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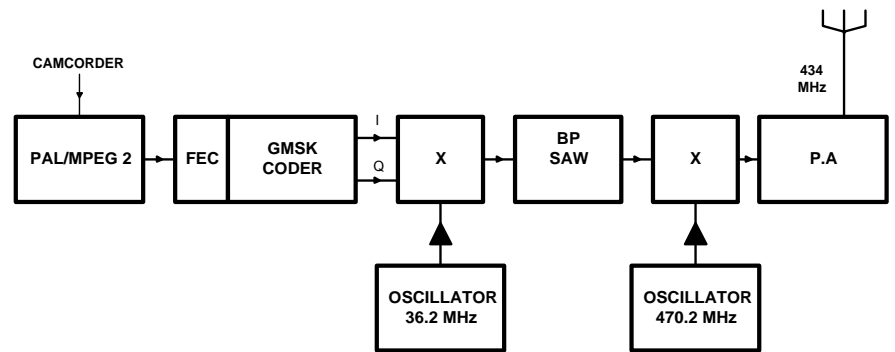
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# Chairman's Column

My email has been working overtime, mainly on digital topics. I suffered one or two rebuffs from my pro digital ATV stance last time I covered the topic in CQ-TV. I could back off - "but we don't want to do that" seems to be the catch phrase of the moment. Age has some advantages, and I can remember all the arguments when we moved from 405 to 625 and again when we pushed FM modulation forward for 24cms and upwards; I think we got it right on both counts. Noel Matthews G8GTZ is floating the idea of an Ondigital compatible repeater that can be received on set top boxes. This presumably leads us into COFDM modulation. I am not sure what bandwidth Noel's system would produce, but something that we could accommodate on 70cms would be welcomed, by me at least.

During Ham-radio 2000 in Friedrichshafen, DF2DS, DJ3DY and DC5QC put on a transmission demonstration with 10mW of digital ATV on 434 with 2MHz of bandwidth. The AGAF stand 20m away manned by DJ8VR, DJ1CU, DL4KCK, DC6MR and DJ8DW received and displayed the results on two colour monitors. The DARC administrative committee was soon taking an interest in the demonstration.

The block diagram shows the system. A PAL camcorder supplied the signal to a PAL/MPEG converter where a MPEG 2-transport stream with 2 Mb/s is produced including FEC (error handling). The effective usable data rate varied around 1.3Mbit/s, the rest is FEC and adaptively added stuffing packets. This was insufficient, but enabled the use of single chip MPEG 2 encoders. The GMSK coder comprised a digital unit supplying the I and Q signals and an analogue I/Q modulator that produced a GMSK signal at 36.2 MHz. This IF was chosen to enable the use of commercially available SAW



filters with 2MHz bandwidth that emanated from Digital Audio Broadcasting developments. For steeper filtering and better selectivity two filters and buffers can be cascaded. A step up mixer with a SBL1X converted the IF signal to 434 MHz with the aid of a 470.2 MHz oscillator. Next was a helical bandpass filter and PA producing 10mW into 50 ohm.

The receiver IF stages used 1/4 wavelength tubular tuned circuits at the input and between the pre-amps and the SBLX1 mixer. This fed to limiter demodulator ICs with SAW filters in front of and between them. From the demodulated signal, a slicer produced the serial data stream and a 16 MHz crystal pll with divider the corresponding 2 MHz clock signal. For error handling, MPEG decoding and PAL signal processing a commercial set-top box for digital satellite TV standard 9DVB-S was used. To interface to this, the received serial MPEG 2 transport stream was remodulated onto an 1152 MHz carrier as narrow band QPSK modulation (SCSP). The set-top box must be able to process a symbol rate of 1 megasymbol/s, where some devices have difficulties because of their internal oscillators phase noise. Other boxes only allow 2 Megasymbols/minimum.

This system would seem to point to a QPSK system and I feel it is important that we experiment with as many

systems as possible, but that in the end we arrive at a common system for Europe.

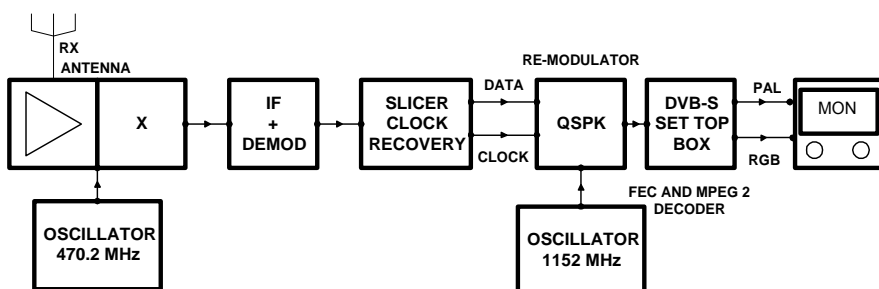
If you don't all want to use Digital Television for transmission, then perhaps it is worth exploring it for postproduction work. Computer editing systems are falling in price and will eventually be adopted by amateurs for polishing the output of their camcorder. I know of at least two members who have invested in or have access to this technology and by the next CQTV should be in a position to review one of the systems. I am always worried about too many reviews in CQTV, in case we start to look like a hi-fi magazine, but as yet nobody has tried to argue the advantages of oxygen free coax around the shack.

Last but not least, can I ask you to put the date for Bletchley into your diaries. Plans are still evolving but I hope we can build on last year and add more features. I think the only stipulation is that I am not the last to leave, as my car would not start after Shuttleworth and there was a distinct lack of fit volunteers to do some pushing. One of the problems of running what my wife calls a banger and I call a classic.

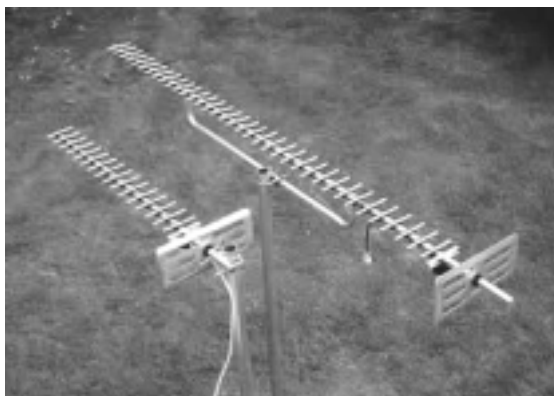
## References

- (1) Projektgruppen DATV gegründet: Uwe Kraus DJ8DW, CQ DL 2/99, S 92
- (2) Modulares DATV-Konzept lauft: Uwe Kraus DJ8DW CQ DL 11/99, S. 904
- (3) <http://www.darc.de/distrikte/g/datv/datvindex.html>
- (4) Repeater magazine 3/2000
- (5) General notes from Ian Waters G3KKD

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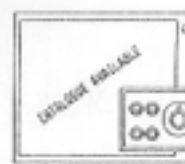
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# **The BATC ENIGMA CONVENTION and ANNUAL RALLY will be held in Historic BLETCHLEY PARK on Sunday the 6th of May 2001**

**The Gate will open for visitors from 10.00 hrs. Entry fee £1 per person - accompanied children under 16 free.**

**Talk in on S22 by the Milton Keynes ARS that is based in the Park.**

**All indoors in the former CAA building, with two separate rooms for members to display their personal equipment and discuss developments Although it is a “Closed weekend” for the museum a special tour of the Cryptology trail will be available during the afternoon for an additional £1 payable at the entrance to the trail in Faulkner House.**

**Refreshments are available both indoors, in Faulkner house, and outdoors, with a Bar in Hut 4**

**A member’s car boot sale at £5 per pitch is set out on the Faulkner House car park- NO VANS.**

**Visitors will be free to visit GB2BP and some other specialist groups in Faulkner House who have kindly agreed to open up for the occasion. The Military Group will provide generator power for any OB vans.**

**Members wishing to attend a social evening in the bar on the Saturday are advised to contact Tom G3LMX for a list of local establishments, SAE please! A buffet at £5 has been arranged early booking essential.**

**Red Cross in attendance, Cadet forces as guides.**

**Maps of the site and travel information are shown on the following pages.**

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## Where is Bletchley Park?

Bletchley Park is 200 yards to Bletchley railway station in Milton Keynes, Buckinghamshire. It is located just off the B4034, Bletchley to Buckingham road.

## Opening times

Bletchley Park is open every other weekend 10:30am to 5:00pm with last admissions at 3:30pm, and the last tour begins at 3:00pm. For further details of open weekends and special events, visit the [Bletchley Park Open Weekend Diary Page](#).

## Parking and Wheel Chair Access

Parking is free within the grounds of the Bletchley Park. Bletchley Park has good wheel chair access.

## Refreshments

There are 3 refreshment areas, offering a good selection of hot and cold food. Groups of 20 or more are welcome to telephone +44 (0) 1908 640404 if they want to make special arrangements.

## Visiting Bletchley Park by Public Transport

### By Rail

Fast efficient service to Bletchley Railway Station from:

London Euston, Milton Keynes Central (for InterCity connections), Coventry and Birmingham New Street.

Bedford Midland (except Sunday) for connections to London Thames Link, East Midlands and South Yorkshire. For more information, including train times visit the [Railtrack web site](#).

### By Bus

There are buses and coaches from all parts of Milton Keynes and beyond, arriving at Bletchley Bus Station. On leaving the Bus Station head towards the Railway Station and take the footpath to Bletchley Park, opposite the station entrance.

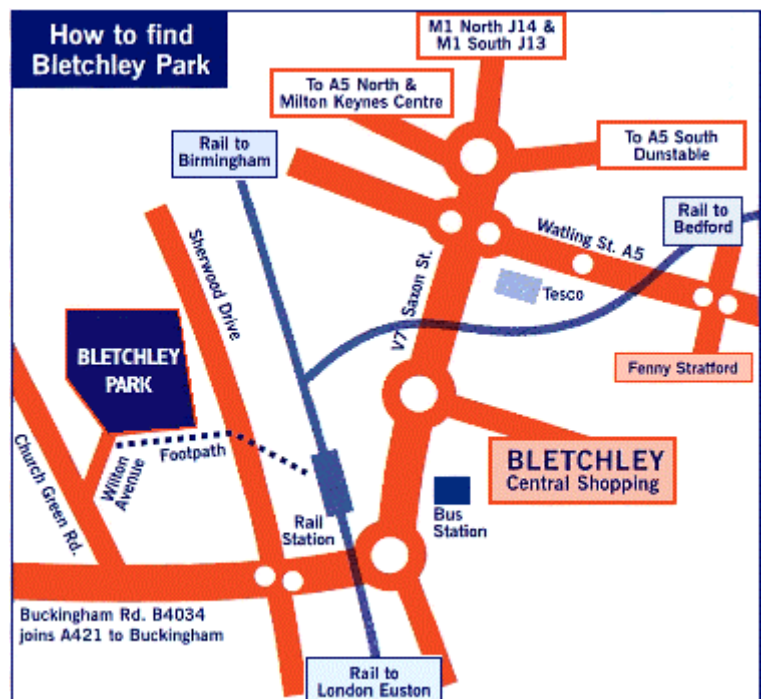
## Visiting Bletchley Park by Road

### From the North or East

Find Saxon Street (V7, also marked B4034) and South towards Bletchley. Follow the signs towards Bletchley Railway Station. Go straight across the double roundabout into Buckingham Road (B4034). At the Eight Belles public house turn right into Church Green Road then take the first right into Wilton Avenue that leads into the Park.



Road map of Milton Keynes



Road map of Bletchley

### From the West

On the A421 look for the roundabout with the B4034 to Bletchley on the right, then look for the Eight Belles public house on the left.

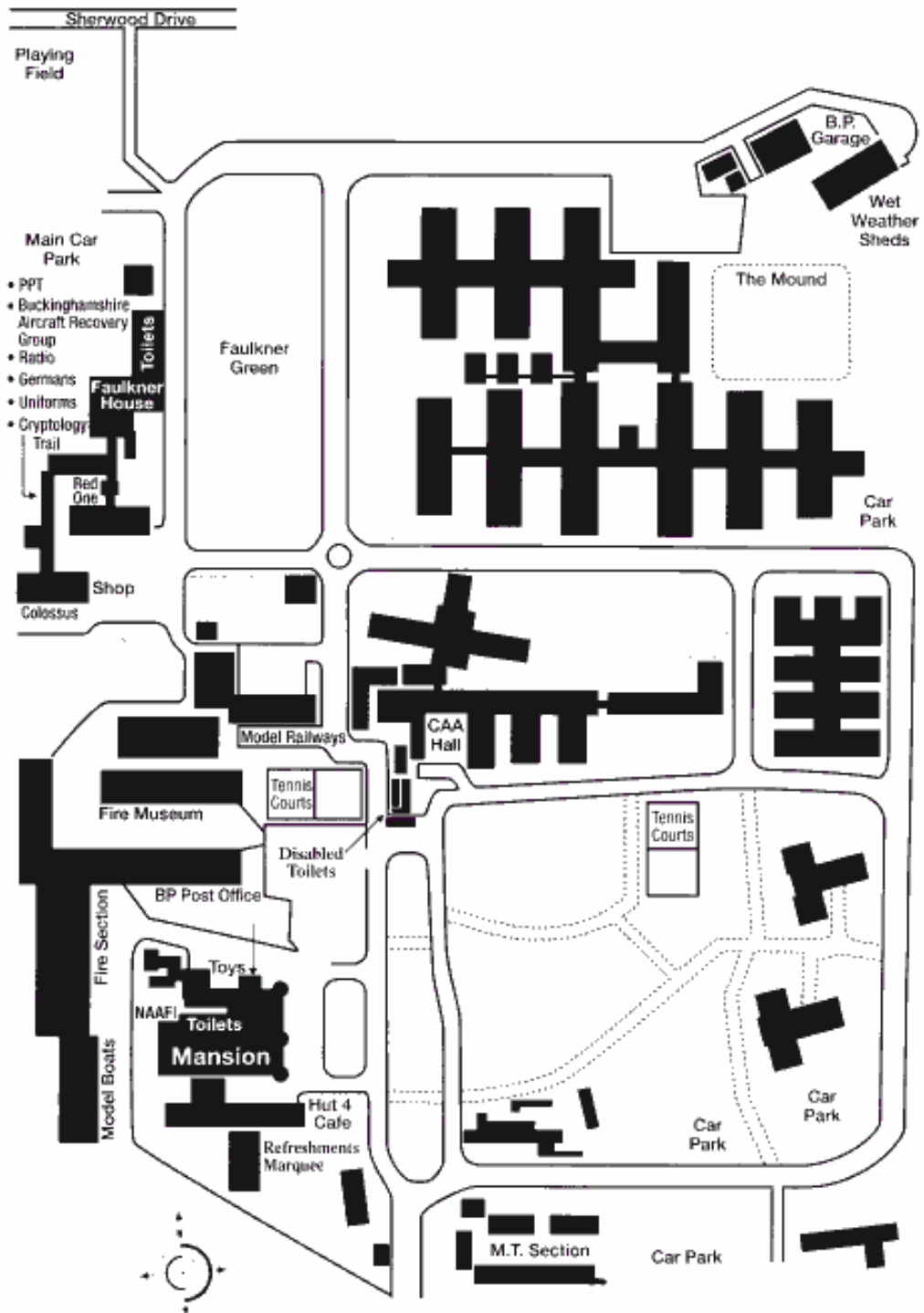
### From the South West

Enter Bletchley on the A4146, and follow the signs for Bletchley Railway Station. At the double roundabout on Buckingham Road turn left.

### From the South

Enter Bletchley on the old A5 (V4) through Fenny Stratford, turn left at the Tesco store onto the B4034.

## A map of Bletchley Park



# An Introduction to PIC programming - Part 4

By Brian Kelly

In this final part of the series, we will be looking at how to configure the 16C84 so that it works correctly in different circuit designs. We will also briefly look at interrupts and see how they can be triggered by signals from outside the chip and tie-up a few loose ends left over from earlier text. A bit-by-bit breakdown of the registers is included at the end for reference.

## Clock configurations

I mentioned before that the clock generates the timing reference for the whole microcontroller. Almost all the internal processes advance to their next stage, in time with the edge of the clocks waveform. The 16C84 conveniently has clock circuitry on-board and only requires the addition of timing components, connected to the OSC1 and OSC2 pins, to set its speed. To cater for different applications, the chip can be configured so its clock operates in one of four modes, "RC", "LP", "XT" and "HS". Note that these have to be set during the chip programming stage; it would be pointless to make these configurable from within the software as the chip probably wouldn't operate at all if the mode was set wrongly. A special register called the "configuration fuse" that can only be accessed during programming is used to set the clock mode and a few other things I'll come to later.

The RC configuration is best suited to very low cost applications since the timing components are nothing more than a single resistor and capacitor. Our "spacewriter" project in the last issue uses RC mode. Because of the relatively poor temperature coefficients of the components, sensitivity to supply voltage and the chip itself, RC oscillator mode is not safe to use where the timing is critical. The chip is, however, optimised to give as little drift as possible at a comfortable room temperature. The resistor is connected between the supply voltage and the OSC1 pin and the capacitor from OSC1 to ground. Fig 4.1 gives some idea of values needed to set a particular frequency. As a bonus, in RC mode, the OSC2 pin provides a square wave

output at one quarter of the oscillator frequency that may be of use elsewhere in the circuit.

The other three clock modes are very similar and to some degree their values overlap from one mode to another. The only difference inside the chip between these modes is the value of the feedback resistor that biases the oscillator and therefore the amount of drive signal it can produce. In these configurations, the timing components

**Fig 4.1 Clock Oscillator values in RC mode.**

Note that the values shown are based on a 5V supply at a temperature of 25 degrees Celsius. Increasing the temperature will tend to lower the frequency.

The frequencies shown are approximate and will vary by as much as 30% depending on the batch of chip. In all but the most cost sensitive applications it is better to use a quartz crystal or ceramic resonator to set the frequency.

RC values shown are for guidance, values of R between 3K and 100K combined with C larger than 20pF are recommended.

Resistor	Capacitor	Frequency
3K3	20pF	4.71MHz
5K	20pF	3.31MHz
10K	20pF	1.91MHz
100K	20pF	207KHz
3K3	100pF	1.65MHz
5K	100pF	1.23MHz
10K	100pF	711.5KHz
100K	100pF	75.6KHz
3K3	300pF	673KHz
5K	300pF	490KHz
10K	300pF	275.7KHz
100K	300pF	28.1KHz

will typically be ceramic resonators or quartz crystals and should be connected between the OSC1 and OSC2 pins. From each pin there needs to be an external loading capacitor connected to ground to ensure the oscillator starts properly and is stable. Fig 4.2 shows typical capacitor values for a range of quartz crystals, as a rule of thumb, use values between two and three times larger for ceramic resonators. "LP" (Low Power) mode is best suited to low

frequency applications, it minimises the clock circuits current consumption. "XT" (XTal) mode is for normal mid-frequency applications and "HS" (High Speed) mode uses extra gain to enable the oscillator to run faster. Frequency stability of these three modes is almost entirely dependent on the quality of the resonant components and can be extremely high.

## The reset circuit and watchdog

There are four internal sources of reset signal and one external one, all causing the chip to set some default register values, then jump to program memory address zero. The external signal comes from the pin called MCLR (Master CLear). You will notice it normally has a line drawn over the letters; this means the signal is "active low", in other words the reset is actioned by pulling the pin to a low voltage; for normal operation the pin must be near supply voltage. As a safeguard against a program crashing, there is inside the chip a gadget called a watchdog timer that can also reset the chip. This timer runs independently of the clock and program and cannot be adjusted in any way except to reset it with the CLRWDT instruction. It works by timing intervals of approximately 18 milliseconds then internally causing a reset. Provided the program runs the CLRWDT instruction within that period, the timer will never reach 18mS so no reset occurs. If for some reason the program fails to use the instruction within that period, a crash is assumed and the chip is restarted. To put the time-out period in perspective, 18mS gives time for about 18,000 instructions to execute with the clock running at 4MHz.

If longer time-out periods are needed, the timer can be routed through the prescaler to increase its period by 128 times by setting a bit in the "configuration fuse" during programming. Unfortunately this ties up the prescaler from being used for other purposes. At power-up the chip also has to be reset; for this there is a voltage detector on the silicon that automatically causes a reset as the supply rises above about 1.3V. In some applications the supply may not rise quickly or the clock may be coming



from a source slower to start than the chip itself - to accommodate this there is another safeguard built into the chip. Release from reset can be delayed by two methods - by counting 1024 clock cycles or by counting 1024 pulses from an internal pulse generator. The latter method gives a period of about 72mS that should be sufficient for the supply to stabilise; the former allows sufficient clock pulses to ensure the clock has stabilised and enough cycles have been fed to the chip to “prime” it ready for action. Note that the clock pulse timer is also activated when the chip awakes from sleep mode so the clock, which is disabled during sleep, has time to restart itself and settle before being used.

## Input and output ports

The 16C84 has two IO (In/Out) ports called Port A and Port B, these are for some unknown reason also called RA and RB respectively. Port A only has five bits (numbered RA0 to RA4) and of those, bit 4 is an open-drain pin, that means it can only sink current to ground, it cannot supply a current. Port B has eight bits and all can sink or source current. The maximum current any single pin can sink is 25mA and the maximum it can source is 20mA but there is also a maximum total sink current for all pins on Port A of 80mA and for Port B, 150mA. The most combined source current for Port A is 50mA and Port B, 100mA, in any case the combined current sink for both

Clock mode	Frequency	Quartz XTAL caps		Ceramic resonator caps	
		C1 (pin 16)	C2 (pin 15)	C1 (pin 16)	C2 (pin 15)
LP	32KHz	30pF	30-50pF		
LP	100KHz	15pF	15pF		
LP	200KHz	0-15pF	0-15pF		
XT	100KHz	15-30pF	200-300pF		
XT	200KHz	15-30pF	100-200pF		
XT	455KHz	15-30pF	15-100pF	150-330pF	150-330pF
XT	1MHz	15-30pF	15-30pF	50-330pF	50-330pF
XT	2MHz	15pF	15pF	20-330pF	20-330pF
XT	4MHz	15pF	15pF	20-330pF	20-330pF
HS	4MHz	15pF	15pF	20-200pF	20-200pF
HS	10MHz	15pF	15pF	20-200pF	20-200pF

**Fig 4.2 Loading capacitor values for LP, XT and HS Clock oscillator modes**

Increasing the value of the capacitors makes the oscillator more stable but also makes it slower to start up. I recommend using one of the delayed reset modes when values toward the top end of the range are used. Both capacitors are connected to ground with the crystal / resonator between pins 15 and 16. If a very low drive level crystal is used, it may be necessary to include a resistor in series with pin 15 to prevent overdriving. If this is included, C2 should be connected at the crystal end of the resistor.

ports together must not exceed 150mA and as a source should not exceed 100mA. Despite all those restrictions, the 16C84 has some of the industry’s beefiest ports available. Take care when using the ports to drive LEDs, as they are constant voltage devices you must use resistors to limit their current or the port may be damaged.

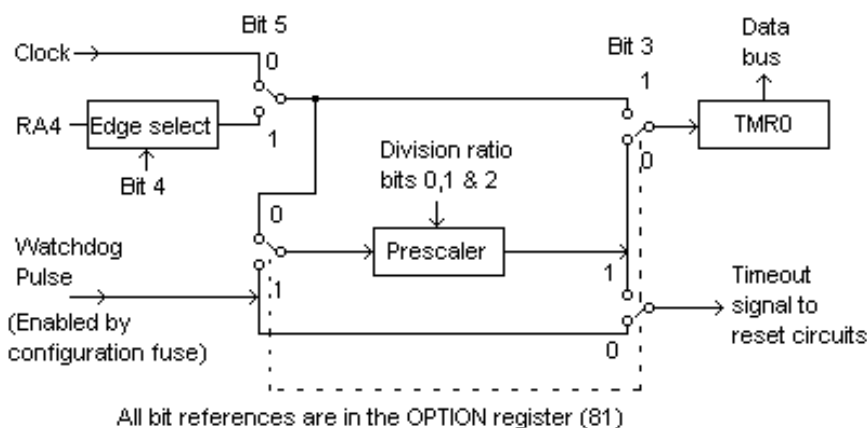
In “spacewrite” we had to configure the port pins to be inputs or outputs; setting bits in the “TRISA” and “TRISB” registers under program control did this. Each TRIS (TRI-State) register bit controls the corresponding pin on the port, setting it to “1” makes the pin an input and setting it to “0” makes it an output. Think of “1” looking like “I” for input and “0” looking like “O” for output if it helps you remember. When a port is read in, the states of the pins are seen as ones and zeroes in the

destination register, when writing, any pins configured as outputs will assume the state of the bits being written. The only “gotcha” to be aware of is that if a bit test instruction is used directly on the bits of the port, the state of pins configured as outputs will read back as the value last written, not the actual voltage on the pin. Similarly, if the state of the output pins is expected back when the port is read, any bits configured as inputs will return the voltage currently on the pin. Normally, safeguards would be incorporated in the program to mask out data from pins that should be ignored.

The RB pins have rather a nice feature available to them - they can have pull-up resistors switched into circuit under program control. These resistors are collectively turned on and off by switching bit 7 in the OPTION register but in any case are only connected to pins configured as inputs. The pull-up current is about 100uA per pin, the equivalent of a 50K resistor up to supply. The pull-up resistors can be used to make certain the pins cannot “float” when not being driven from outside the chip or as weak current sources for outside circuitry.

## The RTCC and prescaler

Before going further, a word of caution is needed. Somewhere around 1995 Microchip decided that RTCC (Real Time Clock Counter) was a potentially misleading name because “real time” is



generally associated with the time of day so they renamed it TMR0 (TiMeR 0) which is far more sensible. There was no change in the chip hardware or operation in any way and you can treat the two names as interchangeable.

TMR0 is actually nothing more than a register inside the chip but it can be put to use in some very clever ways. Although it can be written to and read like all the other registers, it also has the ability to add one to the value it holds when told to. The instruction to count up can come from two sources, either the RA4 pin (which must be configured as an input for this to work) or from the clock generator. Effectively it becomes either a counter for outside pulses or a counter for clock pulses. When told to monitor RA4 it will either count up on the rising edge of a pulse or the falling edge, depending on a bit setting in the OPTION register. It

makes a useful item counter if used this way. If we assume the clock is running at a fixed frequency, by counting clock pulses it becomes possible to measure or generate time periods. The counter only has eight bits which limits us to a count range from zero to 255 (H'FF) which can be very restricting so the PIC has an additional counter on-board called the prescaler which extends its range. The prescaler can be configured to sit between the count source and TMR0 itself by setting a bit in the OPTION register and can also be set to count 2,4,8,16,32,64 or 128 before passing the pulse on, in the same way. The prescaler can't directly be read or written to but its division ratio can be changed under program control. It is also cleared whenever any instruction that writes to TMR0 register is executed so that no residual count is left in it. Fig 4.3 shows the ways TMR0 and prescaler can be configured. Note

that as mentioned earlier, the prescaler can be assigned to either the watchdog timer or TMR0, but not to both!

## EE data memory

EE stands for "Electrically Erasable" although this is something of a misnomer left over from the similar type of memory used in EEPROM devices. When power is removed from a PIC device there is no longer a source of voltage to maintain the bits in the registers so they all go to logic zero. On power-up they are either left alone or in some cases they are preset to default values. EE memory is different in that it retains data in the absence of power. In fact the memory will typically stay intact for 40 years although I doubt I'll be able to verify that! The 64 bytes of data memory could be used for storing user preferences, serial numbers (special addresses 2000 – 2003 also

**Fig 4.4 Bits in special function registers:**

Bit	STATUS (register 3)	INTCON (register B – INTerrupt CONTROL)
0	C – carry / borrow bit	RBIF- set when RB4-RB7 bits change
1	DC – digit carry / borrow bit	INT – set when RB0 interrupt generated
2	Z – zero bit	RTIF – set when TMR0 overflows
3	PD – power down bit (cleared by sleep)	RBIE – enables RBIF interrupt
4	TO – time out (cleared by WDT)	INTE – enables INT interrupt
5	RP0 – direct register page bit 0	RTIE – enables RTIF interrupt
6	RP1 – direct register page bit 1	EEIE – enables EE write complete interrupt
7	IRP – indirect register page bit	GIE – Global interrupt enable

Bit	OPTION (register 81)	EECON1 (register 88 – EE CONTROL 1)
0	PS0 – prescaler division ratio bit 0	RD – set to 1 to read EE data memory
1	PS1 – prescaler division ratio bit 1	WR – set to 1 to initiate EE data write cycle
2	PS2 – prescaler division ratio bit 2	WREN – EE write lock, 0=inhibit, 1=enable
3	PSA – prescale 0=TMR0, 1=WDT	WRERR – set if write cycle aborted due to a reset
4	RTE – TMR0 edge, 0=rising, 1=falling	EEIF – set when EE write interrupt generated
5	RTS – TMR0 source, 0=Clock, 1=RA4	Not used
6	INTEDG – INT edge, 0=falling, 0=rising	Not used
7	RPBU – pull-ups, 0=enabled, 1=disabled	Not used

Bit	Configuration fuse (address 2007)	FOSC bits
0	FOSC0 – OSC selection bit 0	00 = LP oscillator
1	FOSC1 – OSC selection bit 1	01 = XT oscillator
2	WDTE – 0=watchdog disabled, 1=enabled	10 = HS oscillator
3	PWRTE – 0=power-up timer off, 1=on	11 = RC oscillator
4	CP – 0=code protection on, 1= off	
5	Unused, reads as "1"	<b>PS2, PS1, PS0 Prescaler bits</b>
6	Unused, reads as "1"	000 = 1:2
7	Unused, reads as "1"	001 = 1:4
8	Unused, reads as "1"	010 = 1:8
9	Unused, reads as "1"	011 = 1:16
10	Unused, reads as "1"	100 = 1:32
11	Unused, reads as "1"	101 = 1:64
12	Unused, reads as "1"	110 = 1:128
13	Unused, reads as "1"	111 = 1:256

exist for this purpose) or whatever you want to keep while the power is off. The drawback to using this type of memory is its speed. It can be read at normal speed but when writing to it there is a considerable delay (10mS) before the data is lodged in the memory cell. To be fair, the chip has to generate a high voltage from its own on-board supply to force the bits into the memory and this is what takes most of the time. EE data memory can be re-written at least one million times so it is very reliable. The EE addresses are not part of the normal register map - they are accessed through an index register and data register instead. The idea is that you first put the EE address in the index register then access it through the data register. There is also a fairly elaborate protection mechanism that involves writing a special combination of numbers to the EECON registers to "unlock" the memory for writing so that an accidental erasure or corruption is extremely unlikely.

## Sleep mode

I wish I had one of these myself. The SLEEP instruction puts the chip in power-down mode and reduces its current consumption to, at most, a few microamps. It is very useful in battery-powered applications where longevity is essential. Not only does the core of the chip shut down but the clock stops running and the RA and RB pins "freeze" at whatever state they were in. Note that if power consumption has to be minimised, any current flowing out of or into pins will still be flowing and current through the pull-up resistors will have to be taken into account. The chip will awake under four circumstances; the power is removed and re-applied, a reset via MCLR is received, a watchdog timeout occurs (if enabled) or if an interrupt is generated. When waking up, if the clock is in XT or LP mode there is a short delay to allow time for the clock to restart before the program continues. If all external current drain is removed, the chip itself will typically draw less than 10uA in sleep mode.

## Interrupts

For some reason, the concept of interrupts strikes fear into the hearts of some programmers. Admittedly, they can be a real pain to debug when something isn't working properly but

their usefulness far outweighs any reason to hate them.

An interrupt isn't a hardware or software thing, it is more of a concept that has hardware ready to support it. Like in everyday life, some things happen periodically and expectedly and other things are occasional or at random. We can plan for the anticipated things but by their very nature we can't afford to spend all our time preparing for the unlikely happening. Looking back at the traveller example in part 2, the instructions were fairly easy to follow but suppose, quite unexpectedly, someone stepped out in front of the car as it was in the "proceed" stage and the brakes had to be applied. We could write the flow chart so at every stage there was a decision made to see if there was an obstruction but that would overcomplicate things and there would be so many checks that the underlying purpose of flow charting would be lost.

A far better way is to make a "contingency plan" in case something like that happens but only use it if the occasion calls for it. This is how interrupts work - the normal flow of the program is followed until some stimulus "the interrupt" forces a jump to a new portion of program, the "interrupt service routine". The beauty of this system is that the interrupt code can be independent of the remainder of the program. It isn't included in the normal instruction flow and can exist as a self-contained sub-program that starts as soon as it is triggered and when finished returns control back to the original place in the main program. In the 16C84 there are several mechanisms to trigger an interrupt but all result in a jump to memory address 4; that's why the "spacewriter" program avoided using that address by jumping over it. It is up to the program author to put a suitable interrupt service routine at address 4; the chip automatically saves its current address before jumping to it. When the service routine is finished, it should use the "RETFIE" instruction that first re-enables further interrupts then returns the program back to the point where the interrupt occurred. Lets look at the possible sources of interrupts in the 16C84:

The most obvious is the RB0 pin, which can be configured as an interrupt trigger if not being used for other

purposes. It provides a direct connection to the interrupt mechanism so any outside circuitry can demand attention at any time. TMR0 can also generate an interrupt as it exceeds maximum count (FF) and rolls over back to zero. This is handy if an interrupt is needed after a certain number of input counts on RA4 (external count) or if an interrupt is needed periodically (clock pulse count). On completion of a write cycle to EE memory an interrupt can be generated, which might sound silly at first but the EE memory is quite slow to write to and the processor may as well initiate the write then get on with something else until it is finished. The final interrupt source is very clever. It comes from port B again but this time it looks for any change in logic levels on RA4, RA5, RA6 or RA7. The chip makes a copy of whatever levels it sees on these pins and generates an interrupt if any of them change.

All these interrupts have "enable" bits in the INTCON register so they can be turned on or off as required. They also have bits in the same register which indicate which caused the interrupt. As there is only one routine at address 4, it should check those bits to see which interrupt has occurred. INTCON also has a global interrupt bit which allows the whole interrupt mechanism to be disabled if it isn't being used.

## Code Protection

Microchip has a neat solution to the software piracy problem. If you have just spent weeks writing and debugging your masterpiece program, especially if it is for commercial use, the last thing you want is for someone to copy it. To make it impossible to read back the program in a 16C84 yet still confirm it is programmed correctly, a protection bit is included in the configuration fuse. When protected, the 14 bits of the program memory are read back as the top 7 bits XOR'ed with the bottom 7 bits then AND'ed with H'007F'. The result is a number that is virtually impossible to convert back to its original state but will be the same from one chip to another if they are programmed with the same code.

That just about sums up this short crash course on PIC devices. I have only covered the aspects that you need to know to get started with them and

enough examples to give an outline of how they work. Fig 4.4 shows the bits used to configure the chip but I strongly advise you to get a copy of the 16C84 data sheet from [www.microchip.com](http://www.microchip.com) and explore the

other features it and its family offers. If you are worried that you might make mistakes, don't, it isn't all that difficult and even if things don't work first time, the chip is reprogrammable at least 1,000 times so you get plenty of tries!

If you have any questions about PIC programming you can e-mail them to me ([BetwixtBBS@cs.com](mailto:BetwixtBBS@cs.com)) and I'll try to respond as soon as possible. But please don't expect me to be familiar with any software I've never seen, though.

## High Definition plasma display panels for home TV

Fujitsu Hitachi Plasma Display (FHP) has developed 32 and 37in high-definition plasma display panels (PDPs) using its proprietary alternate lighting of surfaces (ALIS) method drive circuit technology. The displays, which join the company's existing line-up of 42in PDPs, are positioned for use in household television sets.

Because of their thin profile, lightweight, large viewing area and wide viewing angle, PDPs are becoming increasingly popular as large-screen displays. The PDP market – particularly the business-use segment – has grown rapidly, hitting 100,000 units in FY1999 and expected to reach 250,000 units in FY2000. Moreover, the upcoming initiation of digital broadcasts (scheduled to begin in Japan this December) and the wider availability of DVDs is expected to result in explosive growth in the market for PDPs for household television receivers. FHP anticipates that by FY2003 PDP demand will total 2.3million units, 1.4million for use in television sets and 900,000 for business environments.

Most large-screen consumer television sets currently range in size from 25 to 36in, but as they use CRTs, they are inevitably bulky and heavy. This constrains freedom of placement, particularly when household space is limited. On the other hand, thin, lightweight PDPs can be placed easily even in the most compact living quarters. FHP aims to foster greater use of PDPs in home environments by providing 32 and 37in models - i.e. sizes that fit easily into most homes.

Once digital broadcasting gets underway, there will be increased demand for high definition, high-quality devices to display clearly moving video and still images, including captioned text.

With previous generation PDPs, reducing the screen size also reduced the area of cell illumination, and it was difficult to ensure brightness. However, high-definition PDPs using FHPs proprietary ALIS method drive circuit technology makes possible both high definition and high luminosity. When digital broadcasting starts bringing


high-definition images into people's homes, FHPs latest PDPs will display them with a vertical resolution of 1024 lines, making the devices leading contenders to capture the market for home-use wide-screen television sets.

At the end of July this year FHP completed construction of a new production facility on the premises of its wholly owned subsidiary, Kyushu FHP. Production equipment is currently being installed, with initial pilot runs planned for January 2001 and commercial shipments to begin by next April. The facility will have the capacity to produce 30,000 PDPs/month, mostly high-definition units, and FHP plans to raise production to 60,000 units/month in 2002. This, together with output from Kyushu FHPs original production line, will bring FHP's total POP production capacity to 70,000 units/month in 2002.

From 'What's new in Electronics, October 2000', [www.wnoee.com](http://www.wnoee.com)

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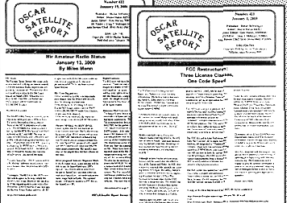
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# Digital DX, it can be done

By **Henry Ruh AA9XW (KB9FO)**

With the controversy surrounding 8VST-T modulation, and the generally gloomy outlook for its acceptance for indoor reception, versus having outside antennas, and the various questions of "is it going to work?", here is a little excitement.



While my ATV friends may think I am absent from the airwaves, I in fact have just been very busy on the commercial side of TV. Recently I completed a study (600+ pages) comparing UHF reception in Chicago. The study involved 5 NTSC UHF stations and 1.25 DTV stations. That's one full data and one with partial data. Recently more stations in Chicago have joined the DTV world, and I will be conducting another study shortly that will document the DTV reception. I'm using my own personal "ENG" truck, mast and a large quantity of test gear that almost makes my ham shack look light.

Meanwhile, there are now some 60+ DTV stations operating full time in several markets. You can obtain a current list by visiting the NAB [[www.NAB.ORG/dtv](http://www.NAB.ORG/dtv)] site and going to the DTV station page. There they list by market the DTV operating stations and the list is updated as quickly as stations become operational.

You can receive ATSC digital TV fairly inexpensively. A WinDTV card for your computer (by Haupague Electronics) is available for \$299 at most computer stores or by Internet. The NTSC version is only about \$49. I purchased 8 of the NTSC/DTV cards to pass around station staff to monitor our own Channel 45 DTV signal which is a half million watts from the top of the Sears tower. I have one in my home

computer, and it is hooked to my master house antenna system. The antenna is a typical mid range Wineguard UV combo on the rooftop, about 25 feet above ground. A rotor lets me move it to view adjacent markets.

From my home south of Crown Point, IN, (about 45 airline miles from the Sears Tower) I can usually watch South Bend P4 about 50% of the time Milwaukee from the Lake inversion effect, and frequent glimpses of Indianapolis, Lafayette, Ft Wayne, Madison, and more distant locations. Needless to say, these coincide with the 440 MHz ATV band openings. The VHF stations in these markets are also similarly viewable under the same atmospheric conditions.

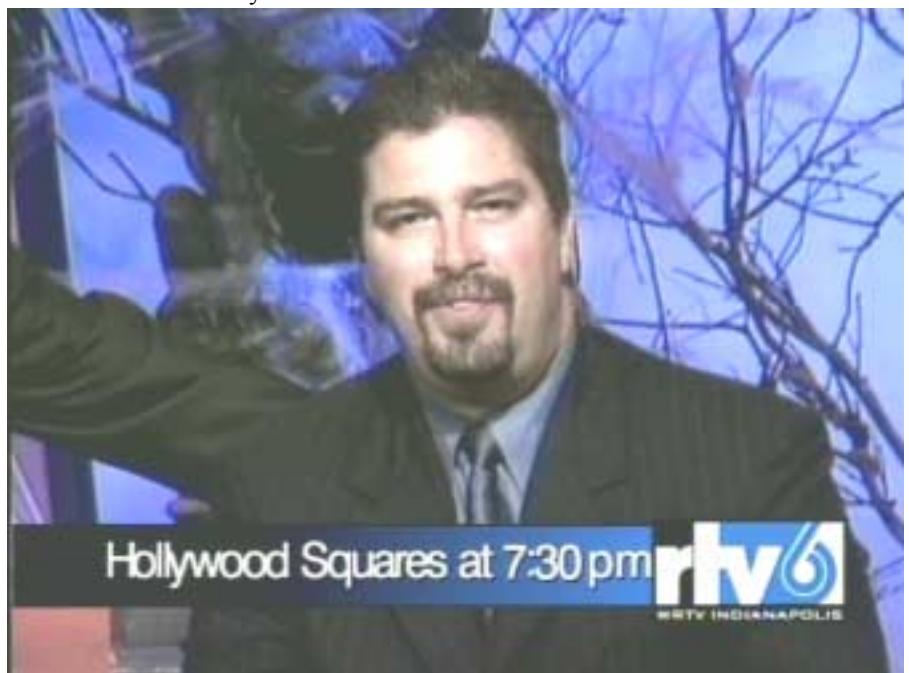
The obvious question is, "Are the DX DTV stations also able to be received?" The answer is yes, and to some extent, more easily than the NTSC stations!

Sunday morning 29<sup>th</sup> October 2000, between shopping, making meals and training dogs, I managed to squeeze in a few minutes of regular TV and noticed a band opening. Milwaukee, Indianapolis was fairly strong and South Bend a bit iffy. In Milwaukee there is a rather low powered DTV-8 that carries NTSC 10 WMTV. It is best known in Broadcasting for interference to Muskegon, MI viewers of WOOD TV 8 in Grand Rapids. The shot being about 65 miles directly across the lake



between Milwaukee and Muskegon. The Channel 8 Milwaukee station has decreased its power and changed to a directional antenna to reduce the problem, but, as we hams know, when the band is up, power is meaningless with 10 watt 300 mile contacts on ATV possible.

Sure enough, from Milwaukee, channel 10 was visible; channel 6 was there but had two other co-channel signals beating with it. A scan of the DTV mode found channel DTV8. At first, much like rain fade DBS, the signal was blocks, intermittent and audio bits here and there, but as the band improved, the signal got better until there was full reception. I snatched a few frames in the WinDTV 2000 program, and E-mailed them off in hope of a reception confirmation. The scan also picked up a DTV 25 station. I did not know where that was, and so a search was made by rotating the antenna while watching the DTV 25 channel on the computer. When I got to the Indianapolis direction, it popped in





and came in just fine. Full reception. So I captured a few frames of DTV 25, which is the parallel of WRTV channel 6 Indianapolis. I could also get 13 NTSC from Indianapolis just fine. DTV pictures are either "perfect" or nothing, albeit, there is a 1 dB range of signal level where the error rate may produce partial pictures, blocks, or broken sound. DXing the usual NTSC signals often is difficult because of the co-channel interference. This is clearly seen in the channel 6 NTSC pictures. The closest channel 25 NTSC signal to me is Peoria, IL, about 100 miles, the DTV 25 signal is about 150 miles away. There was no trace of the Peoria signal, but the Indianapolis signal was certainly P5, or perhaps we should say D5! The NTSC 13 pictures is a good P4+, some co-channel signal can be seen from a local (6 miles) LPTV channel 13 that runs video jukebox.

Although not visible in this picture, there is also a 13 in Grand Rapids, that when the band is open, gets competition from the local LPTV 13. If I turn the antenna today, I can see it also. While the Indianapolis channel 25 DTV signal was easily received, there were only P1 to P2 signals from one Indianapolis NTSC UHF stations, and the others were not visible at all. So in this one instance, UHF DTV was perfect while UHF NTSC was basically not watchable from 150 or so miles.

The Milwaukee low power DTV 8 signal was also visible, but the more powerful NTSC VHF channels in

Milwaukee was a full P5 perfect reception, except for some co-channel interference. So even low power VHF DTV can make it, albeit not as well as full power VHF NTSC. I did not receive any of the DTV signals from South Bend, and the NTSC signals were at best P3 (16, 22, 28), quite a bit less than "normal."

Also included is the ID shot from my own Channel 44N/45D station that has a half million watts from the Sears building 24/7. It's the most powerful DTV station in Chicago. For those watching DTV, Chicago has D31 WFLD fox at 200 kW ERP, D43 WCPX (with 6 multiplex channels of programming) at 100 kW ERP, D45 WSNS with 467 kW ERP. All are at

the same antenna height (but not the same antennas) from the top of the Sears building. Soon NBC 29 and ABC 52 will be operating (they have been testing on air for the past week) and WGN DTV 19 is supposed to be on in December. Pictures of 31 and 38 are also included.

The WinDTV board is quick in locking in to the DTV signals. The board itself doesn't have a lot of buffer memory, and will, on perfectly good signals, occasionally drop frames, or block defect the picture. But for the money, it's perfectly fine in these early days of DTV.

The WinDTV board receives all VHF and UHF channels, in NTSC M, NTSC N or ATSC 8VSB-T mode. It also has two inputs, one for an antenna and one for cable. It can scan both and selects the demodulation mode automatically between analogue and DTV. The board also has lots of nifty features to capture video input from an external source, i.e., your baseband video and audio from an ATV receiver, TV set, camera, VTR, etc., and has a good tuner. I have not yet tried to see if using the cable input for cable channels 56-60 will net ATV signals, but it would be a natural thing to try. The capture mode lets you snatch off-air frames, and there is also a movie mode, however, you need lots of disk space to store the JPEG picture files!

So here are the pictures, and happy DXing the new DTV world.



# Mini 23cms aerial

By Len Smith, G7GNA

The simple aerial described here is the result of constructing the 'Mini Aerial for 24cms' (Best of CQ-TV page 100) by John Wood, G3YQC. After testing the aerial was found to have a good match of 50ohms, and covered the whole band (VWSR at 1240MHz at 1.2.1) and (VWSR at 1320MHz at 1.3.1) with a gain of 2.5db with 2 watts drive, (tested by G8CNK).

The construction materials and sizes are slightly different to those for John Wood's original aerial.

## Construction.

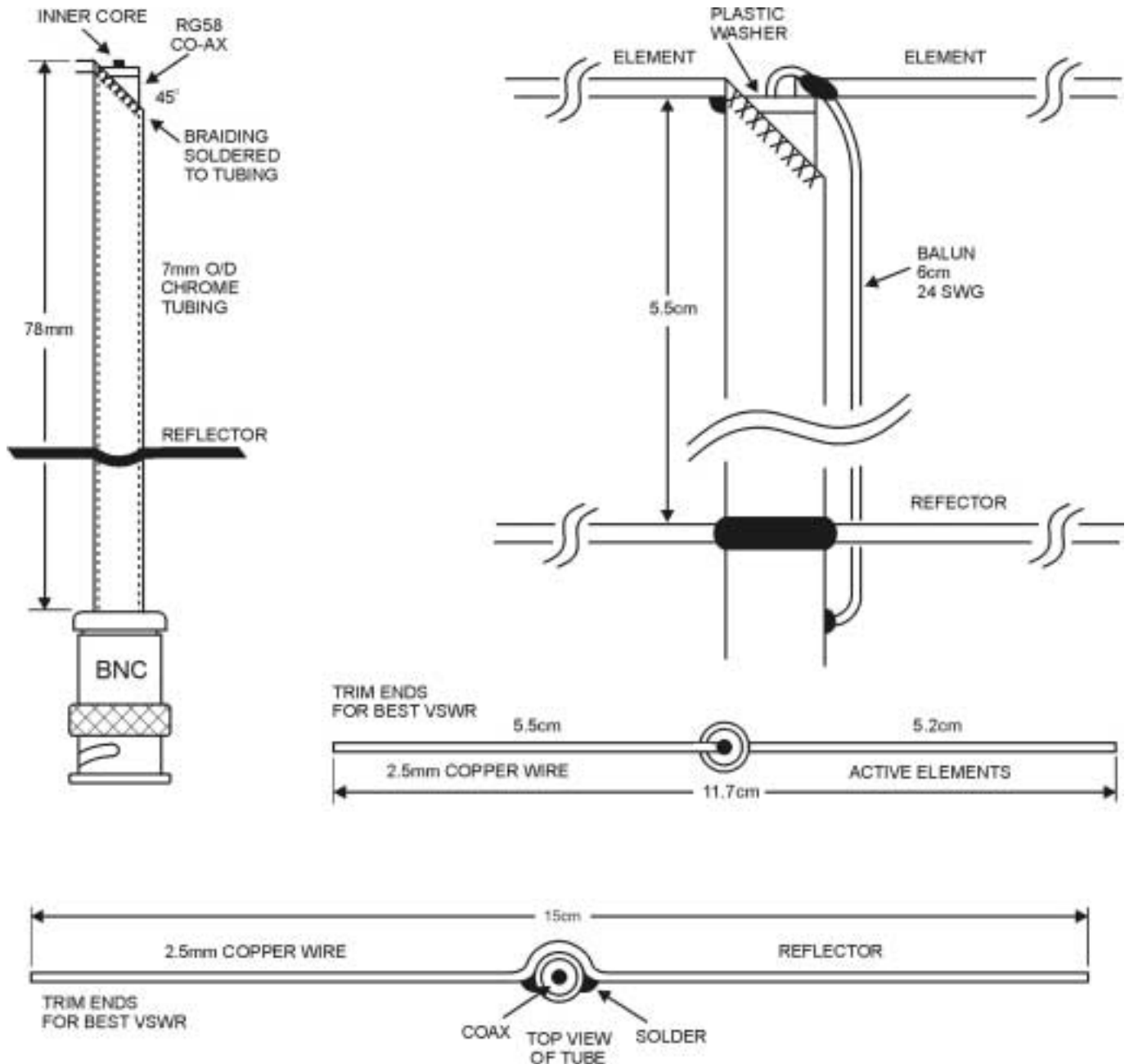
First get a piece of tubing and at one end cut a 45-degree angle (see drawing). Clean off the chrome at the top of the cut angle so that the brass is showing (5mm). Measure from the tip of the tube (cut end) for a length of 78mm. Then clean off the chrome from the other cut end (straight end). Take a B.N.C. plug and clean the nut outer surface to solder the tube on the cable entry

Now solder tin the both ends of the tube.

With a piece of RG58 co-ax, make up

the B.N.C. plug as you would normally do; the length of the co-ax should be about 10cm long. Now solder the tube to the top of the B.N.C. plug, with the co-ax passing through the tube. Strip off the outer casing of the co-ax level to the lowest point of the 45-degree cut. Pull back the outer braid over the tube and cut the excess back to about 5mm, then solder this to the tube.

The inner core is now cut flush to the tip of the tube. Strip back about 4mm of insulation off the inner core and tin with solder, place over the inner core an insulated plastic washer, as used in isolating transistors from a heatsink; this should fit flush on top of the inner



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cable. Cut one length of 2.5mm copper wire about 11cm long, find the centre and measure from the centre 5.5mm and cut it off at this position (this is the active element). Solder this to the inner core keeping it straight. Now cut another piece of wire 5.2cm long and solder this to the tip of the tube. (See drawings). Then cut a piece of 24swg wire (clean off the varnish) and solder one end to the centre (active element) end. Measure about 6cm and solder the other end to the outer casing of the

tube. (See drawings on previous page). Now cut another piece of the copper wire 16cm long and find the centre. At this point bend the copper wire around (half way) the tube then cut each end of the wire so that you get equal lengths either side to the total length of 15cm. Measure down from the tip of the tube 5.5cm and solder on the reflector at this point. Seal the top of the tube and connections with sealant, making it waterproof. Then place some thin heat shrink sleeving over the copper wire

elements. DO NOT use the old insulation for the copper wire, as this has a big effect on the matching and the gain. Lastly, cover the whole aerial with paint up to the B.N.C. plug.

The aerial was tested after completion, with good results. Several aerals have been built like this, and each has one performed as the first. The aerial described is nothing new, but it might be of some use to somebody who likes to play, just like me.

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## Thoughts for the 21st Century

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### By Peter Delaney

A number of comments have been made in recent time about what the Club might look to do into the 21st century. Some of these relate to the future of ATV on 70cm, and the role of various Clubs or Societies in securing this. The following are some thoughts on this topic (personal, not "official BATC policy").

After around 20 years or so, I left RSGB as I felt it was not providing - me personally - with 'value for money', or defending the whole spectrum (pun intended) of amateur radio modes and activities. Having said that, they are the "recognised national association" with bodies such as IARU and so on. At Shuttleworth, I have to say, the RSGB representation did seem prepared to listen to what members had to say - and I mean 'listen' rather than 'hear'. Several, including the RSGB President, joined BATC, without any 'pressure' from us, and seemed to be genuinely interested. I think we should welcome and encourage this dialogue. An alternative group, the UKRS, has developed in recent years, but I have not yet seen anything to convince me that this group has any greater authority or influence than RSGB.

We need to work with others, not against them. That implies working with users of other modes etc, and so observance of a band plan of some kind - hopefully arrived at by mutually agreed negotiation. Without it, anarchy rules. Wideband ATV is desirable on 70cm, of course, but if digital packet could roam free wherever it wants, free from any band planning, I suspect that

the analogue atv signals would far more suffer from the computer generated than vice versa. To this end discussion may need to take place with the RA, RSGB and UKRS on matters affecting ATV transmissions.

Several correspondents have mentioned that there is 70cm activity in their area. I am pleased to hear it. BUT, if they were to write about it ("like the committee of BATC who play in the upper reaches", as one commented) in CQ-TV, to tell us about the station, when they have activity periods, and so on, then others might be encouraged to watch out for their signal/join in. I am not aware of ANY practical articles on "a band where beginners can construct" from any of the correspondents concerned - although one did have a page about 70cm - and his local 23cm repeater - in CQ-TV 187. Graham Hankins has requested in several recent issues for more 70cm information, but if the only activity we hear about is 'higher bands', and therefore put in CQTV, it is not unreasonable for 'the world at large' to think that is where the activity is. However, it is much easier for prospective members to watch 70cm ATV than the higher bands - many domestic sets, and even aerals, will receive it unmodified, which is a truly low cost mode, whilst it is more tolerant of intervening hills than higher bands, so aiding dx etc. If possible, we should keep the current allocation on 70cm for analogue ATV. As an example, I have received pictures here (Berkshire) from Devon or France that would not be possible on 23cm - and a hill seems to (just) block my path to the local repeater.

However, BATC members have traditionally been up with, or ahead of, the broadcasters over the past 50 years. Often we have achieved acceptable, if not broadcast, results for a fraction of the cost - colour transmissions come to mind, with Grant Dixon's historic transmissions, and Mike Cox's early colour camera. The amateur licence is for the self-training and improvement of the holder (etc). That does not happen by standing still. Yes, current digital technology is expensive, and not always perfect (and I have no interest whatsoever in subscribing to the digital 'entertainment' (?) system currently 'on offer'), but I believe the amateur television fraternity SHOULD look at ways to develop this as an ADDITIONAL mode in the next century. Whether that should/could be transmitted on 70cm or elsewhere is not the issue, but I think it would be short sighted not to investigate the possibilities. Then, IF fast scan analogue should be denied to us on 70cm at some time in the future, we would at least be prepared with an alternative way to utilise this band - with amateur ingenuity, maybe to dx over 'those there hills' down to the South Coast.

As a Club we should look ahead, without ignoring our heritage, and that applies as much to transmitting practice as to anything else. Many members may have different views, whilst others may be able to write an article on circuits, equipment or operating on 70cm - or just a note about activity in their own area. If so please share them in CQ-TV; the BATC Committee cannot possibly know of all the activity, all the ways to do things, or



know of all the members views unless the members tell us!! And, if you all

disagree I will be interested, and not

offended, to read you well reasoned case in the magazine.

## History Corner - 'The Stonefield Vehicle'

**Dicky Howett writes: -**

Where is it now? The pictured Stonefield ob vehicle, photographed by myself in 1993 at the since demolished Thames OB base in Hanworth, near London was one of several 6-wheelers manufactured by the Scottish Stonefield company based in Argyshire.

Stonefield Vehicles manufactured a range of on or off highway vehicles that were used for OB purposes. The P30006 x 4 pictured was a six wheeler with 3-litre V6 petrol engine rated at 138bhp, and had three speed automatic transmission with four-wheel drive. Examples include at least one vehicle supplied to Thames Television (body built by Reeve-Burgess of Chesterfield) which was divided into three compartments: a three man cab, technical area housing camera and VTR equipment, and a rear section housing heavy duty Chloride batteries allowing silent recording away from mains power. Recharging was either from the



mains or an alternator driven from the Stonefield PTO. The vehicle was also used by Marconi to build its Mini-Mobile MkII for Granada Television, and this had its body built by Smith's of

Great Bentley in Essex. It included an onboard generator.

Rumour has it that the pictured vehicle blew up soon after. If anyone knows better, please tell us all.



**On the 4<sup>th</sup>/5<sup>th</sup> November 2000, the Arfon Repeater Group had a stand at the North Wales Amateur Radio and Computer Show in Llandudno. Above is a snap of GW1IEC and GW3FDZ holding the fort! The Arfon Repeater Group has in it's fold two ATV repeaters, (GB3GW & GB3TM,) two 2metre repeaters, (GB3AR & GB3DW,) one 70cm repeater (GB3AN) three packet sites,(GB7AN, GB7GW & GB7MS) and packet BBS GB7ABB.**

## Subscription rates

### By the Membership Secretary

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

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

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

If your subscription is due shortly, you will find a renewal letter enclosed with this magazine.

You hope you will continue to support the Club and we look forward to receiving your renewal either by post or via our web store.

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Size	Mono	Colour
Quarter page	£20	£25
Half page	£40	£50
Full page	£80	£100



Discounts of 5% for 2-3 insertions and 10% for 4 and above apply to the above prices.

If you would like to advertise in CQ-TV, then please contact our advertising manager, Trevor Brown, 14 Stairfoot Close, Adel, Leeds, LS16 8JR, England.

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## Deadline

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

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

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

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

The CQ-TV A4 size Word 97/2000 document template can be downloaded from our web site. Select the CQ-TV magazine link from the home page at <http://www.batc.org.uk>

Commercial adverts should be sent to Trevor Brown, the advertising manager, at 14 Stairfoot Close, Adel, Leeds, LS16 8JR. Tel: 01132 670115. Email: [adman@batc.org.uk](mailto:adman@batc.org.uk)

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



# Reflections on IBC2000

**By Mike Cox**

This year's IBC was the biggest ever. 45,000 people came to the RAI to see what was new in the field of broadcasting and electronic media.

All the halls of the RAI were in use by 800 exhibitors, and such has been the demand for space for next year that a new temporary hall is to be built on a pontoon in the harbour (between Halls 7 and 8, for those who know the RAI).

There were a number of major topics; video web streaming, broadband, electronic (or D-) cinema, return path technology for interactive services and the remaining problems in converting European Television to digital in any reasonable time scale. The USA has its own problems and we won't intrude on private grief. All these topics were debated in the Papers, Panel Sessions and Workshops, and were displayed on the exhibition floor.

We were privileged to have a special showing of "Toy Story II", one of the first feature films to be made and projected entirely electronically. The screening, using Texas Instruments' micro-mirror DLP technology, was magnificent.

One of the drivers of this technology from Hollywood's point of view is the



saving in cost of film prints.

You cannot have a show these days without an awards ceremony, and this year was no exception. Taking place during the Sunday Spectacular, awards were presented to winners of the IBC Programme Festival, Le Nombre D'Or, and to the best Free Design and Shell Scheme stands. The IBC John Tucker Award for Excellence went this year to Ray Dolby, a name almost as familiar to the public as to engineers, as most

pieces of recorded audio have his name on.

My old friend John Holton and I put together the IBC Message/Information Service channel again this year – with a new feature – international news by courtesy of the BBC.

IBC this year had the benefit of a 2Mb/s "pipe" from the local service provider.



**Pedal power is one thing, but I suspect the fire marshal would have blown a fuse if he had seen this one.**

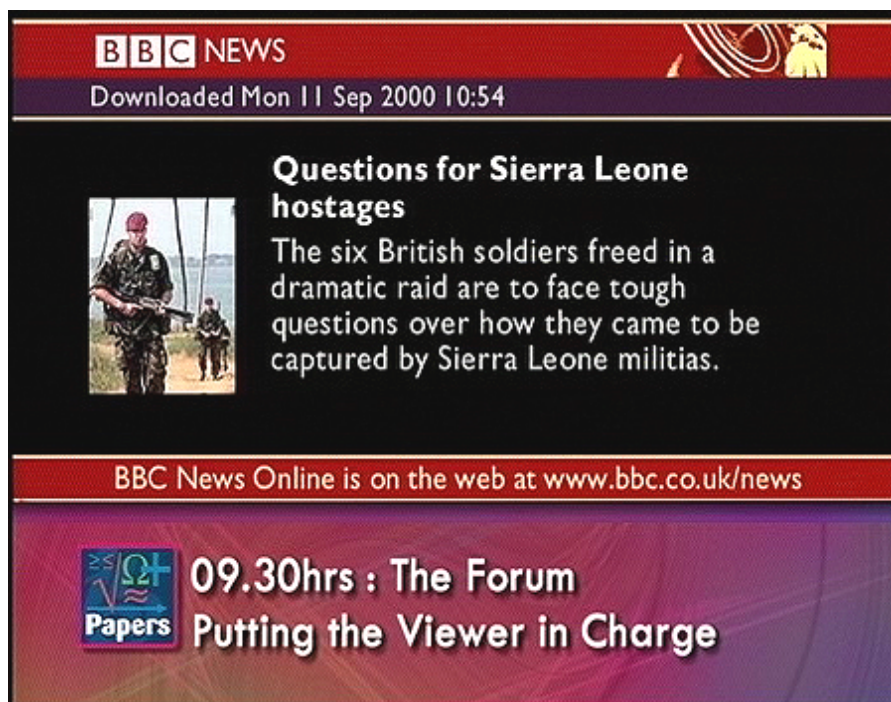
Accordingly we had an 'always on' web connection, and the BBC provided us with a special password protected set of pages on their website. The computer that decoded this was linked to an Aston "Motif" character generator that had been equipped with a template to take the BBC news pages. These had appropriately large characters, and could show pictures that came from the site.

The RAI complex is large, and one walks fair distances in a day. It is not surprising that exhibitors have taken to the scooter as an easier and quicker way of getting about.

By the time you read this, we shall be well into preparation for IBC2001. The Papers for the Conference Programme will have been chosen, and the Exhibition layout will be nearing finality, although it can change a week before the show!

Some of us are already thinking about IBC2002.

I hope to see all of you at IBC2001.



**BBC NEWS**  
Downloaded Mon 11 Sep 2000 10:54

### Questions for Sierra Leone hostages

The six British soldiers freed in a dramatic raid are to face tough questions over how they came to be captured by Sierra Leone militias.

BBC News Online is on the web at [www.bbc.co.uk/news](http://www.bbc.co.uk/news)

**09.30hrs : The Forum**  
**Putting the Viewer in Charge**

BBC News web page

## Modifications to the G1MFG Receiver for Continuous Tuning

The MFG receiver is a very sensitive device but has a couple of shortcomings, one of which is changing frequency. Fingers have to be very nimble to switch from 1249 to 1316 and back again for each over!

Frequency is set by dual in line switches connected to the PIC chip. The local oscillator was a phase locked loop controlled by the PIC. The control voltage to the VCO is also used to track the tuning on the front end.

I decided, therefore, that the receiver might be modified to be continuously tuneable if the VCO was sufficiently stable to free-run. All the mods take place in the metal box, so – what is where? There are four separate sections in the box; the section with the SMA connector is the front end. Moving along the 'long' side of the box, the next smaller chamber is the VCO where we will do all the mods. The next small chamber is the synthesiser control and finally moving anti-clockwise is the IF demodulator etc.

In the VCO chamber there are TWO printed inductors – you need to identify the one that has TWO diodes ... one at each end. The d.c. feed to these diodes is via a 68k (683) resistor; this needs to be removed from the board. Along the outside of the board (on the opposite side to the printed inductors) is a thin track which feeds the previously removed 683 resistor. Cut this track half way along, then scrape off the lacquer and solder two, 4 inch lengths of thin multi-strand wire to each side of the track (these will be used to connect onto the tuning control). Nearly there now! Connect a miniature 683 resistor, to replace the one previously removed, but this time connect the feed end to the supply end in the corner of the box. At this stage, if you connected the two 4 inch long wires together, you should have a fully operational system as before controlled by the dil switches.

Route the two cables out of the tin box via the synth IC chamber and onto two of the 'spare' unused pins coming off the main PCB. Note: make sure that they do not contact any of the pins

going into the tin box! Identify the wire which you have connected to the 683 resistor feed to the VCO; this is now connected to the centre pole of a single pole change over switch. The second wire connects to either of the remaining switch contacts. For the tuning control, you need to create a potential divider fed from the 9-volt regulator. I happened to have a 10k ohm multi-turn and used 22k above and below to provide a voltage of 5 volt plus or minus 1 volt. The exact voltage may vary depending on your VCO. The slider voltage is now connected to the switch. If all is well, you now have an option of either fixed or continuous tuning.

You do need a good pair of eyes and a steady hand to do this job but I think it is well worthwhile. My unit stabilises within about 90 seconds., Adrian G4UVZ

Submitted by Graham Hankins G8EMX and retyped from the Severnside P5 magazine (with only light 'editing') by king permission of Viv Green.

# NBTV Scope

By **Graham Lewis**

It is useful when demonstrating NBTV equipment to be able to observe the video waveform on a scope. However the shack scope may well have been pressed into service as a raster display device or may indeed be rather cumbersome to transport to exhibitions.

The circuit to be described was developed to work with a very small 1-inch scope tube that the author had available but the circuit is adaptable and will work with tubes from this size to around 3 inches in diameter.

The limiting factor is the tube X and Y sensitivity, because if the tube is very insensitive then excessive deflection voltages will be needed to generate a

reasonably sized display.

Tube brightness is related to overall accelerating potential between the cathode and the deflection plates, but sensitivity is inversely proportional to this potential so a compromise has to be struck between brightness and deflection voltages.

To ease the requirements on the power supply the tube heater and the main HT of 215V are AC derived from a mains transformer. The HT current is very modest at about 10mA and so a single smoothing capacitor following the full wave bridge rectifier is adequate.

Any 100Hz ripple is cancelled out by use of push-pull X and Y output stages.

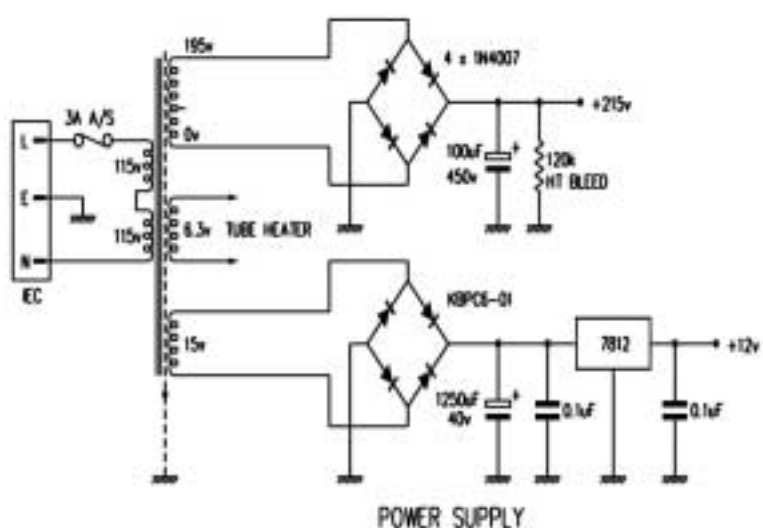
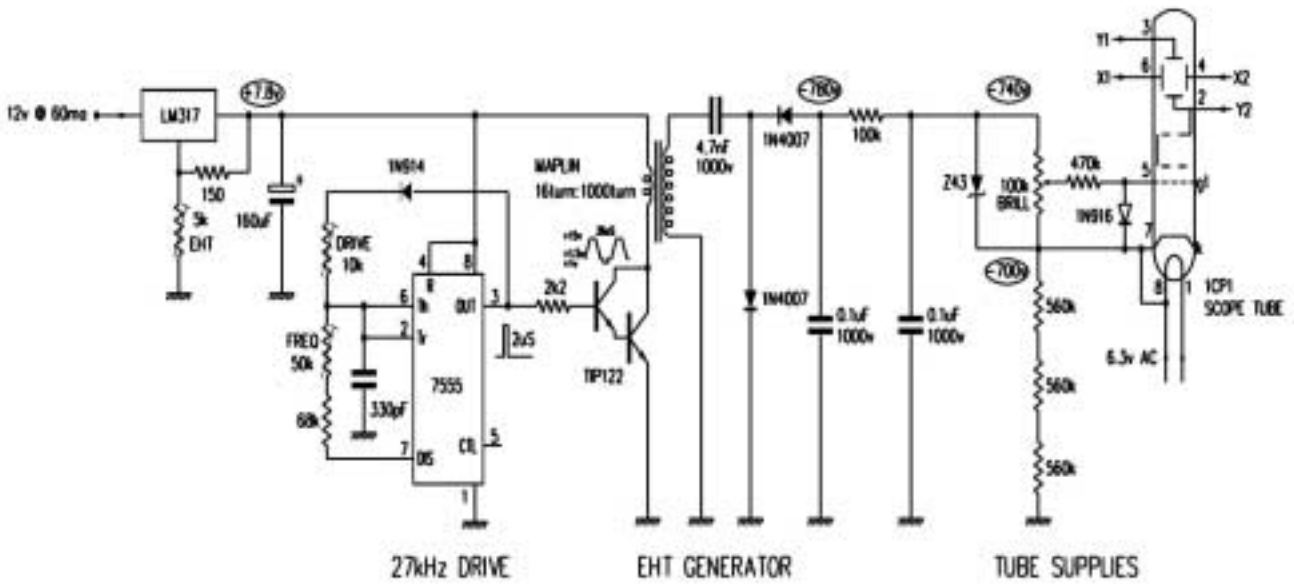
The 15V AC secondary is full wave rectified and an LM7812 regulator provides a regulated 12-volt rail.

The EHT supply is generated by means of a free running 27kHz inverter. The circuit is based on a design that appeared in the Maplin magazine a few years ago for a home de-ioniser.

Maplin still have the transformer in their catalogue as part no. JL94C.

A 7555-astable oscillator generates 2µS narrow pulses that are used to drive a small ferrite cored transformer.

Drive pulse width and frequency are adjusted to resonate with the transformer inductance and then the LT current consumption will fall to



	NTS		NBTVscope
	G.LEWIS	NBTV SCOPE	
	15.05.00		

somewhere around 60mA.

The voltage on the 1:60 secondary winding is voltage doubled to produce a negative cathode potential of over 700 volts.

The tube employed has auto focus but most tubes will need a variable focus potential and this may be obtained by replacing one of the 560k bleed resistors with a 500k pot and taking the wiper to the focus electrode.

An LM317 regulator is used to feed the inverter and by adjusting the LT rail the EHT may be adjusted. In view of the very small tube current involved it was not found necessary to employ any

form of feedback stabilization.

The circuit does radiate quite a strong 27kHz component but a piece of earthed double-sided PC board provided adequate shielding in the prototype unit. It also helps that the frequency is outside the normal passband of the NBTV signal.

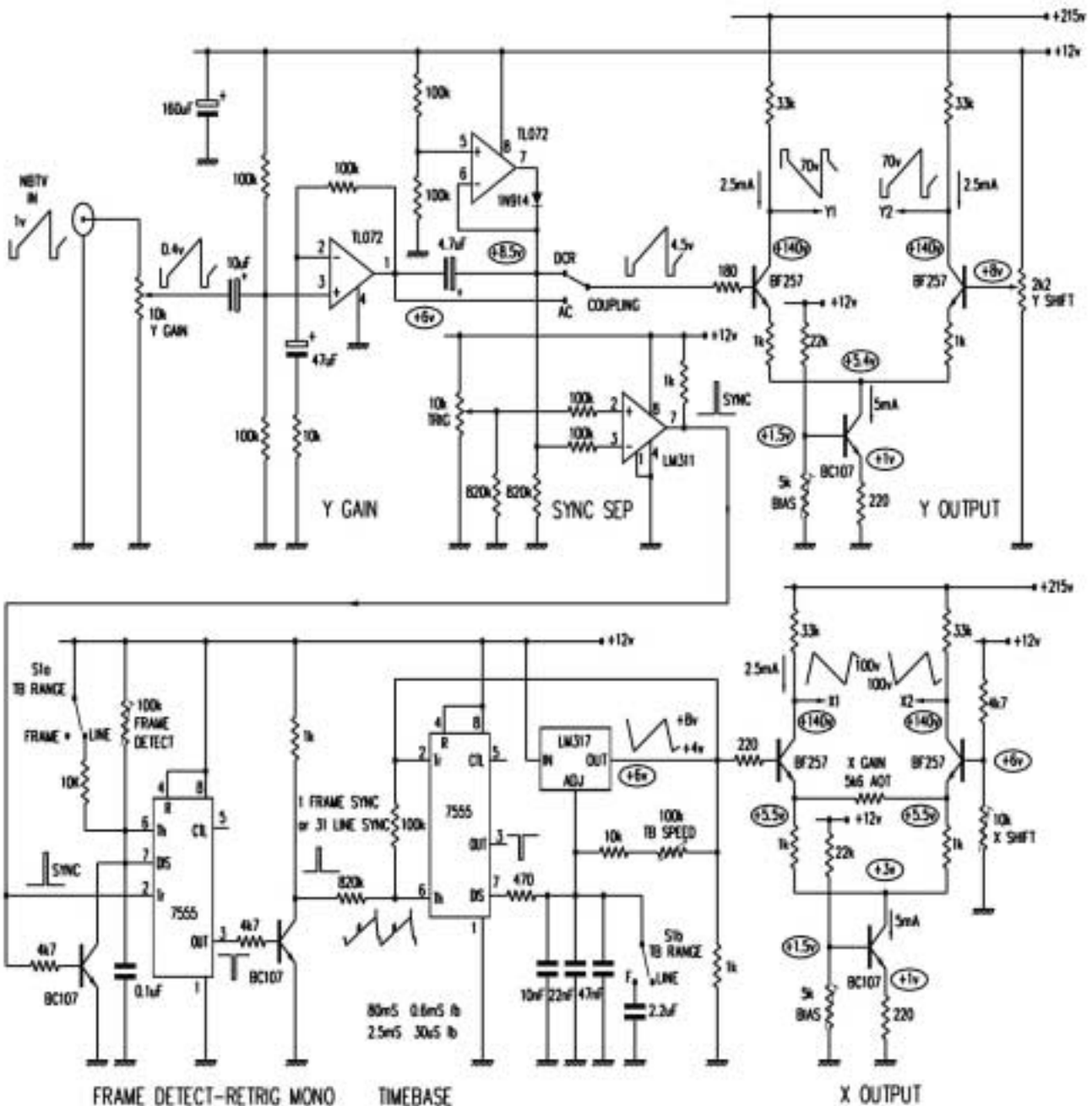
The Y gain stage and DC restoration circuit follow standard practice, the LM311 sync slicer being used to strip off syncs for the timebase circuit.

AC coupling or DC restoration may be chosen for the main signal path and the signal of around 4.5v peak-peak is fed into a long tailed pair with a constant

current source as the "tail".

The advantage of using a constant current source here is that the standing currents in the output pair of transistors may be adjusted independently of the stage gain. These currents determine the plate potentials and it is desirable to minimise astigmatism by arranging for X and Y plate potentials to be about the same. Output balance is very good, the signal amplitudes at the two collectors being equal.

The NBTV bandwidth is luckily not very demanding and so relatively high value collector loads of 33k may be employed. This keeps the dissipation low in the transistors and eases power supply requirements. The output stages



should each be able to produce around 150V pk-pk signals but the 1CP1 tube used only required 70v for full deflection.

The separated syncs are fed to a 7555 retriggerable mono, this circuit having been published by another member in the magazine. It is quite an elegant circuit producing a single line sync pulse one line after the start of frame.

By switching in an additional resistor the frame sync separation may be defeated and then the circuit will produce continuous syncs when running in 1 or 2-line mode.

The timebase circuit is a free running astable using another 7555 timer together with an LM317 regulator used in an unorthodox manner both as a constant current source and low impedance output stage.

By mixing in a small proportion of the sync pulses from the first 7555 a simple lock is achieved.

The 100k pot allows either one or two NBTV lines to be displayed. By switching in an extra timing capacitor one to two NBTV frames may be displayed.

Using an astable as the timebase means that a trace will always be present on the tube whether a signal is present at the input to the scope or not. The flyback is very rapid being around one hundredth of the forward scan and so flyback blanking is not employed.

The X output stage is again the long tailed pair with constant current source; gain being preset by an adjust-on-test resistor between the two emitters. The tube is less sensitive on the X plates

and so peak deflection is around 100 volt from each collector.

The prototype was constructed in a small 280x76x165mm aluminium case from Maplin.

The power supplies, tube and mains transformer were mounted on the base, with the EHT inverter shielded by a small piece of earthed double sided PCB mounted horizontally above.

HT and EHT circuits were built on small tag boards, it being felt that ordinary 0.1inch strip board insulation would not be adequate in view of the potentials present.

The main circuits were built on an RS strip board part no. 433-911 that was then mounted on a simple hinge to allow access to the base components.

## New from PCB from Members Services

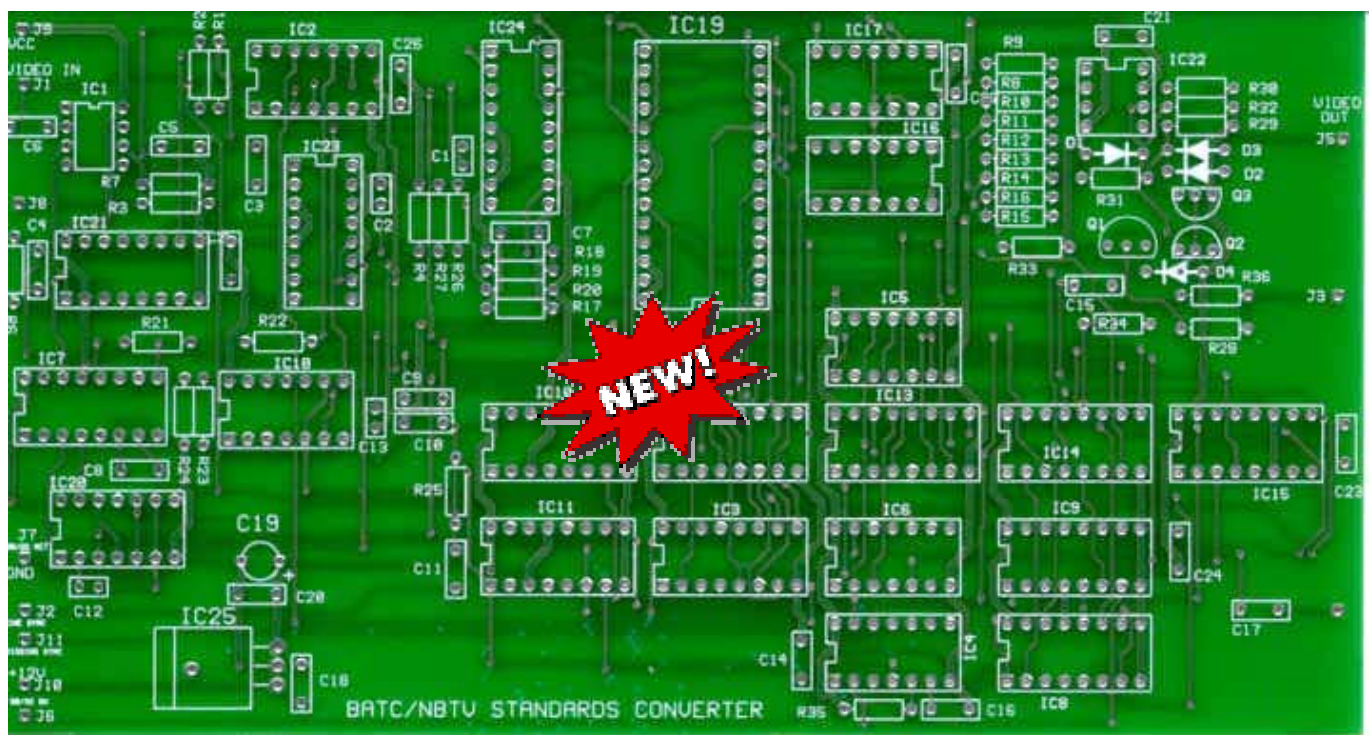
### NBTV Scan Converter (89)

This new design is a through hole plated double sided board, with silk screened legends, measuring 182mm x 97mm. This is designed for the construction of a scan converter from 625 line to 30 line (as per the old Baird

standard), which was described in CQ-TV 189. This uses a CA3306 flash converter to digitise the signal into an HM6264A RAM, and then converted back to an analogue output by a d-a converter built around a CA3130. The remaining circuitry includes an LM1881, to strip sync pulses from the

video input, and control logic, which uses CMOS 4000 series and 74HC series logic devices.

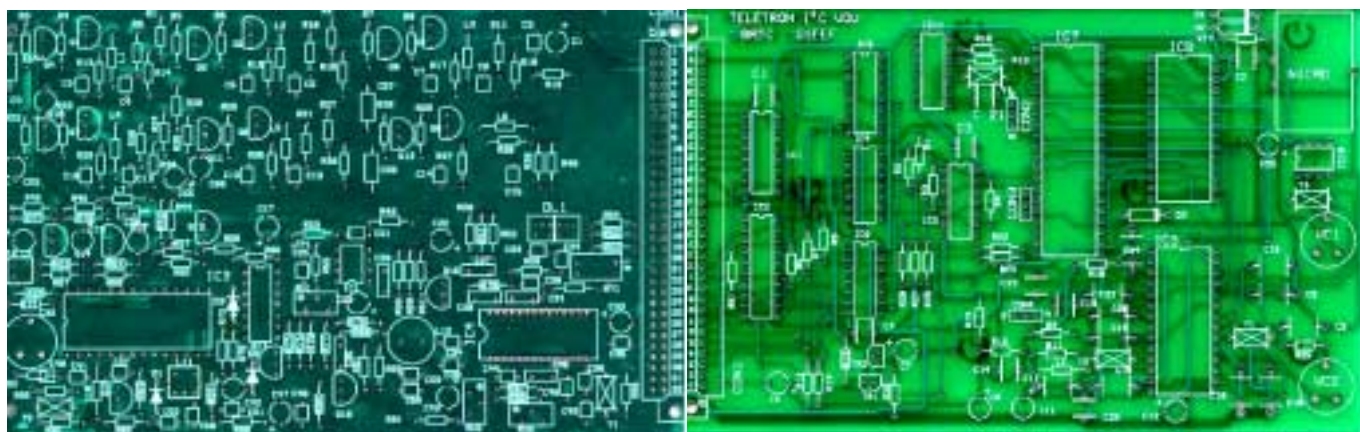
**Priced at £21.00 plus 43p postage.**



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4	2/3 inch Vidicon base .....	£0.80	£0.30	.....	.....	.....
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7	Sync pulse generator PCB .....	£14.00	£0.43	.....	.....	.....
89	NBTV Scan Converter PCB .....	£21.00	£0.43	.....	.....	.....
40	I <sup>2</sup> C CPU PCB .....	£10.00	£0.43	.....	.....	.....
41	I <sup>2</sup> C VDU PCB .....	£10.00	£0.43	.....	.....	.....
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39	LM1881N Sync separator IC .....	£3.50	£0.30	.....	.....	.....
81	I <sup>2</sup> C 27256 EPROM .....	£9.70	£0.30	.....	.....	.....
38	PCF8574P Input expander IC .....	£4.70	£0.30	.....	.....	.....
10	I <sup>2</sup> C Relay PCB .....	£6.50	£0.43	.....	.....	.....
9	PCF8574A Input expander IC .....	£4.70	£0.43	.....	.....	.....
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50	108.875 MHz crystal .....	£8.20	£0.30	.....	.....	.....
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86	24cm solid-state amplifier PCB .....	£10.50	£0.43	.....	.....	.....
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The Sync Pulse Generator PCB (item 7)

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

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



The BATC cloth badge (item 74)

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

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

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

## BATC Publications

Publication	Each	Qty	Total
<b>An Introduction To Amateur Television (225gm)</b> .....	<b>£5.00</b>	.....	.....
The latest handbook full of detailed information on how to set up your ATV station, plus lots of new video and RF construction projects.			
<b>The Amateur TV Compendium (155gm)</b> .....	<b>£3.50</b>	.....	.....
The BATC handbook featuring construction articles on video units, 24cm and 3cm ATV, a Digital Frame Store, and much more.			
<b>The Best of CQ-TV (150gm)</b> .....	<b>£3.50</b>	.....	.....
A compilation of the best construction articles from CQ-TV's 133 to 146			
<b>CQ-TV Back Issues:</b> .....	<b>£1.50</b>	.....	.....
The following issues are still available. Please circle those required: 142, 143, 144, 147, 150, 153, 154, 156, 158 159, 162, 163, 164, 166, 167, 168, 169, 170, 171, 173, 174, 175,176, 177,178, 179, 180, 181. 182, 183, 184, 185, 186, 187, 188,189			
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Please note that the above books (except 'The best of') and CQ-TV issues 171 onwards are available in Adobe Acrobat format for download from our web site, [www.cq-tv.com](http://www.cq-tv.com). They are also included on the BATC CD. (The CD also contains a full keyword search index) Please note that the versions on the web site do NOT include the colour covers or any colour inserts. This is to improve download times.

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# Bandwidth and Chroma

By Ian Waters, G3KKD

In writing this I risk being told that I am telling people what is obvious, but as I have never seen it in CQ-TV, it is probably worth a mention.

## Transmitted Bandwidth.

The mode of emission specified for ATV is M16OF8WWF. In this the M16 refers to the occupied bandwidth in MHz at the edge of which the mean power has to be 0.5% or -23 dB below the carrier. Our system is thus roughly a half sized version of the standard that is (but soon will be was) used for microwave video links and DTH satellite broadcasting.

Assuming a maximum modulating frequency (with significant energy, or in the case of colour bars high energy) of 4.43 MHz and a peak deviation with pre-emphasis of + & - 3.5 MHz, the formula for occupied bandwidth:  $B = 2(M+D)$ . (Carson's Law) where M is the maximum mod frequency and D the deviation, gives 15.86 MHz. This fits the spec very nicely.

The illustration is a tracing of the spectrum analyser display of the output of my shack TV transmitter. This was modulated with colour bars, the deviation was set to the correct level using the first Bessel null method and the sound sub-carrier was turned off. Like most ATV transmitters there is no bandpass output filter. It will be seen that colour sub-carrier sidebands occur at  $F_v + \& - 4.43$  MHz at a level of approx. -13 dB below carrier and again at  $F_v + \& - 8.86$  MHz at a level approx. -32 dB below carrier. Higher order sidebands were less than -60 dB and in the noise. It will also be seen that the energy at +& - 8 MHz (i.e. the 16 M in the spec), was not greater than -32 dB. The spec requirement of not greater than -23 dB was thus met easily. My

other "mobile" transmitter gave similar results. Provided that the modulating video does not contain significant energy above 5 MHz (from computer generated graphics) no TX output filtering would seem to be necessary.

## Receiver Bandwidth.

Receivers designed specifically for ATV use for instance: -

- FM TV Receiver IF system, CQ-TV 122.
- Wood and Douglas 24 cm Down Converter 1250 DC50.
- Camtech Video IF Board.

These have IF bandwidth / modulator transfer characteristics designed to suit the specification. In fact my measurements show 10-13 MHz, 17-18MHz and -3 dB at 16 MHz respectively. They thus give optimal S/N, better protection against adjacent channel signals i.e. radar, and a standard 1.0V output for the specified deviation. They are thus best for DX.

However experience over the years shows these receivers to give a chroma and burst output some 6 dB below normal. This seems fundamental and it is explained by the fact that while several (the number depending on frequency) of the FM sidebands

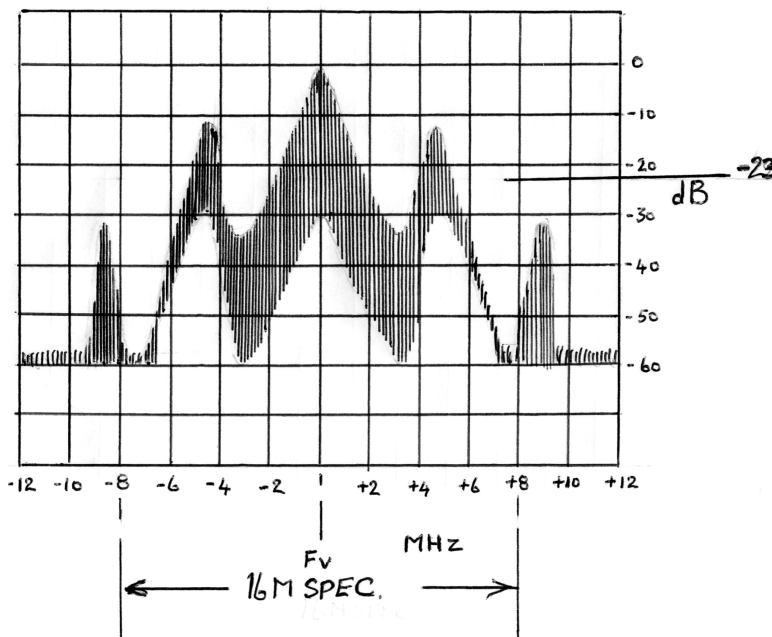
generated by lower frequency luminance components of the modulating signal can be passed, only the first sideband of the chroma can be recovered using such receivers.

The alternative adapted satellite receivers with a nominally 27-30 MHz bandwidth will recover full amplitude burst and chroma. They have of course the disadvantages of reduced S/N, less adjacent channel immunity and a lower video output.

I have recently proved this to my satisfaction by feeding the output of my shack transmitter, which is correctly deviated and without an output filter, simultaneously to two receivers. One was an adapted Amstrad SRX200 and the other a Wood and Douglas. Video was displayed on two inputs of an oscilloscope and on a picture monitor. The recovered bursts were 0.3 and 0.15 V pp respectively and of course the colour saturation of the monitor showed this difference. However I was surprised that the contribution from the second sub-carrier sidebands at such a relatively low level could make such a difference. To prove the point I inserted an RF filter in the feed to the satellite receiver. This had a bandwidth such that when the signal was viewed on the spectrum analyser, the second chroma sidebands were removed without significantly affecting the first. Voila! The chroma and burst from the broadband satellite receiver reduced by 6 dB.

This low chroma problem is exacerbated when working through a repeater when two bandwidth-limited links may be in cascade. Boosting the chroma at the sending end and perhaps in the repeater can do something, but there are limits set by waveform distortion and increased chroma noise.

I suppose you pay your money and take your choice.



# Black and Burst Sync Buffer

By John Stockley, G8MNY

When genlocking video sources together, sometimes there is cable or camera crosstalk from the genlock source feed when distributed with ordinary video as the genlock source. This circuit will solve that problem, while still allowing the use of a non-genlock camera as the genlock source master, rather than the use of a PAL colour SPG.

This 6-transistor circuit is a precision vision buffer amp, or sync black and burst stripper amp, providing 3 outputs. It uses no hard to find or obsolete ICs that many video projects need; indeed many constructors will find all the bits are in their junk box. All transistors can be 100mA general-purpose silicon small signal types as transistor performance has mainly been designed out of this circuit.

Construction can be ugly, matrix or PCB, but be careful if using strip board as the paralleled inductance lines can cause instability!

## How it works

The video input can be looped through or terminated with R1 (this can be made from 2x 150R in parallel if needed). Vision is fed to a high input impedance (>200k) transistor amp T1 and T2 with a gain of just over 2. The low value of pull up resistor R4 and the use of the PNP emitter resistor R6, ensure very good colour linearity. Presets VR1 and VC1 set the gain and

colour phase (delay) of the amp.

The 2V p-p video feeds a lightly biased T3 PNP transistor to make a sync stripper stage. Its collector is high during syncs and VR2, R11 and C5 form a sync and colour burst timing window that will operate the blanking stage T4 PNP transistor during picture time. Resistor R10 in series with C5 lets fast sync rise time edges through. Mode switch SW2 will allow composite or black and burst modes by disabling the blanking stage. Capacitor C5 can be omitted if the colour burst is not wanted.

The amplified video also feeds through C3, and then it is clamped at 0.6V below from the half supply rail with D1. Using a 2V P-P video level this point sets the black video level to approximately the bias rail with standard sync amplitude of the genlock source without the need for a proper black level clamp. When the collector of T3 is 0.5V more negative than the half rail (during picture time) T4 is turned on, shorting out the picture video that has gone through R14 and VC2 to the half rail.

Transistors T5 and T6 make up a unity gain video buffer amp, with a low value of pull down resistor R16 to provide good syncs while driving 3 loads. Again a low value of pull up resistor R15 and the use of the PNP emitter resistor R17, ensure very good video and colour linearity. VC2 trimmer sets the HF gain and colour phase. Good LF performance is ensured with a large

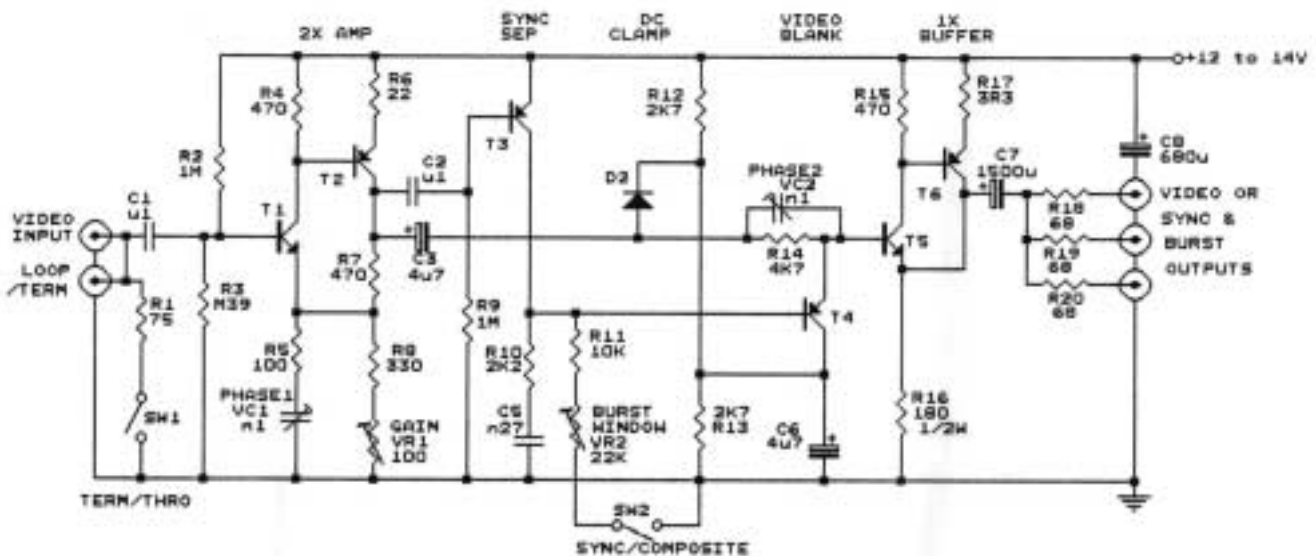
value output C7 and each of the 3 output source impedances will be very close to the ideal 75 ohms with the use of 68 ohms as the feeding resistors.

## Setting up

The circuit should draw about 35mA from 12-14V DC; anything wildly different should be investigated. Using an oscilloscope check the 2x amplifier is working OK. Then in black and burst mode, check the sync separator output, it should have inverted line syncs from 12V to 6V with a lazy back edge. Check at frame rate that there are no LF problems with the syncs.

Scoping the output buffer (T6 Collector) you should have just syncs and burst with no picture content at about 6V DC. Adjust the burst window preset VR2 so that blanking starts just after the burst. In composite mode there should be around 2V P-P. Terminate all the outputs into 75 ohms and check that the buffer amp output stays nearly constant (showing that the buffer amp has nearly zero ohms output impedance). Scope the output on one of the terminations, and adjust gain preset VR1 for unity overall gain of the circuit. Also check at frame rate that there are no LF droop problems.

Colour phase is best set up with a colour bar source and a vectorscope using identical leads. Adjust the 2 HF phase presets for best phase and amplitude match on the vector display. It will be seen that the two presets do have slightly different effects and by

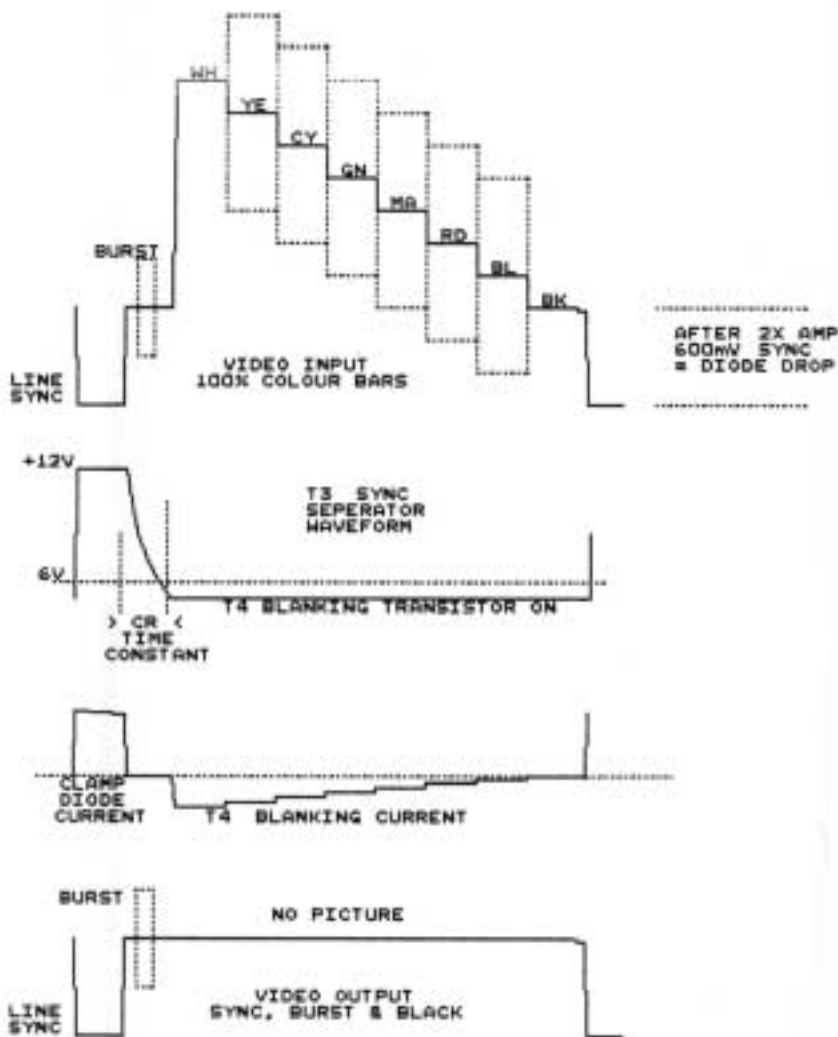


alternate tweaks the correct phase & amplitude can be obtained. Switching to black and burst mode the phase of the bursts should not alter.

For those without a vectorscope and colour bars, adequate phase set up can be done by subtraction comparison using an evenly lit brightly coloured card in front of a colour camera and a dual beam scope with channel subtraction. Calibrate the scope by probing the video input with both probes and adjusting the timebase and gains to show a single colourful line. Put the scope into subtract mode and tweak channel gains and scope probes adjustments to produce the best nulled out blank line. Now move a probe to one of the terminated outputs and adjust the 2 HF phase presets for best burst and colour picture carrier null.

### In use

In composite mode the buffer amp works as well as can be expected. In the back and burst mode the video blanking is only approx at the black level and will depend on source sync levels. The exact amount of picture vision left after blanking may depend on the component layout. Both of these should not have any affect on the kit being genlocked



## Members only!

As mentioned in the previous issue (CQ-TV 188, page 42) we have set-up a 'members only' section on our web

site. Access to these pages requires a username and password. This quarters codes are as follows: -

**Username:** amember

**Password:** yagi

## TV on the air

### By Graham Hankins G8EMX

This column should perhaps be retitled 'TV On the Internet' because that seems to be where most of the ATV news is now appearing. For instance, a proposed 2.4GHz ATV repeater was found on the RSGB web site, in amongst the repeater listings. To be situated in Hull, East Yorkshire, GB3VW will provide ATV service on 13cm into Filey, Selby and Scunthorpe,

adding to around 30 1.3GHz ATV repeaters, and a lesser - but growing - number of 10GHz ATV units now in operation around the country.

From an ATV repeater in planning, to a repeater back in service after two years off air. In an e-mail, Simon Manning, G1IRG, of the Northampton Repeater Group, is pleased to report that: "24cm ATV repeater GB3MV is back in operation from Northampton town

centre and came back on air on the August 11. The break in service was caused by a change of site due to the 'usual suspects' - mobile phone mast people paying out lots of money and then us being asked to pay the same!" Simon assures previous users that all repeater details remain as before: "power out is 14dbW, transmit frequency is 1316 MHz, receive at 1249 MHz. with just the good old spectrum running the software!" Any

enquiries to Simon G1IRG QTHR or e-mail [simon.manning@ntlworld.com](mailto:simon.manning@ntlworld.com) or via the Northampton Repeater Group's web site <http://www.northampton-repeater.fsnet.co.uk>

Wales would be a difficult place to serve with microwave ATV at the best of times, and the Arfon Repeater Group have had to cope with site changes too – site rental fees again. 24cm ATV repeater GB3GW was conceived, designed and built by the Arfon Repeater Group to cover the west coast of Wales (Cardigan Bay) and to supplement GB3TM (located at Amlwch on Anglesey) which covers the north coast of Wales.

Derek Whitehead GW3FDZ says: "GB3GW is now located at Pentrefelin which is northeast of Criccieth and which gives excellent coverage of Cardigan Bay, and at a sensible rent! The equipment of GB3GW consists of a satellite receiver (modified for auto switch on) preceded by a low noise pre-amp. The transmitter consists of a frequency synthesised oscillator followed by a Mitsubishi M67715 power module driving a further Mitsubishi power module M57762, giving an output to obtain the 25 watts e.r.p.. A 6.0 MHz f.m. sound carrier was added to complete the installation".

Derek adds: "So far so good, but the licence granted an output frequency of 1310MHz with an input frequency of 1280MHz. I am told that the frequencies assigned were a compromise, to prevent possible problems in those parts of North Wales where our other ATV repeater, GB3TM, could be accessed"

Coverage of GB3GW appears to be better than anticipated with Pat GW0GZQ located at Moylgrrove south of Cardigan at a distance of sixty miles being a regular user. At present there

are four other operational ATV stations in the reception area. Gareth GW0SEO located at Llanbedrog, Reg GW1TPS located at Harlech, (another) Pat GW6IMS at Minffordd and Derek himself, GW3FDZ at Dyffryn Ardudwy.

Still on the internet, follow various hyperlinks to the web site of Noel Matthews G8GTZ (<http://www.qsl.net/g8gtz>). Noel is in Basingstoke and runs 15 watts of ATV on 1.3GHz, 40mW on 2.4GHz, which also multiplies up to 10GHz! Noel's site has many photos of his home 'shack' and portable expeditions on his 'home' page, which includes a link to the 'ATV e-mail reflector'.

The 'ATV Reflector' is basically an e-mail list that enables any ATV station to inform distant stations of where and when they would be operating portable. Stations that subscribe to the list will be sent details of planned ATV activity, plus discussion on any ATV related topic. Sounds like a good idea to me.

Could I remind any individual or repeater group who is placing any ATV news on the web, please try to send some copy directly to the CQ-TV editor or me. While web pages and e-mail are a wonderful resource, with exciting technology all just a mouse click away, it must be remembered that not everyone has personal access to the internet, yet. The majority continue to rely on the paper page. So, if you are building a web site with loads of text and photos of your ATV exploits, please remember the many folks who still wait for their printed magazines! Editors and column compilers need your news too!

### Exhibitions and Rallies

Coming up in April 2001 are two new rallies. The RSGB Hamfest moves to

Bletchley, and the 'Picketts Lock' Show goes to Alexandra Palace. Each are two-day events and we hope to have a BATC stand at both. There are significant numbers of folks 'out there' who are keen to start on ATV IF they can be reasonably certain of accessing a repeater. It would be great to have, on the stand, full info on every ATV repeater, including its coverage map!

So here comes a plea to every ATV Repeater Keeper, yes including those who are 'Particulars Withheld'. Could you possibly send to me, either by e-mail or post, a reasonably detailed map of the usual area your repeater RELIABLY serves (I am not interested in exceptional or dx conditions) with confirmation of input / output frequencies, antenna type and anything else of relevance. The more we can show and tell exhibition visitors, the greater the possibility they will come onto ATV eventually!

Whether it be indicative of a general trend, or not, the Severnside ATV Contest station has decided not to continue with operating ATV on 70cm. In their September newsletter (P5), Ken Stevens G4BVK writes: "We have found over the past years that activity on 70cm has fallen to a point where it is no longer worthwhile in entering on this band. It's sad, but times change and this will give us space to explore other possibilities". The STG decision to drop contest operation on 435MHz ATV will reduce their 'rigging and derigging' time, and the demand on the generator.

The STG are also changing to vertical polarisation on 2m talkback. Again, STG say that this follows the trend over recent years.

**If your subscription was due by January 2001, and you have not renewed, then this is the last issue of CQ-TV that you will receive!**

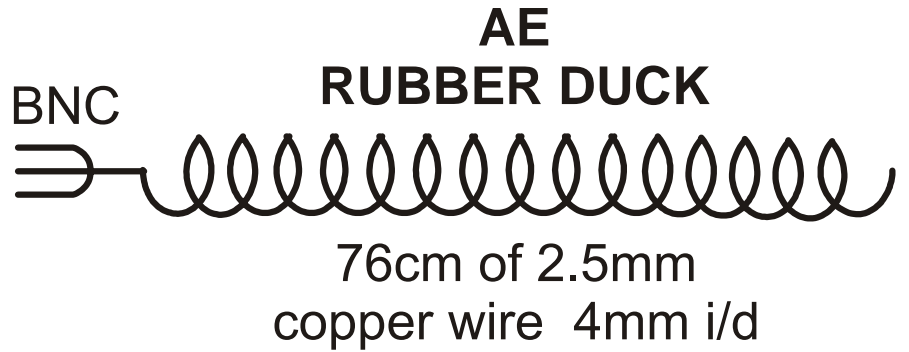
**Please check your address label to see if your subscription has elapsed and please renew if it has.**

# FM Radio Microphone

By Len Smith G7GNA

A friend needed a replacement radio microphone for a disco, as his own one had been damaged by beer. So I had a look in the back issues of CQ-TV. I found what I thought to be the answer in CQ-TV 135 page 47. After building the unit, I found it to be a bit unstable and it had a tendency to wonder off frequency. Figure 1 shows my first attempt and it worked quite well (better than expected) however, it was not very powerful (audio wise) using a three terminal electret head.

Figure 2 proved to be a better version, this time trying a different mic head (2



terminal electret). R1 and R2 now included, provided the voltage for the internal FET amplifier. Changing the value of R3 (lower) and DC coupling capacitor to a higher value to 0.47 $\mu$ F I found what I was looking for.

Figure 3 is the Veroboard layout used in the prototype and I was well awarded with the good results, a radio mic tuneable over 88-108MHz tuning by VC1 and L1.

Figure 4 Is the Veroboard layout for the

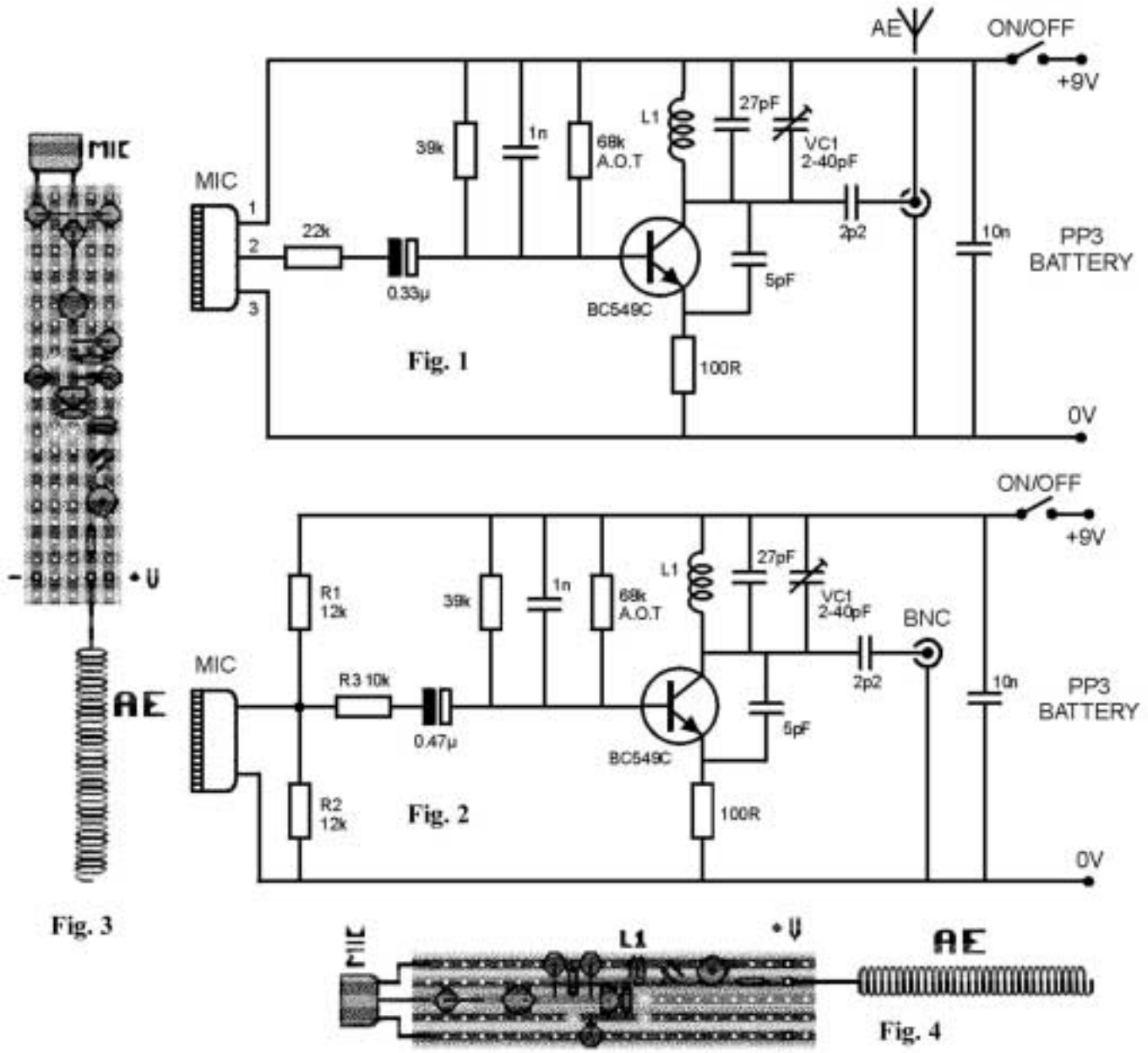


figure 1 circuit. I used a short piece of wire for the aerial but found this to upset the frequency. The rubber duck aerial that was used on the old mic was tried with poor results. And so it was that another rubber duck came about, and became part of the new mic.

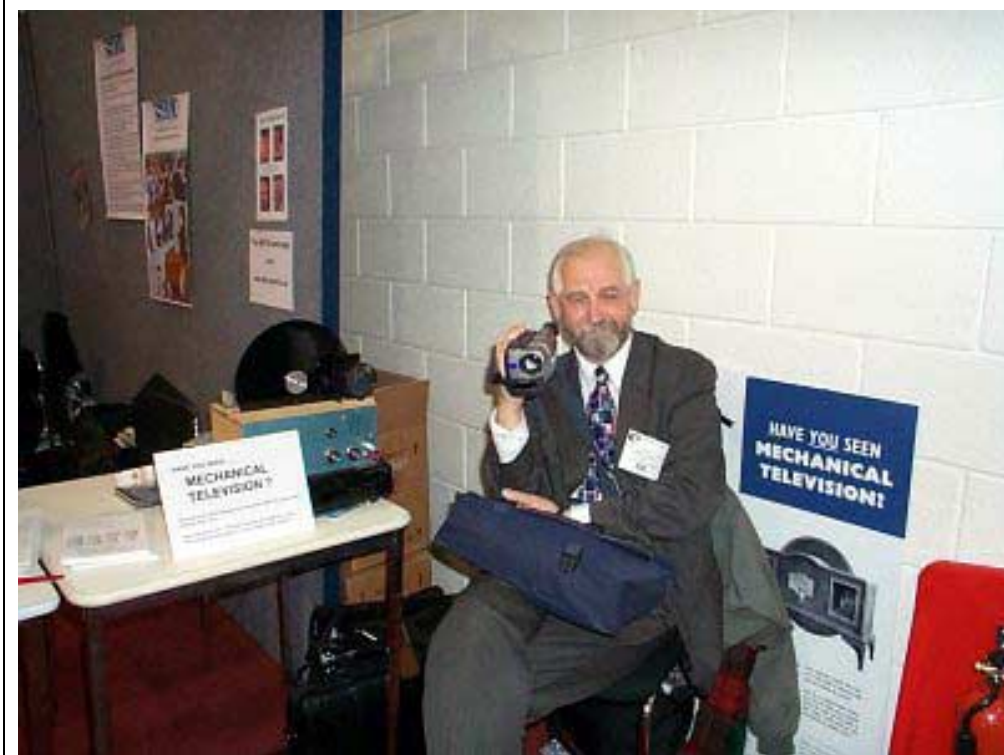
### Rubber duck

This was made from 70cm of 2.5mm copper wire close wound on a 4mm diameter metal rod and then pulled apart for equal spacing between turns, then covered with heat-shrink sleeving. One end, (2cm) was soldered into a BNC plug that plugged into a BNC socket at the base of the mic, using the old body from the original

mica compact mic powered from a PP3 battery. The range was found to be around 80 to 100 metres before the signal was totally lost. All in all a good two days spent playing around. The mic has now found itself part of my ATV system housed in a different casing, hanging around the neck!!!



**At the Exhibition of Information Displays 2000 the NBTVA was given a space on the stand of the Society for Information Displays and a successful demonstration of Grant Dixon's disc monitor aroused a lot of interest and nostalgia.**



**Prof. Maxim Tomilin of the State Optical Institute of St Petersburg who was very interested in the NBTVA demonstration.**

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# Worthing Video Repeater Group



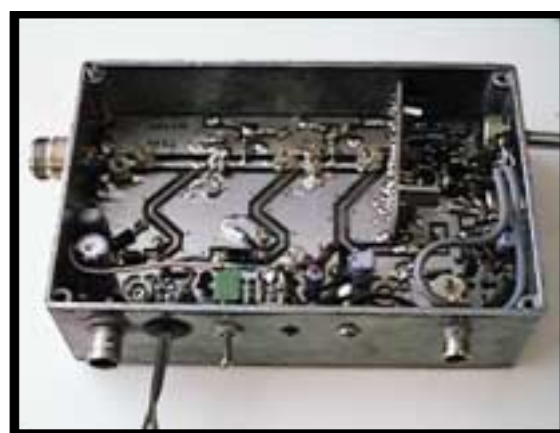
**GB3VR GB3RV & GB7VRB**



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

## 1Watt FM-TV 24cms Transmitter

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

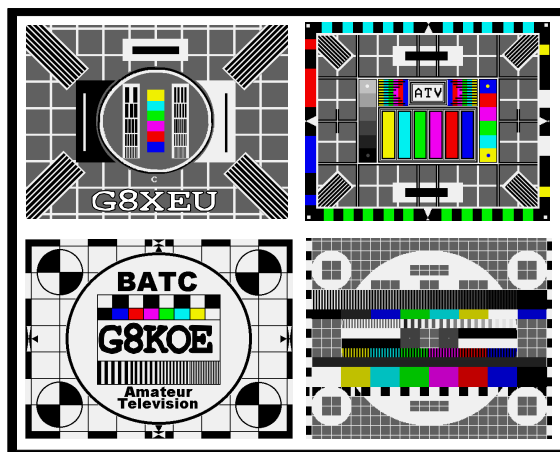


## Two channel phased locked loop kit.

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

## Amiga ATV Program-2

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



## Video AGC Kit

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

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

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

Orders should be sent to: -

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



By Paul Holland G3TZO

## The crystal ball is out again!

It hardly seems 12 months ago that we ushered in the millennium and looked forward to both forecast and promised developments in the world of satellite television. Looking back I would say that the last 12 months have been evolutionary rather than revolutionary. Yes there have been lots of new services from a crop of newly launched satellites. However, the promise of real multimedia convergence between the Internet and TV is still not with us due to a combination of factors - not the least of which are cost and availability of bandwidth.

The buzzword for the next decade I suggest will be "streaming video". This IP based technology will allow true video on demand to the home consumer, and will not necessarily be limited to the Internet Server provider being subscribed to. What has this got to do with satellite TV I hear you ask. One very strong option is the use of satellite delivered video streaming services allowing domestic and business users the ability to surf the Internet and select from a range of video libraries put on line by a new generation of "broadcasters".

These developments pose interesting questions for our hobby in that Amateur TV has yet to fully embrace the digital technology of MPEG2, a technology which itself is just a stepping stone to quite a different world - Happy New Year!!

## Astra 3A & DFS Kopernikus 1

SES, owners of the Astra satellite system, and Deutsche Telekom have signed an agreement for SES to provide follow-on capacity for Deutsche Telekom's DFS 1 Kopernikus satellite located at 23.5 degrees east.

SES has commissioned the building of Astra 3A to Boeing Satellite Systems for a planned launch in the first quarter of 2002. Deutsche Telekom will utilise the capacity on Astra 3A for the continuation of DFS Kopernikus' cable feeds. Remaining capacity will be used

for Internet data and DTH services. Astra 3A will have 20 active high-power Ku-band transponders with a bandwidth of 36 MHz, in the Kopernikus frequency range 11.45-11.70 and 12.50-12.75 GHz. Astra 3A will have a minimum design life of 10 years in orbit. SES hopes to appeal to new German broadcasters to offer DTH services from Astra 3A and promote dual feed systems positioned for optimal viewing at both 19.2 and 23.5 degrees east. The launch provider will be announced at a later date.

## Kopernikus 2

KOPERNIKUS DFS 2 was due to go out of service on 31 December 2000 and until the launch of the Eurobird 1 in the middle of this year will be replaced by EUTELSAT II-F4 at 28.5 Deg E.



Eutelsat IIF4

Signals from Eutelsat IIF4, as the above footprint map shows, are sufficient in the UK for reception with a sub 1m dish. No doubt Sky Digibox owners in the South of the country will now gain access to foreign services. Check out Tp 32 11.554 GHz (H) where you will find the Czech package containing TV3 Prague using SR 27500 FEC ¾ and DeeJay TV on Tp 49 12.718 GHz, SR 2892 FEC ¾. Most of the other Tp's are not yet activated so it's worth coming back and checking this one from time to time.

## Europe\*Star 1

Europe\*Star 1 was successfully launched aboard an Ariane 44LP rocket back on 29<sup>th</sup> October. The spacecraft is owned by the newly created operator Europe\*Star UK, Ltd. and will serve Europe, Middle East, South Africa,

India and South East Asia via spotbeams. Based at 45 Deg E Europestar 1 operates in Ku-band only. The satellite has been testing on several frequencies. Check 11.495 GHz (H) and 11.660 GHz (V).



Europestar 1

## Eutelsat W1 operational

Eutelsat's W1 satellite, launched on 6<sup>th</sup> September on Ariane Flight 132 is now in full commercial service at 10.0 Deg E. Traffic was successfully transferred to the new satellite from Eutelsat II-F4 on the night of 14-15 October. Eutelsat II-F4 has now moved away from 10 Deg E - see above story on DFS Kopernikus 2. W1's 28 Ku-band transponders provide coverage of Europe, North Africa and the Middle East via a fixed Widebeam, and coverage of southern Africa via a steerable spotbeam. Applications on W1 include TV broadcast, Internet and data services.

## Hispasat 1D

Hispasat 1D is due to be launched in the second half of 2002 and will join Hispasat 1A, B & C at 33.0 Deg W. The spacecraft will be built by Alcatel Space and will use their Model: Spacebus 3000 platform.

## ASTRA 2 B, C & D

Astra 2 B has now entered service at 28.2 Deg. E providing an additional 16 Ku-band transponders operating between 11.70 - 12.75 GHz. Astra 2B has a design life of 15 years and is co-positioned with Astra 2A at 28.2 Deg. E. Astra 2B enables SES to provide up to 40 transponders in the BSS frequency range between 11.70 GHz and 12.50 GHz from this orbital slot. Astra 2B features a steerable antenna

with the facility to activate up to 16 transponders in the 12.50 - 12.75 GHz frequency range outside of Europe, across any area of the earth visible from 28.2 Deg. E.

SES has two further Astra launches for 28.2 Deg. E with Astra 2D to be launched in December 2000, and Astra 2C due to follow suit in June this year. In order to be able to offer maximum capacity SES has decided to maintain the temporarily re-located ASTRA 1D spacecraft at 28.2 Deg. E until after the successful launch of Astra 2D.

Astra 2D is the first spin-stabilised satellite ordered by Astra operator SES of Luxembourg. It carries 16 active Ku-band transponders powered by 39-watt travelling wave tube amplifiers (TWTA's). It covers the FSS frequency range of 10.70 - 11.20 GHz providing 500 MHz of additional spectrum made available to SES at 28.2° East within the framework of an agreement with Eutelsat. At launch, the satellite will weigh 1,445 kg; in orbit, Astra 2D will weigh 824 kg. Once deployed, the cylindrical satellite will be 8 m tall and 2.16 m in diameter with its solar panels deployed. Astra 2D is designed to have 1,600W of power at beginning of life and 1,400W of power at end of life. The satellite's power is derived from two telescoping cylindrical solar panels.

Narrow beam transponders on Astra 2D could enable the BBC to broadcast without encryption across the UK. Astra 2D, will carry transponders with a footprint so tightly focussed that only viewers in the British Isles will be able to receive them. Astra's owner SES hopes this will enable the BBC, Channel 4, and Channel 5, which are currently encrypted for copyright reasons, to broadcast in the clear. SES has a limited number of frequencies at 28 Deg E, because of the sharing agreement with Eutelsat. With narrow beams it would be able to re-use the same frequencies in several countries.

### Express AM1

Eutelsat has signed a contract with the Russian Satellite Communications Company for the purchase of 12 transponders on the Express AM1 satellite, which is scheduled to launch in early 2003. The satellite will be positioned at 40 Deg E and will carry a

total of 18 Ku-band transponders. Eutelsat says this will enable it to reinforce its presence in the south of Europe, North Africa, the Arabian Peninsula, and South Asia.

### Eurasiasat 1

As we closed for press the launch of Eurasiasat 1 was on hold pending checks on the spacecraft at the Kourou launchpad. Eurasiasat 1 is to be located at 42 degrees East and has been built by Alcatel Space Industries using their Spacebus 3000B3 platform. Weighing 3,535 kg at launch, it is equipped with 32 Ku-band transponders (20 of them for BSS, 12 for FSS.). The on-board power at the end of the satellites life is specified at 8.8 kW.

### Videoguard CAMs?

The Videoguard encryption format, owned by News Data Systems (NDS), and used by Sky Digital in the UK, Stream in Italy and OTE in Greece, is reported to be available soon as a separate CI CAM (Conditional Access Module). The CAM is to be targeted at official viewers of the Italian Stream service. It is believed that the CAMs will not be on general release - only being issued to official registered subscribers. German manufacturer Technisat holds a licence to produce receivers with NDS's integrated encryption system, whilst French manufacturer XSat have confirmed that they are to introduce a receiver in 2001 with integrated Videoguard. The widespread introduction of Videoguard receivers and individual CAMs is likely to encourage piracy.

### From the Post Bag

It seems a number of people opted for the new Echostar AD3000IP last year and most seemed to find bugs with the software. **Andy Hearn, G3UEQ**, writes "I recently purchased one of these devices and, although generally pleased with it I have a problem when I select digital (not analogue) channels to go in the Favourite menu. They all go in ok, but when I go to select a program, the front display on the RX shows the new channel number but refuses to change to it! If you then use the centre OK button after selecting the favourite menu, it brings up your selected channel, if you then select the channel say one down, then go back to

your original channel. it works. My version of s/ware on power up is 100, the first RX I had was version 120, this exhibited the same problem." Andy asks if anybody else has heard of this problem. Any replies via me will be passed on.

**John Lukey, VK2ZUH**, wrote in with kind comments on Satellite TV News and gave details of his set up down under. He says "As I live rather too far away from Sydney to take part in ATV, I find satellite TV a satisfactory alternative. I can view both Ku and C band with a solid 1.8 metre Ku and a mesh 3 metre C band dish. Both are polar mounted. I can move the C band dish from about 80 to 180 degrees east. Ku band signals are all in the region of 160 to 180degrees, so that the dish only has a small actuator fitted. My co ordinates are roughly 150 Deg E and 35 Deg S so you can imagine Ku band is well elevated. With C band Panamsat 2 and 8 are high in the sky, but some of the Asian ones are getting towards the horizon. There are plenty of US feeds, especially on Pas2 and 8. I think these are situated over Hawaii and so give us a link to the USA." John has kindly provided a PAL videotape with pictures of his shack and the feeds received. If anybody is interested in borrowing the tape let me know. A picture of John's C Band dish is shown below - and very nice to!



**Derek Bumstead, G4FHV**, wrote from Ipswich querying the availability of information on converting an old Philips STU 902/05R to D2Mac. If anybody has any information I will pass it on, but in my reply to Derek I

pointed out the fact that D2Mac is a rapidly disappearing mode. Now nearly only found at 1.0 Deg W, the Scandinavian broadcasters are all busily converting their analogue (D2Mac) customers to digital – very much like B-Sky-B in the UK. My best guess is that there will be no D2Mac in 12 months time – another hostage to fortune!!

## Transponder News

### Astra 2A/B \* & Eurobird 28.3 Deg East

From April this year **Euronews**, the pan-European news channel run by ITN, will become available on Sky Digital from 28.2 Deg E.. It will transmit in six languages (English, French, German, Italian, Portuguese and Spanish) from the soon to be launched Eutelsat Eurobird satellite at 28.5 Deg E, just a fraction of a degree away from the Astra 2 satellites used by Sky Digital. Eurobird will be sufficiently powerful and close to Astra 2 that users of Sky's mini dishes will be able to pick it up without problem. Transponder rental on Eurobird is also much cheaper than on Astra.

The **Einstein Channel** is set to launch on 25<sup>th</sup> January on Sky Digital. The channel will broadcast from 18.00 - 24.00 during the week and 09.00 - 20.00 on weekends using spare S4C downtime capacity.



### ASTRA 1 F-H, 19,2

Wish Line and Motors TV have started on ASTRA 1 G, 12.610 GHz (V) (SR 22000, FEC 5/6

### Eutelsat W1 10.0 Deg E

A new Turkish unencrypted multiplex called can be found on 11.132 GHz (V) using (SR 14000, FEC 3/4). Channels include; STAR 1, STAR 2, STAR 3, STAR Spor"

## Launch News

Probably the most significant launch in the early part of this year is that of

Launch Date	Satellite	Launcher	Deg	Payload
0010-12	Astra 2D	Ariane	28.2 E	15 TPs in 10.700-10.950 GHz
0012-21 earliest	Eurasiasat 1	Ariane 5	42.0E	34 Ku TPs also called Türksat 2A
0102-23	Eurobird	Ariane	28.5 E	18 TPs in 11.200-11.700 GHz 6 TPs in 12.500-12.750 GHz will replace Kopernikus 2
0105	Atlantic Bird 1	Long March 3A	12.5 W	28 Ku TPs for Europe & Americas, will replace Eutelsat IIF2
0106	Astra 2C	Proton	28.2 E	32 TPs in 10.700-11.200 or 24 TPs in 11.700-12.200 GHz
0107-09	Intelsat 903	Proton	24.5W	12 Ku and 44 C TPs, will replace Intelsat 603
0107-09	NSS7	Ariane	21.5 W	Ku & C Tp's replacing Intelsat NSS803 and NSS K
0109-12	Intelsat 904	Ariane	34.5 W	12 Ku & 44 C Tp's replacing Intelsat 601
0110 to -0203	Intelsat 905	Ariane	27.5 W	12 Ku & 44 C Tp's replacing Intelsat 605
0101-03	Astra 1K	Ariane 5	19.2 E	46 Ku TPs will replace Astra's 1A,1B & 1C
0201-03	Hot Bird 6	TBA	13.0 E	28 Ku Tp's
0201-03	Astra 3A	TBA	23.5E	20 Ku Tp's replacing Kopernikus 3

Eurobird. Schedules for February this satellite will create another "hot spot" at 28.5 E allowing reception of European & UK oriented programme to be received on the infamous "Digibox". Euronews was mentioned earlier, however it is likely that many of the German services carried by Kopernikus birds will migrate here. Lower transponder rentals than Astra may also encourage independent UK programmers to use Eutelsat's "Skyplex" technology to form mini bouquets sitting at the side of the Sky programming.

resulting from either spacecraft or launcher malfunction – hopefully occurring before takeoff!

## Panamsat 1R

Panamsat 1R is Panamsat's new satellite to replace its first satellite at 45.0 Deg W and was launched with 3 other satellites by an Ariane 5 on 15<sup>th</sup> November. PAS 1R carries a complex payload to cover the Americas, Europe and part of Africa in - and Ku-band. Technical details are as follows; Panamsat 1R Technical Profile.

As usual you should expect delays

<b>Satellite Name</b>	PAS-1R
<b>Spacecraft Design</b>	HS 702
<b>Orbital Location</b>	45 degrees west longitude
<b>Launch Date</b>	November 2000
<b>Launch Vehicle</b>	Ariane 5
<b>End of Life</b>	2015
<b>Polarisation</b>	Linear
<b>C-band Payload</b>	36 x 36 MHz - 38, 55 Watt Output
<b>Ku-band Payload</b>	36 x 36 MHz - 125, 140 Watt Output
<b>C-band Frequencies</b>	<ul style="list-style-type: none"> <li>• 5.925-6.425 GHz</li> <li>• Uplink</li> <li>• 3.700-4.200 GHz</li> <li>• Downlink</li> </ul>
<b>Ku-band Frequencies</b>	<ul style="list-style-type: none"> <li>• 13.750-14.500 GHz</li> <li>• Uplink</li> <li>• 10.950-11.200,</li> <li>• Downlink</li> <li>• 11.450-11.950 GHz</li> </ul>
<b>Coverage</b>	Americas, Caribbean, Europe, Africa

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## Conclusion

That's it for another edition of Satellite TV News. Correspondence does indicate an ongoing interest in reception of Satellite TV transmissions by all means fair or foul. The column does to the best of my ability try and reflect your interest and to act as a forum for exchanging information.

I have deliberately refrained from reproducing detailed information on channel changes/additions this time as I know many of you do avail yourselves of the more up to date information available on the Internet. If there are readers who do value this data I will try and strike a happy balance next time.

Please do write in and let me know what interests you and if you can please do try to answer any questions highlighted in the "Postbag" section.

As usual I can be contacted on the usual number 01948 770429 or by email to [paul.holland@btinternet.com](mailto:paul.holland@btinternet.com) or even fax on 01948 770476.



Dicky Howett demonstrates preservation techniques to Martin Beaumont of Channel 4's 'Collectors Lot' programme. Dicky gave viewers a lightning 4-minute conducted tour round his camera collection. The programme segment was aired on 19th October and is due for a repeat sometime next year.

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An electronic version of this, and previous issues, can be found on the CQ-TV web site at: -

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3/2000

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

Information about ‘Repeater’ magazine can be found on their web site at <http://www.cchmedia.nl> email: [ru1rich@cchmedia.nl](mailto:ru1rich@cchmedia.nl)

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# Circuit Notebook 73

By John Lawrence GW3JGA

When operating from the Shack, most things are under control, you know which is connected to what and the station layout is reasonably static - not so with portable operation. In the early days, for 12-volt supplies, I used twin red & black cable connected to terminals. Until, on one occasion, I accidentally reversed the polarity. I blew a few fuses, but fortunately, nothing was damaged. I then moved on to using polarised plugs and sockets for power supply connections and incorporated reverse polarity protection in all my gear (a relay with the coil fed through a diode, see CQ-TV 183, page 76).

This summer, whilst out portable, a new problem arose. My 24 cms receiver can supply 12 volts through the coax to power a masthead preamp. The supply is switched and fused in the receiver, so when experimenting with aerials and preamps, the 12-volt supply can be switched on for the preamp and off, should the aerial be connected directly. This prevents the aerial shorting out the 12-volt supply.

But, in the heat of the moment, with the supply switched on, I connected a folded dipole aerial to the cable and blew the 100mA internal fuse. I opened

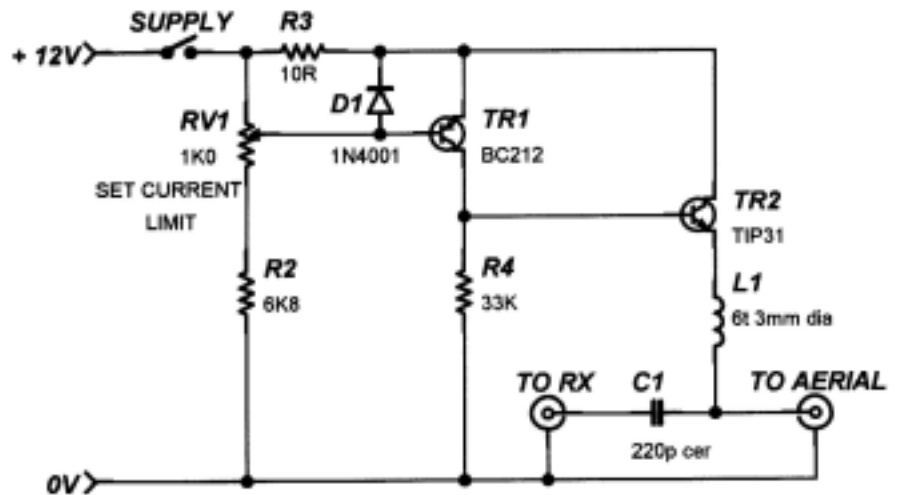


Fig. 1. CURRENT LIMITER

the receiver case, replaced the fuse with a spare one and carried on. You've guessed it, within half an hour I did the same thing again, but this time - no spare fuse!

## Current Limiter

The circuit, shown in Fig. 1, overcomes these problems by making the preamp supply short-circuit proof. In essence, it is a current limiting circuit, where the current level can be pre-set. Once this level is exceeded, as in the case of a short-circuit, the supply current is limited and no damage can result. Removal of the short-circuit restores

normal operation.

Initially, both TR1 and TR2 are conducting, the current through TR1 (and thus through TR2) being set by RV1. The current to the output flows through the 'current sensing' resistor, R3. Should the output be short-circuited, the voltage drop across R3 will rise and tend to cancel the voltage set by RV1. The output current will settle to a maximum level set by the loop gain of the circuit. The current/voltage characteristic of the circuit is shown in Fig.2. The purpose of D1 is to prevent breakdown of TR1 emitter-base junction under transient short-circuit conditions. A TIP31 was chosen for TR2 and although this may seem unnecessarily beefy to dissipate the 0.5 W of heat produced under short-circuit conditions, it does mean that no heat sink is required.

L1 is made from 6cm of 28 s.w.g enamelled copper wire, wound on a 3mm former so that it is only slightly longer than its diameter.

## Setting up

Connect the preamp to the output of the circuit and monitor the voltage across it. Adjust the 'Set Current Limit' control RV1 to a point just above the position where a drop in output voltage can be detected. Under these conditions the voltage drop across the whole circuit is about 0.9V. Under short-circuit conditions the output current will be limited in a similar manner to that shown in Fig. 2.

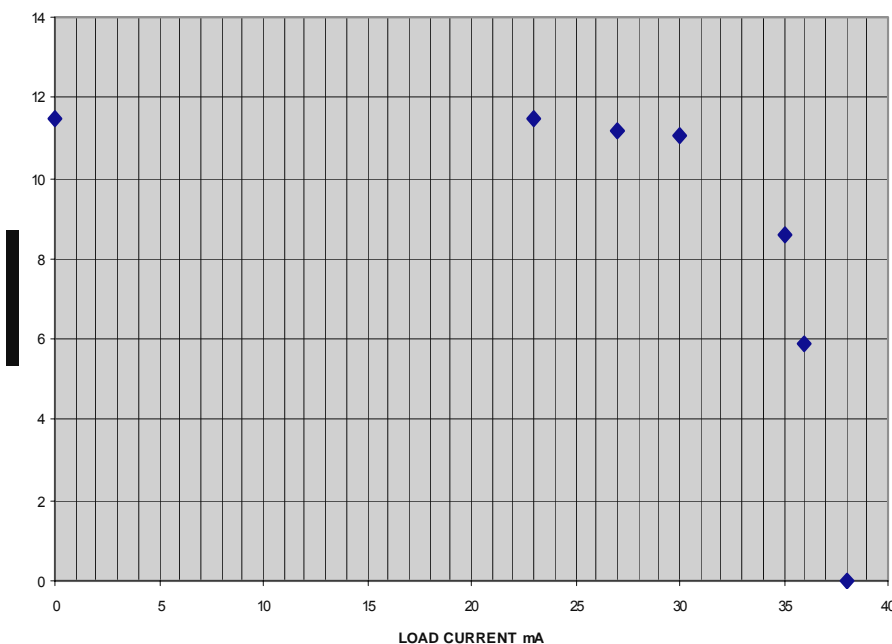


Figure 2 – Current limit characteristics

By E. Kraus, DJ8DW

Reprinted from TV-AMATEUR 117, translation: Klaus, DL4KCK

During the HAM RADIO 2000 fair in Friedrichshafen, Germany, we had a live Digital ATV demonstration. This article describes the present and future developments of the DATV working group.

All day long we transmitted a camera view in hall 9 at the DARC-Distrikts stand, with 10 mW into an eleven-element yagi antenna on 434 MHz with 2 MHz HF bandwidth. DF2DS, DJ3DY and DC5QC supervised the transmitter devices and answered questions from many interested visitors. The receiving devices were installed in hall 9 as well - about 20 m away at the AGAF stand. There DJ8VR, DJ1CU, DL4KCK, DC6MR and DJ8DW cared for equipment and visitors. Two colour TV monitors showed the scene at the camera side in real time, and many German as well as foreign radio amateurs took a lot of interest. The highlight of the first day was a visit by the DARC administrative committee, accompanied by prominent guests.

## Present DATV technology

The second-generation transmitter and receiver devices are shown in the block diagram below. A video camcorder supplies a PAL signal to the PAL/MPEG converter where a MPEG-2 transport stream with 2 Mbit/s is produced including FEC (error handling). The effective usable data rate varies around 1.2 Mbit/s, the rest is FEC and adaptively added stuffing packets. This is not really sufficient but the single-chip MPEG encoder used does not allow a better solution without huge additional effort. The chip produces only a variable data rate elementary stream without full MPEG-2 standard elements (no B-frames). The next development step will add better video quality maintaining, the overall data rate.

The GMSK coder comprises a digital part supplying the I- and Q-signals depending on the input bitstream and a following analogue I/Q modulator that

produces the GMSK signal at 36.2 MHz. This IF was chosen in order to use commercially available SAW filters with 2 MHz bandwidth deriving from the Digital Audio Broadcasting (DAB) development. For steeper filtering edges and better selectivity, two filters with buffers are cascaded. A step-up-mixer with a SBL1X converts the IF signal to 434 MHz with the aid of a 470.2 MHz oscillator. Next is a helical-filter bandpass PA producing 10 mW on 50 Ohm, and a 30 dB power module with 10 W output is useful for middle range tests or driving bigger PAs.

The receiver uses lambda/4 tubular tuned circuits at the input and between preamplifier and mixer (SBL1X). As IF stages, two limiter/FM-demod ICs are used, with SAW filters in front and between them. From the demodulated signal, a slicer produces the serial data stream and a 16 MHz crystal PLL with a divider the corresponding 2 MHz clock signal. For error handling, MPEG decoding and PAL signal processing a commercial set top box with digital satellite TV standard (DVB-S) is used. Therefore the received serial MPEG-2 transport stream is remodulated on a 1152 MHz carrier as narrow band QPSK modulation (SCPC). The set top box must be able to process a symbol rate of 1 Megasymbol/s, where some devices have difficulties because of their internal oscillator's phase noise. Other boxes only allow 2 Mega symbols/s minimum.

The transmitter and receiver are built on modular euro-format printed circuits. Digital signal processing is done mostly in programmable logic ICs.

## Third generation DATV

Ideas for the next generation are clearly formed, at least on the transmitter side. Here the modular concept is dropped in favour of a compact and cheaper form that is more suitable for home construction. The aim is one euro-format printed circuit processing an MPEG-2 transport stream and producing 10 mW HF on 434 MHz. Discussions at the HAM RADIO fair, especially with DJ3OI, resulted in a plan for a built-in test pattern generator

for long time test set-ups. Initial thoughts suggest that it should be possible to integrate a programmable permanent storage device containing 10 seconds long moving MPEG-2 sequences, which are cyclically repeated.

The compact construction of the extended circuit is met by highly integrated programmable ICs, a digital I/Q modulator and digital filtering of the GMSK spectrum making SAW filters and drivers obsolete. The PAL/MPEG transcoder will be constructed with an encoder IC that includes sound coding, B-frame processing, MPEG-1 and MPEG-2 capability and complete transport stream processing.

The third generation receiver will maintain its modular design temporarily. The converter circuits are developed, and the mixer oscillator is crystal controlled with a frequency multiplier (no synthesizer). IF, slicer and clock regenerator remain unchanged; in addition, between the IF and Slicer a channel equalization is planned.

The current solution of MPEG decoding by set top box and QPSK remodulator is driven by time pressure and in the future may give rise to problems. Maybe the boxes are getting cheaper, but the cheaper ones are not able to handle the low data rate of 1 MS/s. Improvement at home of the box's internal circuitry is impossible due to the lack of proper documentation. One possibility could be to enlarge the received transport stream with stuffing packets producing a wider and box friendlier QPSK. This requires complicated error decoding before, and standard error handling after, this process.

Maybe it will be better to use a self-built MPEG-decoder in the long term, with a newer MPEG decoder IC that processes the transport stream and delivers RGB or even PAL/NTSC. Such decoder ICs have more onboard storage capabilities, reducing the overall construction expense. The error handling could be simplified, because

full DVB standards compatibility is not needed.

### Higher bands and data rates

The higher amateur radio bands allow transmissions with higher data rates giving a better video quality. An effective data rate of 5 or 6 Mbit/s provides the excellent quality known from digital satellite and cable broadcasting. An overall data rate of 7 Mbit/s with GMSK means the HF bandwidth is about 8 MHz. Following the technological development of this, FM-ATV could be replaced by digital transmission, with a transition period when both modes could be used. DATV would allow more parallel channels and duplex traffic within the same ATV allocations.

Devices of the second and third generation DATV are able to use higher data rates. The GMSK coder clock frequency can be higher, filters in step-up mixers and amplifiers and in the converter are wide enough, and only the SAW filters must be exchanged for 8 MHz wide filters with a 36 MHz centre frequency. The wider GMSK signal on 70 cm is converted to the higher bands; the 70 cm receiver can be used as a broadband receiving end.

Another modulation scheme could be QPSK. On 23 cm this would enable direct reception with a set top box, provided that a DVB standard signal is transmitted. Furthermore QAM (from DVB-C cable networks) and especially OFDM from DVB-T (terrestrial digital TV) are possible, the latter reducing problems with HF multipath reflections. These modes allow data rates of several MBit/s in 2 MHz HF bandwidth but require very linear amplifiers and higher signal to noise ratios at the receiver frontend.

Low usage of amateur frequencies will not encourage further use. For modern digital broadband modes like DATV,

suitable segments in all amateur radio bands above 430 MHz are important. This was discussed in Friedrichshafen as well, using a diagram with the presently allocated ATV segments from 70 to 3 cm. It would be useful to reach a European agreement on DATV frequencies on each band, which would put those who advocate our interests at frequency conferences in a better position. It is becoming clear that digital broadband modes will be essential working methods in a future amateur radio world. They are very suitable to get young people into modern communication and multimedia technology and direct their interest to appropriate engineering careers.

### Starting and Testing

First considerations and experimental tests on Digital ATV began about five years ago. Most important was the appropriate modulation for the initial period, and GMSK (Gaussian Minimum Shift Keying) was chosen. GMSK is successfully used with mobile phones (GSM), it has a compact spectral density and a constant amplitude even after band-pass filtering. It is similar to FM; an effective power output is possible with class C amplifiers.

Demodulation in the receiver is simple with an FM demodulator; a costly coherent demodulation would give 3 dB more. A GMSK disadvantage is the relatively low data rate of 1 bit/s per Hertz bandwidth. Until now experiments have taken place only on 70 cm (433-435 MHz) - this band is interesting for propagation tests (long distances without repeaters). Antennas give much gain here with moderate dimensions, cable losses are relatively low and middle range power output is produced easily. 2 MHz bandwidth for DATV on 70 cm gives sufficient space for other modes; each of them has equal rights and is used by amateurs according to their personal liking and

possibilities. AM-ATV on 70 cm covering most of the band no longer has any future.

For data compression MPEG1 or MPEG2 was chosen because of worldwide standardisation and the availability of cheap ICs for coding and decoding from consumer electronics. So the first generation DATV was developed with an emphasis on evaluating the digital modulation and propagation effects. MPEG1 data files were sent from a Video-CD through a specially developed PC slot card to the digital modulator and stored at the receiving end through a similar card onto the PC hard disk. An MPEG1 software decoder displayed the video on the PC monitor. These devices were shown and explained in a lecture at HAM RADIO 1999. First successful transmission tests were performed in the nearby area, over 50 km and later over 100 km (with 80 W and stacked 19 element yagi antennas). The development was sped up by support coming from DARC, AGAF, DARC districts G, L, O and R, some private sponsors and by foundation of the DATV working group in December 1998. Four DATV stations should be built within a year and used for tests by the district teams, and they were distributed in December 1999. Hermann, DF2DS, reported results of the field trials in district O in his lecture at the HAM RADIO 2000 fair.

### References:

- (1) Projektgruppen DATV gegründet: Uwe Kraus, DJ8DW, CQ DL 2/99, S. 92
- (2) Modulares DATV-Konzept läuft: Uwe Kraus, DJ8DW, CQ DL 11/99, S. 904

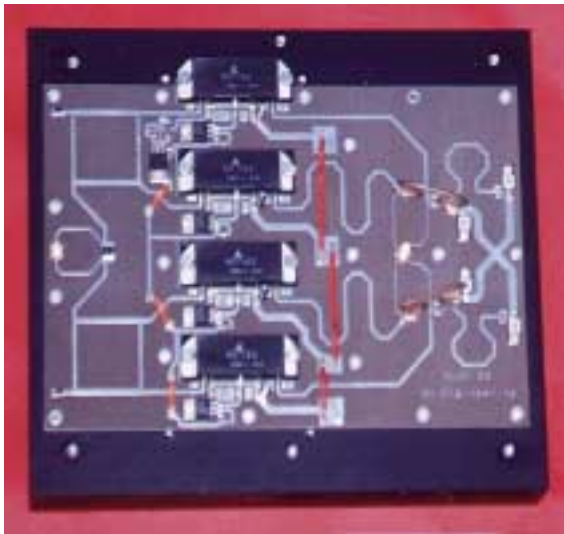
Internet information: -  
<http://www.darc.de/distrikte/g/datv/datvindex.html>

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Fan kit – optional, but recommended for ATV use. Consists of 2 x 93mm 12VDC axial fans, finger guards and fixings. £12

(Requires extra holes to be drilled and tapped in heatsink – details supplied)

Requires DC PSU 12.5 – 13.8V@25A (not supplied).

## PA1.3-2 2 Watt amplifier and PA1.3-18 18 Watt amplifier



### ◀PA1.3-2

Mini-kit        £74.00  
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### PA1.3-18 ▶

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Full kit         £124.00  
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case            £132.00  
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Operating from an external 12-13.8V DC PSU (1.5A for PA.13-18, 5A for PA1.3-18) – not supplied.  
Features: - Both amplifiers have reverse polarity protection, solid state DC switching, selectable PTT polarity (either 0V on Tx or +12V on Tx) and optional input attenuator. Heatsinks can be supplied drilled & tapped for an extra £8. Mini-kit consists of PCB, PCB mounted components and PA module. Full kit (PA1.3-18 only) also consists of front panel labels, switches and LEDs, aluminium case and DC & RF connectors.

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# What was so Great about Black and White Television?

## Dicky Howett casts a few aspersions

Let's face it, good old black and white telly was a bit, well, painful. To be honest, it wasn't exactly the most natural 'window on the world'. Also, it didn't much help that b/w consumer television sets were 'built for price', and lacked a certain robust quality. Most days all those TV sets ever seemed to do was whine away in the corner showing a dim picture crowded with ghosts and other unsuppressed spectral interferences. If that wasn't bad enough, BBC Television offered up a daily selection of ponderous 'live' programmes, in the fond hope that they might perhaps entertain? Too many programmes seemed 'awfully nace' or just plain awful. If a programme was 'worthy' it was usually dull. If it was billed as 'light entertainment' it was dull also but with the added attraction of weak jokes. However, nothing cheap or mean ever passed the BBC programme planners unless it had the added bonus of being actually cheap. Parsimony aside, it made watching old-style black and white television a true adventure.

## Glowing Rose

Naturally, we all remember our favourite bits, bathed now in a rosy glow of recollection. However, it's an uncomfortable fact that these days, with few exceptions, watching an evening consisting entirely of ancient monochrome telly would be extremely arduous. About as entertaining as an enforced diet of silent movies, (or for that matter current 'wide screen' rubbish). Unfortunately, (although perhaps some of us might like to think otherwise), several 'golden oldies' just haven't stood the test of time. For example, production values of such 'classics' as the BBC's 1954 version of George Orwell's 1984 are now risible. Even allowing for arch-RADA acting styles, plus the terror of live performances in studios without benefit of efficient air conditioning, the whole enterprise now comes across as if performing by numbers. The recording amply demonstrates that the CPS Emitron cameras in studio D seemed continually to be on the verge of total meltdown. Also the rickety scenery - where it could be seen through the electronic fuzz - displayed absolutely no sense of space, featuring on more

than one occasion, the dreaded 'BBC Curtain'. (This was a regular BBC TV cash-saving item whereby, in place of an expensive 'wall', a bit of dark grey material was hung in the hope that it wouldn't flap about too much). Also the 1984 hi-tech on-set 'electronic' boxes had the unlikely (but inevitable) hollow ring of painted plywood and we all know that the 'Big Brother' surveillance monitors were clockwork! The few borrowed canteen chairs on view in the background required lots of actor close-ups in order to disguise the penurious props budget. And because the weedy cameras couldn't handle contrasts and highlights, the studio lighting was as flat as Twiggy. The original low velocity Orthicon-type CPS Emitron tubes operated at a contrast ratio of 2:1. Reckless use caused the picture to 'peel' or blob when encountering a stray twinkle of light. This was the reason that CPS cameras were restricted mainly to drama and interviews, whilst over in Studio G the more robust high velocity Pye Photicon cameras got all the dancing girls in bright sparkles plus Quatermass in sparkling space ships.

Naturally, I'm picking nits here. Sniggering through my hindsight. This is not necessarily to demean the valiant efforts of the BBC technical team, who obviously were shackled by appalling BBC financial restraints. Despite that, (and viewed today strictly in context) Rudolph Cartier's 1984 still has moments that grip and are none the less fascinating. But, unfortunately, this particular BBC production displayed not even the slightest layer of Hollywood gloss or even Chorleywood vinyl matt for that matter. Despite such deficiencies, (and perhaps because of them - in our house, a 'Jack Kine and Bernard Wilkie' special effects credit meant we were going to get something special) I watched that 'flickering small screen' utterly transfixed during the entire 1950s and 1960s, TV's 'golden age'.

My earliest childhood TV memory (at least I think it is) is of children's television (1951) and an opening sequence with a toy fort and stop-motion soldier clumping out along the drawbridge waving a pennant. Next came The Quatermass Experiment all



**Off-screen photo of Dicky Howett in the audience of Juke Box Jury in 1961. Image repro'd on a Pye tv set B18T (1948) using an implant Sony PM 931 monitor via a 'Melguard' vidicon camera with the scene shot on an Ikegami 79E 'Handy Lookie' digitally enhanced into black and white.**

bar the final episode that I missed due to my mother failing to wake me (I had to pretend to go to bed as my younger brother wasn't allowed to watch 'horror films'). No chance of seeing that final episode of *The Q.E.* again as only the first two episodes were recorded. I've got the book though. But then I was always missing important telly things. Believe it or not, my family was actually one of the few tv-owning households who didn't watch the live 1953 coronation broadcast. Inexplicably, my family and I went on a day trip to Southend-on-sea and got wet.



**Saturday Night Out. Opening credits.**

### TV For Parrots

Hardly anyone now admits to watching 1940s tv and only three people and a parrot recall the actual opening, in November 1936 (using a Baird 240 line non-interlaced mechanical film / spotlight system) of the BBC's very own 'world's first high-definition' television service. (This is not to be confused with the various Russian / American / French / Italian / Dutch / German television services already running). These days, the early history of television comes across as a myth, with claims and counter-claims specifically devised to confuse the unwary, and in particular, latter-day tv-programme researchers. (Children recently interviewed thought tv started as long ago as 1970! If only..)

A friend of mine, Don Weston watched in wonder the stumbling efforts of pre-war BBC 405-line TV. He said that sometimes the 'bullseye' (picture shading where the middle was dark and the edges light) got very bad. Occasionally, live transmission was halted because of the dire image quality. Also, CRT ion burn was a particular problem. I suppose the minuscule audience at the time endured

it stoically, sitting patiently, (as doubtless they were), in full evening kit with copious quantities of Gin & It on tap and the butler at standby. My father said he remembers watching in 1937, an ob from a theatre where throughout the entire performance the *single* live camera was locked-off at dress circle height. This, presumably was an experiment, an attempt to reproduce a 'seat' in the auditorium. Riveting stuff.

Of course, back in those grey valve-driven days, the technology was the *thing*; the latest gadget. Television aerials were real (and enormous) status symbols, unlike latter-day satellite dishes that still impart all the approbation of a typical page three reader. Proto-TV was in black and white because it was. It didn't seem at all strange that each evening we squinted up-close at a 10in x 8in inch image with no DC restoration to keep the levels black. Also, those old-style tv screens were edged with a curious cream-coloured thick plastic collar which seemed to serve no useful purpose except collect nicotine stains easily, (at least it did in our house). The entire ensemble was usually mounted in a naff imitation oak wooden box with the addition of a cheap reading lamp plonked on top (well we don't want to strain our eyes do we, dear?). Ah, but at least the *lines* were sharp and the whistle was sometimes louder than Granny's hearing aid and the picture screamed when things got too contrasty. Once, our television set actually blew up precisely at the point when the "Saturday Night Out" title sequence road sign burst in star fashion (at the sound of a cymbal) to disclose the upcoming programme. We peered expectantly at the smoking screen, thinking it was all part of the show.

### Test Card Seedy

Such fascinating times we had, to be sure. In the 1950s, most consumer tv sets were ugly, clunky and noisy yet we loved 'em. We even boasted about them for heaven's sake! "My set's a 17 inch Sobell. The picture's perfect. Wouldn't touch a 21 inch Ferguson with a barge pole", and so on. How many households had the brightness control set far too high? The answer, just about all of them. "Well, we want to be able to see what's going on". Bit difficult chum, especially if relying on the *six* different British tv cameras then

in BBC use. To be fair, the BBC tv technical brigade were obliged to support the various UK manufacturers. The BBC habitually issued copious and voluminous 'specifications' for new camera channels and the like. Unfortunately, these technical directives meant that conforming to them enabled the manufacturers to lose lots of money straight away

However, it was a time of experiment, with each electronics company having its own proprietary way of stabilising or boosting the image signal. Studio line-ups were low-tech affairs, laboriously achieved using a well-thumbed copy of Test Card 'C' screwed up close on a wire bracket in front of the cameras. It was all in vain. No two cameras ever gave identical pictures (or if they did, not for long). Also, the hand-wound kit had a habit of getting awfully hot (eggs were fried regularly). This state of affairs caused components to jiggle that resulted in constant and nervous racking down at Engineering. BBC engineer Joe Starie told me that they didn't have reliable 'scopes' to monitor waveforms. They had to make test equipment themselves out of spare parts. To cap it all, camera image tubes lasted on average 50 hours if you were lucky. Starie says that the only thing guaranteed before the start of a show was that the monitors were just about lined up (if that).



**Off-screen shot of the Boat Race (we think). 1960s vintage**

Exacerbating the problem, back in the living room, consumer tv sets had no flyback line suppression circuits. Thus, the written order (I have a copy) went out that all BBC pictures were to be transmitted with an extra 5% black level lift above base! This, apparently, was a futile effort to prevent viewers fiddling with their controls on potentially dark scenes and thus revealing the wretched flyback! Naturally, the absent DC component on stout British tellies didn't help. The

BBC was actually worried that they would be accused of transmitting sub-standard video images. Perish the thought.

In 1955, shrewder Commercial Television used image orthicons and cameras (Pye, Marconi, RCA) that gave the picture at home some punch, even if the I.O. tube's transfer characteristics were somewhat non-linear above and below the 'knee'. Black-stretch notwithstanding, most viewers didn't care if the picture transmitted wasn't an exact 'photographic' reproduction, or a bit contrasty. All that mattered was that ITV's image (even if the programmes were of barrow-boy calibre) looked modern and exciting.



**Squinting at the screen. The Howett Household's tv set in the mid 1950s**

The BBC Television picture suffered also (pre and immediately post war) from the lack of creative and logical TV lighting. Scenes were lit solely to energise the weak-eyed pickup tube, so the more watts the better, chaps! 5kw of dazzling spotlights per actor were not unknown. Understandably there was little room in those days for a delicate and artistic balance of Key, Back and Filler. (American tv shows fared no better. Over-enthusiastic use of 3 inch Image Orthicons-ie: too much iris and beam current- resulted in 'hot' halos blazing around white shirts and bald heads. Also, poor lighting practise resulted in multiple shadows on stage curtains. This resulted in the viewing US millions being treated to the outline of The Mic Boom, which featured regularly as a dark twitching avenger behind many a performer).

In the early 1950s, the BBC down at Lime Grove clung remorselessly to CPS Emitron and Photicon tubes And yes, I'm aware that the BBC's Studio E had 3 inch I.O.'s but only, it would

appear, on sufferance. Installed briefly, these 3 inch I.O. *Marconi Mk II* cameras needed to be cooled with built-in fans, bolted to the side. However, the fan motors made such a racket that they couldn't be used 'on air', thus at a stroke reducing their usefulness. Also, the I.O.'s of the time were quite 'sticky' with annoying and inconvenient bouts of microphony, problems guaranteed not to endear the 3in I.O. tube to pernicky BBC installation engineers who were, to the hard-pressed electronics manufacturers, a complete despair. They found the BBC technical acceptance teams the most difficult to satisfy. Also early 3 inch Image Orthicons had a nasty habit of making actresses look hag-like and thus were unpopular with women of a certain age.

Later, up at the News at Alexandra Palace (in 1961 the equivalent of tv Siberia) the BBC used a clutch of industrial vidicons for the ultimate in softness and smear. Hot news film was transmitted in 16mm negative 'comag' courtesy of Pye Staticon telecine machines. Cheap and not so cheerful.

Incredibly, as late as 1965, the 1940-vintage orthicon type tube in the shape of the 'baked-bean-tin turret' CPS Emitron Mk3 was still active down LG, transmitting Panorama, Tonight and Dr Who plus being used, (of all things), as a standards converter. I suppose there must have been some arcane technical reason for it. When I saw this very same CPS Emitron converting its standards on a BBC bench during my 1965 BBC trainee induction course tour, the technician hinted (with a scorn achieved only from years of practice by undervalued BBC 'oily rags') that the camera was 'obsolescent, ie: we can't quite afford to get rid of it yet'. Naturally, the proof of the parsimonious pictorial pudding culminated with monotonous relays of ice-skating from Grenoble. Ghastly whirling black blobs against an ice whiteout. Picture quality-free Eurovision. (Recently a BBC engineer admitted to me that the old CPS standards converter was only ever used as a last resort, and then not at all! (A German machine was always preferred). He said that the CPS line-up consisted of careful time-consuming pre-sets and a final instruction to use your own judgement and make the best of it! Very technical.)

The 1950s were a time of trial and error. During a typical night's viewing, the BBC would inflict the nation with some of the world's worse telerecordings. Wonderful systems like the Suppressed Field that recorded at a staggering 204½ lines plus spot wobble, grain and blear. Ice rink soot and whitewash wasn't in it. Or perhaps it was. And let us not forget dear old whirling-wheel V.E.R.A., the pride of BBC Engineering. This valve driven monster machine purported to be an Apparatus that Recorded Electronically (on tape), Vision. This great acronymic lump was in reality the last gasp of non-viable BBC Engineering's belief that anything the Americans (and latterly the Japanese) can do, we can do worse.

### Clamped

Along came BBC Two and 625 lines. Hailed as an advance. More resolution. Oh yes? Well, I had one of those pathetic 'dual-standard sets' with new-fangled black level clamp, a GEC set rented from Granada. Ugh! The so-called superior 625-line picture on my telly was quite crappy. Soft as Andrex. In some cases the image seemed desperately under lit. (A greater scan rate actually needed a stop or two more illumination). I can attest it was a relief to switch back to sharp old 405-line BBC One. Actually, the only consistently good monochrome pictures on all channels came from Cintel 35mm twin-lens flying spot telecine machines. A technical triumph, images nicely sharp and chromatically graded. A whizzing wonder. Up at ITV the commercials were all on flying spots, naturally.

Perhaps the knowledgeable amongst you feel now that I was watching the wrong TV sets (and programmes) and that somewhere in Britland was the ultimate and perfect monochrome telly.



**Ditto, when Dicky Howett's tv set blew up.**

Well, by the time that arrived, doubtless the set would have overheated, lost interlace or got involved with some low frequency streaky Venetian blinds. These days,

recordings of old-time black and white TV hardly gets aired for the reasons described. If a show occasionally does emerge, it's only broadcast (in pointless wide screen) to illustrate some

'anniversary', 'theme night' or as a Terrible Wogan curiosity factor. Wonderful black and white telly? When was that then??

## Professional ATV Transmitters & Receivers

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# Bitz Technology Ltd

Tel: 0208 968 0227, Fax: 0208 968 0194

E-mail: [sales@bitztechnology.com](mailto:sales@bitztechnology.com)

Website: [www.bitztechnology.com](http://www.bitztechnology.com)

## 13cm ATV Repeater Application

At the August meeting of the East Yorkshire Repeater Group it was decided to apply for the first 13cm ATV repeater (GB3VW) in the UK. The repeater will be co-sited with GB3XY (3cm ATV), GB3HS (2m Voice) and GB3HU (70cm Voice) at South Cave near Hull (IO93RS). The application was submitted to the RA at the beginning of November and we hope to receive site clearance in February! The transmit frequency applied for is 2380MHz and 2330MHz for receive, these might be changed by

the RA. It is hoped to run 20dBW using a PCS1900 amplifier obtained from DL4MEA via G3XDY, sorry no more available before you ask them. This amplifier can give in excess of 40W output with only 5w drive. Look on the following web site for information regarding this amplifier:- <http://www.qsl.net/dl4mea/13ss/13ss.htm>. Due to weight restrictions we will be using Alford slots instead of slotted wave-guide. Information regarding current repeater applications may be found on the RMC web page at :-

<http://www.coldal.org.uk/rmc.htm>. If you require any more information or can help please get in touch with me.

**Richard Parkes G7MFO 7  
MAIN STREET, PRESTON,  
HULL. HU12 8UB.  
ENGLAND. Tel: - 01482  
898559**

E-mail: - [Richard@g7mfo.karoo.co.uk](mailto:Richard@g7mfo.karoo.co.uk)

## Contest News

### By Richard Parkes G7MFO

I received five entries for the International last year including myself. I would like to thank the people who sent in their entries and took part in the contest and hope they enjoyed working stations they would not normally work. From the logs received a total of thirty-nine stations where on the air and seven of these were portable stations. Don't forget if you only work one station one way please send in your log via e-mail or snail mail. As soon as I get the full 'European' results back, I will make sure they go onto the BATC web page.

I was disappointed not to receive any logs on 70cm. I know I was not the only station to miss quite a few contacts due to not having 70cm portable gear available, also don't forget the 3.4GHz, 5.7GHz and 24GHz bands as well.

Congratulations go to the Severnside group for just piping the SCART group into second place. The Severnside group sent their logs in using the new logging software. The only problem encountered was the locator must be in uppercase or the results are incorrect even though they 'look right'. If anybody knows how to 'force' a cell in excel into uppercase please get in touch with me.

I received quite a few e-mails and phone calls regarding the future of ATV contests. Most wanted a reduction in the number of contests to no more than four a year. I also received suggestions for several other ways of scoring the contests, some of these included the frequency, ERP, ASL, AGL, single or multiple operators to be taken into account. My own point of view is it is best to keep with what we know as some of the other methods sent in to me

would mean, I would have to go into full time retirement to check the results!

I have received two e-mails from other European contest managers about changing the times of the weekend contests from Saturday 12.00 GMT to Sunday 12.00 GMT, what do you think?.

I look forward to working many of you over the next year and hope to see you at the BATC rally at Bletchley in May.

**Richard Parkes G7MFO 7  
MAIN STREET, PRESTON,  
HULL. HU12 8UB.  
ENGLAND. Tel:- 01482  
898559**

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

### International 2000 Results

Place	Callsign	Locator	QSO 24cm	Score 24cm	QSO 13cm	Score 13cm	QSO 3cm	Score 3cm	Total Score
1	G7ATV/P	IO81QC	14	2336	4	1540	7	2050	5926
2	G7SEZ/P	IO91GI	13	2952	4	1485	2	580	5017
3	G7MFO/P	IO93PV	11	1974	1	375	2	400	2749
4	G4LDR	IO91EC	4	324			1	150	474
5	G3RMX	IO93UV	2	128			1	50	178

### Contest Calendar

#### Spring Vision 2001 (Joint European)

Saturday March 10<sup>th</sup> – Sunday March 11<sup>th</sup>

#### Summer Fun 2001 (Joint European)

Saturday June 9<sup>th</sup> – Sunday June 10<sup>th</sup>

Both from 1800 GMT Saturday to 1200 GMT Sunday

**Fast Scan ATV all Bands.**

## Members adverts

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

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

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

## For Sale

**JVC** colour broadcast ENG camera, model CY8800ES with VF8800 viewfinder and large Fuji lens. £75.

**Sony** model DX6000P colour ENG broadcast camera. Body and cable only. £35.

**Interactive Video Controller** by Rapid Research, model IVC401, complete with keyboard for text & titles. £50.

**Presenter's Computerised Prompter**, with lectern, monitor, accessories, cables and handbook. Made by MRVP. Titanium-coated glass reflector. As new and flightcased. (Ex-dem) £995.

**Video Colour Correction - processing units**, 4-channel model VCC3010 with composite and 'S' inputs, by Video Tech Design. Unmarked condition. £85 each.

**Contact Trevor, G8AKA, on 0118 970 1163 (Just South of Reading).**

Ex computer tapes for sale. Over 40 reels of half-inch 1650 bpi computer tape on standard spools - 75p each or £20.00 the lot. Two wire frame racks to hold the tapes - £1.50 each. Buyer collects or carriage extra. **Contact Adrian Rawlings, email:-**

[adrian@euroneta.com](mailto:adrian@euroneta.com) 01908 503 355 (Milton Keynes).

Two Norsat 1.2m satellite dishes. One has a fixed pole mount (included) and is free of charge. The other has a motorised polar mount, triple-band LNB and I'll throw in a PACE MSS1000 satellite receiver with it. The receiver has the dish controller, Dolby pro-logic decoder and audio amps built in. I want £40 for this one, its worth more than that for the RX alone. Buyer collects or arranges delivery. Brian, GW6BWX. [betwixtbbs@cs.com](mailto:betwixtbbs@cs.com)

## Wanted

Philips PM5509 pattern generator. Help, a service manual or just the circuit diagram for this workhorse that has an unusual fault. When first switched on there is sometimes hum bars, sometimes the horizontal frequency seems to be off. After 30 mins the problem goes away! Please email Dave at [dakatech@acenet.co.za](mailto:dakatech@acenet.co.za).

Any PCBs with reference to the G8CMQ Solent Scientific TX 10mW, 200mW, 1W transmitters. RX boards RC24 converter and the G8CMQ receiver. Synthesiser board and any

board relating to G8CMQ. Working, non-working, or half built boards. **Contact L. W. Smith, G7GNA, Tel: 02392 232097, email [g7gna@zoom.co.uk](mailto:g7gna@zoom.co.uk)**

Looking for any really old radio control equipment. Anything from the 1960's onward, working, or not, even bits and pieces. Just the radio and escapement / servo equipment, not models or engines. Trying to get together one or two systems for old times sake! Please email Dave at [dakatech@acenet.co.za](mailto:dakatech@acenet.co.za).

Wanted - Can anyone please help - I am trying to locate a chip that is no longer available. A 7444 Excess 3-bit grey to decimal decoder. Also, any information with regards a display, Philips LTN111R-10 - QJK341H using a SMD chip HD44780A00. Info required, pinouts and/or circuits using this display. **Contact L. W. Smith, G7GNA, Tel: 02392 232097, email [g7gna@zoom.co.uk](mailto:g7gna@zoom.co.uk)**

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## Notes from the Membership Secretary

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Thank you to all of you who renewed your subscription promptly. I did receive a few comments regarding the sending out of the renewal letter several months before the subscription is due.

On every renewal letter it states “your subscription is due or will fall due before the next edition of CQ-TV is sent to members”

The problem we have is that the magazine is published quarterly but subscriptions fall on a monthly basis. We have two choices, the first to send renewal letters out on an individual basis or secondly include them with a magazine.

In an ideal world the sending of individual renewal letters would be my number one choice but there are major drawbacks to that. The first being it costs money to send the letters out, especially postage and secondly it takes a lot of extra work to produce and mail the letters.

### Membership Number

We also receive requests for your membership number. The address label on your CQ-TV envelope contains several useful bits of information. On the bottom right hand side of the address label are two rows of information.

The top row shows your membership number followed by a mail sort code. The mail sort code is use for mailing

purposes and can be ignored by members. The first set of numbers after MemNum: are the important ones. There is no mail sort code for overseas members. The bottom row shows when your subscription expires.

If your subscription is due before the next CQ-TV is published the address label will also state “Subs Due”

### How long do we take to respond to you?

The following comments arise from a phone call received by another B.A.T.C. Committee member. He had just walked through his front door after being away on business to be confronted by a rather irate person demanding to know why he had not received his magazine when he had sent in his application form a couple of week ago.

We are not a commercial organisation with a central office, but a group of volunteers spread around the country working in their spare time. Each committee member deals with a different aspect of club work. I look after the membership database and members’ subscriptions. Another looks after club sales and another publications. A full list of committee

D. Lawton	GOANO
Grenehurst	
Pinewood Road	
HIGH WYCOMBE	
Buckinghamshire	
HP12 4DD	
United Kingdom	
	MemNum: 12345 98765
<<<Subs Due>>>	Subs To:31 Dec 1999

contacts is published at the front of this magazine.

I try to deal with any mail or emails within a couple of days of receiving them, but then I have to pass on any orders for publications or sales to the relevant person. Taking postage times into account you can see that a response to your letter may take well over a week before you receive the response.

This actually is quite good, I have found from personal experience many commercial organisations take much longer to reply. Of course if any person in the chain is away then the time taken will be longer. Please allow for this, especially around holiday times. Also writing to the relevant person for your query will shorten the response time. If I receive a letter to do with sales, for example, all I do is redirect it to the correct person.

I think your Committee do a good job but please remember we are volunteers working in our spare time and have other commitments on our time as well.

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