

**Contents**

**CQ-TV 178**

Contents ..... 1  
 Committee Contacts..... 2  
 Editorial ..... 4  
 Dead Ducks and Forgotten Formats ..... 6  
 List of French Amateur Television Repeaters..... 10  
 The \$70,000 ATV QSO, First Digital ATV ..... 11  
 LUXOR 180 Series TV as a Monitor ..... 14  
 Members Services Sale ..... 17  
 A Slice of PYE..... 18  
 Beyond TTL # 13..... 28  
 ATV at GB4CDI..... 38  
 UK Repeater Update..... 40  
 13 cm Amateur Television..... 43  
 Channel 5 Ghost Story..... 51  
 How to get the Rally..... 53  
 Pair start Amateur Television Channel. .... 56  
 Circuit Notebook No. 60 ..... 57  
 TV on the Air ..... 61  
 Satellite TV News ..... 65  
 Slow Scan TV, an Overture ..... 76  
 Post and News..... 86  
 For Sale..... 93  
 Wanted..... 96  
 Index of Advertisers..... 96

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## Club Sales

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

**Publications:-** Handbooks, Back copies CQTV, and anything related to the supply of BATC publications. **PLEASE NOTE NEW ADDRESS:-**

Paul Marshall, Fern House, Church Road, Harby, Notts., NG23 7ED, England. E-mail: 101573.2170@compuserve.com

## Membership

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## Editorial

Welcome to Ian's first solo CQTV, unfortunately it's the magazine with the shortest lead time, as we try to get it to you before the BATC rally so as to give you all a timely reminder. The down side to this rally plug is this issue closes about two weeks after CQTV 177 drops on your mat, hardly time to gather much copy. I asked Ian if I could do anything to help and in return got stuck with the editorial, not being deterred by not knowing what is in the magazine, here goes.

**Internet** The club web site is growing and now has a complete copy of CQTV 176 and CQTV 177 available for down loading. The files are in acrobat format, which compresses them and allows them to be available to a wide variety of computing platforms. A free copy of acrobat 3 reader is available from their linked web site. I hope by making CQTV available in this way that it will expose what we do to a wider audience and swell our numbers, which in turn will generate copy and keep printing and membership costs down in the future. The down side is it is possible to download CQTV and read it without being a member. Renewals will be closely monitored to see if it is wise to continue this practice. Your views are always welcome on this, or any part of the clubs activity.

**BBS** The club web site does gather some interesting letters and is a good place to store club software. I have had requests to repeat all these features on the club BBS as everyone is not on the net. Brian Kelly the BBS sysops is thinking this over and I am sure would like to hear your views, at the club BBS.

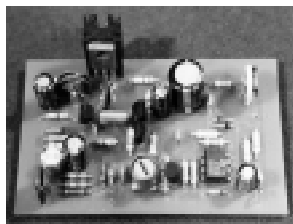
**CQTV** Enough of all this electronic cyber communications and lets get back to ATV and paper communications tough, as it is on trees. I for one am looking forward to reading this magazine, particularly as I have not seen it or angst over it in what can only be described as component form. If I have generated enough copy here to fill a page then Ian cannot include any derogatory clip art as part of the page, fingers crossed. Sorry to spoil your only enjoyment but I do not wield the axe anymore Ian, and hopefully there is not enough space for you to depict my new role.

**TREVOR BROWN G8CJS**

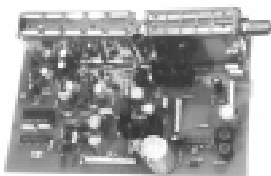
**BATC Chairman.**

# GB3XT Kits & Bits.

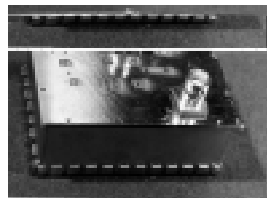
**GUNNMOD2 3cms  
ATV. TX. kit.** Very popular full feature Gunn diode TX. Complete with pre-tuned oscillator head. £30.00. PCB. kit less oscillator **£20.00**



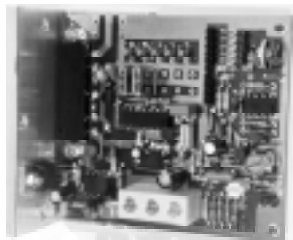
**TVRO3 ATV Tuneable  
IF/RX. kit.** Fully featured 750-1700MHz input. 12vDC operation. No setting up or alignment required. **£50.00**



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Orders etc. to

**Bob Platts G8OZP, 220 Rolleston Road, Burton Upon Trent, Staffs, DE13 0AY.  
Phone 01283 531443, 7-9pm on weekdays only please.**

## **Dead Ducks and Forgotten Formats**

### **Andy Emmerson takes you on a fast forward history of home video.**

When did home video start? Easy question, difficult answer. Ask two people and you'll get at least five answers, and if there's confusion and debate, it lies in the difference between availability and affordability. Look at it this way... if you want to buy a giant-screen wide-format TV today there's nothing stopping you – except an unbelievable price. But no-one can deny they're available now. And so it was with home video in the early days; the price put them in the luxury bracket and they were definitely not mass-market products.

Today VHS is well-nigh the universal video recording format, simply because it's affordable. Earlier domestic video systems weren't and that factor alone was sufficient to ensure their rapid decline into obscurity, although it didn't seem that way at the time.

The first true home video outfit was brought out by Sony in 1966 and it rejoiced in the memorable title of CV-2000. It appears that CV stood for Consumer Video, although Sony never used that name to brand the system. Observers loved it and when Sony launched the CV-2000 recorder, noted hi-fi writer Gordon J. King named it 'a Japanese miracle'. Sold complete with a dinky little 9"-screen portable television, it was an instant hit with the press and other opinion formers.

Its price didn't exactly translate into huge sales, though; the recorder and TV cost £365, whilst the camera, lens and tripod cost an additional £131. A portable recorder and lightweight camera together with sound and vision mixers were also available, but this was in an age when you pick up a brand new car for around £600. As a consumer product it was a failure, although a fair number of outfits were sold into industrial and educational use. Today these equipments are highly collectable and tapes recorded at the time have yielded several lost television programme treasures.

The system worked reasonably well but the fact that it used open-reel tapes at a time when consumers were becoming used to cassette tapes and cartridges for audio was recognised as a weakness. Within five years a consortium of Japanese manufacturers had collaborated to bring a new, cassette-based system to market. This they called U-Matic. It could record colour as well as black-and-white and it was very robust – virtually idiot-proof in fact. The equipment was heavy and extremely bulky, and like the CV-2000, it could record only one hour maximum. Systems were sold into the consumer market in the USA but it was only for the well-to-do. Like a

## *Dead Ducks and Forgotten Formats*

few other apparently dead ducks, U-Matic migrated rather than disappeared. It ended up finding an unexpected niche in the professional market, where it turned out ideal for training and promotional video productions, and the machines are only now starting to be replaced in a big way.

The first video recorder for the home using cassettes came in 1974, when Philips launched their model N1500 VCR or Video Cassette Recorder as ‘a landmark in the history of television and the start of a revolution in home entertainment’. Cost once again meant this machine was only for the well-to-do; the recorder cost £388 in 1974 money, whilst blank tapes cost £25 an hour. A succession of video machines and formats followed – Betamax in 1975, VHS in 1976, V2000 in 1981 – with no obvious winner in sight for another decade.

Time will tell, they say, and for home video it already has told. VHS is well-nigh universal now, and its higher-performance partner S-VHS has made little impact except with the enthusiasts who appreciate its 60 per cent improved picture quality. Betamax, on the other hand, is now regarded as a dead duck, although considering the number of Beta machines sold around the world over a period approaching two decades, ‘flop’ is hardly the right word to use.

Even more, ‘Betamax’ has become the generic word for a video recorder in South America, just like many people call every vacuum cleaner here a ‘Hoover’ and every ball-point pen a ‘Biro’. Today there are still many video devotees who cherish their top of the line Beta machines, claiming better results than S-VHS, whilst the continuing sales of blank Beta-format tapes indicates there must be a mighty big population of humbler recorders still used for time-shifting.

There were some interesting quarter-inch formats. Akai made a variety of mono and colour open-reel video recorders, whilst the Funai/Technicolor miniature cassette system also had its brief period of success. And what about Pixelvision and the other kiddycam products? Fisher-Price introduced a children’s camcorder in the late 1980s that recorded black-and-white pictures on normal audio cassettes; it was called the PXL-2000 and is already highly prized as a collector’s item. Tyco has a similar product on the market now; although picture quality is not as good, it might yet turn out a good investment as a ‘modern antique’!

Finally a word about the video disc. As a home video device, this was the oldest format of all – after all, Baird had offered recordings on gramophone records in the 1930s. What’s more, Telefunken and Decca fooled with their TelDec system in the sixties. Later, growing affluence

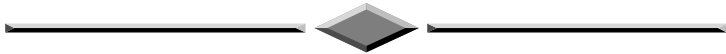
## *Dead Ducks and Forgotten Formats*

and a perceived dissatisfaction with the sound and picture quality of VHS tape led Philips, JVC and RCA to launch video disc products.

In Britain JVC's VHD system aroused little interest except for some industrial projects and only Laservision/LV (from Philips) and Selectavision/CED (from Hitachi, using the RCA system) came into the reckoning; it goes without saying that they were all mutually incompatible and aroused little interest, particularly once new releases on disc dried up.

These early video discs cost the manufacturers dear; Philips weathered the storm but RCA was bankrupted and had to sell out to Thomson of France. Format wars and regional releasing policies have always bedevilled video disc systems... and look set to continue even now with the new DVD offerings. Truly those who ignore the lesson of history are condemned to relive it.

NOTE: Speaking personally, I am no longer collecting video tape machines of the past but there are a growing number of enthusiasts who would happily give these recorders a good home. If you are harbouring an ancient reel-to-reel machine, please contact me and I'll put you in touch with a willing buyer.



### **Deadline**

Will all contributors please note that the deadline for articles for CQ-TV 179 is June 15<sup>th</sup> 1997. Please send your contributions in as soon as you can **prior** to this date.

If you would like to contribute an article for publication in CQ-TV, then please send it to the editor, either by post, or preferably by email. If you don't use a word processor, plain ASCII text is fine. Please see page 2 for address details.





# IMPROVE YOUR TV RECEPTION

## SPECIAL DX GRID

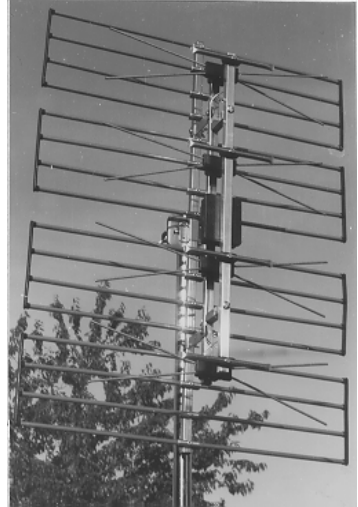
### Wideband UHF Grid with Directors

For receiving extra ITV programmes, or even Continental TV, the wideband UHF JJB/4 BILBOARD GRID provides the answer. Its wideband response means that a single grid can be used to cover the entire UHF spectrum,

The JJB/4 GRID is a special type of aerial consisting of FOUR STACKED DIPOLE assemblies which can provide improved results over a conventional 'Yagi' TV aerial. In some difficult reception areas where local signals are scattered and arrive at slightly different heights (with ghosting, signal imbalance, etc) the use of a grid can improve results,

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The JJB/4 is ruggedly constructed and features a 16-element reflector (not a mesh as found on other makes) providing excellent front-to-back ratio characteristics,



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TWIN GRID (with add-on directors, stacking kit and combiner).....	£69-95
SUPREME HI-GAIN LO-NGISE WIDEBAND UHF AMP (2SdB gain, 1,9dB noise) .....	£23-95
P1290 HI-CURRENT PSU FOR ABOVE.....	£15-95

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## List of French Amateur Television Repeaters,

January 1997

Information is given in the following order:

Location, callsign of repeater, Department, QRA locator, callsign of keeper, input frequency (MHz), output frequency (MHz)

1. CARLAT, F1ZDY, 15, JN14GV, F1ULK, 1255, 438.5
2. ROMANS, F5ZCH, 26, JN24NW, F8LZ, 1255, 438.5
3. EVREUX, F5ZBI, 27, JN09NA, F6GNJ, 1255, 438.5
4. NIMES, F5ZEI, 30, ???, F5AD, 1255, 438.5
5. CARTELEGUE, F1ZEC, 33, IN95QD, F1DZL, 1255, 438.5
6. TOURS, F5ZDD, 37, JN07FK, F6BRV, 1255, 438.5
7. GRENOBLE, FZ8TVB, 38, JN24NW, ???, 438.5, 1255
8. CHAMROUSSE, F5ZAR, 38, ???, F6BUH, 438.5, 1255 and vice versa
9. FIEFS, F1ZDM, 62, JO10DM, F1ESA, 1255, 438.5
10. MONTMORIN, F1ZDT, 63, JN15QQ, F1FY, 438.5, 1255
11. LYON Croix Rousse, FZ8TVD, 69, JN25KS, F1HMB, 1283.5, 1247.5
12. LYON Rilleux, FZ8TVA, 69, JN25KS, F1MHS, 438.5, 1255
13. LES MARCHES, F1ZEB, 73, ???, F1GCU, 1255, 438.5
14. LE HAVRE, F1ZDE, 76, JN09DO, F1EDM, 1255, 438.5
15. COISY, F1ZEA, 80, JN19DX, F1BPO, 1255, 438.5
16. No listing
17. MONTAUBAN, FZ5TVA, 82, JN03RX, F6DVW, 1255, 438.5 and vice versa
18. FREJUS, F5ZDS, 83, JN33EF, JN33EF, F6FCE, 438.5, 1255
19. LA SEYNE SUR MER, F1ZDV, 83, JN23WC, F1FKE, 438.5, 1255
20. CLAMART, F1ZEG, 92, ???, F1HPR, 1255, 10450
21. AULNAY, F1ZIF, 93, ???, F1NSU, 10475, 1255
22. ROSNY SOUS BOIS, F1ZEH, 93, ???, F1LGC, 10450, 10485
23. CORMEILLES, F5ZDW, 95, JN18CX, F6ENB, 1255, 438.5

From information supplied by ANTA, the French national ATV association

## **The \$70,000 ATV QSO, First Digital ATV**

**By Ned Mountain NC4X**

This is to all ATVers who have written about our digital MV tests. We will do an article as time permits, but here are some answers to the questions you have asked. Time is extremely limited, so I will not be corresponding on it any more until we get an article written!

1 The bandwidth of our first transmission was 2.7MHz. Modulation type was QPSK and rate 1/2 error correction was used. If we had more power available, we would have used higher data rates and higher bandwidth. These tests are next

2 The equipment is still way too expensive for hams. Each transmit system costs about \$70,000, and the receivers are \$3,000. This equipment is just now making its way into professional broadcast applications. I think it will be several years before we see prices anywhere near what we need for ham use. But, we are doing this experimental work to show what can be done in the future. We are fortunate to have access to this equipment as it is being manufactured by our company. Anybody working for a television broadcast station or network is very likely to see this type of equipment showing up in the satellite news gathering trucks during the next 12 months.

3 Video quality should be as good as what you get over the DSS satellite system, which transmits each channel at data rates similar to what we used. We can set the equipment for any data rate between 2.5 and 15Mbits/sec. Most broadcasters will use data rates in the 8Mbit/sec range for high quality transmissions. With digital ATV the picture is either perfect, or gone! In our first transmission, the picture was perfect, and we had about 3dB of margin. At the 2.5Mbit/sec data rate, pictures are perfect for normal.

ATV video. Higher data rates will insure perfect video under all motion conditions. In addition to transmitting the video, we also transmit 4 channels of 15kHz audio and a 19.2 kbit/sec data channel.

4. Further experiments are planned in September using higher power and higher data rates, and real antennas between the QTH of WD4MBK in Atlanta, and the two of us from various mountain tops in Georgia and North Carolina. Using digital ATV, we enjoy approximately 15 to 20dB advantage over conventional VSB-AM transmissions. Thus, we expect to

*The \$70,000 ATV QSO, First Digital ATV*

easily communicate over paths that would be impossible using normal analogue transmission.

[From ATV Quarterly, Autumn 1996]

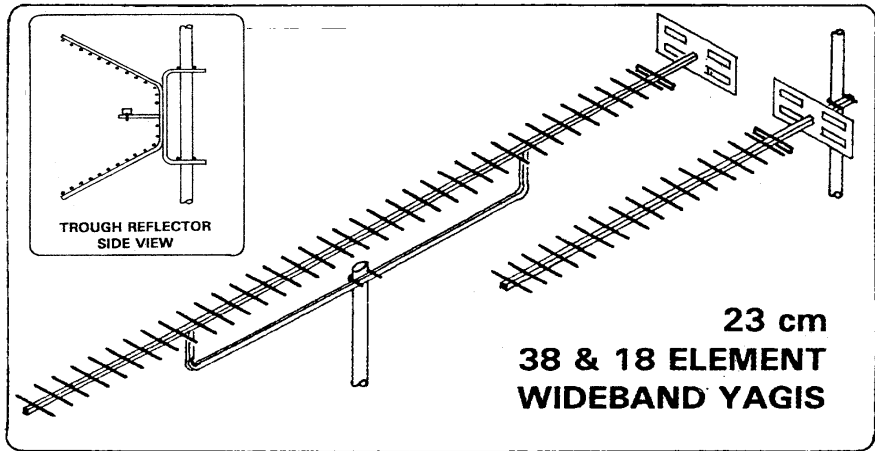


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# Sevenside Television Group



All of our 23 cm Aerials are specifically designed for ATV use - although they can be used for other modes as well. Wideband characteristics mean that you need only one aerial to cover the repeater input and output channels. Our famous wideband yagis come fully assembled in two versions :

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**POSTAGE**: **£3.75** for one aerial, **£5.00** for two or more. Telephone orders with cash on delivery: **£2.75** supplement per order, Orders from outside of the UK - please write for carriage quotation.

**CHEQUES** payable to "SEVERNSIDE TELEVISION GROUP" and send to 18, Linnet Close, Patchway, Bristol BS12 5RN. Telephone ( evenings & weekends only please ) 0117 969 8136. Please allow 28 days for delivery.

## LUXOR 180 Series TV as a Monitor

**By John Stockley, G8MNY**

This TV series has a fully isolated chassis. Recognisable by its large metal framed vertical PCB across the back of the set, the TV's were also badged as LLOYD'S. Two main types were made, 26" & 14". Only one rare version had video in & out, which used an extra internal PCB, external buffer amps & a connection box.

Here is a simpler way to add Video/Sound in & out that can be made on strip PCB or just mounted ugly on the motherboard, as there is plenty of room track side. There are also two other modifications that could be done to many TVs - one for extending the coverage to 70cms, and one for VCR friendly slow line syncs, that helps keep in lock a noisy off air video without jagged VCR mode verticals.

The 26" model can also be made "S" input by the separating the Chroma video feed, uplifting the luminance HF response & shorting out the colour subcarrier luminance trap. Contact me if you need details of this mod.

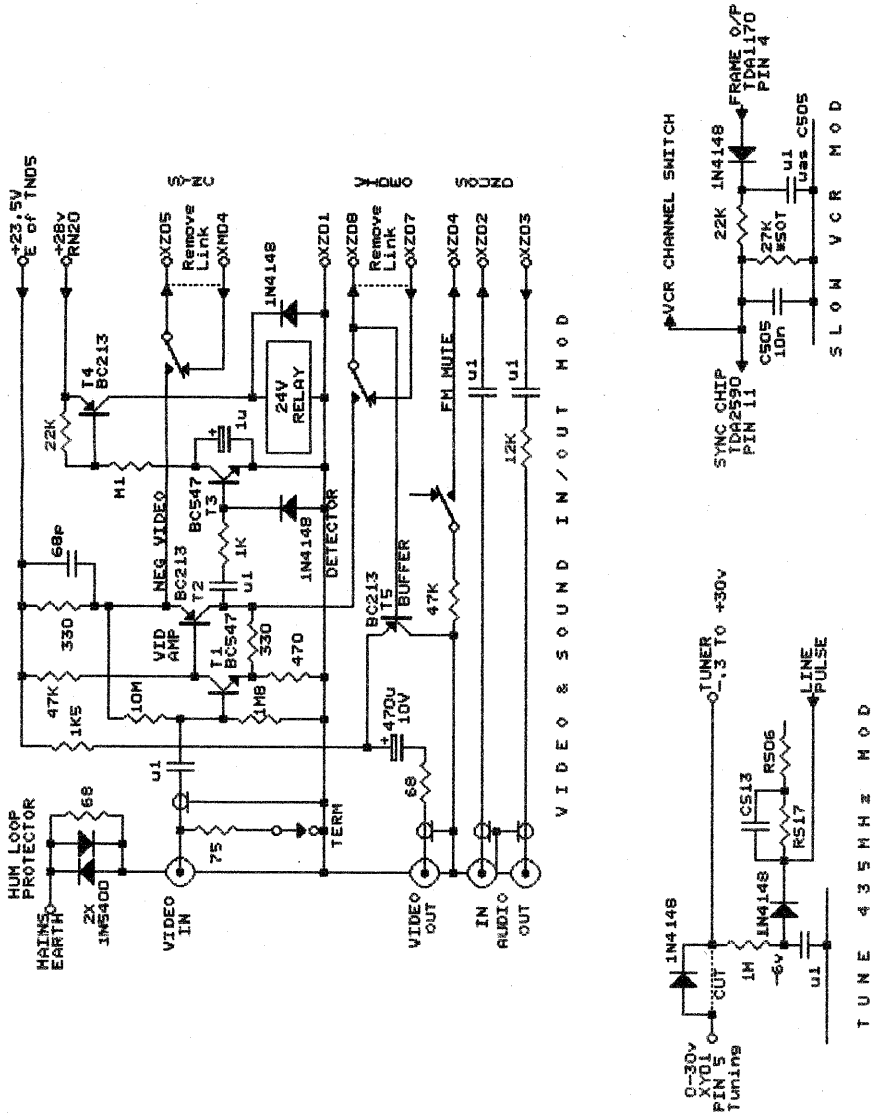
### Video In & Out

For Video work the chassis is safety earthed through 2 diodes & a resistor, to avoid hum loops, but keep connections static (& mains fault) safe. The mains lead may need changing to a 3 core.

On the 14" sets mount the input & output sockets 2x BNC video & 2x Phono audio on the earthed copper screening foil of the back, with the term switch utilising the blanked off hole.

The video output is buffered with T5 from the 2Vp-p rail and matched to 75 ohm with a 68 ohms in series with the 470µF blocking C. The external video input is optionally terminated to permit daisy chain loop through, and amplified by a high input impedance 2 transistor amplifier T1 & T2 that give the 2Vp-p video and negative video for the TV sync circuits. External Video mode switching is done by a 24v relay driven from a video detector T3 & T4 feed after the video amp.

Audio input is just additive, but the TV Rx audio is muted by relay switched 47k to ground on Sound FM IF IC TBA120 pin 13.



### Tune 435

The UHF section on the tuner nearly covers this band, so with a slight negative tuning voltage it does so easily. Cut the tuning track near XY01 pin 3 and add the series diode. Make the -6v rail from rectifying the 55v line flyback pulse rail (only -7v swing) on resistor RS17 with a diode & cap. Apply the negative voltage to the tuner through a 1M resistor. This

## *LUXOR 180 Series TV as a Monitor*

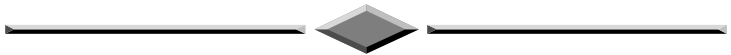
ensures the tuning range is only offset by the few MHz needed. Re-tune the push buttons and set up one (not VCR ch button 8!) to 70cms.

### **Slow VCR**

If you receive a weak signal in VCR mode (Push button 8) the fast line PLL time constant will cause very disturbed verticals that degrade the picture. However it is possible to keep most of the VCR mode ability to lock with a slow time constant provided the sync PLL time constant is switched to fast mode during frame fly back, which is just after the VCR head switch that causes the line phase change.

The circuit generates positive pulses from the frame output flyback swing, shapes the pulse with the diode & 0.1 $\mu$ F & applies it to the line timebase chip VCR pin through the 22k & 27k resistor. The filter cap C505 0.1 $\mu$ F needs to be changed for 10nF to allow the pulse through. The value of the 27k may need “selecting on test” depending on the chip sensitivity and frame height, so that the mode switching back to slow time constant is just at the top of the screen. If this is not right it shows up as a small kink in verticals. If it is not switched to fast mode for long enough it will not lock to a badly phase shifted recording.

This mod does not affect the VCR 8 button, that puts the set into VCR mode as usual.



## **BATC on the Internet**

The URL (address) is:-

**<http://ourworld.compuserve.com/homepages/batc>**



Members Services Sale

**One Day Only!**

The following special offers will ONLY be available at the BATC Rally on April 27<sup>th</sup> - while stocks last. Not only are there some great bargains, you save on the post and packing as well!



Digital television is coming. If you want to experiment with this mode, we have a few UVC3130 ics, that allow you to digitise a video signal, and also to convert it back to analogue.

Normal price: £47.00. Sale price: **£40.00**, including data!

24cm receiver. Build a 2 input 24cm receiver, with video and audio outputs. The through hole plated PCB, ASTEC AT2352 and the XR215 phase lock loop IC are included in this package deal, with circuit diagram, layout plan and component list.

Normal price: £74.50. Sale price: **£68.00**

I<sup>2</sup>C project. This project allows a dedicated computer to control the station, receive Teletext, generate test patterns, etc., but unlike other computers, the screen displays can be locked to your other picture sources. Other boards are available to expand this project, but this basic starter package comprises the I<sup>2</sup>C VDU PCB, I<sup>2</sup>C CPU PCB, the SAA5231 genlock IC, the SAA5243 Teletext IC, the PCP8583 real time clock IC, the specially programmed EPROM - and we'll throw in a 13.875MHz crystal and the circuit and layout plans and a parts list!

Normal price: £64.90. Sale price: **£60.00**

Come early to be sure of obtaining what you want ... or wait till after 2pm and you can have an extra 5% off the sale prices - IF there are any left!

## **A Slice of PYE**

### **By Dicky Howett**

Dicky Howett recalls the famous radio and television manufacturer PYE LTD. He talks to retired Pye engineer and long time BATC member, Ian Waters.

Today, little remains of the Cambridge electronics company called Pye. In the 1930's, Pye Radio Ltd was world famous as a manufacturer of stylish radio sets, including the familiar art deco 'Sunburst' MM model of 1932. Also, Pye was in the vanguard of television development. As early as 1930 it established a laboratory to investigate the commercial possibilities of cathode ray tubes. This lab eventually became the subsidiary company, Cathodeon Ltd. By 1936, just in time for the opening of the BBC's tv transmissions, Pye had it's first receivers in the shops. More models appeared as television slowly grew in popularity. These included 'budget' sets like the now extremely rare Pye 817 (1938) which had a picture measuring only 4 x 3 inches on a 5 inch tube.



**Ian Waters demonstrates his field sequential colour disk.**

Ian Waters joined Pye in 1948 at a time when the Company was expanding in many interesting directions. Ian recalls how he began his long association with Pye.

“I entered Pye as a Radio Engineer-Apprentice. It was a five year stint which initially sent us round all the assembly shops for a three year tour. During the final two years, apprentices were supposed to go into the

department of their choice to finish training. However in 1951, towards the end of my third year, the Company got a big order from the USA for television cameras.”



**The Pye MkIII 3 inch image orthicon camera. (1956)**

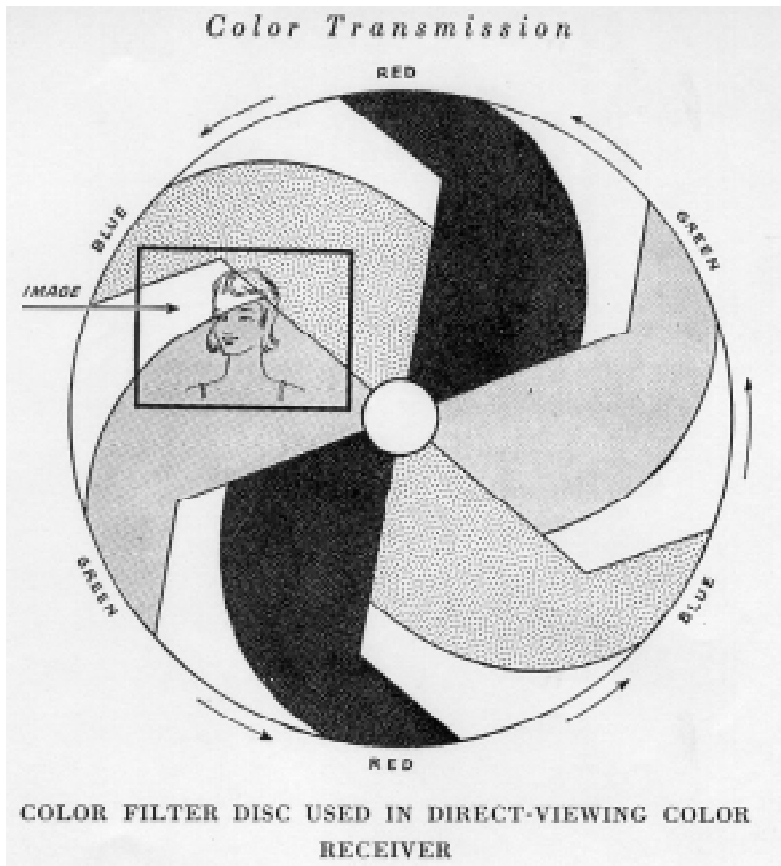
Ian at that time was an enthusiastic television amateur and had built his own television camera. Because of this practical experience, Pye decided to pull Ian off the apprenticeship scheme and start him straight away as a junior engineer on TV camera development, helping to fulfil that large and lucrative American order. Ian discovered that because of a massive expansion of television in America, there was a dearth of suitable TV broadcast equipment. As a consequence, a U.S. company called General Precision Laboratories Inc. was trawling Europe for useable kit. G.P.L. Inc. found Pye's new Mk. III 3 inch image orthicon camera highly suitable and it shipped many channels back to the States, re-badging them in the process. Ian Water's task was to help modify, to US line standards the Mk III.

“Actually, it was towards the end of the Second World War that Pye really started to develop TV cameras and transmitters,” Ian remembers. “What happened was that the chap running Pye, C.O.Stanley announced he wished to diversify and gave two young Pye engineers John Brinkley and

## *A Slice of PYE*

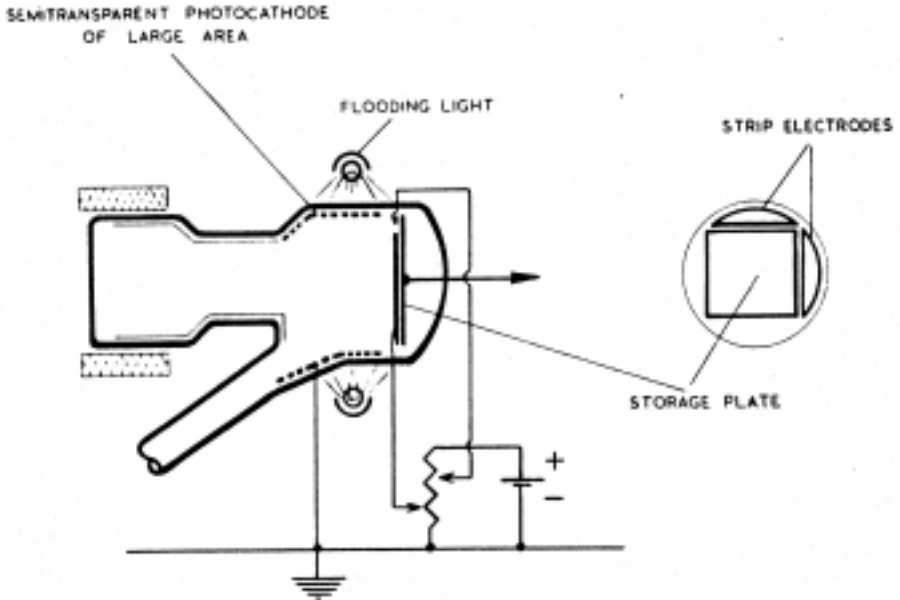
John Edwards their heads. He asked them what they would most like to do. Brinkley chose to work on radio communications (which became Pye Telecommunications Ltd) and Edwards chose TV broadcasting.”

In 1946 a department was established at Pye to study the whole of television broadcast equipment. An experimental studio was built and equipped with imported RCA 827 camera channels. These cameras used iconoscope image tubes. (An unusual feature of the RCA 827 camera was that it had a dual viewfinder. This showed not only an electronic image but superimposed, an optical image of a slightly wider view). Pye gained much valuable experience from this studio.



In 1947 the department had advanced sufficiently to enable it to undertake the design of a mobile o.b. unit which was built into the body of a Humber shooting brake. This unit contained two Iconoscope single-lens cameras

and two wheeled mounts. Also crammed into the Humber was the vision and sound equipment, a link transmitter using sync. modulation (a new concept which used the vision carrier for the sound signal) and an hydraulic aerial sticking out of the roof. This mobile unit travelled the Continent and the Middle East, introducing Pye as a serious contender in the new and expanding world of television equipment manufacture. Pye also exhibited this mobile unit at the 1947 British Industries Fair at Earls Court.



### **Photo-electron stabilisation of an image iconoscope**

In 1949, combined with intensive work at Cathodeon, Pye produced its first broadcast quality camera, the (Mk.I) PHOTICON. The Pye Photicon was an image iconoscope type camera with a four-lens turret and an electronic viewfinder (cameramen at the time were used to framing an upside down optical image. They actually asked for the electronic viewfinder scans to be reversed! Pye wisely refused). The Photicon camera had an image tube that was a distinct improvement over EMI's existing Super Emitron. Pye's Photicon was much smaller (half the size) than the original Super Emitron. Also the Photicon tube came ready potted with plaster of Paris in a sealed, quick-fit black box, complete with its scan coils and head amps. Just a few plugs and a screw secured the Photicon in place, which was inserted on rails. Any replacement due to unit failure

## *A Slice of PYE*

could be achieved with great speed. This cost and time-saving advantage appealed to the BBC and they ordered immediately a new o.b. unit (MCR 3) complete with three of the new Photicon cameras. This unit transmitted for the first time on the 12th Feb. 1949. Ian Waters' very junior engineer non-technical type contribution to this spanking new o.b. unit was to paint the bottom of the scanner with Bitumastic underseal! (Outside broadcast vehicles became one of Pye's most successful products. Over 150 units were sold throughout the world).

Also in 1949 another Pye innovation arrived. This was the 'zoom lens' which was fitted to a Photicon camera. This experimental 2:1 zoom lens, (the first to be specially made for television cameras), was designed by Dr. H.H. Hopkins of the firm W.



**A Pye Photicon image tube of 1949, ready potted for use**

Watson and Sons, a Pye-owned company.

Later in 1952 an improvement of the Pye Photicon was suggested by Richard Theile, a German vacuum physicist working at Pye. At the time all high velocity picture tubes such as the Photicon had shading problems. The picture displayed edge flare and uneven patches which varied in proportion to the level of illumination of the televised scene. This shading was due to spurious electrons bouncing around inside the tube. Also there was an absence of a signal representing a black level.

Eventually, a solution to these problems was found in a process known as Photo-Electron Stabilisation or P.E.S.tication. A (Mk.II) PESTICON tube was constructed with an additional semitransparent photo-cathode surrounding the storage plate plus two additional strip electrodes. The photo-cathode was illuminated by pea-bulbs attracting the spurious electrons. This improved the picture balance. Also the signals

corresponding to black areas now had a constant value and thus a definite black level output signal.

Ian Waters has a story about a Pesticon.

“I was asked to mount an exhibition of amateur TV at the 1954 Radio



**The Pye Photicon Mk I (1948)**

Society of Great Britain’s display in London. My home-made camera had a Photicon but it was getting a bit insensitive so I wandered over to

Cathodeon to scrounge another tube. The test engineer gave me a sub-standard reject tube with a blemish on the target. But this particular Photicon looked a bit different with extra leads at the back. I was told to ignore them and just use the tube like an ordinary Photicon. I discovered, of course that this was one of the new Pesticon tubes. I soon connected the extra leads and got the thing working perfectly with a good black level and no picture shading. On the day of the Radio



**Rear end of a Pye Photicon MkI (1949)**

Society exhibition everyone marvelled at the pictures from my camera including two distinguished gentlemen who wandered over and expressed

great interest in my camera and it's pictures. I recognised these two chaps at once because they were none other than D.C. Birkenshaw and R.H. Hammans, top BBC television engineers. Mr. Birkenshaw took off his hat to me and then immediately placed it over the lens. 'Excuse me,' he said, 'But that tube can't be an Iconoscope and it can't be a Photicon, because I can see it's got a black level!' So I owned up. Anyway, the next day I was summoned by Cathodeon's technical director who was furious, wanting to know why the BBC had phoned him to complain asking why it was that Cathodeon couldn't supply Lime Grove with tubes that had a proper black level, because they had seen such a tube working only the day before in a home made amateur camera!"

Earlier, in 1949, Pye engineer Les Germany had visited the USA to report on CBS's colour television experiments. CBS's colour system was the Field Sequential System (adopted briefly in 1950 by the FCC as the official American colour system--and then quickly abandoned in 1951). Dr. Peter Goldmark had helped devise this purely mechanical colour system which consisted of a spinning three-colour disc (red green and blue) rotating quickly in front of an ordinary 3 inch image orthicon pick-up tube.

Ian Waters, "When Les Germany arrived back from the States he set up this top secret department. Of course, all of us young lads were terribly keen to know what was going on in that building with the painted-out windows and guards on the doors. Then one day an old chap from 'Goods In' came down the yard with three large rolls of coloured gelatin under his arm saying, 'Where's this bloke Germany? I've got something for him!'"

All the secrecy was essential because Pye had an eye on possible lucrative medical applications for colour television. Eventually, a 3 inch I.O. 405 line camera with a spinning colour disc was built for use in an operating theatre. The camera was fitted into a streamlined white enamel case and mounted on the end of an adapted Mole Richardson microphone boom. Whilst the camera dangled above the operating table, the cameraman at the other end had, mounted on the boom pram, mechanical controls for pan and tilt, plus a monitor. This camera (re-packaged without the mic boom) was demonstrated at the 1949 Radio Olympia. Several 14 inch and 17 inch spinning disc monitors were positioned around the stand and members of the public were 'televised' in colour. It caused a big stir. However, this relatively inexpensive colour system was not destined to last. Apart from incompatibility with existing receivers, the major drawbacks were tiresome flicker effects, lateral movement colour break-up and a field scanning rate (150Hz) requiring three times the normal bandwidth. Also from the receivers, the faint purring noise of the spinning



colour disc could be heard. This might have proved distracting in the long term. More alarmingly, a tv set actually disintegrated when somebody turned it round when the disc was still at full spin. Despite these problems, Pye's mechanical colour system had in 1953, another airing at the Coronation. Three cameras were positioned on top of the Home Office from whence they relayed views of the procession to several London hospitals, including Great Ormond Street.

"All this colour experimenting served a useful purpose", adds Ian Waters. "Like the 30 line mechanical system, it was a dead duck, but at least it spurred people on into the right direction."

Despite all those departed water fowl, Pye Ltd continued to earn a good living in the commercial world. In 1951 the previously mentioned Pye Mk III three inch image orthicon camera was launched. This camera proved an instant success and the BBC first operated the camera in November of that same year. Later, the Pye Mk III became the mainstay of Commercial Television, especially ATV who used them exclusively in their London studios and o.b. fleet. The popular ATV show, 'Sunday Night At The London Palladium' was shot using Mk. III's.

A major feature of the Pye Mk III was the sheer automatic nature of it. Turret, focus and iris could all be controlled from the gallery. The camera could also be supplied with a dedicated separate pan and tilt mechanism. Unfortunately, these automatic functions were perceived as a devilish management scheme to do away altogether with the cameraman. Naturally, the various camera-craft unions objected. Eventually, despite these reservations, over two hundred and fifty Pye Mk III camera channels were sold world-wide. The camera finally ceased production in 1960.

But returning to 1956, after National Service Ian Waters moved up in the Pye world. "I was put in charge of the Closed Circuit TV dept. We concentrated on supplying monitoring equipment to commerce and in particular, the nuclear industry.

Before I left the department in 1960, I introduced the 'Cambridge Station' which was a 'cheap solution' vidicon studio package which consisted of two cameras based on the Mk. IV industrial Staticon and a multiplexed telecine/slide camera, all for educational or emerging country use

A new division at Pye was formed in 1960. This was Pye TVT Ltd. Previously the section had been called 'Dept 24 Pye Ltd' but by the beginning of the nineteen sixties the section had expanded enormously. Thus Pye TVT Ltd became a separate entity within the group. (The 'TVT' bit actually stood for nothing. Chairman C.O. Stanley was simply fond of snappy tags). Ian Waters became Chief Sales Engineer, advising and

providing television stations with telecine machines, transmitters, cameras and turn-key packages.

By 1960 new cameras on offer included the Pye Mk IV 3 inch I.O. which had a manual turret and an optional-extra periscopic viewfinder hood. Late in 1960 came the Pye Mk V 4½ inch 1.0. camera. This versatile machine could run 405, 525, 625 and even 819 lines! It had a cone-shaped (and fully motorised again!) turret to allow long and short lenses to be mounted at an angle thus reducing the risk of cut off. ATV installed Pye Mk V's in its four new production studios at Elstree when the studio opened for business in 1960. Mk V's were installed also at BBC Riverside Studios and the Television Theatre.

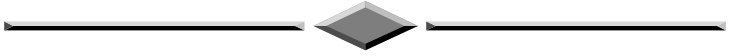
In 1963 the next new camera was the Pye Mk VI 4½ image orthicon. This camera was produced to BBC specifications which included reverting yet again to a manual turret. The Pye Mk VI was the last monochrome camera that the BBC commissioned and it was used exclusively, prior to the introduction of colour, in their o.b. fleet.

Pye's final monochrome camera was the Mk VII introduced in 1965. This compact camera, which made extensive use of transistors, was fitted with a detachable zoom lens. Later versions used a Plumbicon pick-up tube and the zoom was incorporated within the camera body. The overall design concept won an award and examples were exhibited at the Design Centre in London.

From the mid 1960's onward, the Dutch company Philips supplied the designs for all Pye's broadcast cameras (initially re-badged 'Peto Scott'). The first Philips camera in UK broadcast use was the three-tube Plumbicon PC60 colour camera. This camera opened the BBC's colour service in July 1967 with tennis from Wimbledon. Visiting Americans at the time commented that back in the States they hadn't got pictures nearly half so good!

Ian Waters moved from sales in 1971 to become Project Manager Transmitters. He retired in 1992. "It's difficult to judge by modern standards how successful Pye was. The bread and butter was receivers. The chairman C.O. Stanley would set up little developments like tv transmissions to soak up profits, rather than pay excess taxes. If we had a good idea, we knocked it up in the workshop and then put it on the market. If it was a success then the world beat a path to your door. If it was a failure, well, there was always the telly set sales to fall back on. Unfortunately, during the 1960's telly set sales fell badly due to the uncertainty about 625 lines and colour. Nobody was buying new monochrome sets in case they became obsolete. This hit profits and so on.

Ultimately in 1967 Pye was bought by Philips Industries. Although the broadcast side closed in 1986, Pye continues to supply innovations, albeit on a much reduced scale to the communications industry.”



**An inside view of the GW3JGA (John Lawrence) lair.**

## Beyond TTL # 13

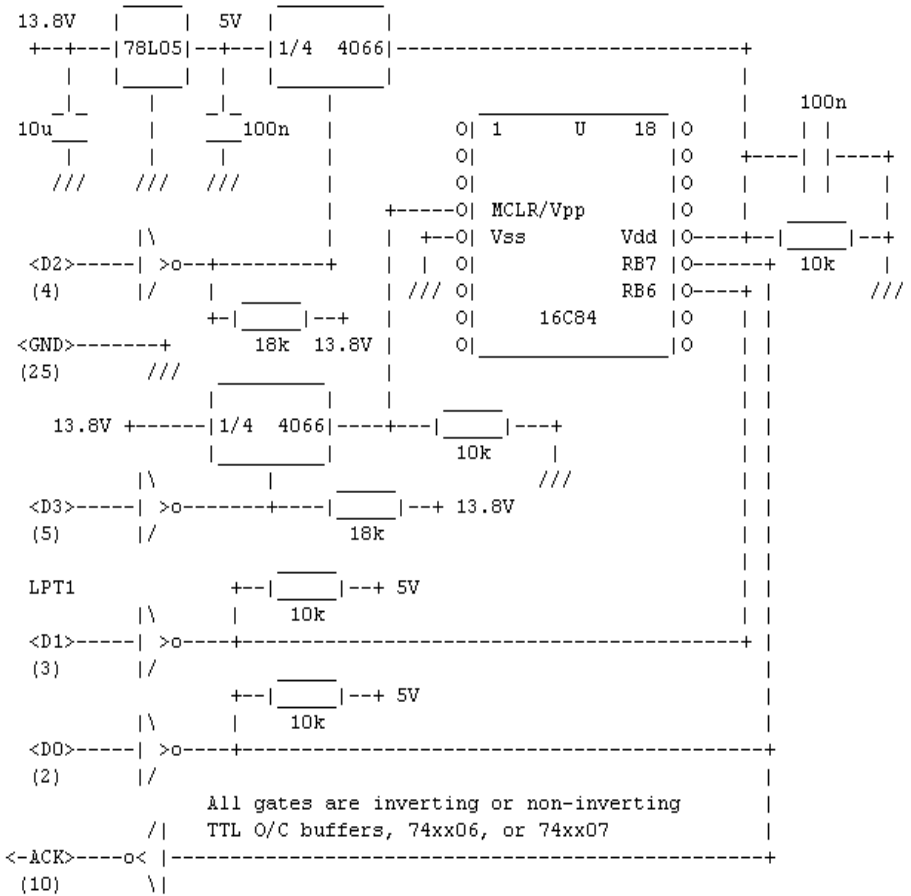
By Trevor Brown G8CJS, Bob Robson GW8AGI, Brian Kelly GW6BWX

In the last issue I reproduced Derren Crome's programmer for the PIC 16C84. As an alternative in this issue, I would like to reproduce David Taits programmer. The design is a little more complex, but it has the advantage of software which works with the MPASM assembler. The syntax for this assembler is different from the TASM assembler in the last issue, but is more widely used. The MPASM assembler is available from the Microchip BBS ASM14000.ZIP and comes in two versions Windows and non-Windows. I used the Windows version. It is front panel driven and all you have to do is press the correct buttons with the mouse to assemble the PIC code. The assembler then generates the files required by the programmer software.

The software to drive David Taits assembler is part of a file called PIC84PGM.ZIP. When you unzip it there are five files - **Readme** (useful notes), **PP.EXE** (Runs the programmer) **PP.BAS** (some Q Basic source code for the programmer) **PP.C** (some C source code for the programmer), and **PP.ASC** (Circuit diagram of the programmer hardware). I have reproduced the hardware diagram for the programmer in fig 1

The format is a little strange as it uses ASCII symbols to create a text file that can be sent as e-mail and reproduced without any special graphics package. It does not have pin numbers for the chips so reference to appropriate data books is necessary before construction. One minor bug is the reference to the open collector TTL buffers as 74xx06 and 74xx07. The 06 is an inverting buffer and the 07 is non inverting surely they can not both work, the answer is they can both be made to work but the software supplied assumes inverting TTL buffers. David covers this in his frequently asked questions file, where he states 7406, 74LS06, work fine. If you want to use non-inverting buffers then you will have to convert one of the source code files. David also mentions that with hind sight he could have used the spare gate to drive an unused port bit and made the software self configuring, but alas this is not a feature so stick to inverting buffers. The final advantage to David Taits design is that it reads the code and verifies that it has been programmed correctly.

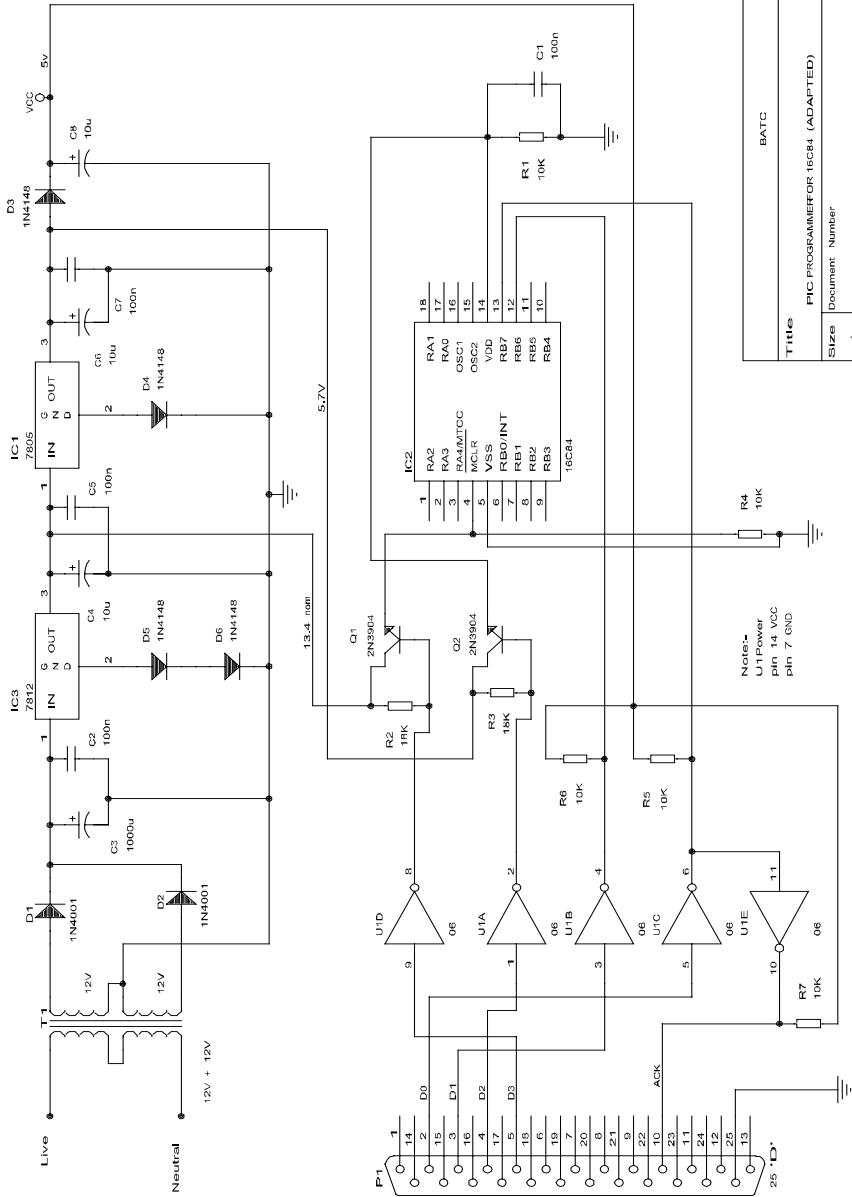
Basic PIC 16C84 programmer for PC parallel port



4066: pin-14, 13.8V; pin-7, GND. buffer: pin-14, 5V; pin-7, GND.

fig 1

I was going to close the hardware there but then Bob Robson asked me for a copy of the David Tait design and then on the evening of the last day before publication sent me his revised diagram fig 2.



Title		BATC	
PIC PROGRAMMER FOR 16C84 (ADAPTED)			
Size	Document Number		
A			
Date:	February 14, 1997	Sheet	1 of 1

This programmer is adapted from a design by David Tate. The modifications involve replacing the voltage switching elements. In Davids design the switching was done with a 4066 analogue switch, but it was felt that the 'on' resistance was too high to ensure the correct programming voltage. The adapted version uses 2 transistors as emitter followers. In addition the control program had to have a delay added to the 'device on line' test as the response was too slow when the control PC was a '486 or Pentium.

Referring to the circuit diagram:-

### **1) Power supplies.**

The voltages are derived from a mains transformer. The rating is quite low so the VA can be as low as 25. The rectified voltage is smoothed by C3, and is regulated to 13.4 Volts by IC3. The 12V regulator is 'jacked up' by the two diodes in the common lead (do use an insulating pad if you mount the regulators on a heat sink as **NEITHER** mounting tab is at ground potential). The 5 Volt supply is regulated by a standard 7805 but with its common lead 'jacked up' by a diode. The purpose of this is to offset the base/emitter drop in the switching transistor. The correct level of 5 volts for U1 is set by the forward current drop of D3.

### **2) Logic and voltage switching.**

Unlike the programmer in CQTV 177 the voltage switching for programming is done under the control of the PC parallel port. The initial conditions are that all the data pins are at logic 1, so no voltages are applied to the programming socket, as the two emitter follower bases are at zero volts. The first thing the control program does is to verify that the programmer is connected to its parallel port and switched on. It does this by applying a 0 to data bit 0 feeding U1 pin 5. This puts a 1 onto U1 pin 11 which pulls down the ACK line which the programme is monitoring.

Having decided that all is well the control program asks you a series of questions about the 16C84 you are using. The first is about the oscillator circuit on the board the PIC is to go on, then it checks the interrupt requirements and the start-up delay and code protection fuse. (I'll go into those questions later in this article).

Having satisfied itself about the answers you have given it (and assuming you have inserted a device to be programmed into the socket) the program switches on the supplies and happily begins to program the device. Should you have forgotten to insert the PIC the program will soon come to a grinding halt as after it has programmed each location it checks what is there (verify is the technical term !) and if the answer differs the program

halts and puts the address, required value and received value on to the screen. Assuming all is well the programmer will take about 25 seconds to program the PIC. It doesn't matter if you are only putting in 10 lines of code or 200 lines, the time to program is the same as it programmes all locations, then carries out a full verification. Then it sets up the fuses for the configuration you require.

### How do you use it?

I write my assembly files using a Wordstar program in a non documentary mode. The resulting ASM file is assembled using MPASM and, if the program has assembled correctly, I use David Taits programming program. As there is, on my computer certainly, a lot of directory changing I use a BATCH file to save time (and get it right every time!). This is one I use for the first PIC project I started.

```
cd\ws\pics
ws
cd\micros
mpasm 16c55 \ws\picS\picproj.ASM
type \ws\pics\picproj.err
cd programr
pp1 -8S \ws\pics\picproj.hex
```

So what does it all mean? (Those of you who are familiar with the procedure can nip off and help the wife with the dishes whilst I go through the process with the newcomers !)

The first line of the batch file changes to the Wordstar program directory and the sub directory where the .ASM files are kept. The next line starts up Wordstar. (You then have to press N to edit a non documentary file, then select the file you are going to work on - in this case PICPROJ.ASM). When you have finished and exit Wordstar the batch file then changes to the directory containing the MPASM files, then invokes the assembler program. The assembler generates the HEX file for use by the programmer program, a LST file containing the full assembled listing and the locations of all the variables used and, if necessary, an error file ERR containing all the errors found in the assembler process.

The batch file then types out any errors listed in the ERR file, and then goes on to change directories once again for the programmer. If I have any errors listed on the screen by the ERR file, the programmer program has to be aborted and the loop started again to correct the ASM file. Having got an error free assembled file you invoke the programming program PP1. In my batch file the line is:- PP1 -8S then the HEX file (in my case \WS\PICS\PICPROJ.HEX).



The programmer program then checks that the interface is powered up and on line and asks you to enter the type of oscillator your PIC is going to use i.e. 0)= LP (low frequency crystal), 1)= XT - Crystal/Ceramic resonator (higher frequency), 2)= HS - 10 MHz crystal or 3)= RC - Resistor/capacitor. When you enter the required number the program asks- Enable watchdog timer (y/n) ?. The answer to this will depend on your programme. The next question asked is - Enable Power-up timer (y/n) ? The answer for this is dependant on your programme requirements. The final question the program asks you is - Protect code (y/n) ? During the development phase of the PIC programme answer N(o), with the final version you MAY want to prevent any other person obtaining your wondrous program by reading the contents of the PIC so you would use the Y(es) to this question.

Having answered all the questions the program tells you to insert the PIC into the programmer and to press any key. After you press the key there is no apparent action for about 20 seconds then the program informs you that it is verifying the code in the micro, then tells you the fuse combination it has set up in accordance with your instructions.

The moment of truth is now at hand and you can take the PIC and fit it into your masterpiece and try out the program. What happens if it is not working as you expect (that's usually how my programs behave at first !). Don't panic because help is at hand. A programme MPSIM is a simulator program. Once this program is running you instruct it to load your errant file (HEX) and then you can run it at full speed (GO) or single step (SS) through the program so that you can find where you sent it , which is usually not where you thought you had sent it !

Having found the error(s) in your program it's back to the ASM file and round the loop once more, until the programme works as you want it.

On the BATC bulletin board in the BATC file area is a file BATCPICS.ZIP which contains the MPASM, MPSIM and PP1 programs. Once downloaded and unzipped you will find text files associated with each program which have the detailed instructions for operating them. Good Luck and Happy programming !!

All that remains is to get to grips with MPASM syntax and an example of a flashing led programme that will illuminate LED's connected to port B as per fig 3. The display sweeps the LED's Knight Rider fashion. The programme was written by Brian Kelly and is reproduced with comments below. The speed of the display sweep can be adjusted in software. (see comments)

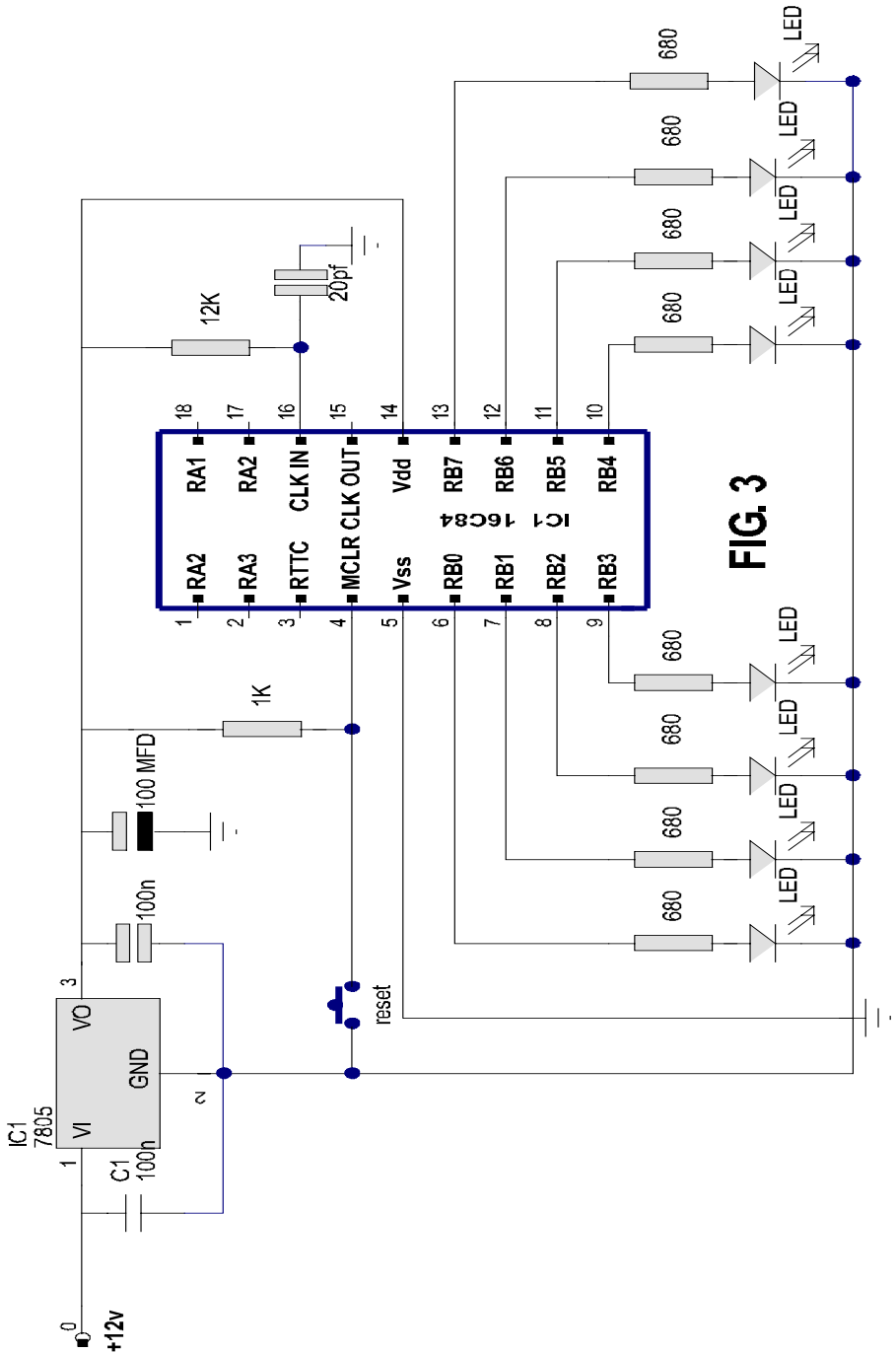


FIG. 3

```
; Demonstration of Microchip 16C84 for BATC.
; Brian Kelly. 14th February 1997
```

```
; The next line tells the assembler which type of PIC is being used,
; the default radix (number base) to use unless told otherwise and
; how many columns to use in the program listing before wrapping text
; to the next line.
```

```
list p=16C84, r=HEX, c=132
```

```
; Define the values to be associated with the register names and bit
; names used later in the program. Whenever one of the names on the
; left of 'equ' is encountered, the assembler substitutes the value
; on the right. This is not essential as the values themselves could
; be used but using meaningful names makes the program far easier to
; read and understand. Capital letters have been used for pre-defined
; registers, the remainder are used to store variables used in the
; program.
```

```
RTCC equ 01 ;the real time clock/counter register
STATUS equ 03 ;various status and control bits
PORT_B equ 06 ;port B, where the LEDs are connected
INTCON equ 0B ;bits for configuring the interrupts
OPT_REG equ 01 ;processor options (in register bank 1)
TRIS_B equ 06 ;port B pin direction controls (in bank 1
pattern equ 0C ;the on/off pattern of the LEDS
direction equ 0D ;only bit 0 used to decide left/right

same equ 1 ;put result back where in source register
w equ 0 ;put result back in the working (W)
register
C equ 0 ;bit number of the carry flag in STATUS
```

```
; The program counter (PCL), points to the next instruction to read and
; is set to 000H on reset so the first instruction to be executed must
; be there.
; As the interrupt vector is at address 004H, not leaving much space
; for code, we will start the program with a jump to an area where
; there is more space.
```

```
init
org 000 ;tell assembler to start at 000

goto start ;the jump mentioned above.
```

```
; This is the interrupt routine. A jump to address 004 occurs whenever
; an interrupt is generated. In this 84DEMO program, all the interrupts
; are disabled except for the one caused by the RTCC overflowing
; (reaching maximum count of FFH and rolling over to zero).
```

```
demo
org 004 ;move assembler to the interrupt vector

bcf INTCON,2 ;clear the interrupt bit so the chip
;doesn't immediately generate a new one
;when interrupts are turned back on.

;as this point is reached at fixed time
;intervals, use it to switch LEDs
```

## Beyond TTL # 13

```
display
    movf pattern,w           ;use working register to carry pattern
    movwf PORT_B           ;to port B

    btfs direction,0       ;check which direction to shift.
                           ;skip next instruction if going right
    goto left              ;the left shift routine

right
    bcf STATUS,C           ;ensure carry=0 before shifting
    rrf pattern,same       ;shift the pattern one position right
    btfs pattern,0         ;skip next inst if not fully at left
    bcf direction,0       ;fully right so reverse direction
    retfie                 ;return from interrupt to main program

left
    bcf STATUS,C           ;ensure carry=0 before shifting
    rlf pattern,same       ;shift the pattern one position left
    btfs pattern,7         ;skip next inst if not fully at left
    bsf direction,0       ;fully left so reverse direction
    retfie                 ;return from interrupt to main program

; This is the part of the program entered when powered up or reset. It
; initialises the processor and puts starting values in some registers.
; After setting everything up it goes into a loop, waiting for
; interrupts to occur.

start
    movlw B'00100000'      ;select register page 1
    movwf STATUS

    clrf TRIS_B           ;set all port B pins to output mode

    movlw B'10000111'
    movwf OPT_REG         ;sets: pull-up on port B OFF
                           ;RTCC counts internal clock
                           ;prescaler connected to RTCC
                           ;prescaler divides by 256
                           ;(other bits unimportant)
                           ; change the "111" to alter sweep speed.

    clrw                  ;clear the working register
    movwf STATUS          ;switch back to register page 0
    movwf direction       ;set direction to LEFT (bit 0 = 0)

    movlw B'00000001'     ;starting pattern for LEDS
    movwf pattern

    movlw B'10100000'
    movwf INTCON          ;sets:global interrupts enabled
                           ;RTIE enabled (RTCC roll over)
                           ;(other bits disabled/cleared)

loop
    goto loop            ;wait here for interrupts.

end                      ;tell assembler there's no more
```

# **RALLY 97**

## **Sunday April 27th SPORTS CONNEXION COVENTRY**

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## ATV at GB4CDI

**By John Stockley, G8MNY**

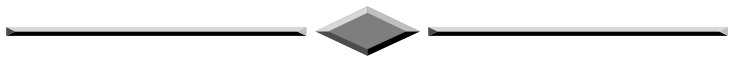
This 4 yearly Scouting event took place at Camp Down International near Biggin Hill in July 96. At the 1500 scout 9 day event this time as well as demonstrations of a Crystal set, HF, VHF, UHF, Packet radio, DF hunting and aerial erection, we put on some ATV. Seven Hams ran the station with special inspiration for the Scouts from young Ruth G7UYR.

We had a small battery 70cm QRP Tx and camera that worked 100m or so (Ladies showers were less than that!) that was actually used to demonstrate ATV during the day when nobody was on.

The 24cm ATV system struggled to see GB3HV at High Wycombe (65km) although the path should have been ideal, but the trees in the local wood beat our 63ft mast and a giant 65el loop Yagi. Over the days it became quite obvious we could only see the repeater when the tops of the trees were dry, and before the sap rose during the day.

However P5 pictures with sound were exchanged to John G3WFM in Potters Bar at 41km. The ground fell away in that direction with only a few trees. Also P5+ to Ian G4MLY's 100watt station at 18km showed just how good the pictures can be. These were contrasted by P2 to John G0PIA at 30km and P1 to Howard G8DXV at 18km both in Essex.

Amateur radio was only one of 33 activities laid on for the scouts, so the ones that visited generally showed an interest, although this was often Troop (individual camp) leader driven. I have noticed with a few it was the ATV that excited them, being able to see who your are talking to, and this had led them to work hard for the Communication Badge that we were teaching at the event. This was no easy task as the badge is a fair way down the road to a NOVICE licence. Seven Scouts completed the badge.



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## **UK Repeater Update**

**from G3VZV dateline 28-Jan-1997**

### **Headlines:-**

- Two new 23cms ATV repeaters have the go-ahead from the RA
- New frequencies have been agreed for our 10Ghz repeaters
- Revised specifications for ATV repeaters “almost” ready!

A new application for an ATV repeater located at the BBC installation at North Hessary Tor was received last July from the group. The callsign applied for is GB3WV and just before Christmas, the RA confirmed that they were happy for the licence to be issued. This box is going to be high up on Dartmoor and should have a considerable coverage. The contact person is Tony Reynolds G8CEQ the group confirm that they hope to be fully operational in a matter of weeks.

GB3AT near Southampton has also just been cleared and GB3KT in north east Kent should also be approved within the next few weeks.

In June last year, the RA announced that they would be withdrawing the 10,150 -10,300 from the amateur band in the UK. Unfortunately, our three ATV repeaters are located in precisely this section!

We have been in discussions with the Microwave Committee of the RSGB as the spectrum Committees are responsible for sorting out the various band plans. As a result a new band plan has been agreed which still retains three wideband repeater frequency pairs. The outputs are: 10040 - 10065 - 10135 and the inputs 10315 - 10340 - 10425

The TG and XG groups have elected to use the 10135 output /10315 input pair as these are the nearest to the existing pair. We hope that their frequency change applications will be processed before April 1<sup>st</sup> 1997 when the band changes come into effect.

The BATC has been in discussion with the RSGB for over two years to agree an updated spec for FMATV in general and repeaters in particular. Many hours have been spent on this and much frustration has occurred. Finally however we now seem to be getting a set of proposed numbers that can be reviewed on technical basis. The most important need is to ensure that there is no QRM from our units to the NATS rada's which exist within the 23cms band. The procedure for ensuring this has now been used successfully for the 'WV application mentioned above. A copy of this



procedure is available from G3VZV and can also be downloaded on the Internet <http://members.aol.com/rmgvet/rmg.htm> The other major matter is a definition of the bandwidth of the FMATV signal! Hopefully this should be clarified shortly!



The three most recent editions of CQ-TV, and the 1997 magazines index are available in electronic format in the Clubs web site. These can be viewed on-line with the Acrobat browser plug-in, or downloaded and viewed off-line. Please note that these files require version 3.0 or above of the Acrobat viewer. **Note:** They are not compatible with version 2.1. Both 16bit and 32bit viewers are available from the Adobe web site. A suitable link is provided from the Clubs web pages.

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## 13 cm Amateur Television

By Ian F Bennett G6TVJ

Thirteen cms is probably one of the more obscure amateur bands in use in the UK and is one of several that span the gap between the familiar 24cm and 3cm (10 GHz) bands. The amateur allocation starts at 2.310 GHz and extends to 2.45 GHz, this actually gives use quite a bit of room and allows all modes of transmission including FM TV up to a maximum power of 400w pep, a somewhat unlikely figure even with todays improving microwave components available to amateurs. The band is more extensively used in Europe and there are many TV repeaters using it as an output frequency, with 24cm as an input frequency. A couple of years ago I was fortunate enough to copy DBOTS P5 during portable operation while enjoying some quite astonishing lift conditions. DBOTS was estimated to be as much as 600 km away.

Close to the amateur band and actually in it (We are secondary users) some other TV signals can sometimes be found. But wait I hear you cry, isn't there another source of quite considerable microwave energy in this band? The answer is of course yes, microwave ovens work on this frequency and even the best sealed units still radiate a sniff of power. Ovens can be a problem but as long as this spot ISM (industrial scientific and medical) frequency of 2.45 GHz is avoided things are not too bad, they do actually provide useful rough frequency markers and prove the sensitivity of one's own equipment.

So why use the band at all when we have several other allocations for TV? I have personally found this band quite interesting as it exists adjacent to other professional frequency allocations. I have also acquired an LNB device which simplifies receiving these frequencies so I naturally decided to develop a transmitter to work with it. It is also, in the light of changing amateur allocations, advisable to both use other allocations and develop expertise in them, in case we were to loose part or all of a band e.g. 10GHz.

### How to get onto the 13cm Band

First thing we need is a receiver which tunes about 2.3 to 2.5 GHz. This may seem quite a tall order, but luckily by a quirk of fate a satellite band actually exists near by. In addition to the familiar "KU" and "C" bands a band called "S" band has been used for satellite TV which covers 2.5 to 2.7 GHz. The band is sometimes known as the "Arabsat" band, it is used abroad as you might expect in the far east, but LNBs for this band can be

## 13 cm Amateur Television

obtained in the UK if you look hard enough. We have been fortunate in obtaining several of these units, one belongs to the Severnside group and several other members have them including myself.

S band LNBS operate in a similar way to other types, they employ a considerable amount of low noise amplification to bring up the signal level and then down convert its frequency using a high side local oscillator running at 3.650 GHz. We have come across two types one made by California Amplifier and the other by Chaparral. They both exhibit very low noise figures as good as any preamplifier and due to the high side local oscillator will actually cover an input range from 2.7 GHz down to 2 GHz and hence fully cover the 13cm amateur band. Nigel G7JZP has very kindly carried out a number of tests on these LNBS and found them both to perform quite well. The filleting inside the units is very wide so the gain does not drop off quickly outside their rated frequency range. Unlike other LNBS the RF input is via a male "N" type allowing the connection of coaxial cable. The output connection is a standard "F" type connector and the LNBS are powered up the coax from the receiver in the normal way.

There are other possibilities for receivers and down converters. CQTV no 62 November 1992 carried an article for a simple down converter using mmics (monolithic microwave integrated circuits). VHF communications sometimes publishes articles on this band and there is also a German magazine DUBUS which also has articles written in English. Mainline Electronics advertises a low noise preamp and a narrow band transverter for 13cm. A transverter could be used as a TV transmitter.

## Antennas

JVL can supply loop yagis for this band and the designs for which have been published in various amateur publications. Tonna also supply an antenna centred on 2.330 GHz. It is a slightly odd beast, - basically a standard type Yagi with many director elements but the feed point employs an unusual waveguide type launcher with a probe inside. This is the antenna I use and is available through Lowe Electronics for about £70. 2.3 GHz is a frequency where dish type antennas start to become viable. It ought to be possible to construct a type of small dipole launcher and use it with a largish dish say 1m in diameter. Unfortunately most coaxial cables are starting to become quite lossy at these frequencies so lengths must be kept to a minimum. The LNBS have the advantage that they can be used up at mast height and connected literally onto the antenna itself. Transmitters are best kept close to the antenna, I use a remotely keyed transmitter in my loft space close to the antenna.

Transmitters on this band can be a bit challenging technically particularly as obtaining any significant level of power on this band seems to get expensive quite quickly. I have seen designs published, and it may be possible to get kits from abroad but I haven't seen anything in this country. CQTV no 160 again carries a design for a simple 13cm exciter. I have taken this design and added a synthesiser to it - this will be described in more detail later. As mentioned earlier, transverters are available for narrow band operation. If it were possible to generate an FMTV IF on 144 MHz then these devices could be used to form an upconverting transmitter similar to the G6TVJ superhetrodyne 23cms transmitter published in P5 a couple of years ago.

### Results

The results so far on this band have been quite good, certainly the reception of DBOTS from Germany is a personal best and quite a spectacular achievement if not helped by the location of Win Green near Shaftesbury which was about 900ft above sea level. Other terrestrial microwave signals from abroad were also copied up to P5, probably local cable feeds in some mountainous region somewhere. On a somewhat more local basis I have established a link to G1HIA's QTH, both ways using the synthesised exciter and a power amplifier providing a 'hefty' 900mW. Pictures were P5 in both directions, with some occasional interference, allowing duplex operation with GB3ZZ in the other direction. Some tests were also done from Tog Hill about 8 miles away with only the exciter and 10mW, this still yielded a P5 picture when using the Tonna antennas demonstrating the high sensitivity of the "S" band LNBS.

The autumn ATV contest proved to be quite successful on this band. G1HIA worked the contest station G7ATV/P both ways on 13 from home and I established a one way contact P5 from Walbury Hill some 50 miles away. This was good as the Severnside group was probably the only group to operate a contest station on four TV bands.

The LNBS we have used do have one or two quirks. They seem to suffer breakthrough from broadcast TV stations operating at UHF and also at the output IF frequency range. My 13cm Yagi points towards G1HIAs QTH only a few degrees off GB3ZZ. ZZ breaks through P5 almost exactly were the wanted IF exists, so some patterning is sometimes experienced. The LNBS appear to 'take off' sometimes if not fed from a matched antenna and they also being designed for weak satellite signals easily can overload. One other point to note - due to the high side LO in the LNB when tuning up on the sat receiver you are actually tuning down the 2.5 GHz band.

## A Synthesised Exciter for 13cms

This is basically a development of the design found in CQTV No.160 under the title 13cm the easy way. Well I don't know about easy but the unit does work reasonably well. I have added a SP5070 Plessey synthesiser to the exciter to maintain the frequency and hopefully make finding signals in this band simpler. I do like synthesised transmitters as they remove one of many variables encountered when attempting to establish ATV links for the first time. Antenna headings, receiver tuning and possible obstacles in the path are quite enough without some doubt about the exact TX frequency as well!

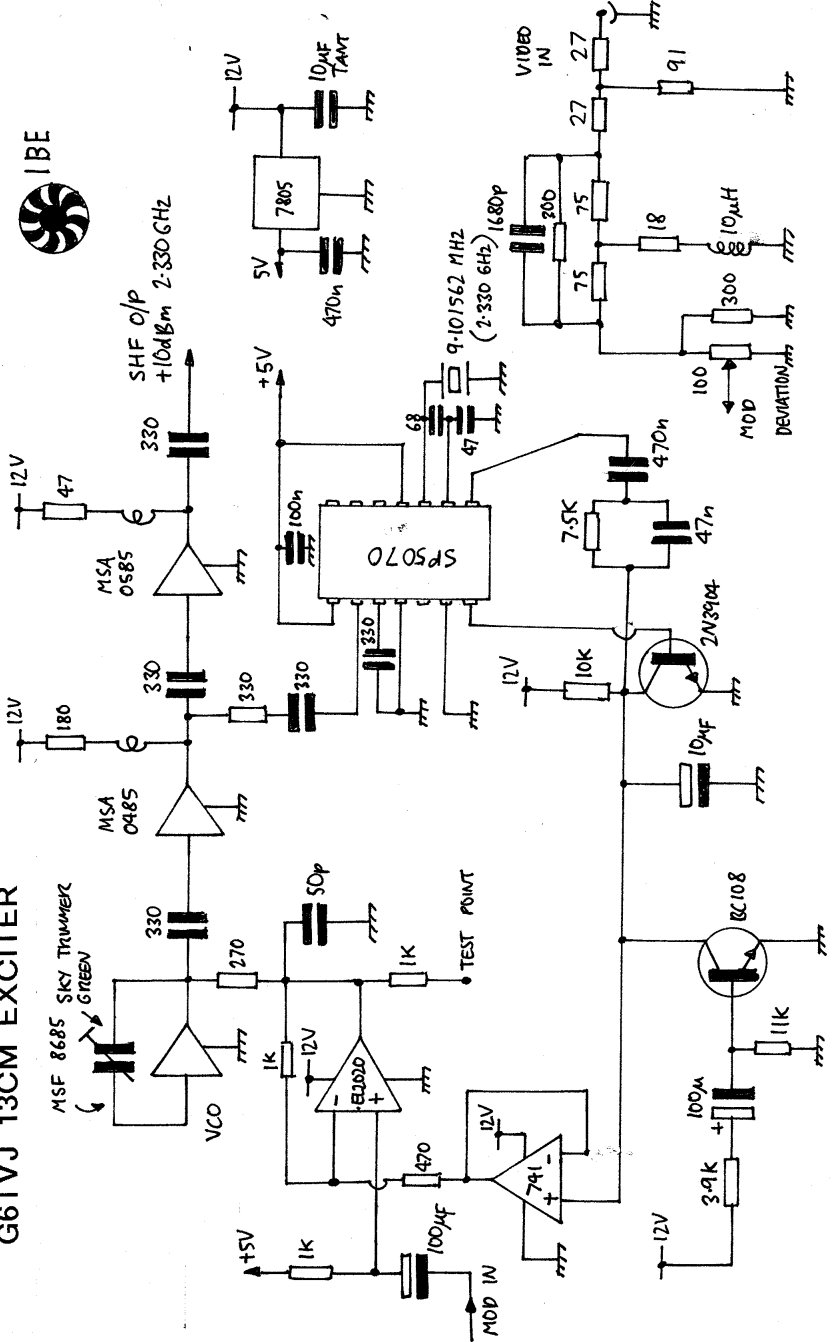
### How it works

A voltage controlled oscillator operating at the transmitter output frequency is formed using a self oscillating mixer device, an Avantek MSF8685. The frequency of oscillation is determined by a trimmer soldered directly across the device which forms a tank circuit, the inductance of which is formed by the parasitic inductance of the trimmer itself. The frequency of oscillation is also determined by the power supply voltage to the device, which allows the oscillator to be modulated and tuned.

The output of the VCO is buffered and amplified by a standard MSA0485 mmic device and then by a second mmic type MSA0585. These devices are starting to struggle a bit at 2.3 GHz but this arrangement produces about 10mW enough for a line of sight contact over a few miles.

Some RF energy is tapped off after the first amplifier and is fed to a SP5070 fixed modulus synthesiser chip. The SP5070 is basically a newer version of the venerable old SP5060 found in many 23cm designs. The 5070 is rated to 2.4 GHz so should be fine for the 13cm band. I did originally build the TX as an experiment to see if the device would work OK, which it did. The device is actually a standard DIL package (A surface mount one is available) and I mounted it on standard fibreglass board which is perhaps pushing one's luck a bit at 2.3 GHz as most commercial designs would certainly be using PTFE board and surface mount techniques at these frequencies. The TX frequency is produced at 256 times a crystal reference frequency which the chip uses. I chose 2.330 GHz which is OK for the antennas and is the official TV simplex frequency (I think), which gives a crystal frequency of 9.101562 MHz. The crystal is a standard parallel resonant unit with a 30pf shunt capacity. Crystals can be ordered from various outlets without much bother.

# G6TVJ 13CM EXCITER



## 13 cm Amateur Television

The SP5070 uses a simple op filter arrangement but care must be taken with the values so that low frequency distortions do not result in the video signal. The values I used work OK but are not ideal, but good solid P5 pictures are possible with these values. Unfortunately the VCO exhibits the wrong frequency voltage characteristic, an increase in volts results in a drop in frequency. This is opposite to the output of the SP5070 so an op-amp inverter is used and the system should then lock up. There is however another problem. When the TX is switched on the synthesiser initially sees no RF which causes the VCO volts to rise. As they are inverted the real VCO volts drop. The VCO volts are in fact its power supply so the device does not oscillate perpetuating the problem. Not much good for the receiving station sitting there patiently tuning up and down the band looking for you. The solution is to use a start up circuit. At switch on a capacitor charges up via the base of a transistor, which clamps the VCO volts long enough to supply the VCO with power to start up. The capacitor eventually charges up and the VCO volts are allowed to float up and down and hence the synthesiser comes into lock.

Video modulation is applied to the VCO using the non inverting input of the op-amp. This results in the correct modulation sense for use with the high side local oscillators in the receive LNBS. This I believe is actually negative modulation - if positive mod is required another video inverter can be used. A standard pre-emphasis network is used at the video input to the transmitter. The modulation sensitivity is quite good up to 6 or 7 MHz/V being possible.

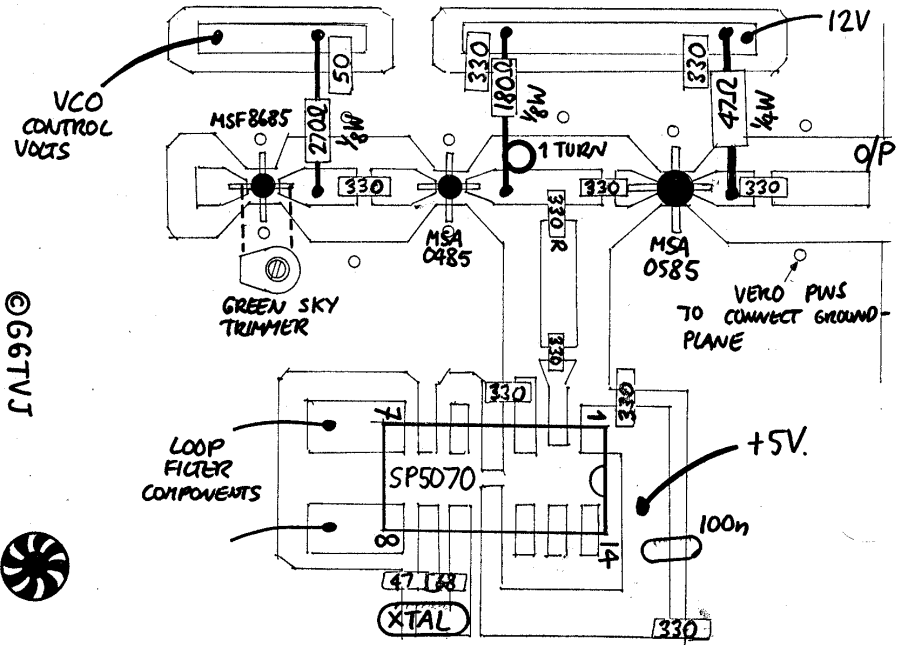
Sound can be added by using a subcarrier of an appropriate frequency. I used a sound modulator down in the shack remote from the rest of the transmitter by simply inserting the subcarrier onto the video near the camera. I have found 200mV of subcarrier sufficient for quietening sound with a reasonable video sig/noise. I have done quite a bit of work on trying to perfect a synthesised sound modulator similar to the one in the G6TVJ superhet TX, with varying results. Getting the correct audio pre-emphasis and hence a flat frequency response back out of a sat rx, is quite tricky.

## Construction

The SHF construction is quite tricky and a PCB layout is shown. Double sided board is used and one side is etched. Holes are drilled for the mmics in order to sit them down neatly onto the board and keep their lead lengths as short as possible. The pins on the SP5070 are cropped off and the device sat flush onto the board and the remains of the connections soldered down. Only the microwave components are critical the rest of the components including the op-amps can be mounted as convenient. The output connection can be an "N" type or SMA as long as sufficient



grounding is employed to both sides of the PCB. The PCB must be housed in a metal box. I used an eddy box with a copper plate at the output connector as the board will not solder directly to the aluminium box.



There should be only one major adjustment to make and that is to set up the VCO range. By monitoring the test point, the volts should rise up and down as the trimmer is adjusted, care being needed as the trim tool affects the frequency. The VCO should be adjusted for about 10 volts. When correctly operating the volts should be seen to vary as objects e.g. fingers are brought close to the VCO. Changing loads on the TX output will also "pull" the VCO a bit. A receiver can be used to further confirm satisfactory operation - when using an "S" band LNB with an LO of 3.650GHz it should produce an IF of 1.320GHz.

## Results

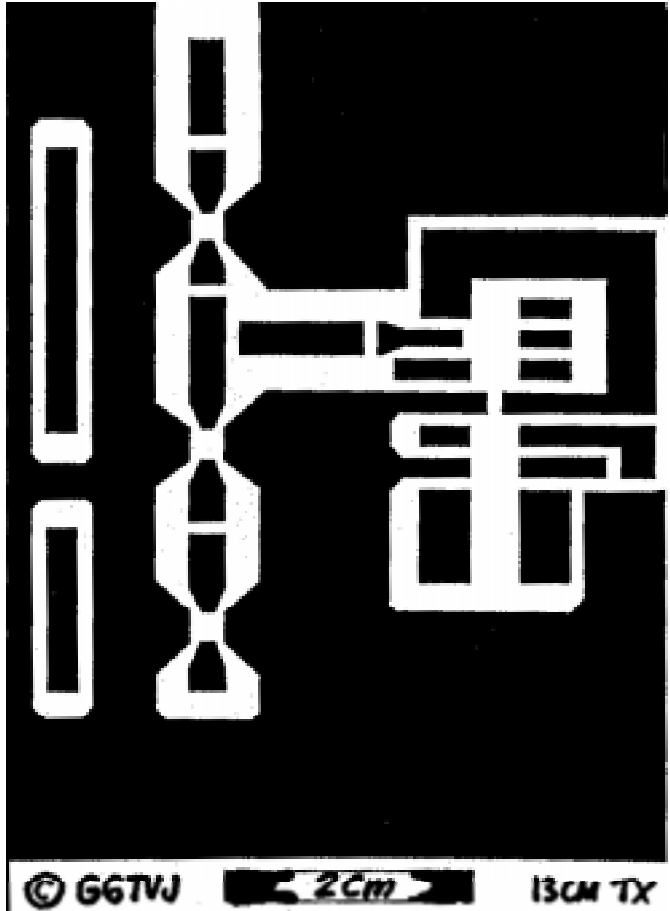
As mentioned earlier the exciter alone managed about 8 miles in conjunction with the Tonna antennas. The arrangement with the VCO is not very elegant but it does seem to start up and lock up reliably. I did try tuning the oscillator using a varactor diode but it seemed to drift a lot. I have seen a design for a transmitter VCO using BFR90/91/96 type transistors but 2.3 GHz is only about an octave away from the transistors

## 13 cm Amateur Television

$f_T$  of 5 GHz so problems might be experienced. The  $f_T$  is the frequency at which a particular transistors frequency response has dropped so far that the device has only unity gain. Mimic devices intended for these frequencies are actually fabricated from transistors with  $f_T$  of 25 GHz! I hope soon to try out a MK2 exciter using a commercial VCO unit covering 2.2 to 2.6 GHz. This exciter will also be synthesised using a better device and a prescaler chip.

### Burner

I have built a power amplifier for 13cms using a special microwave IC which produces about 900mW. The IC requires only 5mW of drive so it works well with a slightly padded down output from the exciter. The IC costs about £40 which isn't bad at



these frequencies. Plans for this PA will appear in a future P5 and perhaps CQ-TV as well.

## Channel 5 Ghost Story

By G8MNY

After seeing some of the recent test of CH5's CROYDON TX at Beulah Hill on channel 37, I investigated the weak signal and it's ghost at my South Croydon QTH. The TX is scheduled as 250KW ERP some 6dB down on the 4 services from the Crystal Palace Mast.

### Measurements

My comparative signal strength measurements were done with a simple fairly flat response loop aerial as the normal group A aerial for this area will have cut off by channel 37, a UHF signal meter, and stack of attenuators. This showed the CH5 signal to be at least 26dB weaker than the others, and not the 6dB as published. This was later confirmed with my home brew spectrum analyser. From CH5 contacts via Packet Radio all CH5 TX were supposed to be on full power!

### Ghost

The signal also had a severe but well defined ghost that defied my attempts to remove it. It was just over one of the five 10 $\mu$ S wide colour bars later, I guessed this delay to be about 12 $\mu$ S. This gives a reflected path of 12x300m = 3.6kM longer. I did a map plot traced on a large piece of paper with my QTH and the Croydon TX site. Hammered in 2 nails placed at these focus points, then I was able to draw a ghost ellipse using a piece of string around these 2 nails but some 3.6kM to scale longer, by placing a pencil inside the string and keeping it tight and drew the ellipse. This went right through the Crystal Palace mast, so I now knew that this was the cause. But why was it so strong? Beulah Hill mast does not produce any detectable ghost on the other 4 Crystal Palace signals.

### Rally Answer

After speaking to a broadcast engineer at Sandown Rally I had the answer. The French had objected to a main station on ch 37 as this would cause interference to there existing TV service. So the Croydon TX aerials had been designed to be 20dB down to the south eg. 1/100 of 250KW = 2.5KW ERP.

This was the cause of the weak signal, and as the full power signal can hit the Crystal Palace mast and reflect this is added to the weaker south signal, making the ghost some 20dB stronger. This ghost move around in

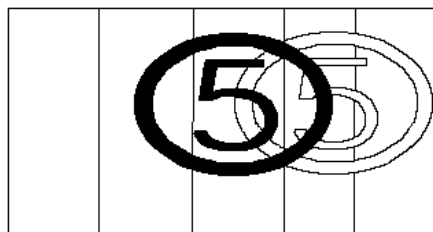
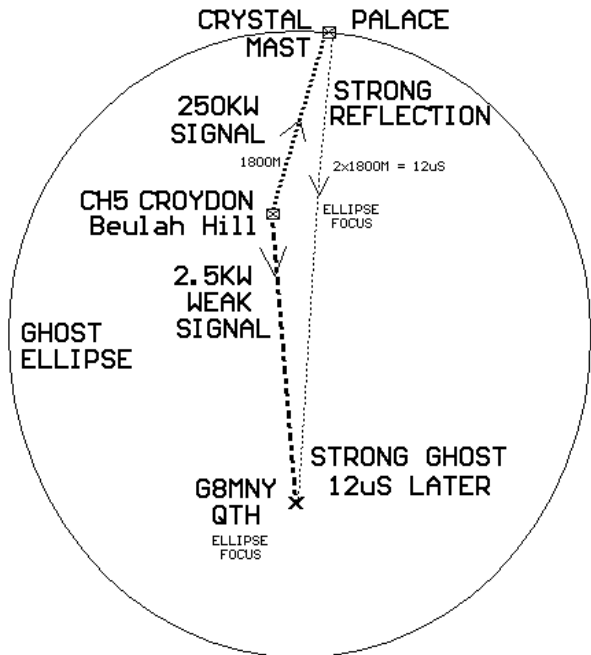
## Channel 5 Ghost Story

and out of phase (positive & negative) as the 2 masts move relative to each other in windy weather. The for most viewers the ghost can't be removed with different aerials as the masts are too close (2 deg apart my QTH).

### Digital

The Teletext P100 had a list of the CH5 transmitter channels, (also on page 1FF?) & P198 had a status of the Teletext encoder, showing errors etc. on some of the channels. No other pages were found on the test broadcasts.

This channel is supposed to be the first using fully digital TV links. However under the recent bad Wx there was picture break-up of the Colour Bars with wrong little squares (corruption on MPEG3 ?).



$\approx 10uS/\text{Colour Bar}$

Also while checking UHF band with a spectrum analyser, I noticed 2 Broadband square shaped signals on ch 28 & 34. These were both 50dB down on the main CP signals, and may be DIGITAL TV test transmissions!

## **How to get the Rally**

The Sports Connexion lies approximately 3 miles south of Coventry city centre and is at the junction of the A445 and the A423. It is within easy reach of the M1, M6, M40, M42 and M45. The major road links to and from Coventry and bypasses around the city make the location very easy to get to.

For those who wish overnight accommodation in the area the nearest hotel/motel is the Coventry Knight Hotel (01203 301585) which is approximately 2 miles from the venue and is located at the junction of the A45 and the A445.

For those who wish to camp or caravan, as usual the site at the Bull and Butcher (01203 301400) on the A445 1 mile south of the venue is ideal. The pub does excellent meals too - maybe I shall see you there on Saturday night? - min's a pint of Kilkenny's.

Coventry Amateur Radio Society will be providing the talk-in station again on S22 and GB3CV (RB9) using the special callsign GB6ATV. Many thanks to the GB3CV repeater group for allowing us to use the repeater again for this purpose.

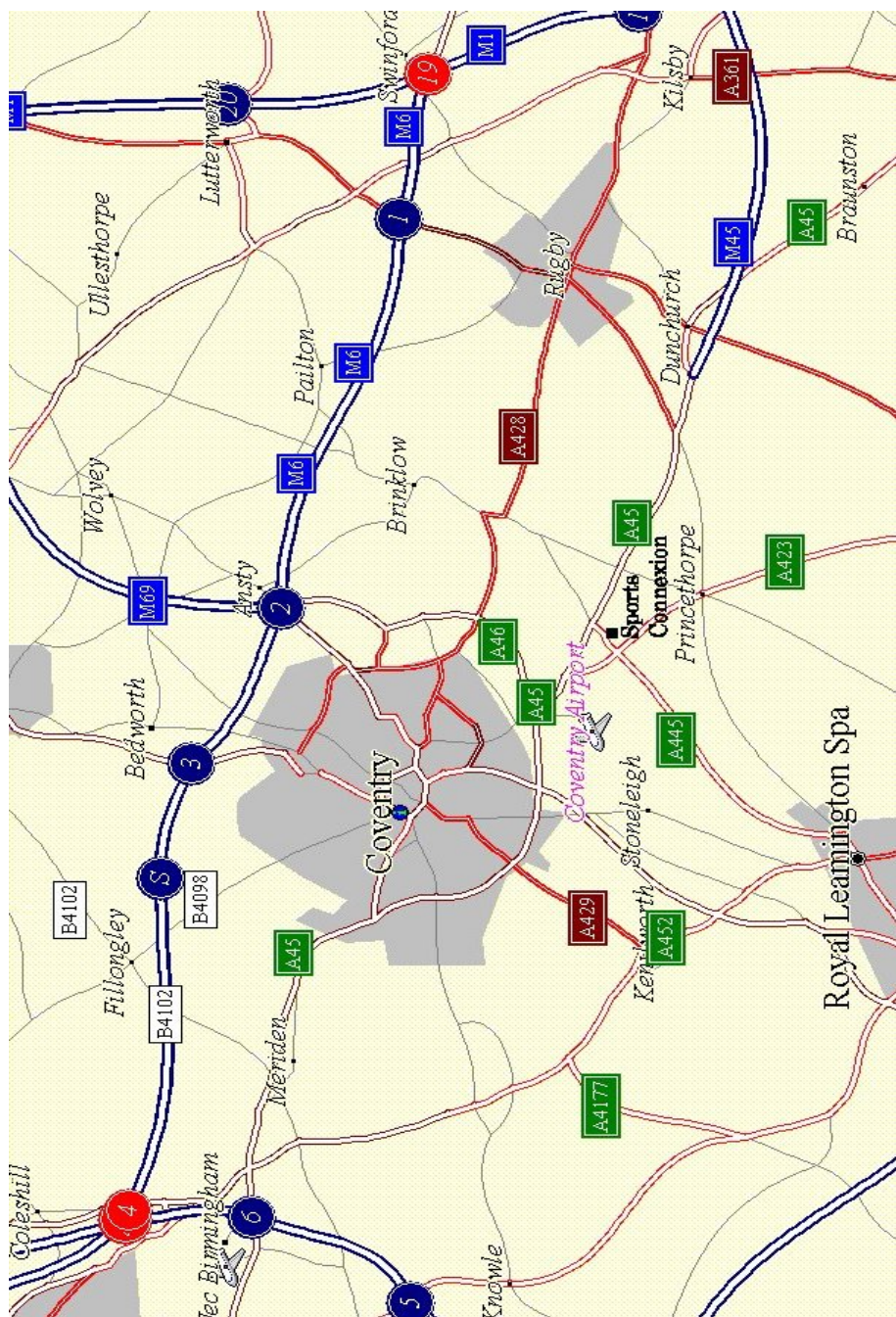
There will be a specialist area available in the Banbury Room (adjacent the bar) for anyone wishing to display ATV equipment. If you wish to do this please contact me as shown below to book a table, these are free of charge and only available to members, trading from them will not be permitted. Other specialist groups may also have displays in this area.

Finally, as ever, the usual plea for help. I have to admit that to some extent it actually worked last year! I shall be on site on Saturday from around 1500 setting up the hall and from 0630 on Sunday morning. if you can spare an hour or two on either day please come and help. If you can help on Saturday please phone me during the previous week or on my mobile on the Saturday, to confirm the time we can have access to the hall. Thanks in advance!

OK that's it. I hope to see you ALL there. Please come and make yourself known to me and the rest of the Committee.

73 ... Mike

Tel: 01788 890365; Fax: 01788 891883; Mobile: 0468 925351;  
Email: batc97@g6iqm.demon.co.uk



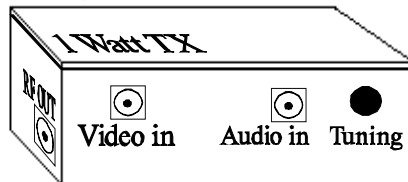
# Worthing & District Video Repeater Group

## GB3VR & GB7VRB

### 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 £80.00, P&P £2.50. Over 650 units sold to the Amateur market alone.

This is probably the biggest selling TX kit in the world!!!



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

## **Pair start Amateur Television Channel.**

**By Geoff Lewis**

Two Hamilton men have started their own TV channel. Bill Crawford and Jerry Lewis are behind the fledgling Waikato Amateur Television that uses a UHF frequency on channel 39. They have been sending home videos, in colour, to each other from their homes on Sunday afternoons.

Now they have bigger plans. "At the moment we transmit things like family videos. Anyone with a Sky TV aerial can pick up our transmissions. However most won't as all the aerials are aimed at the Sky repeater located to the east of Hamilton.

We are looking for a site for our repeater in the same area, which should allow many more to enjoy amateur television." Mr Crawford says.

The channel has a huge future and there are plans to approach schools to explain how it works.

The UHF system is also used by Waikato University's Static TV. At the moment, Mr Crawford and Mr Lewis, both members of the Hamilton Amateur Radio Club, use a line-of-sight transmission system with a repeater at the radio clubrooms in Seddon Rd.

And they use equipment that costs just a few hundred dollars.

Mr Crawford says compact modern electronics and falling equipment costs now makes high quality colour television transmissions readily available.

Mr Crawford, now retired, spent much of his working life in the electrical industry and as a trainee radio technician saw the first television transmission in New Zealand between two Wellington hotels in the early 1960s.

The Commerce Ministry monitors amateur television and the pair had to get an operator licence.

Interested people can call Mr Lewis on phone 847-5338.



## Circuit Notebook No. 60

By John Lawrence GW3JGA

### Stepped Frequency Burst Generator for Television Testing

This design uses the recently publicised Maxim MAX038 High Frequency Waveform Generator I.C. This device will generate square, triangle and sine-waves from low frequencies up to 20 MHz.

A useful test signal for testing video and television systems is a stepped frequency sine wave burst signal which is repeated at line rate and includes a line sync pulse to satisfy the requirements of the video circuits under test.

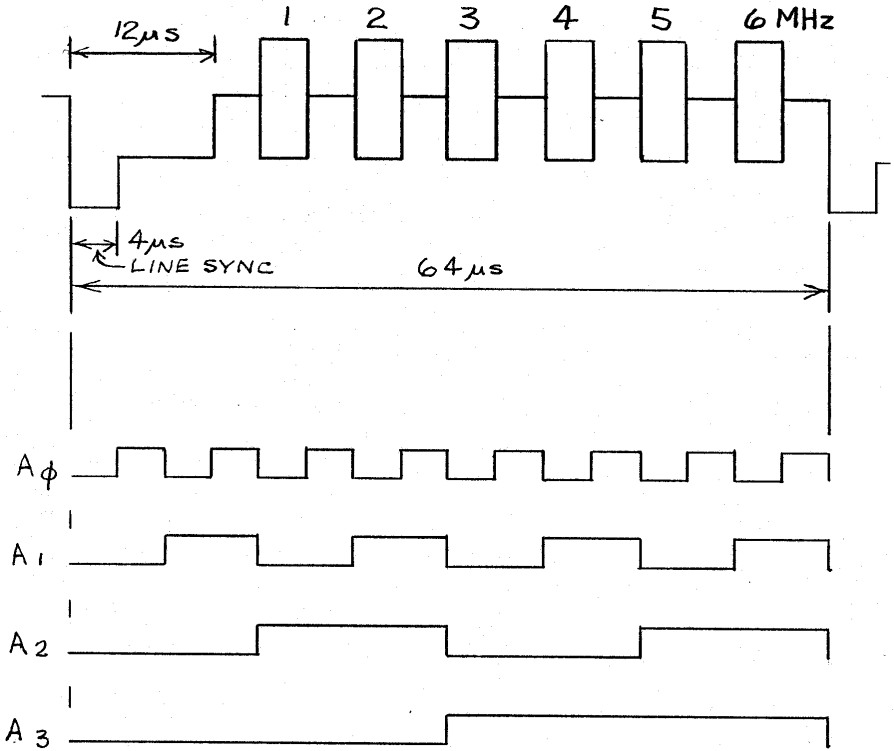
The circuit shown generates sine wave bursts of 1, 2, 3, 4, 5 and 6 MHz each having a duration of 4 $\mu$ s with 4 $\mu$ s spacing, which is repeated on each line. The peak to peak amplitude of each sine-wave burst is equal and extends from black level to peak white. The space between each burst is a mid grey. The line sync pulse is 4 $\mu$ s, a little shorter than the specified value of 4.7 $\mu$ s.

### Circuit Operation

The output from the 1 MHz packaged oscillator is divided down by the 4520, a dual 4-bit binary divider, to provide the address and timing signals to generate the TV line waveform. The 4051 analogue multiplexer is connected to a potentiometer chain, fed from a reference voltage, to provide a precise six step voltage staircase at its output.

This is fed, as a current, to the frequency control input of the MAX038 to generate a sequence of six frequencies from 1 to 6 MHz. The 4067 analogue demultiplexer provides sequential 'logic 1' outputs to control each section of the 4066 analogue switch. This switches the appropriate D.C. levels from the potentiometer chain, on the right, and the sine wave signals from the MAX038, to form the composite video waveform, as shown in Fig.2. The resultant signal is taken to the EL2020 video amplifier to provide a 1v p-p video signal across a 75 $\Omega$  terminated line.

The sine wave frequency output from the MAX038 has constant amplitude, but due to circuit layout and stray capacitances some compensation is required between the output pin19 and the rest of the circuit. In the prototype a 150 pF capacitor (selected on test) across the 270  $\Omega$  resistor provides a flat frequency response giving equal sine wave amplitudes at all the output frequencies.



**Fig. 2. Line Waveform Generation**

In use the test signal is applied to the 75 R input of the circuit or equipment under test and the output signal is viewed on an oscilloscope having an adequate bandwidth, say 15 MHz. The time base should be set to  $10\mu s/div.$  and synchronised by the line sync pulse. The resultant display shows the response of the equipment at the various frequencies and makes testing and adjustment quick and easy.

Reference: MAXIM data sheet for MAX038. Maxim Integrated Products (UK) Ltd., 21C Horseshoe Park, Pangbourne, Reading, RG8 7JW. 0118-984 5255.

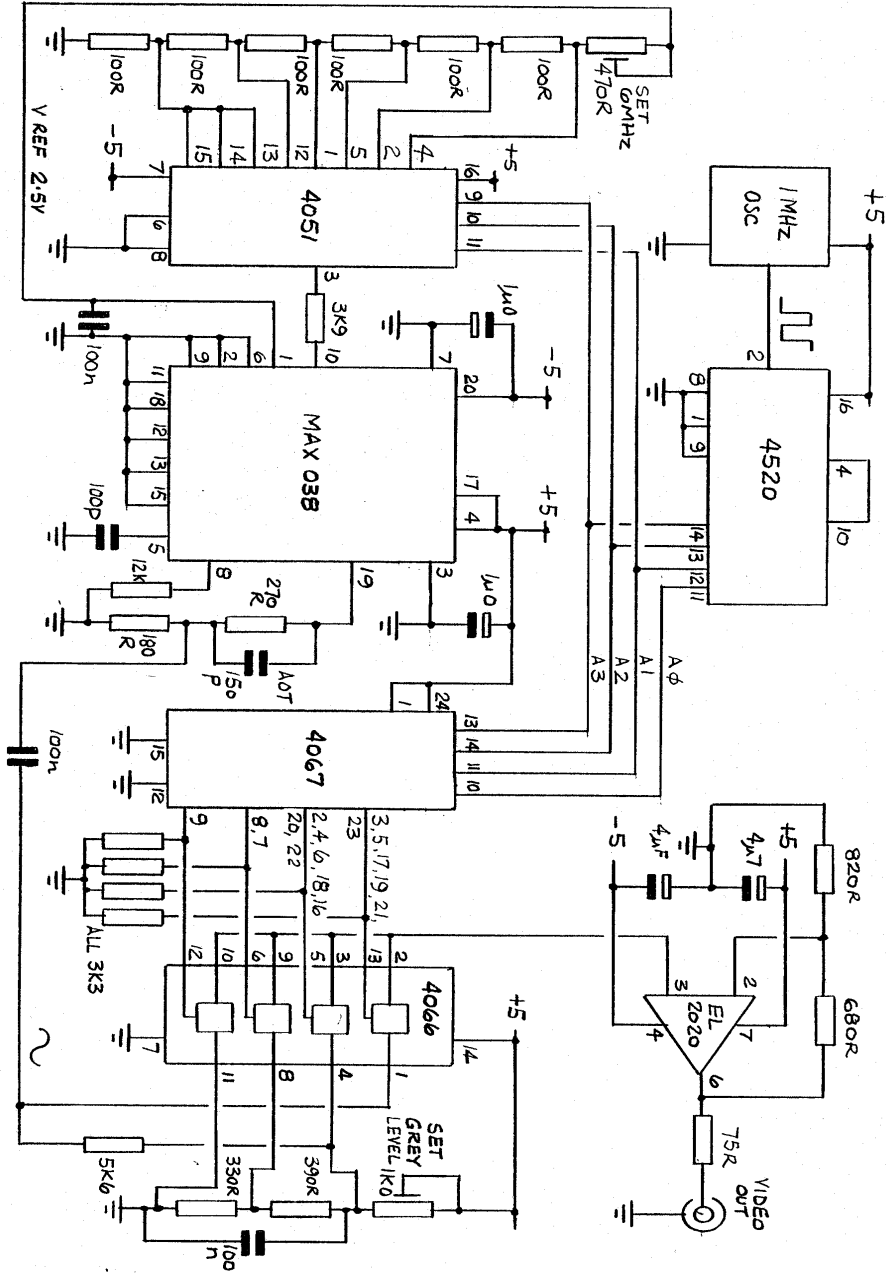
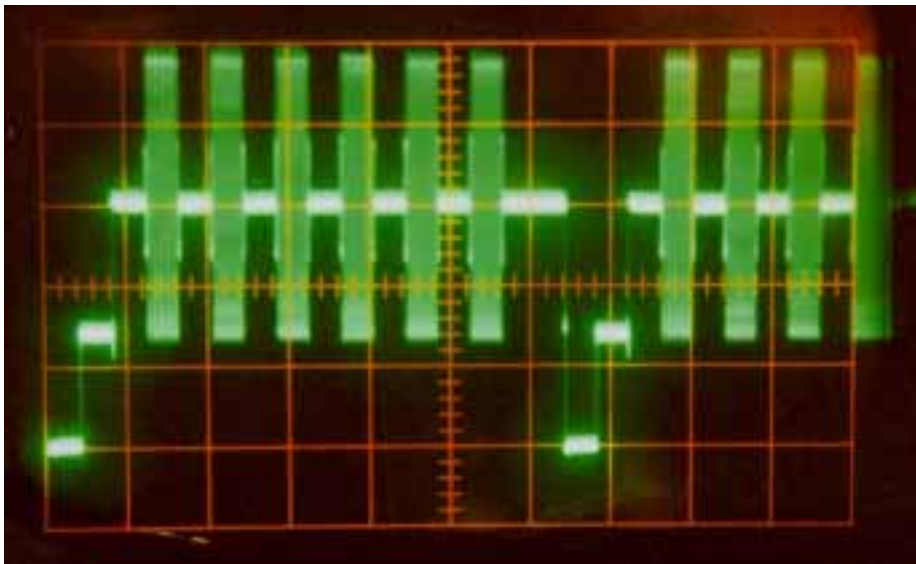
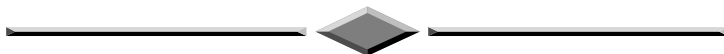


Fig. 1. Stepped Frequency Burst Generator for Television Testing.



**Output waveform from the prototype Frequency Burst Generator. (the version described has the correct line blanking)**



# World Wide Web

The BATC web pages have now moved to a new and permanent address. They can be found at:-

**<http://ourworld.compuserve.com/homepages/batc>**

A new feature is a software download area. This page contains programs, data and articles from CQ-TV as well as other programs related to amateur television.

## TV on the Air

By Graham Hankins G8EMX.

Big news for UK Amateur Television is that two new 1.3GHz ATV repeaters have been granted approval to go into service.

GB3WV is at a BBC transmitter site on Dartmoor and in an excited phone call Tony Reynolds G8CEQ told me: "GB3WV was approved to

start service at the end of January and brings improved 24cm ATV facilities into North Devon and Torbay. We have provided the repeater with three directional trough-reflector antennas which will be at a height of 30m".

Other regulars on 24cm ATV in the South West are Ken G4MPQ, Don GORQL, Mike G4XIX and Trevor G3ZYY.

Further east along the south coast (confused? You will be!) the Solent Club based in Southampton have at last received their licence for GB3AT and are looking to switch on at the end of February. Solent meet on the first and third Tuesdays of each month in the British Legion Club, Park Gate, Southampton from 7.30pm.

All of which still leaves the poor old Kent Repeater Group waiting approval for GB3KT. I gather that the Group recently held one of its occasional 'At Home' days, when stations take along their latest projects to show off. There were test waveform generators, 10GHz systems, video mixers and of course the complete GB3KT project still waiting to be licensed. It seems that these meetings are the only way for most of the local ATVers to show off their ideas without a repeater.



All of the UK ATV Groups have been invited to provide displays at the British Amateur Television Club's annual rally at the Sports Connexion at Ryton, near Coventry on Sunday April 27.

### Cookham Regatta

ATV doesn't always need repeaters. Mike Sanders G8LES and John Stockley G8MNY established a simplex video link on 1.3GHz for the Cookham Regatta along a stretch of the River Thames. Amateur TV was needed because a tree-lined bank kept the commentator 'blind' for the first 100m, but thanks to the video links he had something to describe over the public address system!

John describes what was involved: "We set up colour monitors and 24cm receivers on the announcer's table. Two flatplate receive antennas were fixed fairly high, so that the transmitters could be anywhere up river. Mike used a large Hi-band Super-VHS camcorder feeding a 1W transmitter and long yagi, positioned where there was a gap in the trees so that he could see the start boat; I went further down the course with cheaper ccd cameras but still with only 1W of power".

Needless to say over such a short path pictures were a clean, high quality P5. Next time, perhaps, the Boat Race itself?

### 70cms reports?

Anxious for some report of activity on 70cm, I packeted to Martin G7RTQ in Warley, near Birmingham, who I knew had built a G4DYP 430MHz ATV transmitter. Sure enough, Martin duly responded: "Hi Graham, I have added a few mods. to the G4DYP transmitter, but there does not seem to be anyone using the 70 cms band locally, unless I look at the wrong times!" (Sunday mornings from 11am and Tuesday evenings, I always thought? GJH.)

Right - what's new at this end; Ade G6KSN and I have set up a 3cms link which is working very well, I am active every day between the hours of 1800 - 0000 but even longer most times. I'm operating on 10.470GHz with two audio subcarriers, one on 7.02MHz and the other on 7.20MHz

We are also experimenting with a Hi Speed data link on another sub-carrier, 6.00MHz TX 6.5MHz RX, making the link full duplex. This is being run at 19200 Baud - we try to take it higher but then encounter errors. We have a distance of about 7km between each other and I'm using a D.R.O. for transmit (a converted LNB), with an output around 1mW. The DRO feeds a 65mm dish with a gain of around 35dB giving an e.r.p. of around 4W".



**John Badger, G4YZO, of Badger Boards fame, receives the Leicester ATV repeater at P4 at Barr Beacon, Birmingham.**

Well, there must be many users of 70cm around; it would be great to be able to publish where they are and times of 'nets'. If you don't want to take the time and effort to write, just call my ansafone on 0121-707 4337; tell me whereabouts the 'net' or regular activity operates, likely times and, if you can, usual callsigns.

**Dutch News**

Now to the Netherlands where a 10GHz ATV repeater is being built, says Bernard PA3FZV: "Hello Graham. Hans PA3ETK and his ATV group are constructing a fully featured 3cm repeater right now. At the end of March a 3cm beacon will be operational beaming north with an angle of 200 degrees. Operation will be 24 hour using the callsign PA6ATV. A few months later we hope to make the repeater fully operational".

Any reception report of the beacon will be appreciated, either via the QSL bureau or packet to PA3FZV @ PI8WNO.#UTR.NLD.EU

Hans and his gang are well experienced with ATV, having previously put out 1.3GHz and 10GHz pictures from the 375m 'Gerbrandy' TV tower at Ijsselstein near Utrecht. Even working in freezing windswept conditions

the team achieved 20W on 24cm and an amazing e.r.p. of 800W at 10GHz!

## **Down Under**

My stalwart scribe from Kiwi country, Michael Sheffield ZL1ABS, reports some local problems: “The ZL1BQ repeater went low power during the stormy weather and power blackouts at the end of November”. Wasn't it supposed to be summer over there? The problem was tracked to a loss of d.c. to the final amplifier due to a faulty fuse holder in the power supply. Opportunity was taken to fit the Mk.22 EPROM to give new pages on the Teletext video generator”.

## **Repeater Affiliation Update**

Early in January all known repeater groups with ATV interests were invited to affiliate to the BATC. By the end of February, just under half of the current list had responded, and I am pleased to welcome the Cambridge Repeater Group, who had held back from affiliation because of ‘constitution’ concerns. My covering letter this year made clear that affiliation ‘rules’ are very flexible, so Cambridge can now be added to the list.

This time all Groups were canvassed for 10GHz linking. Willing to trial are 'DH, 'UD, 'HV (but a long haul to 'KT, comments John Stockley G8MNY!), 'RT, 'XT (plans already under way to 'DH) and 'VR. Good feedback, I think.

I normally end this with a “keep sending your ATV exploits and news to me” yet, letters by post are very infrequent. I've probably received only a couple, maybe three, since taking over TVOA. Most info comes from telephone calls or via the packet network. There is usually something in the ‘ATV’ category on my local BBS. Yours too, probably. So now you know!

Very late news: Silent Key in the Midlands, Geoffrey Hill G3DFL of Bearwood passed away from cancer in February. Geoff was very active on the local ATV ‘net’ and will be missed on air by his many friends on 70 and 24.

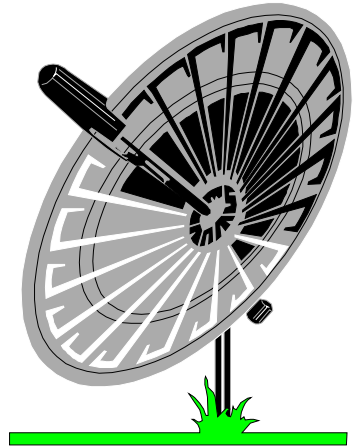
Graham Hankins G8EMX,  
11, Cottesbrook Road  
Acocks Green, Birmingham, B27 6LE  
0121-707 4337  
or via packet to G8EMX @ GB7SOL.#29.GBR EU2



## Satellite TV News

By Paul Holland G3TZO

There is some confusion on the UK digital TV front as I sit down again to write Satellite TV News. Timescales for an Autumn launch of a 200 channel UK digital service seem optimistic as February drew to a close with no firm announcements of an award of contract by B-Sky-B to build £250M of digital IRD's and there is now doubt about use of the planned Astra 2A due to be launched later this year. The main manufacturers to benefit from a decision when it comes are Pace, Panasonic, Sony and Nokia. Things may be moving slowly here in the UK but across Europe there is still much going on with the launch of new satellites and new services in both the new and traditional transmission standards. So let's get on with the news!



### Digital Update

To ignore the growth of digital TV services in a column called "Satellite TV News" would be reminiscent of the days when there were those who thought the use of transistors and new modes such as SSB were not "real radio". The transfer of existing analogue services and the introduction of substantial numbers of new services using MPEG 2 technology is accelerating. Transponder News lists some of the new services that have launched in the early part of this year.

A number of people, particularly in Europe, have now acquired digital receiving equipment. The most popular receiver is the "D Box" designed for the German DF1 service. Through devious manipulation of the standard menu commands it is possible to configure the D Box to receive a number of Free To Air (FTA) MPEG2 signals both in a multiplex and Single Channel Per Carrier (SCPC) mode. There are also reliable reports of multi-service receivers with bespoke software which will be more suited to the enthusiast multi-satellite market. I will keep you updated of progress!

News that will surprise many is that BSkyB may be launching its digital service on the recently launched Astra 1F satellite, using 14 of that satellite's 28 transponders instead of using Astra 2A which is planned for launch toward the end of this year. Astra 1F shares the 19 degrees East orbital position with the earlier 5 Astra satellites, where BSkyB's existing analogue channels are found. Astra 2A is due to be positioned 28 degrees East. We will have to wait and see !

### New Channels

**Radio Noordzee** - Radio Noordzee Nationaal (RNN) plans to set up its own television station under the name TV Noordzee. The station will be on air for a couple of hours initially, with plans to expand later on. TV Noordzee is hoping to share capacity with another broadcaster.

**Animal Planet** - Animal Planet, a new channel from the BBC and Discovery, is close to launching in Europe. Initially a cable only service it will move to satellite later this year and may launch as early as March or April. The channel is already on the air in the United States (now on Satcom C4 on 4.000 GHz), with wildlife documentaries and drama shows.

**Phoenix** - German broadcaster ARD has announced that its special event and documentary channel Phoenix will be launched on April 1. Initially it will be distributed via DFS Kopernikus at 23.5 Deg E with a launch in analogue on Hotbird 2 possible at some later date.

**Polsat 2** - A sister channel for Polsat 1, cleverly called Polsat 2, was due to launch on 1st March for satellite and cable distribution. No transponder details are available at the time of writing.

### Transponder News

#### Intelsat 602 62.9 Deg E

From February, the Italian private TV channels Canale 5, Italia 1 and Rete 4 ceased analogue broadcasting from here in favour of an MPEG2 service via Hot Bird 2. Parallel analogue transmissions on Intelsat 602 continued until February 19th. The digital service on Hot Bird 2 is aimed primarily as a feed for terrestrial transmitters and regional TV centres and is not intended for DTH reception. All three channels can be found on 11.919 GHz (V).

#### DFS-2 Kopernikus 28.5 Deg E

Test transmissions for the new Czech digital-package started on 8th January. Prima TV, Cable + and 2 other domestic networks launched in

MPEG2 at 11.475 GHz (H) (SR 30000, FEC 3/4). The current analogue service for both channels should have ceased by now.

**Eutelsat 1 F5 21.5 Deg E (inclined orbit)**

Its still worth checking here for the occasional news feed on 11.476 GHz (H).

**Astra's 1A, 1B, 1C, 1D, 1E, 1F 19.2 Deg E**

There are now 185 digital TV channels across the Astra satellites forming part of the various packages including the German DF1, Multichoice, Canal Satellite and Canal Espana. Canal Satellite has added more channels to its service on ASTRA 1 E at Tp 78 11.973 GHz (V). The MPEG 2 service is currently in the clear (SR 27500, FEC 3/4). The channels are; Canal +, Canal + Azul, Canal + Vende, Mosaico, Sportmania, Guia TV, Radios (5 radio-channels), Multimusica.

FilmNet 1 finally confirmed the end of its analogue service on Tp 11 11.362 GHz (H) from 31 March. The rumoured successor here is Channel 5 which was due to launch in April. FilmNet 1 is now only available via THOR, 0.8 degrees West.

MTV Networks Europe has announced plans to launch two new services in the UK. The first of the two networks, "MTV In The UK", will replace the north European version of MTV Europe currently on Tp 15 and is expected to begin operation during the summer. The second channel, "M2 Music Television", will broadcast from the US and run commercial free on pan-European distribution. The "MTV In The UK" service is expected to be in BSkyB's multi channels package while M2 will be offered in BSkyB's planned digital service.

**Eutelsat II F3 16.0 Deg E**

Duna TV may move to the Hotbird 3 satellite (13E) from its present transponder on Eutelsat II F3 and may be joined by the Hungarian TV2 service when Hotbird 3 launches later this year. Both Duna TV and TV2 are planned to be in unencrypted PAL.

TV Algeria has moved from transponder 11.678 GHz (H) to 11.095 GHz (V) (ex ART). ART Europe it's now at 11.555 GHz (H) on a 24 hours basis.

Euro 7's analogue service on 11.080 GHz (H) between 10.00 to 14.00 is to close in favour of an extended service between 7.00 to 17.00 CET in MPEG 2. There is no information yet on transponder details.

**Eutelsat's II F1 & II F6 (Hot Bird 1) 13.0 Deg E**

The Greek Nethold/Multichoice package has started in MPEG-2 on 11.823 GHz. The Arabesque package is testing on 12.015 GHz in MPEG-2. The AB Sat promo on 11.766 GHz has changed from super to wide beam.

Italy's RAI 1, 2, and 3 are in clear MPEG-2 on Hot Bird 2 on 11.804 GHz. The Vatican's Tele Pace is also included in this package, and is now 24 hours.

ART will start soon a digital-package as a part of Television par satellite TPS France.

MCM Euromusique closed its analogue service 11.289 GHz (H) in favour of an MPEG2 encrypted service using the Viaccess system from the Canal Satellite package on ASTRA. The parameters will be SR 27500, FEC 3/4.

### **Eutelsat II F4 7.0 Deg E**

The Italian hard core TV channel Satisfaction Club Television (SCT) may join Telepiu's digital package DSTV in favour of its current analogue feed. Talks are currently underway between the two companies and if successful SCT would be the first adult channel offered to DSTV subscribers. SCT is currently uplinked from Paris to Eutelsat IIF2 Tp 21 11.163 GHz (V) in PAL and uses Ping Pong encryption.

### **Tele X 5.0 Deg E**

TELE-X will soon enter an inclined orbit. Although this will have no affect on receive sites in Scandinavia with small antennas it could affect larger antennas with narrower beamwidth here in the UK. This controlled drift will not exceed more then 0.8° p.a.. The end of the planned life is programmed for September 1997. Tele X will then be placed in the satellite "junk-yard" which is 330km higher in orbit. The replacement for Tele X is SIRIUS-2 (see launch news above).

### **Intelsat 702 1.0 Deg W, Thor 1 0.8 Deg W**

Scandinavian Broadcast System (SBS) has announced that its new commercial Danish TV channel, to be launched in March, will be broadcast via the Thor 2A satellite. The new channel will be distributed in D2 Mac.

The Dutch music channel TMF, The Music Factory, is to start a Nordic version from the 1.0 Deg W position but is likely to form part of a digital package with no analogue feed.

### **Telecom 2B,2D 5.0 Deg W**

France Telecom has finally broken its tradition with Telecom 2D in that it operates in the FSS band rather than the usual Telecom Band of 12.5 - 12.75 GHz. At the time of writing all the new transponders were carrying Test Cards in Secam with sound at 5.80 MHz.

<b>Tp</b>	<b>Pol</b>	<b>Freq (GHz)</b>
K1	V	11.472
K2	V	11.514
K3	V	11.556
K4	V	11.598
K5	V	11.640
K6	V	11.682
K7	H	11.493
K8	H	11.535
K9	H	11.577
K10	H	11.619
K11	H	11.661

### **Telecom 2A 8.0 Deg W**

There are reports that the French Canal+ and CineCinemas service currently in D2MAC here will switch to encrypted MPEG II digital delivery from March 31st.

### **TDF1/2 18.8 Deg W**

Canal + will close here at any time and will be offered to subscribers as part of the digital Canal Satellite package on ASTRA. Subscribers are being offered a cheque for 500 FF or 250 FF reduction on a new digital receiver.

### **Hispasat 1A & 1B 30.0 Deg W**

The Spanish Canal Sur channel closed its analogue service on 12.592 GHz (V) at the end of February. Telefonica has apparently leased the transponder to another broadcaster. Canal Sur may re-appear according to Telefonica on Astra, probably as part of the Spanish digital package.

### **Intelsat 603 34.5 Deg W**

Tara TV has started here on 11.158 GHz, in MPEG-2.

### **TDRS 4 41.0 Deg W**

Due to the increasing inclination of the TDRS-4 orbit all DMX channels were moved from TDRSS-4 to TDRSS-6 on 18th January.

## Receiving SCPC Signals in C Band

Those of you with scanners such as the AOR8000 may already realise it is possible to receive analogue SCPC telephony signals via satellites. Any scanner tuning up to 1750 MHz is suitable for use in conjunction with your satellite receiver.

In Europe most of the analogue telephony scpc-signals are in C band. Ku-band is mainly used for data-communications using V-SAT terminals.

A typical set-up is as follows;

1: Connect a signal splitter (DC isolator) between your LNB and satellite receiver. The DC isolated port should be connected to the antenna input of the scanner.

2: Turn your antenna to INTELSAT 1° west and tune for a signal such as TV-Libya on 4.023 GHz (H) . Scan the range between 950 and 1450 MHz in narrow or wide FM mode on the scanner receiver. Check also the vertical polarisation at 4.023 GHz which will also produce interesting results.

Other satellites worth checking include INTELSATs 601, 605 and ARABSAT 1C.

## Product News

**Keymaster VI** - For those who are keen to keep their D2 Mac reception up to date there are many options. One solution is the Keymaster VI which uses a windows based programme to update cards using data acquired from the Internet. The Keymaster VI programs single PIC cards, twin PIC cards and the Multimac II cards in quadra format. It will also program wafer cards that are PIC based. A version to handle the full ISO command spec & COP loading is due later in the year. Check their Web site at <http://www.ims-uk.com/keymaster> or call 0181 508 3076.

## Web News

Thanks to Selwyn Cathcart in New Zealand for dropping me a line about his site at <http://www.nethomes.com/telsat/> which is well worth a visit. The site includes information on subjects such as feedhorn troubleshooting, actuators, antennas, cables and decoders and gives some useful links to satellite and related software downloads.

Another useful site provides details of repairs for many of the popular makes of satellite TV receivers in the UK. Check out <http://elmswood.guernsey.net/sat.html>

For those looking forward to Channel 5 engineers coming to retune their 3 daisy chained satellite receivers and 2 VCRs will find solace at the new Channel 5 site which has a nifty programme allowing you to enter your home phone number and feeding back details of whether a re-tune is necessary and whether you are in the primary service area. Check <http://www.channel5.co.uk/retune.html>

Other sites worth a visit include;

SES (ASTRA) <http://www.astra.lu/>

NTL <http://www.ntl.co.uk/index.htm>

Lockheed Martin Corporation <http://www.lmco.com/>

and of course the best site on the web !

BT Broadcast Services <http://www.vbs.bt.co.uk/>

## Digital Receivers

In the last issue I reported on the Nokia DVB9500S also known as the “D Box” in Germany. I know that a number of people in the UK have acquired the Pace DVR 500 receiver, which till now has been built for export to a number of areas including the Far East, South Africa and Europe. Reports seem to indicate that this receiver is less flexible than the D Box, which has spawned almost a cult for people who have learned to use the control menu to re-programme the receiver in a way that was surely never intended by Nokia.

For those considering the Pace receiver its basic specification is as follows;

- Electronic programme guide (EPG) for on screen channel information.
- Three digit, 7 segment LED display for visual numeric channel selection on unit.
- Full infra red remote control including favourite channel facility.
- Single LNB Digital tuner.
- Power consumption of 44 watts.
- High speed (up to 50Mb/s) digital output and RS232 serial link for interaction with suitable personal computers.
- Four phono sockets for connection to external audio visual equipment.
- Conditional access (CA) module for use with a corresponding viewing card.

- On screen menus and signal strength meter.
- Video wall and video mosaic features for different views of suitable transmissions.
- MPEG/DVB Musicam audio for CD quality stereo and radio sound.

My comments in the last issue still apply, in that there is still a high degree of non-conformity between the different digital multiplexes. Check what conditional access module is sold with the receiver and the availability of the appropriate smart card. One European dealer stocking the PACE receiver is Bakker Electronics BV Tel +31 (0)527 686 130 or Fax : +31 (0)527 683 679. The price is currently Fl. 1595.

Anybody who has acquired a D Box and requires details of how to manipulate the menu structure to receive a fairly broad range of what is currently available should write to me enclosing an SAE.

## Launch News

**Ariane 5** - The European Space Administration (ESA) has now established a detailed timetable for operations leading up to Ariane flight 502 following the disastrous failure of flight 501 last year. The 502 campaign is scheduled to begin on Wednesday 9th April 1997 with the launch itself being planned for early July. Given these dates, the last qualification launch of Ariane 503, managed by Arianespace, is now scheduled for November 1997. Flight 502 will carry only an OSCAR satellite this time with no commercial payload - there's confidence for you .

**Intersputnik-8** - The first Intersputnik-8 satellite will be placed in Orbit at 75°E late next year. The second Intersputnik-8 will be located at 16°W in mid 1999. The footprint in C-band from 75°E covers the whole of Asia, Europe and the Middle East. The Ku-band spot beams target India, south-east Asia, Australia and South Africa. From 16°W the C-band footprint will cover North and South America, Europe, the Middle East and Africa. The Ku-band footprint will cover Central America, Argentina, Chile, Brazil and Europe.

The C Band payload will be 24 x 36 MHz transponders with an EIRP of 37-49 dBW. The Ku band payload will be 16 x 54/72 MHz transponders with an EIRP of 48-53 dBW.

**Thor 2A** - Thor 2A is delayed by the failure of an Atlas 2A launcher in January and the subsequent enquiry to find a cause. Thor 2A will carry 15 analogue or at least 75 digital TV channels and will co-locate with Thor 1 at 1.0 Deg W.



The latest update for launches given in CQTV 176 is detailed below.

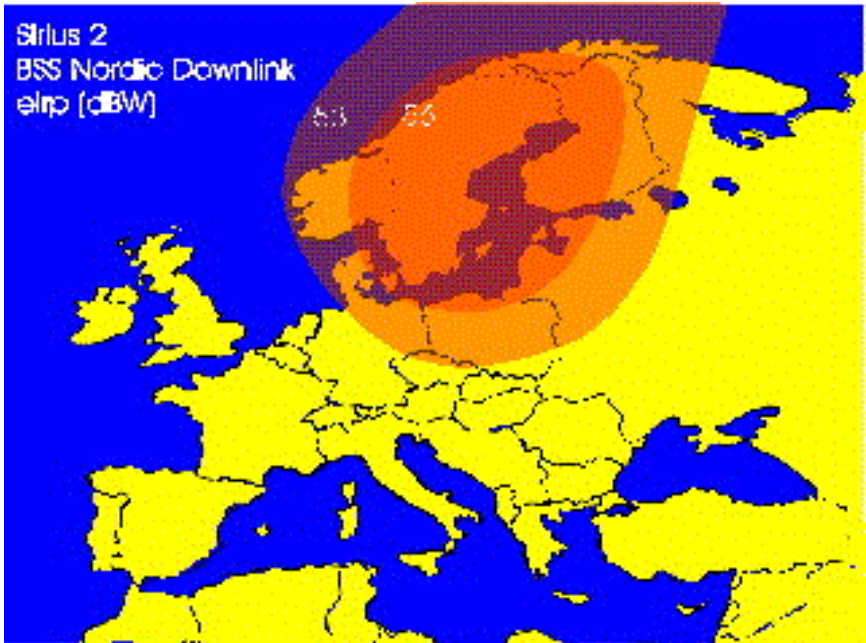
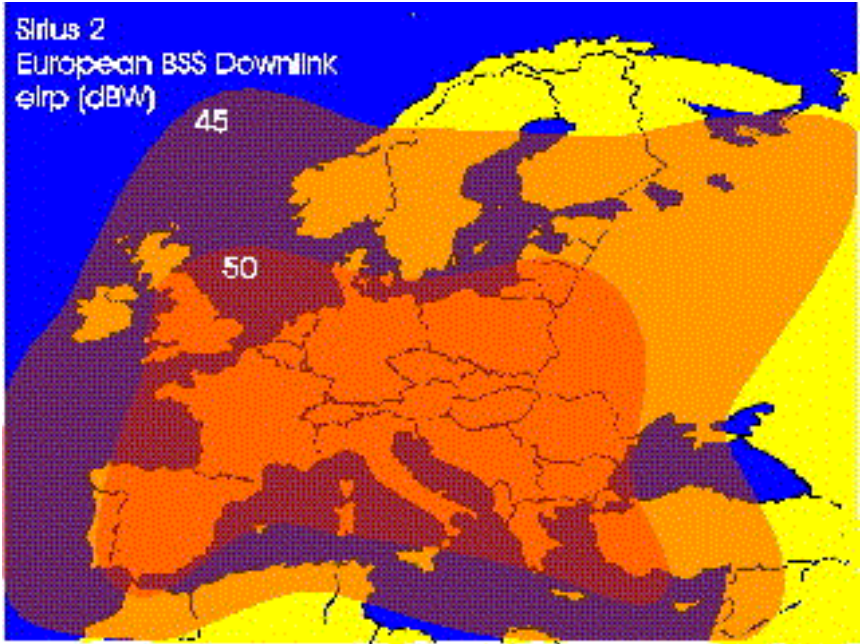
Satellite	Date (all 1997)	Position	Launcher
Panamsat 6	Mid April	43.0 Deg W	Ariane
Thor 2A	April/May	1.0 Deg W	Delta II
Hot Bird 3	July	13.0 Deg E	TBA
Astra 1G	Jun 97	19.0 Deg E	Proton
Sirius 2	Jul 97	5.0 Deg E	Ariane
Nilesat 1	End	7.0 Deg W	Ariane
Astra 2A	4th Qtr	28.2 Deg E	Ariane
Intelsat 804	Nov	21.5 Deg W	Ariane
Hot Bird 4	Oct 97	13.0 Deg E	Ariane
Eutelsat W24	Dec	10.0 Deg E	Atlas

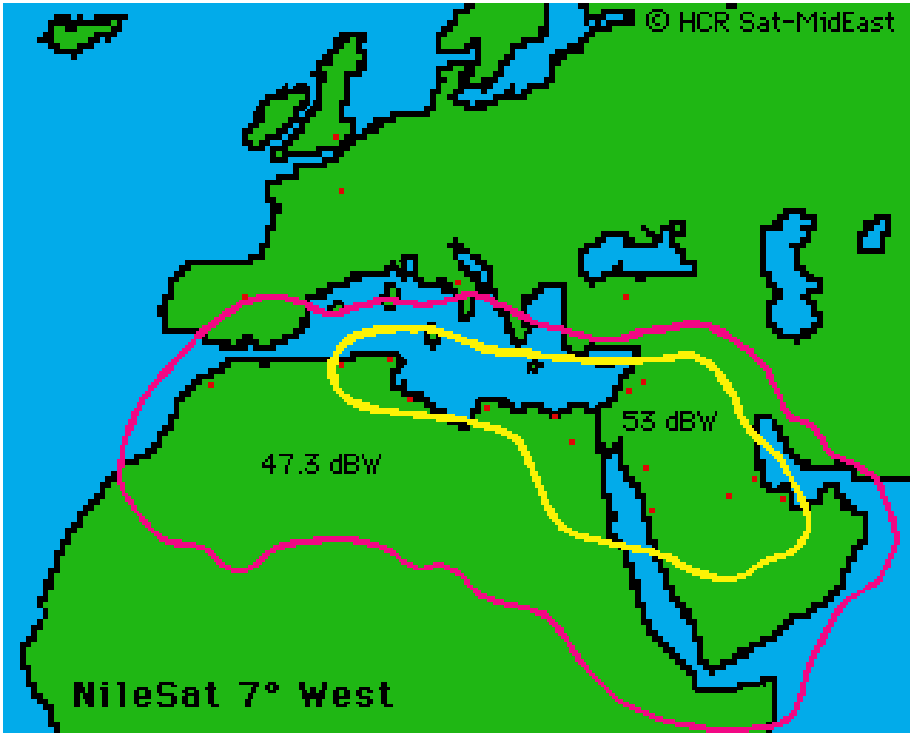
### Nilesat

The footprint for Nilesat due to launch later this year at 7.0 Deg W is shown below. Nilesat, manufactured by Matra Marconi Space will have 12 x 100 watt transponders each with a bandwidth of 33 MHz and will downlink between 11.7 and 12.5 GHz.

### Sirius 2

Sweden's satellite position at 5 degrees East, currently the home of the Sirius 1 and the ageing Tele-X satellites, will be getting a boost soon. General Electric's Sirius 2 satellite is scheduled to be launched in July and will carry 32 Ku band transponders. Half will be used for Scandinavian channels, and GE will use the other half for its own new Pan-European service. When Sirius 2 is in orbit, it will carry 26 transponders between 11.7 and 12.5 GHz, half of which will using the Nordic beam, the other half a European beam. There will also be 6 transponders between 12.5 and 12.75 GHz on a North/Central European beam. The European and Scandinavian footprints are shown below.





### Conclusion

That's it again for another edition of "Satellite TV News". There was no Postbag this time as our deadline was only one week after most members will have received their copy of CQTV177. Any letters received will be held over to the next issue when I will report on this years Cable & Satellite '97 held at Olympia in April and once again bring you all that's new in the world of Satellite TV. All E-Mails to paul.holland@btinternet.com.

## Slow Scan TV, an Overture

By John Langner WB2OSZ

*This article is based on text contained on John's web site, and is reproduced here with his kind permission. Also, please note that rules and frequencies apply in the USA and not necessarily anywhere else ED*



### Introduction

Slow Scan Television has been around for about 3 decades but it never got very much attention. The reason is that commercial equipment was very expensive and it was much too complicated for most people to home-brew. The situation has changed radically in the last couple years. Rather than using expensive special purpose hardware, most of the newer systems are using personal computers to do most of the work. There is now a wide assortment of free software that uses very simple interfaces and ready-to-use commercial systems at affordable prices. New people are showing up on SSTV everyday.

Although SSTV activity has exploded during the last couple years, it's still hard to find much modern information. The most recent SSTV [hard copy] handbook published in the USA, that I know of, is now almost 20 years old. Technology has changed quite a bit since then.

A very popular introductory book about Ham Radio (no names mentioned but it's available at Radio Shack) devotes only a few sentences to SSTV and describes it as 8 second black & white pictures. It's been nearly all colour pictures for many years.

The CQ 1994 Equipment Buyer's Guide lists only two SSTV products and neither is manufactured anymore.

Some outdated and just plain wrong information keeps getting passed back and forth between various lists of SSTV equipment. A while back I sent

letters to 29 different suppliers asking about their SSTV and related products. This article contains condensed information from all the replies, magazine ads, newsletters and other sources of information.

## **Get Started at Little or No Expense**

You don't have to spend lots of money to get started with SSTV. You can receive pictures with some free software and a trivial interface to get received audio into your computer.

This is what you will need:

Source of SSTV signals such as an HF SSB transceiver. IBM PC compatible computer with at least:

‘386 or higher CPU. Colour VGA display. Spare serial port (COM1 or COM2). A mouse is handy but not essential

A very simple interface to get audio into your computer. Use one of these if you already have one or build your own with a few parts from your local Radio Shack store. More details are in the Home-brew chapter.

HAMCOM FAXCAP JVFAX (single op-amp version) SSC PC HF Facsimile AEA FAX

Next, find some free software such as JVFAX, VESTER, EZSSTV, or MSCAN.

Here are some places to look for software:

Internet ftp access:

ftp.ultranet.com: /pub/sstv oak.oakland.edu: /pub/hamradio/pc/digital/atv  
ftp.cs.buffalo.edu: /pub/hamradio ftp.ucsd.edu: /hamradio/sstv

Telephone BBS:

ARRL BBS (203) 666 0578 .. ATV today BBS (319) 886 6020  
CompuServe, America On-line, GENie, etc. have ham radio areas.

## **Stroll through the Photo Gallery**

This section contains some typical SSTV images. All are genuine received off the air and not retouched. These can be divided into 3 types:

*Natural, Computer Generated, Composite*

### **Natural Images**

These are pictures of real things with little or no modification. Send a picture of yourself in the "shack," your friends, relatives, pets, new toys.

### Slow Scan TV, an Overture

These are usually produced by pointing a TV camera (camcorder) at the subject and getting the image into a computer with a device called a frame grabber.

The images below are quarter size images reduced to 256 colours.



### Computer Generated Images

You don't need a TV camera to have fun with SSTV. Many people create interesting images with paint programs.



### Composite Images

Finally, many people combine pictures of themselves and other natural or computer generated scenes for interesting effects. This is easy to do with

paint programs that allow cutting and pasting of arbitrarily shaped regions.



## Frequently Asked Questions about SSTV

### **Why send pictures over the radio?**

The ancient Chinese proverb, "a picture is worth a thousand words," is just as true today as it was thousands of years ago. Vision is our highest bandwidth sense and the primary source of information about the world around us. Material is easier to understand and more enjoyable when images accompany verbal descriptions.

Would you watch television with your eyes closed? Why not make your ham radio contacts more interesting by including pictures?

### **How much does it cost to get started?**

If you already have a voice transceiver and a computer, you can send and receive pictures at zero cost or very close to it. If you're impatient, skip to the last question for details.

### **How does SSTV differ from ATV?**

There are basically two methods used to send pictures over ham radio. Fast Scan TV is very similar to broadcast TV: full motion colour images. This requires a few megahertz of bandwidth so it is used only on UHF. A single transmission is wider than the entire 2 metre ham band.

The other method is Slow Scan TV: still images sent through voice transceivers over a period of a few seconds to a couple minutes. Early pictures were low resolution black and white. Now nearly all images are higher resolution colour.

You'd expect the term Amateur Television to apply to both Fast Scan and Slow Scan but it generally means only Fast Scan TV.

### **What kinds of pictures are sent?**

Reviewing pictures saved during the last few weeks I found: Hams in their shacks, lots of pet dogs, a frog, kangaroo, astronauts in the Space Shuttle (SSTV has been transmitted from some missions!!!), bridges, birds, Elvis Presley, rock formations, an old fashioned microphone wearing a Santa Claus hat, antique cars, flowers, children, Jupiter, a cow, someone playing bagpipes, many colourful butterflies, boats, and cartoon characters with personalised messages. Many SSTV'ers show off their artistic abilities by sending pictures they made with paint programs.

### **Will future Space Shuttle (SAREX) missions transmit SSTV?**

A few years ago there were only several thousand people with the facilities to receive SSTV images. The effort to transmit SSTV from a Space Shuttle benefited very few people. Today, anyone with a VHF scanner, a computer, and a few cheap parts can receive full colour SSTV images. Now, millions of people could benefit from these transmissions.

Contact the SAREX committee members with your thoughts on this topic. Tell them how you can help by donating equipment, educating your local club members about SSTV, or setting up a Space Shuttle SSTV demonstration at a school or shopping mall.

### **How is the image quality?**

There is a trade-off between image quality and time. At one extreme we have low resolution (120 line) black and white images which take only 8 seconds. At the other end we have the new Pasokon TV high resolution "P" modes with 16 million colours at 640 x 480 resolution which take up to 7 minutes. Most images these days are full colour 320 x 240 resolution taking almost 2 minutes to transmit.



### **What frequencies are used?**

Some countries are more restrictive, but in the U.S. SSTV can be used anywhere voice is allowed. Traditionally, certain frequencies have been used as meeting frequencies:

3.845, 3.857, 7.171, 14.230, 14.233, 21.340, 28.680, 145.5 MHz

20 metres is generally your best bet for finding activity. 80 metres is also popular.

### **What class of ham licence is required?**

If you are allowed to transmit voice, you are allowed to transmit SSTV on the same frequencies. The one exception is the Novice/Technician 10 metre segment.

### **Are there any nets?**

Saturdays at 15:00 and 18:00 UTC on 14.230 MHz.

### **Are there SSTV contests?**

There are the usual types of contests where participants try to make the maximum number of contacts in a certain amount of time.

There are also contests for the best pictures. The theme is usually the nearest holiday. For example, around Halloween there is a contest for the best images with a Halloween subject matter. There are different categories for natural and computer generated images.

There is also an award for contacting at least 50 different countries with SSTV.

### **Is SSTV new or has it been around for a while?**

Amateur SSTV has been around since 1958.

### **Why do the magazines and handbooks ignore this fascinating mode?**

There were many articles in the early days when most people homebrewed their own equipment. In the 1970's and 1980's most people bought commercial equipment and exchanged pictures. Few people could afford the expensive equipment and there really wasn't much to write about.

In the last couple years, many new low cost SSTV systems have become available and tens of thousands of hams have discovered the fun of SSTV despite the difficulty in finding information. Ham radio magazines in Europe and Japan constantly have articles on SSTV. I have no idea why the American publishers continue to ignore it.

### **How has equipment changed over the years?**

SSTV started out with surplus radar display tubes with very long persistence ("P7") phosphors. This allowed an image to be painted on the screen over a period of a few seconds.

When memory chips became affordable, scan converters became feasible. Scan converters translate one TV standard to another. In this case the scan converter takes video from a TV camera (e.g. camcorder) and translates it for SSTV transmission. In the other direction, it stores an SSTV image in memory and allows it to be displayed on an ordinary TV set.

The latest trend is to use a personal computer, software, and an interface attached to your transceiver. This is much less expensive and much more flexible.

### **What kinds of commercial equipment are available?**

There are basically two types: Dedicated scan converters and PC-based systems. The legendary Robot 1200C scan converter was discontinued in 1992 but other new products such as the SUPERSCAN 2001 and TSC-70 have moved in.

PC-based SSTV systems abound: Pasokon TV, SSTV Explorer, ViewPort VGA, MSCAN, and PC SSTV 5 all have their own hardware interface that connects the computer to a transceiver. Some Multi-mode TNC's can handle SSTV with optional software. You can even use a Sound Blaster with the Slow Scan II software.

### **What are trade-offs between special purpose scan converters and PC-based systems?**

Dedicated scan converters offer some advantages: You plug in the cables, turn on the power, and they work. You don't need a computer. They are expensive.

Most people with scan converters use a computer anyhow, to store images, so why not use a low cost interface and let the computer do most of the work? This is also more flexible, new features are distributed by floppy disk instead of hardware changes. There are two major disadvantages. First, none of the current systems allow you to run SSTV concurrently with other applications. Second, there are occasional conflicts or incompatibilities when adding new hardware and software to a computer system.

Although the single op-amp receive interface is popular due to its extremely low cost, results aren't that good under noisy conditions. Those who have run other systems, such as Viewport VGA or Pasokon TV, side-

by-side with the cheap interfaces consistently report that the systems with more filtering and hardware demodulation perform much better with poor signals.

### **Where do I plug in my TV camera?**

The dedicated scan converters all have video input but none of the current PC-based systems do. Capturing an image from a TV camera, such as a camcorder, requires an extra device called a frame grabber. Of course, frame grabbers have many other uses besides SSTV and new models are continually being introduced by many manufacturers.

The bad news is that frame grabbers require a fair amount of high speed specialised circuitry and memory. The good news is that prices are tumbling due to new technology and increased competition. A few years ago you had to pay \$600 for a decent frame grabber. Now less than \$200.

### **What should I look out for when buying new or used equipment?**

There are many transmission modes in use. Make sure the system can receive all the popular ones. If you were to pick up an old Robot 400 (black & white only) system at a flea market, you'd be very disappointed to find out no one sends B&W pictures any more.

There is a wide variety in features, ease of use, documentation, price, and so on. Get on the air. Talk to people. Ask what they are using and how they like it.

### **What plans are available for home-brewing?**

Magazine articles in the last couple years:

73 Amateur Radio Today -- August 1992. QST -- January 1993, QST -- January 1994. Radio Fun -- February 1995

### **Is SSTV software available for the Macintosh?**

No, so stop asking. Someone, please tell me I'm wrong and I'll publish the details here.

### **Are there any handbooks or newsletters dedicated to SSTV?**

There are only two modern SSTV handbooks:

#### **Slow Scan Television Explained**

by Mike Wooding G6IQM

(1992 -- ISBN 0-9513779-3-0) (*available from BATC Publications, though it is a bit 'dated' now. ED*)

#### **SSTV Handbook**

## *Slow Scan TV, an Overture*

The primary author is JA6OAC (but the rest is hard to decipher because it is in Japanese.)

(1994 -- ISBN 4-7898-1011-9 C3055 P4500E)

The International Visual Communications Association (IVCA) has a newsletter in addition to its nets, contests, Dayton booth and other activities:

IVCA

P.O. Box 140336

Nashville, TN 37214

### **Where can I get more information on this fascinating mode?**

For a more detailed information package, send a large self-addressed stamped envelope with postage for 3 ounces (that's currently  $32 + 23 + 23 = 78$  cents in the U.S.) to:

John Langner WB2OSZ

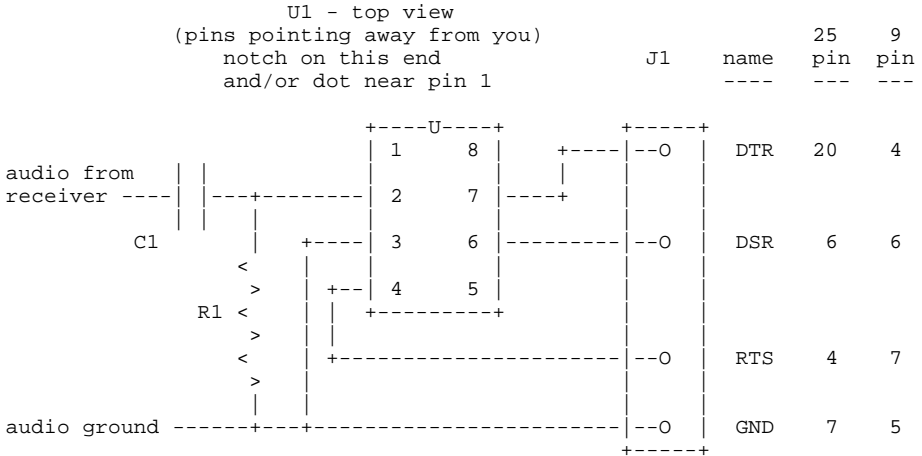
115 Stedman St. #A

Chelmsford, MA 01824-1823

### **How can I get started with little or no investment?**

Either dip into your junk box or take a few dollars to your local Radio Shack store, and build the circuit in figure 1. This circuit simply takes the received audio, amplifies the signal, and sticks it into a status line of a serial port. Software measures the time between the zero crossings to determine the frequency. The software converts these tones into images on the screen.

The circuit shown below is the bare minimum.

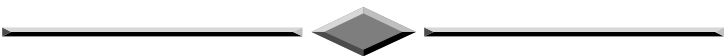


		Radio Shack part #	\$
U1	741 or similar op amp	276-007	0.79
R1	47K resistor	271-1342	0.39
C1	0.01 $\mu$ F capacitor	272-131	0.49
J1	DB25S	276-1548	1.99
or	DB9S connector	276-1538	1.29
-	Shielded cable for audio	?	?

There are many other minor variations on this theme using diodes for reverse voltage protection, capacitors for power filtering, and transformers for isolation. If you already have a HAMCOM, FAXCAP, SSC PC HF Facsimile, or AEA FAX demodulator they will all work with some and maybe all the software mentioned here.

Next, find some free software such as EZ SSTV, GSH-PC, JVFAX, MSCAN, ProsKan, or VESTER. Here are some places to look:

These questions and answers were first published in the February 1995 issue of Radio Fun and reused with permission.



**Please mention that you saw it in CQ-TV  
when responding to advertisers**

## Post and News



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 [ian@ipawson.cix.co.uk](mailto:ian@ipawson.cix.co.uk)

Members sales and wants, and trade adverts should be sent to the advertising manager,

Dave Hemingway, Ivanhoe, Glen Road, Hindhead, Surrey, GU26 6QE. Tel: 01428 604645

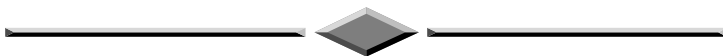
Dear Trevor

Another note to let you all know that my web page has been updated again,

I have added another AVI file. This one is of the record reception 2 1/2 years ago of the Hawaii ATV station KH6HME on 434 MHz in California. This was a span = of 2512 miles. This was received by KC6CCC. This AVI file is about 45 seconds and is about 2.3 MB. My web page is at:

<http://web.io-online.com/users/forsberg/atv.htm>

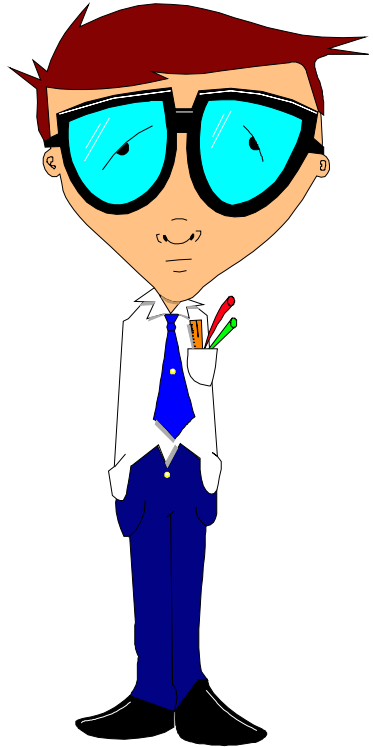
73, Bruce WB6IZG



Dear Editor, congratulations on taking over the Editorship of CQTV I hope you can bring a little humour to these pages than that last chap, he was too dull for words.

I see also that you are the editor of the club web site, perhaps you could help with a software problem I have been struggling with for a close friend.

Last year he upgraded his MS Girlfriend Version 1.0 to MS Wife version 1.0 and found that it's a memory hog, leaving very little system resources for other applications. He is only now noticing that Wife 1.0 is spawning Child-Processes which are further consuming valuable resources. No mention of this particular phenomena was included in the product brochure or the documentation (typical of MS!), though other users have informed him that this is to be expected due to the nature of the application. Not only that, Wife 1.0 installs itself such that it is always launched at system initialisation where it can monitor all other system activity. He's finding that some applications such as PokerNite 10.3, BeerBach 2.5 and PubNight 7.0 are no longer able to run in the system at all, crashing the system when selected (even though they always ran fine before). At installation, Wife 1.0 provides no option as to the installation of undesired Plug-ins such as MotherInLaw 55.8 and BrotherInLaw Beta release. Also, system performance seems to diminish with each passing day.



**Any resemblance to the Chairman is purely coincidental (honest)**

Some key features he would like to see in the upcoming release of Wife 2.0.

1. A "Don't Remind Me Again" button
2. A Minimise button

## *Post and News*

3. An install shield feature that allows Wife 2.0 to be installed with the option to uninstall at any time without the loss of Cash and other system resources.
4. An option to run the network drive in 'Promiscuous mode' which would allow the system hardware probe feature to be much more utilised.

I myself decided to avoid all of the headaches associated with Wife 1.0 by purchasing Girlfriend 2.0. Even here, however, I found many problems. Apparently you cannot install Girlfriend 2.0 on top of Girlfriend 1.0. You must uninstall Girlfriend 1.0 first. Other users say this is a long standing bug which I should have been aware of. Apparently the versions of Girlfriend have conflicts over shared use of the I/O port. You think they would have fixed such a stupid bug by now! To make matter worse, the uninstall program for Girlfriend 1.0 doesn't work very well, leaving undesired traces of the application in the system. Another thing that sucks -- all versions of Girlfriend continually pop up little annoying messages about the advantages of upgrading to Wife 1.0.

\*\*\*\*\* Bug Warning \*\*\*\*\*

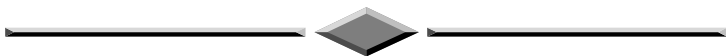
Wife 1.0 has an undocumented bug. If you try to install MS Mistress 1.1 before uninstalling Wife 1.0, Wife 1.0 will delete MS Money files before doing the uninstall itself. Then Ms Mistress 1.1 will refuse to install, claiming "Insufficient Resources".

\*\*\*\*\* Bug Work-Around \*\*\*\*\*

To avoid the above bug, try installing MS Mistress 1.1 on a different system and never run any file transfer applications such as LapLink 6.0. Also, beware of similar shareware applications that have been known to carry viruses that may affect Wife 1.0. Another solution would be to run MS Mistress 1.1 via a UseNet provider under an anonymous login. Here again, beware of the viruses which can accidentally be downloaded from the UseNet.

My suggestion was delete Girlfriend 2.0!! What do you think??

**TREVOR BROWN EX CQTV EDITOR**







The following item were plucked from the Internet of sent to me directly as email.

If you have any snippets of news of information, then please send them in to my mailbox.

At 03:38 PM 12/31/96 -0500, you wrote:

<<SNIP>>

Depends how much processing power you have available. Straight transcoding to CCIR-601 gets you megabytes per second, MPEG-2 gets you megabits per second, but with H.xxx video compression (chipsets and software codecs are becoming widely available) you can get a watchable picture at 56 kilobits, a decent one at 100 kilobits, and a poor but recognizable one at under 30 kilobits. That translates to a bandwidth requirement of 25 to 100 KHz, which is certainly possible for P3D.

Willie Smith wpns@world.std.com NIJBJ@amsat.org

#define NII Information SuperCollider

PMFJI, but I am curious about the compression used in many of the Video conferencing products available (AT&T for one). It seems that utilising a similar compression scheme would be a good compromise between reasonably available hardware and data rate. Most of the systems I have demoed seem to give "Senior V.P. Quality" full screen, full motion video at rates from 3 ISDN lines (about 360KB I think). These systems gracefully degrade to a useable, if jerky or smeared, picture all the way down to about 64KB. As an ATVer I would be thrilled with the quality of the 2 line (240KB) pictures if they were coming off a remote repeater or, Wow, a satellite. If you can stuff 28.8 KB through an analog phone line rated for 3KHz bandwidth, doesn't the technology exist to push the 240KB through say 30KHz of bandwidth? What is the actual bandwidth required for 10 modems running 28.8 KB in parallel? I guess I am being pretty naive somewhere.

Ron Sparks, sparks@sccsi.com KC5ODM

## Post and News

Hi Ian.

The attached Jpeg image was digitised from my 3cms receiver. Its Tony G4CBW in Newcastle-under-Lyme through GB3XG, the 3cms repeater just south of Bristol. His signals were accessing the repeater for over an hour in the lift on January 14th. Distance from Tony to GB3XG is about 175km.

Brian. Kelly.



I just thought that some of you in the TV broadcast industry would like to see what Hams are doing in the TV area. Check out my web page which shows what is happening with Amateur Television in the Southern CA area.

<http://web.io-online.com/users/forsberg/atv.htm>

73, Bruce Forsberg WB6IZG

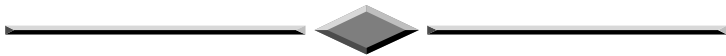
Paul G8YYM raises some interesting points in his letter (CQ-TV 177) but his statement regarding ‘non-licence bands in UK’ along with 2.4GHz is based on misinformation, possibly from the article he mentions.

The frequencies 2400-2500MHz, along with various other bands, include an ‘Industrial, Scientific and Medical’ (ISM) allocation, in which various technical and domestic apparatus can operate in a kind of ‘free for all’ environment. Devices are supposed to be either very low-power or non-radiating but no guarantee is given against interference and Philips of all people should have expected problems from leaky microwave ovens.

Users do need a licence and it’s worth noting that there are very few bands in this country on which no licence is required (and even in the case of 49MHz walky-talkies, cordless phones and wireless door locks there is still one communal licence, held by the Secretary of State for Trade and Industry!).

Answering Paul’s questions, 2.4GHz amateur traffic can and does suffer QRM from microwave ovens. On ISM bands you can only use devices agreed for use and so far I am not aware of any videosenders approved; the use of ISM bands for telecommunications is expressly prohibited (UK Table of Radio Frequency Allocations, page 11). As for modifying satellite equipment, I’ll leave that to the experts!

73, Andy G8PTH.



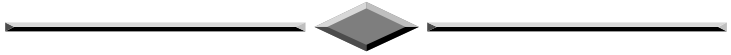
Well it got warm here yesterday in Michigan (45 degrees) so my friend Jeff (N8QPJ) and myself tested out our new ATV kite. The kite is big, 13’ wing span. This extra lift allows me to use a huge one pound battery pack of nicads. (I know lithium batteries are lighter but I wanted to use rechargeables). The one watt PC Electronics transmitter was attached to an “inverted v” dipole antenna which Tom supplied literature on. For reception I used the now famous M2 egg beater antenna attached to my new \$194 Radio Shock 8mm VCR / 5" colour TV which someone from H.A.T.S mentioned Radio Shock was blowing out (thanks). Because there was only a few mile an hour wind we never got the kite up over three hundred feet but the video was great! It even made it P4 into my repeater. I like this kite idea because it’s really quick to setup. I don’t need rocket motors, helium, etc. Jeff and I are giving a talk on ATV to The Detroit Edison club next week.

We will demonstrate a radio controlled car, and will show video tapes of project we’ve done which include an ATV aeroplane QSO, a pan/tilt ATV

## *Post and News*

balloon, two ATV rockets, and now even an ATV kite! Give it a try sometime!

- Chris N8UDK



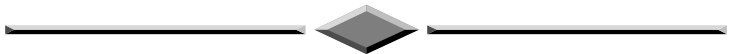
Congratulations to Mike Henkoski (KC6CCC) and Bill Brown (WB8ELK) on a successful balloon launch on Feb 1, 1997. It went to almost 100,000 feet and carried a colour camera and 2.4 GHz ATV FM transmitter. An AVI file of part of the trip is available at my web page. It is 4.3 MB in length.

<http://web.io-online.com/users/forsberg/atv.htm>

73, Bruce WB6IZG

ATV Home Page: <http://web.io-online.com/users/forsberg/atv.htm>

Email: [forsberg@io-online.com](mailto:forsberg@io-online.com)

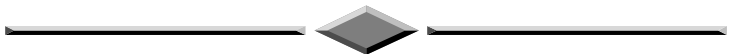


Cruising the Web I found an ATVer in Alameda, WA6ZJG, who has a live camera attached to his tower and which can be viewed in real time on the Web! He has arrow controls on the screen where you can even rotate the camera with your mouse! Of course after the command, it has to move the camera, then re-download and compile a new JPG image for display on the Web page, but it only takes a few minutes. Neat stuff! Check it out...

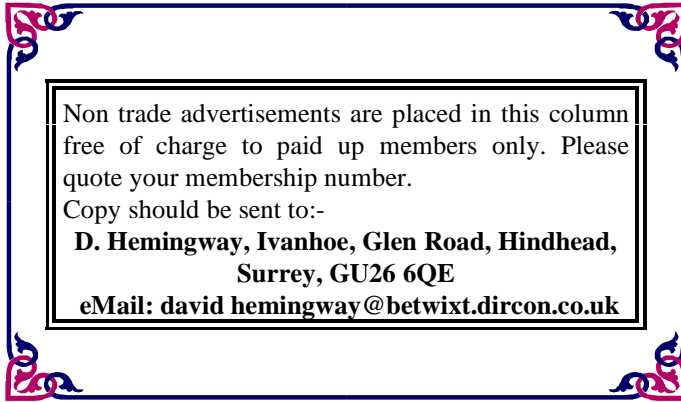
<http://citynight.com/livecam.html>

Tom

KC6TNB

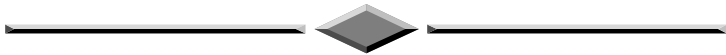


Cristy Perera (4S5CP) wishes to hear from Sri Lankan members, in regarding establishing a Amateur Television club in Sri Lanka Tel: 914011.

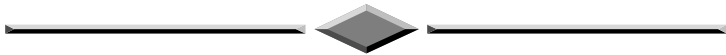


## For Sale

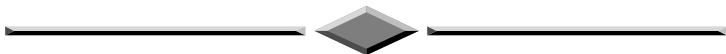
Amstrad SRX200's Unidens and other useful early generation satellite TV receivers and decoders from £10 + p&p, including Skyscans with integral positioners. *Contact:-Trevor Wiltshire G8AKA QTHR Tel 0118 9701 163*



Offers invited for Phillips V200, three vidicon tube video camera, cased, complete with cable reel/built in UHF modulator and PSU. Resolution 300 horizontal, 400 vertical, zoom 8:1 *Ken Domminney, 7, Chestnut Close, EASTBOURNE, BN22 0SZ. Tel. 01323 500174.*



60's viewfinder tube AW17-20 (from Marconi MKIV IO camera) nominal price to good home: U-matic tapes 8x20 min small cassette, 2x60 min large cassette. £1.00 each. Buyer collects High Wycombe or Shepherds Bush. *John Hoare, G3PJI, 4, Thrush Close, High Wycombe, Bucks, HP12 4RJ. Tel. 10494 522108.*



## For Sale

BBC YEARBOOK 1951 Featuring 'The White City Site' Slightly frayed d/w VGC £8.

BBC HANDBOOK 1962 Plenty of pictures. VGC £5.

BBC HANDBOOK 1963 Good old black and white TV. VGC £5.

BBC HANDBOOK 1965 VGC £5.

BBC HANDBOOK 1966. VGC £5.

BBC HANDBOOK 1969 VGC £5.

BBC HANDBOOK 1972 VGC £5.

BBC HANDBOOK 1973. 50th. Anniversary Issue. VGC £5.

BBC Report and Handbook 1986. Penultimate edition . VGC £4.

IBA Yearbook Television and Radio 1979 VGC £3.

IBA Yearbook Television and Radio 1981. Contents in VGC cover intact but torn £2.

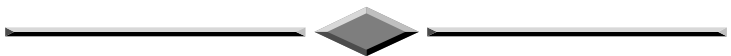
IBA Yearbook Television and Radio 1982 Contents in VGC back cover intact but torn £2.

The TELEVISION ANNUAL 1953. Edited by Keneth Baily. Superior collectable picture and feature book about TV as it was. VGC. d/w. £8.

The TELEVISION ANNUAL 1955. Edited by Keneth Baily. Featuring 'All over the place'. Article about current (then) o.b.'s VGC d/w. £8.

The GIRL FILM AND TELEVISION ANNUAL 1963. Part of spine missing. No d/w. However, very interesting pictures (inb colour) of the BBC's 405 line colour test transmissions. Also, ob's at the zoo and 'Supercar'. £1.

All books clean and intact. Postage £1.50 per book. Some are heavy!  
**Contact Dicky Howett, 23, Micawber Way, Chelmsford Essex. Tel. 01245 441811.**



**Shack Sale:**

30 foot ALTRON wind-up/tilt-over post-mounted Mast (a new ground post will be required but this is standard-section steel and can be purchased for app. UKP 25.00 from any steel stockholders)

The mast is complete with: Yaesu G400RC Rotator

5ele 6m Yagi

7ele 2m Yagi

16ele 70cm Yagi

22ele 23cm Quad-loop Yagi

48ele 23cm JVL Quad-loop Yagi

Total price: ..... UKP 250.00 buyer collects

SSB Electronics SP-2 2m GaAsFET Mast-head Pre-amplifier Gain 20dB/Nf 0.9dB Max Power hard switched 500W ..... UKP 100.00

SSB Electronics SP-70 70cm GaAsFET Mast-head Pre-amplifier Gain 20dB/Nf 0.8dB Max Power hard switched 500W ..... UKP 100.00

Parabolic 23cm GaAsFET Mast-head Pre-amplifier Gain <40dB/Nf 0.9dB (Rx only - no RF switching) Ideal for ATV use ..... UKP 75.00

Yaesu FT-790R unboxed complete with FL-7010 10W PA and mobile mount (slight fault on FM frequency step selection but otherwise works OK) ..... UKP 250.00

Icom 290H/D 2m Multimode unboxed complete with mobile mount, perfect working order ..... UKP 300.00

Farnell 13.8V/20A PSU ..... UKP 50.00

23cm ATV Receive system: Amstrad converted TVRO Rx + Philips colour monitor, ..... UKP 100.00

SSB Electronics 23cm 4-pole Interdigital Filter ..... UKP 75.00

Shipping at cost on any of the above. Prices somewhat negotiable!

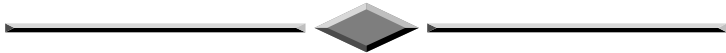
**Michael J Wooding G6IQM** email: [vhf-comm@g6iqm.demon.co.uk](mailto:vhf-comm@g6iqm.demon.co.uk)

<http://www.g6iqm.demon.co.uk/vhfcomm.htm>

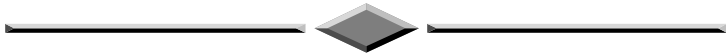
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**Tel: (0)1788 890365** Fax: (0)1788 891883

**Wanted**

Wanted:- Loan or sale of service manual for EMI Encoder type 778/9/1 PAL & NTSC. Manual for EME Aperture Corrector. Type 2113/1/. Equipment wanted :- Matrixing Unit type 2114. Colour Balance Panels, Remote Control Panels Type 2105. Headsets, Jack Plugs, PAL SPG to be in keeping with the EMI 2001. Any spares bits and pieces would be most welcome. *Paul Hundy , 101, Goodway Rd., Gt Barr, Birmingham B44 8RS .Tel 0121 325 0615.*



Wanted:- Ferguson SRA1-S for spares, Amstrad SRD600 and a remote control for Bang and Olufson TV - Beovision 5500 - 7700 - 8800 series *Contact Mark Killingback, Threeways, Saxlingham Thorpe, Norwich Norfolk NR15 1VE Tel.01223 892062 (Evenings).*



**Index of Advertisers**

BATC web pages ..... 60

GB3XT Kits & Bits - Bob Platts ..... 5

HS Publications - Aerials..... 9

HS Publications - Receiver..... 42

**Sevenside Television Group** ..... 13

VHF Communications ..... 39

Worthing & Districe Video Repeater Group..... 55

