



MERRY Christmas

*and Happy New Year to you and
your family*

CHRISTMAS SOCIAL

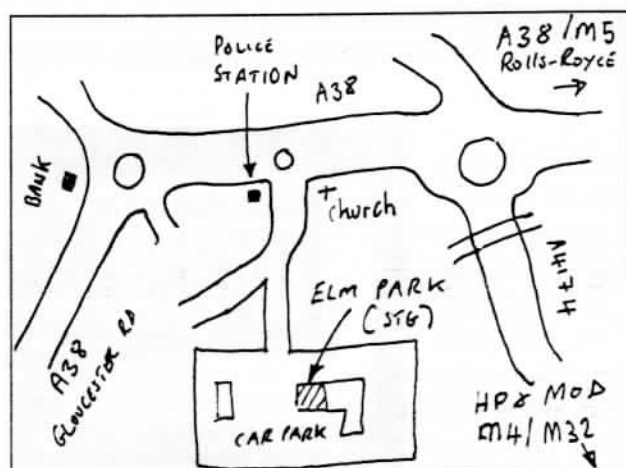


We are holding our traditional Christmas Party which will take place at the GB3ZZ repeater site, Elm Park Parish Pavilion, Filton, Bristol on Saturday 13th December, starting at 7:30pm. Please feel welcome to bring your friends and relatives, the more the merrier. A small buffet

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. If you have any unwanted electrical items to donate for the auction this will help the funds and put a bit of fun into the evening. If you cannot make the social but would like us to collect any thing for the Auction let us know.

Here is a small map on how to get there:-



SURVEY 97

Thank you to all those members who returned the survey. We still need the rest of you who have not yet replied to help us, so come on, put pen to paper, it will only take 5 minutes. If you are coming to the party then bring it along. All the details will provide the group with valuable information to plan and improve the services.

GB3ZZ

The repeater has now had the Video Recorder repaired by Alan G7DRU so all the functions now work. The Weather Satellite is still out of action, until we can get on the roof and carry out tests, we cannot say what the problem is. Shaun G8VPG has kindly offered to assist us.

In the last week of November, it has been reported that the Alford Slot receive antenna or pre amp has degraded. Ian G6TVJ has found a loose connector which could be the cause. I would appreciate your reports via the survey if you have not yet sent it in or by communication. Please be patient if we have to investigate further, it could mean lowering the mast and servicing or replacing components. The last time we did this was in 1988.

GB3XG

The repeater Electronics and Aerials are having extensive engineering carried out on them since the frequency changes. The article by Ross Wilkinson included in this month P5 will help you to get on this band. The repeater's signal strength, will be greatly improved by the recent purchase of a new Power Amplifier and new Aerials. I hope to have a full brief on the repeater when everything is finally finished.

73 Paul Stevenson G8YMM

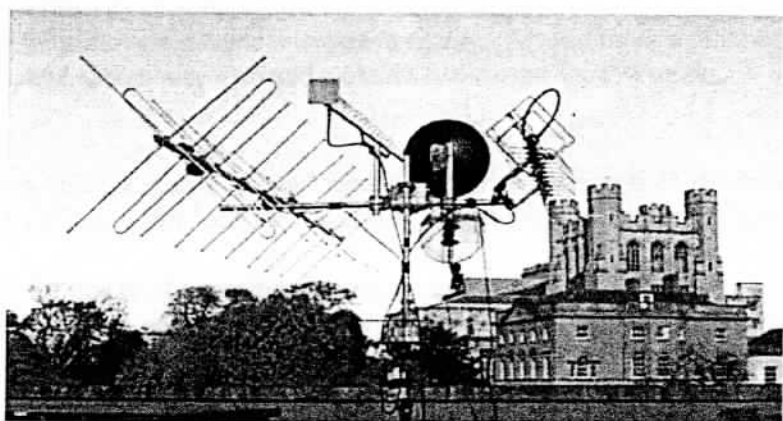
Packet Address G8YMM @ GB7TJZ

Email

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FIRST STEPS ON 3CM ATV

by Ross Wilkinson



With the imminent renovation of the Group's 10GHz ATV repeater GB3XG, what better time to try out 3cm television? It's certainly not an expensive mode to get on, in fact it's easier and cheaper than 23cm: I put together my station for almost no cost with bits from my junkbox!

The first item needed is a very sensitive WBFM X-band receiver. Not an expensive item, as it turns out: in the form of obsolete satellite TV equipment these can be had from

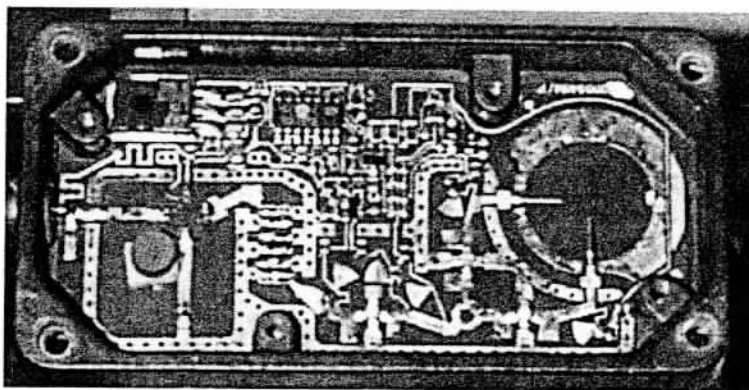
rallies for less than a tenner. Mine was even better value, free from a neighbour when BSB went off air in 1991, and included a small and neat offset-fed dish reflector. The receivers originally worked in the 11-12GHz DBS allocation, and will need some adjustment to tune down to 10GHz.

For systems which used the high end of 12GHz, such as my Philips BSB set, the LO around 11GHz may be left alone, and the preselector filter removed or modified, so that the receiver now picks up the Amateur band as an image of the original input (11.3GHz LO converts 10.3GHz as well as the intended 12.3GHz to a 1000MHz IF). Unfortunately, the use of an LO higher in frequency than the signal means that the IF FM signal is frequency-inverted, and so the demodulated video output needs inverting again to provide the correct picture (but this only requires one extra op-amp). My original modification was to simply bypass the stripline resonator filter with miniature coax, but I have since re-tuned it, by soldering on small pieces of wire to lengthen each of the resonators. Details of the construction of a custom microstrip filter for the Amateur band are given in [1].

Alternatively, for LNB's tuning a lower range, the dielectric resonator element may be changed, to reduce the LO frequency to around 9GHz.

This has the advantage that the 1GHz IF signal is not inverted, and may be fed directly to a standard sat. receiver for demodulation. I have managed to lower the frequency of a 9.75GHz LO to 9.0GHz by removing the resonator "puck" and sticking it on top of a couple of offcuts of microwave substrate board before replacing it. The modified LNB should now be connected to a satellite receiver modified for 23cm ATV use,

with increased video gain and a 6MHz sound demodulator. If you have disabled the DC supply voltage on the antenna input, don't forget to reconnect it, since it will be required to power the LNB.



Armed with this equipment, you should now be able to look for an off-air signal. GB3XG, located at 700ft asl on West Dundry, transmits 1W horizontally-polarised on 10.135GHz, and provides a continuous beacon picture. It is on the same site as narrowband beacons GB3BSL (432.934MHz) and GB3USK (1296.875MHz), which may help you beam onto it. Remember that the beamwidth of a modest-sized dish antenna is very small: only a few degrees, so accurate pointing is essential. It's not even necessary to have line-of-sight to 'XG: I can receive it reflected off the side of another building to the North of me!

The transmitter is even simpler! The most basic design includes only a handful of components [2]! The X-band Gunn diode units which I have used were manufactured by Solfan, for use in Doppler motion detectors, and were available at the recent Bristol Rally for £8, complete with waveguide cavity and short horn antenna. The FM is generated by modulating the DC voltage supplied to the Gunn diode, which converts this directly to a few milliwatts of frequency-modulated microwave energy. Several more sophisticated modulator circuits have been published [3,4,5], which may also add a 6MHz sub-carrier for FM audio.

The short horn, with a gain of only about 10dBi, is not a very effective antenna. I have constructed a prime-focus dish, using a simple "penny" feed [6,7], which has a gain of around 30dBi. This is still sufficiently compact to be carried about for "outside broadcast" operations, such as from the top of the Cabot Tower in central Bristol [8].

I hope this brief exposition has encouraged more of you to have a go at 3cm ATV. 10GHz is an excellent band, but one which is now sought-after by commercial interests: we have already lost 150MHz of our allocation there this year, so it's up to us to show we're making good use of it! The Group has an excellent facility in GB3XG, and I'm looking forward to seeing some new stations on it in 1998.

73 Ross Wilkinson G0WJR, November 1997.

Pictures as seen in order:-

- 1 G3KAC aerials pointing at the Royal Fort
- 2 ex-BSB LNB with oscillator and filter mods
- 3 GB3XG received by reflection from the Royal Fort

References

- [1] VHF Communications 1/1995, pp 8-16
- [2] Radio Communication January 1993, p38
- [3] BATC ATV Compendium, pp 83-89
- [4] Radio Communication November 1994, pp68-69
- [5] RSGB Microwave Handbook, pp 18.65-66
- [6] RSGB VHF/UHF Manual, 4th edn, p 9.75
- [7] RSGB Microwave Handbook, pp 18.85-87
- [8] STG P5, June 1997, pp 2-3

Sound Inter-carriers and Subcarriers, what's the difference?

by Ian F Bennett G6TVJ

Well quite a lot really, a TV sound intercarrier and a TV sound subcarrier are two quite different transmission systems. The two terms seem to get confused in the world of amateur TV and are often quoted incorrectly when referring to the TV sound channel. Even some RSGB publications get it wrong, anyway here's the difference.

TV Sound Inter-carrier

This term actually refers to a technique which is used in domestic TV receivers operating the UK system "I" UHF TV transmission standard. UHF TV transmitters work by transmitting two distinct carriers, an AM modulated vision carrier and an FM modulated sound carrier. These two carriers are transmitted 6 MHz apart, the sound carrier is transmitted above the vision carrier in frequency. These are real carriers at the Transmitter output frequencies, typical frequencies for say Mendip BBC1 (CH58) are 767.25 MHz for vision and 773.25 MHz for sound.

Fig 1 shows the simplified diagram of a UHF broadcast TV transmitter. The two signals, vision and sound are produced by two separate transmitters and power amplifiers. The outputs are combined together before being sent up to the antenna. Usually two vision transmitters and two sound transmitters are used to provide redundancy if one fails. When a transmitter fails the station goes into what's called "reduced power" mode. Due to the fact that the sound is FM the sound carrier is transmitted at reduced power compared to the vision carrier, historically as tellies improved over the years this difference was increased from 5 to 7 and finally to 10 dBs.

The power amplifiers consist of broadband klystrons tuned with multiple cavities, tetrode valves or multiple solid state amplifiers paral-*lelled* up.

The power combiners are based around various transmission line techniques, circulators and couplers. Combiners are used to combine the transmitters together and also the different TV channels ie BBC1,2,ITV and Ch4. The combined signal is then split into two to supply two transmission aerial arrays. Two aerial arrays provide redundancy in case one fails eg a lightning strike!

The UHF system I has been around now since the mid 60s when the colour 625 line service began. In those days receivers relied almost completely on valves and didn't have all the fancy filtering and RF techniques that we have today. Fig 2 shows the layout of a TV receiver. The maximum frequencies used are up to 850 MHz, the TV I.F.s were tuned to 39.5 odd MHz so the tuner local oscillator had to run at almost 900 MHz pretty heady stuff for a poor little PC91 triode valve, it's almost 24cms! Due to the high side TV local oscillator the sound I.F. carrier appears down at 33.5 MHz. The TV I.F. system is tuned to allow both frequencies through, any drift in the local oscillator will cause the IF frequencies to be wrong and the telly go off tune. Drift is not too bad for the vision IF as it is a wide band signal occupying 5.5 MHz, but the sound in comparison is much narrower and will go off tune quickly. The solution is to detect the difference between the two I.F.s, this will always remain at 6 MHz regardless of drift in the TV tuner, this technique is what is called "Inter-carrier" sound and is unique to UHF TV receivers. If the TV I.F. signals are passed through a non-linear device the two I.F.s intermodulate or mix and produce the 6 MHz intercarrier sound I.f. The intercarrier sound signal can then be limited and demodulated with a simple discriminator.

The intercarrier technique is not strictly necessary in all cases and TV sound can be received completely independently of the vision signal by using an FM receiver tuned to the sound carrier e.g. BBC1 sound 773.25 MHz. This can be done with some scanning receivers which tune the UHF band.

TV Sound Subcarrier

A subcarrier is a way of "piggy-backing" one signal on top of another. Colour-subcarrier at a frequency of 4.43 MHz sits on top of a luminance (Black and White) video signal and conveys the colour content of the picture. Sound can be transmitted with a video signal by modulating it on to an FM carrier and adding it to the video signal. This is what a sound subcarrier does. The video signal occupies about 5.5 MHz so in a system of slightly greater bandwidth e.g. a satellite system there is room at the top for another signal so sound can be transmitted at say 6.5 MHz. Most analogue FM TV transmission systems e.g. satellite links and terrestrial video links use subcarriers to transmit sound. The subcarrier frequencies can range from about 5.8 MHz to over 8 MHz. Amateur TV uses an agreed standard of 6 MHz but there is no reason why a station cannot use a different frequency or even more than one. I have transmitted a second sound subcarrier through GB3ZZ at about 5 MHz quite successfully.

It is possible to use a subcarrier to send a sound signal with video down a 75R coax, this is sometimes called S.O.S or Sound On Subcarrier, it is present on some Broadcast TV links. S.O.S saves having to use a separate cable for the sound.

Subcarriers when used in FM TV systems do effect the over all bandwidth so you can't get something for nothing. Sound subcarriers deviate your transmitter and cause side bands which can be excessive, this is why there are relatively strict rules about the subcarrier injection levels on ATV repeaters.

Fig 3 shows how a subcarrier system works, basically a frequency modulated signal is added to the video and then filtered out again and demodulated at the far end, in FM TV transmitters there is no need for a separate sound transmitter.

I expect this makes the difference between intercarriers and subcarriers as clear as mud or even hot chocolate, never mind it's filled up P5 for another month.

On the subject of 6 MHz subcarriers, I have added a phase locked loop to the sound modulator in GB3ZZ. The frequency of the sound subcarrier (Unmodulated) is now exactly 6.0000 MHz so it can be used as a standard for checking other transmitters and receivers. I suspect that it will eventually become part of the repeater licence that the sound is phased locked, I also think GB3HV at High Wycomb uses a synthesized sound modulator-must keep up with the Jones's.

