in the base line of the BD136 transistor is measured for currents of around 250mA; if a larger figure is to be drawn, say 450mA, a correspondingly smaller value of resistor should be chosen, say 820 ohms. The value of the resistor in the timing connection of the 22kHz generator depends on the type of IC used; this is because of the additional Schmitt Trigger feature of the 4093.

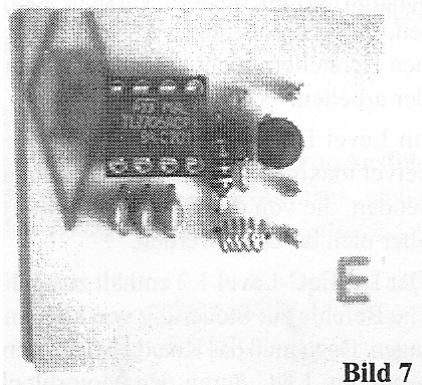


Bild 7

### 14/18V voltage detector

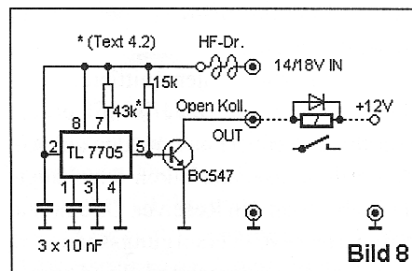


Bild 8

With the help of a small voltage detector, as seen on fig. 7, the 14/18V voltage already available can also be applied to switching purposes in home-made equipment. Fig. 8 shows a circuit suited for this purpose using the integrated voltage monitor TL7705 whilst fig. 9 gives the component layout. Since the TL7705 can tolerate voltages up to 20V maximum it can be connected directly to the 14/18V source (using an RF choke if connected in the

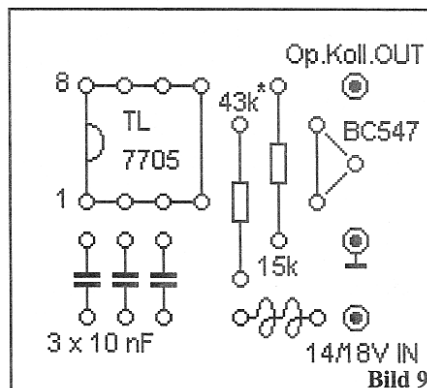


Bild 9

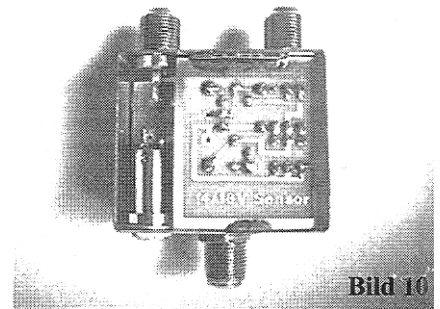
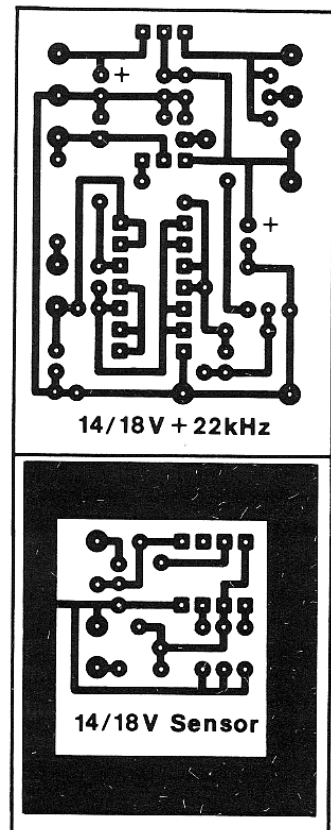


Bild 10

IF line). If this little circuit board is added into the same case as a 22kHz relay, as shown in fig. 10, the IF block already present can be used and this additional switching function can be achieved at little outlay. The switching point of the voltage detector is set to around 15V by a resistance of 43k (nominal value) in the sense line of the TL7705. When the voltage exceeds this, the transistor on the output conducts and a relay (fed for example from a 12V feed and a common return) pulls in.

## Components

Printed circuit boards for the modules described can be made following the prototype in fig. 11. All components are readily available and can be found in the Conrad Electronic catalogue (website in English at [www.conrad-electronic.com](http://www.conrad-electronic.com)) and no doubt from suppliers such as Maplin Electronics, Farnell and Electro-Mail.



## Digital Video - Questions and Answers – part 2

By Adam J. Wilt

### What are 4:2:2, 4:1:1, and 4:2:0 anyway?

These are all shorthand notations for different sampling structures for digital video. They are also used for CIF and QSIF and suchlike MPEG frame sizes, but in the discussion that follows, I focus on the numbers for SDTV (standard-definition TV) digitized to the ITU-R BT.601 standards: 13.5 MHz sample frequency and 720 pixels per line. The first number refers to the 13.5 MHz sampling rate of the luminance: '4' because (a) it's nominally almost approximately sort of four times the NTSC and/or PAL colour subcarrier frequencies, and (b) because if it's '4' the other numbers can be integers whereas if it were '1' the formats would be '1:0.5:0.5', '1:0.25:0.25', and '1:0.5:0' respectively, and which would you rather try to read off in a hurry? The 13.5 MHz sampling yields 720 pixels per scanline in both 525/59.94 and 625/50 systems (NTSC and PAL/SECAM). This number applies to D-1, D-5, Digital Betacam, BetaSX, Digital-S, and all the DV formats just the same. The other two numbers refer to the sampling rates of the colour difference signals R-Y and B-Y (or, more properly in the digital domain, Cr and Cb) In 4:2:2 systems (D-1, D-5, DigiBeta, BetaSX, Digital-S, DVCPRO50) the colour is sampled at half the rate of the luminance, with both colour-difference samples co-sited as the alternate luminance samples. Thus you have 360 colour samples (in each of Cr and Cb) per scanline. In 4:1:1 systems (NTSC DV & DVCAM, DVCPRO) the colour data are sampled half as frequently as in 4:2:2, resulting in 180 colour samples per scanline. The Cr and Cb samples are considered to be co-sited with every fourth luminance sample. Yes, this sounds horrible -- but it's still enough for a colour bandwidth extending to around 1.5 MHz, about the same colour bandwidth as Betacam SP (which, were it a digital format, would be characterized as 3:1:1). So where does 4:2:0 (PAL DV, DVD, main-profile MPEG-2) fit in? 4 x Y, 2 x Cr, and 0 x Cb? Fortunately not! 4:2:0 is the non-intuitive notation for half-luminance-rate sampling of colour in

both the horizontal and vertical dimensions. Chroma is sampled 360 times per line, but only on every other line of each field. The theory here is that by evenly sub-sampling chroma in both H and V dimensions, you get a better image than the seemingly unbalanced 4:1:1, where the vertical colour resolution appears to be four times the horizontal colour resolution. Alas, it ain't so: while 4:2:0 works well with PAL and SECAM colour encoding and broadcasting, interlace already diminishes vertical resolution, and the heavy filtering needed to properly process 4:2:0 images causes noticeable losses; as a result, multigeneration work in 4:2:0 is much more subject to visible degradation than multigeneration work in 4:1:1. 'Now how much would you pay? But wait, there's more!' In US implementations of 4:2:0, the colour samples are supposed to be vertically interleaved with luminance, whereas in European 4:2:0 they're supposed to be co-sited. Practically speaking, this is a headache for developers of codecs, encoders, and DVEs, but for DV purposes it's not especially exciting, since only European DV is 4:2:0.

### Why does PAL DV use 4:2:0?

The best explanation I can come up with why PAL DV went with 4:2:0 is that both PAL and SECAM show reduced vertical colour resolution and better horizontal colour resolution compared to NTSC, so 4:2:0 seemed a closer match to the native display systems in PAL/SECAM countries. As PAL DV was intended as a consumer format for off-air recording or camcorder acquisition, multigeneration losses in 4:2:0 were considered a less important factor than the optimization of first-generation performance. PAL DVCAM also used 4:2:0. When Panasonic developed DVCPRO, they opted for 4:1:1 even in PAL versions, specifically for the multigeneration advantage. Thus PAL DVCPRO decks have the pleasure and responsibility of handling both 4:1:1 DVCPRO playback and 4:2:0 DV playback; they have extra hardware to digitally resample the 4:2:0 signal and come up with a decently synthesized 4:1:1. Sometimes there is a reason for the higher prices that poor

Europeans are saddled with when it comes time to purchase equipment...

### Can I chroma-key with 4:1:1?

Yes - many early DVEs (Digital Video Effects units) were 4:1:1 internally; plenty of digital boxes out there still are (such as the Panasonic WJ-MX50 and Sony FXE-series vision mixers, both of which can chroma-key). As previously mentioned, BetaSP could be considered a 3:1:1 format in terms of component bandwidth, and BetaSP is used for chroma-key applications all the time. True, the chroma performance of 4:2:2 formats is superior to 4:1:1 formats, especially in multi-generation analogue dubbing. Part of the standard JVC sales pitch for D-9 is the superiority of 4:2:2 (which is true), and the utter doom and degradation that awaits you should you try to do anything - including chroma-key - with a 4:1:1 format (which is, shall we say, a wee bit exaggerated). But that doesn't mean that you can't do very satisfactory work in 4:1:1. A Bentley may not be as fancy as a Rolls Royce, but it'll still get you there in style. If you're used to the VW Beetle world of colour-under analogue formats, DV's Bentley should present few problems. JVC has an excellent D-9 demo tape showing multigeneration performance comparisons of DV, D-9, and Digital Betacam; watch it if you can. Just be sure you take the hype with a grain of salt...

### Can I use 4:1:1 DV sources for up conversion to HDTV?

All SDTV source material will suffer when upconverted to HDTV, compared with material originated in HD to begin with. 4:1:1 material is reported by some to be problematic in this aspect; certainly a 4:2:2 original will be more forgiving and if upconversion is your primary goal, you may want to look closely at D-9 (Digital-S) or DVCPRO50. Snell & Wilcox have run DV through upconversion and reports that it looks alright, especially if the excessive aperture correction (edge enhancement) in most DV cameras is turned down. Of more concern is that DV artefacts, especially mosquito noise, may become annoyingly prominent when up converted.

However, the jury is still out on this. Also, all HD material is likely to be 16:9. The way many DV cameras produce 16:9, by throwing away vertical resolution, is enough to send shudders up my spine for SDTV work; for HD, it will be a complete disaster. Perhaps I should add a section on shooting for HD up conversion; there are lots of issues...

### **What is 1394 and/or 'FireWire'?**

IEEE-1394 is a standard communications protocol for high-speed, short-distance data transfer. It has been developed from Apple Computer's original 'FireWire' proposal (FireWire is a trademark of Apple Computer). Sony calls their implementation of 1394 'i.LINK'. DV and 1394 appear to have been developed together. The data stored on DV tape appears to reflect the packet structure sent across a 1394 link to a frightening degree of exactness. Certainly the DV format and 1394 High Performance Data Bus co-evolved, such that the first consumer DV camcorder in the USA (the Sony DCR-VX1000 and its single-chip brother the VX700) was also the first 1394-equipped consumer product available. A 1394 connection enables you to make digital dubs between two camcorders or VTRs using 1394 I/O, and the copy will be identical to the original. You can do cuts-only linear editing over 1394, with no generation loss. You can stick a 1394 board into your computer (PC or Mac), and transfer DV to and from your hard disk. If your system can support 3.6 MBytes/sec sustained data rate - simple enough with many A/V rated SCSI-2 drives and with most ATA/EIDE drives these days - the world of computer-based nonlinear editing is open to you without paying the quality price of heavy JPEG compression and its associated artefacts, or the monetary price of buying heavy-duty NLE hardware and banks of RAID-striped hard drives. Some time ago I edited a friend's wedding, going from Hi8 camera originals to a DV edit master. The 20-minute ceremony was covered by two cameras; we sync-rolled the VTRs and mixed the show in real time as if it were live. At the end, we were not sure that we liked it, so we dubbed it off via 1394 to another DV cassette, inserted a fresh DV cassette, and had another bash at the edit. This time, we

liked it. We put the tape into the VX1000 and set up the DHR-1000 VTR as the recorder, using the built-in editor to drop the second attempt in frame-accurately atop the first across the 1394 wire. No generation loss. And we still had the first edit on the backup tape, should we have changed our minds. A 1394 dub is a digital copy, and so is identical to the original (not like using Y/C or component analogue). That's really nice. Yes, you can do almost the same thing with a SMPTE 259M SDI (serial digital interface) transfer, but VTRs with SDI cost big money. 1394 is built into many low-end cameras and VTRs. Also, transferring via 1394 is a digital copy, a data dump and no decompression or recompression occurs. Transferring DV around as baseband video, even digitally over SDI, subjects it to the small but definite degradation of repeated decompression/recompression. If a digitally-perfect copy is a 10, and a point-the-camera-at-the-screen-and-pray transfer is a 1, here's how DV picture quality holds up over different transfer methods: IEEE-1394 10 SDI 9.8 Analogue Component (Y, R-Y, B-Y) 9 Y/C ('S-video') 8 Analogue Composite 5 Point camera at screen and pray 1

### **What about DVCPRO equipment and 1394?**

DVCPRO, or D-7, is a DV-based format with a few subtle differences in its datastream. These changes were made by Panasonic's engineers to improve the robustness and reliability of the DVCPRO system when compared to DV, but they do mean that certain data header bits do not conform to Blue Book standards. Thus a direct data interchange between DVCPRO gear and DV/DVCAM gear is not possible in the same way that DV and DVCAM gear can interchange data; furthermore some nonlinear editor systems are not capable of accepting or generating a D-7-compatible signal. As a result, DVCPRO gear with 1394 connections can only exchange data with other DVCPRO systems, not with DV or DVCAM gear. Since a 1394 transfer is a direct data dump, this is understandable; if a cross-format transfer were to be possible it would require that one deck or the other 'translate' the signal to or from the DVCPRO data format to the Blue Book format. As far as incompatibility with

1394 transfers to and from NLEs, this limitation is expected to diminish (and eventually vanish) as developers get a chance to work with DVCPRO over 1394, and to provide switches inside their programs to supply a Blue Book or DVCPRO data stream as required. D-7 was designed first and foremost as an ENG format, so robustness of the signal was paramount, and interconnection of gear in the ENG world is done via analogue or via SDI (1394 is too limited an interface for the broadcast world, where the ability to switch and route video over thousand-metre runs is both necessary and taken for granted; 1394 has a length limit of 4.5 metres and requires a point-to-point session-level communication instead of a switchable open-ended transmission). 1394 was added to the DVCPRO lineup as an afterthought, at the prompting of customers, and as it becomes more prevalent (and if the marketplace demands it) you'll see more NLEs capable of dealing with D-7 data as readily as with Blue Book data, and possibly even realtime DV/DVCPRO format translators. It is early in D-7's evolution; there may yet be surprises up Panasonic's sleeves...

### **What's the difference between locked and unlocked audio?**

Locked audio is 'audio done right': the audio sample clock (the digital time reference used in the sampling process) is precisely locked to the video sample clock such that there is exactly the same number of audio samples recorded per 'audio frame' of video (not all TV formats and sound sample rates have a neat integer relationship between audio samples and frames, so an 'audio frame' is my term (similar to a 'colour frame') for the number of video frames it takes for audio and video to match up in the same phase relationship). For PAL, 625/50 video, locked audio provides exactly the same number of samples per video frame with either 32 or 48kHz audio, but for NTSC, 525/59.94 video, the 48kHz 'audio frame' is 5 video frames: locked audio will provide exactly the same number of audio samples for every five video frames, though not every frame within that 5-frame sequence has an equal number of audio samples. 32kHz locked 'audio frames' cover a whopping 15 video frames! Unfortunately, such precisely-locked audio clocks are expensive. Since DV

was designed as a consumer format, unlocked audio was allowed as a cost-saving measure. In unlocked audio, the audio clock is allowed some imprecision, such that there can be a variation from the locked spec of up to +/- 25 audio samples written to tape for every frame, instead of a precise and exact number. This economy measure is simply one of allowing the audio clock to 'hunt' a bit around the desired frequency; the phase-locked loop (or other slaving method) used to keep the audio sampling in sync with the video sampling can have a bit more slop in its lock-up, with the audio sampling sometimes running a bit slower, sometimes a bit faster, but always staying in sync in the long run. The total amount of sync slippage allowed in unlocked audio is +/- 1/3 frame - not enough to really worry about. It's the difference between walking a dog on a short leather lead, always forcing the dog to stay right by your side (locked audio), and using a long, elastic lead or one of those 'retractable clothesline' leads that allows the dog to run ahead a bit or lag behind (unlocked audio). In either case both you and the dog will get where you're going at the same time, but along the way the 'unlocked' dog has a bit more freedom to deviate from your exact walking pace. Unlocked audio should not cause audio sync to drift away from video over a long period of time. The audio clock is still linked to the video clock; it's just allowed a bit more oscillation about the desired frequency (more wow & flutter if you will) as it's trying to track the video clock. Like the dog on the springy lead, it can run a bit ahead or a bit behind the video clock momentarily (up to 1/3 frame ahead or behind), but in the long run it'll still be pacing the video clock and on average will be right there in sync with it. I have shot one-hour continuous takes of talking heads with a consumer DV camcorder (DCR-VX1000) and experienced no drift at all between audio and video. DV cameras and VTRs generate unlocked audio, both in 32 kHz 12 bit and in 48 kHz 16 bit recordings. DVCAM and DVCPRO cameras and VTRs generate locked audio in 48/16 audio format, and DVCAM can also generate locked 32/12 audio. 44.1kHz, discussed below, is never locked; it has no neat integer relationship with either 625/50 or 525/59.54 frame rates. Some non-linear DV/1394 editors generate locked audio, some output unlocked,

and some allow the choice. Final Cut Pro through version 1.2.1 (at least) generates locked audio always, but it doesn't set the flag to tell the VTR that it's locked - so the VTR reports it as unlocked. DV gear is happy to record locked audio via 1394, just as the DVCAM DSR-20 VTR will accept unlocked audio. The DVCAM DSR-30 VTR and DSR-200 camcorders can also be made to record unlocked audio with a bit of coaxing. Also, many non-linear editors output 16 bit 44.1 kHz audio (at least on PC platforms), which both DV and DVCAM 1394-equipped decks record without any problems. 44.1 kHz is part of the Blue Book spec, so this is not too surprising. 'The difference between theory and real life is that in theory, there is no difference between theory and real life, but in real life, there is a difference.' - DV Filmmaker Marshall Spight. While the theory sounds good, real life is sometimes a bit different. Some manufacturers appear to take the word 'unlocked' literally; a completely separate clock seems to be used for the digitization of audio, with no direct linkage or locking to the video clock. The result is an audio timebase stability that's excellent (since no 'hunting' around a target frequency is present), but the possibility arises of a long-term drift between audio and video, when processed independent of each other. This was revealed at NAB '99 by Randy Ubillos, lead engineer on Final Cut Pro, who has found that while most DV cameras are pretty good, Canon cameras grab 48kHz sound at around 48.009 kHz, which can result in almost a second of video/audio slippage over the course of an hour (or around one frame every two minutes). Sonys, by contrast, seem to average 48.001 or 48.0005 kHz, resulting in perhaps a couple of frames of slippage over the same time period (and I haven't seen any slippage in my own tests of the VX1000). Clocking rates for other cameras were not discussed. In normal playback of the DV tape this isn't seen, since on playback the audio is played back based on its embedded clocking data, in sync with the image. Both the audio and video slave to the data samples in each packet; as these are commingled in the DV datastream, the sound and picture will always play back in sync. In most DV NLE systems to date (May '99), it was also not a problem, since captures were limited to under ten minutes due to the 2

Gigabyte file size limit and the slippage seen in this short time period was minimal. Final Cut Pro, however, uses file referencing to span the 2 Gigabyte limit, allowing captures limited only by available disk space, and the QuickTime media format used treats audio and video as separate tracks, each with its own time reference. When capturing long clips, the drift can become apparent; Final Cut can measure this drift and recalculate the audio sample frequency so that QuickTime playback will stay in sync.

### **Will unlocked audio hurt me? How do I deal with it?**

When using analogue audio I/O, the whole question of locked versus unlocked is moot: it's analogue and there are no clocks to worry about. Analogue is always safe to use for dubbing or editing. As discussed above, DV audio data are converted to analogue in real time as the data come off the tape, and audio slippage simply doesn't occur regardless of the accuracy of the sampling clock. It should also be of no concern when taking the audio in via 1394 to a DV-based nonlinear editing system. When all the audio samples are stored in a neat memory array, the software doesn't care if there was some timebase instability on the original recording; when non-real-time rendering is occurring, a sample is a sample is a sample. However, some long-term slippage between audio and video can occur in long clips, at least in QuickTime format, if the capture application doesn't compensate for any audio clock inaccuracy. Fortunately, the problem is understood by those in the business (at least at Apple and Digital Origin), and corrective measures are taken at capture time: Final Cut Pro measures the actual number of samples captured over time vs. the theoretical number, calculates the actual effective sampling rate, and uses that in QuickTime file processing. Unlocked is only a potential problem when doing real-time audio and video editing with digital transfer of the audio between source and recorder. 'Digital' means conveyance of the audio using the IEEE-1394 bus, AES/EBU digital audio outputs (on pro DVCAM/DVCPRO VTRs), or SDI embedded audio (ditto). As far as DV-based editing is concerned, when you make an edit in the digital domain

between two different DV datastreams using unlocked audio, you might wind up with a few too many audio samples or not quite enough, in which case you can get a click or pop on the soundtrack during playback as the audio subsystem either has to discard some extra data and resynchronize (an audio buffer overrun), or as it winds up with too few bits of sound to cover the time available (buffer underrun) and you get a momentary dead spot or mute effect (depending on the audio circuitry used, the system may also mute when it's re-synchronising after discarding samples). In either case the audio glitch will occur in a fraction of a second; it won't result in several seconds of dead audio or any prolonged audio noise. Reportedly, it's also only a problem at the out-points of insert edits, not at edit in-points. Interestingly enough the same problem may occur when cutting between two locked audio streams without regard to synchronization of the 'audio frames', though here the problem is much smaller in scope since the variation in sample counts will only be +/- 2 samples per video frame. Such errors are typically inaudible, though they may still complicate things if the audio track is then used in real-time digital audio mixing (see below), and they'll only occur in 525/59.94 video, never 625/50 due to 625's 1:1 relationship between video frames and 'audio frames'. (It's also worth noting that any hard cut between clips can result in a pop or click if the instantaneous level of the audio at the cut point is mismatched, causing impulse noise. This is true in locked or unlocked audio; it can even occur when working in analogue. This is one reason that linear analogue audiotape and film fullcoat magnetic tracks are often spliced at an angle instead of with a straight cut; this mechanically performs a quick crossfade between the two tracks instead of an abrupt transition.) When all you are doing is editing one generation down from camera originals to an edit master, and then making release copies on an analogue format such as BetaSP, SVHS, Hi8, VHS, or the like, all you need to be concerned about is audible popping or muting. The release copies will contain an analogue track that records what you hear; there are no hidden gremlins due to asynchronous clocking, jitter, or other nasties that so complicate digital audio. However, when you take the digital audio datastream from a DV

tape and try to integrate it into a larger digital audio system, such as AES/EBU routers, digital audio workstations (DAWs), and/or multitrack digital audio recorders including the Alesis ADAT and Tascam DA-88/98, the sloppy synchronization of unlocked audio can cause glitches, artefacts, and distortion. If the receiving equipment is trying to derive its audio clock from the unlocked audio datastream, the entire downstream audio chain can be rendered unstable and dysfunctional. Furthermore, playback of unlocked audio including edit-point glitches as discussed above into a DAW or other digital audio system can cause a major commotion when the edit-point glitch is played back. Ever had a really bad splice go through the gate on a film projector, or past the heads on an analogue audiotape recorder? A glitched unlocked audio edit is the digital equivalent of that crummy splice, only worse! Fortunately it's fairly simple to avoid this. Either convert unlocked audio to locked, or use analogue audio connections between your unlocked source and the digital audio chain you're feeding (and if your source tape has 44.1kHz/16 bit or 32kHz/12-bit sound, going analogue into the digital system means that you get a rate conversion into 48kHz sound at however many bits are being used courtesy of the A/D converter on the professional digital system; it may actually sound better - and be easier - than hooking up digital sample rate converters in the chain). There are four known ways to convert unlocked audio to locked audio:

- 1) The DSR-60/80/85/2000 DVCAM VTRs will convert unlocked audio to locked audio on playback. DVCPRO VTRs are also supposed to relock DV audio on playback. This solves the problem at the point of playback. If you need to make a tape with locked audio, then...
- 2) Dub the DV tape to a DVCAM or DVCPRO tape using analogue audio connections between the source and the recorder. Hey presto, locked audio! The video can be dubbed via SDI for minimal if any losses. This is also the recommended route if the source audio is not

48kHz, since you want the dub to have 48kHz audio for best compatibility.

- 3) Play back the DV tape in a high-end DVCAM or DVCPRO VTR, and dub it to a high-end DVCAM or DVCPRO VTR using either the AES/EBU digital audio or the SDI embedded audio options. The player will relock the data and the recorder will write locked audio to tape.
- 4) Transfer the footage into a non-linear editor that allows outputting locked audio, and use the NLE to write out locked audio, even to a DV-format tape. Slow and cranky, but it works.

### **How can I intermix locked and unlocked audio?**

It is best not to intermix any variations of digital audio on the same tape. While VTRs seem to cope with sudden changes in sampling rate, bit depth, and locked/unlocked status, often you'll get a brief moment of silence at the transition between audio types as the internal workings of the audio chain readjust themselves to the new audio type. Some non-linear editors are very uppity about audio changes; if you start digitising a 48 kHz clip and the audio changes to 32 kHz, you'll get silence for the entire 32 kHz section (or vice versa; once the capture card and software start grabbing data at a certain rate, they're too busy to try to change rates in mid-stream. Furthermore, the meta-data stored with the clip can only remember one audio format per clip). And if you try to digitally feed such mixed-mode tapes' audio into further digital processing, major glitches can be expected. The best thing when doing a linear edit is to use analogue audio, or (if the only changes you have are between locked and unlocked audio) use the digital outputs from a high-end VTR as described above. For non-linear editing, capture clips each containing only a single format of audio; when you render the finished project, all the audio will be converted to a common format.

*'Adapted from an article by Adam J. Wilt. Copyright (c) 1998, 1999*

# Technical Facilities at IBC

By Mike Cox

## Introduction

IBC is the world's second largest Electronic Media Convention, the largest being NAB in Las Vegas. But it was not always like that.

IBC was first held in the half finished Royal Lancaster Hotel in 1967. It moved to Grosvenor House in 1968, where it stayed until 1978, and a brief sojourn in Wembley. It moved to Brighton for the 1980 event, but over the years, as it grew, even this was no longer adequate. In 1992, IBC moved to the RAI convention centre in Amsterdam, where it has remained ever since. For those of you who have not been to the RAI, it is one of the best Convention centres in Europe, having extremely easy access by road, air or rail, and having very easy unloading of vehicles, all important when mounting a large show. If you add in all the attractions of the city of Amsterdam, it is hard to think of a better location.

In 2000, IBC will be using all the halls in the RAI (around 40,000m<sup>2</sup>), and this will have to do until the new halls at the RAI are available in 2005/6. The show consists of an Exhibition, a Conference comprising 2 strands of Papers, a Panels strand, a Workshops strand, a Tutorials/Mini-Conference strand; and the Nombre D'Or Widescreen Television Programme Festival running for 5 days. A Keynote Address is held on the Saturday morning.



**Tony Ball's Keynote**

In addition, IBC mounts its own 30 minute breakfast news programme every morning, transmitted on one of the Amsterdam Cable Channels (AT5);



**Picture of RAI Centre, Amsterdam**

and a Message/Information channel, displayed on around 90 monitors around the show complex.



**News Studio**

During IBC, the Sunday Spectacular is mounted for an audience of 2000, which is a mix of variety acts and Awards presentation, followed by the IBC Party that has become a highlight of the IBC social scene.

Something for everyone in broadcasting and electronic media, you might say.



**Sunday Spectacular, Gloria Gaynor**

The success of IBC has largely been due to the way it is organised, and by its ethos, which is "run by the industry, for the industry". The event is owned by the 6 Sponsor bodies, IABM, IEE, IEEE, RTS, SMPTE and SCTE, and organised by a dedicated team of people from the industry. I have been involved with IBC as an exhibitor from 1970 to 1990, and latterly as part of the organising team, and it is a fun show!

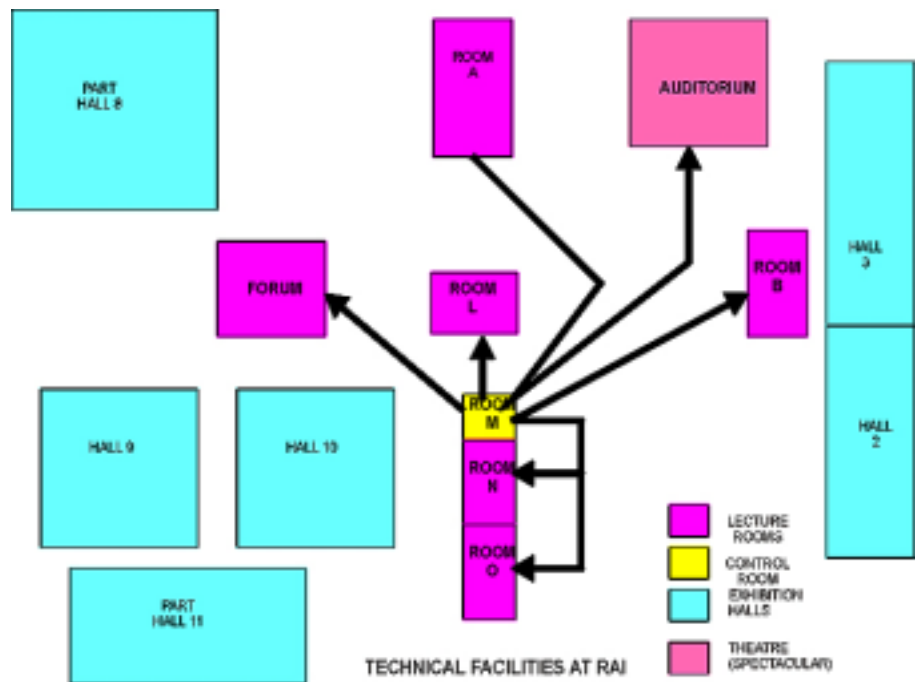
## Technical facilities

I am sure you have all been to lectures where the A/V facilities are poor. It happens all too frequently, particularly where equipment is hired in and poorly installed or operated by inadequate staff. IBC has always taken the view that at a broadcasting show, attendees are entitled to be given as near broadcast standards of presentation as possible.

Thus the facilities needed to service the activities mentioned above are roughly the equivalent of 7 broadcast TV channels. These facilities are all installed in the week before the show starts by Technical Facilities Chairman Phil White and his crew. The equipment used is borrowed from industry friends (listed at the end), and what is not available on that basis is hired. Equipment ranges from relatively simple Analogue Component (YPbPr) switchers through Digi-Beta machines to a state of the art server with SDI in and out ports.

Each lecture room (there are 5) requires projectors for video, and for data, for use with Powerpoint presentations that are almost universally used in place of slides. The room used for the Widescreen Programme Festival has to have the capability of projecting HDTV material if any entries are in that form. Otherwise material is projected in line-doubled mode on as good a video projector as can be obtained. In 1999, we were fortunate enough to get a DPL projector using Texas MicroMirror technology, which coupled with a Snell and Wilcox Prodigy input processor, worked extremely well.

One of the smaller lecture rooms at the RAI is used as the control room for all facilities except for the Breakfast TV News programme which has its own dedicated edit suite and studio elsewhere.



Feeds from Room M

### More Detailed Look

In any given lecture room, there will be a video switcher to take a feed of the IBC “sting”, and any other supporting video material, and to give a fade to black facility. This will feed a video projector, often a Hughes-JVC ILA unit.

Most of the presenters bring their “slides” as Powerpoint files, and a separate projector in each room is dedicated to VGA/SVGA/XVGA feeds, often via an appropriate Extron switcher. There is always the presenter who wants to use his own lap-top, and there have been instances where the connection of the system to said lap-top takes longer than the presentation itself. So you can see why we do not encourage this. Presenters have a dedicated briefing room where they can load their files into one of several computers to check out the running order, and then they are loaded into the computer of the particular meeting room via an Ethernet network connection.

This process is repeated in each of 5 lecture rooms. Very comprehensive audio facilities are also installed.

Q.E.D. Ltd makes audio recordings of all sessions for sale to attendees, and they take a feed from the room audio desk. Radio mikes are used by chairmen and presenters, and, via

stewards, the audience during discussion and questions.

The Widescreen Programme Festival was mentioned earlier; this poses a particular problem for the Facilities team, as entries may be on a number of different standards. In the past we have had 525 and 625-line material on Digi-Beta and Beta-SP, 1125 line material on Uni-Hi and Digital formats, and 1250 line on single D1 and dual D1 formats, not to mention Surround Sound!



HD Playout Facility

It is likely that material from the USA will appear as 720 line Progressive, 1080 line interlaced, and even as 1080 line 24 frame progressive as much effort is being put into this standard by Sony, Panasonic and others.

Out of all these standards we need to produce clips for compilation tapes and promotional use on 625 lines, and even

16:9 material shifted to the upper part of a 4:3 frame for use on the Message Service (see later).



View of big screen display

This technique allows us to use the considerable inventory of 4:3 displays available at the RAI, while preserving the correct aspect ratio of the 16:9 material.

Interconnection of the control room with the various presentation rooms causes a few problems, and the experience gained over a few IBC helps in optimising cable runs. SDI is used for much of the standard definition video cabling, and the use of embedded audio makes further saving if audio is necessary.

However, the Widescreen Festival needs to have the capability of High Definition feeds, and for this, a Fibre link is used with signals fed over as GBR or YPbPr signals.

SDI or SDTI would be attractive but it is not yet multi-standard.

## Message Service

Some years ago, the Message Service was just that. A Teletext type display on a few strategically placed monitors gave information to attendees that there was a message for them at the desk.

As IBC grew in size and in activities on offer, the Message Service had to grow with it, and the type and amount of material shown on its screen increased greatly. It is used for messages of course, but in addition now promotes Conference activities, Social activities such as the IBC Party and Spectacular, Widescreen Festival trailers, information about eating places and bars in the RAI, promotion for the Companions Programme, and credits to those companies that have kindly provided equipment and services for Technical Facilities.

John Holton and I usually drive out to Amsterdam a week before IBC starts. Most of the equipment and cabling comes out in a large truck with other Technical Facilities equipment. John and I start by laying out tables and racks, then install the equipment and fit the power and video cabling. We aim to get most of the kit working by the end of the second day (Sunday). Monday is spent finalising the installation and on Tuesday the Aston Operator arrives to start loading in all the fixed pages such as Conference schedules.



**Aston Operator loading pages**

Titles for the Nombre D'Or clips have to be prepared and recorded. These 16:9 clips have to be de-anamorphed in such a way that the material fits the top of a 4:3 frame as mentioned earlier. This is usually carried out as a DVE exercise in a Soho facilities house.

John Holton shoots and edits much of the promotional material on DV, edits it in one of the DPS Perception machines, and it is played out from there or transferred to one of the Aston machines that has clip storage facilities.



**John Holton editing DV material**

The other Aston machines have pre-prepared pages of Conference information, details of all the Widescreen Festival clips, and the running strap along the bottom of the display which tells people who is currently speaking in the Conference Sessions and who is up next. This strap information comes from a dedicated Aston machine as the output switcher inserts this as a constant bottom of screen, while the top  $\frac{3}{4}$  of the screen can come from any of 6 sources.

During the show, the Aston Operator controls the on-screen output, selecting the appropriate prepared material, and putting up names of visitors for whom there are messages.

The Technical Facilities area has a large routing matrix, which has layers for component analogue video, SDI video and both analogue and AES audio.



**Control panel, Matrix**

There is also an associated Quantel Clipbox, which stores and plays out much material during the show.



**Quantel Clipbox**

The Message service operates in component analogue video (CAV, YPbPr) from the Aston character generators, or the DPS systems, through the system switcher and is then converted to SDI (Serial Digital Interface) for passing on to the matrix just described. From the matrix, the SDI signal is sent to the large screen monitors, and to the RAI cable system modulators. A PAL signal is fed into the RAI cable, and displayed on around 80 standard receivers around the complex



**Message Switching Service position**

Picture monitoring is carried out in the CAV domain, although the output transmission monitoring can be switched to SDI return feed to check that a correct SDI signal is leaving the Message Service desk.

The switcher arrangement is made up from two COX CAV switchers in series, operated from a purpose built control panel.

The upstream switcher has eight inputs and two banks. It allows cuts or dissolves between sources. The downstream switcher is locked in a horizontal split screen mode such that the upper part of the screen comes from the upstream switcher. The lower part of screen can be selected from 2 Aston sources. There is a final fade to black facility.



At the switcher output, a YPbPr to SDI converter is installed so that the Message Service feed is in the optimum format for the Technical facilities routing system.

Tally outputs are provided at the rear of the panel, and connected to monitor lamps and LEDs on sticks behind each Aston keyboard to avoid any untoward on screen tweaking.

Mention was made earlier of the DPS computer based editing machines. These are located in a separate preparation area, which houses the master SPG (COX 2085) for the Message Service, providing colour black reference for all Aston machines and the DPS systems and an 8 x4 CAV routing switcher, purpose built using 3 Maxim 8 x 4 matrix ICs (MAX459). This allows for convenient dumping of material: for example, material edited and stored in DPS may need to be transferred to one of the Aston Ethos machines for playout, or material on one DPS needs to be transferred to the other for back-up, say.



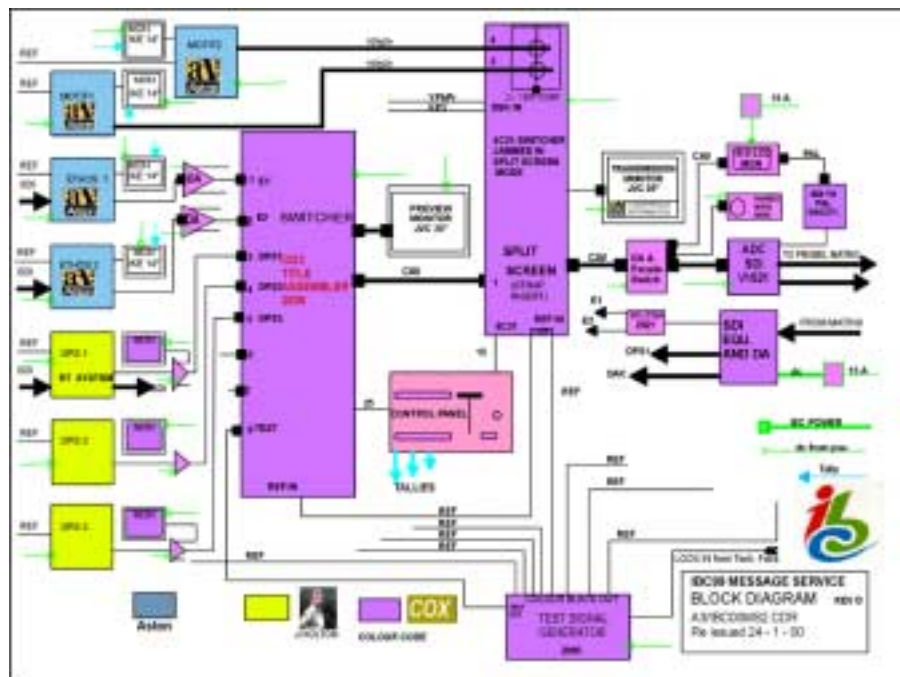
**Message Service switcher panel**

The DA's described in CQ-TV190 were used to give up to 3 outputs of each Aston Machine, one for each switcher, and one for the monitor.

### Audio

The Message Service is essentially silent; as to try to get intelligible audio into the monitors used and against the ambient noise background inherent in a busy exhibition would be completely pointless.

However the AV facilities in the lecture rooms include audio, and comprehensive talkback facilities are used between the lecture rooms and the Control Room.



**Message Service Schematic**

Another activity is the Welcome Tape. Exhibition visitors arrive at the Europa registration area, and may have to queue up for a while at the opening of the show.

To keep the crowd informed and entertained, the tradition has grown up of showing them a tape containing useful information about the show, about eating and transport facilities, and a bit about Amsterdam. This tape is shot and edited by John Holton, on DV, and then transferred to the server for playout by the Technical Facilities crew to a large screen display (3 m x 2.25 m, this time with sound) installed in the Hall 1 registration area. The Welcome Tape is alternated with showings of that morning's IBC TV News programme. Reports of the queue rioting have been few!



**Room M on Wednesday PM**

At the end of the show, John and I take about half a day to de-rig and put the

kit back in boxes for return to UK, with much of it going back to my garage. This is always a somewhat sad occasion, just as it is for exhibitors. People spend a numbers of days of hard labour building a stand, or a message system, run it for 5 days, and then have to break it all down it again.

### Credits

IBC is greatly indebted to the industry for the support given in the form of loan equipment.

Sony	DPS
Quantel	Anna Valley
Probel	Ikegami
Panasonic	Trilogy
Tektronix	Vinten
JVC	Solid State Logic
Aston	Digital Projection
Vistek	BDL Autoscript
Snell and Wilcox	Thomson Broadcast Electronic Visuals
Faraday	Fujitsu
Shooting Partners	John Holton

These and others provide a variety of equipment and support.

There is also a great team of engineers and operators to help mount a professional event. It shows!

Some of the pictures shown here were "grabbed" from IBC TV News footage.

## Movies tell a digital story

When Toy Story 2 premiered in the US in November 1999, it was the first time a studio feature was released in both a traditional and digital film format. Using Texas Instruments (TI) specially developed Digital Light Processing (DLP) technology for the film making industry, DLP Cinema Projection technology delivers higher brightness, sharpness and resolution than traditional 35mm film.

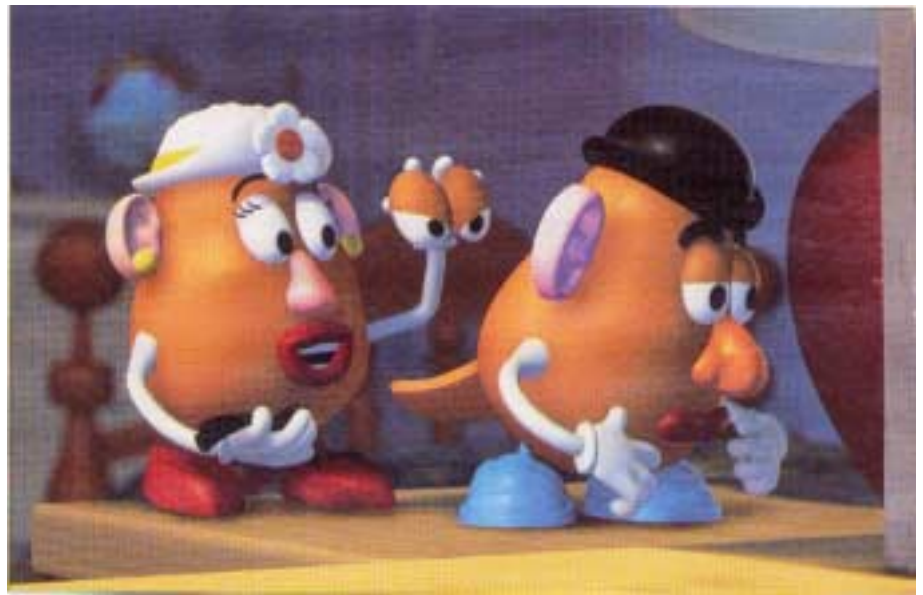
This electronic digital projection technology is fast becoming the technology of choice for manufacturers that make projection products from ultra-portable lightweight to large venue models.

Comparable to the effect that digital sound had on audio presentation, DLP Cinema eliminates the flicker, scratches, focus flutter and colour deterioration normally associated with large screen film presentation.

Ian McMurray, European marketing manager for digital imaging at TI, said: "The reality of digital cinema has moved another step closer. Not only can we demonstrate that the projection technology to support digital cinema is ready today but, by increasing the number of movie patrons who see it, we believe we'll create considerable public demand for the consistently pristine images made possible by DLP technology."

TI now supplies DLP subsystems to more than 30 projector manufacturers worldwide and, since 1996, the company has supplied 245,000 subsystems. There are now more than 50 DLP-based products in the market.

Central to TI's DLP technology is the Digital Micromirror Device (DMD). DMD is an optical semiconductor chip that has an array of 480,000 SVGA, 786,000 XGA or 1 310,000 SXGA hinged, microscopic mirrors mounted on a standard logic device. The mirrors operate as optical switches to create a high-resolution, full-colour image by rapidly switching on or off more than 5000 times a second according to directions from the image's code.



**Toy Story 2, the first feature to be released in traditional and digital formats**

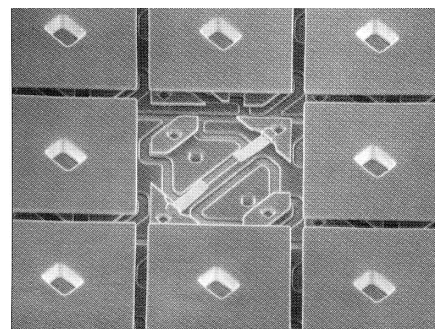
As well as the continual upgrade and improvement of DLP Cinema, other technical upgrades are required for a complete digital electronic film delivery system. A key element of this is the digital mastering process, which includes compression and encryption technology, digital delivery to cinemas and the digital exhibition system in the cinema.

Digital masters are created using high-definition telecine systems that, with slight modification, provide higher levels of image quality. A digital master can also be created by digital capture from an original negative or from digitally created films such as Toy Story 2.

According to TI, consumer compression technology is not adequate to achieve the quality needed for the projection of large screen films. Various film studios and industry are evaluating currently available technologies such as layered MPEG and high bit-rate MPEG, as well as others under development such as NEC's TriDigital Image Processing Film Decoding technology, so a standard for compression levels and the resulting data rates can be agreed. Data delivery and subsequent storage requirements are dependent on a compression algorithm.

The primary methods for digital film delivery currently under review are those of satellite and optical disk. A major problem currently facing the film industry is how to deliver a digital film that will work in all cinemas across the globe. It must be economically viable during the transition from film to electronic delivery as well as in a fully implemented electronic delivery state.

An advantage of satellite delivery is that it provides simultaneous reliable delivery almost worldwide. But it is also costly and requires a satellite receiver, computer storage and server system in every cinema - it also has to guarantee reliability and be relatively simple to use.



**Texas Instruments' Digital Micromirror Device (DMD). The central mirror has been removed to show the underlying hinge structure.**

Optical disk technology, as used for DVD production, is also an option but requires higher quality for digital film delivery, and so multiple disks and a specific player for film hall use may be required. But as existing industry infrastructure already supports optical disk technology, disk players could be connected to servers in large multiplex cinemas or directly to individual projectors in small film houses.

The film making industry is reviewing both solutions, and although the clear winner in effectiveness would be satellite delivery, optical disk technology may prove to be more economically viable during the transition period that may precede financial feasibility of the satellite delivery model.

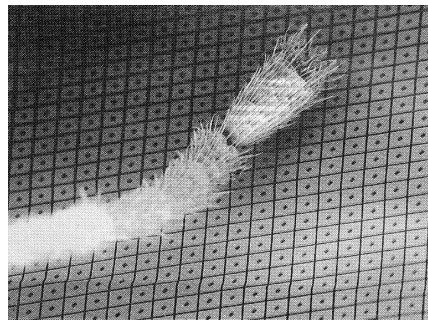
Either delivery method requires the digital data to be decompressed and decrypted before projection. This must be done without the possibility of the decrypted digital film being copied.

Steve Green, director at Toy Story production company Cap Gemini, said: The use of digitalisation changes the whole value chain around distribution, content production and the feedback mechanism.

“Traditionally, we’ve had companies that distribute films as a middleman. The new technology potentially allows the value chain to be much shorter and much more direct, and gives the production company the opportunity to also introduce a very immediate feedback loop into the value chain.”

The advantage of digital electronic cinema to studios, the cinema-going public and creative types is apparent. The consensus of the film making industry on standards and a business model will soon make watching

digitally projected films more than a one-off experience.



**An ant's leg on the DMD surface. Each mirror is 16µm square with 1µm separation between pixels.**

### It's all done...

Daewoo Electronics has produced a thin-film micromirror array (TMA) display based on micro-electromechanical systems. Unlike Ti's DMD, where individual mirrors can be tilted by the electrostatic force to turn pixels on and off, Daewoo's spatial light modulator uses micromachined thin-film piezoelectric actuators to control the grey scale on the screen. Precise control of the tilt angle can generate more than 256 levels of grey on the screen.

Each pixel consists of a mirror and an actuator. In previous designs, the two had been co-planar, but the improved design has the actuator situated below the mirror, increasing the fill factor to as much as 94% and the contrast ratio to 200:1.

The thin film piezoelectric actuators are in the form of micro-cantilevers, which consist of a supporting layer, bottom electrode, piezoelectric layer and top electrode. When an electric field is applied to the two electrodes, the mechanical strain in the piezoelectric

layers causes a vertical deflection of the mirror.

To modulate the light intensity of the individual mirror pixels projected on the screen; a projection stop is used as a light valve. When a mirror does not tilt, all the light reflected by the mirror is blocked by the projection stop and the pixel shows its darkest state (black). When the mirror is fully tilted, all light goes out through the projection stop and the pixel is at its brightest state (white).

### ...with mirrors

NEC has released its MultiSync XT5000-DC, a high light output cinema projection system with TriDigital Image Processing film decoding technology. The decoding technology processes incoming signals to emulate the look, feel and colour space of film.

Steve Jackson, director of product development for the Visual Systems division at NEC, said: “Film source material requires a ‘film decoder’, not a video decoder. A video decoder may produce images acceptable for a home cinema or a concert, but for a theatre venue where film is king, digital cinema must look like film, not television.”

The projection system utilises the 0.9in three-chip DLP mirror technology from TI to produce evenly illuminated images and as well as NEC's AutoSense technology which automatically adjusts and optimises all computer and video signals to further functionality without adjustment or operator intervention at the film venue.

*Reprinted from Electronics Times, 3<sup>rd</sup> April 2000 [www.dotelectronics.com](http://www.dotelectronics.com)*

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## Members only!

As mentioned in the previous issue (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 quarters codes are as follows: -

**Username:** amember

**Password:** summer

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## TV on the air

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### By Graham Hankins G8EMX

SHE's BACK!

Who ELSE could I be talking about other than the vivacious Viv Green G1IXE, who, after a five year break has returned to the post of Chairperson of the Severnside ATV Group (STG). Viv's previous stint 'in the chair' was from 1989 to 1994, so in the STG June 2000 newsletter she says: "so yer we go into the 21<sup>st</sup> century and things can only get better". Viv takes over from Ross Wilkinson G0WJR, and acknowledges his contribution: "I would like to thank Ross for being chairman last year – a job well done".

The STG is running an informal ATV cumulative contest this year, and the 'P5' newsletter includes Ross's claimed scores so far. Ross has totalled 74611 points over four sessions during March, April and May at Dundry, Winter Hill and Tog Hill. The STG contest runs until the end of November so there is plenty of time for STG members to have a go. STG hopes to have a few activity days on the weekend of 7,8,9 July – may even pop down (again) myself!

A chance encounter at a rally led to this report of 10GHz (3cm) activity in the Derbyshire area from Dave G8TNE: "I have a reliable full duplex link from my QTH in Littleover, Derby to Stan G3VJK in Castle Donnington, a distance of 13km. Stan uses 10.315GHz, I operate on 10.425GHz so you can see there is plenty of spacing between frequencies to allow full duplex operation".

But the 10GHz link between Dave and Stan was very lossy, despite the 20dB horn antennas. A major car manufacturer had just finished building its new test facility - a large concrete structure straight in the path of the 10GHz signals. Picture quality varied between P3 and P4 with a lot of variation in levels both ways.

"Then," says Dave: "I tried making the horns twice the focal length, which made all the difference to our link! Stan and I now achieve good P5 pictures both ways and fully quieting sound. We

would like to work other stations and would like to arrange possible skeds with anyone interested in having a go. If anyone would like to contact me they can on Email [dave.g8tne@virgin.net](mailto:dave.g8tne@virgin.net) and I would be only too pleased to arrange a sked!"

Now some repeater news and the Coventry ATV repeater GB3RT has had its transmitter repaired again. A reduction in power around two years ago was solved with a new co-axial link – this time it was the power amplifier that had failed. GB3RT will be returned into service with one of its four ident EPROMs updated.

Meanwhile Birmingham continues to wait for a 24cm ATV repeater. Problem here is finding a site that is not 'line-of-sight' to Cleve Hill radar, or has an acceptable path loss to that installation. A member of the Beacons Repeater Group has volunteered his house in Erdington for the repeater, so it remains to be determined what the path loss from there is calculated to be.

Ian Waters G3KKD has been ATV /P in North Wales. Ian reports: "I operated static mobile from the Great Orme Head near Llandudno and enjoyed excellent two-way vision contacts, via the GB3TM ATV repeater in Amlwch, with John GW3MEO in Prestatyn and Brian GW6KFH in Pensiarwaun. The powerful professional radio equipment on the Great Orme totally blocked my 2M and 70cm receivers, but duplex audio was achieved with incoming sub-carrier sound on 24cm and my transmitted talkback on 2M". Ian is thinking of returning to North Wales later in the year, going to the south side of the Lleyn Peninsular to work through the new GB3GW repeater at Pentrefelin.

Now some news from much further afield (can you get further away than New Zealand?) from Auckland ATV Interest Group (of the Auckland VHF Group inc.)

### Whitford ATV Repeater

Here is some information on the Whitford ATV repeater, Auckland's

first 23cm ATV repeater, courtesy of Grant ZL1WTT

Input frequencies to the Auckland repeater are:

70cm 443.25 MHz AM vision, Sound +5.5, 5.742 MHz FM subcarrier  
50cm 615.25 MHz VSB vision, Sound +5.5 MHz FM subcarrier  
23cm 1284 MHz FM vision, Sound 5.5, 5.742 MHz FM subcarrier  
FM Bandwidth 15 MHz

### Aerials

70cm 2\*7 element LPYs (loop yagis ??? GJH)  
50cm 1\*16 element LPY  
23cm 1\*8 element Panel colinear

### Output frequency:

23cm 1248 MHz FM vision, Sound 5.5, 5.742 MHz FM subcarrier  
Bandwidth 15 MHz  
output power will be about 10-15 watts into 23cm panel co-linear aerial (10 dB gain)

### Notes for overseas readers:

Amateur allocations in New Zealand

70cm band 430 - 449.75 MHz  
50cm band 614 - 622 MHz  
23cm band 1240 - 1300 MHz

Normally the 615.25 MHz receiver will receive the ZL1BQ ATV repeater at Nihotupu and pass it for transmission on 1248 MHz. Transmissions received on either 443.25 MHz or 1284 MHz receivers will have priority over this.

Locally generated test patterns will be available from Whitford by DTMF command on 2M FM simplex. Locally generated signals will be also be inserted if reception from ZL1BQ is lost. Two sound subcarriers are provided for stereo audio use.

All the NZ news, as always, via Email from Michael Sheffield ZL1ABS, 176 Albany Highway, Albany, Auckland, New Zealand. Packet [ZL1ABS@ZL1AB.#11.AKL.NZL.OC](mailto:ZL1ABS@ZL1AB.#11.AKL.NZL.OC) Home page [www.geocities.com/mjsheffield](http://www.geocities.com/mjsheffield)

## By Paul Holland G3TZO

Welcome to another edition of Satellite TV News. As usual there is the usual mix of news of new launches, new channels and developments in Satellite TV Broadcasting. Having just gone motorised with my Echostar AD3000IP I can share a few more thoughts on its performance as well as report on a new edition to the shack which aids dish alignment for motorised digital reception.

### Eutelsat News

Eutelsat W4 was successfully launched on 25th May aboard the maiden flight of the Atlas III rocket provided by International Launch Services (ILS).

W4 will provide additional capacity for new consumer digital television platforms and IP-based services in Russia and Africa. Manufactured by Alcatel Space Eutelsat W4 will carry a total of 19 transponders that can be switched into a high-power fixed beam over Russia. Sixteen of these transponders will be used for direct-to-home digital television.

One fixed and one steerable beam, each with six transponders, will be pointed over sub-Saharan Africa where they will be used for a range of services including digital pay television and broadband Internet access.

W4 will be co-positioned at 36.0 Deg East with Eutelsat's SESAT satellite that was successfully launched on April 17 by a Proton launcher from the Baikonur Cosmodrome. SESAT's 18 Ku-band transponders deliver a range of business-to-business services that include Internet backbone connections, corporate networks and the EUTELTRACS mobile messaging and positioning service. It will provide coverage of Europe, North Africa, the Middle East and the Indian sub-continent.

With the entry into service of SESAT and W4, EUTELSAT's resource will consist of 16 satellites spanning the orbital arc from 12.5 degrees West to 48 degrees East and with visibility of Europe, Africa, large parts of Asia and



connectivity with North and South America.

### Eurobird

A new name to some, Eurobird is the outcome of negotiations between Eutelsat and SES to provide capacity at 28.5 Deg E co-located with Astra 2A/B.

Amongst others, BT will provide DTH services via the Eurobird satellite which is due to launch this year. BT will provide transponder leasing facilities plus conditional access and subscriber management. The move will mean that, for the first time, UK programmers will get a serious alternative to Astra in order to reach the UK direct-to-home satellite market. Homes with Sky Digiboxes will be able to pick up channels from Eurobird as well as from the Astra satellites.

With five transponders available, BT will be offering capacity for between 25 and 30 channels at current compression ratios.

Eurobird will enable BT to offer "steerable beam" transponders focussed on the UK and Ireland whereas the SES transponders on Astra 2A are "fixed beam". This will provide wider coverage of Europe as well as the British Isles.

SES have signed an agreement enabling them to use six 72 MHz transponders on "Eurobird". The agreement provides additional

transmission capacity to that provided by Astra 2A/B.

The six 72 MHz transponders are in the 11.20 - 11.45 GHz downlink band. Eurobird is due to become operational in February 2001. The transponders can be used for single or multiple channel per carrier services (SCPC - MCPC) for data, audio, and video or as an Asia-Europe turnaround for up-linking signals transmitted by AsiaSat.

SES' development plans for 28.2° East will however continue to be based on their planned three additional satellites (ASTRA 2B, ASTRA 2C and ASTRA 2D) which will be co-positioned with the existing ASTRA 2A at SES' second orbital location over the coming 18 months.

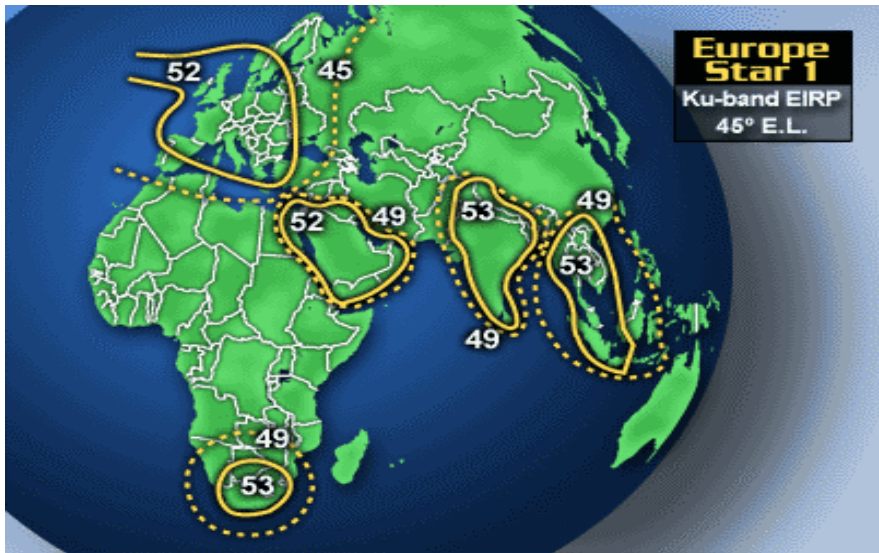
### Europe\*Star 1

Not to be confused with Eurobird comes Europe\*Star. Europe\*Star 1 is an all Ku-band satellite with 30 transponders of 36 MHz bandwidth each. It will be launched into orbit in mid 2000 with the launch of the second satellite Europe\*Star 2 is planned in 2002.

These will be among the highest radiated powered Ku-band satellites available for the regions served, featuring high-power and high elevation angles that ensure distribution to small dish antennas.

With Europe\*Star 1 at 45° E, and growth potential slots at 43° E and 47.5° E, the Europe\*Star satellite system will be able to provide satellite telecommunication services to the five growth markets: the whole of Europe, the Middle East, South Africa, India and South East Asia. With high elevation angles, more than 50 dBW radiated power and large coverage, this combination will result in small size and low cost receive-antenna.

Europe\*Star will offer transponder, connectivity between the five coverage areas it serves. Each area can be connected via one hop and will allow multimedia broadcasting and multicasting.



**Europe\*Star 1 Data**

<b>Orbital position</b>	45° East	
<b>Satellite dry weight</b>	1,740 kg	
<b>Launch mass</b>	4,150 kg	
<b>E.I.R.P.</b> (Typical Equivalent Isotropic Radiated Power)	From 48 to 53 dBW	Europe zone
	From 50 to 54 dBW	Middle East zone
	From 49.5 to 55 dBW	India zone
	From 52 to 54 dBW	South Africa zone
	From 50 to 54 dBW	Asia zone
<b>Power consumption</b>	9.6 kW	
<b>Contractual operational lifetime</b>	15.2 years	

**Transponder Information**

Given the enormous expansion in satellite capacity with the onset of digital broadcasting and the consequent explosion in services available it is now necessary to update a receivers channel memories on a frequent basis. Given that changes to satellite positions and transponder loadings occur almost daily the Internet offers a number ways to keep you up to date.

For that up to the minute data you can always check Lyngsat on <http://www.lyngsat.com/>. This site provides not only full transponder details for all satellites world-wide (updated constantly) but provides links

to broadcasters, satellite footprints and many more interesting sources. Alternatively you can get on the mailing list for daily transponder updates from Stefan Hagedorn on <http://www.sat-hagedorn.de>. Stefan provides a fantastic service, which provides updates daily on all European satellites giving details of services coming, going or just moving from one Transponder or Satellite to another. The daily e-mail also carries news on launches and other Sat related information. For those who would like instant access to Transponder Loadings for every Satellite World-wide without going on line Tele Satellite Magazine (published bi-monthly in Germany) has a Free CD ROM with every issue. This

carries meticulously documented data that can be filtered using a variety of parameters i.e., all Free to Air (FTA) services on a particular satellite, all Analogue, all D2Mac etc. The CD ROM includes software allowing you to update information from the Satco DX Web site on <http://hlava22.fsv.cvut.cz/~frk/index.html>. Contact details for Tele Satellite Magazine are; Christine Williams, P.O.Box 1124, Ascot, Berkshire GB-SL5 0XH, ENGLAND Tel: 01344-620799 Fax: 01344-620354. E-mail [chris@TELE-satellite.com](mailto:chris@TELE-satellite.com) .

A more automated process for Nokia 9800 owners is also now available from the Lyngsat web site mentioned previously. By connecting the Nokia 9800's serial port to your PC you can now download updated channel lists for which ever satellites the Nokia is capable of receiving. Details of the how the process works and necessary software is available on <http://www.lyngsat.com/nokia/help.shtml>

**Transponder News**

Given that it is impossible to provide full up to date news of changes via a quarterly publication here are just a few of the changes occurring as we closed for press.

**Eutelsat W4 36.0 Deg E**

The Transponder line up for this new satellite is as follows. Note the combination of linear and circular polarisation;

11.727 GHz l	12.284 GHz h
11.747 GHz h	12.303 GHz lz
11.766 GHz l	12.322 GHz rhc
11.900 GHz h	12.322 GHz h
12.073 GHz l	12.341 GHz l
12.092 GHz h	12.360 GHz rhc
12.130 GHz h	12.360 GHz h
12.169 GHz h	12.380 GHz l
12.188 GHz l	12.399 GHz rhc
12.207 GHz rhc	12.399 GHz h
12.207 GHz h	12.418 GHz l
12.226 GHz l	12.437 GHz rhc
12.245 GHz rhc	12.437 GHz h
12.245 GHz h	12.456 GHz l
12.265 GHz l	12.476 GHz rhc
12.284 GHz rhc	12.476 GHz h

## EUTELSAT Sesat, 36 Deg E

The transponder line-up is as follows: **10.964 GHz** v, SR 2892, FEC 3/4: Pink Plus; **10.981 GHz** h, SR 13327, FEC 7/8: News Feed; **11.013 GHz** h, SR 5632, FEC 3/4: KurdSat; **11.626 GHz** v, SR 6009, FEC 3/4: Data-Feed. **11.652 GHz** v, SR 5206, FEC 5/6: News Feed; **12.507 GHz** v, SR 2892, FEC 3/4: Nuvolari; **12.531 GHz** v, SR 2100, FEC 3/4: Radiostacja P4 Polska; **12.561 GHz** v, SR 3254, FEC 2/3: Georgian TV; **12.603 GHz** h, SR 2892, FEC 3/4: [IT@Vision](#); **12.682 GHz** h, SR 2498, FEC 2/3: Studio Europa; **12.686 GHz** h, SR 3254, FEC 2/3: NTA - Armenia and Radio Armenia; **12.691 GHz** h, SR 2523, FEC 2/3: Il Tirreno Sat; **12.694 GHz** h, SR 2498, FEC 2/3: Digitally; **12.699 GHz** h, SR 2498, FEC 2/3: Elefante Telemarket; **12.703 GHz** h, SR 3254, FEC 2/3: CFN; **12.708 GHz** h, SR 2169, FEC 3/4: TBN



**Nuvolari on at 36.0 E**

## ARABSAT 3 A, 26 Deg E.

Arabsat 3A has a new digital package from Lebanon on transponder 11.785 GHz (V) SR 27500, FEC 3/4) Channels include;

Al Manar TV, Future International, LBC Sat, MTV Lebanon, Tele Lebanon, Arabsat test cards. Al Manar TV is no longer available on 11.747 GHz (v) (SR 27500, FEC 3/4).

## Hot Bird 1-5, 13 Deg E.

**TV Romania** is now present on Hot Bird 5, 11.623 GHz (v) (SR27500, FEC 3/4, V-PID 227, A-PID 247). The Korean channel **Channel Sun** has launched on 11.623 GHz (v) (SR 27500, FEC 3/4, V-PID 229,A-PID 249).

**WRN** is planning to launch a satellite digital radio multiplex. On the

proposed multiplex will be WRN 1 Europe (English), Euromix (Multilingual) and EuroMax (German) which will initially be offered as free-to-air stations.

## News Roundup

**Sky Digital** will have added a number of new channels from Astra 2A at 28.0 Deg E by the time you read this. One, a youth orientated channel, was planning to launch its full-24 hour service on the 5th July on 11.853 GHz (H) (SR 27500, FEC 3/4). **Discovery Health**, from the Discovery Network launched on the 19th June, broadcasting between 0900 - 1700 on 12.109 GHz (H) (SR 27500, FEC 2/3). **Kiss TV**, a dance network, is on 12.266GHz (H) (SR 27500, FEC 2/3). The pay-per-view film and sports channel, U>Direct, has extended its services. From the beginning of July, it added a further five channels to their existing twelve, via the Sky Digital EPG 812 – 816. A new business channel called **biz4bizTV.com** will also launch on Sky Digital later this year.

The Landscape Channel is launching Nitescape as a FTA overnight service this autumn. Nitescape will operate between midnight and 6am (CET) and be available as a direct satellite feed and via the Internet. No satellite details are available to date.

**Astra 2B** was still not ready for launch aboard Ariane flight 130 as we closed for press. The next mission of the Ariane 5 heavy-lift launcher has now been postponed a number of times owing to the unavailability of the Astra 2B satellite. The new target date for flight 130 was July. Scheduled originally for 23 May, Flight 130 was to have launched Astra 2B and the GE-7 satellite for U.S. operator GE Americom. Astra 2B was originally scheduled for launch in the third quarter of 1999 however problems were discovered with the solar arrays of several other satellites - among them Astra 2B. Either the solar array degradation problem hasn't been overcome yet, or there's a new one. Arianespace is now planning Flight 130 with the choice of launch vehicle to be based on the availability of customer satellite payloads and as and when Astra 2B is ready to go.

**Eutelsat 1F5**, which was temporarily located at 4 Deg E, was finally de-orbited in late May.

**Sirius 1** (alias BSB 1) has finally left 5.2 Deg E after 6 years of service and has been relocated at 13 Deg West. A Sirius test card in PAL can be found on 11.783 GHz (RHC)

**Telecom 2D** has been moved from 5.0 Deg W to 8.0 Deg W.

## Echostar AD3000IP

My experience of the new Echostar AD3000Ip Digital motorised receiver is moving on. As usual those who can't wait to get their hands on kit when its first launched often find themselves on the bleeding edge of new technology. And so it turns out with this receiver.

Echostar International has now announced that a new version of the operating software for the receiver will soon be made available. According to Echostar in the Netherlands, the new software will fix bugs, which are still on Version 2.00 of the currently available software. Version 3.00 will include the possibility to listen to more than 8 radio stations, access to all CI menus (re-integrated from version 1.00), an improved 'fixed dish' function, advanced menus for radio programming, and other improvements. It is expected that Version 3.00 will be on the Internet when available.

The main problem I have with the receiver so far is that when doing an Auto Search function (which finds all digital services on a given satellite) it has the affect of overwriting channels stored at other satellite positions. In practice this is not calamitous, as the speed of an Autosearch is fairly quick (depending on how many transponders are stored for the satellite selected) and can therefore be carried out whenever you change satellite position. This is obviously not however an ideal feature!

The main problem with setting up a digital satellite receiver whether motorised or fixed is that unlike with analogue, it can be quite difficult to locate and identify satellites when moving the dish.

In the old days I used to sit by the dish with a Sat Meter which gave an audible

and metered representation of satellite strength. The problem comes however in working out what satellite you have found. With analogue you could just pop a receiver on and tune around after locating a satellite and it was then fairly simple to work out what satellite you were on. Alignment of the LNB mount for accurate adjustment of polarisation offset could be easily achieved by observing signal strength on the meter and double checking on the receiver when switching between H&V.

With digital it is less simple to find signals given the wide variation in parameters used for different services. There is also an inherent decoding delay that means that signals don't resolve immediately and therefore make adjustment very problematic. The Signal Level and Signal Quality bar graphs on the Echostar are far too slow to track what is happening as you move the dish or adjust polarity. I would not imagine that this delay is limited to the Echostar receiver.



The solution I have found to the problem has come with investment in a Satlook III signal analyser. Made in Sweden these units are basically a satellite receiver with a black and white monitor that can be switched into spectrum mode. In spectrum mode all frequencies between 950 MHz and 2150 MHz are displayed as per a normal spectrum analyser with the X axis running vertically up the right hand side of the screen. An audible tone is provided as well which increases its pitch as the signal increases. The spectrum can be expanded to look at a smaller number of carriers and examine signal levels as horizontal and vertical polarities are selected. Where analogue services are available it is possible to switch to the black and white monitor which as might be expected for a 4.5in monitor

gives a very clear picture.

The Satlook III is not particularly cheap at just over £300. Doebis in Germany, who managed carriage in about 3 days, supplied my unit.

### Problems with SECA CAM's

The manufacturers of the Seca/Mediaguard CI CAM, Aston, have announced that an over-the-air software upgrade for their SECA Cams will be made available. CAM owners will be able to download the new Version 3.00 software from 13 Deg E on the Eutelsat Skyplex transponder at 12.539 GHz V (SR 27500, FEC 3/4). The major problem is that the Version 1.00 CAM often needs resetting, normally when changing to channels in a different package - for example switching from a Spanish Taquilla channel to a French Kiosk service would usually require the user to switch their digital receiver off and back on to be able to regain access. Aston has informed those software upgrading, that an on-screen menu will appear, prompting the entry of the CAM serial number, once entered, the CAM will go through its software upgrade.

### Scheduled Launches

As usual the following launches are subject to change for a variety of reasons.

Date	Satellite	Position
June	Express 3A	11.0 W
July	Astra 2B	28.5 E
August	PAS1R	45.0 W
August	Nilesat 102	7.0 W
August	Eutelsat W1	10.0 E
September	Europe* Star 1	45.0 E
September	Turksat 2A	42.0E

### Turksat 2A (also called Eurasiasat)

Eirp - G/T	Max : 52.6 dBW Eoc : 51.0 dBW - 2.5 dB/K
Polarisation	Vertical
Uplink Freq	17.30 - 18.10 GHz
Downlink Freq	11.70 - 12.50 GHz
Typical SFD	-80 dBW/m <sup>2</sup>

### Conclusion

That's it again for this edition of Satellite TV News. A very slim post bag this month. Your news and views are welcome. Given that Sat News can not be classed as representing main stream BATC activity I think it is important to know whether these valuable column inches continue to be valued as our hobby moves on. As usual the contact details are;

[Paul.holland@btinternet.com](mailto:Paul.holland@btinternet.com) or by phone to 01948 770476/ Fax to 01948 770552.





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# Worthing Video Repeater Group



**GB3VR GB3RV & GB7VRB**



[www.videorepeater.co.uk](http://www.videorepeater.co.uk)

## 1Watt FM-TV 24cms Transmitter

The 1 watt transmitter generates its signal at the wanted frequency which can be set anywhere in the band, colour or B/W. On board intercarrier sound and fixed pre-emphasis are standard features. The kit includes the PCB all the on board components, pre-drilled heat sink, an Eddystone Di-cast box and full and comprehensive instructions. Building time is three evenings work. The new price for this kit is £85.00, P&P £2.50. Available to licenced radio amateurs only.

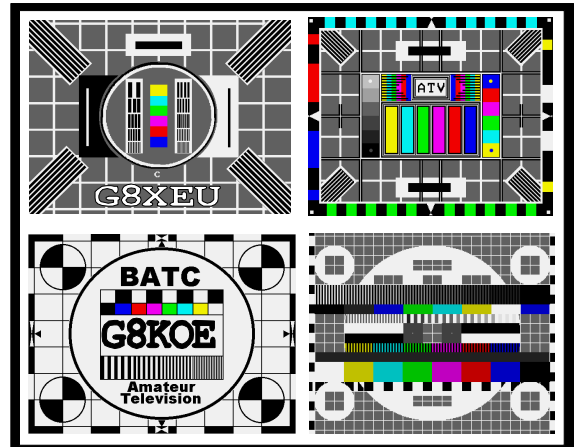


## Two channel phased locked loop kit.

This add-on kit vastly improves the overall stability of the 1-watt transmitter two crystal locked channels and a third free running tuning position are available. Kit price £30.00

## Amiga ATV Program-2

The New Amiga ATV program has more features than ever, up to 56 testcards, 20 wipes, superb text control, 30 screens of text messages, QRA calc, Testcard music, selectable displays, and this version has a DTMF tone pad to control your repeater. All testcards are over-scan i.e. the whole screen is used, Load in your own customised testcards, Extra large text, scrolling text, clock, callsign extensions, Hot key operation, Doc reader, ATV Cli, Cross Hatches, Purity and a comprehensive section for genlock users. For any Amiga with 1meg or more, state callsign and QRA (if known) when ordering, this three disk set is now only £10.00 P&P 75p



## Video AGC Kit

The Video AGC is capable of excepting signal levels in the range of 0.15Vpk-pk to 2.5Vpk-pk and generating a constant output level of approximately 1Vpk-pk Kit. Price £20.00 + P&P 75p

PC-ATV now available, see web site for details.

Visit the all new GB3VR-RV web site at:- <http://www.videorepeater.co.uk/>

Orders should be sent to: -

Treasurer of GB3VR, R. Stephens, 21 St. James Ave., Lancing, Sussex, BN15 0NN.  
Cheques payable to "WVRG" Tel (01903) 765760 7 to 8pm.

# British Amateur Television Club Contest Rules For 2000

**PREAMBLE:** - The Main object of an Amateur Television Contest is to promote ATV activity. Anyone interested in ATV whether they are members of The British Amateur Television Club or not, are welcome to take Part.

**1) ELIGIBILITY:** - Contests are open to all licensed radio amateurs who are equipped to transmit and receive pictures by Fast Scan. Non-transmitting amateurs or SWL can also take Part with their own section.

**2) DATES AND TIMES:** - Dates and time are also published in CQ-TV (only available to BATC members), BATC web site, other amateur radio periodicals from time to time and on application to the BATC Contest Manager.

**3) LOCATION:** - Operation must be within the terms of your licence, from either the main station as listed in the current RSGB Call book known as a FIXED station or a PORTABLE station. A portable station, cannot be located in a permanent building, does not support its antennas from a permanent structure and does not power its equipment from the mains electricity supply. Please get the permission of the landowner.

**4) FREQUENCIES:** - Within the allocated segments of the 70cm, 24cm, 13cm, 9cm, 6cm, 3cm and 1.5cm bands for FSTV. Operation via repeaters does not constitute a valid contest contact.

**5) POWER:** - Output power must not exceed that set out in the terms of your licence.

**6) EXCHANGE:** - CALL SIGN and a FOUR-FIGURE code number must be conveyed via video. Confirmation of reception is by transmitting back THE SUM of the code numbers on the talk-back channel, NOT THE ACTUAL TRANSMITTED NUMBER. Please note all FOUR digits in the contest number should be different and not consecutive. The numbers must be different for each band, e.g. these numbers are OK:-

2741, 4820, etc., these are not:- 1111, 1138, 1381, 1234 etc.

**7) SCORE:** - ALL BANDS 70cm and above, 1 point per km. One way. Multiply by 2 for a two way contact. It's the same score rate for ALL BANDS. The contest manager will apply multipliers for the International in September. Note your computer program should give 6371.290982 km as the earth's radius and 111.2036 km for each degree change in latitude before rounding off to the nearest km. For scoring purposes all valid contacts shall be deemed to have taken place over a distance of at least 5 Km, even if the two stations in contact have the same or adjacent locators.

**8) LOGS:** - Separate combined log/cover sheet should be submitted for each band. Each sheet should indicate:- Call sign of station entering contest, Contest name, Band, TX Power, Aerial etc., Code number used, Your locator, Total number of QSOs and best DX etc., Name and address of 1<sup>st</sup> operator, names and call signs of operators and the signed declaration. For each contact the date/time, Station Worked, Report/serial number sent, Report/Serial number received, Locator of other station, Code number received, km and points claimed. Each band should begin with the serial number 001. No station to be worked more than once on any band. Please mark dupes. You could lose points for gross errors, however the contest manager will correct minor errors of scoring and distance calculation. Logs must be posted by the third Monday after the contest.

**9) AWARDS:** - Certificates will be issued to each individual band winner and runner up together with the overall leading station.

**10) RECEIVE ONLY SECTION:** - Send log sheet or a copy of it giving your Call sign / BRS No. and name and address, Band, Date/Time in GMT., Call sign of station seen, 'P' report on signals seen, Code number seen, Locator of receiving and DX station if possible. The contest manager will work out

your locator if you send him your National Grid Reference (two letters and six figures please) UK only or Lat./Long. in degrees. The locator of the DX station will if possible be abstracted from other logs received. Scoring is 1 point per km.

**11) DISPUTES:** - The decision of the contest manager and/or the BATC Committee is final.

**12) SPIRIT OF THE CONTEST:** - DON'T LEAVE YOUR VIDEO TX ON ANY LONGER THAN NECESSARY on 70cm. There is only a limited space for a TV transmission. Other stations might be trying to resolve a weak signal. MOVE OFF THE ATV CALLING FREQUENCY 144.750 MHZ. AS SOON AS POSSIBLE. Check before you land on a frequency that it is not in use. Try using SSB (144.525 MHz) if you can't find a free FM channel for talk-back. Contests mean activity and good fun, join in, and even if you only work one or two stations please send a log in.

**13) DECLARATION OF INTEREST:** - Although acting as contest manager, I reserve the right to take part.

**14) COMPUTER LOGS:** - Computer logs are quite acceptable provided they have all the information listed above under LOGS. Hard copy or a 3.5" floppy are OK, however a declaration like the one on the bottom of the cover sheet must be signed. The file should be in Word or Excel format.

**15) CONTACT ADDRESS:-** For entries, contest log and cover sheet obtained by sending a SAE to:-

**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)

## Contest News

### By Richard Parkes G7MFO

Due to the depression in BATC ATV contests over the last few years. I have volunteered to take on the job of contest manager.

While a few individuals and groups have continued to participate in the International event in September, our national competitions have declined to zero.

I wish to regenerate an interest for radio amateurs to compete in this competition. Whilst not necessary winning they may make many new contacts, as many stations will be on the air at the same time.

If any of you have any ideas on revamping the contest rules such as, dates, duration, times and scoring, etc please let me know.

Hopefully by the time you read this, information will be available on the BATC web site.

### Urgent

It would make the job of scoring these contests easier if I had templates, of our current designs of logs sheets and cover sheets in excel. I would be most grateful if any computer expert could help me by producing a template for these.

# International ATV Contest 2000

Saturday September 9<sup>th</sup> to Sunday September 10<sup>th</sup>

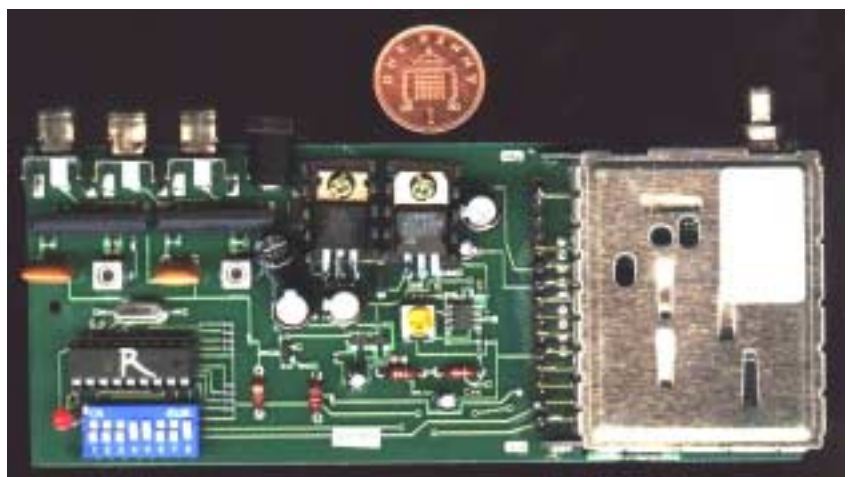
1800 GMT Saturday to 1200 GMT Sunday

Fast Scan TV all Bands

### Review, what review

Brian Kelly is currently trying out the 23cms and 13cms transmit and receive modules from Giles Read. (*see the inside front cover*). We had hoped to be able to print a review of these in this issue, but, due to circumstances beyond our control this has not been possible. However, we will endeavour to have it ready for the next issue. From what I have heard so far, it will be worth waiting for. Ian Pawson – editor.

23cms receiver module ->





## ‘Repeater’ is the premier ATV magazine in Holland.

Repeater is a new ATV magazine published in the Netherlands in Dutch. The 13/24cms TX in this issue is reprinted from Repeater with the kind permission of the Editor Rob Ulrich PE1LBP. I hope we can from time to time bring you other extracts as we do with all the ATV magazines.

Information about ‘Repeater’ magazine can be found on their web site at <http://www.euronet.nl/users/rulrich>, email: [repeater-nl@rocketmail.com](mailto:repeater-nl@rocketmail.com)

Snail mail:- Gibbon 14, 1704 WH Heerhugowaard, Netherlands.

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## Post and News

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Please send all correspondence for **Post and News** to the CQ-TV Editor. Ian Pawson, 14 Lilac Avenue, Leicester, LE5 1FN, England.

Tel: 0116 276 9425.

E-mail [editor@cq-tv.com](mailto:editor@cq-tv.com)

Trade adverts should be sent to the advertising manager, Trevor Brown, 14 Stairfoot Close, Adel, Leeds, LS16 8JR.

Tel: 01132 670115.

Email: [adman@batc.org.uk](mailto:adman@batc.org.uk)



Dear Ed,

This story may sound like an Urban Legend but it is, in fact true - it happened to me. I was visiting a lab today and happened to look behind an equipment rack. There I spied a dozen or so 2m lengths of semi-flexible Andrews Heliac cable, complete with factory-fitted Andrews male and female 'N' connectors. Chancing my arm, I asked the chief technician if they were going begging (as if!!) because I knew a few people who would kill for the stuff.

"Oh yes," said the technician, "you can have all there is. It all came as part of some installation kits, but we didn't use it. Actually, you should have been here last week - I gave a few dozen more away to another visitor. He said he was going to use it as drain rods."

Heliac with Andrews 'N' connectors as drain rods... I nearly throttled the chap.



### From the Internet

From: Fred Johnson  
[mailto:[fredj@clear.net.nz](mailto:fredj@clear.net.nz)]

Cc: NZART HQ

Subject: U R G E N T! Your help is needed

Greetings All,

In late 1999 it was made known to the NZART Administration Liaison Officer (ZL2MA at the time) that the MOC had developed a bandplan for adding stations of other services into the band 440 to 449.75 MHz. Ken was very concerned about it. Very little real and useful information was known.

Two separate meetings of FMTAG were held prior to Christmas at ZL2SX's QTH to consider the problem. These meetings were attended by ZL2MA and myself. There was very little firm information available at that time.

These two FMTAG meetings resulted in a formal meeting being requested with MOC. The meeting took place on the afternoon of 28 January attended by ZL2SX, ZL2TAR and ZL2AMJ. MOC representatives were Andrew Mulcahy and Alex Orange. The matter was not made any easier by the sudden death (on 2 Jan) of ZL2MA.

This MOC meeting went over the traditional ground of this band being the INPUT to repeaters for the Amateur TV channel E39 and the rocky history of the ATV frequencies in New Zealand. It was a long discussion. The Ministry officers agreed to receive a paper expressing our concern and the effect the loss of this band would have on Amateur Television in New Zealand. This informal paper was sent to MOC on 17 February.

We were advised at that meeting that a "Public Bulletin" type of document was being prepared by MOC as a part of their study of all bands above 400 MHz and that a more formal submission to MOC could be made by NZART in response to that call for input at a later time. That time has now arrived.

At a meeting at MED today, (the Ministry of Economic Development - the MOC changed its name on 28 February) I was advised - informally - that a "release" about the 400 MHz matter was to soon be made on the

MED web page. I was told that there were TWO releases that would be of interest to me.

I ask you to PLEASE do the following:

Please go to the Ministry's web page for Radio Spectrum Management, which is now at:

<http://www.med.govt.nz/rsm>

Click on "What's New". You will read there about two documents: ECD 2000-1 and ECD 2000-2.

Please Click on each in turn.

PRINT off EACH OF THEM! They both involve the band 440 to 449 MHz.

PLEASE READ EACH DOCUMENT VERY THOROUGHLY AND VERY CAREFULLY. Please assess the impact on the Amateur Service.

Please note that the closing date for comment and for submissions is given as 20 April. I will be trying to get an extension of time because this proposal has a great impact on the Amateur Service and more time is required. Extra time may not be possible. It is known that the Ministry has pressures of their own.

Some preliminary work has already been done on this problem. But much more is required. I ask you to PLEASE provide me with text that can be used in a submission giving REASONS and giving your views WHY this Ministry proposal should not proceed. Alternatively, please tell me where the input to our ATV repeaters (with their output on 614 to 622 MHz) can be re-located should the band be lost.

Start working on this problem now - please. Your contribution would be appreciated BEFORE 6th APRIL. It takes time to blend text into a readable Submission and for it to be thoroughly checked by others. So your early input will help.

It would be very much appreciated if you could please acknowledge receipt of this message. Messages seem to

disappear into free space - THIS ONE IS IMPORTANT. Your HELP IS REQUIRED.

Thank you. 73, Fred ZL2AMJ

Fred Johnson ZL2AMJ, 15 Field Street,  
Upper Hutt 6007, NEW ZEALAND  
Phone: +64 4 528 8313 Fax: +64 4 528  
2173 (NZART HQ) Email:  
[fredj@clear.net.nz](mailto:fredj@clear.net.nz)



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£10.50 - replacement for the obsolete BLV91

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MGF1402    £16.00

Note that Mitsubishi have recently increased the price of some of the PA modules, including the M57762

**Now available** – The GH 'QUAD'. 24cms solid state PA using 4xM57762 for up to 80W out for ATV. Available as a mini-kit, including PCB, un-drilled heatsink, mounting plate and all PCB-mounted components with full instructions. Check web site or ring for latest details. This is a no-tune amplifier, but is not suitable for novice constructors. *Construction notes available free on the web site.*

The above devices are always in stock. All other Mitsubishi PA modules and GaAsFETs available to order, please ask for details. GH Engineering is able to supply many other RF semiconductors that have become obsolete or difficult to find. All prices are full inclusive, but please add £1.50 handling for orders under £10. Please send cheques made payable to **GH Engineering** to the address above, or order by phone with any major credit card.

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## Members adverts

Non trade advertisements are placed in this column free of charge to paid up members only. Please quote your membership number. Copy should be sent to:-

CQ-TV Editor, 14 Lilac Avenue, Leicester, LE5 1FN, England.

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

## For Sale

For sale, YAESU ft-225rd tx-rx a 2 meter all mode base station TX/RX with vox operation on all modes with 25 watts rf output. with mutek front end fitted, in mint condition with box and manual £400.00 ono g6pks *qthr phone Brian on 020 8304 3992*

JVC S-VHS-C Camcorders:- GR-S505EK £80, GR-S77EK £60 and GR-SZ9U (NTSC) £60.  
Hitachi VHS-C Camcorder:- VM-C40E £40. All with sets of accessories.

JVC CCD Colour Camera (S-VHS-C GR-S70EK Camcorder less tape unit) £40.

Link 130 viewfinder (tube chipped) £4.

Vidicon yokes, 1" and 2/3" with tube sockets £1 each.

Teleton 15 watt stereo hi-fi amplifier GA-202 £3.

Computer items: -

Primax hand scanner with disks and manuals £15.

SDS Archer Z80 development system with added memory, BASIC rom and ADC card £30.

Microsoft Visual C++6 £20.

Microsoft Visual C++4 CD-rom only £5.

Books (almost as new):-

Beginning Visual C++6 (Horton) £15.

Visual C++6 Core Language (McCarty) £8.

Free manuals:-

Philips LDH26, TEAC V4200G-N, Sony SL-C6UB, CV-2100ACE, AV-3670CE,

JVC GR-C1EK, GR-C7EK, HR-C3E, Ferguson 3V00/16/22.

All items plus postage at cost.

**Contact Trevor Lumb G0ARU, 2 Briarwood Avenue, Bury St. Edmunds, Suffolk IP33 3QF. Email: [plumb@clara.net](mailto:plumb@clara.net) Tel: 01284 75431**

Hitachi FPC2 Camera with Canon 15X9.5 Broadcast Lens. Will dock with BetaSP recorders. Fitted with Camera adaptor enabling stand alone use.

With Flightcase and Service Manual. £1500.00, Wayne Kerr Video Oscillator T0.22B 10kHz – 10MHz. Output attenuator

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MUSA Connectors (silver plated in original tissue wrapping!!!!!!!)

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25 off RS 456-497 50 ohm

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2/3" Saticon RGB Camera Tubes for Sony BVP3 Camera green tube poor but others OK. £40.00 ono

2 off 3U high 19" Rack cases. Steel similar to RS 224-284 no front £10 ea.

1 off Tangential Cooling Fan 19" Rack Mount 240ac with filter and front grille similar to RS 506-873 £25.00

**Contact: Chris Evans on 07831 604 338 E-Mail : [chris@redwoodtv.co.uk](mailto:chris@redwoodtv.co.uk)**

**The Old Stables, The Street, Walberton, Arundel, West Sussex. BN18 0PQ**

THE ART OF TELEVISION Jan Bussell. 1952. Photo-illustrated tv production at Alexandra Palace by Muffin's dad. No d/w. ex-libris. £6, HANDBOOK OF BROADCASTING. McGraw-Hill 1957. Lots of pictures of US cameras, lights, mics, studios etc. £5, ITV ANNUAL 1964. ed Huw Thomas. Nice pictures of ITN's Kingsway studio, plus making Fireball XL5, ATV Pye cameras etc. £5.

UNDERSTANDING TELEVISION. Ed. Robert Hilliard. USA Hastings House 1964. Many photos of tv equipment- vt-mics-cameras-lights from the period. A last century 'How To' book. £5, TELEVISION: The First 50 years. Geddes/Bussey. 1986. Well illustrated booklet produced by the National Museum of Photography, Film & Television. £3, UNDERSTANDING TELEVISION. John Howkins. Sundial Books 1976. Large format, well-illustrated sections including 'Upstairs-Downstairs' , ITN, History of Tv etc. £3, INDEPENDENT TELEVISION IN BRITAIN. Bernard Sendall. 1982. Vol 1. Origin &

Foundation 1946-1962. How ITV began. Invaluable history for the TV scholar. £5, GIRL FILM & TELEVISION ANNUAL No1 1957. No d/w. £5. 1st of this attractive series, FANTASTIC TELEVISION. Gerani/Schulman. Titan Books 1987. Lots of US/UK fantasy tv shows listed. Illustrated. £3, EAGLE COMICS from vol 2.no.2 1951. £2.50 each. All with centre spreads intact! List available.

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

## Wanted

View Finder GM-3BP for Hitachi FP-Z31 Camera. Camera cable for Hitachi FP-Z31 camera to connect to ccu, 41pin connectors 1 end male and 1 end female. Lens for Hitachi FP-Z31 Camera. Tripod and Pan/Tilt head for LDK 5 camera, anything considered. Connection details for, JVC VF-C511E View Finder and Hitachi GM-3BP Circuit diagram would be nice!

I am also trying to re-equip Links 172 an ex TVS Vehicle. Contact Ray Hill, Tel: 01989 762839 E-mail: [rayandneil@rayhilltv.freeserve.co.uk](mailto:rayandneil@rayhilltv.freeserve.co.uk)

**Clive Graham on 01305 262006 (South Devon).**

Circuit diagram and other information for the Siberden TV camera type FP100. **Contact D J Longon 01274 877211, email [valid@tesco.net](mailto:valid@tesco.net)**

Help: -I have a SONY CCD-F340E camera but the in viewer readout is no longer locked to the picture. Can you loan me a manual or tell me how to fix this problem. I can be contacted via [roggail@globalnet.co.uk](mailto:roggail@globalnet.co.uk) I am also QTHR. Roger Jenkins, G8HDP.

Information on Panasonic colour camera type no. WVP-200E. An operational manual, service manual or even a circuit diagram would be more than useful, as I have no documentation at all at present. I also need a viewfinder for the same unit. **Contact**

Could any member please supply me with the name and address of a supplier of A.M. Band receive Aerial system. To enable a London Hospital to try to obtain interference free AM radio.

I know this is an unusual request via our magazine, but I am desperate. Thank you. **Please Contact Alf Partridge. Tel: 01268 793256. [benfleet@partridgeelectronics.co.uk](mailto:benfleet@partridgeelectronics.co.uk)**

Cathodeon 1" staticon (side pip) C932 etc.

**Contact Trevor Lumb G0ARU, 2 Briarwood Avenue, Bury St. Edmunds, Suffolk IP33 3QF. Email: [plumb@clara.net](mailto:plumb@clara.net) Tel: Tel. 01284 754318**

## Index of Advertisers

Amateur Television Quarterly .....	11
BATC advertising rates .....	11
BATC Publications.....	22
Confidential Communications Ltd .....	44
CQ-TV contribution deadlines .....	19
GB3XT Kits and Bits .....	12
GH Engineering.....	46

HS Publications.....	4
Members Services .....	22
'Repeater' magazine.....	44
S. Marshall .....	4
Sevenside Television Group .....	4
Worthing Video Repeater Group .....	41