
 Newsletter of the Severnside Television Group

REPEATER LICENCE CHANGES

NOTICE OF VARIATION ON REPEATER KEEPERS CALL

Major changes have been introduced in the way that repeaters are licensed. These took effect from 1st April, although because the arrangements between the DTI and the RSGB have not been completely finalised, a formal announcement has not been made. The changes will not have a big impact on repeaters users, but they will certainly focus the minds of repeater keepers and groups !

Previously, the licence for a repeater was granted by the DTI/Radiocommunication Agency and paid for and held by the RSGB. The RSGB then let a "franchise" to groups such as ourselves to operate the repeater on their behalf.

NOTICE OF VARIATION

Under the new arrangements, the repeater will be licensed under the terms of a Notice of Variation on the repeater keepers own personal licence. The RSGB will continue to manage the repeater network and vet applications for new licences. Whilst the repeater keeper has always been the person who bears the overall responsibility to the RSGB for running the franchise of the repeater in accordance with the licence conditions, he is now even further forward in the firing line. This is because, in the event that the repeater suffers abuse or is operated outside of its licence conditions, not only would the Notice of Variation be at risk, but the repeaterkeeper could loose his own personal licence !

REMINDER !

This is therefore an opportune moment to remind members and all users of GB3ZZ that we must all be careful not to abuse the repeater. The major problems in this

area do not occur on 23 cm ATV repeaters where all the users know each other, but are usually confined to the 2m phone devices in major cities. None the less, we cannot afford to be complacent, and all members are asked to keep an eye on the repeater output and advise G8VPG or any committee member if there is anything appearing that should not be there.

COPYRIGHT MATERIAL

You will all know that copyright material and broadcast television output should not be relayed via GB3ZZ. Similarly, you should not send music unless it is co-incident to the video material (for example, a home video of a marching band). What many members may not realise is that all of our local TV companies employ Radio Amateurs with an interest in ATV, and both the BBC in Bristol and HTV have monitoring facilities which pick up a very good signal from GB3ZZ. Clearly, they would not be happy to see their output being relayed.

RIS WATCHING ?

Similarly, the local RIS office has now moved to the outskirts of Southmead, which is line of site to the repeater. They have some very impressive wideband log periodic aerials installed, and may well have the capability of watching our output. I know that there is very little abuse of GB3ZZ and we generally keep our own house in order very well. However, I am sure that you will all understand that with the personal licence of the repeater keeper (G8VPG) now at risk, we would not hesitate to close the repeater down for a while if problems occur. ●

VOLUNTEERS REQUIRED !

At our AGM in April, our Chairperson Viv GIXE once again thanked members for their help over the past year, and appealed for volunteers to continue to help the Group. It is always a great help when members from outside of the committee lend a hand. There are two principal ways in which help is required at present.

RALLY STANDS

The first is in connection with manning our stand at some of the local rallies due later in the year. We have arranged space at the following rallies during 1993 ;

Longleat, 27th June
Bristol, 5th September
Leicester, 30th October

If members volunteer to help out for an hour or so, it enables the committee members who have organised the stand to see the rally themselves. In the past, members have been very good in this respect and hopefully this will continue.

CONTESTS

The second area where help is required is with our contest station. I have heard a few people say that the contest team is a bit of a closed shop, and that help was not required. Nothing could be further from the truth ! It is true that the contest team started out as a small group of members who wanted to have a really serious attempt at portable operation. The bulk of

VOLUNTEERS REQUIRED

the funding and equipment comes from this small group, because we have always felt that the primary use for Group funds should be the repeater.

However, it is very hard work for just a handful of people to arrange such a large portable station, and some extra willing hands would be most welcome. The bulk of the work setting up the station takes place on the Friday night and Saturday morning. Operating that station goes through from Saturday evening to Sunday lunchtime. Help is particularly appreciated on Sunday morning, when the spirits of those who have been up most of the night are beginning to flag! Finally, after lunch on Sunday, the whole station has to be taken down and packed away. This is where a dozen willing hands make a real difference, and enable the people who have camped out all weekend to get home to a hot bath and an early night! Lets not forget aswell, that Viv & Ivor have two caravans full of equipment and a diesel generator to unload when they get home, and some assistance at that end is always appreciated.

The contests that we will be entering this year are as follows :

Summerfun - Saturday/Sunday 12/13th
June
International - Saturday/Sunday 11/12th
September

If you are able to help with any of these items, please contact Viv or any committee member. The contest site is near the Castle of Comfort Inn on top of the Mendips, and once we are on site, you can always contact us on 144.750 MHz. ●

**PLEASE DON'T
FORGET THAT
SUBSCRIPTIONS
ARE NOW DUE!
STILL ONLY £5.00**

10 GHz REPEATER NEWS

SITE AT DUNDRY NOW CONFIRMED

We are continuing to make further progress on the proposed 10 GHz ATV Repeater for Bristol and the surrounding district. As most of you now probably know, through the good offices of Co-Channel Electronics of Avonmouth, Bristol, we have been offered a very good site on top of the hill at Dundry, just on the southern outskirts of Bristol. This site is nearly 220 m above sea level and has a commanding view and take-off over Bristol, South Wales and much of the surrounding area.

On Easter Monday, 12th April, Ivor G1IXF and Shaun G8VPG took the repeater transmitter up to the site for some further trials. It was a typical "Dundry day" with very heavy showers of rain and hail, and extremely wet and muddy underfoot. The first report was from Ted G3JMY in Winterbourne, who immediately saw a P5 picture with colour. As many of you will know, the 10 GHz repeater is very much Teds "baby", and in particular the complex aerial assembly that houses not only the slotted waveguide aerials, but also the prime mover for the transmitter was conceived, built, tested and aligned entirely by Ted.

Phil G1HIA in Horfield reported a P5 but without colour, whilst Brian GW6BWX in Risca and John G3RFL in Clevedon both drew blanks on this occasion. Steve G8KUW along with Doug G7NZZ went out portable, and dodged the showers to report a P5 with colour from Rudgey, but only a P3 at Brentry.

Your committee are presently working on the licence paperwork, and hope to have this completed by the time that this issue is published. As always, thanks go to all of those who helped with the tests, and worked so hard to prepare the equipment beforehand.

The following article was prepared by Ted G3JMY, primarily to brief me to fill in the licence application correctly. However, I think that it deserves a wider audience and will give you a good appreciation of the design of the 10 GHz repeater. ●

ANTENNAE, TRANSMITTER & RECEIVER ASSEMBLIES FOR 10 GHz ATV REPEATER

by Ted Halliday G3JMY

All items are mounted inside a 69 mm diameter white ABS tube + expansion housing. Top cap of nylon pressed on.

1. Receive antenna is a 20-slot, semi-omni, WG16 waveguide, optimised for 10.250 GHz, the input frequency. Antenna fitted with sliding short at the top end and 3 matching screws at base (middle screw only is inserted into the waveguide for best match, 1 & 3 are flush).

2. Base of antenna connected to tapered WG16 - WG17 transition.

3. Transition connected to a WG17 multi-cell filter, tuned to 10.250 GHz. Filter insertion loss measured 3 dB.

4. Filter connected to satellite LNB, retuned for 10 GHz operation.

5. Low-loss cable from LNB passes down behind lower TX assembly.

6. Transmit antenna is a 20-slot, semi-omni, WG16 waveguide, optimised for 10.150 GHz, the output frequency. Antenna fitted with sliding short at the top and 3: 8 BA matching screws at base (all screws have been adjusted for best output, return loss almost 0). The top of the TX antenna is 1m below the base of the RX antenna to give at least 50 dB isolation between the two. The flat (5 degree) vertical beam angle increases the isolation greatly. Also the ABS tube appears to have no effect on either antenna regarding match or gain.

7. WG16 - SMA transition connected to base of antenna, sliding short adjusted for maximum output.

8. MGF 1801 GaAsFET PA connected via SMA + semi-rigid coax to transition. Power supply of 12 to 14V is by means of the drive coax screen (OV) and a separate 12 to 14V wire terminating at the bottom cover. The PA output at the waveguide flange is at least 250 mW. The PA box contains an 8V regulator and a polarity inverter for bias. The idle current measured at ground level is set to a warmed-up value of 120mA. The current under full-drive conditions is 134mA. This means that correct operation of the PA can be monitored from the ground, via a 150mA meter.

9. SMA - WG16 transition connected to PA via SMA + semi-rigid coax. Sliding short adjusted for maximum output.

10. Two-cell pin filter in WG16 from transition adjusted to 10.150 GHz. The filter reduces any multiples of 1127.778 MHz above and below 10.150 GHz to an unmeasurably low level. The WG16 itself acts as a further filter to the lower frequencies. At the lower end of the waveguide is the launching probe of the DJ7VY multiplier, an adjustable sliding short terminating the system.

11. The DJ7VY multiplier is housed in a cylindrical brass housing, containing a tapered coaxial line, with trim capacitor, and a SNAP varactor diode, MD 4901, tapped into the outer end of the line. A coaxial shunt capacitor terminates the outer end of the line, which is then coupled to capacitor half-Tee matching section. Drive to this section is at 1127.778 MHz at a level of roughly 1.5 W, from a modified Worthing ATV transmitter via low-loss coax (7m).

The RX and TX antennae are both horizontally polarised and have a minimum beam-width in azimuth of 90 degrees. They radiate on the same side, which is marked on the outside of the tube with dashed lines. In several tests it was evident that the radiation outside the minimum angle was considerable and the total beam angle could be as much as 270 degrees for stations within, say, 15 km of the repeater.

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Well, now that your brain is in gear, how about entering the dream world of real Microwave, 10 GHz. It was thought many years ago that these frequencies were only for line of sight use and no good for Communications at all. If you think that you can't build or work on these frequencies as well as on the other bands, then take the "T" off of can't and you can ! I personally have found it easier and cheaper to get on FM ATV and Narrow band 10 GHz than on HF, 24 cm or Top Band. Due to so much cheap second-hand (or even new) satellite equipment such as LNB's, Dishes, Receivers, Squarials etc. now being easily available through many sources at nearly give-away prices, we are able to play and develop in an experimental way.

AERIALS

The BSB aerial (squarial) can be used easily on 10 GHz without many modification and seems to give as much gain as a 21" dish. Because the front of the BSB aerial is flat and the feed is at the back, there is no loss due to the LNB attenuation, or any loss due to dish curvature errors.

The only snag is that it is very sharp in both V and H planes ; about 2 degrees plus or minus so care must be taken when mounting.

POLARISATION

If you replace the LNB for a Linear type then the aerial transmits in a linear form and not as the original "Right Hand

Polarisation". The original LNB has a device that to me looks like PTFE tube covering the cavity probe, 13 mm long by 3.8 mm diameter and is tuned by a screw to correct for matching.

What I think happens (!) is that the PTFE covering the probe creates a very small phase delay between one half of the 250 phased dipoles and thus forces it to turn in a given direction causing a cork-screw effect. Removing the screw after much force will allow you to remove the PTFE tube through the screw hole and then replace the screw for matching use.

Note that as yet, I have not transmitted using an original BSB LNB but soon I will prove that the above theory is correct (only being an Amateur HI HI), but I have transmitted using an modified Echostar LNB.

LNB'S AS TRANSMITTERS

You should be puzzled by my last statement about LNB's as Transmitters, but yes, its true ! I obtained a cheap LNB (Echostar) for 1/3 at a rally and wished I had purchased more. I then removed the main PCB, cut off the PCB type cavity aerial feed that just looked like a dipole, one element on topside and t'other on the bottom side, with a pair of scissors. Then after the third amplifier stage, I cut the pcb again.

Now here is the easy bit ! Reverse the amplifier PCB and solder the aerial to the other end (Amp O/P end). Then solder the I/P end to the rest of the PCB, thus being the same size as original. Next short out the filter that looks like this " -////- "

with solder. Then remove, and link, out the mixer can : this should be saved for other projects in the future.

Now link up the "+" and "-" FET supplies correctly. On refitting the PCB the casting will need drilling out to stop the FET bias pots shorting. Take extra care here or the FETS will be blown up due to lack of negative bias.

The oscillator was on 10,000 MHz (Low Band LNB), so to increase this turn the brass tuning screw on the oscillator can inwards to increase frequency. Refer to the December 1992 issue of P5 for information about how to measure 10 GHz frequencies easily.

This unit gave several times more output than your average Gunn diode and should be suitable to drive 300 mW type FET P. A.'s.

FERGUSON SRBI RECEIVERS FOR ATV USE

These are a very well designed unit. I think that the Group may still have access to one or two, but suspect that soon the source will run out (It has, but they are still available at rallies - Ed.).

The unit is a fully synthesized receiver covering 950 to 1750 MHz. I have managed to sort out how to convert these for use on ATV. Also there are people who convert these for PAL use on Astra for a price. The method is to bypass the DMAC/D2MAC decoder and add a 6 MHz sound board. These are available as kits from a well known KIT circuit firm.

Change the eprom and you have a very good tunable back end FM receiver that,

if the full mods are done, gives you D2MAC or PAL for use on satellite, 24 cm ATV and 10 GHz ATV. NOTE ; if you are good at Software you can make a several page Caption Generator controlled by the infrared remote control handset (Just one of my next uses for these RX's).

If you use them as 24 cm ATV RX's, then you will need a Pre-amp to bring the sensitivity and noise figure up to reasonable levels. If you use them for Astra you will have to do mods to remove the dispersal signal.

Another possible use, again with a pre-amp and IF mod's, is to copy the weather satellite pictures on 1691-1695 MHz Geostationary (Fixed position).

PROPAGATION

To date, from this location near junction 20 on the M5, 0 feet ASL, I can hear the Taunton beacon on 10,368 MHz (slightly HF) at all times, over a path of 32 miles using an aerial at a height of 25 feet (a squarial with an Echostar LNB only modified on its output to give an IF of 158 MHz).

On narrowband FM, I have worked Ted G3JMY in Winterbourne, North Bristol

which is 16 miles away over several hills and Adrian G4UVZ in Taunton, again about 32 miles distant, this time on CW, FM and SSB.

ATV pictures from Dundry hill were a good P3+ picture. The equipment for this was very quickly put together and lacked a little bit of effort on my part, but it worked.

ATV MODULATION

I found that only three parts were required to turn my PAL testcard (1 V peak to peak signal) into a 10 GHz FM ATV signal, and then by adjusting each FET bias stage, I could fully remove any AM modulation. At the start this was about 5% ; however I was able to see this on my 'scope and tune it out. Peak to peak deviation was about 3.5 to 3.7 MHz for the best results. This would then require a bandwidth of about 14/16 MHz typical ATV use. Refer to a very good article in CQ-TV February 1992 (No. 157, Page 26) "SETTING UP YER

DEV" by David Allen G8LHD.

CONCLUSION

There is more interest in 10 GHz now and this will result in an increase in activity ; so before we - lose it - lets use it ! On 10 GHz the bandwidth available now is more than the total of all our lower frequency bands put together, and this is a gift for experimentation. Due to high gain aeriels being easily available, only low power is required such that, say 300 mW into a dish / squarial will give hundreds of watts ERP.

Directivity of aeriels is really a bonus because only the direction YOU want to communicate with will exist. TVI to other services is at a minimum because you direct all of your power in the direction you want ; satellite systems are angled up to the sky away from you. Its cheap to get going and fun too !

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(G3RFL !)

1993 AGM REPORT

ANOTHER YEAR OF GOOD PROGRESS FOR THE GROUP

The 1993 AGM was held on 13th April at the Elm Park Parish Pavilion, Elm Park in Filton, otherwise known as the GB3ZZ Repeater site. The following comprise the major reports presented by the Officers of the Group.

CHIEF ENGINEERS REPORT

The Chief Engineer Steve Walsh G8KUW presented the following report ;

The operational status of GB3ZZ in 1992/3

The repeater has worked reliably over the last year, suffering no significant failures or power outages. There is at present a slight problem with the matching of the Alford slot antenna into the RX 5 pole

filter. The problem manifests itself as a "smearing" on RX video when the Alford slot is selected (the default condition). Switching to a beam will greatly improve the image quality. This will be rectified next week when the filter will be removed for alignment on an HP8510C network analyser. Unfortunately this will mean that the repeater will be in beacon mode, though only for 2 to 3 days whilst the alignment is carried out, and therefore not accepting signals.

The colour burst corrector built for GB3ZZ was designed to decode the composite PAL signal to RGB components and re-encode RGB to PAL after cleaning up the burst and sync pulses. The unit was demonstrated on the STG stand at the Bristol Temple Meads rally last year. The sync was meant to be

regenerated by PLL, but the pull in time was too slow to use on unstable signals as are sometimes received from distant stations, this results in very clean but unstable syncs. More work will be done to this unit when time permits.

Major changes / additions to GB3ZZ in 1992/3

There have been no changes to the logic Firmware since the last AGM, the TEST CARD GENERATOR EPROM has been changed, reports of usefulness and/or buzzing should be directed to GW6BWX !

Future enhancements to GB3ZZ in 1993/4

At some stage this year, an attempt will be made to adjust the video and audio levels

of the signals relayed by GB3ZZ for unity gain and bandwidth. This may require the use of special telecom test receivers and spectrum analysers to determine the system bandwidth and gain characteristics. Initial tests of the new receiver are encouraging, a significant improvement in reception of distant stations has been seen. Our esteemed Hon Sec was seen at almost P5 into GB3ZZ, an improvement of two P grades on his usual report. Some more work by Ken G4BVK will ensure that we will soon have a first class receiver for GB3ZZ.

SECRETARIES REPORT

The Secretary Shaun O'Sullivan G8VPG reported that during the past year, the committee had met on 6 occasions, the Group attended 5 rallies (BATC at Harlaxton Manor, Longleat, Hamfest at Wimborne, Bristol Rally and through the good offices of Mike Wooding, we had a corner of his stand at Leicester), gave 3 talks and demonstrations (Bristol & West Video Camera Club, North Bristol ARC and Kingswood Venture Scouts), participated in a JOTA station and entered 2 ATV contests. It was believed that we are the first group to enter a 3 band log for an ATV contest. The Group had once again organised a coach trip to the London AR Show.

The group had organised 3 social evenings and had been particularly pleased to lend assistance to 3 other ATV repeater groups around the country (Anglesey, Weymouth and Birmingham).

Sales of Group products had shown a marked increase, largely due the new products which have been selling strongly. Since the last AGM we had launched the new 20 element extension for the 18 element aerial, a combined package for a 38 element aerial, the trough reflector, LNB's converted for 10 GHz, the new Echostar SR50 satellite receiver, the colour test card generator and our new book " A Guide to 23 cm Television.

Besides these items, the committee had spent time discussing the 10 GHz beacon/repeater project, finance, banking and insurance matters and arrangements for Socials, Talks, Rallies and Contests.

Close relations had been maintained with other users of the 23 cm band in the Bristol locality, including the GB3UT

team at Bath, the packet radio links and the proposed revival of the GB3AA Alveston phone repeater. Word had also reached us that the radar at Filton is to be replaced with a 23 cm unit, which is a very worrying development for us.

One very important item was that with effect from 1st April, the arrangements for licensing of repeaters had changed. Previously, the RSGB had held the licence for each repeater, and then let a franchise to groups such as ourselves. Now, the repeater is licensed by means of a Notice of Variation on the personal licence of the repeater keeper, who in the case of GB3ZZ is G8VPG. If the repeater is abused or operated outside of its licence conditions, not only is the Notice of Variation at risk, but also the personal licence of the repeater keeper. G8VPG therefore reminded everyone to be careful what they transmitted through GB3ZZ, in particular not relaying copyright or broadcast material.

TREASURERS REPORT

The Treasurer Jean Fletcher G0AWX introduced the accounts sheet for the past 11 months. The accounting period was reduced because we closed our books a month early as a result of the change to the constitution agreed at the last AGM.

G0AWX stated that " I think you should feel satisfied with the profit made by the Group during 1992/93, all helped by the sale of the new aerials and books. This has meant a lot of work for members of the committee, in particular our Secretary, Shaun, who handles all the orders. The committee have decided to recommend that the subscription remains at £5.00 - I would like to point out that there hasn't been an increase since the inception of the Group. The committee's thanks once again go the Auditor Chris Newton G0FGZ who has once again confirmed that I have not had a good holiday on the Groups profits ! "

CHAIRPERSONS REPORT

The Chairperson Viv Green G1IXE wished to thank the Officers and Committee for all of their hard work during the past year, much of it done unobserved behind the scenes.

Viv wished to record thanks to Ted

G3JMY who had worked very hard throughout the year on our 10 GHz repeater project. The site at Dundry had now been confirmed and we hoped to make a licence application shortly. G1IXE would probably be the repeater keeper, and hence members had better not abuse the repeater ! On a serious note, Viv underlined the comments made by the Secretary about the new repeater licensing arrangements, and reminded members to be sensible in their use of the repeaters. There is very little trouble with GB3ZZ, but this is largely due the responsibility of the members and the vigilance of the committee.

G1IXE called for some further volunteers to help the committee with certain tasks, in particular helping out at our Rally stands and with the contest station.

NEW COMMITTEE

The following comprise our new Officers and committee for 1993/94 ;

Chairperson ; Mrs. Viv Green G1IXE,
Chief Engineer & Vice Chairman ; Steve Walsh G8KUW,

Honorary Secretary ; Shaun O'Sullivan G8VPG,

Honorary Treasurer ; Mrs. Jean Fletcher G0AWX.

Committee Members ; Ivor Green G1IXF(GB3ZZ Site Engineer), Ken Stevens G4BVK, Brian Kelly GW6BWX, Paul Stevenson G8YMM and John Hudson G3RFL.

APPOINTMENT OF HONORARY AUDITOR

G1IXE recorded thanks to Dr. Chris Newton G0FGZ for acting as our Auditor for the past few years. This can be an onerous task and it was felt that we should give Chris a rest for a while. The committee therefore proposed that Bryan Collins G4YQR be the Auditor for next year. This was approved by all present.

ANY OTHER BUSINESS

It was noted with thanks that Doug G7NZZ had donated a monochrome camera for installation at the repeater site. Several members expressed concern at the

DX-TV NEWS

by Stephen Michie G7KXD

In this issue, I have details of Stephens results through most of the winter months. He has fitted a new UHF pre-amp which gives 25 dB gain and a noise figure of 1.9 dB, and this seems to be working most effectively. Stephen reports that since installing it, he is able to resolve Dutch signals every day, even whilst it is raining ! The picture is weak and must be viewed in narrow band mode, but none the less it shows what can be done even under flat conditions.

On Boxing Day, there was a UHF tropospheric opening with very strong signals from Holland and Germany. Around midnight, ZDF Germany was noise free on ch. E25/33. Other signals seen at good strength were ARD1 Munster on E32, West 3 Dusseldorf on E55, Nord 3 on E55, ARD1 on E50, Keil on E55 and NDR1 on E50.

Prior to this, tropo signals were seen on 23rd November and 14th December. The highlights were on Band III with ARD1 Hessen on E7, MDRI on E5. Further tropo openings occurred on 27th, 28th and 30th December and 1st January with more useful Dutch signals and ZDF Germany visible.

Besides the VHF/UHF tropo signals mentioned above, VHF Band I pictures have also been seen via sporadic E. On 15th December, Sweden on E2 was seen and on 16th January, there were signals from Czechoslovakia, Hungary and Romania.

Stephens second letter gives details of his results during February, March and April. March seems to have been a bad month with no log entries, but February yielded MTV Hungary ch. R1 on 2nd via SpE, Netherlands, Germany and Canal+ France via UHF tropo on 4th, and the

AGM continued ..

new repeater licensing arrangements, and the potential risk to the repeater keepers own licence. G8VPG replied that it very unlikely that a repeater keeper would actually loose his licence unless he was personally reckless or negligent - however the threat remained. G1XE stated that both of our local TV companies - BBC Bristol and HTV - can and do monitor GB3ZZ, and hence we should not imagine that any relaying of broadcast material would go undetected.

Several members remarked about the general state of ATV, and that Bristol seemed to be a pocket of activity whilst many other areas were very quiet. However, it was noted that 70 cm activity in Bristol was now very low.

It was noted that since the Mendip Repeater Group have run out of the test card generator pcbs's, we have had to suspend sales of this product. It was hoped to find an alternative in due course. ●

same signals were seen on 9th and 13th. 14th February was the best day with a long list of German stations visible via UHF tropo. There follows a big gap until 27th April, when more Dutch signals were seen on UHF.

Stephen came along to our AGM in April and told me that he would welcome any feedback from other members who are interested in DX-TV. I will put any interested persons in touch.

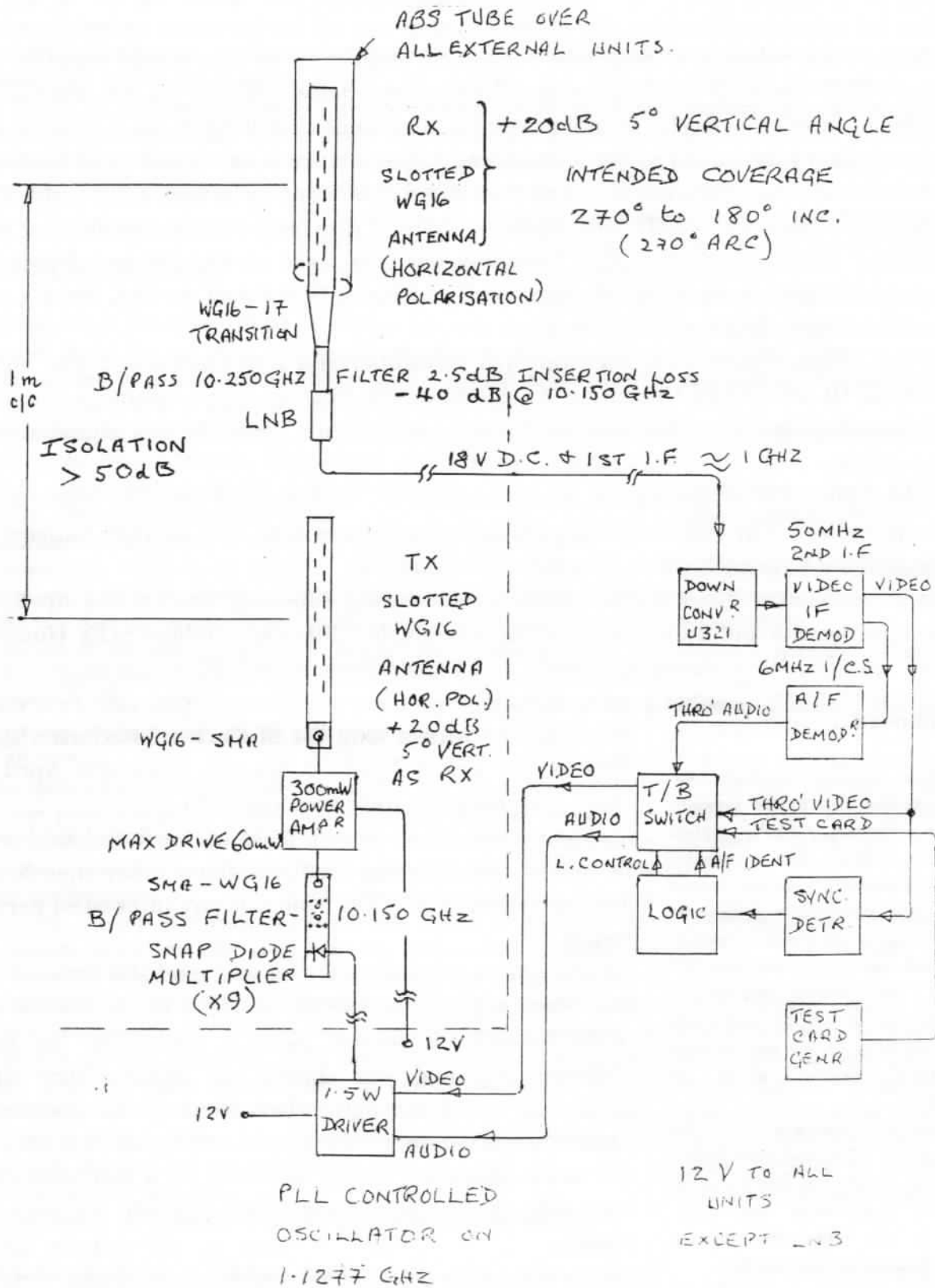
Finally, just a reminder that as you read this issue of "P5" in late May or June, we should be right in the middle of the main Sporadic E season. Keep a watch out on Band I, channels 2-4, and you should see signals from all over Europe at good strength when there is an opening. The signals are often very strong, and even a set top whip aerial will work. However, if you can hang up a half wave dipole (each side about 1.45 m long) then you will get even better results.

That's it for this time. Thanks to Stephen Michie G7KXD for his logs and good luck for the 1993 season. Don't forget to let me know what you see. ●

BLOCK DIAGRAM OF A 10 GHz ATV REPEATER FOR BRISTOL

by Ted Halliday G3JMY

This diagram should be read in conjunction with the technical description which appears on Page 3 of this issue.



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