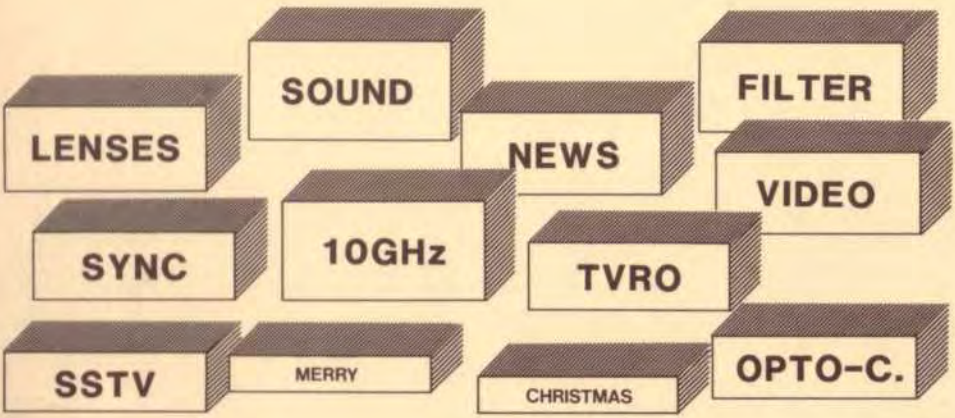
CQ-TV MAGAZINE No.136

BRITISH AMATEUR TELEVISION CLUB

NOVEMBER 1986

MODIFYING THE ROBOT-400



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MEMBERSHIP

FULL YEAR: £5 or £1.25 for each remaining quarter of the year. All subscriptions fall due on the first of January. Membership application forms are available by sending a stamped addressed envelope to Dave Lawton, whose address may be found on page 2 of this magazine.

OVERSEAS MEMBERS are asked to send cheques bearing the name of the bankers London agent. Postage stamps are not acceptable as payment. Overseas airmail is extra - please enquire from Dave Lawton.

The British Amateur Television Club is affiliated to the Radio Society of Great Britain and has representatives on the committee of the European Amateur Television Working Group.

The BATC is registered under the DATA PROTECTION ACT, all queries to Dave Lawton.

CQ-TV is produced by the British Amateur Television Club as its official journal and is sent free to all members. It is not for general sale.

The BATC maintains many pages of news and information associated with amateur television on the Prestel Information Service. Club pages may be found within the ClubSpot section and full details were last published in CQ-TV 134. Copies of the article (two pages) may be obtained from the Publications department.

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MERRY CHRISTMAS FROM THE OFFICERS AND COMMITTEE OF THE BATC

CLOSE FOR PRESS DATE FOR THE FEBRUARY 1987 ISSUE.....20th December

WHO TO WRITE TO

Members of the BATC committee are available to help and advise club members on any ATV related subject. Remember that all such work is done in their spare time so please try to keep such queries to a minimum.

GENERAL CORRESPONDENCE - Club affairs; video tape library; technical queries, especially related to handbook projects: TREVOR BROWN G8CJS, 14 Stairfoot Close, Adel, Leeds 16. Tel: 0532 670115

MEMBER'S SERVICES - PCB's; components; camera tubes; accessories etc. (other than publications); queries related to such supplies: PETER DELANEY G8KZG, 6 East View Close, Wargrave, Berkshire RG10 8BJ. Tel: 073 522 3121

MEMBERSHIP - Anything to do with membership including new applications; queries about existing membership; enquiries from prospective members; Non receipt of CQ-TV; subscriptions; membership records; data protection; Prestel: DAVE LAWTON GOANO, 'Grenehurst', Pinewood Road, High Wycombe, Bucks HP12 4DD: Tel: 0494 28899

LIBRARY - Any queries relating to the borrowing or donation of written material to the BATC central library. PAUL MARSHALL G8MJW, Fern House, Church Road, Harby, Nottinghamshire NG23 7ED: Tel: 0522 703348

PUBLICATIONS - Anything related to the supply of BATC publications. CQ-TV back issues and other publications are normally only available if listed on the Publications order form at the centre of this issue: IAN PAWSON G8IQU, 14 Lilac Avenue, Leicester LE5 1FN. Tel: 0533 769425

EXHIBITIONS AND RALLIES - Also arrangements and information about lectures and talks to clubs; demonstrations etc: SITUATIONS VACANT - any volunteers should contact Trevor Brown.

CLUB LIAISON - And anything of a 'political' nature; co-ordination of ATV repeater licences: GRAHAM SHIRVILLE G3VZV, The Hill Farm, Potsgrove, Milton Keynes, Bucks MK17 9HF. Tel: 0525 25 343

ACTIVITY REPORTS - And information about groups and general ATV gossip for 'TV ON THE AIR' column in CQ-TV: Andy Emmerson G8PTH, 71 Falcutt Way, Northampton NN2 8PH. Tel: 0604 844130

CQ-TV MAGAZINE - Anything destined for publication in CQ-TV magazine (except 'TV ON THE AIR' column) or forthcoming BATC publications:
EDITOR: JOHN WOOD G3YQC, 47 Crick Road, Hillmorton, Rugby CV21 4DU. Tel: 0788 69447 - articles; review items; advertisements; other material; queries on the content of past issues.
ASSISTANT EDITOR: MIKE WOODING (see next item).

CONTESTS & AWARDS - Mike Wooding G6IQM. Due to an imminent change of address please send all correspondence c/o the Editor, CQ-TV.

Where possible it is better to telephone your query. Please do not call at unsocial hours. As a guide, try to call between 6.30 and 9.30 evenings and not before 11am at weekends.

EDITORS POSTBAG

The last issue carried a short piece suggesting the use of vertically polarised aerials for ATV repeaters, rather than the present horizontal. I have received many letters and phone calls on the subject, almost all of them in agreement. Here is a selection of the letters starting with the one exception:

Dear Ed,

The article in CQ-TV135 entitled 'Horizontal or Vertical' prompts me to write some notes and comments it promotes.

The reason why horizontal was insisted on by the RSGB Microwave Committee is that it has demonstratable propagation advantages. This shows in the form of a considerably lower/slower fading rate.

The greater multipath effects observed using vertical polarisation are caused by the proponderence of natural objects to reflect such signals. A reduction of around five times has been observed when rapidly changing from V to H over extended periods with resulting improvement in readability or better picture.

The other advantage that is mentioned was produced by the desire not to create separate divergent standards if at all possible.

The extra gain that is supposedly available by going vertical is a myth or wishful thinking. More gain is to be had by making the array longer (by stacking vertically). This is of course possible with long Colinear stacks but the return is, in practice about the same whether horizontal or vertical, especially at the frequency under discussion. The horizontal form has to use Alford slots with either a longer slot, (to a maximum practical length of about 3-wavelengths). More than one slot can be combined and fed in phase as was employed at GB3IOW. In this installation two slots were mounted one above and one below the transmitter box and the whole unit mounted on the mast.

The answer to the question about mobile is "yes". I, and several others, have fitted and used, quite successfully the Alford slot on a variety of vehicles. The more recent design, using a skeleton form, is even less trouble and has been used for ATV mobile operation in the Chichester Carnival parade quite successfully.

Mike Walters G3JVL,
RSGB Microwave and Propogation
Studies Committees.

Dear Ed,

Here is another letter praising Bonex Ltd to the skies.

Having used the services of a well-known supplier specialising in kits, modules and components, I became more than just a little fed-up with their lack of service and long delays when out of stock situations arise. In one case I waited more than three months for a kit after being quoted 30-days or so. After many frantic phone calls, during which I was told the kit had been despatched, I located a kit by phone at Bonex and, to my utter surprise, one landed on my doormat the next day. This is service indeed and I feel we should support such a company who has the amateur at heart.

Andrew Smith G6LTZ

Dear Ed,

I would like to know whether any of your members in the Manchester area are operational on 24cm FM-TV. So far I have only come across amateurs on 70cm.

Activity on 24 seems non existant here and I would like to help get some going so, if anyone in my area is interested, please contact me.

Simon Bradshaw G4OUK,
Flat 1,
150 Palatine Road,
Didsbury,
Manchester M20 8QM

Dear Ed,

May I comment on the article 'Horizontal or Vertical' in the last CQ-TV?

I was a prominent supporter of the choice of FM as against AM for the microwave TV bands, in this respect I am well pleased at the outcome. Over the polarisation question the path may not be quite so clear.

On the face of it vertical may offer some advantages, true mobile operation with horizontal aerials is difficult, and vertical aerials are easier for repeater operators where omni-coverage is required.

Horizontal may offer some advantage where a Yagi is not situated at the top of a mast; there was some problems with this in vertical band-3 areas, caused by interaction of the mast and the vertical elements. The problem of Radar could be a factor. I have attempted to find out the polarisation of 25cm Radar without success.

Most significant is the factor of convention, there would be little point in having only repeaters vertical, for many people one aerial is expensive, never mind two. What about our continental colleagues? Would we be prepared to build an inevitable cross loss into a QSO? or would they also change?

I think the matter should be fully considered in the light of the above. Personally I probably at this moment would consider a change.

David Long G3PTU

Dear Ed,

Regarding the comments in CQ-TV135 on polarisation for 24cm ATV repeaters, I totally agree that vertical would be far more sensible in view of current trends, ie repeaters, portable etc. It would also reduce interference to and from sideband stations (many of which, even on 23cm seem to have incredible bandwidth) and may well help with the reduction of broadcast TV breakthrough in some circumstances.

Keep up the good work with the magazine, the effort you clearly put into it does you credit; the end result is excellent.

Chris Ashby G4AYT

NEWS ROUNDUP

SUBSCRIPTIONS

All subscriptions to the BATC become due on January 1st 1987.

If you have not already paid in advance you should receive a renewal form with this magazine. Please complete the form and return it, together with a remittance of £6, to BATC SUBSCRIPTIONS, 'Grenehurst', Pinewood Road, High Wycombe, Bucks HP12 4DD. If you have already paid (check the address label on this issue's envelope) and still receive a form, please ignore it.

SOLENT OPT-OUT OF KITS

Due to pressure of other business, Solent Scientific - for so long the main supplier of kits for 24cm ATV - have reluctantly decided to pull out of the amateur kits market.

Allan Latham is concerned that the designs should not be lost to the amateur community and is trying to find someone to take over the kits business and provide a spares support to existing units.

Thanks Allan for all you have done for 24cm ATV and we all wish you every success in your business ventures.

MEMBERS SERVICES

BATC Members Services have arranged for the MC1445 i.c. to be made available to members, as it is no longer available from normal retail outlets. Details are on the club order form, and the devices should be in stock by the time you read this.

In order to help our engravers, batches of callsign badges will be sent to them in future once per magazine cycle. Please ensure that your order reaches BATC Members Services by the CQ-TV close for press date, given in each issue. Badges will be distributed to members as soon as they have been engraved, but this can take several weeks.

OVERSEAS AIRMAIL RATES & SUBSCRIPTIONS

Would overseas members please note that payments made to the BATC should either be by cheque, bearing the name of a UK banking agent, or by International Money Order. Please DO NOT send foreign cheques.

All overseas mail is sent surface unless requested otherwise. Members outside Europe who wish their magazines to be sent via air mail should add an appropriate amount, calculated from the table below, to your subscription. Please make it clear on your form or letter that the extra is for air mail.

Zone A	£2.50 per year
Zone B	£3.25 per year
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Principle countries and their zones are as follows:-

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Barbados	B
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Egypt	A
HongKong	B
India	B
Israel	A
Japan	C
Kenya	B
Kuwait	A
Malasia	B
New Zealand	C
Nigeria	B
Oman	A
Pakistan	B
Saudi Arabia	A
Singapore	B
South Africa	B
South America	B
United Arab Emirates	A
U.S.A.	B
Zambia	B

TVRO TALKS AND DEMO'S

Dr Charles Suckling, G3WDG, has very kindly offered to give talks and demonstrations of TVRO reception to clubs and societies. Club secretaries are invited to contact G3WDG at the following address (SAE please).

4 Windsor Close, Towcester, Northants NN12 7JB. Tel: 0327-52100

PRESTEL NEWS WANTED

Since the start of the BATC Prestel service very little information or news has been received for inclusion.

A great deal of time and effort has been spent in getting the service going and in developing some 50 or so pages of ATV interest. All this will be to no avail if YOU don't let us know what is going on and when.

The sort of things we are looking for are news items connected with ATV, special event stations, rallies and shows at which ATV is to be featured, details in advance of TV activities from clubs and groups, DXpeditions, unusual contacts, unusual activity, forthcoming events, repeater news etc. etc. Please don't forget this valuable service.

Please send any information to Dave Lawton, GOANO, 'Grenehurst', Pinewood Road, High Wycombe, Bucks HP12 4DD. Tel: 0494 28899.

THOSE DAMN'D 'F' PLUGS

Now that there are lots of Astec TVRO tuners about we find many people are bewildered by the lack of a centre pin with their F plugs. The reason is "there isn't one!" It seems that these plugs are some sort of cheap American type which are intended to fit on coaxial cables having a solid inner conductor. Make it nice and cheap, thought they, and use the coax inner as the centre pin. (How cheap can you get?).

Anyhow, Comex Systems are getting fed-up with phone calls on the subject so they have produced a slip of paper to explain to customers the apparent lack of a pin and these should be sent out with all orders now.

Of course you could always (like me) use a BNC to F adaptor. These DO have a pin!

CROPREDY TEST CARD

In the last issue I discribed a fix for a sync problem on the Cropredy test card generator. Unfortunately I got the value of the pull-down resistor wrong; it SHOULD have read 820-ohms - sorry.

VIDEO CONTROLLER

R&EW magazine (Sept.) reported on a remarkable new chip just announced by ITT Semiconductors.

The device - a one-chip video memory controller - is designed for use within domestic TV sets and brings several digital features to the viewer. These include a flicker-free picture, still picture, multi picture-in-picture, zoom, and background storage for a teletext processor.

Doubling of the vertical deflection frequency effectively eliminates picture flicker. This is achieved by using a memory which stores a complete field and is fast enough to handle both single speed input and double speed output transfer rates. Five external standard 256k DRAMS are used for the memory.

For multi picture-in-picture mode, the screen is divided into nine small pictures of equal size, each displaying either a section of a large picture or a complete picture. Zooming is achieved by displaying only part of the RAM content: enlargement factors of two and three times are possible.

The chip is designated VMC 2269.

REPEATER NEWS

G4ZQF reports that an application for ATV repeater GB3ZZ was submitted to the Repeater Working Group in June. The repeater is to service the Bristol area and will operate on FM only. I understand that a site has already been obtained at a peppercorn rent.

One interesting point is that the application states that, although horizontal polarisation is being applied for, this only follows present custom and practice. The group would be quite prepared to adopt vertical polarisation if this were permitted.

TROUBLE WITH ADVERTISERS?

Any member who is experiencing persistant broblems with any of our advertisers are invited to write to me (Editor) with the details.

SPLIT ARTICLES

You will have noticed that an increasing number of articles appearing in CQ-TV are being split over two or more issues. I am sorry if this causes any inconvenience but often to print an article in its entirity would take up a sizeable portion of the mag. OK for those interested in the particular subject but not so good for those who arn't. The situation is being helped by producing a much larger magazine but the small page format still places some restrictions. Don't stop sending in those long articles though folks.

SINGLE-CHIP TELETEXT

ITT Semiconductors have introduced a new teletext processor which can handle European Level-1 teletext signals. The processor incorporates all the necessary circuitry (with the exception of a single low-cost RAM chip) to display full teletext and is designed to be added to conventional TV circuitry.

The TPU 2732 is an n-channel VLSI MOS circuit and is housed in a 40-pin DIL plastic package.

SSTV - WRAASE ON THE ROBOT

This problem of incompatibility between Wraase and Robot scan converters seems to have been partly solved.

G3WW reports that G3OQD has developed an upgrade EPROM which, when fitted into a Robot 1200C, enables colour transmissions from the Wraase SC-1 to be received. Unfortunately there is so far no similar upgrade which works the other way. (see article elsewhere in this issue).

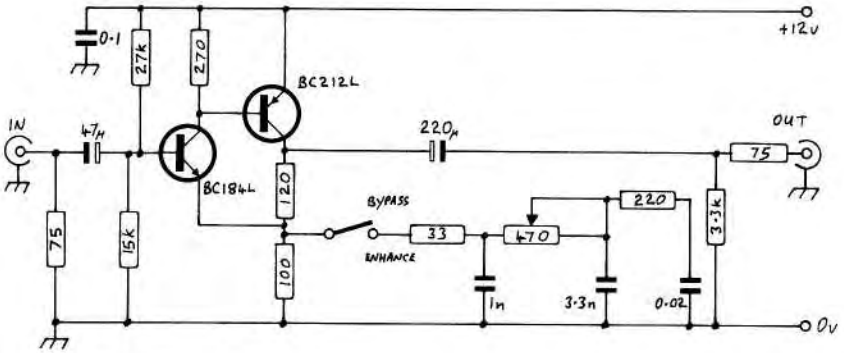
M.H.Emmerson, G3OQD, 6 Mounthurst Road, Hayes, Bromley, Kent BR2 7QN (SAE with all enquiries).

A VIDEO ENHANCER

by Eric Edwards GW8LJJ

This unit is simple to build and uses few components. Its purpose is to artificially improve the sharpness of a picture by accentuating the high frequency component. The circuit can be connected between two video recorders when transferring your own recordings onto another tape to pass along to other ATV'ers. Using this design something like the original quality of the master can be preserved on the copies. The unit can also be connected in series with your video camera and portable video recorder to improve the detail in your recordings.

The use I had in mind though when designing the circuit was to connect it in the video input to the transmitter modulator to adjust the enhancement level for emphasis at the transmitter. This effectively compensates for detail loss in the transmit system.



ADJUSTMENT

Connect the unit between your video source and video input of the transmitter and connect the supply. With the switch in the 'normal' position the through video should be unaffected when viewed on the monitor and RF probe. Turn the control to minimum and switch the unit on whereupon a slight improvement in detail may be seen. Advance the control until sharpness is increased without distorting the sync pulses. When appreciable results are observed, switch to 'off' and notice the difference, you should be pleasantly surprised. Ideally, for best results and more correction, the unit should be used with non-composite (no syncs) video, then enhancement can be increased right up to the production of ringing on the picture. The use of the processing amplifier elsewhere in this issue may be of use in this application.

A 10GHZ TRANSCEIVER

By Roy Humphreys, G4WTV

If you think that microwave television is difficult to achieve, think again. The Medium-Deviation Frequency-Modulation transceiver described here is very simple to build and can give excellent results. I make no claims as to the originality of any of the material, most of which has appeared previously in CQ-TV at some time or other, but offer it collectively in order to point those interested in microwaves in the right direction in an attempt to encourage more operation on 10GHz.

At the heart of the system is a SOLFAN Gunn oscillator which has a horn aerial and mixer built in. These are available new at a cost of £16 (inc VAT & p/p) from Trevor Wraith, 33 Colebrook Road, Swindon, Wilts SN3 4EB. An alternative source for the head unit is The Microwave Society, 81 Ringwood Highway, Coventry CV2 2GT, from whom the cost is £20 for a tested unit adjusted for 10.4GHz (the Solfan unit has to be retuned). In order to purchase from the Society one has to be a member (£6 per annum) further details of which can be obtained from the same address.

HEAD UNIT

On receipt the Solfan head unit is likely to be set at something in the region of 11GHz, looking at the band plan we see that there is 500MHz available at 10GHz. The part of the band that is normally used is 10 to 10.4GHz and I would suggest the use of 10.4GHz in this instance.

Before applying any power to the head unit first remove the 3.3k resistor, diode and 10uF capacitor connected to the mixer and oscillator respectively. Whilst microwave devices of this type are not particularly sensitive to handling, it is advisable to keep any contact with unconnected Gunn and Mixer Diodes to a minimum. It is also advisable to use isolated (preferably low voltage) soldering equipment if possible and if you really are concerned then the use of a static-conducting wrist strap will help.

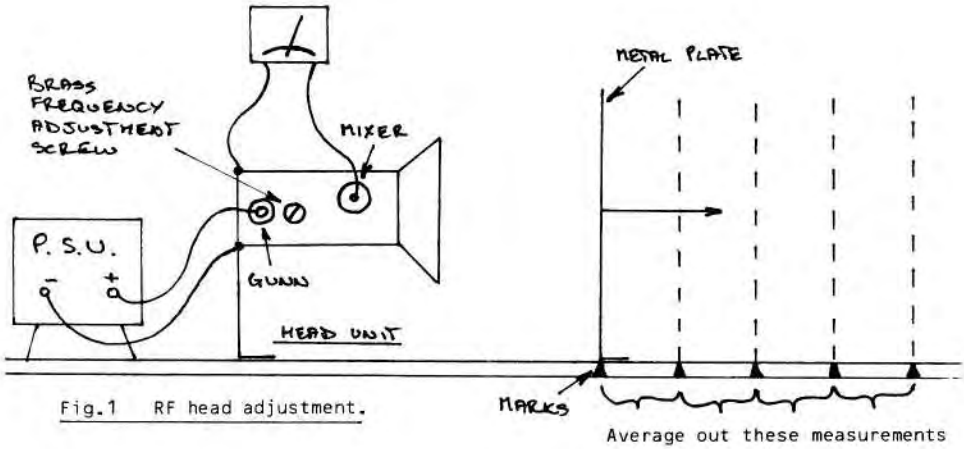


Fig.1 RF head adjustment.

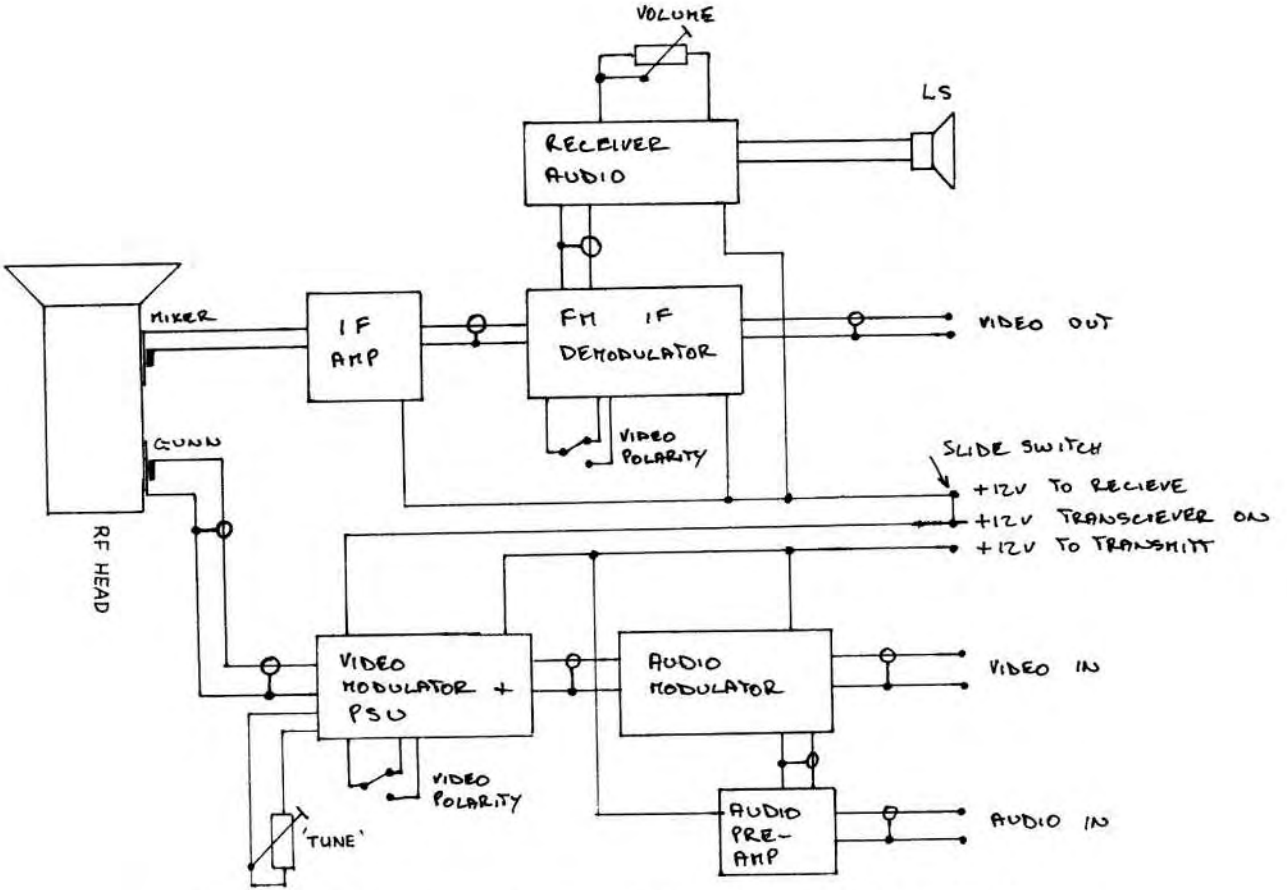


Fig.2 10GHz transceiver modules interconnection (receive position)

To set the Solfan unit to approximately 10.4GHz undo the brass locknut and screw in the brass screw by 1-turn. DO NOT move the steel screws yet. Fix the head unit firmly to a flat surface and apply about +5.5 volts to the GUNN diode.

WARNING: NEVER LOOK INTO THE WAVEGUIDE WHEN POWER IS SWITCHED ON.

NOTE: GUNN diodes are negative resistance devices, lowering the voltage results in an increase in current, so be careful not to apply less than +5 volts as the current then drawn by the diode may destroy it.

Connect a multimeter between the mixer diode and ground (Fig.1), with the gunn supply on a current of between 1 and 3mA should be shown on the meter. Take a flat piece of metal and, keeping it parallel to the mouth of the horn, move it slowly away and watch for a minimum reading on the meter. When this condition occurs mark the position of the plate. Continue moving the plate outwards until another position of minimum current is found and again mark the position of the plate. The distance between the two marks is half the wavelength of the oscillator and from this can be determined the frequency. The accuracy of the system can be improved by finding several 'minimum' positions and averaging the result. If the frequency is not correct make small adjustments to the BRASS screw until the correct frequency is obtained, turning the screw in reduces the frequency and screwing it out raises it. The following equation is used to determine the actual frequency from the wavelength measurements.

$$\text{Frequency} = \frac{150}{\text{distance in millimetres}} \text{ GHz}$$

CIRCUIT DESCRIPTION

The simplicity of the transceiver islargely due to the use of readily available kits and circuit boards for the various sub-units. The block diagram in Fig.2 shows the interconnection of the various assemblies.

The IF PREAMPLIFIER is built around an SL560C integrated circuit, which comes in an eight-pin package and exhibits a gain of some 30dB with a quoted noise figure better than 2dB. The circuit shown in Fig.3 has been optimised for use with the Solfan head unit, it has an input impedance of 300-ohms and the output impedance matches the the FM IF. The preamplifier must be mounted as close as possible to the mixer diode on the head unit keeping wiring leads short.

The FM IF is the BATC design originally described in CQ-TV122 p6, with all the modifications added as detailed in CQ-TV126 p14. A circuit board is available from Members Services.

The receiver audio board is the SCR-2 Sound Demodulator from Wood & Douglas, although any sound demod could be used (CQ-TV132 p31).

The video modulator circuit is shown in Fig.4 and an undrilled printed circuit board may be obtained from the Worthing and District Repeater Group c/o 106 Willow Crescent, Worthing, W.Sussex BN13 2SY, Tel: 0903-67764 (7-8pm evenings). The circuit requires 1-volt p-p of video and features CCIR pre-emphasis. An NE592N video amplifier IC is used to allow for adjustment of video deviation. The 7805 regulator provides the supply for the Gunn diode

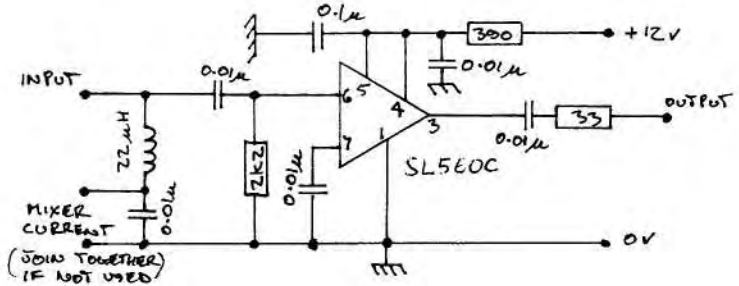


Fig.3 I.F. Pre-amplifier.

(fit board close to the mixer and keep leads short).

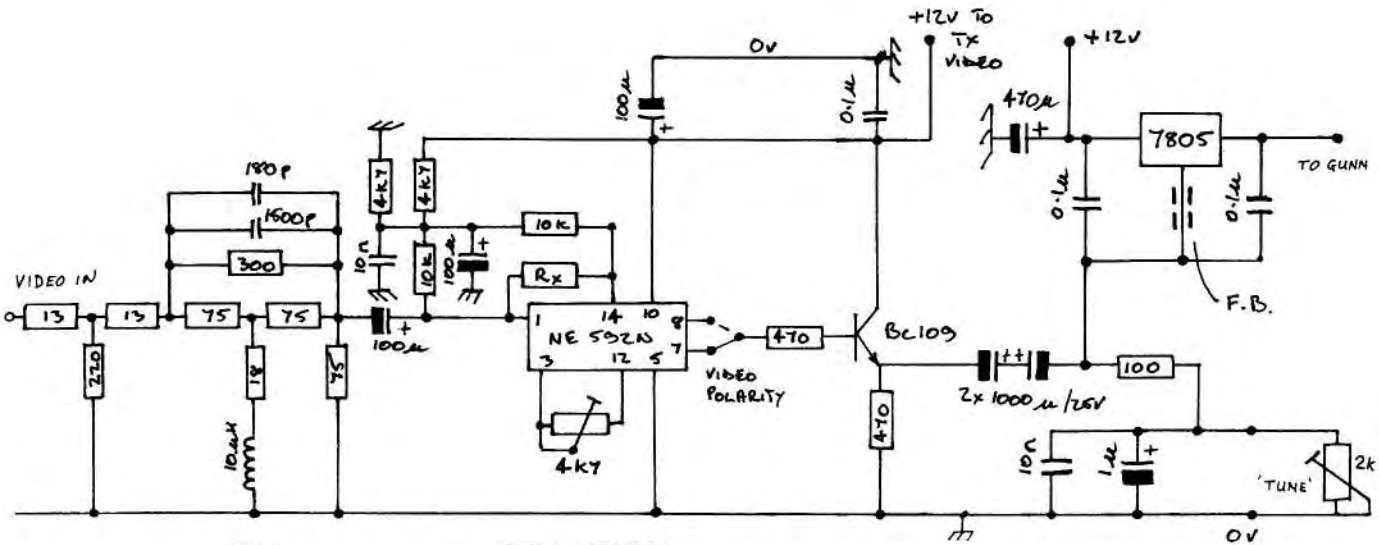


Fig.4 Video modulator.

with the modulating signal applied to the centre (normally earthed) reference pin, the tuning control provides a shift of approximately 50MHz. Please note that the supply to this board must be maintained when in receive in order to supply the mixer diode with it's local oscillator.

The audio modulator is the SCT-2 Sound Modulator from Wood & Douglas. This requires 1-volt p/p of audio, so in order to drive it directly from a microphone the MOD-1 AUDIO PREAMP, also from Wood & Douglas is used, although any audio preamplifier could be used.

CONSTRUCTION

The horn aerial should be removed from the head unit. Cut an aperture EXACTLY the same size as the internal dimensions of the waveguide into one side of a suitably proportioned die-cast metal box (STC stock no. 73402X) and mount the unit precisely in the box. The slot should be cut so that the head unit can be mounted with the IF Preamplifier positioned as close as possible to the mixer diode.

NOTE: With the long side of the waveguide HORIZONTAL the polarisation is VERTICAL and vice versa.

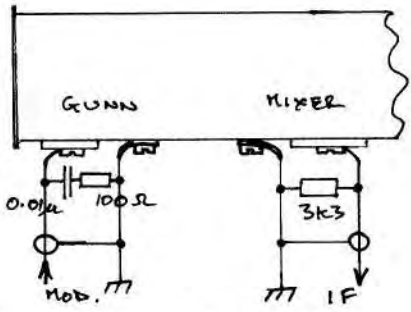


Fig.5 Gunn and mixer connections.

The various modules should be connected as shown in Fig.2 using screened leads for all interconnections. Refer to Fig.5 and add the components shown to the head unit as close to the diodes as possible.

The horn aerial can be mounted on the outside of the die-cast box, or alternatively, with some waveguide bolted on, a dish may be fitted.

ALIGNMENT

Before connecting the output of the video modulator to the gunn diode, check by varying the 'tune' control that the voltage output from the 7805 varies from approximately 5.5 to 12 volts. Connect the video modulator to the gunn diode and, with the aid of an oscilloscope and with an input to the modulator of 1 volt p/p, check that approximately 50mV of video is superimposed onto the tuning voltage. Whilst varying the 'deviation' control ensure that the level of the superimposed video also varies. If the correct level of deviation cannot be obtained then alter the value of Rx (Fig.4) by small increments until the desired level is obtained. Raising the value of Rx will raise the level of deviation. Remember that +12v must be applied to the 7805 to receive as well as transmit. The 'tune' control will tune the transceiver by around 50MHz or so.

The other modules should be aligned normally following the supplier's instructions. If the BATC FM Demodulator is being used then follow the alignment instructions in CQ-TV122 and if possible confirm it's operation first.

When the transceiver is completed tune into a weak signal and adjust the STEEL screws on the head unit for maximum signal strength.

OPERATION NOTES

Transmit power will be approximately 10mW and with the simple horn aerial will not present any health hazard. However if a dish aerial is used then the ERP could be of the order of 10W, therefore do not stand in front of the dish for long periods when transmitting.
NEVER look into a waveguide, horn aerial or dish feed when radiating power, as serious damage to your eyes may result.

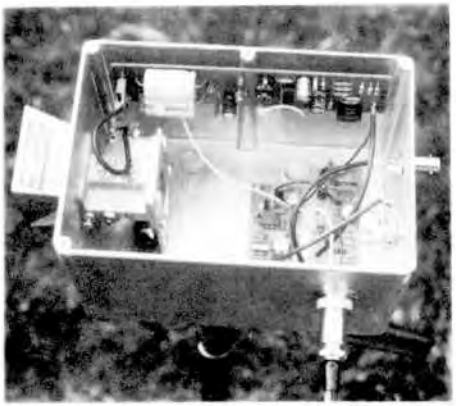
The transmission paths likely to be covered are basically line-of-sight, but interesting results can be obtained by reflecting signals from solid surfaces. The order of distances obtained using this transceiver will be approximately 2km with the horn aerial, but may be in excess of 50km when using a dish.

If a test beacon is required then a Solfan GUNN oscillator unit without the mixer diode can be purchased for £7, this can then be used with a Video Modulator unit to provide a test signal.

If this video modulator circuit is used with other makes of GUNN oscillator then ensure that the diode is a POSITIVE supply type, the more usual variety is of the opposite polarity.

So there you are, a simple, cost effective transceiver for 10GHz, that will give an insight into microwave techniques and, hopefully, help to promote some interest in the higher microwave bands.

The photographs show two different versions of the 10GHz transceiver.
Details of dishes and feeds may be obtained from the RSGB 'VHF/UHF Manual'.



The complete 10GHz transceiver showing the Solfan horn aerial as supplied.

A general view of the transceiver fitted with a dish earial and 'penny' feed (see RSGB VHF/UHF Manual).

MODIFYING THE ROBOT-400

By D. Anderson, G6YBC

This article has come about to try and bring some of the existing modifications to the ROBOT 400 SSTV scan-converter together. No claims are made for the originality of any of the material used, except for the 256-line mode system, where the assistance given by Frank Wood G8NSE is gratefully acknowledged.

SUPERIMPOSED GRAPHICS AND SPECIAL EFFECTS

There is no need to have a computer or second memory to superimpose graphics, all that is required is your video camera, a letter board or 'magic-marker' and this relatively simple modification. The additions to the circuitry consist of two miniature toggle switches, one 4.7k resistor, some hook-up wire and some unused sections of four IC's already on the Robot circuit board. This modification also provides a facility for reversing the caption or background from black/white to white/black and vice versa.

All the comparator outputs in the 400 are combined by logic gates to form the 4-bit words representing black, 16 shades of grey and white (see table A-2 Digital Codes in the Robot manual). The first significant bit in each word is high (1) for the eight darkest shades and low (0) for the eight lightest. Also, the first two significant bits are the same in each group of four shade codes. Black graphics on a white background, or the reverse, can be snatched without wiping out a picture already in memory, by supplying the write enable encoder with only the first two significant bits of data. An added bonus is that the entire grey scale can be reversed before input to the memory, by simply inverting the first significant bit, thus making it possible to operate the station using only one caption board.

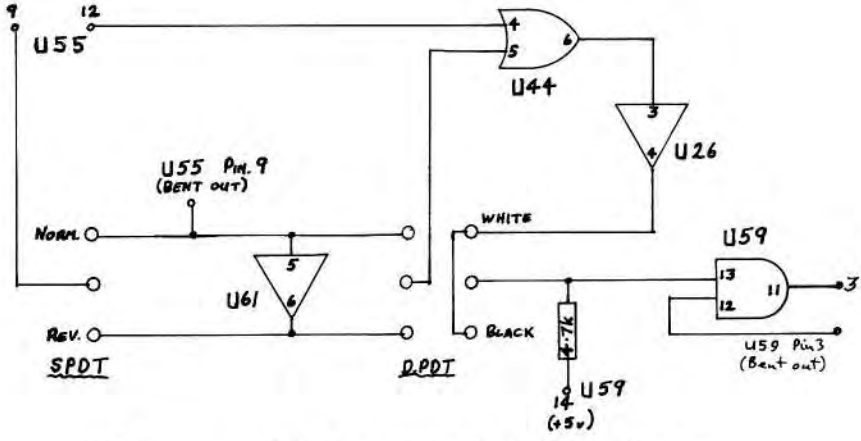


Fig.1 2-Bit and caption reversal modification

CIRCUIT DESCRIPTION Fig.1

For simplicity in the following the darkest shades are simply referred to as black and the lightest as white and all IC numberings refer to Robot designations on the circuits and layouts. The two most significant bits of data from pins-9 and 12 of U55 are sampled by a section of the OR gate array U44. Data from pin-12 is low for both black and white and data from pin-9 is high for black and low for white. Therefore, by feeding pin-9 data through one half of a DPDT centre-off switch and inverting black high through a section of U61, both inputs to U44 will be low and the resulting output low for both black and white. This output is then inverted by a section of U26 and fed through the other half of the switch as one high input to a section of the AND gate array U59 (pin-13). The other input to the AND gate (pin-12) is connected to an existing high output of U59 by removing pin-3 from the IC socket and connecting with hook-up wire to pin-12. The resulting high output of the AND gate (pin-11) is connected to the now empty socket position of pin-3, which is routed to the write enable circuitry. When the switch is in the centre-off position, the input to pin-13 of U59 remains high through the 'pull-up' 4.7k resistor, connected between pin-13 and pin-14 (+5v) and the Robot functions normally. For black and white reversal, the input to memory pin-9 of U55 is bent out from it's socket and connected through a SPDT switch. When the switch is in the REVERSE position, data from pin-9, already inverted by U61, is fed to the socket of pin-9 and thus to memory input. When the switch is in the NORMAL position then pin-9 of U55 is routed as normal to it's socket.

WIRING AND CONSTRUCTION

I chose to mount the two new switches on the front panel of the Robot, along with the '256' and 'Quad' modification switches, what are a few more holes? Remove the Robot board and set aside, drill two 15/64" holes, 7/8" apart, through the front panel on a line directly below the power-on LED. The bottom hole should be 5/8" above the top of the white outline around the receive contrast and brightness controls. CAUTION! take care to ensure that the wiring loom running along the inside of the front panel is not in the way whilst drilling. Locate U55 (74LS157), U59 (74LS08), U44 (74LS32), U26 (74LS04) and U61 (74LS04). Remove U55 from it's socket, bend out pin-9 and replace the IC in the socket. Remove U59 from it's socket and bend out pin-3, carefully drill a 1/8" hole through the circuit board adjacent to pin-2 of the socket (U59), making sure to avoid any tracks on the board above and below, then replace U59. All wiring is done on the bottom of the board except for the connections to pin-9 of U55 and pin-3 of U59, these are made by bringing the hook-up wire through the hole drilled in the board. When the wiring has been completed, mount the switches, reinstall the board making final connections and tune for maximum smoke!

Wiring List:
1) U59 - 4.7kohm 1/8W resistor between pin-13 and pin-14.
2) U59 pin-13 to the right centre terminal of the DPDT switch (graphics switch)
3) U59 pin-3 to pin-11.
4) U59 pin-12 through hole in board to bent out pin-3.
5) U55 pin-9 to centre terminal of the SPDT switch (reversing switch).
6) U55 bent out pin-9 through hole to U61 pin-5.
7) U55 pin-12 to U44 pin-4.
8) U44 pin-5 to the left centre terminal of the graphics switch.

9) U44 pin-6 to U26 pin-3.
10) U26 pin-4 to the top right and bottom right terminals of the graphics switch.
11) U61 pin-5 to the top terminal of the reversing switch and to the top left terminal of the graphics switch.
12) U61 pin-6 to the bottom terminal of the reversing switch and to the bottom left terminal of the graphics switch.

N.B. The references to left and right when referring to the switches are when viewed from the rear.

OPERATION

Due to the use of the additional IC sections and the extra lengths of wire it will be necessary to adjust the width control slightly clockwise to compensate for the extra delay to the data. Good lighting is very important when setting up a picture in the memory. For camera graphics suggested settings are, Snatch Contrast at 12:00 and Brightness at 9:00, these will vary depending on the lighting conditions. Choose a darker background for white graphics and lighter for black. When adjusting the Snatch controls remember that the picture will be wiped out by too much brightness for white and by too little for black. For white letters on a black board set the graphics switch to the WHITE position (down), to obtain black letters set the reverse switch to REVERSE (up). For black letters on a white background set the graphics switch to the BLACK (up) position and to invert set the reversing switch to REVERSE.

256 LINE TRANSCEIVE

The term '256 line' used in SSTV is often misleading, it means 256 lines x 256 pixels in a 32-second picture. The Robot 400 converter transmits 128 lines x 128 pixels (i.e. 1:1 aspect ratio) which are translated by internal systems. The modification shown will get most of the 256 line picture but not all, as it is for a 1/2 speed 128 line format (i.e.every other pixel). The line time is the same as 128 lines (8 seconds), but doubling it to 16-18 seconds gives the advantage of longer frame time, thus providing a better 'QRM' copy of the picture.

There are many designs for this modification, ranging from very simple to highly complex and I have tried most with varying effects. Some modifications require a 74LS74 to divide the output of U60 to U13, plus extra components around U60. However, this was found to be unnecessary, all that is required is a simple resistive/capacitive network added at the edge connector and the front panel switch, as shown in Fig.2.

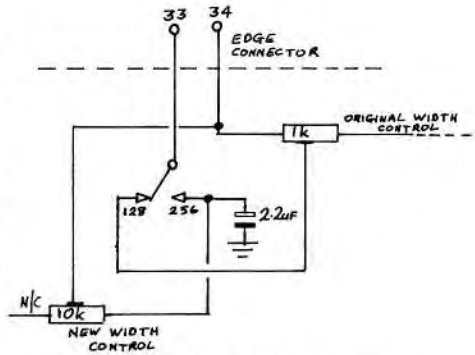


Fig.2 256-Line transceive

OPERATION

To receive set all the controls to normal operation and the 256/128 switch to 256. Feed in a 128/128 picture and adjust the new width potentiometer for exactly two, side-by-side pictures on the screen, with a black division bar down the centre.

To transmit a 256 line picture (16 to 18 seconds) first snatch a frame of 128 line video in the normal manner and disconnect the video source. Set the Display switch to the CAMERA position and you are ready to transmit. This procedure must be followed otherwise problems will be encountered with the snatched picture and the syncs.

FOUR PICTURES IN ONE

The original idea for this modification was by KD6HF and it enables the user to store and transmit four completely different pictures in one Robot 400, the format being 64 lines x 64 pixels per picture. The quadrants may be selected one at a time for re-transmission, or all four may be sent in the normal manner. When using either method the receiving station will see four pictures on his screen at the same time; one in each quadrant. The previous modification (256 line) will need to have been installed also for this to work correctly.

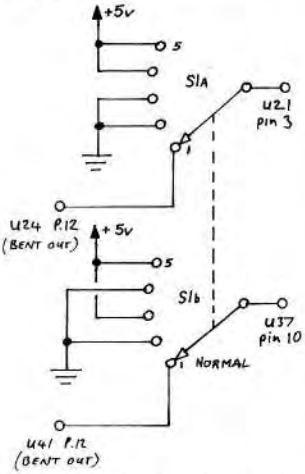


Fig.3 Four-pictures-in-one

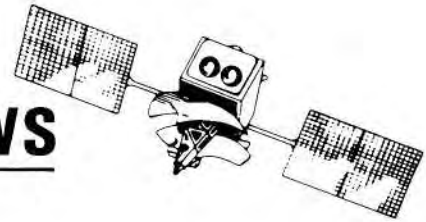
The circuit in Fig.3 shows all that is required. Switch S1 is a DO5T wafer type, one section, S1a, is wired between U24 pin-12 and U37 pin-3. Section S1b is wired between U41 pin-12 and U37 pin-10. With S1 in position-1 then normal operation of the converter takes place. Positions 2 to 5 of S1 select combinations of ground and +5 volts routed as the inputs to U21 pin-3 and U37 pin-10, such that each switch position selects a different quadrant.

Assuming that the 256 line modification has been installed, switch S1 to position 2, the 256/128 line switch to 256, this will select quadrant 1 for viewing and storage. Note that whatever video is in quadrants 2,3 and 4 will be held in memory regardless of the HOLD/CONTINUE switch position. When quadrant 1 has been filled, freeze it, switch to quadrant 2 and so on, until all they have all been filled.

There are two ways to transmit from memory, all four quadrants at once or 4x any one quadrant. To transmit 4x one quadrant set the 256/128 switch to 256 and S1 to the desired quadrant position. To transmit all four quadrants simultaneously, set the 256/128 switch to 128 and S1 to normal.

As stated initially I claim no originality for these modifications, but hope that they may prove of interest to those of you who wish to enhance the plain 128 x 128 black and white picture facilities offered by the excellent Robot 400.

SATELLITE TV NEWS



by Charlie Suckling G3WDG

Satellite TV is rapidly becoming part of modern day life and is destined to influence our lives still further as time progresses. Having carried one or two satellite TV related articles in recent issues, we are pleased to welcome here a new regular column dedicated to the subject.

Charlie Suckling has for many years been in the forefront of UHF and microwave technology in both commercial and amateur circles and is well known for his journalism in 'Radio Communication' and other publications. In more recent times Charlie's interests have diverted towards the reception of satellite TV transmissions and it is in this field that he now devotes much of his efforts. It is appropriate then that this regular column should start with Charlie's pen and we hope that it will prove popular and informative to readers of CQ-TV.

Ed.

There is no doubt that interest in amateur satellite TV is growing rapidly. There is first the attraction of building the equipment and getting it going (hopefully!) then the fun of watching your first TV signals from over 2,300 miles away. Unlike most aspects of amateur radio/TV satellite TV can also benefit the rest of the family! This column has been started not only to cover news but also to provide a forum for exchange of ideas between satellite TV home constructors. So please write or phone me with any items you may think might be of interest to others.

In this column I have decided to list all the currently active transponders on Intelsat V at 27.5W and Eutelsat 1 (ECS1) at 13E. These two satellites carry the most programming of immediate interest, but there are at least 4 or 5 other satellites active in the 10.95 - 11.7GHz band. (I hope to provide more information on these other satellites in the next column and would appreciate any information you may have). The information below may change as it is not unknown for the programmers to go out of business from time to time! Power levels are as measured at my location and may be a few dB in error. Signal levels also change by a few dB from time to time as the uplink stations adjust their parameters. I have even seen signals fade out on one transponder while other transponders on the same satellite have not changed. "Y" in the 24hr column implies that at least a carrier plus syncs are transmitted 24-hours a day, but not that there is continuous programming. Pol means polarisation.

Please use the table only as a guide and don't blame me for any errors (but do tell me!).

(Please send correspondence on satellite TV to: 46 Windsor Close, Towcester, Northants NN12 7JB. Tel: 0327-52100)

INTELSAT V E1=25.6 Az=211.5 (true) from Central England.

Channel Power	Freq.	Programming	Pol.	24hr	Sound subcarriers
PREMIERE 45dBW	11.015	Films	H	Y	6.6MHz main
CHILDREN'S CHANNEL		Children's programmes			7.02MHz L Stereo 7.2MHz R Stereo
SCREEN 45dBW	11.135	Sport	H	Y	6.6MHz main
SPORT ARTS CHANNEL LIFESTYLE		Arts General			7.02MHz L Stereo 7.2MHz R Stereo
Spare 44dBW	11.175	None	H	Y	6.6MHz
CABLE NETWORK 46dBW NEWS	11.155	News from USA	V	Y	6.6MHz

EUTELSAT-1 E1=28.5 Az=161.5 (true) from Central England

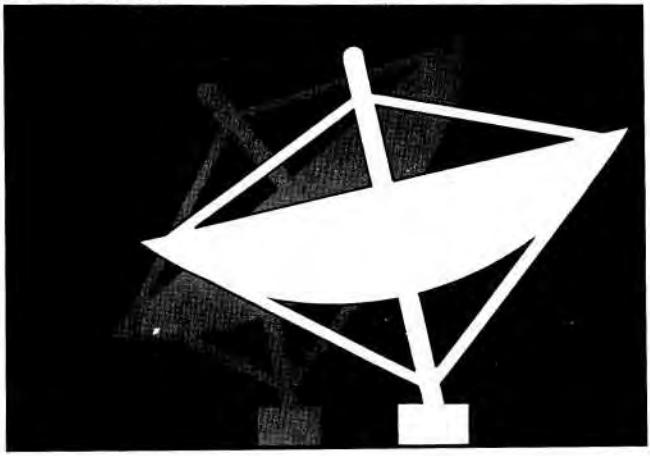
RAI 47dBW	11.005	General (Italian language)	H		6.6MHz
3-SAT 37dBW	11.055	General (German language)	H	N	6.65MHz
EUROPA 47dBW	11.170	General	H	Y	6.65MHz (English) 7.02MHz (Dutch) 7.2, 7.38, 7.56MHz
TV5 47dBW WORLDNET	11.470	General (French language) News (USA)	H	N	6.65MHz
SKY 46dBW	11.650	General	H	Y	6.6MHz mono
TELECLUB 47dBW	10.986	Films (German language)	V	Y	6.5MHz

Channel Power	Freq.	Programming	Pol.	24hr	Sound subcarriers
RTL 34dBW	11.085	General (German language)	V	N	6.65MHz
FILMNET 46dBW	11.138	Films	V	Y	6.6MHz mono 7.02MHz mono 7.2MHz digital data
SAT1	11.507	General (German language)	V	Y	6.65MHz 7.02MHz Voice of America Europe 7.2MHz radio
MUSIC BOX 47dBW	11.674	Pop videos	V	Y	6.65MHz mono 7.02MHz L Stereo 7.2MHz R Stereo

Notes:

1. 3SAT and RTL are transmitted on the east spot beam and are much weaker. RTL is just about watchable on a good home system, while it is normally only possible to just about lock a signal from 3SAT.

2. All signals are standard PAL apart from SKY and FILMNET which have scrambled video. Looking on a scope one can see that Sky Channel has inverted video with no line sync pulse, but a burst of (approximately) 2.5MHz and a burst of digital data (presumably sound). FILMNET also has inverted video but uses a different scrambling system where the line sync pulse is present together with a normal looking colour burst, but the subsequent video is shifted down so that the black level is 0v instead of 0.3v (no wonder the sync separator gets confused!)



A WIDEBAND OPTOCOUPLER

By A.Macarthur

Well it all started when I wanted video "IN" to my G11, but the problem was the live chassis. Why not use an isolation transformer? I hear you say. But my set had teletext which took up all the unused space in the cabinet, besides the G11 chassis sits at half rail voltage, even with an isolation transformer. What I needed was an opto-coupler that would handle video. No problem I thought, there's bound to be a circuit in one of my collections of magazines or books. I have an awful lot of magazines going back many years so I started looking. Two weeks later I had finished looking, only one circuit could be found. This was in the Video Handbook by Ru Van Wezel but it had a frequency response of 9dB down at 5MHz which was not really suitable for colour.

I decided then to have a go at building one myself so, armed with an old Hewlett Packard application note and a 1977 data book, I set to work. The result is shown in Fig.1.

The circuit has a 3dB bandwidth of 10MHz and is flat to 8MHz. It is therefore capable of very high performance and suitable for high resolution text and graphics as well as colour.

TYPICAL PERFORMANCE DATA

2% linearity over 1v p-p dynamic range
3dB bandwidth - 10MHz
Gain drift - -0.6%/°C
Common mode rejection - 22dB at 1MHz
D.C. insulation - 3000v
Signal-to-noise - 50dB WRT, 1v p-p input

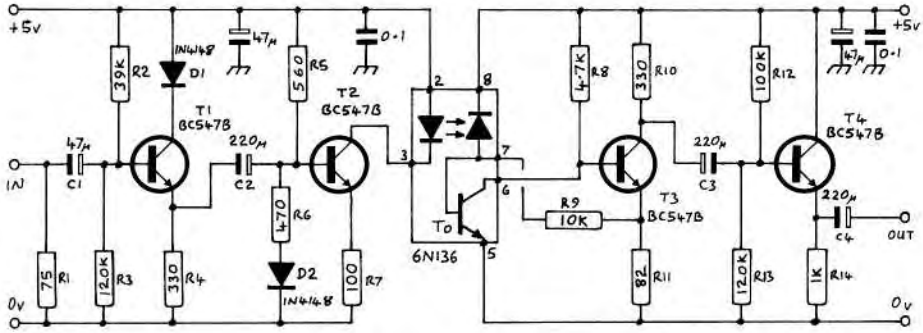
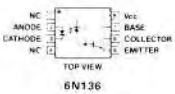


Fig.1 VIDEO OPTOCOUPLER CIRCUIT DIAGRAM



The circuit is based on an optocoupler type 6N136 which has been around for about 8-years. This is a Hewlett Packard device and is an industry standard. It is available from most suppliers including Electromail (RS Components) stock number 303-141. However, of all the optocouplers tried out, only those branded with the HP logo produced identical results with the component values shown. The ones available from Electromail are not branded and have a somewhat variable performance, nevertheless their performance is still very good and quite suitable for most applications. The measured response from the poorest specimen was 3dB down at 5MHz. In order to achieve optimum results though use a genuine HP device.

CIRCUIT DESCRIPTION

The circuit shown in Fig.1 produces unity gain between input and output and the input can be terminated in 75-ohms or left at high impedance. It is designed to work with a nominal 1-volt video input but can tolerate up to a 1.7v level.

T1 is a conventional emitter follower, a diode being fitted in series with the collector to ensure that the input signal is not loaded when the unit is switched off. This is coupled to the LED driver via C2. The static bias through the LED is set to 20mA by means of R5 and R7. Resistor R7 is selected so that the current varies from 15mA to 25mA as the input signal swings up to 1v p-p. The high bandwidth is achieved by the circuit configuration of T0 and T3. A separate connection for the photodiode bias and the output transistor collector improves the speed up to a hundred times that of a conventional optocoupler by reducing the base/collector capacitance. The output transistor in the IC is connected in a cascade circuit with T3; feedback is applied through R9 and R11. Resistor R11 is selected for the maximum gain/bandwidth product of T3 and R10 determines the output swing. The closed loop gain is determined by R9 and D2 is included in the bias circuit of T2 to improve the temperature stability. The output of T3 is fed via C3 to emitter follower T4 and is suitable for driving the input to a transistor or integrated circuit in the television set to be modified.

If a 75-ohm output is required, a suitable circuit is shown in Fig.2. R27 is adjusted to provide 1-volt into 75-ohms.

If a slight loss of bandwidth can be tolerated T4 can be omitted and the base of T7 can be taken from the negative end of C3. If a greater signal handling capability is needed run T7 and T8 from a 12v supply increasing R25 to 470-ohm and making T8 a 2N2905 or similar. If you want the unit to be used at the end of a long coax cable run, in order to remove hum by breaking the earth return loop, it will be necessary to compensate for the HF losses in the cable. This can be achieved by including the circuit in Fig.3 between T3 and T4. The HF lift control, R18, will provide up to 6dB of lift at 5MHz. The large value coupling capacitors are required to minimise tilt on the frame pulse, do not reduce them!

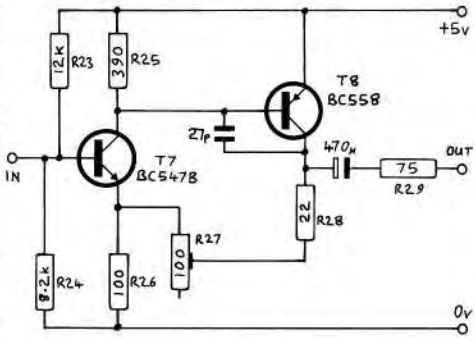


Fig.2

CONSTRUCTION

The original was built on Veroboard but some care is needed with the layout. The critical part of the circuit is the cascade amplifier formed by TO and T3, this is a high gain wideband amplifier. R9 must be directly connected to pin-7 of the optocoupler as this is a high gain input point, do not use Vero track or a piece of wire but connect the resistor directly to the IC. If you do use Vero, remove any surplus copper track in the area of TO and T3. Should by any chance transistor T3 start acting like an oscillator, connect a small value capacitor (around 22pF) between the collector and base, this will however cause a slight chroma lag, visible on a 10T pulse. If the application is critical and this could cause a problem, an alteration in layout should cure the fault.

SAFETY

As with all cases where mains voltages are involved take great care. A word of caution; do not do the same as I did. when the unit was installed in my TV I decided to connect a double-beam 'scope to look at the input and output at the same time. You know what comes next? the zero volt rails were connected together by the two 'scope probes which removed the isolation provided by the unit. The 'scope was earthed so BANG, a big repair job on the TV again. Only use one 'scope probe at a time and if it is a G11 use a blocking capacitor on the probe earth.

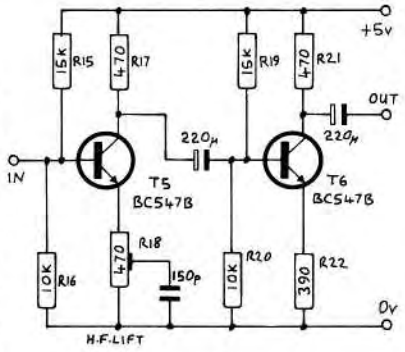


Fig. 3

Silent key

It is with the deepest regret that we record the passing, on July 11th, of Graham Goodger, ZL2RP. A long-time member of the BATC Graham was due to visit his friends in the UK this year.

He was interested in video in all its forms having built the G8CGK pattern generator, a SSTV monitor plus the ZL version of the popular JA/G3WCY scan converter, which he was looking forward to converting to colour. Graham gave many their first ever SSTV contact and was well known on the air.

We extend our condolences to his wife Rata and daughter.

G3LPB

UNIVERSAL SYNC RE-PROCESSOR

By John Goode

Those of you with long enough memories to stretch back to CQTV 131 may remember reading an article with the snappy title of "Synchronising Micros and VTRs". In it I tried to outline some of the problems that arise when trying to synchronise these pieces of equipment with other vision sources in the shack without (1) extensive modifications that invalidate guarantees, and (2), spending large sums of money on ancilliary equipment. One piece of gear that was referred to as being under development was the "Universal Sync Unit". It is now built and working; however, I have decided that a slight change of name was desirable so that it sounds as if it should be in the shack rather than the kitchen!

The idea of the USR is to have a unit that will produce the standard SPG pulses and subcarrier locked to ANY source of composite PAL video, including micros that may have non-standard scanning. This is done by using a direct locking circuit for the field pulses rather than counting down from twice-line. The unit should therefore lock to any signal that a TV receiver or monitor will, as it uses similar techniques. Note that it is NOT a stand-alone Sync Gen., and MUST have an input signal to lock to.

As I wanted to test it with my own vision mixer, I have included a black and burst generator in the prototype, but this is optional of course. Nevertheless, I have taken this opportunity to build and debug a new design of BBG (suggested in CQTV134) using the 1496 (cost, approx. 90p) instead of the 1445 (around £9 if you can get it), and I am quite pleased with the results.

The building and testing of the prototype has been jointly undertaken by the Editor (G3YQC), David Ellis Jones (GW8PBX), and my (unlicenced) self; as this involved it travelling from Warwickshire, via Anglesey to Hertfordshire, all to busy people, you may begin to realise why it has been some time in coming!

CIRCUIT DESCRIPTION

The circuit can be conveniently divided into four parts:-

(Board 1) Video input, horizontal and subcarrier oscillators;
(Board 2) Pulse forming and subcarrier distribution circuits;
(Board 3) Black and burst generator;
(4) Power supply.

Fig.1 shows the input circuit. Q1 separates the chroma from the luminance; the luma is amplified and inverted then applied to IC1, a TBA920 chip containing the sync separator and horizontal oscillator. The time-constant of the oscillator PLL is wired in the 'fast' mode so that the unit is suitable for following the instabilities present when replaying videotaped material. This means that some horizontal "ragging" may occur if a noisy signal is used as the master source (so don't). The chroma signal is applied to a TDA3950 BLO chip arranged in a similar circuit to that due to GW8PBX shown in CQTV129.

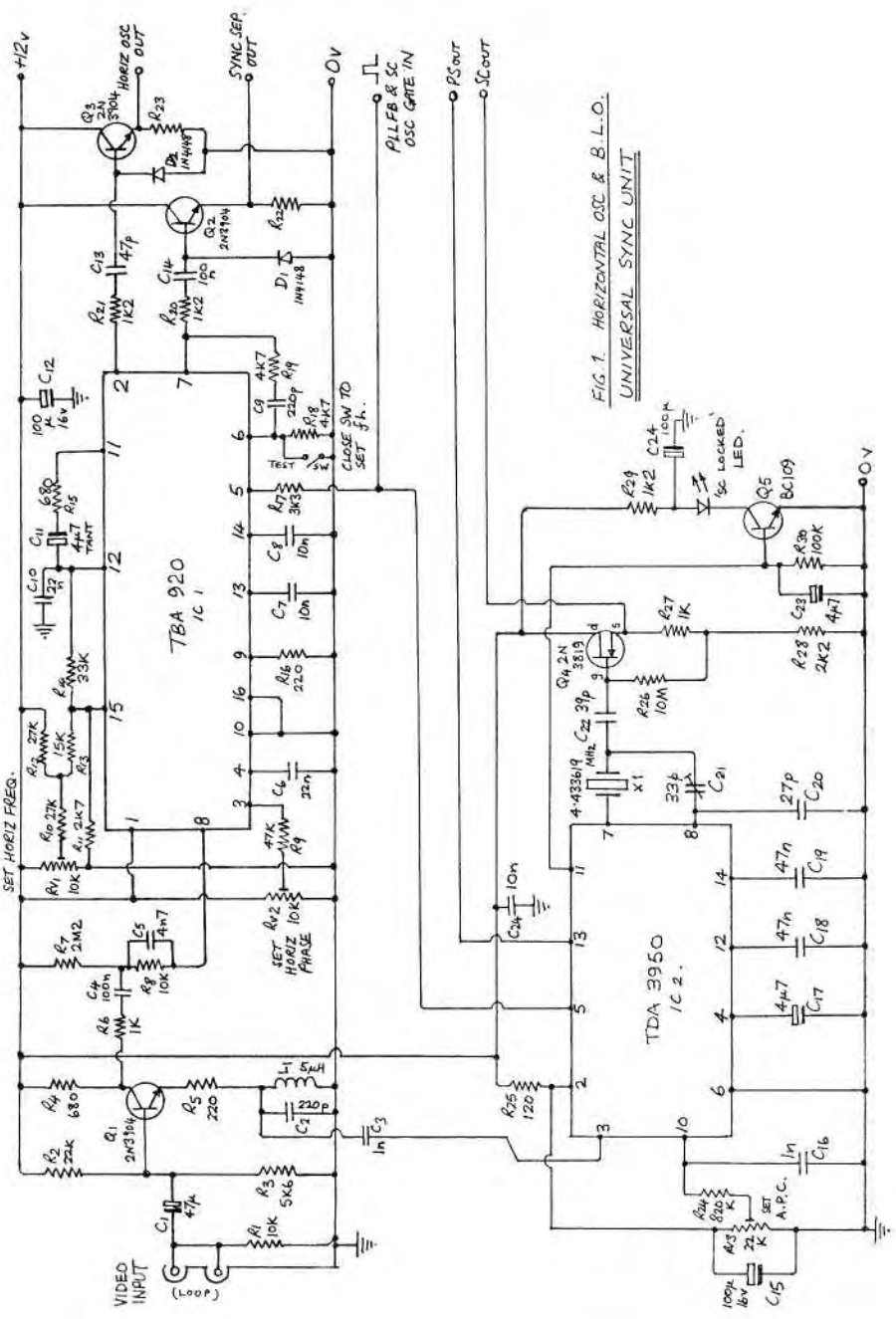


FIG. 1. HORIZONTAL OSC & B.L.O. UNIVERSAL SYNC UNIT

Both chips use a feed of line blanking fed back from board 2 - the TBA920 as the PLL sample, and the TDA3950 to gate the burst for oscillator synchronisation. As well as producing a subcarrier output, the BLO chip also produces a PAL Squarewave output synchronised to incoming video.

Fig.2 shows the pulse and subcarrier phasing circuits. The output from the horizontal oscillator is used to generate line-blanking, and from that the other horizontal pulses are generated. The separated sync output is integrated (C30,R10) to provide field sync, and from this the other field-rate pulses are generated. During testing with a processing amp., it was found necessary to arrange for the field-blanking signal to start prior to the regenerated field-sync, otherwise the original field sync would not be fully blanked (due to the unavoidable delay in the integrator). This has been achieved by delaying FB for just under one field period, using a dual monostable type 556 (N9). This exhibits much less jitter at high duty-cycles than the 74-series monostables, essential in this application. (As this unit is designed to be able to work with non-standard signals, the more accurate method of using line-counters is not appropriate).

The PS waveform is generated from the "swinging burst" by the TDA3950. This is converted to TTL level using Z1, and this and R34 sink the input current for N6a. I have checked this circuit using both a 74LS86 and a 7486, and it seems to work reliably.

A suggestion from GW8PBX was that instead of regenerating MS with a single field pulse, we use separated sync so that if a full-spec. signal were at the input, at least then we would get a full-spec. output. However, due to the biassing of the sync separator in the TBA920, the width of the output pulses appears to be increased, in the case of line sync, beyond the start of burst-gate. In view of this I didn't persue the matter further. Whether this can be improved I don't know, so if anyone else feels strongly about it please have a go!

The subcarrier from board 1 is amplified by Q1, and then sliced by N7 a 74LS13 Schmitt-trigger gate. The resulting TTL signal can then be delayed by the adjustable monostable N4a to give fine phase control. The signal is then reformed by N4b, and coarse phase control is provided by N6b. Thus, by using a combination of these controls, the subcarrier phase can be adjusted over the range of one cycle, and be used to adjust the colour of any driven coders to be in step with the master source. The TTL signal is then filtered to a sinewave and distributed by the amplifier Q2,Q3.

Fig.3 is the new black & burst generator. This accepts TTL pulses (MS.BG,PS) from board 2, together with 75 ohm phased subcarrier. The sc input network R2,RV1,C2,R3,C1 provides two quaderature feeds which are then switched by the PS signal in IC1. BG is then attenuated by R19 and R20, and DC restored by D1 before application to IC2, a balanced modulator. The output, suitably buffered and filtered is then added to MS (at Q8) to form the black & burst signal.

Fig.4 shows a suitable power supply, using 78-series 3-terminal regulators. The overall current requirement including the BBG is around 600mA (all outputs terminated).

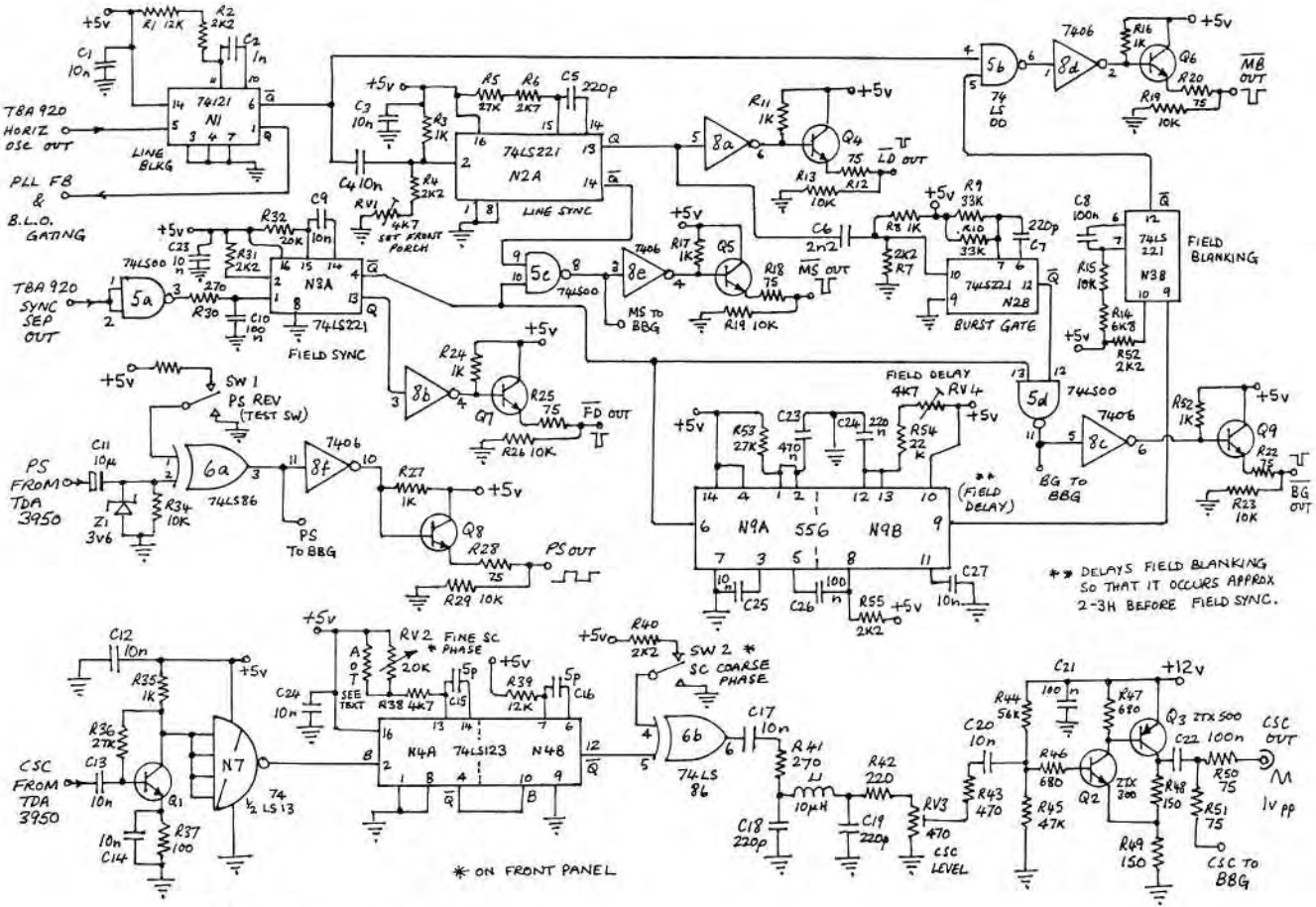


FIG 2 : UNIVERSAL SYNC UNIT

PULSE & SUBCARRIER CIRCUITS (ISSUE 3)

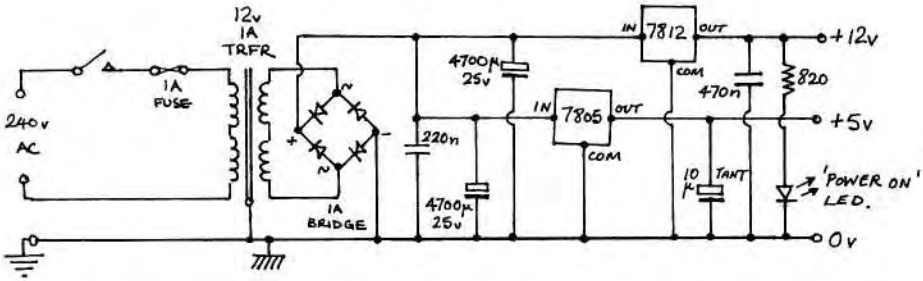


FIG 4 : POWER SUPPLY

SETTING-UP

It is necessary to begin by setting up the sync regeneration before adjusting the subcarrier circuit. The optional BBG cannot be set up until the other signals are correct.

(1) Earth pin 6 of the TBA920 (use the test switch if fitted), and monitor the emitter of Q3 on ch.B of a dual trace 'scope. On ch.A monitor a broadcast (BBC or IBA) signal. Trigger to ch.A (TV line mode), and adjust stability for a stable ch.A trace. Adjust RV1 on input board (Horiz freq) for a minimum rate of run-through compared with off-air signal. Remove earth from pin 6.

(2) Apply broadcast signal to video input, while still leaving it on ch.A of the 'scope. Monitor the PLL f/b (N2 pin 6, R17,TDA3950 pin 5), and adjust RV2 (Horiz phase) so that the leading edge of this waveform coincides with the start of line-blanking on the off-air signal.

(3) Check that the broadcast signal is a colour transmission with a reasonable burst amplitude. If so, with RV3 (set APC) centered, adjust C21 so that the "sc locked" LED lights. Then trim RV3 for the brightest and most stable indication.

(4) Transfer the 'scope ch.B probe to the MS output, and terminate it with 75-ohms. Now adjust RV1 on board 2 (Set front porch) so that the leading edge of line syncs agree with the off-air signal.

(5) Using the terminated ch.B 'scope input, confirm that the other pulses coincide with the appropriate parts of the off-air signal. Note that due to field pulses being recovered using a simple integrator, they will be approximately a half-line late compared with the master signal. In practice this has not been found to be a problem, provided that the start of regenerated field-blanking agrees with the start of field-blanking on the input (master) signal. With the broadcast signal as the master, adjust the start of field blanking with RV4 (field delay).

(6) Provided that your 'scope has a vertical bandwidth of at least 15MHz, reconnect ch.A to the sc output from board 1, and trigger to it (HF mode). If possible, advance the sweep speed so that the wave form is observable (it probably won't be very sinusoidal). Connect ch.B (terminated) to the

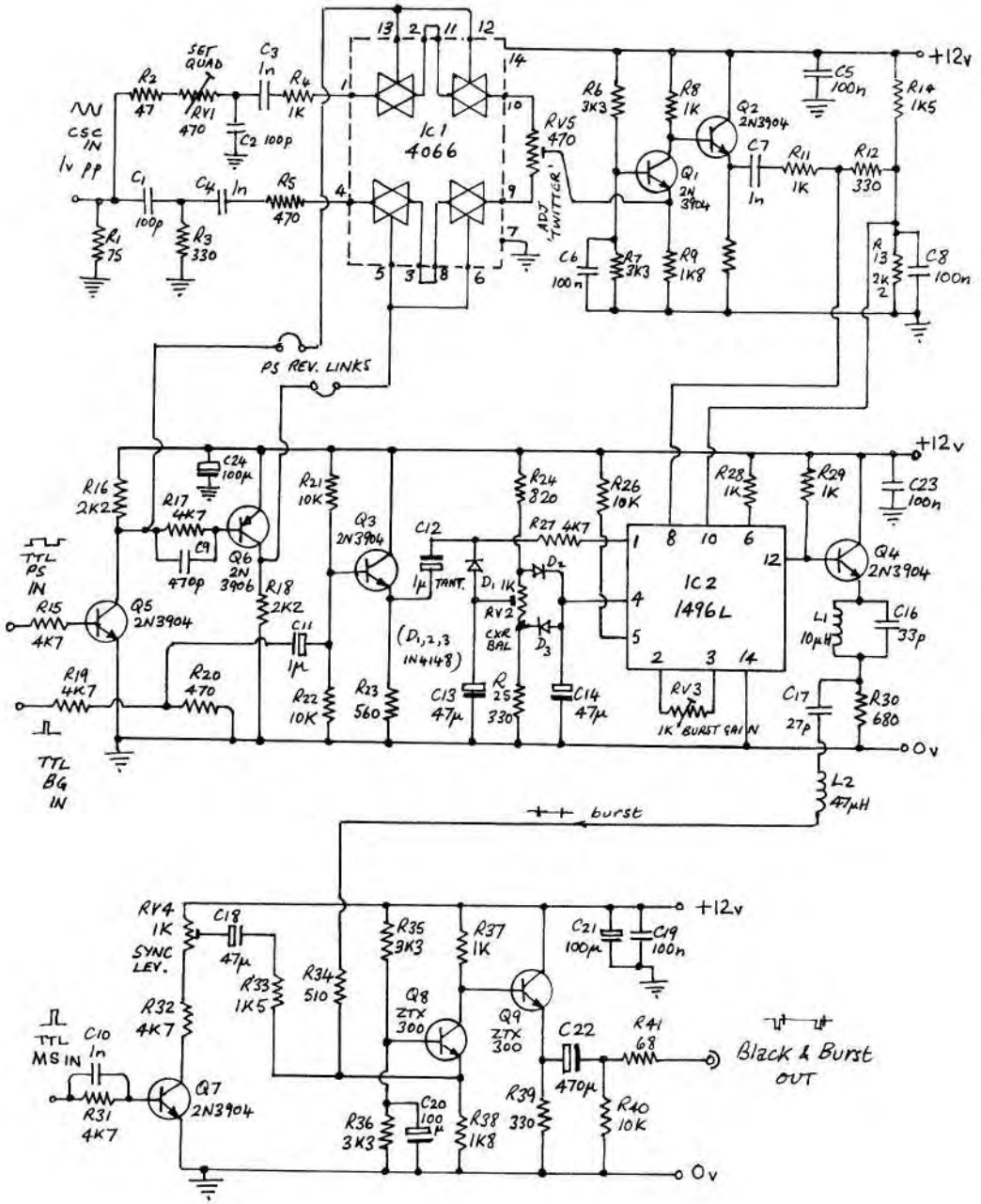


FIG 3. BLACK & BURST GEN. (OPTIONAL)

CSC output, and adjust RV3 (CSC level) to give a 1v pp output. Now try adjusting RV2 (fine phase); if your scope has a fast enough timebase to show the waveform, you should see the csc shift in phase compared to ch.A. If the csc disappears at extreme settings of RV2, it is because there is too much range, and you will have to shunt RV2 with an AOT resistor - start at about 100K and work downwards. Also, check the action of SW2 (coarse phase) - this should change the CSC phase by 180 degrees.

OPTIONAL BLACK & BURST GENERATOR.

Centre all presets. Reconnect ch.A of the 'scope to broadcast signal, trigger from it at line rate. Connect ch.B (terminated) to BBG output; it will probably be covered in subcarrier. Adjust RV2 (cxr bal) to minimise subcarrier, and burst should 'emerge'; continue adjustment until subcrrier is eliminated from all parts of the signal except the burst itself. Adjust RV4 (sync level) for 0.3v pp sync pulses, and RV3 for 0.3v pp burst amplitude. Now adjust the 'scope sweep-speed to show up any line-to-line 'twitter' on the burst, and use RV5 to minimise it. If a vectorscope is available, RV1 can be used to accurately set the burst axes 90 degrees apart. If so, it may be necessary to retrim RV5 as they do interact. If no vectorscope is available, it is best to leave RV1 centered. (Note that if your 'scope's bandwidth is less than 15MHz, you can't be sure that the level settings involving the subcarrier are correct).

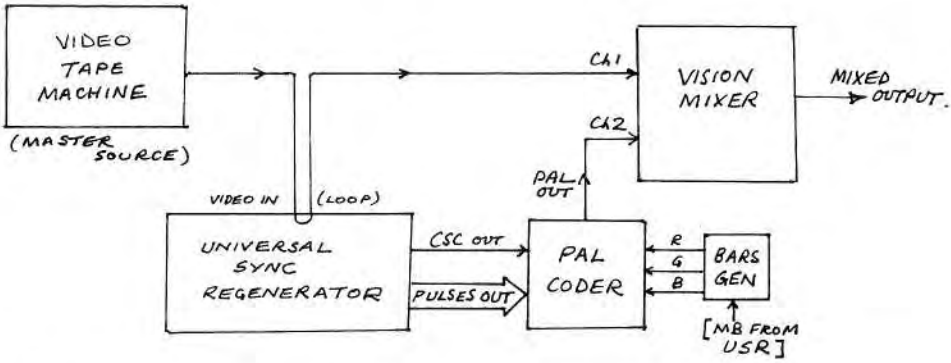


FIG 5 : MIXING SOURCES — (SEE TEXT)

CHECKING FOR COLOUR LOCK

During testing I have found that the 'sc locked' indicator is not foolproof, and that the only way to be absolutely sure that full colour synchronisation is occurring is to actually use the unit to lock a second colour source to the master, and mix between them. Let's suppose that the master source were (say) videotape, and the second source were bars from a colour coder using the pulses and csc from the USR. If the mixer got its sync and burst from videotape it should pass that satisfactorally, and theoretically we should now be able to mix to the bars. Let's go through what might be wrong.

(1) Bars have no colour or streaky random colour:
(Adjust the BLO frequency (C21)).
(2) Colour flickers:
(Adjust APC pot.(RV3)).
(3) Colour is locked, but incorrect:
(Adjust Coarse SC Phase (SW2) for correct bars colour sequence; adjust Fine SC Phase (RV2) for maximum saturation. If neither position of SW2 gives the correct colour sequence, it is necessary to change SW1 on board 2 to reverse the PS phase).

N.B.- If a vectorscope is available, use this to set the Fine SC Phase (RV2) rather than adjusting for maximum saturation.

All the above instructions assume that the circuit is working properly, and that you don't have duff chips, etc. as the Editor did when he first tried to get the unit going!

FURTHER NOTES

If you want to synchronise more than one colour coder to this unit you will need a subcarrier phasing and distribution amplifier so that each additional source can be colour-phased to the master signal - see CQTV127, p.31. As suggested in the same article, the pulses could be distributed by looping-through and terminating the end of the chain. Please note that the pulse output stages used in this unit only work correctly when terminated in 75 ohms.

DON'T END UP LIKE THIS!

By returning your subscription renewal form NOW you will be sure of your CQ-TVs for next year.

There are some GREAT articles coming.

ATV REPEATER - GB3UT

By Henry O'Tani G8OTA

The Mendip Repeater Group's first amateur television repeater 'GB3UT' went permanently on the air at five minutes past noon on Sunday 15th June 1986.

The system is regarded as a somewhat spartan first step, but meets the group's basic technical and licencing specifications.

The repeater is sited at about 210 metres ASL using the same location as the group's 70cm repeater GB3UB. Both repeaters are installed in a lift house on the roof of one of the university's two tallest buildings.

CHANNEL	RMT-1 (1276.5MHz input, 1311.5MHz output)	
MODULATION	Input:	A.M.
	Output:	A.M. (initially double sideband, full carrier)
INITIAL POWER	Approximately 5-Watts E.R.P.	
AERIAL	Single-aerial working	
	Main:	Horizontally polarised, omni-directional, 20el phased co-linear array, nominally 10dB(d) gain.
	STANDBY:	Horizontally polarised, omni-directional, 8-element phased co-linear array, nominally 6dB(d) gain.
MODES	Beacon:	Standard grey-scale pattern generator with a superimposed white callsign at the lower LH side of the frame.
	Repeat:	Standard video 'view-thru' with full 6MHz bandwidth.
ACCESS	A 3-second 625-line frequency AM signal on the input causes the output modulator to accept whatever modulation is present and re-transmit it.	

SYSTEM CONFIGURATION

AERIAL & COMBINER

The main aerial is enclosed in a white GRP weatherproof sleeve, provided by G4ZEU. The mounting is a sturdy welded mild-steel, cold galvanised cylindrical hollow plug, with a 1.75" U-bolt mast clamping stem made by G4OTJ.

Elements are brazed brass 1/8" rod and 1/4" square-section with soft soldered connections to the brass. Fittings are silver and copper.

The stripline hybrid combiner was scaled down from a circuit in the 'UHF Compendium' and assembled and boxed by G4JQP. The diplexer worked well first time and exhibited less than 4dB insertion loss.

FILTERS

The receive and transmit filters were hand built by G4ZEU from copper stock with dimensions supplied by G4JQP from data and calculations originating from and old 'RadCom' article. With an insertion loss of less than 6dB and better than 50dB of rejection, these components form a fundamental ingredient of our successful operation in such a challenging system environment.

RECEIVER

The receiver uses a pre-production prototype CQ-Centre converter which has excellent dynamic range, reasonable low noise sensitivity and freedom from spurious responses. A Mutek bipolar 23cm amplifier gave a marginally useful 5dB improvement simplex, however its incorporation under single-aerial repeater conditions resulted in over 20dB de-sensing of the otherwise clean receiver. The receiver IF with its matching 3" monochrome monitor are part of an old Akai portable VTR unit loaned by the author.

A slight system intermodulation product problem has been encountered with the use of a 35MHz 2nd IF, which is not surprising since the repeater shift frequency is also 35MHz. An improved receiver will take this into account.

VIDEO GENERATOR & SWITCH

The grey-scale generator with callsign overlay and line-frequency switch were constructed from existing designs by G8XZD. Some problems have arisen with the sync detector picking up extraneous signals (leakage through the base-band video switch, leads, demodulated video carrier, line output scanning flux, EHT generator field and/or PSU ripple!). An improved detector would be fully screened, enclosed and have fully filtered feedthrough connections.

TRANSMITTER

The AM modulator/PA/tripler assembly is a unit designed and built in early 1984 as part of product development for the CQ centre. It uses a medium power, high efficiency active tripler with f3 and f2 tuned idling stubs and stripline output filtering. This feeds a straight stripline 23cm PA with a simple BD132/BC109 series video AM modulator. RF line-up is BLV93 - BLV92 delivering 400mW at 70cm for 5-Watts out at 24.

The 300mW exciter was an experimental miniature NBFM phone transmitter, the RF and multiplier circuits being very similar to the G3YQC 70cm TX in CQ-TV122 and 'TV For Amateurs'. It is based on a 109MHz crystal oscillator.

GB3UT co-sited with GB3UB in a lift room above Norwood House, Bath University.

ENCLOSURE

The whole repeater is enclosed in a 19" x 20" steel case with removable front and rear panels and chassis sub-units. A small 3-Amp 13.6v power supply, bought at short notice, works rather hard keeping all the modules supplied with a nominal 12-volt.

After site tests, interference to the Group's 70cm phone repeater (on the same shelf) caused the exciter to be re-tuned to 327.875MHz. The power multiplier was re-aligned to work as a x4 multiplier, the loss of efficiency being somewhat compensated for by the increased stage gains at the lower frequencies.

Members of the Mendip repeater Group are indebted to the overall co-ordination provided by its technical manager Peter Harston G4JQP and progress chasing initiative undertaken by Ian Parker G8XZD. John, G4OTJ, who will be responsible for creating the future logic and 'Teletext' facilities planned next, made several useful contributions to the initial installation such as the aerial base, mast fixings, cable runs and shelf supports - not least the actual transport and installation of the completed system itself.

RECEPTION REPORTS

At the time of writing the repeater had been running for nearly two months transmitting continuously. By the time this article appears though GB3UT may be delivering its full 25-Watts ERP due to increasing its aerial efficiency and power output (6-7dB).

The repeater as received at Burnett Hill, 10.5Km due West. Taken on 17th August.

The very uneven terrain around Bath and the Mendip hills area generally means that the service area is inevitably patchy with screened areas of north Bristol and even a mile or so from the repeater quite inaccessable.

Using simple hand-held aerials of 6-10dB(d) gain G4JQP, G4OTJ, G8OTA and G8XZD have received good signals with CQ Centre converters over various optical paths, signals rapidly dropping off due to obstructions. Best so far has been a P4 at 22Km.

A later receiver will have a 'proper' FM receiving capability. Any reports from repeater users would be gratefully received.

INTERNATIONAL ATV CALLING 144.750 MHZ

TV ON THE AIR

by Andy Emmerson G8PTH

The uninspired summer seems to have been no dampener of ATV activity, indeed it may have been a stimulus. Either way, I have received a good batch of letters, which saves me from having to make it all up.

-MICROWAVES-

Just for a change we can start at the top of our spectrum, so let's work our way down from 10 GHz.

The 3 cm band seems to be attracting more and more interest. Chas Winton GM6XW writes from Larbert in Stirlingshire about the very active ATV group in the Central region, with group calls GM4OMT, GM6JWH, GM1FAI and GM6XW. GM1FAI is in Linlithgow and the others are in the Falkirk area. They hope to be operative soon on 10 GHz and there is already activity on 70 cm and 1.3 GHz most evenings and at weekends. Most of the interest is in 1.3 GHz and a call on 144.750 will usually raise one of the group for information.

Mike G3PFR suggests that 10 GHz ATV be kept to the 10.1 to 10.3 section of the band (according to the RSGB Microwave Newsletter). Tim G3KEU also notes that a centre frequency of 10.250 GHz appears to be the accepted one for ATV and raises the question of just what deviation should be used; there appears to be no standard at present. Several stations are using Wood & Douglas equipment with an IF bandwidth of 10 to 12 MHz, but Tim prefers the DBS standard of 13 MHz/volt and 27 MHz bandwidth, since this allows the receiver to double for satellite use. With the availablity of SAW filters for DBS receivers it becomes relatively easy to construct a high quality system.

Tim has used his ATV gear during the cumulative contests with good results and is gradually extending the range. During May he worked from his home in Swindon to G3VKV/P on Cleeve Common, Glos. and in the June contest from Cleeve Common to G3VKV/P on the Clee Hills in Shropshire. In July the 73 km path between Walbury Hill and Cleeve Common was beaten. His equipment is a 50 mW transmitter and a one-metre cassegrain-fed dish.

On 23 cm Dave McQue G4NJU has a 1W transmitter in Bletchley and is working on a 10W PA. Colleagues Tony Smith G6DJI and Dave Ruck G6RFH are constructing 70 cm gear, and both Daves have "Worthing"-style broadside arrays almost ready for 1.3. They are using separate TX and RX antennas to avoid relay complications.

Another couple of potential 10 GHz activists are Chris G4AYT (Whitstable) and Ron G6GHP (Westgate). Staying in east Kent Roy Gilham tells me that John G8UWS is on another tour of duty in the Falklands and this time he has taken his ATV gear - that should fascinate the penguins! Roy has worked John G3OGX in Rayleigh (Essex) now, getting a P2 report over this obstructed 36 km path.

Some summerfun contest achievements now. Mike G8LES near Alton managed to reach Chris G8GLQ/P at Trowbridge, getting P5 pictures on 3 watts over the 60 mile path.

-70cm NEWS-

June, July and August were good months for Roy Gilham in Thanet, managing to work as far as Trowbridge (G8GLQ/P) in the Summerfun contest on 13th July. It was not exactly a good contact: each figure had to be exchanged separately in turn but they made it after 30 minutes! On Saturday 14th June he worked ON1AHT and FC1GIA, while F1ESA hooked up with G8UWS in Folkestone. Roy also made it to Dave G3MPS in Farnham and Lewis G6HVQ in Hampton Court. The following weekend conditions allowed reception on G4SHC up in the Peak District of Staffordshire as well as G4CRJ (High Wycombe).

In August he worked our old friend Peter G4LXC/A, now in Maidstone, and in a minor lift on 13th August hooked up with G3MPS again, G8LES (Mike, Alton) and G6HVQ (now in High Wycombe). On 31st August the Maidstone radio club put on a radio and ATV display at an agricultural rally on Detling Hill, using the callsign G8GRF. Nick G4ZXI brought his TV gear from Headcorn and the various operators worked most of the stations in east Kent. Earlier in the month, on 10th August F1ESA came up out of the blue with P5 positive modulation pictures from an old German gun emplacement in the Pas-de-Calais. Unfortunately two metres was as flat as a pancake and no contact was established.

More summerfun news - it sounds like a popular event! The best DX for Mike G8LES in Hampshire was GW8LIR in Wrexham. Not bad for flat conditions and probably says more about their sites. Garry G4CRJ also entered the contest but had to withdraw very rapidly as his tower collapsed! The damage has now been re-welded by G6HVQ.

Good news from South Wales! Eric Edwards GW8LJJ has reformed the Gwent ATV Group and had the old callsign GW8OOJ re-issued. Indeed the Gwent and Glamorgan area is again awakening from the dead. Eric has started his trips around the radio clubs with talks and demonstrations of home-brewed ATV gear. Mike GW4JKV has been diving into the shack debris to retrieve his home-made 70 cm upconverter, while Keith GW8TRO has 100 mW radiating from a Pye pocketphone. Peter GW4EAI has built a 100 mW 70 cm transmitter to a CQ-TV design and is busy constructing a camera. Interest in the Caerphilly area is supplied by Ray GW8GKF, who has 24 cm in mind. Photocopies of relevant information has been supplied to him ...

In Barry we have Jeff GW6CNS again surfacing to radiate 70 cm TV with Wood & Douglas equipment, and tests have been carried out with Simon GW8NVN. Roger GW4UGI has shown interest and is busy with mods to a 1043 tuner as well as sorting out an aerial system. Also in Barry, Eric has come back to ATV after five years and has started from scratch with home-brew gear. Transmitter lineup is 100 mW into a 6 watt transistor linear feeding a 2C39A plus 1 kV. 70 cm receive is a tuner stripped from a scrap VCR and another using a 1043. The latest receiver is a Philips G11 tuner/IF strip using a modified Mullard U321 tuner and provides composite video out with 12 V supply. Antenna at GW8LJJ is an 88 element Multibeam at 50 feet.

Work has also started on 24 cm equipment: the receiver is already made and a transmitter is progressing with some difficulty. Eric says he has given up the old idea of starting constriction at 3 AM, but he does sometime carry on until 0130! Give them a shout on two metres if you are in the vicinity: 144.550 and 144.750 are used in Barry, while in Blackwood they monitor 144.800.

-REPEATERS-

GB3VI (Hastings, AM) is still awaiting its licence and hopes to assume the call GB3SX when this is released by the Crowborough 10 metre beacon. Bob G4BGQ has constructed most of the transmitter section and it is reportedly very impressive. It will probably undergo soak testing from his home. The logic rack has been started and 99 per cent of the materials required for this have been donated. Provision is being made for a fourth repeater handler module for future expansion, possibly a digipeater (whatever that is!).

GB3ZZ (Bristol, FM) has passed its second annual general meeting stage in August. A superb site has been found on a high spot in Filton, with a peppercorn rent of just £1 a year. Work is now starting on the construction of the repeater and a licence application has been made. Not many call letters remain unallocated in the GB3 series, so the distinctive GB3ZZ has been requested. This would complement Bristol's other 23 cm project GB3AA and would give Bristol the dual honour of being first and last in the list!

-SLOW-SCAN-

None whatsoever. The SSTVers probably close down and hibernate for the summer!

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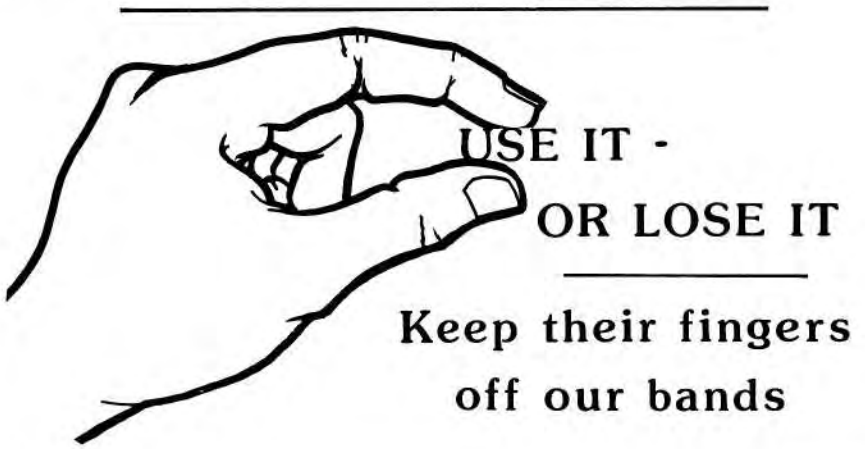
That's it for this time. We can do with a few more letters for the next roundup, so don't keep all the news to yourselves. Drop me a line at 71 Falcutt Way, Northampton, NN2 8PH or leave a message (up to 30 minutes!) on 0604-844130.



IN RETROSPECT

A TVRO RECEIVER - CQ-TV135.

Nothing wrong with this project, just one or two matters arising:

As the article said this was originally developed for 24cm ATV use but, of course, many are using it for TVRO reception. One or two builders have found that due to the wide deviations on satellite TV the amount of recovered video can be rather too much for IC1 to cope with. In fact, I suppose, in this application, IC1 could be replaced by something much simpler. Anyhow, rather than use a 'proper' 75-ohm attenuator (this seems to introduce some degradation in certain parts of the waveform) simply replacing R1 with a 10k or so does the trick. Most units don't suffer from this problem but the odd IF/demodulator module seems to deliver a higher video signal than normal.

SOUND DEMODULATOR

Of course for satellite use the fixed sound demodulator is not so useful. Many of the transponders use a 6.6MHz subcarrier which is well out of the passband of the 6MHz filter. I have not been able to locate a source of 6.6MHz filters but T Powel of 16 Paddington Green, London W2 1LG stock a 6.5MHz one. In fact they do a range:-

SFE 4.5MB	£0.35
SFE 5.5MB	£0.35
SFE 6.0MB	£0.35
SFE 6.5MB	£0.35

Postage is 60p then VAT should be added. The fitting of a 6.5MHz filter is not ideal but it should result in reasonable sound being received. Don't forget that C9 may need reducing as will C4. The trap (C4/L1) may need adjusting slightly for a good notch.

HIGH-IMPEDANCE SOUND OUTPUT

It is possible to extract a high impedance audio signal from IC2 which is suitable for direct connection (via a 4.7uF capacitor) to a TV modulator, VCR or audio Hi-Fi system. Disconnect pin-3 from ground and connect a 10k resistor and a 4.7n capacitor from pin-3 to ground (in parallel). The audio signal may then be taken from pin-3. Thanks to Bob King.

Comex Systems Ltd - suppliers of the kits - are, at the time of writing (end of August), in the final stages of testing a tunable sound demodulator to go with this unit which should be available by the time this magazine is published. Also available is a 2-digit LED display unit.

Some satellite transponders use a 25Hz energy dispersal waveform on their signals which causes flicker on the received picture. To overcome this a simple DC clamp circuit is suggested in Fig.1 to

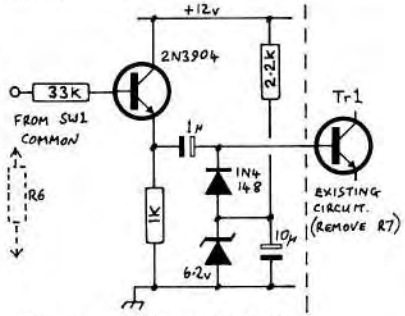


Fig.1 Clamp circuit.

maintain the DC level of the video signal thus preventing the flicker.

The circuit may be constructed on a small piece of Vero board and located adjacent to SW1 pins on the edge of the PC board. The existing R7 is removed and the top of the diodes is connected directly to the base of the existing Tr1 via a short piece of insulated wire. The connection to the new circuit is taken from SW1 common and the existing R6 should remain.

CROPREDY TEST CARD - CQ-TV135.

Under a news item in the last issue two problems were solved on this test card generator. The second of them involved installing a pull-down resistor from the base of Q2 to ground. The item specified was incorrect and should have read 820-ohms.

COLOUR TEST CARD (modules interconnect) - THE REVISED ATV HANDBOOK

Wherever this article has appeared it has been correct, as is the paperwork supplied with the PC board set. nevertheless the "Modules Interconnect" in the Revised ATV Handbook does not include the following connections:-

Test card board-2 pin-3 to test card board-3 pin 3.
Test card board-2 pin-7 to test card board-3 pin 7

Thanks to Peter Martin, G6OPP for that one.

24cm FM-TV TRANSMITTER - CQ-TV133

Poor old Peter has been blitzed with phone calls about this project and it is fair to say that such a complicated one is bound to throw up some problems by individual constructors. The beginning of the article did warn that it shouldn't be tackled by the inexperienced or faint-hearted! Peter will explain further:

"It seems that the oscillator will only work between 1500 and 1800MHz, and no one seems to be able to get it going - even myself! On examining the prototype my only conclusion is that the introduction of the RFC and beads was the only change made to the published design. Having investigated further with the original some other broblems have been unearthed so I thought it better to start again.

The new design shown here covers 1250 - 1300MHz, works well and is easy to construct. The printed circuit board has been carefully dimensioned to join the original PCB4 although, due to an additional buffer amplifier stage, the whole board is longer than the original*.

*(Although the printed pattern for the new board was available by press date the component layout was not. Anyone requiring these details may either contact Peter Johnson (QTHR) or wait for the next CQ-TV in which it is hoped to print the artwork - Ed).

The regulated DC supply is provided by PCB4 and, for the new oscillator circuit, this supply should be raised to 9.8v. This can easily be done by wiring two reverse connected silicon diodes in series with the 9.1v zener diode. Each diode equals a 0.7v increase in voltage therefore making a total

of 10.5v presented to the base of T12. The volts drop across T12 will reduce this level to around 9.8v.

The oscillator is a true stripline circuit, the principle being that the stripline is a series of inductors spaced by a series of parallel capacitors to ground or, in other words, a continuous tuned line, therefore the length and width is fairly critical to the frequency of the oscillator. The dimension of line L1 should be 25mm long by 2.5mm wide and etched onto a 1.6mm thick fibreglass double-sided PCB. The ground plane must be pinned through so that both sides make good RF contact. When boxed both the top and bottom ground planes should be soldered to the inside of the enclosure. C* is a 1/2" length of around 26swg insulated wire soldered directly to T11's emitter.

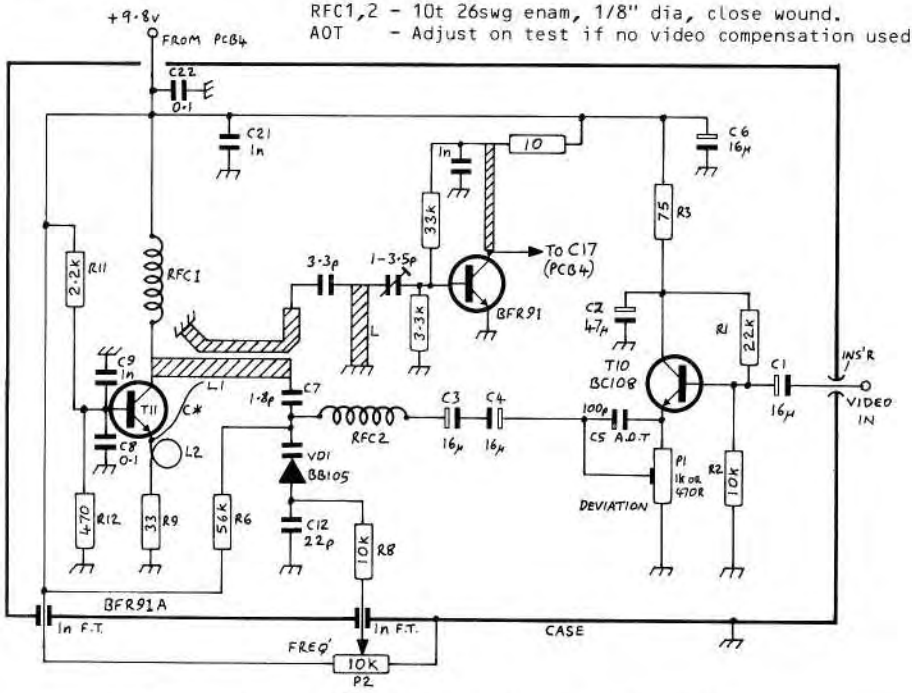


Fig.1 PCB3 - Oscillator, Buffer, Video modulator

It is assumed that anyone who has attempted to construct the FM-TV project has got only as far as the oscillator and has not proceeded further, it is at this stage that the PCB should be cut off at 53mm and the new oscillator/buffer board soldered onto PCB4. The sides of the box will act as supports for the new board. For those who wish to make a completely new PCB3/4 the printed pattern is available.

Complete the oscillator/buffer and test out as described in CQ-TV133. Once it is working complete the remainder of the TX board PCB4. Add sides, ends and partitions and again check out.

OSCILLATOR ADJUSTMENT

The feedback capacitor C* (Fig.1) should be set for sustained oscillation and increased only to provide a flat output on the power meter, whilst tuning from one end to the other.

CCIR PRE-EMPHASIS

If no CCIR preemphasis to the video is provided and video goes direct to T10 input, C5 will provide some HF compensation and may be increased to 250 or 270pF provided P1 is set to mid-position.

RS COMPONENTS FOR ALL

There has long been frustration in amateur circles regarding the purchase of parts from RS components. With the exception of Doram Ltd., which lasted only a short time and only stocked a small part of the RS range, most of us have had to persuade a local trader to obtain components for us. Now, at last, RS have set up a small-order retail company - ELECTROMAIL - to fill this gap in the market.

Electromail can supply EVERYTHING which appears in the commercial RS catalogue and uses the same stock numbers and prices. A separate 600-page catalogue is produced - priced at £2.50 (inc) - but this is virtually identical to the trade one, so if you have access at work to a RS catalogue you needn't buy one at all. Separate price lists are produced to update an existing catalogue which saves buying every issue (3 per year).

A fixed charge of £2.00 is made for postage but this applies to whatever you purchase. It is probably a good idea to compile a single order from a group to offset this cost. There is no minimum order value. Full product support is available as well as a free data sheet service, in fact, the full RS service, previously only available to traders, has been made available to us all.

Order forms are available and payment may be by post using a cheque, postal order or credit card, or by phone using a credit card.

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A 70CM VSB FILTER

By Peter Hardcastle G1COI

The design and construction of this filter was inspired following approximately two years spent building a Vestigal Sideband (VSB) transmitter for 70cm. The transmitter was based on the BATC design, but on completion bore little resemblance to it in many respects. The performance finally achieved was 3 Watts output, with the lower VSB 33dB down on the upper sideband. However, I was unable to find an amplifier to follow the transmitter which was linear enough to maintain this level of sideband suppression, even at very low drive levels. The best performance I could achieve was using a Microwave modules MML432/50, but the lower sideband was found to be only 10dB down after amplification, which is unacceptable.

The VSB filter described here was constructed to attenuate the lower sideband from the PA output to acceptable levels. I see no reason, though, why it should not be used with a conventional AM TV transmitter to provide VSB transmission, provided certain precautions are taken.

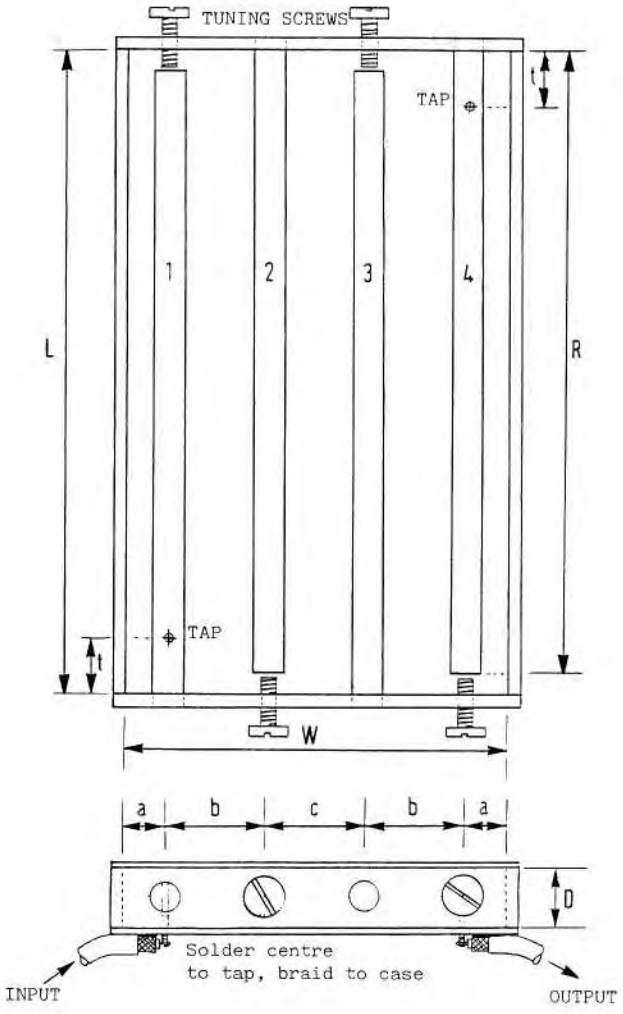
FILTER MODE OF OPERATION

This type of filter works by presenting a mismatch at frequencies outside the passband, hence, unwanted signals are reflected back to the transmitter rather than being passed to the aerial. The filter will only give the required performance in a well matched 50-ohm system; that is, the transmitter and aerial impedances must actually be 50-ohms. The voltage standing-wave ratio (VSWR) looking 'into' the aerial feeder should be better than 1.15:1. The transmitter output impedance can be stabilised by inserting a length of lossy 50-ohm cable between it and the VSB filter. Since most cable is lossy at 70cms this should not be a problem! I use 6 metres of UR67 and yes I know that this means more watts down the drain, but VSB ain't cheap! Both requirements of impedance matching could be achieved by installing the filter halfway along the feeder to the aerial.

FILTER DESIGN AND CONSTRUCTION

The filter was designed around brass rod and bar sizes actually available at the local metal shop. Dimensions are quite critical and will need re-calculating if differing sizes of materials are to be used. I have available a program for the Commodore 64 computer that will enable the dimensions to be calculated for varying material sizes, please send a large SAE for a listing, or blank 5" floppy disc for a copy, to the address given at the end of this article.

I am the world's worst tin basher, so anyone with a few tools and a blowlamp should be able to make the filter. It is advisable to buy new drills, taps and hacksaw blades before cutting the brass as it is too expensive to throw away because of mistakes. Another useful tip is to drill and tap the parts such that the entire assembly can be securely held together with screws during soldering. The top plate should be held on with screws only, to provide access to the filter interior for cleaning after soldering. These screws should be positioned at 15mm intervals to ensure a good RF seal.



ASSEMBLY

Solder the sides, base and resonators in place using a blowlamp. Avoid getting solder inside the filter cavity as the performance will be degraded. After soldering drill down through resonators 1 and 4 and out through the base at the input and output tap positions. Tap the holes in the resonators with M2.5 threads and enlarge the holes in the base to 3.5mm. Brass studding can then be screwed through the resonators and out through the base for the input and output connections. The feeder cables can then be soldered directly to the protruding studding.

Once construction is complete all interior surfaces should be thoroughly cleaned and brought to a high gloss using metal polish. This really does make all the difference in reducing the through loss of the filter. A final light coat of varnish will protect the finish, but take care to mask the area where the lid makes contact.

70 cms VSB Filter Dimensional Data

Symbol	Value (mm)	Dimension
L	170	Cavity internal length
W	101,8	Cavity internal width
D	15,9	Cavity internal depth
R	164	Resonator length
t	14,4	Input tap position
t	14,4	Output tap position
a	11,1	Sidewall to centre resonator 1
b	25,8	Centre resonator 1 to 2
c	28	Centre resonator 2 to 3
b	25,8	Centre resonator 3 to 4
a	11,1	Centre resonator 4 to sidewall

Materials:

Sides	5/8 x 1/8 inch brass bar (15,9 x 3,2 mm)
Resonators	8mm diameter brass rod
Top & base	16swg or 18 swg brass sheet
Tuning screws	0 BA, 2 BA, or M4 brass, or similar
Input & output taps	M2,5 studding or similar

FILTER ALIGNMENT

This is the tricky part! I used a spectrum analyser to align and test the filter, which makes the job easier. Since this is no longer available to me, I am rather reluctant to try other methods in case realignment proves impossible! So I can only offer untested suggestions for aligning the filter without the use of an analyser.

The initial problem will be to get any signal at all through the filter to enable tuning to begin, since when it is out of alignment the attenuation is very high. Insert the filter in the receive path of a 70cm 'phone receiver and tune for maximum signal on the 'S' meter from, say, a local repeater. Once the filter is in course alignment it can be moved to the transmit path of the transmitter. Use a single frequency carrier at band centre and tune for maximum power out of the filter, or alternatively minimum input VSWR. The filter should, of course, be terminated with 50-ohms. A 47-ohm quarter Watt carbon composition resistor soldered inside a BNC plug makes a superb termination.

This process should get the filter close to it's correct alignment so that RF power can be passed through it. The next problem is to set the passband shape, since this should be very flat tuning for maximum power is not the complete answer. Tuning for the flattest response between 434MHz and 440MHz by injecting various frequencies and measuring/adjusting the power output, coupled with the maximum attenuation at 430MHz, should produce a correctly tuned filter. The insertion loss at 430MHz should be around 16 to 18dB higher than at vision carrier frequency, if lower sideband signals below 430MHz are

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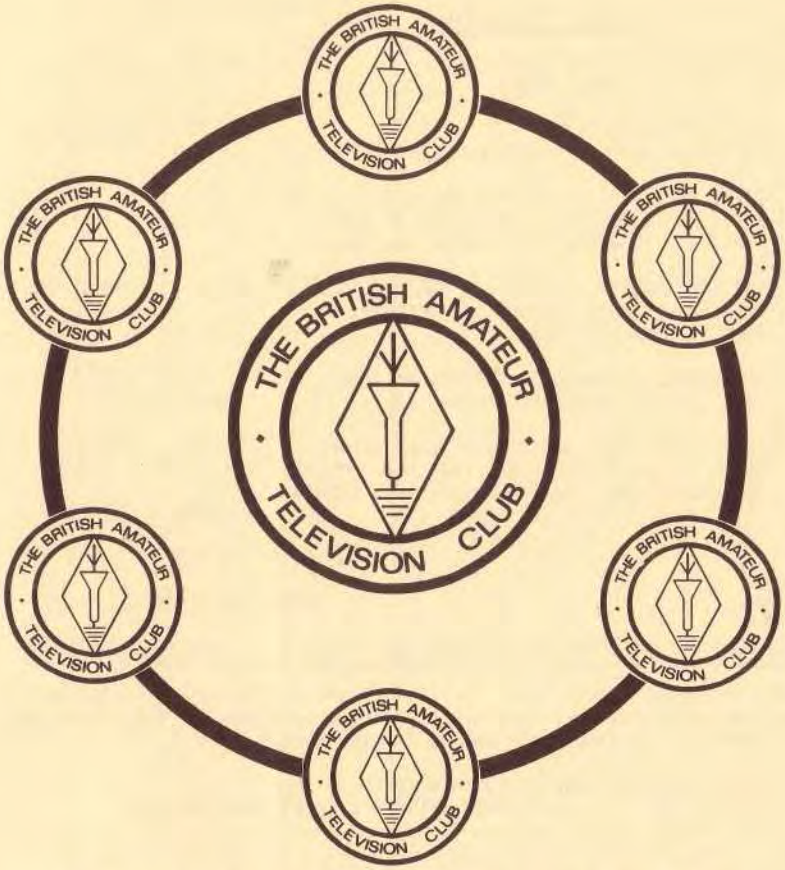

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to be suppressed. It must be noted here that the usual directional-coupler type of Power/SWR meter will only give accurate readings in a 50-ohm system. Since the filter works by providing a mismatch the meter must be isolated using long lengths of lossy 50-ohm cable to make the connections, otherwise inaccuracies will result. A final check should be made with a Wavemeter for out-of-band emissions.

PRECAUTIONS

The filter itself is not sufficient to prevent signals outside the 70cm band from being radiated, a video filter which cuts off sharply above 3MHz must be used at the transmitter input (see CQ-TV134 - "How Wide Is Wide?").

At the lower end of the band the filter 'rolls off' quite sharply, but not sharply enough if a Double Sideband transmission from a conventional TV transmitter is used to drive it. To further reduce any possible interference with the 'phone and repeater section of the band it is advisable to have the carrier frequency in the order of 436.5 to 437MHz. An alternative is to cascade two filters to achieve higher attenuation of the unwanted frequencies.

The address for copies of the computer program is: P.Hardcastle, 10 Crosbys, Burbage, Marlborough, Wiltshire, SN8 3TL.

70 cms VSB Filter Measured Response

FREQUENCY (MHz)	Insertion Loss (dB)	VSWR (Approx)
410	53	
415	46	
420	38	
425	31	
430	18	>3
431	14	2,9
432	9	2,3
433	4	1,5
434	2,5	1,2
435	2	1,18
436	2	1,2
437	2	1,2
438	2	1,1
439	2,5	1,08
440	3	1,08
445	33	
450	>62	
455	>62	

SSTV FREQUENCY - 144.5MHZ

IN FRONT OF THE TUBE

Part-4

by Peter Delaney G8KZG

In the first 2 parts we looked at the different types of lens that can be put in front of the television camera tube, and in part 3 at the systems used to separate the light into component colour signals. We can now consider ways to create special effects, optically.

FILTERS

There are several ranges of filters and other similar accessories available that can be fitted to the front of a camera lens. Probably the most widely available are those from Boots, Cokin and Hoya. Many of the Cokin filters are
fitted using a special filter holder that comes with a useful book of examples, for a few pounds. Some of the Boots filters appear to fix by the same method, but some are, as with the Hoya range, a screw fit to the lens front. The Hoya range is the preferred choice at this QTH - there is also a useful booklet of examples from them, free, I believe! To fit filters to the front of the lens, the thread size needs to be known. Modern lenses have standard threads on the front, identified by the diameter of the thread.(Fig 1), e.g 52mm for the Sony HVC2000, 58mm for the HVC3000.

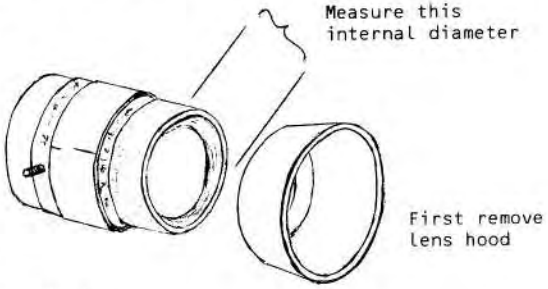
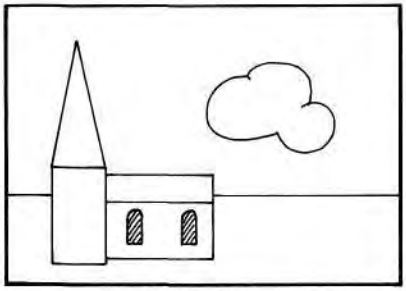


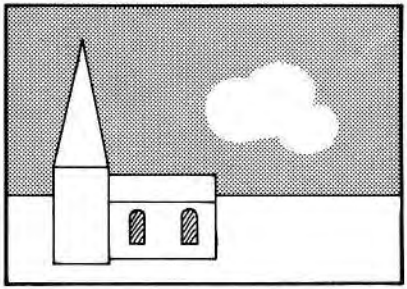
Fig.1

So, knowing how to add accessories to the camera lens, what sort of filters are useful? At this point, it is worth remembering, as said before, that every extra piece of glass in front of the tube will attenuate the light. For most applications this will not be a problem, but if the camera is being operated in marginal light conditions, then removing the filter may help. Of course, with video, the effect can be seen immediately, unlike photography.
The choice of filter depends in part on whether the camera is monochrome or colour.

Firstly, monochrome. The most commonly added filter, also used with colour cameras, is a UV type. This not only absorbs the ultraviolet radiation, which can make outdoor shots rather hazy, but acts as a lens protector. In many cases this is left permanently on the front end - it is easier to clean or replace than the front lens element. The other filters used are coloured elements. This may seem odd for black and white TV, but it enables the contrast to be increased. For example, white clouds against a blue sky - a yellow filter will pass the yellow component of white light, but will not pass any blue light, as blue is complementary to yellow. The camera tube therefore sees light where the clouds form part of the image, and no light where there is sky, thus enhancing the contrast (Fig.2).



Without filter



With yellow filter

Fig.2

For those who are not familiar with colour addition, the colour triangle (Fig.3) may help. The colours at the corners are the primaries. The colour along any straight line can be made by mixing the colours at the end of that line. The colour opposite a primary (along the line through white) is its complementary. All three primaries OR all three complementaries will mix to make white, if the proportions are right. Aided by this chart, it is possible to work out the colour filter needed to increase the contrast in a scene, following the cloudy sky case above as an example.

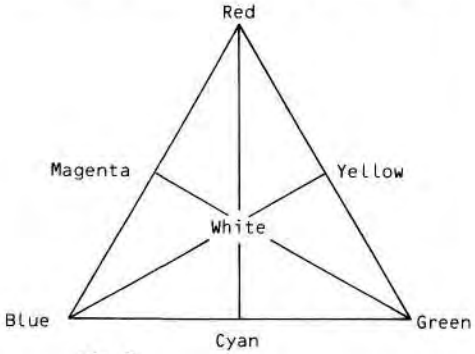


Fig.3

Now to consider colour television. There is not usually the need to increase contrast in the way mentioned above, as even a small amount of colour will help in distinguishing the parts of the televised scene. In addition, of course, the picture would be artificially coloured. Most colour cameras already include a set of filters to correct for the colour temperature of the light source, for this is the coarse adjustment when performing a white balance. (Further comment on colour temperature will be made in part 5 on the subject of lighting).

A useful item is a neutral density filter. This limits the quantity of light entering the lens, without affecting its colour balance. As less light reaches the lens, it must be used at a wider aperture, so that an equivalent light intensity reaches the tube faceplate. This results in a reduced depth of field, so that, for example, the foreground can be sharply in focus, but the background is not. Clearly this is a filter only to be used when there is ample light available.

Polarizing filters can also be helpful. A polarized wave changes its plane of polarization on reflection, as is well known with radio signals. Light, being also an electro-magnetic wave, behaves in the same way. By aligning a piece of polaroid in front of the lens, the required light is passed through, but the unwanted reflections from glass, water etc. are reduced. The filter is

normally mounted in a rotating frame, so that it can easily be aligned for the best effect. When properly set up, the camera can, for example, look out through a window without 'seeing' the room reflected in the glass.

Most of the other 'front end add-ons' are used to create special effects. One is known as a cross-screen or a star-burst. The effect is created by having a thin piece of glass with sets of parallel lines etched onto the surface. Normally this produces no effect on the picture, but if a bright source of light (such as a spotlight, or reflected light from jewellery or trombone, etc.) comes into the picture, then beams of light appear to radiate from the light source. If the etched lines are at 90 degrees, there are 4 beams; if at 45 degrees, there are 8 beams - and so on. A white light source will produce rainbow coloured beams of light in the picture. The effect is strongest if the lens is at a wide aperture, and if the flare appears against a dark background. Fig 4 gives some idea of the effect, but try watching "Top of the Pops" - it seems a permanent fixture on the camera! Do, however, be careful not to shoot directly at the spotlight, or it may burn in a permanent mark on the camera tube.

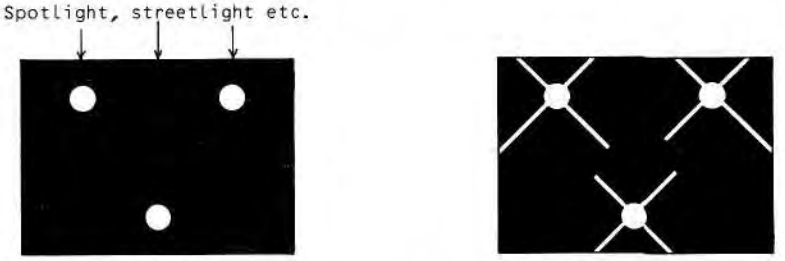


Fig.4

The other special effect worth mentioning is a multi-image. Without using Quantel type digital effects machines, it is possible to produce a picture containing several copies of the same image. Of course, it is less versatile than a digital frame store ..... but the cost is rather less (typically £15). In part 3 we saw how prisms could split the light up to follow different paths. The multi-vision filter is basically a multi-faceted prism. The images will be either radial about the centre, or parallel to each other, corresponding to the layout of the prismatic faces. The effect is again strongest at wide aperture and against a dark background. A wide-angle lens will make the images appear close together, and a telephoto lens make them appear more widely spaced. Fig 5. gives an idea of the effect.

Two other items may be fixed to the lens front thread. A lens hood will help protect the lens from both stray light and dirt. It is a good idea to leave it permanently on the front end. The other item is a close-up lens. These have a very small depth of field (i.e. depth of object that will be in focus) so need to be used with care. The depth of field is maximised be using the smallest aperture possible. Many cameras now have a 'macro' facility built in, which achieves a similar effect.

All of the items mentioned in this article (except the lens hood) can have a thread on both front and back, so that they can be stacked together to produce a composite effect. The lens hood should always be at the very front.

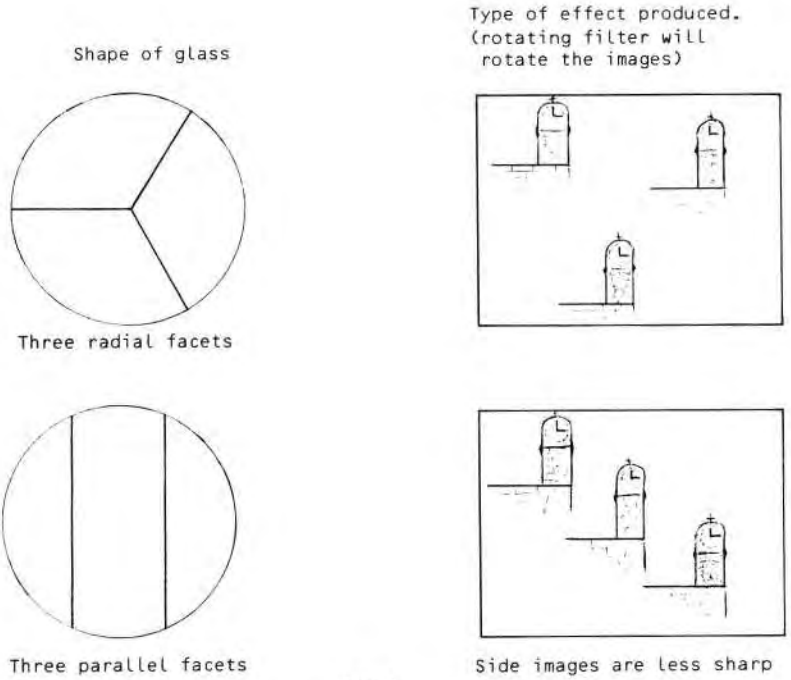


Fig.5

Lastly, there are two points to note to prevent damage. Some lenses, particularly wide-angle ones, have a front element that bulges forward so far that fixing a filter may damage either, or both. Some filters are made of several pieces of optical glass and/or coloured gel, and may be damaged if left in direct sunlight or a damp hot situation for a long time.

These filters are easy to try, and most are not very expensive. Many others are listed in the booklets mentioned. In the next part we shall look at lighting.

A TUNABLE SOUND DEMODULATOR FOR SATELLITE TV

by Dave Crump G8GKQ

During the development of a satellite TV receiver I found that the various sound standards and low sound carrier-to-noise ratios required something more flexible than a tunable discriminator for satisfactory recovery of the audio signals. An NE564 PLL design proved better than a TBA120 but the approach here out-performed them both.

CIRCUIT DESCRIPTION.

The complete circuit of the tunable sound system (minus audio power amplifier) is shown in Fig.1. The input signal is buffered and then passed through a high pass filter, to keep out video and syncs, which is also equipped with a 4.43MHz colour subcarrier trap. The input attenuator can be changed to accommodate different input levels.

IC1 is a special oscillator/mixer device which, in this application, has an oscillator covering between 16 and 18MHz which is varactor tuned by a BB204 diode pair. This range, when mixed with the input to provide a 10.7MHz fixed IF, means that the unit will tune from about 5.3 to 7.3MHz. Some receivers may require an 8MHz low-pass filter at the input of the module to eliminate the image response at 26.7MHz - 28.7MHz. The varactor supply can be taken from presets or a front panel tuning control; in either case it should be well smoothed and regulated.

The mixer output is buffered and filtered by a 280KHz bandwidth ceramic filter. Provision has been made to switch in a narrower filter in order to recover weaker signals. This part of the circuit could be omitted if it is not required. The red dot ensures that both filters have the same centre frequency.

The FM demodulator is the ever-versatile CA3089 which uses a commercial quadrature coil assembly, this system was chosen for its availability and proven track record. A TBA120 or similar TV sound IC should however perform equally as well.

RESULTS

Six of these units have so far been constructed using "birdsnest", Vero and PC techniques; all have worked well for both satellite TV and 24cm amateur TV. If stereo reception (Music Box) is required a second circuit from IC1 on may be driven from the output of the high-pass filter.

The SO42P is available from Electrovalue Ltd, 28 St.Judes Road, Englefield Green, Egham, Surrey TW20 OHB (Tel: 0784 33603). Other components are available from Bonex Ltd., 102 Churchfield Road, Acton, London W3 6DH (Tel: 01 992 7748) - see adverts in CQ-TV.

L1: 30t 28swg 4mm former with core. (4.43MHz trap)
L2: 10t 28swg 4mm former with core. (To tune 16-18MHz)
L3: Toko 12HF Q228CCM-1037D.

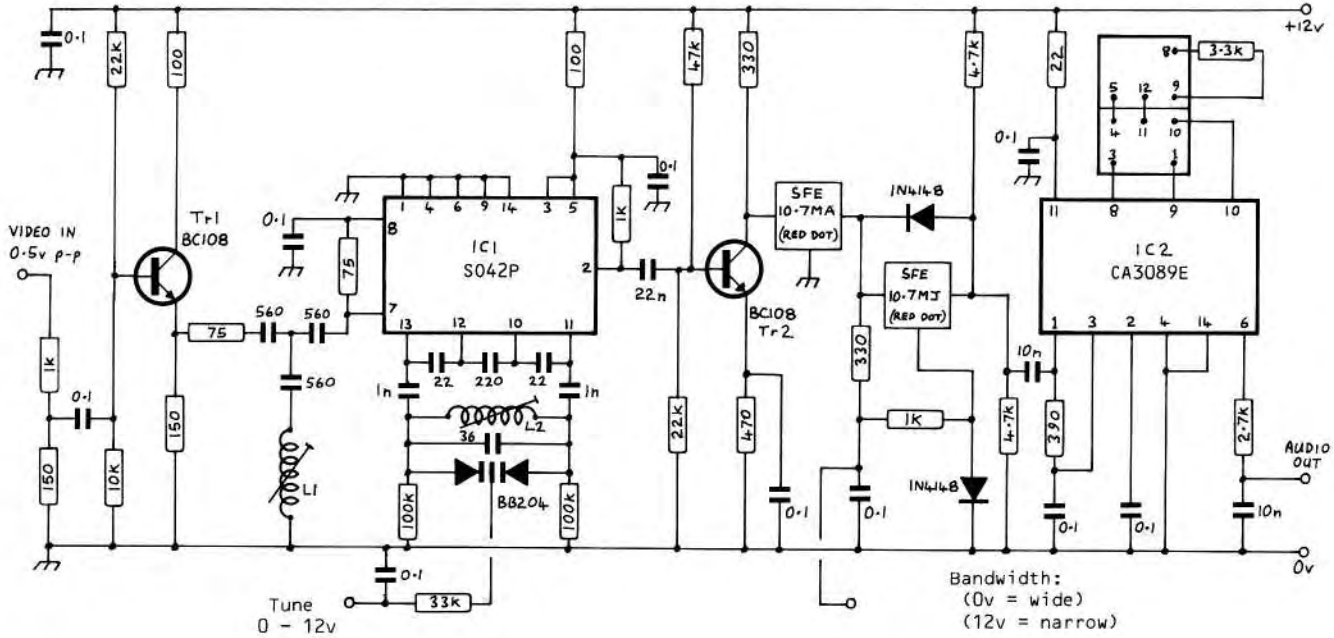


Fig.1 TUNABLE SOUND DEMODULATOR

BUILDING YOUR SATELLITE TV RECEIVER

by Charlie Suckling G3WDG

INTRODUCTION

Building satellite TV equipment used to be quite an involved business as everything had to be built from scratch, and to be successful one either needed access to professional facilities or very green fingers (or both!). Things have become much easier recently as many of the more 'difficult' parts have become available commercially. So now it is possible to put together a system based largely on ready-made building blocks, but at a fraction of the cost of a commercial package. It is my belief that more and more people are becoming interested in constructing their own TVRO equipment in this manner, and the purpose of this article is to pass on my own experiences with this type of approach.

BASICS

A block diagram of a typical satellite TV system is shown in Fig.1. The outdoor part consists of a dish plus associated feed and the LNB. 'LNB' is an abbreviation for 'Low Noise Block Converter' and is sometimes also called an LNC (Low Noise Converter) or simply 'the outdoor unit'. The function of the LNB is to convert input signals in the 10.95-11.7GHz band to a lower frequency which can be fed indoors via a coaxial cable. Normally the LNB converts all the signals in its input band to the IF band (just like a normal converter), and the wanted signal is selected by tuning the indoor unit to the correct frequency. In its simplest form the LNB can be just a mixer/local oscillator such as the well-known Mitsubishi FO-UP11K module. Better LNBs have one or more stages of amplification before the mixer to improve receiver sensitivity.

The indoor unit converts the output from the LNB to a second IF where the signal is amplified and fed to a wideband FM detector. The output from this detector (the 'baseband' signal) contains the video signal and one or more audio subcarriers. The video signal is split off and after passing through a de-emphasis network is amplified to the usual 1V p-p. A tuneable FM detector is used to demodulate the sound. Some receivers incorporate a UHF modulator to allow a normal TV set to be used.

SYSTEM DESIGN

What affects the performance of a satellite TV receiver? The all-important factor is the signal to noise ratio present at the input of the main FM detector (carrier to noise ratio) relative to the threshold performance of the detector. If the signal is strong enough for the carrier to noise ratio to be equal to the threshold level then the demodulated signal will be of good quality. If the carrier to noise ratio is one or two dB below threshold the signal quality will be acceptable, but below this the quality deteriorates rapidly. Some FM detectors are better than others in terms of threshold performance, and this needs to be borne in mind when planning your system (more on this topic later).

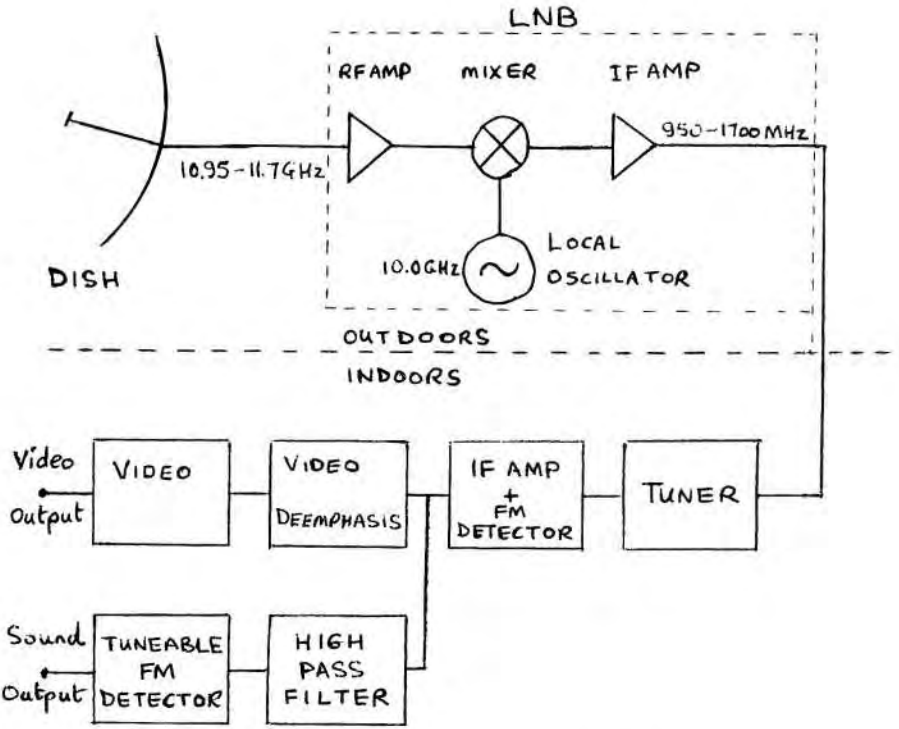


Fig.1 BLOCK DIAGRAM OF A SATELLITE TV RECEIVER

The two system parameters which affect carrier to noise ratio are the gain of the dish and the noise figure of the receiver. Fig. 2 shows the expected carrier to noise ratio for a typical system using a 1.2m offset dish (or 1.5m conventional dish) as a function of receiver noise figure assuming a satellite EIRP of 46dBW (about right for INTELSAT V or EUTELSAT 1 transponders), and a noise bandwidth of 27MHz.

Most FM detectors in use have thresholds in the range 6-11dB. From the graph a noise figure of 6-7dB would produce good pictures with a 6dB threshold detector, while a noise figure of 3.5dB would be required to 'compensate' for an 11dB threshold detector - quite a difference in LNB performance! Many commercial LNBs today have noise figures in the range 2-2.5dB which is rather an overkill for an amateur receiver where cost is an important factor. Provided that you have a reasonable detector (say 8dB threshold) then a noise figure of up to 5dB should produce quite good results. Of course, if your antenna has less gain than the 41.5dB mentioned above, a lower C/N ratio will be obtained for a given noise figure (and conversely if your antenna has more gain).

When planning or analysing your receiver performance it is worth noting that weather related propogation effects can reduce the C/N ratio. Most of the time signal levels are pretty constant, but heavy rain or snow/ice build up in the dish can cause several dB attenuation.

SATELLITE EIRP=46dBW
ANTENNA GAIN =41.5dB
RX BANDWIDTH =27MHz

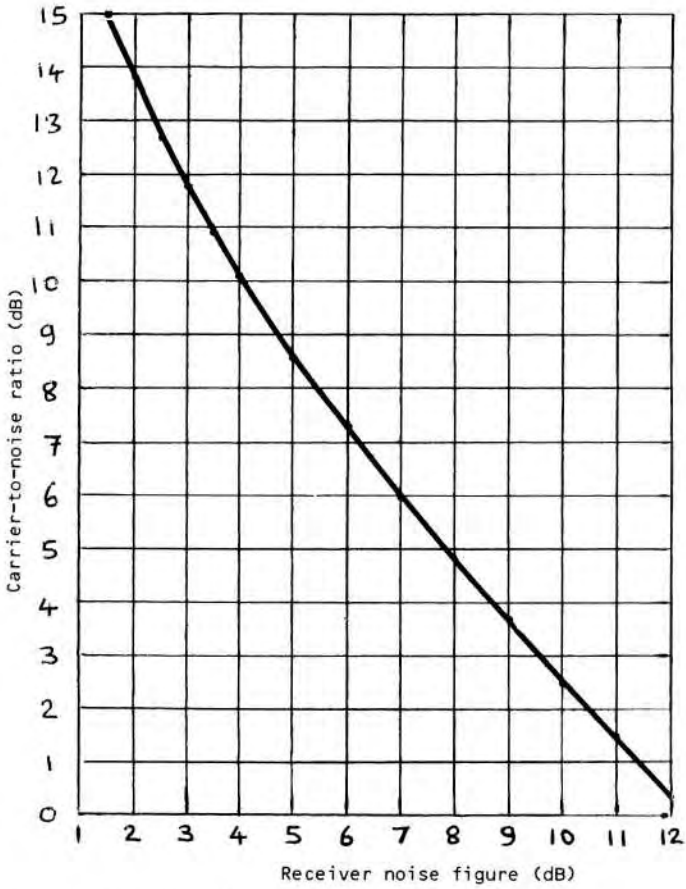


Fig.2 CARRIER-TO-NOISE RATIO VERSUS NOISE FIGURE

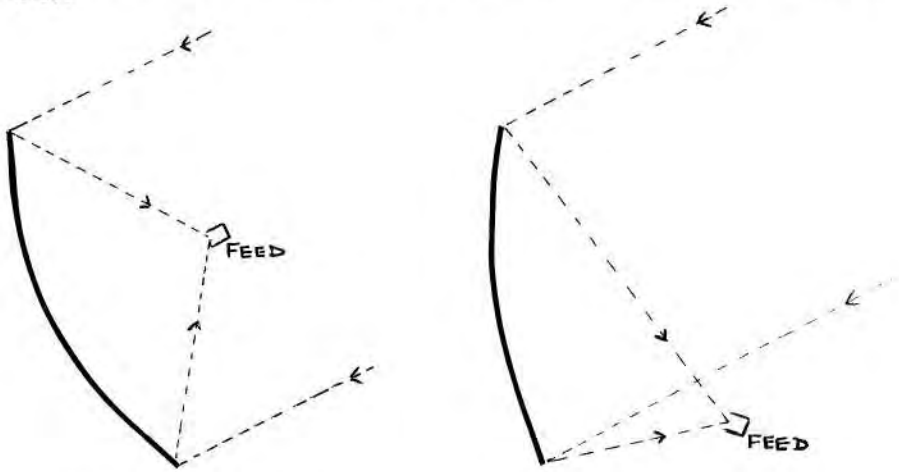
ANTENNAS

Dish antennas are used exclusively for current TVROs because of the high gain required (>40dB). The 'smallest' antenna I would recommend is a 4ft (1.2m) conventional dish. Dishes larger than 1.5-1.8m are not often found in home installations as the mounts tend to become rather massive and the antennas are more difficult to align due to the narrower beamwidths. Until recently I used a conventional dish, but am now using a 1.2m offset dish made by Silverstone Electronics. The offset dish has about 2dB more gain than the conventional dish. The extra gain arises from two factors - zero blockage by the feed/LNB and a shallower dish geometry which is easier to feed more efficiently. The difference in construction between offset and conventional dishes is shown in Fig. 3.

A number of people have successfully built their own dishes. Epoxy/fibreglass construction is generally favoured as the resulting dish can be made quite

rigid. If you are contemplating building your own antenna remember that the surface accuracy must be better than one tenth of a wavelength, preferably better than one twentieth. For 11GHz this means surface errors no greater than 2.5mm. For further reading on the design and construction of dishes I would recommend the Microwave chapter of the RSGB VHF/UHF Manual.

To get the maximum gain from any dish it is important to match the type of feed used to the geometry of the dish. Shallow dishes (large focal length to diameter ratio) can be fed efficiently by a simple horn, whereas deeper dishes (eg. F/D ratio < 0.4) require more complex feeds such as the commonly used scalar horn. Shaped sub-reflectors can be employed to improve feed efficiency for deep dishes (see VHF/UHF Manual). The worst feed in my experience is the 'penny' feed much beloved by 10GHz operators. This feed has a very poor radiation pattern and I have measured up to 5dB degradation in dish performance when using this feed compared to a scalar horn/sub-reflector feed with a 0.35 F/D dish. Please avoid the temptation to scale this feed to 11GHz!!



Conventional dish Offset dish

Fig.3 CONVENTIONAL AND OFFSET DISHES

Squeezing the last bit of gain out of your dish is usually well worth the effort particularly if you are struggling to reach threshold. Some form of indication of signal level out at the dish is necessary - either an S-meter or a monitor. This allows you to align the antenna precisely on the satellite and to experiment to find the best position of the feed (including polarisation).

Before moving on to LNBs, just a word about dish mounts. There are two basic types of dish mount in use - the elevation/azimuth type (el-az) and the polar type. The el/az mount is simpler in concept and much easier to engineer, but has the disadvantage that the elevation, azimuth and polarisation need to be changed when moving from satellite to satellite. The polar mount has only one axis of movement and when correctly set up tracks the geostationary orbit very accurately. Polarisation is also set automatically.

I would recommend the use of an el/az mount initially, even with its limitations. You will probably spend the first few months experimenting with the rest of the equipment with the antenna fixed on one satellite. You can always change over to a polar mount later when the equipment is working well and the desire to explore different satellites or watch different programming becomes of more interest.

LNBs

Many amateur satellite receivers employ the Mitsubishi FOUP11K (or ..KF if supplied with a waveguide flange). Past articles and current advertising may lead the beginner to think that this module is the be-all and end-all of satellite TV front ends. This is most definitely NOT the case and before parting with hard-earned cash it is worth looking at this module in more detail.

The unit contains a microstrip GaAs FET oscillator (stabilised using a dielectric resonator) and a mixer. Both the GaAs FET and mixer diode are wire-bonded chip devices and if either is blown up the unit is effectively scrap. Thus great care should be taken when handling the unit (which is static sensitive) and when soldering it into circuit (earthed soldering irons etc).

Before the unit is used for satellite TV some modifications are usually required. These have been described by Hugh Cox in his article in 'Television' magazine (Feb. 1985).

My experience with a number of these modules is that they are useable only up to about 11.3GHz above which the conversion loss increases, causing the sensitivity of the unit to deteriorate rapidly. This problem appears to be mainly associated with the wedge microstrip to waveguide transition, and no amount of modification short of removing the wedge and virtually rebuilding the unit will make it work at the top end of the band, where Music Box, Sky Channel, TV5 and SAT1 are located.

Another problem with the Mitsubishi module is that of IF frequencies. As supplied, the local oscillator cannot be tuned below about 10.2GHz which means that it cannot be used with the standard 950MHz and up IF band used by receiver modules such as the Matsushita or Astec units. It is more suitable for use with TV tuners with IFs such as 450-850MHz.

In terms of sensitivity, the Mitsubishi module after modification has a conversion loss at best of about 8dB (in the lower half of the band), which with a 2dB noise figure pre-amp will give an overall receiver noise figure of 10dB. From Fig. 2 we can see that this noise figure would give a carrier to noise ratio of only about 3dB. This is well below the threshold of even the best FM detector and would get a rather noisy picture (unwatchable in domestic terms) and poor sound. With a poor detector and a less than perfect dish you might even have trouble locking a picture!

A related problem which can be a real killer when trying to set up a system with such a poor receiver, is that it is very difficult to find the satellite in the first place. Bear in mind that you have to set the antenna to the right position at the same time as being tuned to the right frequency! If you have never done it before it can be quite difficult to find the satellite even with a good receiver!

The sensitivity of the Mitsubishi module can be improved by a GaAs FET pre-amp. Even a single stage pre-amp could reduce the noise figure to 5.5dB. This would improve the carrier to noise ratio to 8dB giving a remarkable improvement in picture quality. I am currently working on a pre-amp for use with the Mitsubishi module which I hope to have finished by the time this appears in print. Please write or phone if you would like details.

Modifying the Mitsubishi module is not the only way of making a DIY LNB. I have had quite a lot of success with Gunn diode doppler modules of the types used for 10GHz wideband work. Very often these modules are tuneable to 10.0GHz allowing the normal 950MHz and up IF band to be used. One point to be aware of is that the decoupling of the mixer diode may well not pass the IF signal and a modification such as that shown in Fig. 4 may be needed.

I have used this modification with the Plessey GDHM32 doppler module. Performance was similar to the Mitsubishi module, but the frequency stability with temperature was not as good as that of the Mitsubishi.

Another option is to purchase an LNB ready made. Prices are coming down, and at least you will be sure that one part of your system (perhaps the most tricky part) works properly. My own LNB is a prototype of a low-cost LNB currently in the final stages of development by Silverstone Electronics.

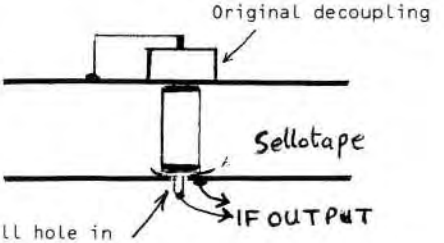


Fig.4 MODIFICATION OF DOPPLER MODULE FOR 950 - 1700MHz IF OUTPUT.

INDOOR UNITS

The two key parts of the indoor unit are the tuner and the IF amplifier/FM demodulator. For IFs in the range 400-800MHz a number of people have used TV tuners to convert signals from the LNB down to a second IF of around 35MHz, followed by the FM detector (often a phase locked loop) operating at 35MHz. There are two problems with this type of approach if high quality pictures are the goal. Firstly it is very difficult to make a detector operating at 35MHz which will handle the wide deviation of satellite TV signals without introducing a lot of distortion. Secondly the bandwidth of the TV tuner is usually too narrow which also introduces distortion.

More recently ready-made tuner/demodulator modules have become available from Matsushita and Astec which greatly ease the construction of the indoor unit. I have compared both, and they are equally easy to get working first time. However the Matsushita modules have two distinct advantages: they have a better threshold performance and are designed to cover the whole band. Full band coverage is nice to have (especially if you have a full band LNB), but the better threshold performance is a very definite advantage particularly in an amateur receiver where some deficiences in LNB or dish performance can be offset. The important specifications of the two units are compared below:

	Matsushita	Astec
Input frequency range	950-1750MHz	950-1450MHz*
Input signal level (no agc)	-68 to -48dBm	-70 to -40dBm
Typical threshold	6dB	9dB

(* I understand that a full-band version of the Astec module should be available about now - Ed)

The threshold of the Astec module is quoted for its 'wideband' configuration because operating it in its narrowband mode can lead to very noticeable distortion on some signals. In fact, the Astec module in its wideband mode is still too narrow for proper demodulation of most Eutelsat signals. The main effect of this is the appearance of noise impulses ('sparklies') in areas of bright colours even when the signal is well above threshold. This should not be confused with the sparklies caused by a below-threshold signal, which are present all over the picture. Regarding the quoted tuning range of the Astec tuner module, several users have reported that the tuning range can be widened by increasing the tuning voltage up to nearly 20V. If you are using Astec modules, this might be worth trying.

One parameter often overlooked in the design of amateur indoor units is the overall level of gain required in the system. This is because the FM demodulator usually has a range of input signal levels outside which the performance is degraded. The signal level can be calculated quite easily as shown in the following example:

RF output from dish	-88dBm (46dBW satellite EIRP, 41.5dB dish gain)
LNB gain	+40dB
Cable from LNB to indoor unit	-5dB
Total (signal at indoor unit)	-53dBm

If the LNB gain is too low, an extra amplifier will be needed. If the LNB gain is too high it may be necessary to use the agc feature on the modules, or to fit an attenuator.

The output signal from the demodulator is usually about 1V p-p, and contains both the video signal (requiring de-emphasis) and the audio subcarrier(s) at 6.5-7.5MHz. A number of circuits have been published to do the subsequent video/audio processing (eg. "A TVRO Receiver" by John Wood in CQ-TV 125). Some circuits do not incorporate a video clamp, which is necessary to remove the flicker caused by the energy dispersal FM signal superimposed on the satellite signal. The video/sound circuits I use are based on Nick Harrold's articles in the November/December issues of 'Television' magazine with a few modifications (mainly to the sound board). I hope to publish details of these in the next issue of CQ-TV.

SILVERSTONE ELECTRONICS

YOUR ONE-STOP SOURCE OF REALISTICALLY PRICED TVRO EQUIPMENT FOR THE AMATEUR!

Silverstone Electronics has been developing a number of modules specifically aimed at the homebrew TVRO enthusiast. Our aim is to provide all of the "difficult" parts of the system, including a high-quality offset dish for optimum gain, a low-cost outdoor unit (LNB) covering the full 10.95-11.7 band, and compatible full-band modules for the indoor unit including a high quality low threshold demodulator.

High quality 1.2m offset dish supplied with complete constructional details of feed, support structure etc. Gain equivalent to 1.5-1.6m conventional dishes.....£125

Optimised feed horn for above dish together with mounting struts.....£85

High quality polar mount for above dish.....£85

Matsushita 950-1700MHz tuner/demodulator modules featuring 8dB typical noise threshold complete with application note describing complete receiver.....£69

Mitsubishi FO-UP11KF DRO/Mixer assembly.....£34.50

Mitsubishi module with DRO modified to 10.0GHz to allow standard 950MHz and up IF to be used.....£44.50

Low noise 950-1700MHz preamplifier featuring 18dB minimum gain and 3dB average noise figure for use as post-mixer low noise amplifier.....£29.50

High gain 700-1700MHz amplifier, 25dB gain for use as a general purpose gain block.....£29.50

10.95-11.7GHz LNB with 2.1dB (typical) noise figure and 50dB (minimum) gain 10.95-11.7GHz LNB.....£155

Low-cost 10.95-11.7GHz LNB (3.5dB noise figure 45dB minimum gain).....POA

Allied Telecommunications 950-1700MHz complete indoor receiver with excellent threshold performance (video, audio and modulated UHF outputs).....£225

Complete home system including 1.2m offset dish with feed, feed supports and polar mount, 2.1dB NF LNB and Allied Telecommunications receiver.....£635

All prices exclude VAT and carriage.

For further information on any of our products, or to arrange a visit to see our equipment in operation, please write or telephone (9am-8pm seven days a week).

Silverstone Electronics, 78 High Street, Whittlebury, Towcester, Northants NN12 7XJ
Tel: 0327 857350 Telex: 311363 SILEC

NEW TVRO DISH

Following last issue's article for TVRO enthusiasts, we have come across a source of reasonably priced parabolic dishes.

Kord Audio Products are producing a 1.5metre dish which is a one-piece glass fibre moulded parabolic design with the conductive material being encapsulated within the moulding. This form of construction is said to be stronger than its aluminium counterpart as well as being corrosion proof. The dish has an integral back mount which affords additional strength and provides four 3/8" holes to facilitate its attachment to a mounting arrangement. A mounting tripod to hold the LNB is also available and is supplied in a 'flatpack' form for fitting on site.

SPECIFICATION

Diameter	1.5m (5ft)
Gain	42.5dB
Frequency	10.95 - 12GHz
Focal length	6-9mm (24")
F/D ratio	0.4
Colour	white

A polar mount is also available which enables the dish to track the satellites. Once the mount has been correctly adjusted, one simple hand adjustment (manual version) is all that is needed to quickly move between satellites.

The mount is supplied complete and is designed to fit the Kord dish, however it can easily be adapted for use with other dishes by means of an adaptor frame. A motorised version of the mount is projected for the near future.

Kord Audio produce a set of application notes for DIY'ers which explains in detail the various techniques concerned with the installation of a TVRO aerial system. Useful tables are included showing azimuth and elevations for both Eutelsat ECS and Intelsat birds in different parts of the country. Details and measurements for the dish mount are clearly illustrated as is a suggested design for a DIY dish mount.

The notes are available price £2.00 plus a large SAE but this is refundable upon the purchase of a dish.

PRICES

1.5m Dish aerial	£77.00
L.N.B. tripod (flatpack)	£14.50
Polar mount	£95

Prices do not include carriage and VAT.

Kord Audio Products, 7 The Green, Nettleham, Nr.Lincoln, LN2 2NR. Tel: Lincoln 750702

NEW TVRO MODULES

By the time this issue is received Comex Systems should have available two new modules for their TVRO receiver kit.

DIGITAL TUNING INDICATOR

A digital tuning module permits the receiver to be tuned over its range in 99 steps and displays the step number on a 2-digit LED display. Tuning is performed manually by a small, centre off, toggle switch; pressing it one way tunes the receiver high whilst the opposite tunes low. Fine tuning between channel steps is accomplished with a front panel control.

The module can be used with any varactor tuned system (ELC1043 tuners etc) and can handle tuning voltages up to about 30v or so, all or part of the range can be chosen to occupy the 99 channels. The displayed digits can be selected so that they either increase or decrease with tuning volts as desired. The kit is supplied on two boards (logic and display).

TUNABLE SOUND

A tunable intercarrier sound demodulator kit is also available which can be used in conjunction with almost any receive system (TVRO or otherwise). The sound signal feeds a MOSFET mixer via a high-pass filter. A transistor VCO provides a final tuning range typically between 4.5 and 7.5MHz, although it can be tailored for other frequencies if required. The mixer output at 10.7MHz is heavily filtered and shaped and passed to a single chip demodulator/audio power amplifier. Both 15-ohm speaker and high impedance audio outputs are available and the board runs from a 12v supply.

In use the demodulator is extremely sensitive and will recover an audio signal from surprisingly weak transmissions.

Both modules are available from Comex Systems Ltd., Comet House, Unit 4, Bath Lane, Leicester LE3 5BF. Tel: (0533) 25084 (SAE with written enquiries please).

MORE MODULE KITS FOR THE TVRO RECEIVER ARE DETAILED ON PAGE 88.

TV COOKERY!

By Mike wooding G6IQM

In response to a letter sent in by one of our long standing members, Cyril Chivers, it has fallen upon me to attempt to answer the question posed. The source of Cyril's question is an old microwave oven that he was given, so now maybe you have guessed! How do you modulate a Magnetron for amateur TV?

The immediate answer that came to mind was; 'you can't , but it might make a nice tongue-in-cheek article for the magazine'. The problem that then arose was, the more I mulled it over, the more it became feasable. Below is the result of a certain amount of memory searching from my college days, a fair deal of reading and by far the largest part, wild speculation based on my knowledge of microwave techniques.

Foremost, for those who are not aware of exactly what a Magnetron is (see photograph), here is a brief explanation: A cylinder is mounted between the poles of a very powerful magnet so that the lines of magnetic force are parallel to the cylinder's long axis. Inside the cylinder are mounted the usual component parts of a Triode, a heating element, a cathode and an anode. The heater is nothing unusual, but does have a tendancy to require a small power station to start it up. The cathode is also cylindrical and is in the centre of the device, running through it's length. The anode,

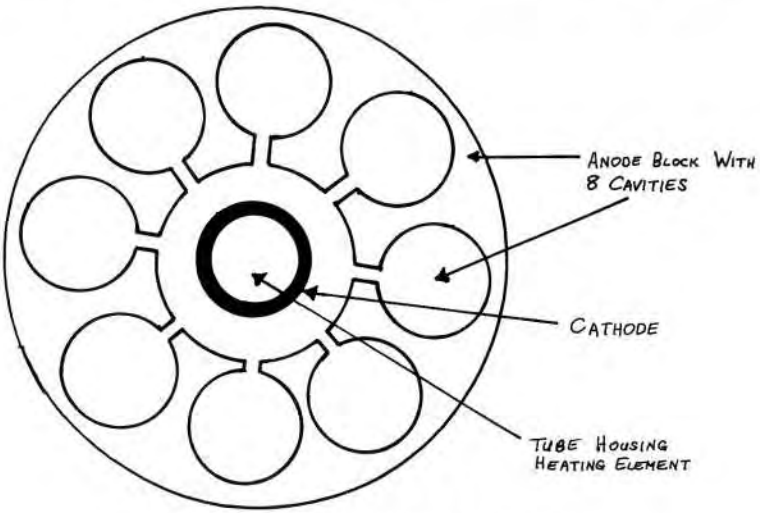


Fig.1 CROSS SECTION OF A MAGNETRON.

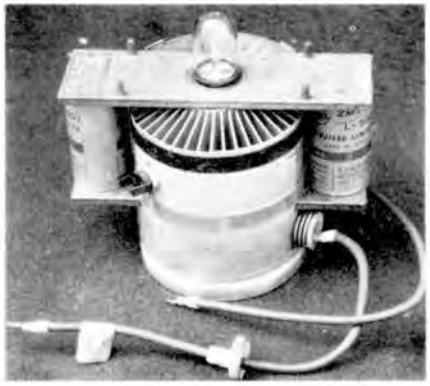
however, is where the Magnetron differs from a normal valve, it is made in the form of cavities (Fig.1) of equal size and shape, the proportions of these cavities govern the frequency at which the device operates.

As in a normal Triode, when the cathode is heated a 'cloud' of electrons is emitted from it. The anode is at a very much higher potential (+ve) than the cathode, thus the electrons in the 'cloud' surrounding the cathode are drawn into a stream travelling toward it. The interaction between the electron stream and the strong magnetic field gives the electrons a curved path as they try to reach the anode. This curved path takes the electrons past the mouth of more than one cavity, the effect of which is to excite the cavities to resonance as a result of the field disturbance created at their mouths. Since the cathode is cylindrical and the cavities evenly ranged around it , the whole shebang starts to oscillate, at the frequency governed by the size of the cavities. The power is extracted by inserting a coupling loop into one of the cavities and transferring its gathered power into a waveguide by a properly matched probe.

So it can be seen that there are two basic problems (only two?):

1) How to change the frequency to the amateur bands.
2) How to modulate the beast.

there is of course another large problem but one that is not to difficult to solve (sez he!).



1) To change the frequency of a Magnetron entails changing the size of the cavities. In industrial and military (radar) devices there are usually tuning stubs in the cavities so that their operating frequency can be altered, but I very much doubt that this is the case in the Magnetrons used in cookers. Nevertheless if we investigate a little closer we find that most domestic cookers operate at between 2400MHz and 2450MHz, in other words right within one of the bands at our disposal. Suddenly I see the spectre beginning to arise of stations all over the country mounting microwave cookers on their masts!

2) To modulate a Magnetron is simplicity itself (in theory), all we have to do is amplitude modulate the cathode, the efficiency of this method would not be very high, but it is a darn sight safer than trying to modulate the anode running at several Kv. I am not going to propose any circuit ideas as this article is mainly theoretical, and besides, I'm not that mad.

The other problem that I hinted at is of course the matter of the output power. Most Magnetrons from domestic ovens are in the area of 600W mean output, that is approaching the order of +58dBW. The maximum carrier power we are allowed on this band is +20dBW. How do we dissipate 38dB of power?...bake a cake? That may be one way, but the most effective would be to use a waveguide load or, better still, a waveguide transformer, both of which are probably not available on the amateur market!

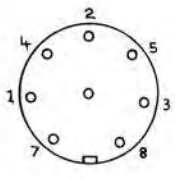
So there it is Cyril, yes in theory it can be done, in practice I feel that it is beyond the means of most amateurs, even those of us fortunate enough to have at our disposal the appropiate sort of test gear. But I may be wrong, perhaps we will see yet pictures of the Sunday joint being roasted, beamed from Wiltshire.

SONY CAMERA REMOTE CONTROL

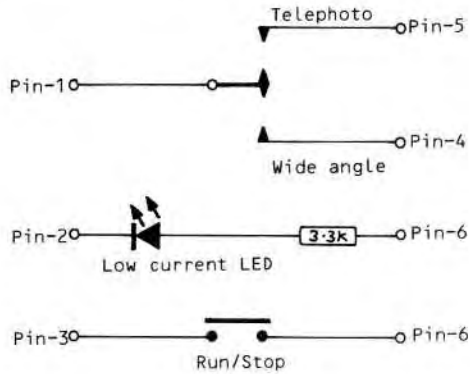
by Peter Delaney G8KZG

The Sony HVC series cameras have an 8-pin socket on the side for the connection of a remote control. The Sony accessory to do this is no longer a current item, and was relatively expensive. When the camera is being used on a tripod, the normal zoom control is not in a very convenient location. It is quite easy to make a remote control lead, so that the lens can be controlled from on the pan handle.

The socket used appears to be a DIN type, but the pin spacing is non-standard. However, if two pins are removed from a standard 8 pin DIN plug, it will fit - the relevant contacts are not used anyway. The pins to remove are those corresponding to the Sony pins 7 and 8 (see diagram) - DIN plugs are numbered differently. Cutting the unwanted pins on the wiring side, and pulling the contact part of the pin firmly with a pair of pliers does the trick. Pins 1, 4 & 5 are wired to a double throw toggle switch, which is sprung to the centre-off position. A P.O. type lever key switch would be a suitable alternative.



8-pin DIN PLUG.
(Remove pins 7 & 8)



Whilst remoting the lens control, the same plug can be used to remote the VTR run button and indicator. Use a push to make switch, a low current LED, and wire them up as shown in the diagram. Even if all the bits are bought new, the cost is a small fraction of a Sony box.

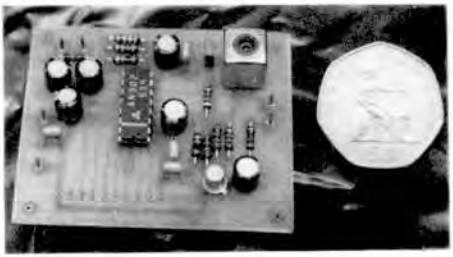
(All pin numbers refer to the Sony socket, as in the diagram).

KITS, CHIPS & THINGS

The Worthing & District Video Repeater Group are nothing if not resourceful, even entrepreneurial, in their desire to fund GB3VR, the Worthing ATV repeater. Regular readers will have seen the full page advertisements which appear in each CQ-TV giving details of the various products and services which are on offer. This short article will look briefly at some of their hard and firmware for the ATV'er.

VIDEO AGC KIT

This is quite a magic little unit. It basically accepts any composite video signal from around 0.15v p-p to 2 or 3 volts and delivers a standard amplitude level (2v p-p into 75-ohms) at its output. The concept has been unashamedly 'lifted' from domestic VCR circuitry and indeed uses one of the special chips for that purpose. However the original circuitry has been stripped down to leave only those facilities which are useful to ATV'ers. An output stage to allow driving into a 75-ohm load has been added.



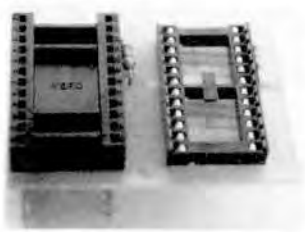
Video AGC board illustrating its compact size.

Repeater groups especially will recognise the value of such a unit. It is one of those common problems that no two stations working a TV repeater seem to have the same level of FM deviation, consequently the level of demodulated video changes accordingly and thus varies the deviation on the repeater's output. With this board the level to the transmitter is held absolutely constant, regardless of under or over deviation on the input.

Of course many will find the unit useful in the shack, especially since it will enable you to chop and change video sources during transmission without ever having to worry about level matching, or for that matter constantly adjusting the deviation control.

Price: £16.00 inc.

CROPREDY TEST CARD 2-WAY EXPANSION BOARD



2-way expansion

The Cropredy Electronics digital test card generator kit is widely used in amateur TV shacks and is still available from Cirkit today. Unfortunately, even after the long time since it originally came out, there is still only one style of test pattern available from Cropredy. Now all that has changed!

The Worthing Group have worked out for themselves how the data is stored in the EPROM and have set about designing some alternative patterns of

their own (see below). Since however there is only provision for a single EPROM on the board, a 2-way expansion board has been produced so that two patterns can be made instantly available.

The board itself is very straightforward and comprises an EPROM socket, whose pins protrude through the underside to allow it to plug into the test card board's socket, plus one other 'cascaded' socket on the expansion board. There are three points to which are connected a simple changeover toggle switch to select either pattern.

Price: £6.00 inc.

CROPREDY TEST CARD 8-WAY EXPANSION BOARD

This board has a similar function to the 2-way one but is too large to fit straight onto the test card generator. The 8-way board obviously has room for up to 8 EPROMS which can be accessed either from a straightforward multi-way rotary switch or, with the aid of an extra on-board chip (supplied), from a BCD switch.

8-way expansion kit.

Full documentation detailing construction, connection and device selection options is supplied. However I did find some of the instructions, especially those relating to various links and device select, a little hard to comprehend. Nevertheless after reading it through a few times and studying the board and drawings, it soon became clear how to proceed. The board itself is home-produced, photographically, therefore full professional quality workmanship should not be expected. Having said that the board is entirely adequate although some of the tracking does seem dangerously thin and, in fact, (at least on the one supplied), the old 'dust-on-the-artwork' problem is being experienced and one or two tracks were actually open circuit due to these dust particles. The lesson here of course is to carefully inspect the tracking by holding the board up to a strong light, and repairing any faults by flowing solder over the suspect track before construction.

The board is the same size as the test card board and can mount directly above it on extended pillars. A short connecting lead is supplied ready to connect the two together.

Price: £16.00 inc

TEST CARD EPROMS

There have been occasions when the necessary EPROM (which carries the actual pattern) has been rather difficult to obtain, this being supplied directly by Cropredy and not by Cirkit. But now there is an alternative supply intended to augment the original.

IBA look-alike.

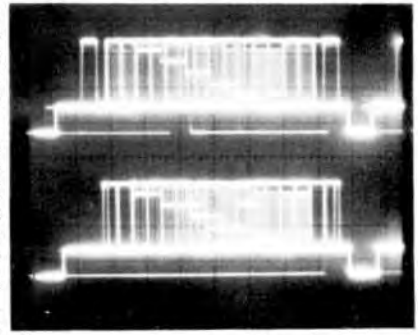
There are two test cards available: an IBA look-alike, which is somewhat similar to the Cropredy design but more accurate (see photo). This has provision for personalisation of both callsign and a two-line caption of your choice. A BATC style card has been programmed into an EPROM which is similar to the card currently being sold by the club. As you can see this has BATC logo's on as well as the corner circles. This pattern also carries a large personalised callsign.

Another design carries a fixed message in ordinary text and yet another can be programmed with four huge numbers for use as a code group during an ATV contest.

BATC test card pattern.

An example of a text EPROM.

The group are constantly looking for ideas for more designs and would be delighted to hear from anyone who has any. Details on all the above can be obtained from Geoff Mather G8DHE on 0903 32161.



In designing these EPROMS the opportunity has been taken to correct and improve the waveforms produced from them. In particular the correct number of lines at the top of the picture have been left and also a near-correct number at the bottom. (It is not possible to leave the exact number specified - but it is close). The frame sync pulse uses the correct half-line pulses on the Worthing style instead of only full-frame pulses as on the original. This gives a superior performance on many TV's, video recorders and when interfacing into broadcast spec. equipment. A standard 52uS line period is also used now instead of the significantly shorter one before. The photograph should give some idea of these differences; the Worthing trace is on top whilst the Cropredy is below.

Price: £5.00 each inc.

Further information and ordering details can be obtained from the Worthing advert elsewhere in this issue.

SSTV – WRAASE PICTURES ON THE ROBOT 1200C

Users of the Robot 1200C SSTV scan converter will be aware that it is not possible to receive line-sequential colour produced by the Wraase SC-1. Unfortunately the problem is becoming more acute in Europe as the Wraase continues to gain popularity. Even with 7-seconds B&W, results with the 1200C can be disappointing unless the received signal is virtually noise-free. All this is a great pity especially since the Robot is such a fine piece of equipment capable of superb results.

To the rescue comes a new upgrade for the 1200C by G3OQD which allows full reception and transmission of 'Wraase standard" colour pictures. The modification is simplicity itself - merely the removal and replacement of one EPROM - all existing Robot modes and facilities being retained un-altered.

Principle features of the new upgrade are as follows:-

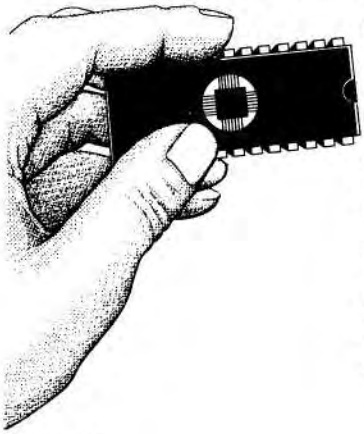
1. Total compatibility with all SC-1 SSTV modes, both colour and B&W including 48/96-second, and also the new 'Quasi' mode as fitted to the new SC-1/2000 (128/256-line with doubled line duration for superior quality pictures). It is also compatible with any other line-sequential colour system using the sequence: green-blue-red, starting from frame sync (eg: Wraase SC422A).

2. Excellent 7/8-sec monochrome reception even under weak signal conditions.

3. Simple front panel switching between Robot and SC-1 modes, no external computer required, except for keyboard operation.

4. Square picture format with 128/256-line display when in SC-1 mode so a full picture may be received and transmitted. (The standard 1200C has only 120/240 lines).

5. A 16-level grey-scale can be added to the top of the picture to give easy identification of an SC-1 format signal. You can also use all your existing 120/240-line pictures by simply adding grey-scale to fill the frame.



6. On-screen indication of red colour sync if it is present on the received signal; red sync switching being completely automatic. (The SC-1 requires a switch on the rear panel for receiving stations without red sync). There is a manual re-sync facility for use with signals not employing the red sync system, in case interference causes a loss of colour sync.

7. Automatic reception is extended to include SC-1 modes detection. The system will automatically switch over to SC-1 mode when receiving a similarly upgraded 1200C or back to normal 'Robot' mode when receiving a standard 1200C signal.

8. Keyboard, using the graphics input, adjusted to give 8x4 and 8x8 character format exactly like the SC-1 keyboard and more in keeping with a 1:1 aspect ratio.

9. A built-in callsign generator inserts the callsign at the bottom of the picture, either on a colour bar background or white on a black background, (can be changed if required to order), selectable from front keypad; also available in normal Robot mode with slightly wider letters for a 4:3 aspect ratio.

10. All test patterns, including colour bars, are adjusted in width to produce a 1:1 aspect ratio with added grey-scale at the top (SC-1 mode only).

11. The zoom facility has been extended so that an SC-1 format picture, received in quad mode, may be zoomed up to full size with no missing lines. The normal Robot zoom remains unaltered.

12. Better colour display than the SC-1; the Robot 1200C's larger display memory gives clear bright colour pictures with no horizontal black lines on 24-second, and no annoying flicker on 48-second.

As a non-SSTV'er I feel that since this upgrade is available surely it makes sense to equip with Robot 1200C equipment. After all you get the best of both worlds in one package - can't be bad.

The Robot 1200C upgrade EPROM is available, complete with 6 pages of documentation, for £50 from M.H.Emmerson, 6 Mounthurst Road, Hayes, Bromley, Kent BR2 7QN. Please write your callsign CLEARLY so that it can be incorporated in the software.

You may be interested to know that such leading SSTV'ers as G3WW, G3NOX, G3CDK, G4CZT, G3KOM, G3OQD, G2BAR, GJ4YCR and CT1AKD (to name but a few) are already using this upgrade to good effect. G3OQD is also looking into the possibility of producing a similar EPROM for the 400C and 450C models as well. It will NOT be possible to work the same trick on a Wraase SC-1!

TV IS 50 YEARS OLD

It was on the second of november 1936 that the BBC started the world's first high definition television service. Studios at Alexandra Palace in North London were speedily converted and the first programmes were transmitted alternately, using Baird's mechanical system and EMI's electronic one. The EMI system quickly became the accepted standard and it is from that that modern television was developed.

Only around 2000 people saw the first programmes but, by the start of the war in 1939, this had grown to some 50,000. At the outbreak of war transmissions abruptly ceased. In fact a cartoon film was being shown and part way through the station just went off the air for the duration.

The BATC offers its congratulations to the BBC on its half-century. I wonder what it will be like in another fifty years time!

CONTEST NEWS

By Mike Wooding, G6IQM

Here I am then, back off my holiday with loads of letters to answer, articles to finish off for the magazine, the news to write and to cap it all, my right leg in plaster (nothing to do with the holiday!).

Before I get into the news etc. I must offer my apologies to Viv Green, G1IXE, for not including her entry in the Mayday Microwave contest results published in the last issue. I could always blame the data dump that I use between the filing program and the word processor, but this time it was me, so once again sorry Viv, the corrected list is included below.

OK so to the news: As I write the International is almost upon us and the weather pattern suggests that conditions may be better than we have experienced for some time. I hope by now that your Autumn Vision and Slow Scan contest entries are in and I shall announce the results in the next issue.

The Summerfun contest was by all accounts well attended, although, as usual, conditions were not particularly good. I have received various comments concerning the timing and length of the contest and it seems that quite a few of you had not realised that it had been extended to 28 hours over two days. Generally however the new format appears to have worked so in future it will remain the same. The level of entries was a little disappointing considering the reports I have had of activity, but it appears that it was well enjoyed by all which is the main thing. I am especially disappointed over the single SSTV entry after all the comments that were made to me by people at the convention, I hope that the SSTV contest was better attended! Quite a few amusing comments from you so as usual here are a few of them, with of course my own additions:

G8LIR/P - "we have found out that if you pull the Heliax out of it's connector at the aerial people can't see you and the amplifier complains!"

G6MPE - "B***er the NFD. What about the Brighton rally?"...sorry about that John, it's very difficult to find clear dates so we invariably clash with something.

G8MNY/P - "set up new electric cow fence"...beats a multibeam John!

G8BWC (the one from Brindsley) - "Derbyshire born, Derbyshire bred, strong in arm, but thick in't head"...heaven knows what it's got to do with the contest, I think there must be a hidden meaning!

G6SKO - He reckons I ought to keep off the "neck oil", don't know what that means either, funny old lot up north.

Congratulations to Andy G8LIR, Fred G4GCO and Ron G4SHC (see photograph) who form the winning 70cm team and were operating this year from Cairn-y-Brain near Wrexham as GW8LIR/P. Congratulations to John G6MPE for his win on 24cm despite the Brighton rally! and congratulations to Dennis G6YBC for his win on SSTV from his QTH in Manchester.

G8LIR erects the aerial array during the Summerfun

1986 SUMMERFUN RESULTS 70cm

Posn	Call	Points	Contacts	Best Dx	@	Km
1	GW8LIR/P	10540	54	G6CEZ/P		250
2	G8GLQ/P	5351	20	G6OKB		249
3	G8VZT/P	5127	39	G8LES		173
4	G8MNY/P	4869	31	GW8LIR/P		212
5	G1COI/P	3413	22	G6HMS		206
6	G8BWC	2310	16	G8GLQ/P		221
7	G6SKO	2254	17	G8GLQ/P		219
8	G6HMS	1637	13	G8GLQ/P		249
9	G4WRA/P	1431	21	GW8LIR/P		143
10	G6CEZ/P	1117	11	GW8LIR/P		250
11	G3VXM/P	477	10	G6OQS		65
12	GW6BDM	280	2	G8GLQ/P		114

1986 SUMMERFUN RESULTS 24cm

Posn	Call	Points	Contacts	Best Dx	@	Km
1	G6MPE	600	8	G1DSO		65
2	G3VXM/P	469	7	G6MPE		65
3	G8GLQ/P	188	7	G8LES		75
4	G8BWC	66	3	G1OTO		28

1986 SUMMERFUN RESULTS SSTV

Posn	Call	Points	Contacts	Best Dx	@	Km
1	G6YBC	1991	19	G3CDK		288

As promised Viv here is the corrected list for the Mayday Microwave contest:

MAYDAY MICROWAVE 86 RESULTS

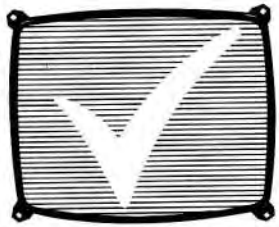
Posn	Call	Points	Contacts	Best Dx	@	Km
1	G6MPE	878	17	G6TVX		80
2	G3YQC	522	8	G8BWC		78
3	G4HJD/P	325	5	G4DVN		68
4	G8MMF/P	264	3	G4CRJ		67
5	G1GST	191	4	G3YQC		65
6	G1IXE/P	153	3	G4ZQF		62
7	G1OTO	33	2	G6SKO		19
8	G6IQM	2	1	G3YQC		1

Don't forget that if you require a certificate (everyone gets one) please include a large (A4) SAE with your entry. Contest forms and log sheets (A4 SAE please), contest entries and any other contest correspondence to: BATC Contests, c/o The Editor, 47 Crick Road, Hillmorton, Rugby CV21 4DU

Closing dates for entries in the forthcoming contests are:

International ATV - October 31st.
AutumnVision - December 31st.
SSTV - December 31st.

1987 CUMULATIVE CONTEST



The 1987 Winter Cumulative contest comprises four separate sessions and will take place from 1900 to 2359hs local time each day. The dates for each session are as follows:-

Thursday January 8th 1987
Friday January 16th 1987
Saturday January 24th 1987
Sunday February 1st 1987

BATC general contest rules will apply as will the following additions:

A station may be worked once only each session to count for points.

A different code-group should be used in each session and on each band entered.

A maximum of any three sessions to count towards an entry.

Any band which permits fast-scan ATV may be used for vision contacts.

Entries to be received by the Contest Manager, Mike Wooding G6IQM, 3 Perkins Grove, Rugby CV21 4HU, not later than March 1st. Entrants requiring BATC contest log sheets and entry forms should send a large (A4) stamped addressed envelope to the above address.

A PROCESSING AMPLIFIER

By Bryan Dandy, G4YPB

Having decided to upgrade my ATV system to colour it made sense to start at the last link in the chain; the processing amplifier, and work backwards allowing testing at all times into working units. The processing amplifier which I built is shown in Fig.1 and is based on the design by John Goode in CQ-TV 130, with a few changes as described below.

Using +&- 12v rails caused a problem with dissipation in TR8 and it's associated collector resistors, this was overcome by using +&- 5v rails with no loss of performance. Also this type of output stage works better inverted when driven with video signals so, as the board had already been designed in the original article, I decided to invert all the circuitry.

Clamp pulses for the amplifier are derived from the mixed syncs, rather than from the more commonly used line drive. This ensures that clamping always takes place while the signal is at black level (provided of course that the incoming sync pulses match the local ones). Also with this method simple sync pulse generators, such as the ZNA234, can be used without having to provide line drive.

A printed circuit design is shown in Fig.2 and the component layout in Fig.3. Provision has been made on the PCB for two extra 100nF decoupling capacitors on the positive rail, in the area of the clamping and blanking circuitry. Resistors are all 1/4W, but it is possible to use 1/2W types in the output stage if higher than +&- 5v rails are used. Transistors TR1, TR3, TR7 and TR9 to TR12 are all general purpose NPN types such as BC182 or BC107. Transistors TR2, TR5, TR6 and TR13 are PNP types such as BC213 or BC177. Transistor TR4 is a BSX20 and TR8 can be any NPN TO-39 type such as BC461 or 2N2905. All the diodes are 1N4148 and the 47uH choke can be a Sigma SC10 or SC15 type.

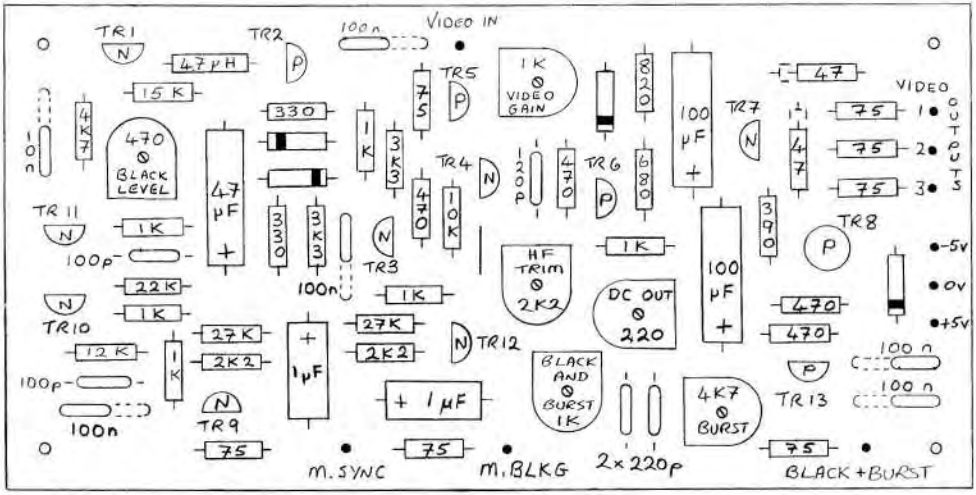


Fig.3 Component layout

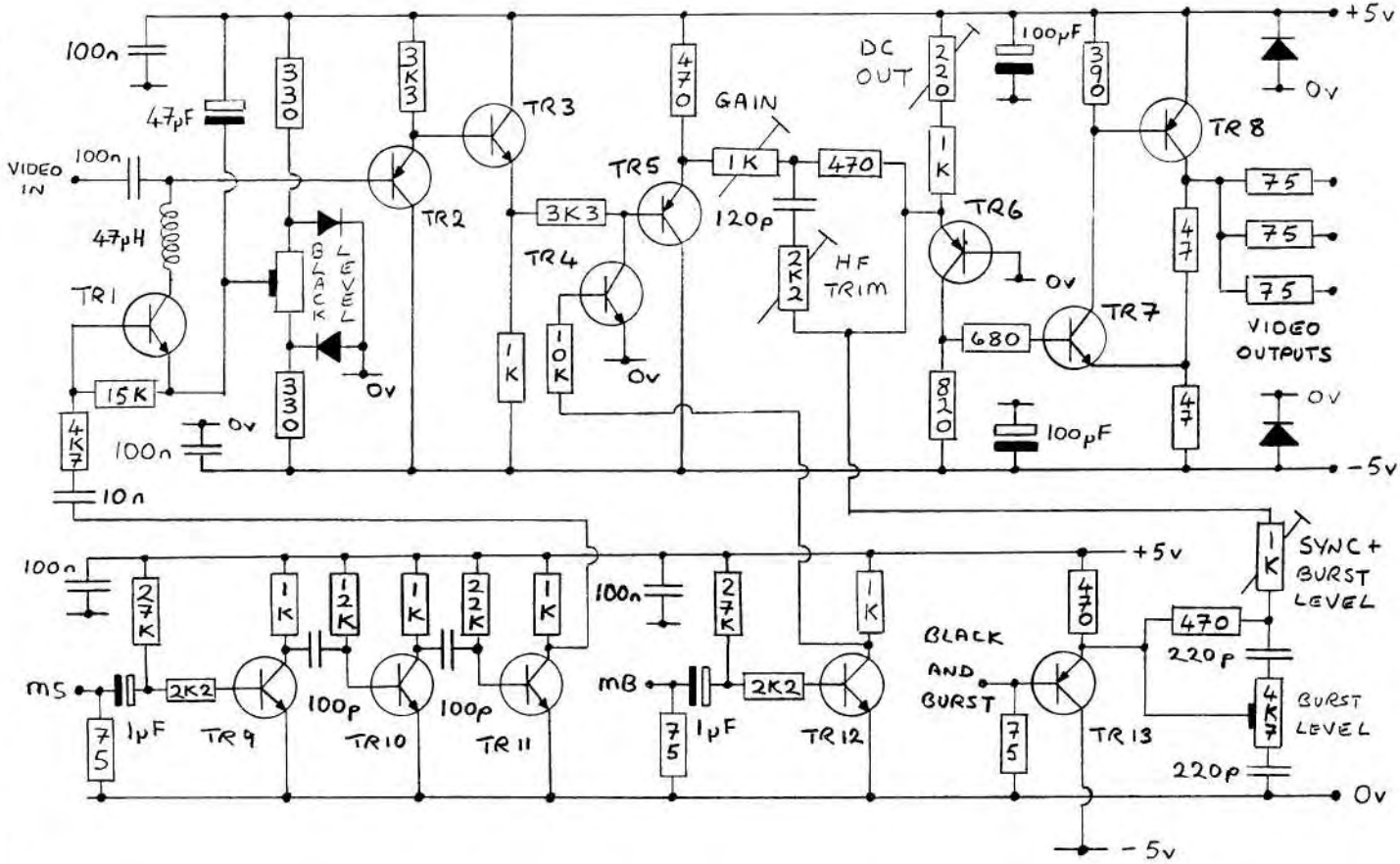


Fig.1 CIRCUIT DIAGRAM

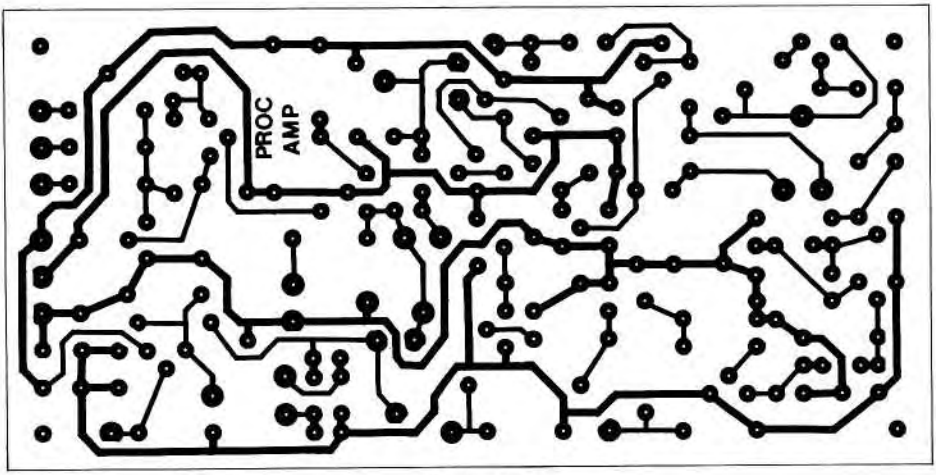


Fig.2 Foil pattern

If the amplifier is to be used with Monochrome signals feed the Black and Burst input from the Mixed Sync input via a 560-ohm resistor.

CAN YOU HELP?

A couple of our colleagues 'down under' seek help in one or two areas and they wonder if any member may be able to offer some assistance.

Dennis Jurisinec of 11 Glengate Street, Hamlyn Heights, Geelong 3215, Victoria, Australia is looking for a circuit that can decode a PAL composite video signal and present a standard RGB plus syncs output, similar to the signal which might be provided by a 3-tube colour camera.

(I have had one or two enquiries from members on this subject. Most want to decode a composite signal and have an output suitable for driving an RGB monitor - any offers of an article? Ed).

Michael Sheffield of 4RD Albany Highway, Albany, Auckland, New Zealand is looking for someone who can handle 1/2" video tape to the Ikegami reel-to-reel format (black & white only) so that he can exchange some material. He adds that he can take VHS too but the quality degrades badly if it is copied.

SQUARE ONE
Part-3

By John Lawrence, GW3JGA

VIDEO DISTRIBUTION AMPLIFIER (VDA)

The purpose of a VDA is to accept a video input signal and provide several (usually 3 to 6) mutually isolated 75-ohm impedance outputs. The frequency response must be flat to at least 5MHz and preferrably extend down to d.c. The amplifier does not usually provide any overall voltage gain - a 1-volt p-p input signal will provide a 1-volt p-p signal across 75-ohms at each output - but of course it is providing power gain. The input impedance is usually high (greater than 10k-ohms) so that it does not load the signal source when 'looped through'. A switched 75-ohm resistor is usually incorporated to 'terminate' the input.

PULSE DISTRIBUTION AMPLIFIER (PDA)

A PDA is similar in purpose to the VDA except that it is designed specifically to handle pulse signals and provide several mutually isolated outputs capable of feeding 2-volt p-p pulses into 75-ohms.

INPUT AND OUTPUT CIRCUITS

Most SPG's in use today use TTL I.C's in the pulse forming circuits. As the outpt of a TTL device is not intended to drive a 2-volt signal into 75-ohms, some form of interface circuit is required otherwise low output and/or mismatch will occur. The principles and design of input and output circuits, VDA's and PDA's capable of meeting these requirements is very clearly explained by John Goode in the 'Best of CQ-TV' pp. 58-64.

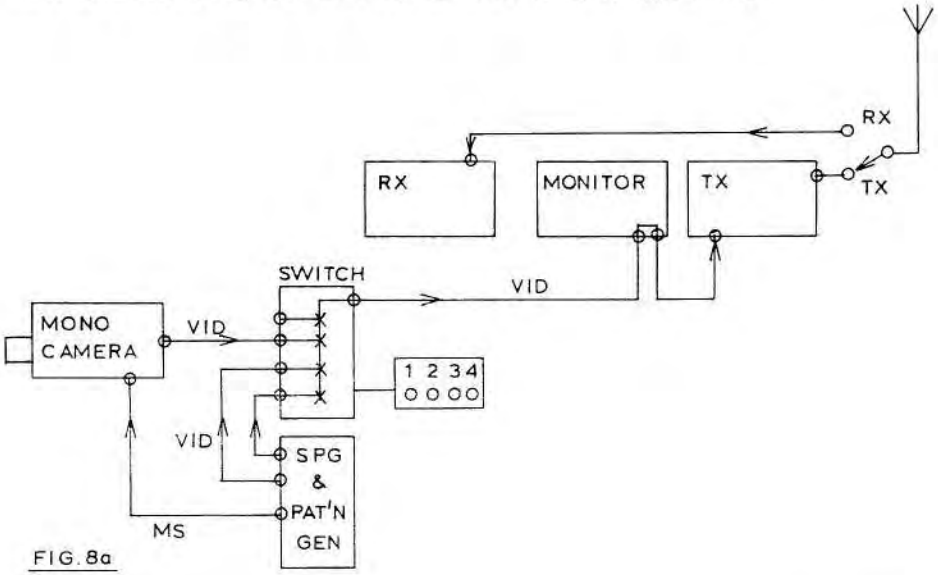


FIG. 8a

SETTING UP AN AMATEUR TV STATION

We have considered some of the practical problems and methods of interconnecting video equipment and now, to put this in perspective, we look briefly at how you might set up an Amateur TV station. You could of course go out and buy a camera and some 'black boxes' and be on the air immediately, but my guess is that after a short time your interest would almost certainly subside, unless of course your interests lie in production rather than technicalities. The more usual method is to start with a simple basic system - complete with its limitations and restrictions - and to expand this as time and finances allow. This will provide you with the opportunity to get to know how each section works, at the same time getting you on the air to swap pictures and to discuss ideas and projects with other TV Amateurs. Most ATV stations are in a continuous state of development as this is one of the most interesting facets of the hobby.

Over the years members of the BATC have designed a number of simple ATV circuits which form an ideal starting point. P.C. boards for many of these are available from Members Services. Any beginner who can solder should have little difficulty in building these simple circuits and making them work. To illustrate this point, consider a basic monochrome ATV station as shown in Fig. 8a. The SPG-Pattern Generator and Video Switch are on two P.C. boards - this system will produce a picture with or without a camera as it generates five different patterns including grey scale bars. The transmitter and receiver types will depend on whether you wish to go on 70-cms with AM or 24-cms with FM. Several companies make ATV transmitters and receive converters but, if you are a keen constructor, circuits and P.C. boards (where appropriate) are available for all these options. It would be realistic to point out that building circuits for 70cms requires some appreciation of RF circuit operation and that for the construction of some 24cms equipment experience of UHF techniques would be essential.

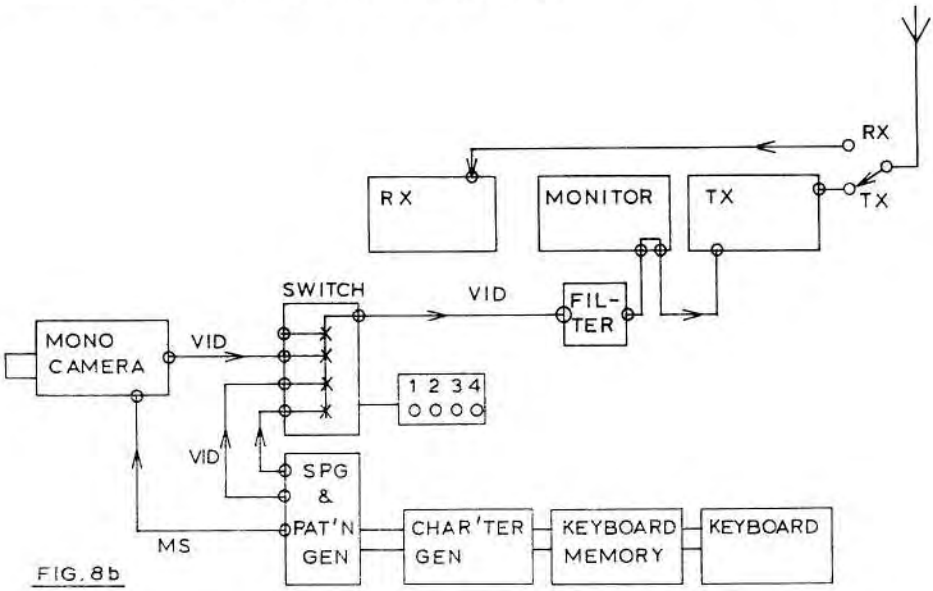


FIG. 8b

To continue: at some point you may wish to add a character generator and keyboard to your system, so that you can display your call sign and location, CQ, reports etc. It is usually necessary to restrict the bandwidth of digitally generated text by incorporating a video low-pass filter in the video output. This arrangement is shown in Fig. 8b. A further up-date might be to add a downstream keyer, as shown in Fig.8c, which will allow you to insert your call sign or other text into the outgoing picture. For AM, an RF probe fitted in the aerial lead is very useful for setting up the transmitter. Your home video recorder could be incorporated to record and replay off-air transmissions. You might then consider that the video switching arrangements are rather too basic and your next move might be to replace this with a video mixer, (To be covered in a subsequent 'Square One'). At this point you will find that there are just not enough hours in the day and you haven't even considered colour, aerials, feeders, contest operating, SSTV and so on! However, to start you off, a list of equipment, as shown in Figs. 8a-8c, is given below.

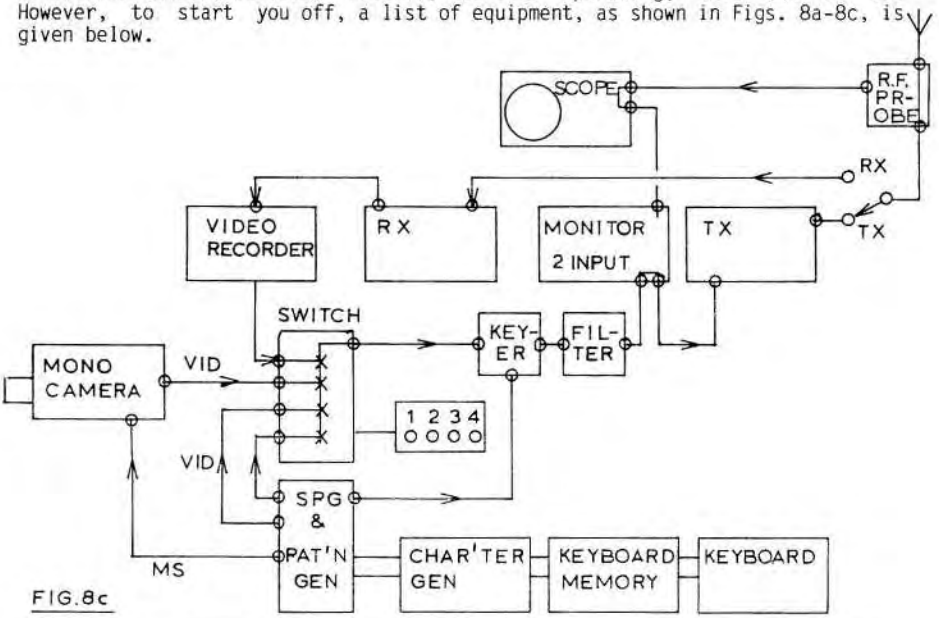


FIG.8c

Equipment	Source		PCB
SPG & Pattern Gen.	Micro & TV Projects	p.3-11	yes
Keyboard add-on	Micro & TV Projects	p.12-15	yes
4-way Vision Switch	Micro & TV Projects	p.16-19	yes
Video Filter	CQ-TV 122	p.31	yes
A 70-cm ATV Converter	Best of CQ-TV	p.4-5	yes
A 70-cm Transmitter	Best of CQ-TV	p.22-25	yes
A 70-cm Monitor Probe	Best of CQ-TV	p.56-57	no
24-cm ATV Converter	Best of CQ-TV	p.6-10	N/A
FM-TV Receiver IF	Best of CQ-TV	p.16-21	yes
24-cm FM-TV Transmitter	CQ-TV 133	p.8-21	no
Video Keyer (Soft Option)	Revised ATV Handbook	p.15	no

(N/A = not applicable)

SSTV ON THE ORIC

by John & Diz Feeley.

Having seen a SSTV demonstration at our local club we were intrigued by this mode of amateur radio. The fascination of watching the picture build up line by line hooked us. However, demands of the 'Talking Newspaper' (we are Chairman and Hon.Sec. of the Blind Radio Amateur's taped radio magazine QTI) left us with little time to build a slow decay tube system, and cost ruled out the purchase of a commercial system.

We did, however, have an Oric-1 microcomputer and Andy Emmerson was kind enough to give us a copy of the SSTV program written in French by Eddy Dutertre F1EZH and Denis Bonomo F6GKQ. Upon translation and rewriting this was found to work well on the Oric without an interface and provided a rough and ready tranceive program for SSTV. With Oric-1 and ATMOS computers being available for around £25-30 secondhand this would appear to be a cheap entry into SSTV.

The program offers full receive and transmit features. It gives a high resolution picture stripped of grey scale (black and white points only) which is very effective if the transmitted picture is high in contrast, but fails if the picture is rich in grey tones. In this mode a small section of the picture on the right of screen is lost. As an opinion a low resolution mode offering an 8-point grey-scale provides a block graphic type picture. In operation we found this to be rather a pain since best results were obtained by standing back and removing our glasses to blur the image which then resolved quite well! The system needs no interface - the rig audio being fed directly into the cassette port.

On transmit a black and white image is transmitted offering a choice of callsign, test grid, and QTH locator. Given time an extra message can also be written into the computer to give reports. These messages are read into memory when the computer is run and this process takes some time. In practical use we found that directly feeding the transmitter from the micro led to RF feedback down the linking lead, but when interfaced by the cheap and easy method of holding the microphone under the Oric loudspeaker good picture reports were obtained from local stations on FM. In fact the first report was accidently overlayed as an 8-second picture on a Robot 32-second picture and was mistaken for a special effect!

When a full translation of the program is available, we are willing to offer copies of it on tape in return for a £2 contribution to QTI-TNA. We have currently a full working version for the Oric-1 and a receive version for the ATMOS, but we are still trying to debug the transmit on this one. If only we had time.....!

The contact address is: Diz and John Feeley, 2 Cartmel Walk, North Anston, Sheffield S31 7TU. Tel: 0909 566301

W&D 1240TVT

TEST REPORT

By John Wood, G3YQC

The new Wood & Douglas 1240TVT is an FM-TV transmitter using a fundamental oscillator at 1240MHz which is phase locked to a crystal reference. The unit also incorporates a sound sub-carrier which is mixed onto the video signal and can be preset over a limited range around 5.5 to 6.0MHz.

Audio input requirements are a standard 1v p-p into 600-ohms and a notch filter prevents audio from entering the video source. Video input is 1v p-p into 75-ohms.

The unit is designed to operate from a +12v d.c. supply which is internally regulated to +10v.

MANUFACTURER's SPECIFICATION

Output frequency	1240MHz
Output power	20mW (+13dBm); 50-ohms
Video input (adjustable)	1v p-p into 75-ohms
Sound input (adjustable)	1v p-p into 600-ohms
Sound subcarrier frequency	6.0MHz
Subcarrier deviation	+/-50KHz
Loop lock-up time	10 seconds max., 3 seconds typ.
Loop noise	>-65dBC (typical)
Supply voltage	+11 - 14v (30v transient maximum)
Supply current	260mA @ 12v
Internal user adjustments	Reference frequency
	Video deviation
	Audio deviation
	Sound subcarrier frequency
	Sound subcarrier notch

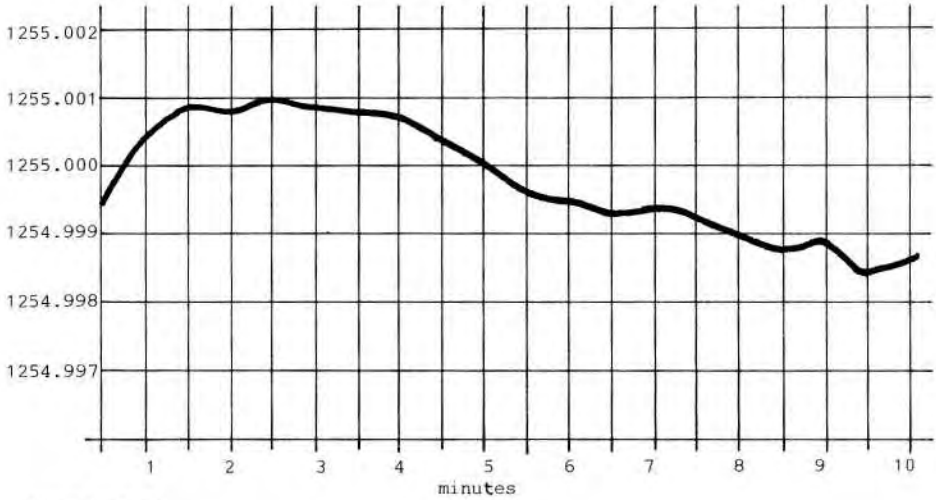
The unit is packaged in a sturdy tinplate box with a removable lid on each side. BNC sockets are provided for RF output and video and audio inputs. Power is applied via a feedthrough capacitor and two indicator lights give warning of frequency locking and battery state. Two threaded holes are provided along one edge to facilitate vertical mounting of the unit in a cabinet etc.

BENCH TESTS

The unit supplied was in fact adjusted for 1255MHz and the graph below shows frequency drift over a 10-minute period, which includes 30-seconds warmup. Power output was measured at 21mW into a resistive 50-ohm load and the table shows the amplitude of all harmonics (measured to 21GHz).

The sound subcarrier amplitude (viewed on a spectrum analyser) was 29dB down on the unmodulated vision carrier. There was a close-in signal of around 1.2MHz on either side of the vision carrier, but this was 50dB down and therefore of little consequence in practice. Supply regulation was excellent over the specified input voltage.

The 'in lock' light comes on after typically 3 seconds but the 'low batt' light is illuminated all the time, no matter what voltage is applied in fact the test unit's stayed on at all voltages above about 4. I have heard that there may be a slight error in this circuit which will presumably be rectified.



ON-AIR TESTS

20mW is not very much power so I was only able to air test this unit over a 1.5 mile path between G6IQM and myself. Good quality pictures were received at just about P5 over this path with good colour content. We found that, with 1v p-p video applied and the internal deviation control turned to maximum, signal deviation was only just sufficient when received using a BATC FM demodulator. The fact that no more deviation was available means that with some other receivers (Wood & Douglas's own for example) which can handle greater deviations, best noise and recovered video performance would not be realised. Of course an external video amplifier would rectify this.

Even with a strong picture being received the sound subcarrier was well down on what it ought to have been. This was not unexpected since bench tests showed the level of subcarrier, with respect to the vision to be 29dB down. In practice (at least with normal amateur sound systems - including W&D) tests show that a level of around -10dB is more appropriate therefore, over the test path, usable sound was not really possible. I should say in fairness though that the audio demodulator used was possibly not quite as sensitive as it might be. The input requirement of 1v into 600-ohms suggests it was designed for line inputs rather than a microphone.

CONCLUSIONS

I feel sure that this unit was designed for a commercial application rather than the amateur market. 20mW output is very low and obviously needs several amplifiers to bring it up to a useful level. Although it is very nice to have such a stable transmitter it could be said that it is rather a luxury for such wideband transmissions. It is a pity that an external video amplifier may be needed to increase deviation and so take advantage of some receivers, (especially those using the Astec demodulator). An external microphone amplifier would also be needed for microphone operation and it appears that no subcarrier amplitude adjustment exists in the unit.

The test equipment used for the above measurements is as follows:

Hewlett Packard 8559A spectrum analyser
Hewlett Packard 435A power meter
Hewlett Packard 8481A power sensor
Racal 9921 frequency counter
Racal 9232 bench power supply

HARMONIC TABLE	
2nd	-15dB
3rd	-26dB
4th	-34dB
5th	>-40dB

All other products better than -50dB

MARKET PLACE

ADVERTISING RATES:

Classifieds - 3p per word*
Full page - cover - £20
Full page - inside - £18
Smaller displays - proportional

*Advertisements are placed in this column free of charge to paid-up members. Addresses will be included with adverts unless requested otherwise.
All ads should be sent to the Editor at 47 Crick Road, Hillmorton, Rugby CV21 4DU. Tel: 0788 69447 not later than 20th December for the next issue.

- FOR SALE -

CRT's type D13-51GH and AW17-20...£10 each. LENGTHS of ex-broadcast camera cable - suit Marconi Mk3 etc. Please enquire.
Peter Delaney G8KZG, 6,East View Close, wargrave, Berkshire.RG10 8BJ. Tel 073522 3121.

PHILIPS G7000 Videopac Computer; This is a games machine which takes Philips videopac cartridge programs. Complete with a shop type display cartridge with several modes/options; ideal as a caption generator for ATV idents etc. Membrane keyboard, modified for 1v p-p composite colour output. Service manual but no documentation on the software (except my own user notes), c/w two joysticks...£15. (Buyer to inspect and collect or carriage extra).
John Wood, G3YQC, 47 Crick Road, Hillmorton, Rugby CV21 4DU Tel: 0788 69447 (evenings/weekends).

LIMITED NUMBER of 12" and 14" RGB monitors, uncased, ex-equipment. Fully tested, 110v operation, ideal for BBC computers etc...£50.00 each.
Bob Platts G8OZP, 8 Station Road, Rolleston, Burton-upon-Trent, Staffs DE13 9AA. Tel: 0283 813181 (8.00 - 9.00pm only please).

RIGONDA SPARES. Please note new address for all your Rigonda spares. Stamped addressed envelope with enquiries please.
Rigonda Supplies, 10 Lakehouse Road, London E11 3QS

10GHz PRECISION glass vane attenuator by W.H.Sanders Ltd; micrometer head, WG16 waveguide, round flanges (with rings), in lined box and in perfect condition...£30. ELLIOTT 10GHz precision RF short; micrometer head type A, WH16 waveguide, square flange. In excellent condition this is believed to be still a current item...£15.
John Wood, G3YQC, 47 Crick Road, Hillmorton, Rugby CV21 4DU Tel: 0788 69447 (evenings/weekends).

WRAASE SC140 SSTV receive scan converter board; unused. Offers please to: Chris, G3TUX, Tel: 0428 56255 (office hours).

WRAASE SC-1 SSTV/FAX transmit/receive unit, latest model, as new...£700. JAYBEAM D15/23 23cm Yagi, new...£45. SOLENT SCIENTIFIC 20mW 24cm FM-TV mini test transmitter, as new...£30.
Paul Chamberlain G4XHF, 9 Goffs Close, Southgate, Crawley, West Sussex RH11 8QB. Tel: 0293 515201

6 - PROWEST PM19/7A grade-1 19" colour monitors (RGB). Three with PAL decoders, some working, with spares and manual...Offers (preferably for the lot). IKEGAMI detail corrector, 19" rack mount (one unit) with manual...Offers.
Phone (Tyneside) 091 2579792 and ask for Roger.

EX-BROADCAST EQUIPMENT. A lare quantity (several 19" racks full) of broadcast equipment will become available for sale around late November or early December 1986. Items will include Audio and video jackfields, 100's of BBC white units such as video distribution and others. Relay units, power supplies, power distribution boards, multicore cable, video and audio leads, blanking plates, generators, hardware etc. For comprehensive list send large SAE plus £1 to cover costs to Bailey, 40 Seymoor Close, Selly Park, Birmingham B29 7JD

SOLENT SCIENTIFIC units for sale - 23/24cm ATV converter in diecast box, BNC connectors, works OK...£20. UHF FM receiver, constructed but never tested, in metal case, all switches, meters, BNC connectors - looks attractive...£30. GaAsFET pre-amp kit - never opened...£25. Postage extra. All three items £70 plus postage (U.K. only - enclose SAE).
R.Bunney, 33 Cherville Street, Romsey, Hants SO5 8FB

9" PETO-SCOTT B&W monitor, with manual. Slight fault, for spares or repair...£10.ono. 20" PHILIPS LDH2110 monitors, with manuals, in good working order, one almost new...£22 each. BRAND NEW Sony CCK-5 video camera extension leads...£14. VIDEO CAMERA extension cable in 4-metre cut lengths...£10. 1.25kvA 230/110v auto-transformer, in case...£5. 12" EXTENSION SPEAKER, in case, suit group, organ, dance hall etc...£6. ALSO a selection of new cine projector lamps, surplus to requirements, going for a song or free to good homes. Buyers to inspect and collect or carriage extra.
Chris Maxwell G8MKT, 24 Jensen, Tamworth, Staffs B77 2RH. Tel: 0827 285949

JVC PORTABLE VIDEO SYSTEM comprising:- HRC3 portable compact VHS format recorder including ni-cads, charger, mains PSU, standard VHS adaptor cassette, GXN5E low-light colour camera with integral caption generator, power zoom, mic etc. All complete with manuals and original packing. Perfect working order, little used...£740 o.n.o.
Dave Marshall G8MGD, "Shelwyn", Nut Orchard, Twyning, Tewkesbury, Glos. GL20 6DR. Tel: Tewkesbury 294082 (evenings/weekends).

MSX COMPUTER. Full working order but with NTSC video output (not PAL)...£25 o.n.o.
C.Smith G1FEF, 25 Strande Park, Lightlands Lane, Cookham, Berks SL6 9DU. Tel: 06285 26003 (after 6pm).
PYE 21VR20 portable VCR and tuner/timer, with carrying case and Sony camera adaptor and SCART plug...£165 o.n.o. PHILIPS V200 colour camera, 3-tube, 1" viewfinder, PSU, manual, Schneider f1.8 8-64mm zoom lens...£140 o.n.o. Would consider exchange for 2metre or 70cm radio gear or good stereo reel-to-reel tape recorder.
R.Hill G6TSL, 7 Willowbrook, Greytree, Ross-on-Wye, Herefordshire HR9 7JS.

TELEQUIPMENT D54 oscilloscope, twin channel, 10MHz, good working order...£75. TWO PHILIPS video recorders, both faulty: N1700 has a new video head fitted but has a fault on the motor control board, otherwise OK. N1500 has good heads but a fault on the modulator. Some tapes also available...£25 each. 1" VIDICON tube with KV9 yoke assembly, lens mount, vidicon base and case for complete camera. All new...£25.
Alan Bayne, 26 Orchard Street, Motherwell, Scotland. Tel: Motherwell 64698

IKEGAMI vertical and horizontal aperture corrector for camera or telecine, I.R.U. high, ex-broadcast, as new with handbook...£70. COSMICAR MACRO lens, f1.4, C-mount 25mm, 6" to infinity, little used...£30.
Allen McMurtry GI3MBB, 20 Towerview Crescent, Bangor, Co.Down, BT19 2BA. Northern Ireland. Tel: 0247 461946

TEKTRONIX 531A double beam oscilloscope, in virtually mint condition, complete with handbook, 10x probes, rubber viewing hood and spare graticule...£75. IS ANYONE INTERESTED in a Marconi BD.819 14" picture monitor with handbook, (1950's vintage), some used Marconi Mk7 CRT's and some used Tektronix waveform monitor CRT's numbers; 154-0525-00 and 154-0514-00. Also several vidicon tubes (integral mesh). I don't want anything for these items, it just seems a pity to dump them!
Fred Steed, 60 Brock Hill, Runwell, Wickford, Essex SS11 7NR. Tel: 03744 2513

PHILIPS 12" transistor monitor...£25. HITACHI 2/3" camera with lens...£15 5:1 motorised zoom lens...£25. SUPER LYNX camera with lens...£30. LIGHT DUTY pan & tilt unit...£10. UHF distribution amplifiers, various...£8. UHF chanelised filters...£2. VARIOUS items of aerial distribution equipment - please enquire.
A.Macarthur, 27 Beechwood Drive, Walton, Stone, Staffs ST15 0EH. Tel: 0785 814995

SET OF FOUR integral mesh 1-1/4" Plumbicon tubes...£20. SONY receiver/monitor CVM 1810UB,; for spares or tube...£8. RBM 19" colour monitor, RGB in, handbook, needs attention...£12. LANDROVER AND TRAILER, 1973, MOT, ex-army lightweight, best offer over £400 the pair.
Brian Summers G8GQS. Tel: 01 998 4739 (weekday evenings) or 0427 616210 (weekends).

NEW UNUSED boxed surveilance black and white CCTV system. Comprising: 2 cameras f1.6 16mm lenses, 1 switchable monitor (cables etc)...£350. MTV435 ATV transmitter, as new...£125. MMC435/600 ATV up converter...£25. BATC ATV transmit/receive converter, all new components, unused...£15. All o.n.o.
Ron Bland, G3BKL, 11 Great Croft, Firs Road, Winterslow, SP5 1SN. Tel: 0980 862489 (after 6pm).

BUILD AN ON-SCREEN DIGITAL CLOCK. Set of major parts for this project; oscillator chip and crystal, clock chip, display chip plus backup PCB. Rechargable batteries, manufacturer's application note with full circuit. New and unused, approx. £25 worth of parts for just...£10. MUSA patch panel, 2U high for 19" rack, with U-links and double enders...£25.
David Wilson, 4 Harkness Close, Bletchley, Milton Keynes, Bucks MK2 3NB. Tel: 0908 641234

AMPEX VPR5803 one inch reel-to-reel VTR, full working order...£60. A second VTR; identical but not so good...£40. VIDEO TAPES for use with above recorders, 40 reels, spare spools and cases...£40 or will split with VTR's if required. EMI WM16 oscilloscope, with three Y-amp plug-in modules, offers. TURNTABLE unit comprising Connoisseur Craftsman II table with neat G30B arm and Auriol lift on oak plinth...£15. PRECISION OSCILLATOR by HCD Ltd., 4.4296875MHz, includes oven, runs from 12.6v dc...£5 each or three for £10. VARIOUS other bits of TV gear, please phone.
R.H.Harris, 7 Fosse Lane, Shepton Mallet, Somerset BA4 4PW. Tel: 0749 3876

- WANTED -

PAST ISSUES OF CQ-TV MAGAZINE wanted for private collection. All issues prior to No.123. Also 'TELEVISION' magazines prior to 1983 wanted urgently. Good prices paid.
David Norrell, 51 Cairngorm Walk, Larne, Co. Antrim, Northern Ireland BT40 2JP

CIRCUIT INFORMATION for Ikegami B&W camera model CTC5000. Loan or copy, all expenses paid.
P.Trussler, 74 Drove Crescent, Portslade, Sussex BN4 2TA. Tel: 0273 417332

CASSETTES of 12 to 18wpm plain text and facsimile morse tests wanted.
Paul Thompson G6MEN, P.O.Box 32, Shrewsbury SY1 1ZZ

INFORMATION wanted on converting a Tamron model 665H lens to work with a Sony DXC-M2PH colour camera. The lens has an 8-pin plug whilst the camera has a 6-pin socket. ALSO WANTED: 6-pin plug to suit and a tripod attachment for the camera. 70cm MASTHEAD GaAsFET pre-amplifier.
Brian Robinson G4ZEK, 9 Stammers Road, Colchester, Essex. Tel: 0206 851343

FORTOP TVD100 video demodulator wanted, in good condition.
John Crawshaw G8YBD, 8 Bromsgrove Avenue, Bispham, Blackpool, Lancashire FY2 9LX. Tel: 0253 594381

2/3" VIDICON TUBE wanted. Magnetic focus and deflection, any condition (burns etc) type Toshiba 8844 or equivalent; as cheap as possible or exchange for MSX computer (see 'For Sale' section). ALSO fixed-focus 'C' mount TV lens, again as cheap as possible or exchange. ANY circuit diagrams of solid-state CCTV mono cameras using 2/3" tubes.
C.Smith G1FEF, 25 Strande Park, Lightlands Lane, Cookham, Berks SL6 9DU. Tel: 06285 26003 (after 6pm).

WANTED - CIRCUIT for talkback amp. 84-4061/01; PROWEST PM15/28 mono monitor; MARCONI Mk8 B33215, B3217, B3373, camera parts, anything considered, good prices paid.
Brian Summers G8GQS. Tel: 01 998 4739 (weekday evenings) or 0427 616210 (weekends).

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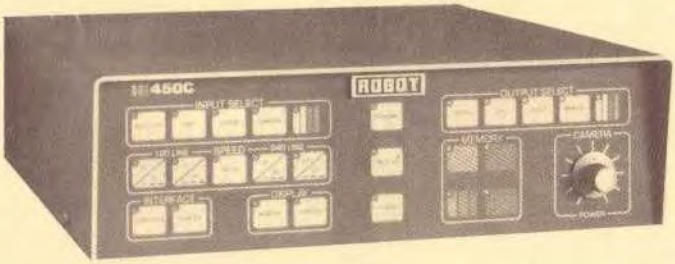

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