DEC 1998

P5 NEWSLETTER

MERRY Christmas

and Happy New Year to you and your family

CHRISTMAS SOCIAL

Are you coming to our Christmas party ?

Saturday 12th December

Starting 7.30pm

Elm Park
Parish Pavilion, Filton,
Bristol
(GB3ZZ SITE)

Please feel welcome to bring your friends and relatives, the more the merrier. A buffet will be provided by the committee but members are encourage to bring along some light refreshments or drinks to supplement this please.

As usual, we will be holding our Christmas Raffle with a First Prize of £25 and consolation prizes. So don't forget to buy your raffle tickets on the night.

We will have our annual fund raising Auction. If you have any unwanted items to donate please bring them along. This Auction provides some entertainment and useful income for the group.

MICROWAVE SUPPLIERS

From time to time I get correspondence from other groups and Local Suppliers who have Microwave components for sale.

Whilst the group cannot be held responsible for any purchases made from suppliers, we do feel that members should have the opportunity to enquire.

This month I have included two address.

COMBITEK

DIGITAL, RF, COMPUTERS & ANALOG ELECTRONIC

Mr & Mrs K Kelly
Luckwell Road
Ashton
Bristol
BS3 3HG

TEL 0117 966 0605 BBS/FAX 0117 966 0605
Mobile 0421 384682
E-Mail: Kkelly@globalnet.co.uk

This company trades at most of the rallies each year and they have lots of Microwave Parts on sale. I know that STG members have found excellent bargains so if you are looking for parts it might pay to contact them.

BEACONS REPEATER GROUP

Alan Kendal G6WJJ
40 Monument Ave
Wollescote
Stowerbridge
West Midlands
DY9 8XS

TEL 01384 894512 After 6 PM please

Alan has 9 GHz DRO pucks for sale at £6.00 each inc. P&P. Contact Alan if you want to place an order.

73 From your Chairman

Paul Stevenson G8YMM

G7ATV/P enters International ATV Contest

Ross G0WJR reports from the Mendips

Having heard reports of, and seen film of the Group's entry into previous contests, I was delighted to have the opportunity to see it all first-hand.

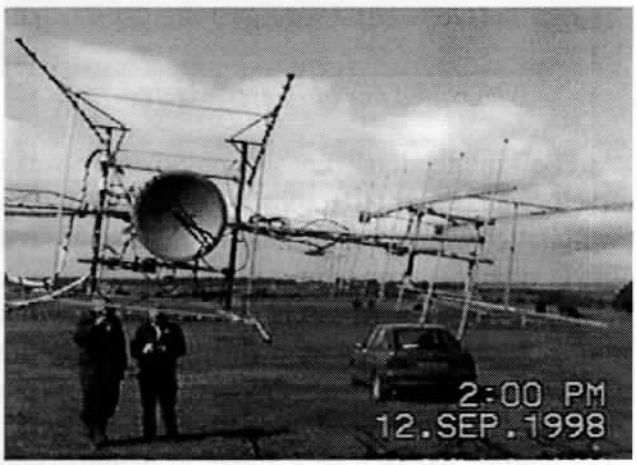
The Group takes its contesting seriously, with a full four-band entry planned on 70cm, 23cm, 13cm and 3cm. As well as the callsign G7ATV, the Group also has a mobile 40ft tower, a caravan and a formidable set of antennas, which include an array of four long yagis on 70cm, and four 48ele loop yagis for 23cm. Ivor also brought along a 60cm dish for 10GHz, complete with elevation rotator. That poor tower and rotator would have some hard work to do over the weekend!

Ken G4BVK checks out the 23cm masthead unit

Despite the rather poor weather forecast, there was a good turn-out to help set up the station on the Friday night and Saturday morning. Apart from struggling by floodlight to repair the mains connection to the generator on the Friday night, all the preparations went quite smoothly. I was amazed to see all these antennas and bits of station arriving in different cars, and go together for the first time in two years with no problems.

In addition, this was the first year we were running 13cm transmit, thanks to equipment loaned by Ian G6TVJ, and that all had to be added to the masthead array.

We managed to dodge the few rain showers on the Saturday morning, and had the antenna system in the sky just after lunch. The next task was to sort all the various cables, and wire them through to the equipment inside the caravan. The cables were fed through a draught-proofed letterbox hole cut in the side of the van, and were soon connected up.

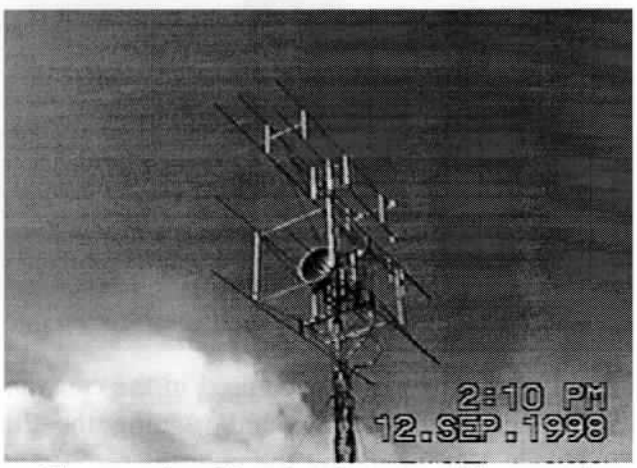


The assembled array ready for erection

A set of tests were conducted with Phil G1HIA back in Bristol, and apart from a poor connection on the supply to the 3cm modulator (the problem was in the caravan, not up the mast, thankfully!) everything worked first time.

We had also been joined on site by Graham G8EMX, who had come down from Birmingham to observe the station, and report for *CQ-TV*.

Now we only had a couple of hours to wait for the start of the event.



The completed four-band array safely erected

Who called this business "wireless"?

After all the feeders were secured, the guy-wires fixed, and the photographs of the array taken, we chatted with Graham, and were also visited by Phil and Brian from the Thornbury Club, who called in to see the station. Finally, with the generator topped up with diesel, and the operators with tea, we were ready for the 7pm start.

The contest began with a flurry of activity, and working G1HIA on four bands in 15 minutes stretched our log-keeping abilities to the limit. Happily the paperwork was soon straightened out, and we settled into a business-like routine. To avoid mistakes being made, Ivor's sticky white labels were soon used to remind us which caption generator settings and monitor inputs were to be used on each band.

"Ivor the engine" fuels up the generator

A lot of teamwork was required in the caravan, with Viv sitting at one end running the 2m talkback, Ken operating the controls on 70 and 23cm, and Ivor switching between 3cm and 13cm. A new feature this year was the use of a laptop PC to calculate the distance and compass bearing to each station being worked.

It was quite remarkable to see the string of contacts which we had on Saturday evening from seven o'clock, until I left at half-past ten. Most of the time, we had a queue of two or three stations waiting to send us pictures, and certainly no CQ calls were required.

As well as local base-stations, there were a few hardy souls who had braved the elements to send back pictures from distant hills. Nigel G7JZP had gone out with a 3ft dish and multi-band feed, and Jim, Dave and Roger had taken all their gear out onto a Welsh hilltop site. As darkness fell, they had to resort to shining a torch onto their caption cards, so we could read them!

Ken performs tests on the 70cm system

We also contacted a couple of other contest groups down in Devon and Cornwall, contradicting our earlier decision to set the end-stop of the rotator in a South-Westerly direction, since there would not be any stations on that heading!

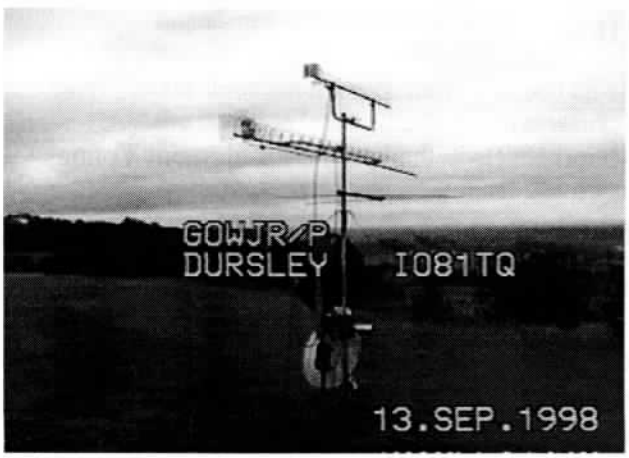
As night fell, we were warmed by the excess heat generated by Ken's 400W 70cm valve linear, and were joined by Phil, who had come up for the evening shift, allowing Viv and Ivor to nip off to use the facilities in the nearby Inn before closing time.

As I drove back into Bristol at 11pm, I could still hear a stream of activity on the talkback channel.

2.3GHz and 10GHz systems with elevation control

In contrast to Saturday, which started with a heavy rain shower, Sunday dawned bright and clear. By eight o'clock, I had loaded up my car, and was en route to the Cotswolds, to meet up with Bob G4JXC, who lives in Dursley.

By nine, I was set up with 23, 13 and 3cm equipment at the car park near the golf course at Stinchcombe Edge. Bob soon arrived on his mountain bike, and helped to keep the antennas pointed against the wind as I made easy contacts on each band. Even over a path of some 49km, the power amplifier was not needed on 13cm: I received a P5 report with just a few milliwats at the antenna. Exchanges were made on all three bands within twenty minutes, even allowing a break for another station to jump in on 23cm whilst we were changing over leads to operate on the next band.



G0WJR/P portable station at Stinchcombe Edge

As we were packing up, Nigel arrived, fresh from sending some signals from nearby Nibley knoll. He told me of the difficulty of operating in the even windier conditions the night before, when his wife had done a sterling job in keeping the dish steady!

My next rendezvous was with Richard M1ATD, at Purdown in Bristol, from where we were able to make another three-band exchange. This site was screened from line-of-sight by the East end of Dundry, and so the 10GHz contact was very difficult, and a power amplifier was required on 13cm. We were lucky to complete the contacts just before the Club station had to close at quarter to one, to ensure getting their lunches at the *Castle of Comfort*.

After lunch, I returned to the site to help with the dismantling. Jim GW3PYX and Dave GW0ROL had made the journey over from Penarth to give us very welcome assistance, and the entire station was dismantled in two hours. It seemed such a shame to have to take it all down after so brief a time, but the number of contacts made over those eighteen hours had certainly made it all worthwhile.

We now keenly await the results, but in the meantime hope that the enthusiasm shown by so many people during and in the run-up to the event is continued over the coming months, with an increased level of ATV activity in the area.

Many thanks to all concerned with organising the event, getting the equipment up to site, helping to set up, operate, and dismantle the station, and taking the time to come on air and give us contacts, especially those who ventured out portable in some pretty unpleasant conditions.

Same time next year, everyone?

In the meantime, there will be a series of activity weekends throughout the summer months: if anyone is interested in doing some more (maybe less elaborate) portable activity, please get in touch.

Ross Wilkinson G0WJR, September 1998.

G7ATV/P Summary of Results

Graham had seen TV outside broadcast units less well-equipped than our contest station!

70cm

using 400W peak into four 21-element Tonnas, and a masthead GaAsFET preamp.
1446 points from 9 contacts, best dx: G4ZJY at 158km

23cm

using four 48-element loop yagis, each individually fed with 17W solid-state PAs, all at masthead, with GaAsFET preamp.
3300 points from 19 contacts, best dx: G8LES at 111km

13cm

using synthesized 750mW masthead transmitter and S-band LNB, with separate 25-element Tonnas for transmit and receive.
1510 points: 4 two-way contacts, best dx: G0WJR/P at 49km; also one-way GW7JZP/P at 65km

3cm

using 60cm prime-focus dish with flared waveguide feed, on elevation rotator. Remote-controlled waveguide switch for changeover, with 1W transmitter and LNB fitted behind dish.
4100 points from 12 contacts, best dx: GW7JZP/P at 65km

A total of 10356 points from 45 contacts with 21 different stations.

Amateur TV Receiver *By Ian F Bennett G6TVJ*

Here is a design for an ATV receiver which makes use of a Sharp Satellite tuner module. The module was bought from "Satellite Surplus" at a rally a year or so ago. The tuner module is basically all the hard work already done, so all that is needed is some video circuitry and a power supply. I built the receiver primarily for use with "Unknown" signals on 13cm, so I did not include any sound circuitry, but a sound demodulator can easily be added if desired. There are one or two types of tuner module floating around, my design should also work with other modules either bought surplus or robbed from old satellite receivers.

Circuit

Fig1 shows the circuit diagram for the receiver, a base band signal first emerges from the tuner module and is amplified by an EL2020 video op-amp. The base band signal is basically the raw demodulated received signal and so is quite wide band, pre-emphasised (Boosted HF) and may contain one or more sound subcarriers. The op-amp brings the level up by about 14 dB, the output from the sharp module is quite low, other modules may provide a higher level and so the gain of this op-amp stage can be reduced. The B.B. output of the sharp module appears to be DC coupled and at a potential above ground, the B.B. signal is DC coupled into the op-amp stage at this potential so the inverting feedback resistor is referenced to +5V which helps to cancel this DC potential at the op-amp output. A big fat juicy electrolytic feeds the next stage to AC couple the video and prevent any unwanted DC from "Smoking" the attenuator.

Next up, a variable attenuator, this sets the video level through out receiver, this is a constant impedance device which is preferred for video as like RF, video is a "matched" signal. I did publish a design for a constant impedance attenuator in P5 a couple of years ago, failing this the attenuator can be omitted and the gain varied at the previous stage by putting a potentiometer in the op-amp feedback loop.

The attenuated signal passes into a standard CCIR video de-emphasis network, this takes out some of the HF and helps to improve the apparent group delay performance, contrary to popular belief the noise performance is only improved by a couple of dBs. The CCIR network is a constant impedance network so hence the reason, for using a constant impedance attenuator to drive it.

The de-emph network feeds a second op-amp which amplifies the video and compensates for the insertion loss of the de-emph network. This op-amp is fed via a switch to allow swapping between positive and negative video modulation, a useful feature when operating on 13cms. Unfortunately in inverting mode the op-amp gain changes so a second switched resistor is used in the feed back loop so that the over all amplitude remains virtually constant when changing polarity. A relay is used to switch the signal, this allows the relay to be placed adjacent to the circuitry and hence keep all lead lengths short. The relay is simply remotely switched from the receiver front panel.

Next item a video low pass filter, this removes any sound subcarriers, the one used is available from Cirkit. The filter rolls off at about 4.5 MHz so does knock down the chroma a

little, but without it the video as viewed on a scope will look noisier than it really is, an unfiltered signal will contain out of band noise up to about 8 MHz. The filter is not essential, it may make little difference on a picture monitor so it can be left out.

The filter chosen is cheap but not phase equalised so if you're into video test waveforms you will be disappointed with the filtered output, its a bit ringy and significant chrom-lum delay is present.

The filtered video is buffered and amplified by yet another EL2020 op-amp and is ready for viewing on a telly. The receiver output can be taken from this point or an additional circuit can be used.

The receiver output can be passed through a DC restored amplifier. An EL4089 amplifier contains a clamp circuit which maintains the sync bottoms at approximately earth potential. This circuit can help remove any low frequency distortion present on the incoming signal. If rolling or tearing pictures are present, and the effects appear to be picture content sensitive, then the clamp can be switched in which should help steady things up.

The clamp circuit within the EL4089 amplifier requires sync pulses to operate the clamp action, these pulses are provided by an EL4581 sync separator I.C. The sync separator provides mixed syncs derived from the incoming video, unfortunately the circuit does require good syncs to function properly. Noise or severe distortion on the incoming signal can cause miss clamping to take place so the circuit will fall over. The circuit will work best when a strong but distorted signal is detected, if the syncs are crushed or the distortion is very bad, the sync separator will be unable to find the proper syncs so miss-clamping will occur. Poor video clamping can cause lines or low frequency noise to appear on the picture, it can sometimes bugger up the picture completely. A relay can be used to select the clamped video output, so that it can be switched in and out of circuit as required.

Tuning

The only other thing which needs to be added to a tuner module is a tuning voltage. A pin on the module is taken to the wiper of a potentiometer, this varies the voltage and hence tunes the receiver. Care is needed to ensure the supply remains stable and that there is no hum present on the signal otherwise the receiver could drift and hum bars will appear on the picture.

Synthesiser

Most satellite tuner modules are designed to operate with a synthesiser, originally this would have been quite a complicated affair using a microprocessor. The microprocessor would have the tuning, memory and remote control functions all integrated on one or two chips. For amateur applications a simpler synthesiser could be added to the receiver.

Many tuner modules have a "Pre-scaled" local oscillator output, usually the L.O. devided by 128 or 256. This low frequency (A few MHz) can be fed directly into a parallel synthesiser like the Motorola MC145151 and a simple loop filter added. The loop filter connects to the tuning voltage and bingo one very stable ATV receiver! The frequency switching could be done on "Dip" switches or you could program an EPROM, all good old simple parallel logic not a PIC insight anywhere!

Results

The results I obtained from this receiver weren't bad, the video circuitry comes out best of course. When using a weak signal from my 13cm MK11 transmitter the received picture remained locked and in colour right down to P1. Sync pulses do not really contain much information they only have to tell the telly where the starts of lines and fields are. Even if very noisy, so long as the video signal is not distorted and contains the correct amount of chroma you should get a locked, colour picture on most tellies. Most colour killer circuits in TVs will hang on to the chroma if it is there right down to P1/2. Try an experiment, pull out the aerial down lead from your normal TV and bring it back close to the socket until a picture starts to appear, note at what point the picture locks up and becomes colour, you might be surprised. Don't try this if you have a Digital TV, you will be interrupting a Coded Orthogonal Frequency Division Multiplex 24 MB/S Transport Bit Stream Containing an MPEG2 Coded Program Multiplex- and who knows what will happen!

The RF performance of the Sharp Module can be a bit mixed, I found it Ok in the shack but on the road it was susceptible to other nearby strong signals and could get wiped out easily. A filter at the RF input could improve matters, the RX was OK on 3cm and produces an excellent picture from GB3XG. Other tuner modules may give better results in terms of RF.

Using other Tuners

The circuit should work with other tuner modules, the first op-amp stage may need AC coupling from the tuner output and the gain at this point should be checked. I have found some tuner modules to perform poorly at low video frequencies, so the results of the excellent video circuitry may be compromised by the tuner. The only way to test the tuner is to feed it with a known good signal modulated with a square wave and look for ramping effects on the base band signal.

Sound Circuit

There is no sound demod in this circuit but one could be easily added. The base band signal from the first op-amp stage can be used to feed a demodulator. I have used a TBA120 discriminator type demod and an XR215 PLL demod in the past, both give good results. If only amateur signals are to be received with a 6 MHz subcarrier, it should be possible to place a 6 MHz ceramic filter at the input to the sound demod.

Better video LPF

I am always in search of perfection when it comes to video signals, one step closer to this is to use an ML6420 IC. The ML6420 is an active video filter designed for broadcast digital video applications, it has a 5.5 MHz cut off frequency and is phased equalised so it doesn't bugger up transients. This IC can be fitted instead of the Cirkit unit, but will need to be AC coupled, DC coupling gets awkward as it runs on a single 5V supply. The IC is a surface mount unit and can be used with "Wainwright" prototyping board. One of these ICs is fitted to GB3ZZ, bet you never noticed!

RESULTS SEPT 1998 CONTEST

70 CM FIRST IN UK

24 CM FIRST IN UK

2.3GHZ FIRST IN UK

10GHZ FIRST IN UK

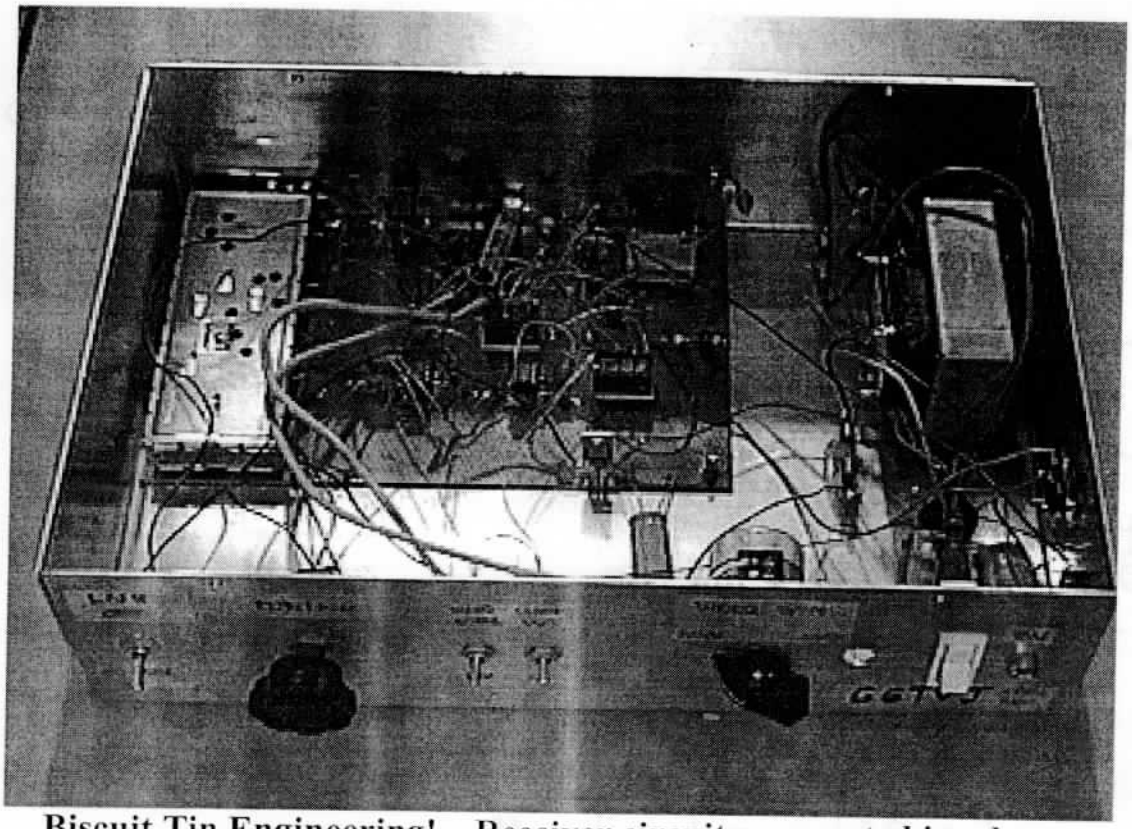
Well Done ..

THANKS TO ALL WHO HAVE HELPED IN THE PAST YEAR IT,S WHAT MAKES A GOOD CLUB.

LOOKING FORWARD TO SEEING YOU ALL AT THE CHRISTMAS SOCIAL

REGARDS

FRANK G0CEN



Biscuit Tin Engineering! Receiver circuitry mounted in a box.

Power Supply

I powered the receiver from the mains, split supplies are needed so battery operation is a bit tricky. By using DC-DC converters a negative rail can be derived for the op-amps but care is needed for the tuning volts as a battery powered RX may drift. If an 18V LNB supply is needed (3cms) then a second DC-DC converter will be needed to generate 18V from 12V. Always decouple DC-DC converters and keep them away from the video circuitry.

Components

The tuner module was bought from "Satellite Surplus", this lot appear at various rallies though out the year. I don't think they have any modules left, but if you bought one of these tuners from them for future use, now's your chance to make use of it.

The 4.5 MHz filter is available from Cirkit electronics but beware their stock control of these specialist items is not always very good. If you fancy a ML6420-1CS they are made by Micro Linear and available from Ambar Components on 01844 261144, ask for a data sheet which tells you how to wire it up.

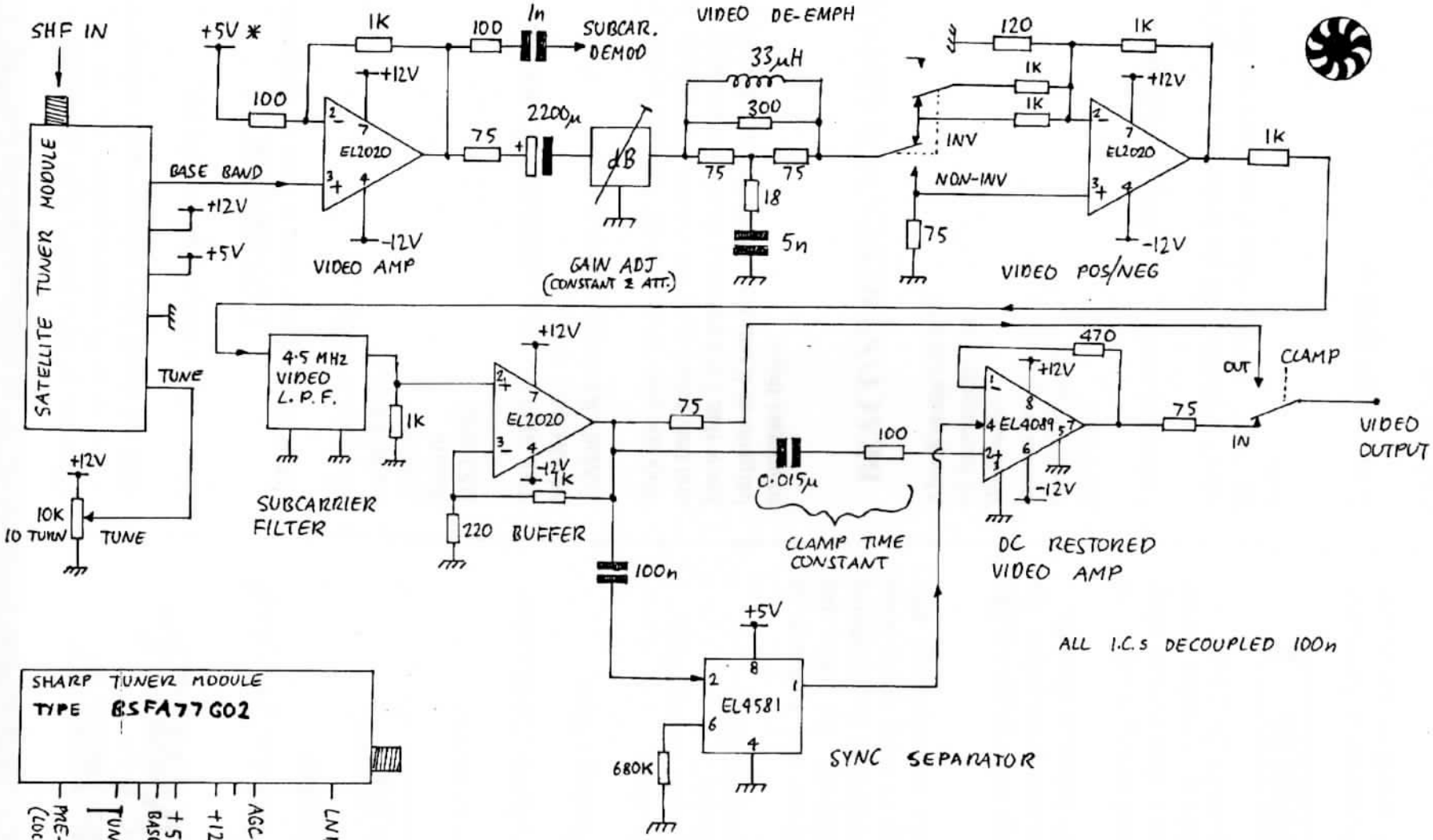


FIG 1 AMATEUR TV RECEIVER

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