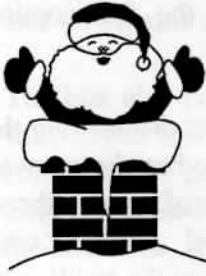




MERRY Christmas

*and Happy New Year to you and
your family*

CHRISTMAS SOCIAL



Once again we are holding our traditional Christmas Party which will take place at Elm Park Parish Pavilion, Filton, Bristol on Saturday 14th December, starting at 7.30pm. Please feel welcome to bring your friends and

relatives, the more the merrier. A small buffet will be provided by the committee, but members are requested to bring along some refreshments to supplement this please.

As usual, we will be holding our Christmas Raffle and Auction. A First prize of £25 will not be high as the National Lottery stake, but the odds of winning are more favourable. Further consolation prizes of drinks and confectionery will be drawn, so don't forget to buy your raffle tickets.

If you have any unwanted items to donate for the auction such as Magazines, Bananas!!, Oil !!, Electrical Equipment, this will help the funds and put a bit of fun into the evening. If you cannot make the social but would like to donate some of your precious junk let your committee or the editor know.

TV TRANSMITTERS FOR THE HOME BY PAUL G8YMM

I was reading an interesting article by Barry Fox in the New Scientist which prompted me to comment.

The article concerns the problem of sending TV pictures around the house from the living room. As you know, this can create additional wiring or the purchase of an illegal Video Sender, (Glorified Nasty RF Modulator) to which you and I would not contemplate.

Phillips engineers have been looking at this problem for several years in the view to marketing such a device and this is where my ears pricked. There are several non-licence bands in the UK one being 2.4 GHz low power. Phillips tried this band only to find that the Microwave Ovens working on this Band affected the signal. Does this mean we have leaky ovens? and what about our Radio Frequency Allocation. I did read an article about converting a Microwave Oven as a 2.4 GHz TV transmitter in the BATC Magazine. The other legally approved band which has the capacity to transmit the bandwidth required, is 5.8 GHz. The international agreement on this band limits the power to 25 milliwatt with an expected range of 250 metres across an open path. To produce a transmitter and receiver at this frequency could prove rather expensive to implement. However, Phillips spotted an easy way to keep costs down by modifying existing domestic Satellite equipment. Therefore, producing a system for approx. £100 which could be on the market next year.

My main questions are :-

- Will we be subject to low power microwave transmissions seeping through from next door? or perhaps from within?
- Could we use the band legally for a quality RF video link to an ATV transmitter?
- Where have you seen interesting results from modifying LNBs and Satellite equipment ?
- What components and circuits have been used?

I look forward to seeing this product should it reach the domestic market. It could prove rather interesting !!

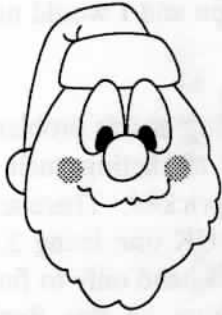
73 Paul G8YMM



P5 NEWSLETTER



ATV INTERNATIONAL CONTEST BY PHILL G1HIA



Well, a big thanks to all who gave their time and expense into making the international contest a smooth running event, and also to the weather! It felt more like the Summer Fun than the September International. With dry fields and sunglasses I even managed to raise a laugh when I donned my shorts. Our chairman's wife Marina, said I look like Arnold Swartzenegger. That brought roars of laughter from all at the site. (I say, she has great taste and character assessment ha, ha !!). I'll send her my glasses in the post.

The site was up and running quite early this year, with no problems. We had 3cm on its own pole with a separate pan and tilt unit. At the last minute 13cm receive was rigged on the main mast as we decided to enter four bands, 70cm, 23cm, 13cm and 3cm. The TX for 13cm was put on the 3cm mast only 15 feet off the ground, so we didn't expect good results from this. Maybe next time we will have them altogether on the main mast along with the receive antenna and 3cm.

13cm it was a close thing between Ian (G6TVJ/P) and Nigel (G7JZP/P) for the longest DX at 76km and 82km respectively. Whereas, Malcolm (G0UMP/P) came tops on 3cm at 52km for a two way contact. 23cm, G3SMU at 260km for a two way contact was excellent, and 70cm saw G4YTV, the BATC contest manager at home with a one way of 328km.

We were all kept very busy with so many bands to work. Micheal (Ken G4BVK's boy) doing the logging for us, thanks Micheal for the many hours spent on site, and for taking on all the nasty tasks we gave you including winding up the tower. However, he got his own back with an appetite for two making short work of our rations. But seriously, though, getting back to the contest, we did have many stations call late on Sunday morning

which made things very hectic, if you were one of the one's left out we can only apologise. Working four bands takes more time for each contact. It seemed strange that we had no contacts after 11:00 Saturday evening and everyone wanted to work us on Sunday morning. Rather than wait in a queue, please try to work us on Saturday evening if at all possible.

As soon as the site closed down we all went to lunch down at the pub, all except Paul (G8YMM), who stayed behind to paint the tower with a good coat of Hammerite whilst the weather was in our favour. This will protect it for the forthcoming winter.

After lunch there were no problems dismantling the equipment, that all went smoothly, but the caravan was like a wobbly jelly on the back of my (brother's) car. I still haven't told him I used it! Anything over 40mph it would snake violently down the road! The following convoy was at least 800 yards behind, too frightened to get closer, or maybe they were just picking up the pieces?

Another end to the contest year, with the results expected to be published in CQ-TV. We will keep our fingers crossed for the final results and will let you know.

Thanks again to you all for making it all possible, 73's Phil G1HIA.

Well done Phill for managing the contest, Marina says "shame about the legs" ED



HANG ON MICHAEL NOT FAR NOW!!



THE SIMA SCREENWRITER CHARACTER GENERATOR FOR ATV.

BY MIKE G7GTN

Just some quick notes on one of the items that I purchased from the recent Leicester Amateur Radio Rally. On the well known Midlands Video Equipment stand where some dusty SIMA character generators dating from the early 90's which for the asking price of 20 pounds complete with all cables and a 9v mains adaptor seemed like a good deal.

The box also contained a set of instructions which were of the multi-lingual variety, these should have contained an English version, but you've probably already guessed what happened next. On trying out the machine it seemed to be operating rather erratically, so a quick shake of the said article revealed something rattling around inside. Once open you have the main circuit board which has a 4 way ribbon cable to connect to the keyboard PCB, the keyboard is of the rather poor membrane type. Although it does boast a full keyboard style layout you have to get use to the Alternate and Shift keys which are needed to select Symbols.

There are only 6 chips including one EPROM and battery backed ram chip to store the screens that you will create. The unit is driven by a WDC 1917-PL which I presume is some sort of CPU device clocked by a 12 MHz xtal. The video and through audio output is controlled by another unusual chip a PROWTEC M50458-068SP.

The battery backed RAM device is a Toshiba TC5565FL-12 which is a surface mount device on a small PCB complete with DIL pins for the socket, it may be possible to increase the size of this device to allow more screens to be saved.

Should you have any problems with the Lithium battery CR2032 installed in the unit, then Maplins have a suitable one, stock code : ZB74R.

The machine comes complete with a built in demo of what it is capable of, this is activated whenever

you hold down any of the keys and turn the power off and back on.

The unit is quite versatile as it stands, since you don't need to put a video source through to be able to correctly sync and display your captions.

Programming your own messages into the memory.

To program your own messages you firstly need to select which of the 15 pages you want to use. This is done by pushing the Page button and then keying in a number from the top row of the keyboard.

Once you have selected your required page press the create button, this will display an on-screen grid for you to enter text etc.

The size button is used to select the size and number of characters that will be displayed on screen.

Here are the 4 different character screen formats that you can select from when composing your own text.

*14x22 characters or 14x12 characters
14x8 characters or 14x6 characters*

Displaying your messages.

First press the page button and key in a number from 1 to 15. Then to display your message just press the Insert button.

Other utilities include scroll up the screen, scroll across the bottom of the screen, zoom in and naturally zoom out.

If you have a through video signal connected, then the caption will be gen locked on to your original picture.

73 Mike G7GTN

Sounds a good buy, I wonder if they are still available? ED

THOSE WERE THE DAYS ...

Further ramblings from the beginning of our Group by Shaun O'Sullivan G8VPG

Enthusiasts are really quite dangerous people. There is no limit to the extremes that a group of them will go to pursue their interest. Not content with the work of building and maintaining a Repeater (and eventually starting a second one, but that is another story), we decided in the early days to have a go at ATV Contests.

Now one advantage of Amateur Radio & TV as a hobby is that for the most part, it can be enjoyed in the comfort of a shack. We usually ensure that this is a snug little spot, and only emerge blinking in the sun light on summer days to go to Rallies. However, if there is one sure way to get cold, wet and muddy, it is to enter a portable Contest. Alternatively, if the weather is fine it is too hot and we all get sun stroke and hay fever. I remember one blistering June Contest when we were in the middle of a hay field, and some people suffered from hay fever for the first time in their lives !

However, it all started in a quite modest way. Before the start of the Severnside Group, some of the early Bristol ATV enthusiasts, such as G8GLQ & G4BVK used to enter contests, using sites like Lansdown and Westbury White Horse. We thought that it would be a good idea to revive this tradition. We thought of this in the depths of winter, and the next ATV Contest was in March. We decided to have a go, and set about finding a suitable high spot. Now this is not widely known or understood, but there seems to be relationship between a good spot for a radio contest and the nearby presence of a pub ! The presence of alcohol seems to help the launch of the little waves into the ether. Anyway, we ended up one rather bleak day in March in the car park of the Crown Pub, on the A46 by Junction 18 of the M4.

Those of you who think that today's Contests are hard work should have experienced our early efforts, when we did not have the benefit of a wind up tower. Pulling up a collection of heavy aerials on top of an assortment of scaffold poles

is a distinctly dodgy business. After several hours work with spanners, everything was ready for the big moment. We carefully moved all of our cars out of the falling radius, but strangely we did not seem to be too worried about the nearby overhead power lines - it was a very cramped site after all ! Of course our first efforts were unsuccessful, the aerial crashing to the ground as soon as they reached about six foot. After much adjustment of guy lines, gin poles etc., we managed to get the aerial aloft just as dusk was falling.

After this, things went quite well for a few hours. Then it was noticed that whilst the 2m PA was getting quite hot, there was not much signal getting out. A test with a meter confirmed the worst, the feeder cable was open circuit. Since it was late and dark outside, it was decided to leave repairs to the following morning.

The previous day, we had the benefit of lots of people to pull on the end of the guy lines. However, at nine O'Clock on a Sunday morning, there was just three of us. We decided to have try anyway. Once the aerials got past the 45 degree mark, it was rather like being on the losing side of a tug o'war team : what followed was more of a controlled fall. However, the aerials survived intact, and it was quickly established that yours truly had not properly plugged the cable into the aerial correctly. Of course, I blamed the stupid French connectors on the Tonna aerial, but afterwards for some years, my efforts were always carefully checked before the aerials were put aloft !

Surprisingly, the small team assembled were able to pull the aerial back aloft without too much difficulty. We were soon back on air, and were quite busy working stations - certainly busier than some of our more recent entries. At this time, we borrowed the North Bristol ARC's caravan, and this combined as the shack, rest room and kitchen. It was crowded at times, but we had not then got used to the luxury of two caravans for portable Contest use. Luckily the weather remained dry, and we did well enough to agree to enter the next contest in June. However, that would take place at a different site, and forms the basis of another story !

13 cm Amateur Television *By Ian F Bennett (6TVJ)*

Thirteen cms is probably one of the more obscure amateur bands in use in the UK and is one of several that span the gap between the familiar 24cm and 3cm (10 GHz) bands. The amateur allocation starts at 2.310 GHz and extends to 2.45 GHz, this actually gives use quite a bit of room and allows all modes of transmission including FM TV up to a maximum power of 400w pep, a somewhat unlikely figure even with today's improving microwave components available to amateurs. The band is more extensively used in Europe and there are many TV repeaters using it as an output frequency and 24cm as an input frequency. A couple of years ago I was fortunate enough to copy DB0TS P5 during portable operation while enjoying some quite astonishing lift conditions. DB0TS was estimated to be as much as 600 km away.

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

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

How to get onto the 13cm Band

First thing we need is a receiver which tunes about 2.3 to 2.5 GHz, this may seem quite a tall order but luckily by a quirk of fate a satellite band actually exists near by. In addition to the familiar "KU" and "C" bands a band called "S" band has been used for satellite TV which covers 2.5 to 2.7 GHz. The band is sometimes known as the "Arabsat" band, it is used abroad as you might expect in the far east, but LNBs for this band can be obtained in the UK if you look hard enough. We have been fortunate in obtaining several of these units, one belongs to the Severnside group and several other members have them including myself.

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

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

Antennas

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

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

Results

The results so far on this band have been quite good, certainly the reception of DB0TS from Germany is a personal best and quite a spectacular achievement if not helped by the location of Win Green near Shaftsbury which was about 900ft above sea level. Other terrestrial microwave signals from abroad were also copied up to P5, probably local cable feeds in some mountainous region somewhere. On a somewhat more local basis I have established a link to G1HIA's QTH, both ways using the synthesized exciter and a power amplifier providing a hefty 900mW. Pictures were P5 in both directions with some occasional interference allowing duplex operation with GB3ZZ in the other direction. Some tests were also done from Tog hill about 8 miles away with only the exciter and 10mW, this still yielded a P5 picture when using the Tonna antennas demonstrating the high sensitivity of the "S" band LNBS.

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

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

A Synthesized Exciter for 13cms

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

How it works

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

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

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

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

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

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

Construction

The SHF construction is quite tricky and a PCB layout is shown. Double sided board is used and one side is etched. Holes are drilled for the mmics in order to sit them down neatly onto the board and keep their lead lengths as short as possible. The pins on the SP5070 are cropped off and the device sat flush onto the board and the remains of the connections soldered down. Only the microwave components are critical the rest of the components including the op-amps can be mounted as convenient. The output connection can be an "N" type or SMA as long as sufficient grounding is employed to both sides of the PCB. The PCB must be housed in a metal box, I used an eddy box with a copper plate at the output connector as the board will not solder directly to the aluminum box.

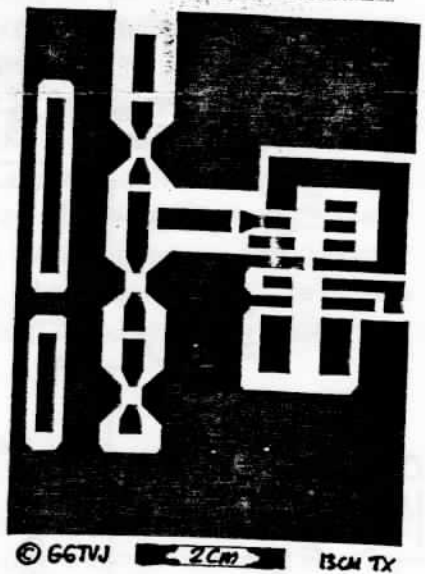
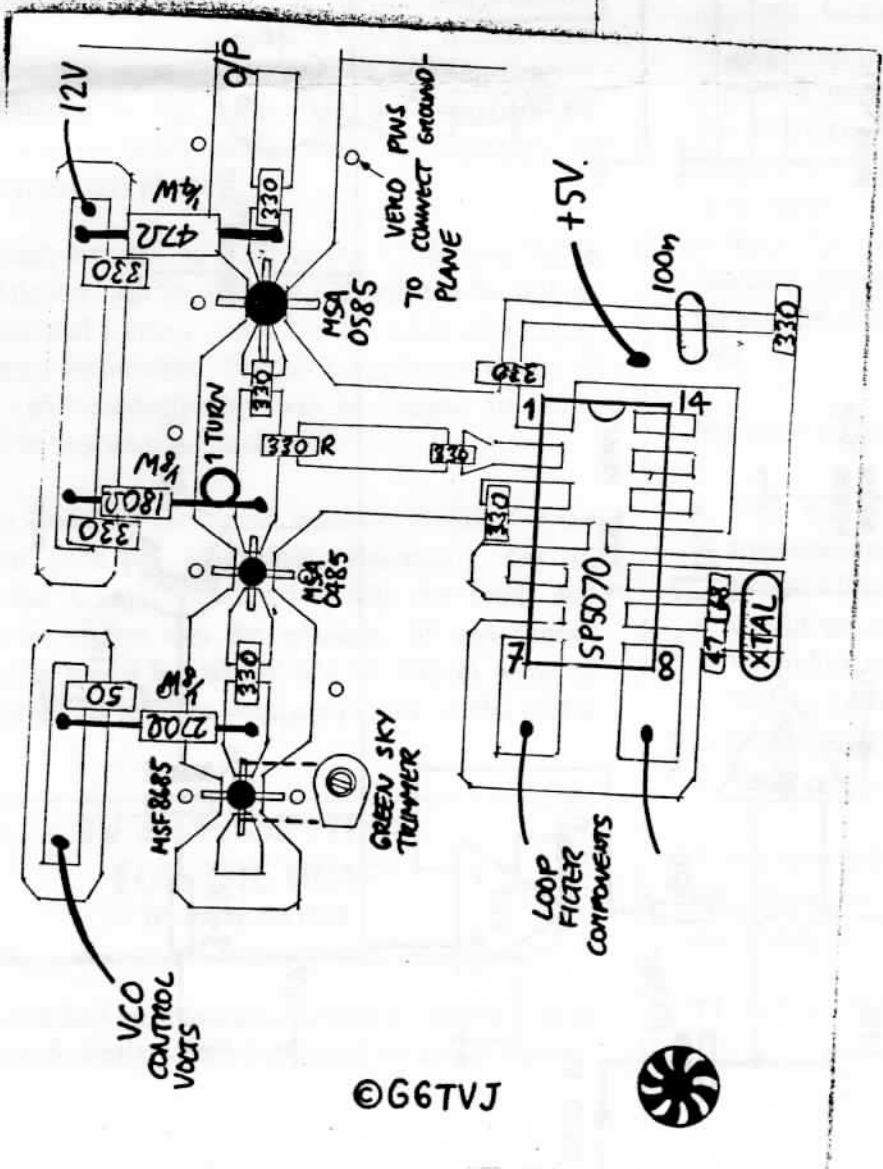
There should be only one major adjustment to make and that is to set up the VCO range. By monitoring the test point the volts should rise up and down as the trimmer is adjusted, care is needed as the trim tool effects the frequency. The VCO should be adjusted for about 10 volts. when correctly operating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

Results

As mentioned earlier the exciter alone managed about 8 miles in conjunction with the tonna antennas. The arrangement with the VCO is not very elegant but it does seem to start up and lock up reliably. I did try tuning the oscillator using a veractor diode but it seemed to drift alot. I have seen a design for a transmitter VCO using BFR90/91/96 type transistors but 2.3 GHz is only about an octave away from the transistor's f_t of 5 GHz so problems might be experienced. The f_t is the frequency at which a particular transistor's frequency response has dropped so far that the device has only unity gain. Mimic devices intended for these frequencies are actually fabricated from transistors with f_t s of 25 GHz! I hope soon to try out a MK2 exciter using a commercial VCO unit covering 2.2 to 2.6 GHz. This exciter will also be synthesized using a better device and a prescaler chip.

Burner

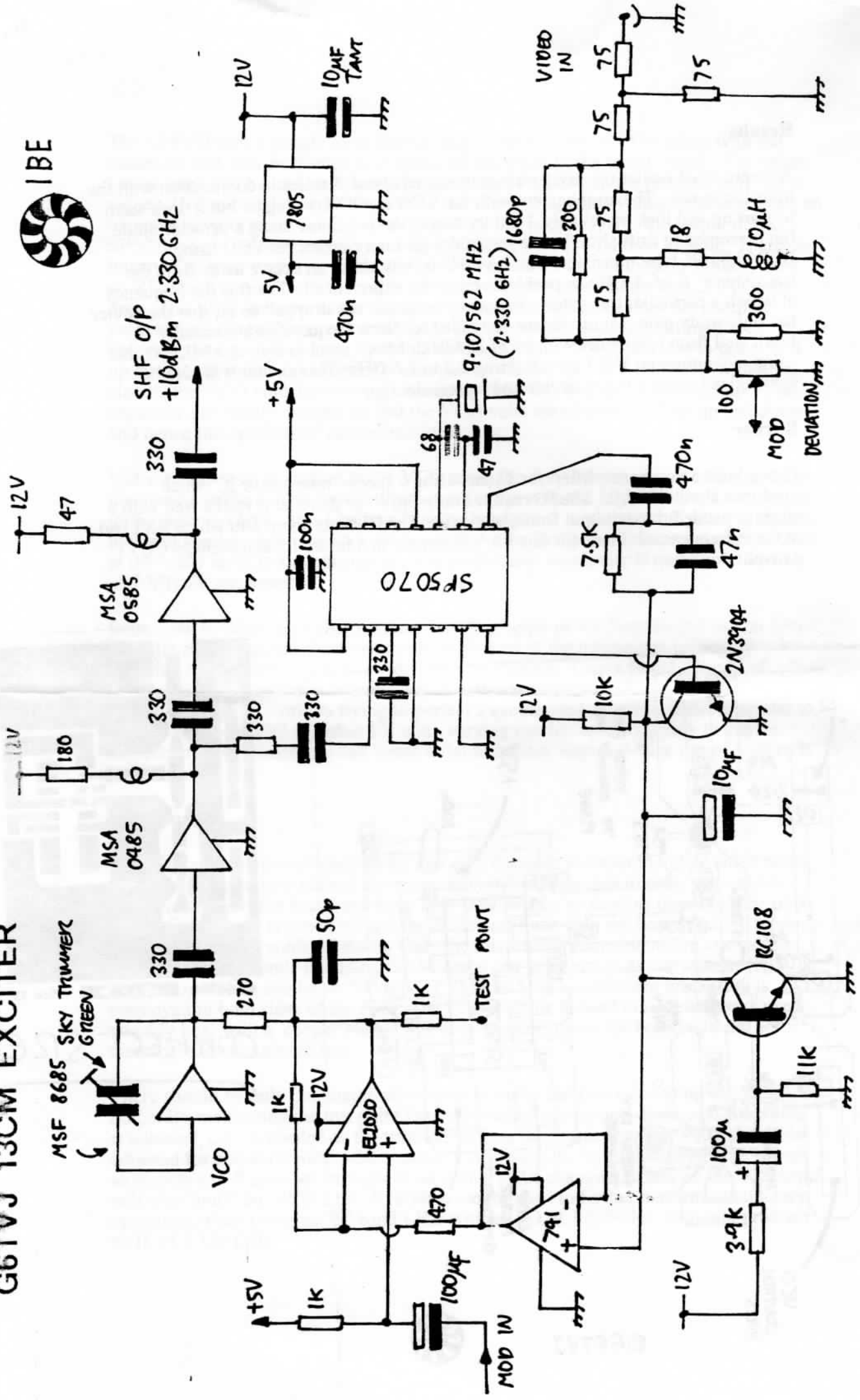
I have built a power amplifier for 13cms using a special microwave IC which produces about 900mW. The IC requires only 5mW of drive so it works well with a slightly padded down output from the exciter. The IC costs about £40 which isn't bad at these frequencies. Plans for this PA will appear in a future P5 and perhaps CQTV as well.



CORRECT SRE



G6TVJ 13CM EXCITER



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