

24cm ATV and the Wood and Douglas 'Downconverter'



Ideas for articles can happen in strange ways — your editor says "How about a review on Wood & Douglas's new FM TV bits if I get hold of them for you?" To which I

cm equipment can be used for ATV transmission and reception, and domestic TVs can be used for viewing the transmissions. Increasing pressure on the space of 'seventy'

ing that you'll make more contacts immediately than on 'Seventy', though — 24 is still essentially a band for people with a pioneering spirit.

As 70cm becomes more crowded, many TV enthusiasts are moving to the next band up. Aerial systems are very compact, repeaters are planned for many parts of the country and there is DX to be had. Andy Emmerson, G8PTH, surveys the current 24cm scene and looks at the latest in equipment from Wood and Douglas.

had to reply "But I'm ahead of you — I'm already using them!" So was born this review of W&D's new 24cm ATV receiver, and for good measure an update on the TV repeater scene.

Wood & Douglas are not a bad lot really — for instance, they have helped out the Worthing TV repeater group with advance samples of their products (good idea for in-the-field product testing). When W&D recently brought out their new tunable downconverter they made sure that several people had 'samples' to evaluate. On the basis that a good product sells itself by word of mouth, particularly true in the world of amateur radio which, after all, is essentially concerned with communication(!), this is a good philosophy and I am pleased to say their new baby is a winner. But before we take it to bits, so to speak, let's look at the current situation with regard to 24 cm ATV.

24 — The Next Band Up

Traditionally amateur television (ATV) has been on seventy centimetres, just below the UHF broadcast TV band. A lot of normal 70

and the desire to try something new has led a growing number of ATVer's to try the next band up. Commonly known as 23 cm this stretches from 1240 to 1325 MHz, though not all the band is used for TV. "We" use mainly the bottom and middle of the band, which is why ATVer's call this ATV area more correctly 24 cm. Activity is both simplex and through repeaters, and in both AM and FM. AM or 'Ancient Modulation' was the original ATV mode but is now all but extinct, and the future I believe lies entirely with FM, which allows much simpler signal generation and power amplification. (See the Wood & Douglas catalogue for an even more convincing explanation of this!).

Since 24 cm is our lowest microwave band, people not already up there may be forgiven for thinking that working on 24 is a bit 'hairy' and is only suitable for short distances. Not so; you have to construct your whole station carefully (but really you need to do that on all bands) and propagation is very comparable with 'seventy'. Under lift conditions, '24' actually can be better, and 'openings' to relatively distant parts seem to happen more frequently. I am not say-

Making A Start

Having read my rosy description of the potential of 24cm TV you may wish to make a start on the band by receiving the local activity. Even with a converter, a normal TV receiver will not make a very good job of displaying local-ish FM transmissions; it will work but not efficiently. And this is where the new W&D products come in: the 1250DC50 tunable 'downconverter' and VIDIF FM demodulator. Together they take an FM TV signal anywhere in the 23/24 cm band and bring it down to baseband video, which can be displayed on a normal monitor (or put into a channel 36 modulator for viewing on your domestic TV set).

The downconverter comes in a sturdy tinfoil box 5" x 3.75" x 1.25". The video IF board also fits into the same box, which is available separately. I put my IF board in this box and would recommend you do likewise; the combination will then fit nicely into the standard no. 202 Verobox (see photo nearby).

Both items are available ready assembled, and the VIDIF can also be purchased as a kit. The downconverter is not available in kit form, however, and the manufacturer's explanation for this makes technical sense to me. "The complexity of the circuitry demands a high level of instrumentation to allow correct alignment, and minor variations in assembly

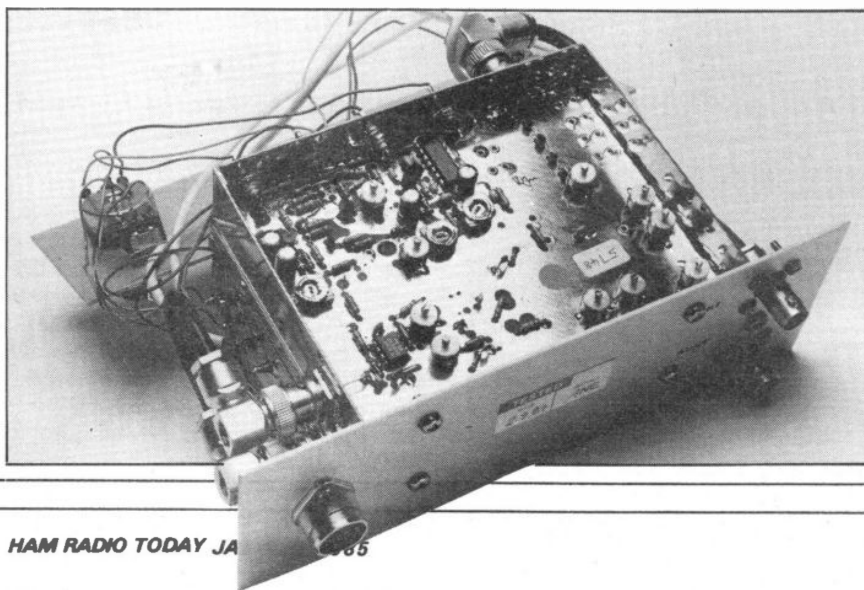
technique could not be tolerated at such a high frequency." In other words, assembly must not only be exact but a rather larger amount of test gear than the average amateur possesses is necessary to make it tick!

With this in mind, I had to take the lid off and see the standard of their construction; it is exemplary, with separate compartments for the RF sections. Looking at the PCB, and one can see the signal entering a bandpass filter, gain-matching it for the GaAsFET and then out through another filter to the ring mixer. There is an NE219 as VCO, controlled by two BB221 varactors and a BFR91 following a VCO. A standard Plessey SL560 amplifier leads to the output of the downconverter. The overall noise figure is not quoted but from a subjective point of view seems very adequate. (Many 23cm stations tend to use low noise masthead preamplifiers to minimise feeder losses, enabling the use of reasonably priced feeder cable such as H100 — providing the feeder run is not too long — and making the noise factor of the actual Rx front end much less important — Ed). The AFC seemed unnecessary for FM to a colleague; the phase-locked loop in the VIDIF ought to be able to track the incoming signal without too much difficulty. This minor quibble to one side, my impression as an ATV enthusiast for a fair number of years, is that a lot of thought has gone into the design and this looks very professionally executed as well.

Looking At The Video IF

After all this hi-tech, the VIDIF

The lid off!



board seems quite tame! No problem though, it is a workmanlike product. You get a circuit diagram in this case which helps you follow the signal past an OM335 level booster to limiting and demodulation (NE564 PLL). A positive or negative signal can be selected: all amateur FM signals are positive sense, though my board came somewhat mysteriously with the link set to negative. Anyway, it's no trouble to change this. Twin 1 volt video outputs are supplied, also a 6 MHz audio signal for external direction and AFC (for front end tracking) and AGC voltage (for an 'S' meter).

Connecting the two boards is a simple matter; the cabinet of your choice will need to be provided with a modulation sense switch and a 'tuning' potentiometer. A volume control and loudspeaker are optional extras.

Best Buy?

I do have two other manufacturers' (who shall be nameless) converters in use in the G8PTH shack, but after trying these two W & D units over a period of a fortnight I decided to buy them. This is a recommendation then: I find their performance very satisfactory and in some respects better than the opposition.

Good points to note are the first rate rejection of radar signals (pointing to good limiting) and no spurious oscillators of any kind. The modulation sense is absolute: you cannot mistune a signal with the wrong sense as you can with a rival product. The units are not a 'plug-in and turn-on' job though: you still have to build the case and

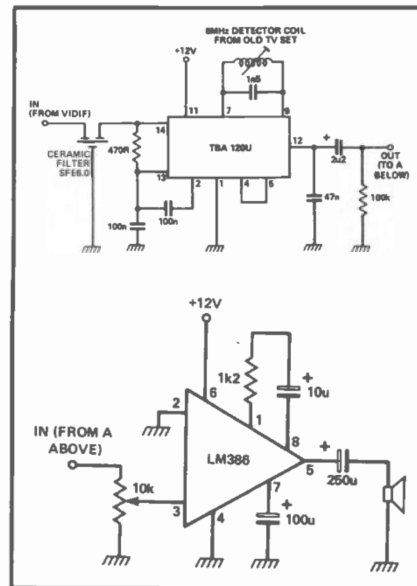


Fig.1. Sound demodulator and output stage suitable for the unit.

peripheral circuitry. For many people this is not only more fun but is an advantage — the converter can be cased and switched to suit your particular set-up.

My sole real complaint is that the tuning spreads way above the top of the band; if there is to be an overspill why not have it at both ends as some French stations still use 1227 MHz. It is a pity that the sound demodulator is not yet ready, but you can easily build your own audio output stage (see Fig.1). The packing of the bare VIDIF boards does need to be improved, though; mishandling in the post caused the coils to poke through the jiffy bag and... crunch!

A custom-designed audio board is planned and may be reviewed here in due course. Wood & Douglas also make some modules for the construction of an FM TV transmitter; I recommend you get hold of their catalogue and check these out.

Where The Activity Is

Without a doubt the TV repeaters have given 24cm TV a terrific boost, and for this reason most of the activity is centred around the places where repeaters have been opened. There are five repeaters in Phase 1, of which two (Worthing and Dunstable) were in full operation at the time of writing. Of the others Leicester (the very first) was in beacon mode, and the other two (Bath and Stoke-On-Trent) are still under construction.

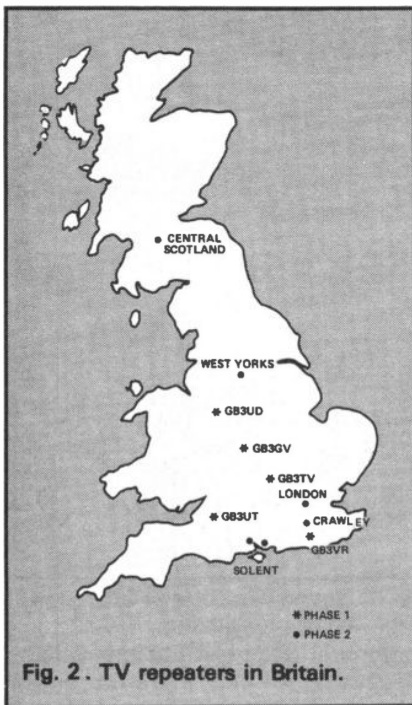


Fig. 2. TV repeaters in Britain.

As the Phase 1 repeaters are more 'experimental' than those which will follow, there are two distinct systems in use. GB3GV (Leicester) and GB3UT (Bath) accept either AM or FM input signals but radiate in AM only. The remainder, GB3TV (Dunstable), GB3VR (Worthing) and GB3UD (Stoke) are FM machines, and all the known repeaters planned for Phase 2 will be FM too. (FM is the rule in most other European countries where the 24 cm band is exploited).

More Repeaters Soon?

From the start of planning a

repeater to the eventual licencing can take a long time, even if everything goes to plan. I am not aware of an official timetable for Phase 2 TV repeaters but there is no harm in mentioning those planned which are fairly well advanced. From A-Z we have:

CENTRAL SCOTLAND. Still at initial planning stage.

CRAWLEY, GB3CT. Site in ZL80H, 325 feet above sea level. Power 20W erp from an Alford Slot. Field trials show good average of North Sussex and Surrey.

SOLENT REGION. The proposal is for one or two machines, to serve firstly, Poole and Bournemouth and secondly, Southampton.

WEST YORKSHIRE. The site has been agreed — the top of Emley Moor TV mast!

I have also hear rumours of plans for machines in the Thames Valley, west of London, and also in Central London (co-sited with GB3LW). In addition, I was associated with a plan for a repeater on the Isle of Sheppey to serve parts of Kent, Essex and London. An excellent site was found and although the plans never came to fruition the opportunity is still there for enthusiasts in this area.

Simplex And Relay Working Too

Not everyone lives within reach

of a TV repeater and there are pockets of keen simplex activity, especially in the Thames Valley, Midlands and Solent areas. All in all, there are some forty transmitting stations on 24cm in England now and many more 'eyewigs'. Simplex also gives you the opportunity to work a bit of DX: the Sussex Coast mob regularly have contacts across the Channel, and stations in the Midlands have had visual QSOs with France and Holland.

Relay working is also a possibility: signals can be picked up on 70 cm and transmitted further on 24 (and vice versa). With proper filtering and a wide spread between Rx and Tx frequencies, in-band relays are also a possibility.

Frequencies And Standards

Although in theory you can operate on any frequency you choose, commonsense dictates that you follow the established patterns of activity to maximise your chances of a QSO. Simplex activity is generally low in the band. 1255 MHz is the standard frequency in France and Belgium, and is becoming the rule here as well. Many Continental stations have crystal-controlled receive converters, so 1255 makes sense. The FM repeater frequencies are 1249.0 MHz input and 1318.5 MHz output. For the AM boxes, the figures are 1276.5 MHz in and 1311.5 MHz out.

FM signals are limited to a deviation of +/- 6.5 MHz, and the audio subcarrier is the same in both systems, namely 6 MHz (but 5.5 MHz abroad). Aerial polarisation is horizontal or circular.

Further technical information can be found in a six part series on 24 cm in "Amateur Radio", (*What's that — Ed.*) February to July 1984 and in the BATC Amateur TV Handbook, available from the RSGB, so why not get cracking now?

WOOD & DOUGLAS, Unit 13, Young's Industrial Estate, Paices Hill, Aldermaston, Berks., RG7 4PQ. (Telephone 07356-71444).

1250DC50 Downconverter, £69.95. assembled. VIDIF board, £38.95 kit or £54.25 assembled. Custom box for above, £5.50. Postage 75p extra on all above items.

Table 1 — SPECIFICATIONS

1250DC50

Input frequency range	1240-1325 MHz
Intermediate frequency	50 MHz nominal
Conversion gain	25 dB minimum, 30 dB typical
First RF stage	MGF1100 GaAsFET
Mixer type	discrete Schottky ring
Post mixer processing	SL560c amplifier
Operating voltage	11.5-14.0 volts
Operating current	80 mA nominal
Internal stabilisation	8.5, 5.5V rails
External connections	AFC input, supply input, tuning voltage input, 8.5V output
RF connections	BNC

VIDIF

Input signal range	40-55 MHz
Supply voltage	12V (with internal stabilisation for PLL supply)
External connections	AGC output, AFC output, IF input, twin video outputs, 6 MHz audio output, supply voltage.