P5

The Newsletter of The Severnside TV Group.

March 1996

Hot News!

Social Evening on Saturday, March 16th

In years gone by, STG used to hold social evenings every few months, more recently we have concentrated efforts on a single gathering just before Christmas. Yourself, family and friends are invited to this additional meeting which starts at 7:30pm and is being held at Filton Parish Pavilion, the GB3ZZ repeater site.

Those of you who went to the December social may remember that we had visitors from "Raw Charm Productions Ltd.", a Cardiff based television production company. I'm pleased to say they were impressed by our offerings and will be coming back for more! This time they will be bringing recording equipment with them to capture the atmosphere of the social and to take a look at GB3ZZ itself. As a "thank you" from them, they are paying most of the costs of arranging the evening and helping with the catering costs. Any extra food and drink you could bring along would still be welcomed though.

If all goes to plan, the finished program will be shown early in June on HTV Wales, this gives us an ideal opportunity to present a positive image of ATV to potentially huge audience. Its worth remembering that on the Welsh side of the Severn alone there are about 250,000 people within range of GB3ZZ and GB3XG. The number on the English side is even greater. ATV'ers from North Wales are also participating and part of the program will show (if it works!) a link on 23cm and 10GHz between North and South Wales.

There will be an auction at the social so dig deep in your junk boxes for something to donate, you can always buy someone else's junk to refill the space afterward!

The AGM draws close.....

Hot on the heels of the social evening is the annual general meeting. Although it isn't the most inspiring of events it is the most important meeting of the year. It is on Tuesday, April 9th at 7:30pm at the GB3ZZ repeater site. Please try to go along and help to select your representatives on the committee for the next year. If you have any points you would like make at the meeting it would help if you could forewarn a committee member before hand so that time for discussion can be arranged. You will find a committee nomination form and a subscription renewal form (its that time of the year again) inside this copy of P5.

GB3XG is off the air.....

but not for long. John G3RFL was last seen with his head stuck in the logic box and Ivor G1IXF is busy with heavy metal (antennas, not pop groups). It should be back on the air by March 9th or 10th at the latest.

Gossip by G1HIA

Off screen photo from G4CBW

Well,well, great news for GB3XG, G4CBW in Stoke on Trent was receiving signals from the South. I understand he telephoned Ted, G3JMY to obtain information about the signal he was seeing, it was 'XG! He received a full-colour P5 picture that same evening. He was getting into the repeater with a signal 6 as shown in this 'photo he took from his monitor.

The next morning 11/12/95, I made contact on 2m talkback with G4CBW. He was receiving the repeater P3 and also saw my pictures through. I tried a simplex with him, although he saw my signal on narrowband, we failed to make a video contact. Oh, the conditions, freezing fog from the South to the Midlands, so I assume that the 'XG signals were being ducted in the freezing fog with little or no signal losses. Oh yes, 187 Km between 'XG and G4CBW. Great stuff!! We signed off in our logs at 3am that morning.

The Christmas social went well with a good turn out and some new faces that were most welcome. Roger G4ZQF did his usual "auction routine" or was it trying to get blood out of a stone! Anyway the group managed to raise a tidy sum for the club funds, so not a bad night.

Some people tell me that they don't know what is going on in the club these days. Well 144.750MHz is the talkback channel, and if you don't hear that, well here are some of the snippets as heard on air. Ian G6TVJ has been running colour tests at 'ZZ. Ian, Nigel and myself had a successful 13cm contact, many thanks to them to running up a mountain whilst I sat comfortably at home! Matthew, G0ECM, is trying to develop an addition to our antenna lineup to increase club sales, I hope that it works out OK.

Nigel G7JZP, fell off his ladder whilst trying to find 'XG at home. Bruised and battered himself and bent the ladder! Not sure who came off worst, him or that ladder. Ivor's been at 'XG so many times, that we are thinking of installing a bunk bed on site! Not because of problems, but only to change and tune satellite receivers. 'XG has been performing brilliantly.

Malcolm G0UMP has a lovely baby girl called Grace (I'm sure Derren's had something to do with it!) Good luck to all three of them. Ken G4BVK, has made a 10GHz TX out of the white Rediffusion LNB's, he now knocks me off my perch in signal strength. Well done Ken, hope to see the article in P5 soon. John G3RFL has come out of the bunny hole and can see 'XG from home. Must have been inspired by Nigel's efforts. Tom G1WQU, has been busy on air and can see 'XG, we now await his TX signals.

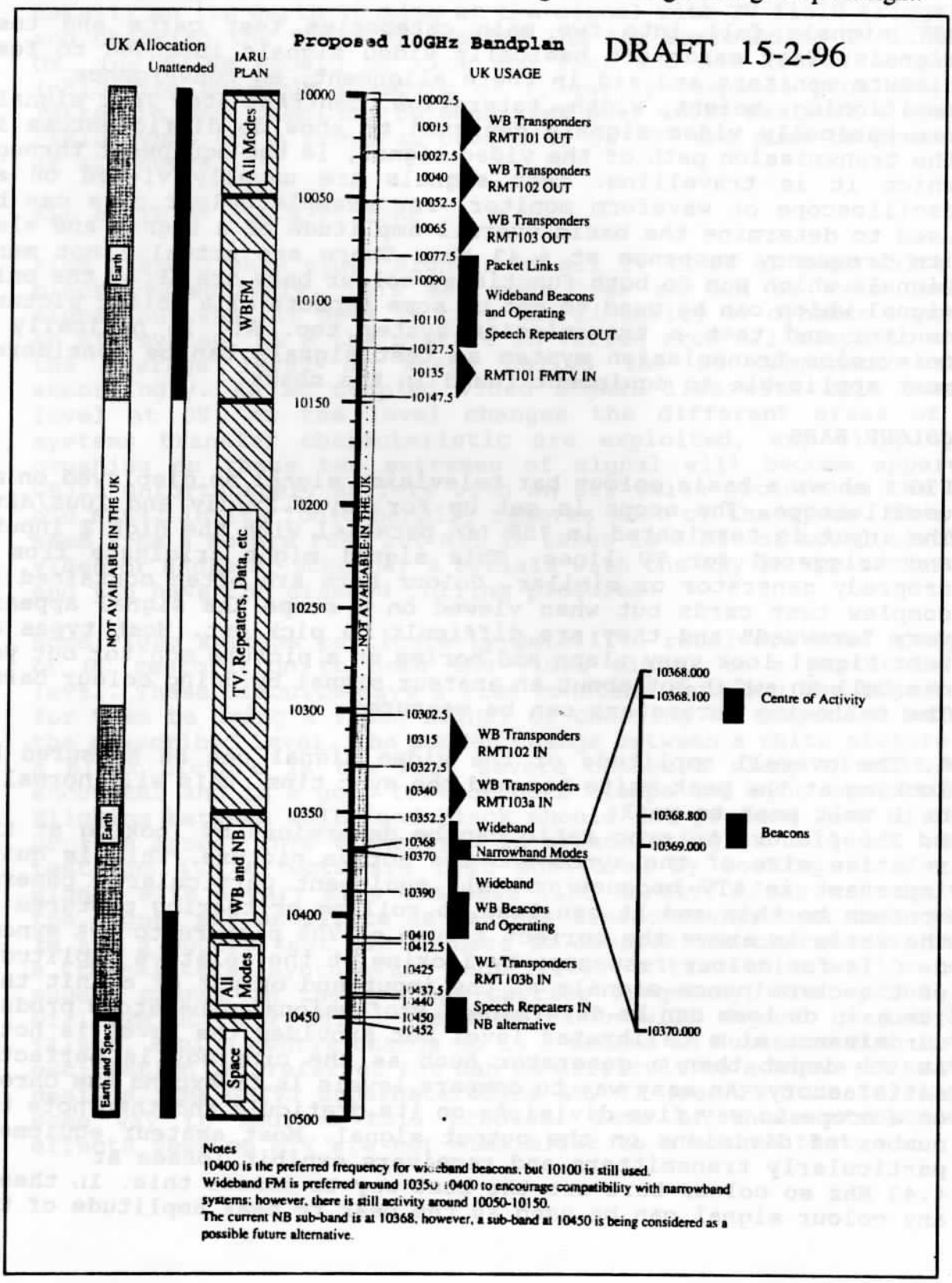
Bob GW8AGI, was seen going into 'XG from home by some devious means (via 'BWX). Nice to see you in the shack, Bob, instead of huddled around some sheep on a mountain top.

BATC RALLY ~ SUNDAY APRIL 28Th

10 GHz frequency losses

Rumours abound as to the possibl loss of our 10GHz ATV band (10.150-10.300) to local loop services. This may not take e fect for at least two years, or so it is said. Thanks to the Microwave Committee who have drawn up a proposal for presentation.

This may not be the final or accepted draft, but at least it's a start. So don't be dispondant, we're not beaten yet! However, we do feel for those who have put so much time, effort and money into raising 'XG on the air. It's far better to fight for the right than give up the fight!



Notes

10400 is the preferred frequency for wideband beacons, but 10100 is still used.

Wideband FM is preferred around 10350-10400 to encourage compatibility with narrowband systems; however, there is still activity around 10050-10150.

The current NB sub-band is at 10368, however, a sub-band at 10450 is being considered as a possible future alternative.

73's Phil, G1HIA

1996_1C

BASIC ATV VIDEO TESTS & MEASUREMENTS by Ian F Bennett G6TVJ

In amateur television there are many different types of video test signals and test cards some of them useful, others not so useful. In this article I hope to describe how, by using relatively simple signals one can identify problems or shortcomings in their equipment and hopefully improve their station output. It is assumed that the reader has a basic understanding of a pal video signal and how 625 line television works.

ATV signals fall into two main categories test cards and test signals. Test cards are basically video signals intended to feed picture monitors and aid in there alignment, eg convergence, positioning, height, width, saturation, contrast etc. Test signals are basically video signals designed to show up difficientces in the transmission path of the video signal, ie the equipment through which it is travelling. Test signals are usually viewed on an oscilloscope or waveform monitor. For example colour bars can be used to determine the basic overall amplitude of a signal and also its frequency response at 4.43 Mhz. There are actually not many signals which can do both functions, colour bars are about the only signal which can be used to set up some aspects of a colour picture monitor and test a transmission system too. ATV is basically a television transmission system so test signals can be considered most applicable to equipment found in the shack.

COLOUR BARS

FIG 1 shows a basic colour bar television signal as displayed on an oscilloscope. The scope is set up for say 0.2v/div and 10us/div. The input is terminated in 75R (in parallel with the high Z input) and triggered for TV lines. This signal might originate from a cropredy generator or similar. Colour bars are often contained in complex test cards but when viewed on a scope the signal appears very "crowded" and they are difficult to pick out. Most types of test signal look very plane and boring on a picture monitor but you can tell an awful lot about an amateur signal by using colour bars. The following parameters can be measured-

A. The overall amplitude of the video signal can be measured by looking at the peak white bar and the sync tips, this will normally be 1 volt peak to peak.
B. The picture to sync ratio can be determined by looking at the relative size of the syncs and the active picture. This is quite important in ATV because not all equipment particularly cameras conform to this and it can lead to rolling or tearing pictures if the ratio is above the correct figure of 70% picture to 30% syncs.
C. C is for colour response, by looking at the relative amplitudes of the chrominance signals at the input and output of a unit then its gain or loss can be determined. Professional generators produce chrominance at a calibrated level but provided the level is noted at the input then a generator such as the cropredy is perfectly satisfactory. An easy way to compare levels is to expand the chroma on a scope to say five divisions on its graticule and then note the number of divisions on the output signal. Most amateur equipment particularly transmitters and receivers exhibit losses at 4.43 Mhz so colour bars are the best way to assess this. In theory any colour signal can be used as the peak to peak amplitude of the

colour burst can be measured but in severe cases bars are easier as the burst can become quite small and lost in the noise if present on the signal. If plenty of colour is present in an ATV signal it is probably reasonable to assume that the overall HF response is OK too.

F. F is for field syncs (don't worry about D & E) colour bars are a nice gentle video signal with little LF components (no horizontal detail) so its worth looking at the signal with TV field triggering and checking the field sync pulse and its surrounding TV lines is OK. The pulse should be nice and flat and not kinked or arched indicating possible clamping or frequency response problems, the latter in some cases can be equalised out, GB3ZZ has such a system. Field syncs are a presious commodity in ATV and must be preserved at all costs.

ALL WHITE OR BLACK PICTURE

Figs 2 and 3 show video signals of all TV lines at peak white and black respectively. This may seem like an odd or even useless signal but what it does is test the linearity or dynamic range of an ATV system. As a the picture is varied from all black to white the average level or whats called the DC component varies accordingly. An AC coupled video signal lies with this average level at 0V, as the level changes the different areas of the systems transfer characteristic are exploited, any clipping or crushing on these two extremes of signal will become apparent. GB3ZZ unfortunately suffers with an all white picture as the dear old NE592 in its logic happily removes most of the syncs. This may seem like a severe test but all it takes is a bit of model aircraft video or shots of somebody's aerials with the sky in the background and you have the dreaded rolling pictures!

Some video systems particularly satellite receivers have clamping or DC restoration to hold the video signal to a particular DC level. These circuits have a time constant defining the time taken for them to bring a video signal of changing DC component back to the prescribed level. The sudden change between a white picture and a black picture is the most severe change a clamp circuit will encounter and is a good test of both clamps and sync separators. Flicking between white and black should not produce loss of frame or line syncs. This transition in broadcasting is called a bounce test and its effects are best monitored by looking at a video signal with a very slow timebase like 1s/div. After a transition the signal may oscillate as various timeconstants come into play. In ATV a bounce test can be used to observe the charaturistics of a transmitters' synthesizer loop filter. A transition will cause a sudden change in the average carrier frequency, the synthesizer will correct for this, the time taken will depend on the loop filter. A nice gentle change up to a second in duration with little oscillation is preferred but can be difficult to achieve in amateur designs. The G6TVJ superheterodyne ATV TX (see P5 June 1994) goes some way to address this problem. Some of those stroboscopic effects seen on MTV are not dissimilar to a bounce test.

50 HZ HALF WHITE HALF BLACK PICTURE

Fig 4 shows a video signal with 156 lines of peak white and 156 lines of black level. The oscilloscope timebase is set to 2ms/div and the trigger coupling set to TV Field. This again looks pretty boring on a telly but is an extreamly useful for testing video circuits and their low frequency performance. The waveform shown is a perfect signal from a DC coupled generator. Any AC coupling of the signal manifests itself as a tilt along the waveform as the time constants of the coupling capacitors take effect charging and discharging slightly as the video changes from white to black and back again. The degree of tilt can be expressed as a percentage of the active picture amplitude (100%). Fig 5 shows a signal with 30% field tilt which would be exeptable in ATV. GB3ZZ with much modification now achieves about 20%. Inadequate AC coupling will result in the waveform becoming very arched, it can be seen as the problem worsens the sync separator has an increasingly difficult time in detecting the line syncs resulting in a tearing or broken up picture. The field sync is also vulnerable to low frequency distortions resulting in those dreaded rolling pictures. In a 75R system 1000uf is the minimum value that should be used to couple video, it is worth remembering that interconnecting units will cause the distortions to add up, something that has to be watched in repeaters as several units are used in tandem, the distant ATV stations also contributing.

A 50Hz signal also exercises clamps which will remove some or all the tilt depending on their timeconstants. If the field tilt is large however like might be experienced with amateur signals then the clamp circuit may malfunction creating more distortion as it misclamps the video in the wrong place. Clamp circuits can introduce odd charactistics and can distort the field syncs if used in the wrong place, for video transmission systems they are best avoided. Satellite receivers always contain a video clamp, they are put there to remove the dispersal signal (A dispersal signal is a triangular waveform added in at satellite uplinks to spread out the frequency spectrum) which is not present in ATV transmissions, it is possible to get good results with a good AC coupled receiver and no clamps. BBC1 and BBC2 travel from TV centre in London to the Blackhill transmitter near Glasgow with no DC restoration anywhere!

As with the bounce test the 50Hz signal can be used to look at loop filters on transmitters. It is a common fault with ATV transmitters that the synthesizer has a fast time constant and tries to correct the slow 50Hz modulation of the carrier, this results in distorted received video with excessive tilt. The standard plessey SP5070 values will produce this effect. By applying a 50Hz signal to a transmitter a triangular 50Hz signal can be seen on the VCO control voltage subtracting itself from the video modulation. This problem can be avoided by using a much slower loop filter but getting the optimum values can be tricky, broadcast quality transmitters can take up to several seconds to lockup.

Again a half white half black picture may seem like an alien TV signal but any home video showing half a grass field and half sky is pretty similar, tempting those rolling pictures.

A cropredy generator can successfully produce a 50Hz signal with a small amount of tilt due to AC coupling, this is not a problem as the degree of tilt before and after can be observed. This test can actually be done with a simple 50Hz 1 volt squarewave signal from say a fuction generator, if no clamps are present then line syncs are not necessary.

As you can see a simple easily generated test signal can actually reveal quite a lot about an ATV system, together we can banish rolling pictures from ATV for ever!

ATV CHAMBER OF HORRORS

Here is an video chamber of horrors which shows faults I have personally encountered as I have journeyed through ATV. I have also shown the lightly effects on a picture monitor, distorted video always effects tellies in different ways so they should only be used as a rough guide.

G6TVJ TIPS FOR A BETTER ATV STATION

Always use big electrolytics (1000uf+) in coupling video circuits or better still use DC coupling.

Avoid circuits with clamps in them just one in a Sat RX will do.

Avoid over-exposed camera shots as they can lead to excessive picture-sync ratios.

Use plenty of light as this will give a sharper less noisy picture all camcorders work better in good light, a 70W metal halide lamp works wonders.

Avoid daisy chaining lots of needless equipment like video recorders in an ATV system as their distortion effects are usually cumulative, if possible use a switch to insert other units only when needed.

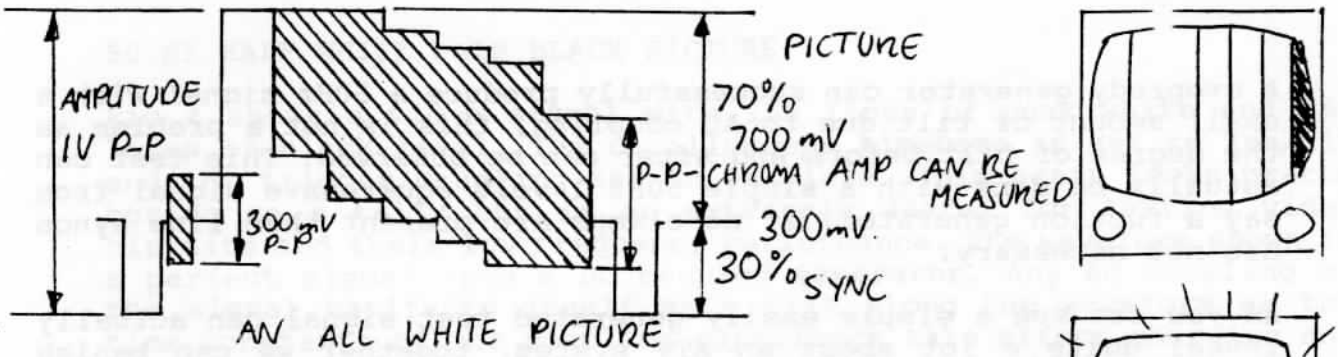
Always try to radiate plenty of chrominance, the G6TVJ chroma booster is a good way of doing this.

If possible use a transmitter with a slow synthesizer, the surface mount G4WIM unit (see CQTV no 165) is not bad, of course manually tuned free running units are not effected with this problem.

Avoid judging a TV signal by looking at it on a picture monitor if the signal is strong enough look at it on a scope. Different tellies react differently to a distorted video signal.

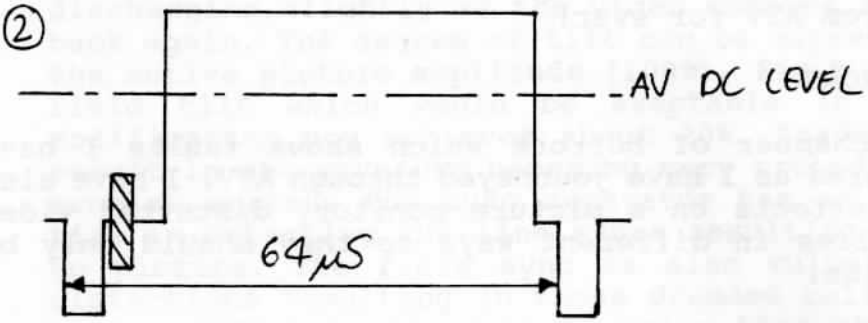
Avoid complicated test cards, simple colour bars with your call sign is all that is needed, frequency gratings and multiburst signals originating from unfiltered generators simply cause buzzing on the sound and can't reveal anything meaningful about the sytem. A pulse and bar test signal is the best way to test video systems, a design for such a generator did appear in Electronics and Wireless World a couple of years ago.

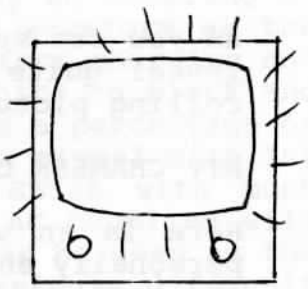
FIG ① COLOUR BAR SIGNAL



AN ALL WHITE PICTURE

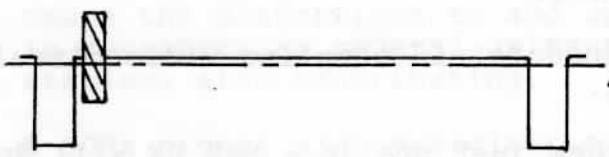
FIG ②

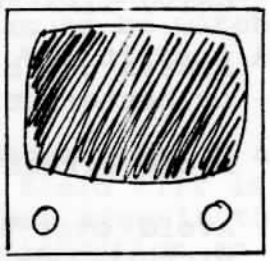




A BLACK PICTURE

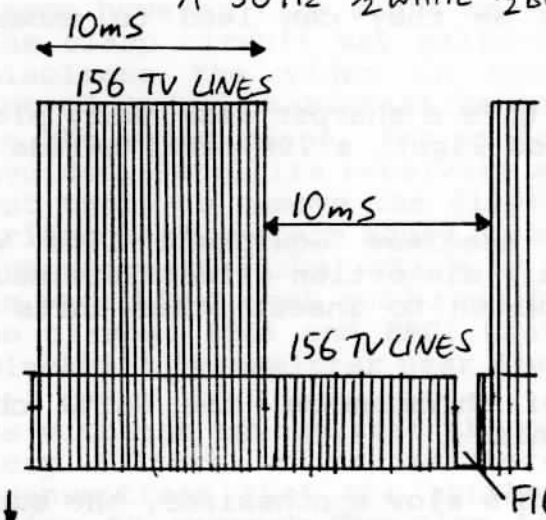
FIG ③





A 50 Hz ½ WHITE ½ BLACK TEST SIGNAL

FIG ④



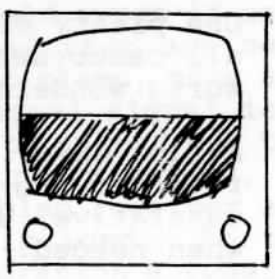
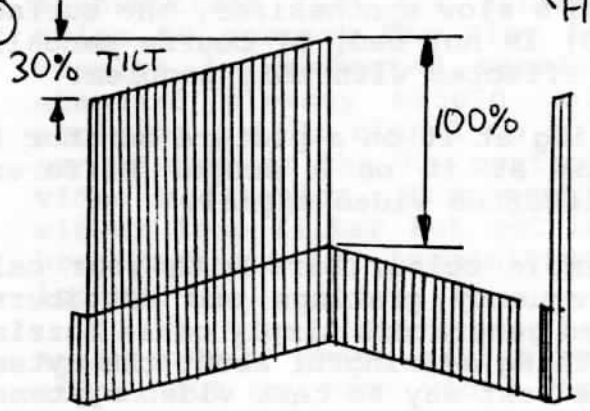
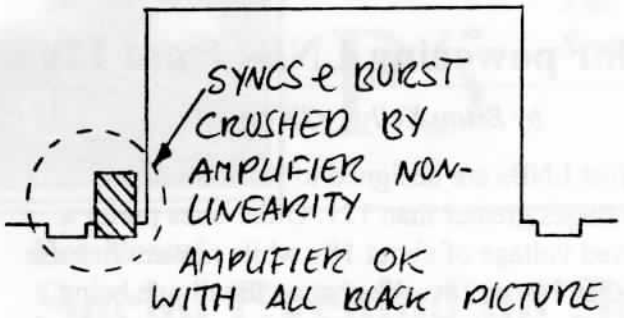


FIG ⑤

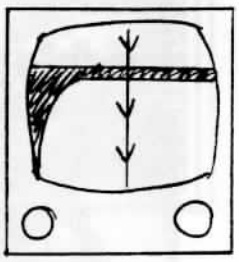


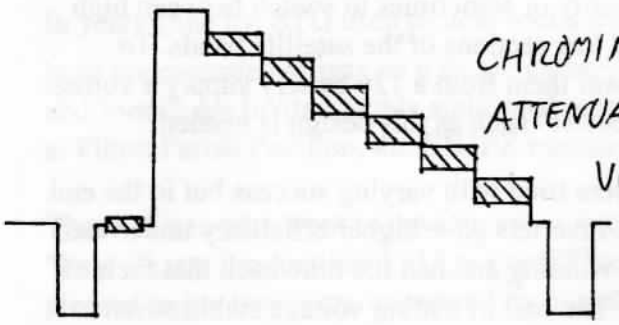
A 50Hz TEST SIGNAL CONTAINING 30% OF FIELD DISTORTION OR 30% TILT

VIDEO CHAMBER OF HORRORS

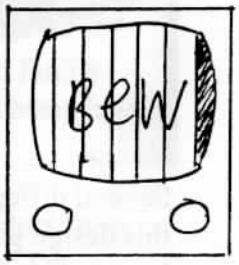


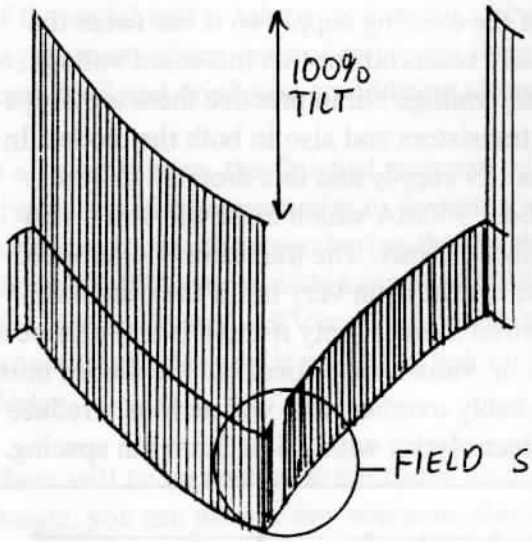
MONITOR TEARS & ROLLS.



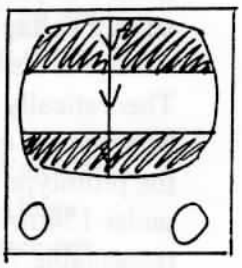


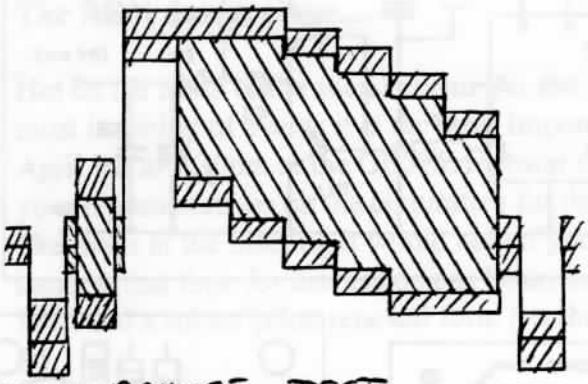
CHROMINANCE SEVERLY ATTENUATED BURST BARELY VISIBLE B&W PIC ON MONITOR



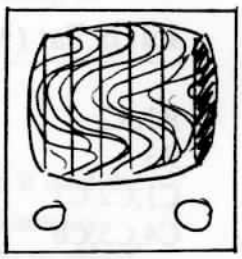


VIDEO SIGNAL BECOMES VERY ARCHED SYNC SEPARATORS HAVE DIFFICULTY IN CHOOSING BETWEEN PICTURE & SYNCS.

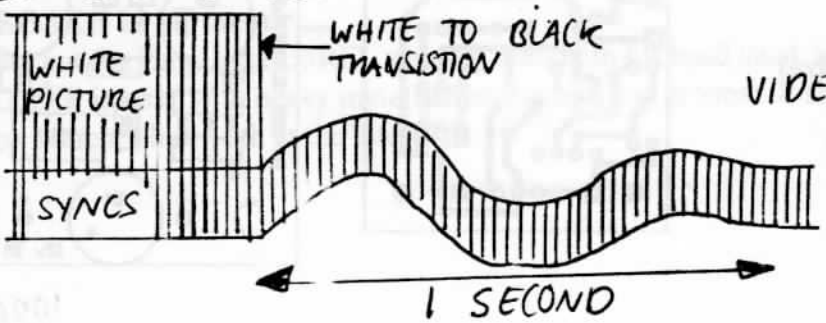




RF INTERFERENCE CAUSED BY VIDEO AMP INSTABILITY OR HOOTING REGULATOR NOT TO BE CONFUSED WITH AUDIO SUBCARRIER WHICH LOOKS VERY SIMILAR.



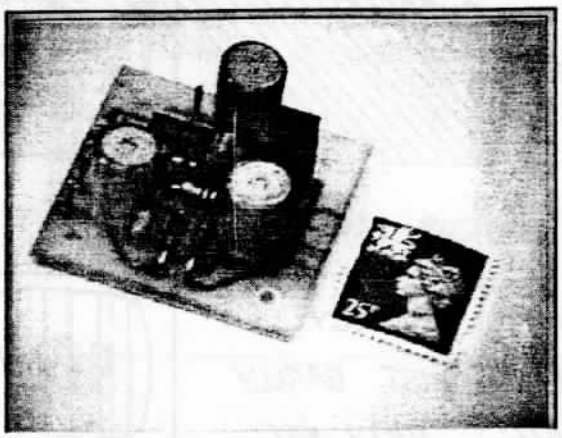
VIDEO BOUNCE TEST



VIDEO BOUNCES AROUND UNTIL NEW LEVEL ESTABLISHED.

1996-II

A step-up Voltage converter for powering LNBs from 12v



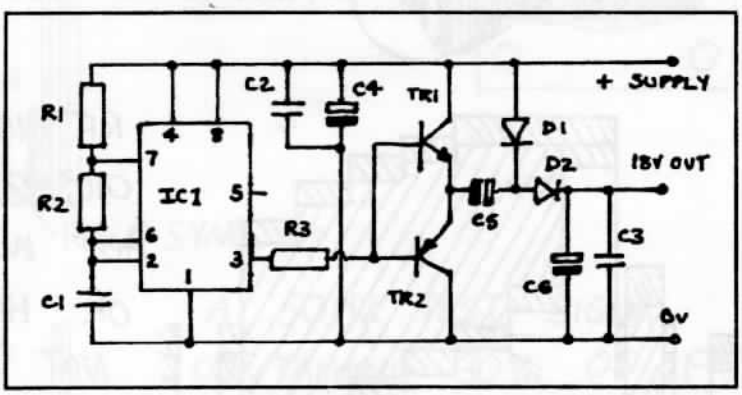
by Brian Kelly, GW6BWX

Most LNBs are designed to work on supply voltages greater than 12v. Older ones prefer a fixed voltage of about 18v while newer ones use either 14v or 18v, the change in voltage being used to switch from horizontal to vertical polarity or sometimes to switch between high and low sections of the satellite bands. To power them from a 12v battery supply a voltage "booster" such as this design is needed.

Several different types of DC-DC converters were tried with varying success but in the end this design gave best value for money. Flyback inverters gave higher efficiency under load but were more expensive, needed transformers winding and had the drawback that their off load voltage would rise to unacceptable levels. The cost of adding voltage stabilisation to them was prohibitive. This unit uses a pair of diodes to alternately charge a capacitor to supply voltage and then effectively sit it on top of the existing supply so it has twice the voltage at its top end. A second capacitor serves as a reservoir for this increased voltage. Theoretically the output voltage is twice the supply voltage but in practice there are drops between the collector an emitter junctions of the transistors and also in both the diodes. In the prototype the output was 22v (off load) with a 12v supply and this dropped to 18v under 150mA load. Input current at full load is about 300mA which make the unit a very respectable 75% efficient, with no load it draws about 15mA. The transistors do not need heatsinks, they run quite cool even under full load but they run very hot if the output is shorted out. I strongly suggest a 500mA fuse is wired in the supply if there is any chance of a short occurring. None of the resistor and capacitor values are critical but the diodes must be fast switching types, normal rectifiers will probably overheat and will seriously reduce the units performance. The PCB layout accepts electrolytics with 2.5 or 5mm pin spacing.

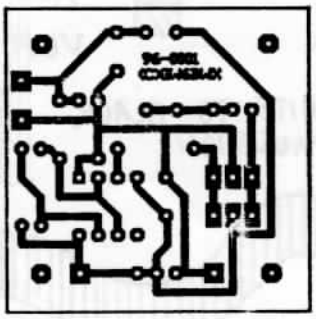
Parts list (Maplin codes)

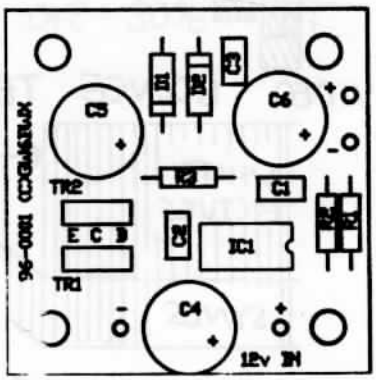
R1,R2	1K	(M1K0)
R3	100R	(M100R)
C1,C2,C3	22nF	(WW19V)
C4,C5,C6	100uF	(JL49D)
TR1	BD131	(QF03D)
TR2	BD132	(QF05F)
D1,D2	MUR120	(GX40T)
IC1	NE555	(QH66W)



The total cost of components is less than £5.00

PCB track layout (actual size) and component placement overlays >>





1996-1 J