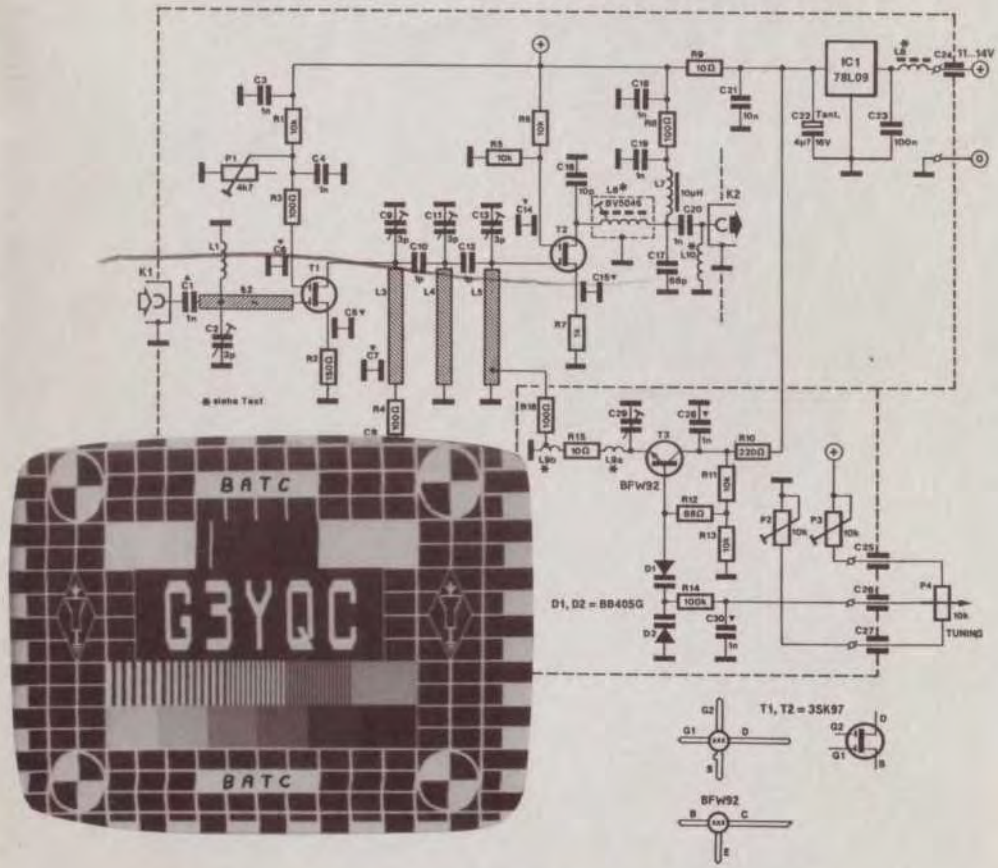
CQ-TV MAGAZINE No. 144

BRITISH AMATEUR TELEVISION CLUB

NOVEMBER 1988



GaAs FET CONVERTER FOR 24cm AMATEUR TELEVISION

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MEMBERSHIP

FULL YEAR: £6 or £1.50 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 issue.

OVERSEAS MEMBERS are asked to send cheques bearing the name of the banker's London agent. Postage stamps are not acceptable as payment. Overseas airmail is extra - please enquire from Dave Lawton or see the rates list with your last subscription reminder form.

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, and VAT registered - number 468 3863 01.

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.

Articles contained in CQ-TV magazine may be quoted by non profit-making organisations without prior permission of the Editors, provided both the source and author are credited. Other organisations may obtain permission in writing from the Editor

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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CLOSE FOR PRESS DATE FOR THE NEXT ISSUE.....20th December 1988

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.

CLUB AFFAIRS; video tape library; technical queries, especially related to handbook projects: TREVOR BROWN G8CJS, 14 Stairfoot Close, Adel, Leeds LS16 8JR. Tel: (0532) 670115

MEMBERS 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: (07352) 23121

MEMBERSHIP - Anything to do with membership including new applications; queries and information about new and existing membership; change of address; 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

GENERAL CLUB CORESPONDENCE & LIBRARY - Any general club business. Queries relating to the borrowing or donation of written material. PAUL MARSHALL G8MJW, Fern House, Church Road, Harby, Nottinghamshire NG23 7ED: Tel: (0522) 703348

PUBLICATIONS - Anything related to the supply of BATC publications. 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 are asked to contact Paul Marshall.

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) 25343

TVI & RADIO INTERFERENCE - problems of this nature to: Les Robotham G8KLH, 38 Ennerdale Avenue, Stanmore, Middx. HA7 2LD. Tel:(01 907) 4219 (not committee).

CQ-TV MAGAZINE - Anything destined for publication in CQ-TV magazine or forthcoming BATC publications. Articles; review items; advertisements; other material. EDITOR: Mike Wooding G6IQM, 5 Ware Orchard, Barby, Nr. Rugby CV23 8UF Tel: (0788) 890365.

CQ-TV ASSISTANT EDITOR - Alternative destination for CQ-TV material and queries on the content of past issues. JOHN WOOD G3YQC, 47 Crick Road, Hillmorton, Rugby CV21 4DU. Tel: (0788) 69447

CONTESTS - Bob Platts G8OZP, 8 Station Road, Rolleston-on-Dove, Burton-on-Trent. Tel: 0283 813181 (6.30 and 9.30pm evenings and after 11am at weekends)

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

EDITORS POSTBAG

DRAE SSTV

Dear Ed,

I recently became hooked on SSTV and, like a lot of others, started with a computer to display the signals. After plonking myself in another SSTVer's shack however, I quickly became aware that a custom receiver was the thing to use in order to resolve good grey scales and resolution.

I was offered an early DRAE receiver at a realistic price and so far am very happy with the results on receive, and also the reports received on transmitted pictures.

I was wondering if any reader has done any modifications to these units to alter, if possible, the timing etc. in which case I would be pleased to hear from them.

P.S.Bruce G4WPB.
2 Constance Road,
Croydon,
Surrey CRO 2RS

NEW ATV MAGAZINE - USA

Dear Ed,

I was Editor/Publisher of A5 magazine from 1975 to 1981. Recently several friends have been trying to persuade me to begin a new ham TV magazine which would closely follow the format of CQ-TV - mostly technical material and little editorial. Tentatively the new magazine will be called 'Ham TV Quarterly'. Needless to say I need to re-establish my ties with the other ATV magazines and would therefore like to offer reciprocal subscriptions and editorial exchange with CQ-TV.

The first issue is slated for January 1989 and we are targeted at 48 full size pages and an initial circulation of 3,000.

Henry B.Ruhwiedel, KB9FO
540 Oakton Street,
Des Plaines,
Il. 60018. U.S.A.

NTSC to PAL TRANSCODING (1)

Dear Ed,

Reading Andy's EATWG article in CQ-TV 143, and in particular the paragraph about videotape exchange, I am reminded of a personal need which I am sure is echoed amongst other members and which, with the enormous increase in camcorder sales, will doubtless become a growing need. Having American relatives I would like to exchange tapes of family events and even local countryside, but the costs of professional transcoding will be too much and I would prefer my own equipment anyway.

Is there any member who knows of a reasonably priced piece of equipment or constructional design to help? Perhaps one of our gifted members might like to design such a unit for publication in CQ-TV - or tell us why it can't be done as simply as that!

J.C.Wood, G8DPY
9 High View Close,
Loughton,
Essex IG10 4EG

NTSC to PAL TRANSCODING (2)

Dear Ed,

I recently spent a most enjoyable three weeks in Calgary and recorded a heck of a lot of the 'stampede' and surrounding countryside. I promised to send copies of the tape to my brother-in-law and his family. As you know the TV system is different in Canada, so can anyone help/advise me how to go about this please?

Jim Stokes.
47 Riber Avenue,
Somercotes,
Derbyshire DE55 4LL

I fear that transcoding between these two systems is very difficult and is probably only practical using digital techniques. By far the easiest way is to go to a professional facility house and have them do the copying for you. Several such establishments advertise in 'What Video' magazine. ED.

THANKS

Dear Ed,

I am just writing to say thank you for my first prize from the bring & buy stall raffle at the BATC convention. I was overwhelmed with the 23cm aerial donated by Micromax, and I must thank them very much. At the moment I am only QRV on 70cm, but in the near future I will be QRV on 24 (hopefully!!).

Many thanks to the BATC for a good rally and I will see you next year.

Robert Perks G6KDZ

WEGENER MODULATION - GEN WANTED

Dear Ed,

Please may I have the use of your letter page to ask if any member of the Club has any knowledge of the Wegener Modulation systems.

Whilst information about subcarrier frequencies etc. is freely available, I have not come across any information about the compression and pre-emphasis techniques used for the 1600 series and Panda-2 systems.

I understand that comprehensive information was published in a French electronics magazine some while ago, so if anyone can put me on to this or any other source of designs for demodulating these signals I would be most grateful.

Richard Danieliad.
2 Elmbridge Drive,
Ruislip,
Middlesex HA4 7XB.
Tel: (0895) 633486

NEWS ROUNDUP

NEW CQ-TV EDITOR

A change in editorial positions is to be implemented before the next issue. Mike Wooding G6IQM, former assistant editor is to take over as editor, whilst John Wood G3YQC, editor for many years is to assume the assistant editor's post. All material destined for publication in CQ-TV should now be sent to Mike whose address may be found on page 2 of this issue.

SUBSCRIPTION RENEWALS

With this issue will be found a subscription renewal form. All subscriptions fall due on January 1st 1989 (unless already pre-paid) and members are asked to renew promptly in order to ensure their continued membership.

In an attempt to reduce the work load on our administration system, members are invited to renew for two years (rather than the usual one). This will cut the work in half. Of course if you do this and the cost rises in the meantime, your subscription will still stand.

SSTV SOFTWARE

The BATC is often being asked about computer software for receiving/transmitting SSTV signals. A recent leaflet from J & P Electronics lists the following:-

SPECTRUM SSTV RECEIVE.
SPECTRUM SSTV TRANSCEIVE.
(neither need an interface)

ATARI 520/1040ST SSTV RECEIVE.
(interface and leads available)

J & P Electronics Ltd.,
New Road Complex,
New Road,
Kidderminster,
DY10 1AL.

Tel: (0562) 753893

NEW PRINTED CIRCUIT BOARDS

There will shortly be available two new printed circuit boards for designs in CQ-TV. The EPROM programmer for the Spectrum described on page 12 of the last issue, and the GaAsFET 24cm ATV receive converter in this.

Due to their not being ready at the time of going to press they do not appear in the price list with this issue. Anyone wishing to be advised as soon as either board is available may send a stamped addressed postcard, with appropriate note written on, to Peter Delaney at BATC Members Services.

VIDEOTAPES WANTED

On page 85 of the last issue Andy Emmerson spoke about making a video tape showing the best of European amateur television. This is in reply to one received from the States but so far Andy has received no contributions for such a tape, so this item is by way of a plea.

The sort of thing required are shots of ATV shacks in use; perhaps some good quality exchanges via repeaters and simplex; some portable and mobile operation, particularly anything which is more unusual or impressive, and anything else which may be of interest to overseas amateurs.

Material should be ORIGINAL RECORDINGS (not copies) and of the best possible quality. They may be on VHS or possibly BETA but would be better on one of the better quality standards, this includes U-Matic, Quad, Betacam and current broadcast media.

Do please rack your brains and try to come up with something, after all we are honour bound to produce a reply tape, and it would look good in the BATC library as well.

If anyone would like to get involved with the organisation of such tape production would they please contact Andy Emmerson (address in 'TV on the Air' column) or Trevor Brown (address on page-2).

ATV IN EIRE

On July 10th this year, as part of the celebrations for Dublin's Millenium, radio amateurs in the Dublin area were given permission to hold a special event station in the Phoenix Park. As well as phone opration a special concession was given for the event station EI-1-000 to operate 4 hours of Fast Scan television. For those of you that are not aware, at the present time Eirean amateurs are prohibited from transmitting Fast Scan television on any band. The station was set up after a slight delay and calls put out on '750. Pictures were sent to amateurs in the Dublin area, and also to a second portable station set up in the park to demonstrate portable emergency radio equipment. Owing to the nature of the special licence and the restrictions previously described, only the event station was allowed to transmit. The event was a great success and we hope that as a result, further discussions with the Eirean government will see the restrictions lifted and Fast Scan operations allowed. Our thanks to EI7GM and EI6AS for getting this information to us, in fact it had to come over the packet network as the PO strike hit us hard here in Rugby!

NEW CONTEST MANAGER

We are very pleased to announce that Bob Platts G8OZP has offerred to take over the job of Contest Manager, thus relieving Mike of the job and allowing him to concentrate on the magazine and handbooks. This move will take effect from the next contest, that is the Slow Scan/Autumn Vision. Although the contest entry forms will show Mike's address please send all future entries, logs, etc to the address shown below. Any entries sent to Mike will, of course, be forwarded to Bob.

Bob Platts G8OZP, 8 Station Road, Rolleston-on-Dove, Burton-on-Trent. Tel: 0283 813181 (6.30 and 9.30pm evenings and after 11am at weekends)

IS CQ-TV LATE?

The September postal strike has hit the production of CQ-TV. By closing date the local sorting office (Coventry) was virtually the last one still out, and this of course meant that no copy was getting through.

In an attempt to include as much as possible we have held up production for a couple of weeks hoping that the mail will catch up. So if your magazine was received late, don't blame the editors, blame the post office.

Our thanks to all those contributors who found other ways of getting copy in on time, some of them were certainly inventive!

GaAs FET CONVERTER FOR 24 CM AMATEUR TELEVISION

By G.Wehrhahn DD9DUK

This article first appeared in Elektor Electronics July/August 1988 and we thank the editors for permission to reproduce it here.

This 24cm down-converter is the perfect introduction to 24cm ATV, because it is a relatively inexpensive and simple design. It has only one preamplifier stage, an active mixer and a free running, single transistor, local oscillator. Construction is also fairly straightforward thanks to the use of a small printed circuit board with printed inductors (micro-striplines).

All prototypes of the GaAsFET converter were found to give better results than a formerly used combination of a two-stage stripline preamplifier for 24cm, using (very expensive) bipolar transistors type NE64535 from NEC, and a 24cm down-converter based on a crystal-controlled local oscillator chain and a Schottky diode mixer (designed by DJ5XA and described in edition 2/1975 of VHF Communications). Interestingly, the cost of the GaAsFET converter is much lower than this (now technically outdated) combination of a preamplifier and a converter.

CIRCUIT DESCRIPTION

The coming of Gallium-Arsenide semiconducters has enabled receiver noise figures to fall below values that are virtually impossible to achieve with bipolar transitors available to the radio amateur. The GaAsFET's used in the present converter are relatively inexpensive dual-gate types 3SK97. Types S3030 (Texas Instrumemts) and CF300 (Siemens) were also tried with excellent results.

Contrary to popular belief, there is nothing mysterious about GaAsFETs. In fact their outlook, static and dynamic operation is very similar to that of well-known VHF or UHF dual-gate MosFETs in the 3Nxxx and BF9xx series. The main advantage of the GaAsFET used here is that it can offer an in-circuit noise figure that remains below 2dB for frequencies up to 1.5GHz. Furthermore, gain is high but stable, and matching to tuned circuits is fairly simple thanks to the extremely low internal capacitance that results in a small reactive component.

The circuit diagram of the converter is shown in Fig.1. The incoming signal from the aerial reaches gate-1 of preamplifier T1 via micro-stripline inductor L2. Matching of the input stage to the cable impedance of 50-ohms is optimised by adjusting trimmer C2. Preset P1 allows the drain current of the FET to be adjusted to optimise the gain/noise figure of the device. In most cases a compromise between these two will have to be found.

The amplified 24cm signal is passed to mixer T2 via a three-element top-coupled micro-stripline filter, which is tuned by means of trimmers. It should be noted that C10 and C12 increase the total bandwidth of the filter to a value suitable for reception of 27MHz wide FM ATV signals. For FM ATV these capacitors may be omitted to achieve pure inductive coupling resulting in lower bandwidth.

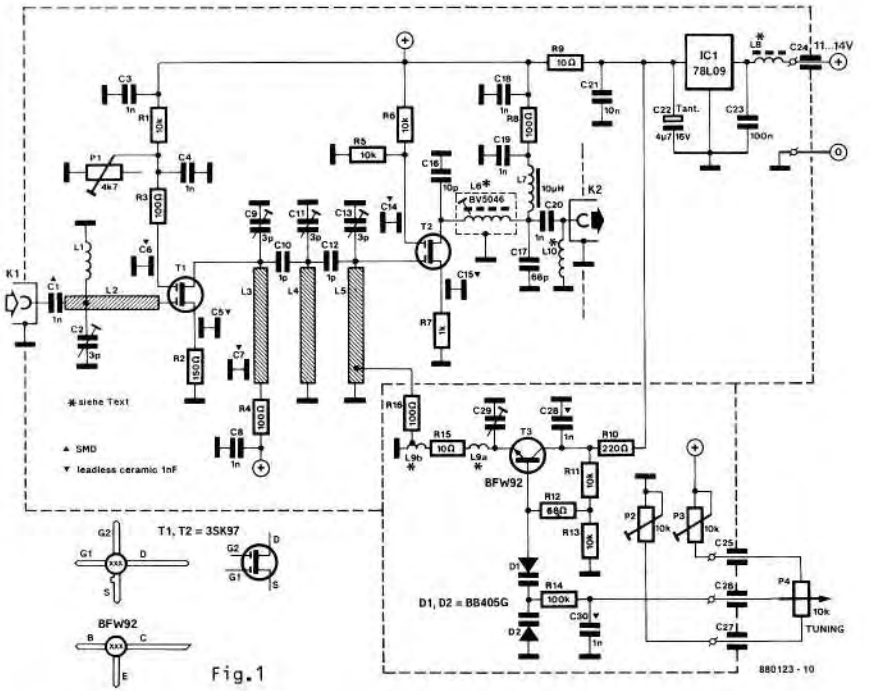


Fig.1

The local oscillator signal reaches gate-1 of T2 via R16 and a low impedance tap on L5. The intermediate output frequency of the converter can be chosen freely between 40 and about 200MHz. In prototypes the drain circuit of T2 was tuned to 48MHz by C16, L6 and C17 to enable the converter to be used for AM ATV reception with a portable colour set tuned to VHF channel-2 (now no longer used for broadcast TV in the UK). Provided C16, L6, C17 and L10 are dimensioned accordingly, the intermediate frequency is simple to move up to, say 180MHz (channel-6 in band 3). Obviously, the higher the intermediate frequency, the better the image rejection of the mixer. A domestic television set is, of course, not suitable for receiving FM ATV unless the resultant loss of quality in the FM to AM conversion is acceptable. For FM ATV a special intermediate frequency amplifier will have to be made, followed by a wide-band FM demodulator. The most commonly used IF for FM ATV is 70MHz, but here again, the IF frequency can be chosen freely.

Editor's note: If it is intended to use the BATC design FM demodulator (CQ-TV122 pp6-11) an IF frequency around 35MHz is desirable. If using a Wood & Douglas demodulator an IF around 50MHz is required.

The single transistor, varicap-tuned local oscillator is a slightly modified version of that discussed in Ref.1. Properly constructed, its stability is so good that an AFC circuit is not required. Presets P2 and P3 enable defining the tuning range of the converter. Capacitor C29 is a course frequency adjustment, and also serves to stabilise the power output of the oscillator. This trimmer, which may not be needed in all cases, is simply 10mm or so of straight wire positioned above the PCB surface. Although not apparent from

the circuit diagram, the actual length of the anode lead of D1 and the construction of L9a also determine the frequency of operation. The oscillator can be set to operate roughly between 1000MHz and 1500MHz. Finally, the dashed lines in the circuit diagram denote a screen around the local oscillator to prevent stray radiation.

CONSTRUCTION

Figure 2 shows the printed circuit board designed for the converter, however, the BATC is, by arrangement with Elektor Elektronics, making boards available to constructors. Details may be found in the 'Member's Services' advertisement section in the NEXT magazine, (see also news pages in this issue). In the description below, the upper drawing is called the component side, and the lower drawing the reverse side (soldering side would be incorrect because a number of components are also soldered at the component side).

Construction is fairly simple for those grown accustomed to the use of the leadless ceramic capacitors. The actual value of these is uncritical (anything between 470pF and 1.5nF will work; 1nF being the most commonly available value). There are seven of these capacitors in the converter - each is fitted vertically in a slot which is carefully jig-sawed or drilled and filed in the PCB. The length of the slots is such that the shoulders of the leadless capacitors rest on the PCB surface. The holes for the two GaAsFETs are drilled to 3.5mm. T3 is not fitted in a hole.

The cross-sectional views of the PCB in Fig.3 show the connections of the gate-2 and source terminals of T1 to decoupling capacitors C6 and C5 respectively. Micro-stripline L4 is connected to ground by a small piece of copper foil. All 1nF capacitors (and C21) not marked with a black triangle in the circuit diagram are miniature ceramic types with a lead spacing of 2.5mm.

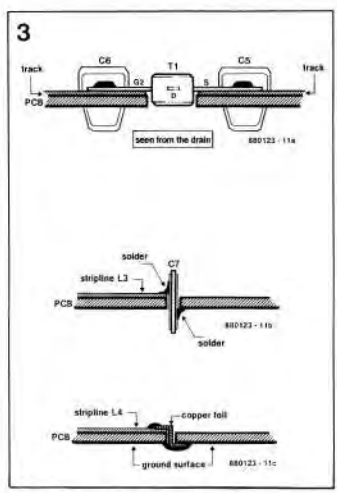
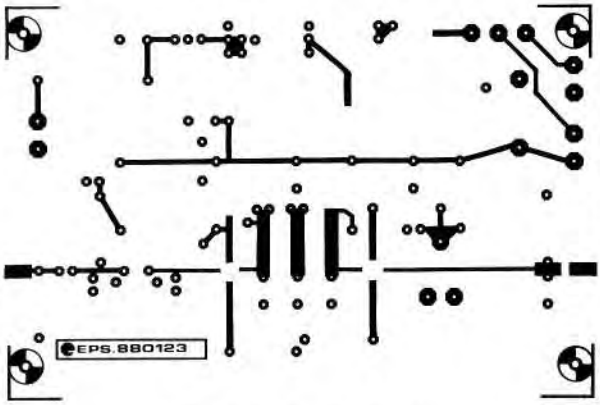


Fig. 3. Showing the use of leadless ceramic capacitors on the PCB (3a; 3b), and the connection to ground of micro-stripline L4 with the aid of a small piece of copper foil (3c).

Input inductor L1 is one turn of 0.5mm diameter silver-plated wire. Choke L8 is wound as 6 turns of 0.2mm dia. enamelled copper wire through a ferrite bead or small balun. Inductors L9a and L9b are formed by the wire terminals of R15. L9a is 2 turns with an inside diameter of about 3mm and a turns spacing of 1mm. The other inductor, L9b, is the straight-wire terminal soldered to ground, as shown on the component overlay. A 2mm hole is made in the screen surrounding the local oscillator, so that R16 can be soldered to a tap on L9b, approximately 10mm from where this is bent down and connected to ground. It is important that R15 runs horizontally at about 4mm above the PCB surface. Also make sure that it does not cause excessive strain on the emitter lead of T3.

When required, coupling capacitors C10 and C12 are fitted direct onto the micro-striplines, keeping the leads shorter than 1mm. The GaAsFETs are the

2 **Note: only T1, T2 and C1 are mounted at this side of the board**



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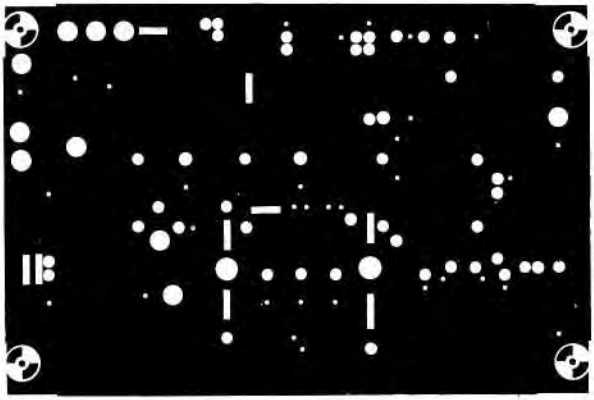


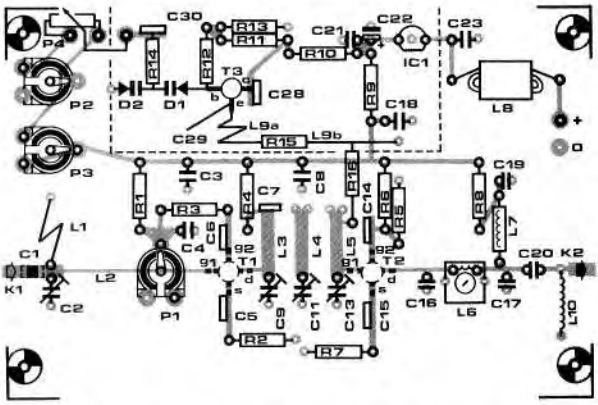


Fig. 2. Double-sided printed circuit board for the converter.

Parts list

Resistors (0.25 W carbon film; ±5%):
R1;R5;R6;R11;R13 = 10K
R2 = 150R
R3;R4;R8;R16 = 100R
R7 = 1K0
R9;R15 = 10R
R10 = 220R
R12 = 68R
R14 = 100K
P1 = 4K7 or 5K0 preset H
P2;P3 = 10K preset H
P4 = 10K linear potentiometer

Capacitors:
C1 = 1n0 chip or SMD (Bonex; VeroSpeed; Cirkit)
C2;C9;C11;C13 = 3p subminiature trimmer (manufacturer: Sky) (C-I Electronics)
C3;C4;C6;C18;C19;C20 = 1n0 ceramic
C5;C6;C7;C14;C15;C28;C30 = 1n0 leadless ceramic (Cirkit; Bonex)
C10;C12 = 1p0 (see text)
C16 = 10p
C17 = 68p
C21 = 10n ceramic
C22 = 4μ7; 16 V; tantalum
C23 = 100n
C24 . . . C27 incl. = 1n0 feedthrough (solder type) (Cirkit; Bonex)
C29 = see text.

Inductors:
L1 = see text.
L2;L3;L4;L5 = micro-stripline on printed circuit board.
L6 = Neosid BV5046 (yellow-blue; 0.9 μH; 5 . . . 50 MHz) (C-I Electronics).
L7 = 10μH axial choke.
L8 = see text.
L9 = see text.
L10 = see text.

Semiconductors:
D1;D2 = BB405G (Bonex; C-I Electronics)
IC1 = 78L09
T1;T2 = 3SK97 (C-I Electronics)
T3 = BFW92 (Cirkit)

Miscellaneous:
K1;K2 = BNC socket (flange type).
PCB Type 880123 (not available ready-made through the Readers Services).
Tin-plate box with top and bottom lids. Size: 111 × 74 × 50 mm.

last parts to be mounted on the PCB. As they are very small and static-sensitive, soldering must be done fast, with utmost care and using a low-power iron with a grounded tip.

The completed PCB is mounted in a tin-plate box with feed-through capacitors for the direct voltages and holes for the BNC sockets K1 and K2. These are positioned such that the centre pin can be soldered direct on to the copper area provided. The PCB edges at the reverse side of the board are soldered direct to the inside of the box panels. When a ready-made tin-plate box is not available an alternate enclosure can be made from cut-to-size pieces of printed circuit board.

NOTE: In the original component layout as reproduced in Elektor Electronics IC1 was shown reversed, this has been corrected in the layout shown here.

SETTING UP

The simplest way of aligning the converter is to ask for the assistance of a radio amateur to transmit ATV on 24cm. Alternatively, you may be in the service area of one of the several 24cm FM ATV repeaters operational in the UK, and thus tune up the converter using that signal. For the following description it is assumed that a 24cm ATV signal is available, and that the converter is used in conjuction with a TV set tuned to VHF channel-2, or a pre-aligned FM ATV demodulator with the video output fed to a monitor. (It must be noted that if a television set is used to receive the picture direct from the converter it will be degraded due to having to slope-detect the FM signal for the AM television).

Set all presets and trimmers to the centre of their travel. Adjust P1 for a drop of 1.3 volts across R2. Check that the oscillator works by measuring the drop across R7; short-circuit the emitter of T3 to ground to stop oscillation. This should cause the voltage drop across R7 to drop by about 0.2 volts. Remove the short circuit and peak L6 for maximum noise output of the converter, then tune to the ATV signal and peak the trimmers for optimum reception. This is fairly easy when the signal strength is relatively strong initially. Reduce the signal strength by carefully turning the receive aerial away from the transmitting station and redo all adjustments for the best reception. It may be necessary to bend C29 closer to the PCB, or space the turns of L9a wider, to stabilise the local oscillator output across the tuning range. Note, however, that re-positioning C29 changes the oscillator frequency, so that the tuning control P4 must be adjusted to restore reception. Also, P2 and P3 may have to be readjusted to obtain the correct tuning range.

REFERENCES: 1) 'Indoor Unit for satellite TV reception, part-1.' - Elektor Electronics October 1986.

SPECIAL COMPONENTS

The special components required in this unit may be obtained from the following suppliers:

Chip capacitor C1 (1nF) - Bonex, Piper Communications
Trimmer capacitors C2, C9, C11, & C13 (3p) Sky type - Piper Communications
Trapezoidal (coffin) capacitors (1nF) C5, C6, C7, C14, C15, C28 & C30 - Bonex, Piper Communications
Feedthrough Capacitors (1nF) C24 to C27 - Bonex

Inductor L6 (0.9Uh) - Piper Communications, Wood & Douglas
Two-hole balun L8 - Bonex
Diodes D1 and D2 (BB405G) - Bonex
Transistor T3 (BFW42) - Bonex
78L09 regulator* - Piper Communications
GaAsFETs T1 and T2 CF300 Piper Communications
3SK97 -

* NOTE: Due to the difficulty in obtaining 78L09 regulators, an alternative method would be to use a readily available 78L05 (R.S.Components stock no: 306 190) with a 3.9 volt zener diode between the reference leg and earth.

Bonex Ltd., 12 Elder Way, Langley Business Park, Slough, Bucks SL3 6EP. Tel: (0753) 49502

Piper Communications, 4 Severn Road, Chilton, Didcot, Oxon OX11 OPW. Tel: (0235) 834328

PACKET RADIO ON 70cm

No doubt many of you have heard about the RSGB recommendation that packet radio mail-forwarding links be moved from the bottom end of 70cm to between 436.6 and 436.8MHz. This recommendation has not come from the RSGB at their own behest, but from the prime users of the band, the Ministry of Defense. Their reasoning is at best unclear and at worst non-existent. However, it appears that the MOD is at present unwilling to allow data transmissions in the originally specified area due to interference with their own systems, whatever they might be. The only area that they will allow such transmissions is 436.6 to 436.8.

This situation, although made without any apparent regard to the other users of the spectrum, is not as bad as it may at first seem. The Packet System Operators (SySops) intend to use a higher Baud rate for the transmissions which will cause little interference to the majority of ATV'ers, perhaps not unlike the radar we see on 24cm. It is more probable that ATV transmissions will cause more interference, ie: holding open system receivers, to packet radio. However, we are not resigned to this situation. The officers of the Club, and the SySops are together negotiating with the powers-that-be in order to rectify this situation to the benefit of all parties.

The editors wish to thank the many stations, both ATV and packet, for their interest and ideas, one in particular coming from club member Roger G3YMK. He suggests that if we end up stuck with this situation perhaps a time sharing system could be used, with packet forwarding taking place in the early morning hours using vertical polarisation and ATV having the frequencies during day and evening times. Please be patient if the band becomes aggravated with QRM from packet forwarding and rest assured that all parties are working towards having this problem rectified.

NOTE: For those wishing to contact the club's officers on this or any other matter may do so using packet radio by contacting the following: Mike Wooding G6IQM @ GØHWC-2. Graham Shirville G3VZV @ GB3HQ-2.

BOOK REVIEW

VIDEOCASSETTE RECORDERS - a servicing guide

'The world of video changes very quickly and what is more the rate of change is also increasing. Technical advancements made over the last five years will be complemented by changes that will be made over the next three years. Since the first edition of this book not only have the original Philips N series videorecorders become obsolete, but also the V2000 series and Betamax in certain parts of Europe. This does not mean that the techniques described in this book are also obsolete where they refer to these systems as in time they will be resurrected in other forms as development continues'.

The information contained in this volume is intended to supplement the manufacturer's service manual by dealing with the techniques used in some detail.

'Also included is some information on the Video-8 system where it is relevant to video but not the PCM audio. S-VHS is described as a new format for the future to accommodate the very high quality pictures from high definition TV and satellite, and for the home video enthusiast who wants near broadcast picture quality.

There are seven chapters, logically presented to cover each of the seven main sections which go to make up a video recorder: Tuner and IF stage; Record and replay, monochrome, or luminance; Record and replay, colour; Servos; Systems control and timer; Power supplies and Audio record and replay.

Chapter one describes the various VCR systems in some detail. The systems are very well illustrated and include detailed pictures of track configuration, head assemblies, lacing and track sensing. Frequency modulation goes into the theory of the FM recording system and the subject is described in a readable way and illustrated with block diagrams and circuits. The FM carrier frequency spectrum is compared between the various systems, giving the reader a clear indication of the fundamental differences between them. Also included are details of such things as head switching, drop-out compensation, limiting, aperture correction etc. This chapter is very comprehensive and invaluable for the understanding of recording systems in general.

The complicated subject of servo mechanisms is covered in some detail with, apart from detailed descriptions, many excellent illustrations, circuits and control waveforms. Colour systems are well described and show the differences between the various systems. The ones specifically dealt with are Philips N1500; VHS, Betamax and V2000. A discussion of the latest LSI colour processors is also included in this chapter. Next comes 'Systems Control', this chapter again being very well illustrated and includes a practical circuit diagram to guide the engineer.

Having looked at the size of some of the 'important' chapters, 'Slow motion and still frame techniques', at twenty eight pages seems at first to be something of an overkill. However, when the text is examined one soon realises just how complicated these facilities are (and how they must push up the price of recorders!). Again lavishly illustrated and described this chapter shows just how well the book is written.

Given similar treatment is the section dealing with Hi-Fi and audio. Stereo sound is described as well as such modern inovations (for television) as noise reduction, Hi-Fi etc. Camcorders are well represented although the chapter deals mainly with VHS and VHS-C formats. Camera tube operation and CCD image sensors are fully explained as are camera optics - again the chapter is well illustrated. The final chapter is a compilation of examples of fault symptoms and causes that have been found in various models of videorecorders. It is not exhaustive and should be regarded as a guide as to which area of the machine's circuitry or mechanics may be responsible for a given fault symptom. Lastly a couple of useful appendices detail the various multi-way plugs and sockets used on most recorders, and a comprehensive glossary of terms for those less well informed on video jargon.

Considering the technical nature of the book's subject I found it to be very readable and easy to follow. For anyone interested in understanding and doing some servicing on their own recorder or for a service engineer, the book can be highly recommended.

VIDEOCASSETTE RECORDERS: a servicing guide, 3rd edition, by Steve Beeching.
ISBN 0-434-90123-7

221 pages, hardback, £20.00 sterling.

Heineman Professional Publishing,
22 Bedford Square,
London WC1B 3HH

A 10uH INDUCTOR

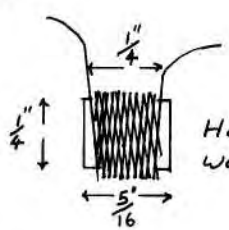
By J.Cronk GW3MEO

CCIR pre-emphasis networks, widely used for FM-TV, use 10uH inductors which are not often found in junk boxes. Although Electromail (RS) stock them under part number 228-141, as do Bonex Ltd, it's useful to be able to make one yourself when it is needed.

Since most amateurs don't have access to an inductance bridge the following method should prove close enough for most purposes.

Cut a standard 1/4" diameter by 5/8" long coil former ferrite core in half. Wind on a 20" length of 30swg enamelled copper wire in a small pile about 1/4" long and secure with a blob of glue or wax. The other half of the core may be used for the same purpose so that you have a 10uH inductor in stock.

The inductance can be checked with the aid of a dip meter or oscilloscope and LF signal generator, in which case 2,500pF in parallel should produce a 1MHz tuned circuit.



Half of an Aladdin core wound with 23 turns of 30 S.W.G.

PHILIPS KT-3 ON 70CM

Eric Edwards GW8LJJ

Now that Pye/Philips colour televisions using the KT3 chassis are becoming available on the surplus market at reasonable prices, it is well worth considering one of them for use as a 70cm receive station.

If you are fortunate enough to get one in good working order, all that has to be done is modify the U321 tuner. This simple modification to enable the tuner to be tuned to 430MHz has been described in CQ-TV before, but for those of you who have not read it I will describe the method again.

MODIFYING THE U321 TUNER

Remove the back from the television to reveal a large vertical panel, which should be hinged down by releasing the two clips at the top. Looking at the panel now in the horizontal position locate the tuner on the left-hand side. This is a plug-in unit and can be easily extracted once the retaining clamp has been removed.

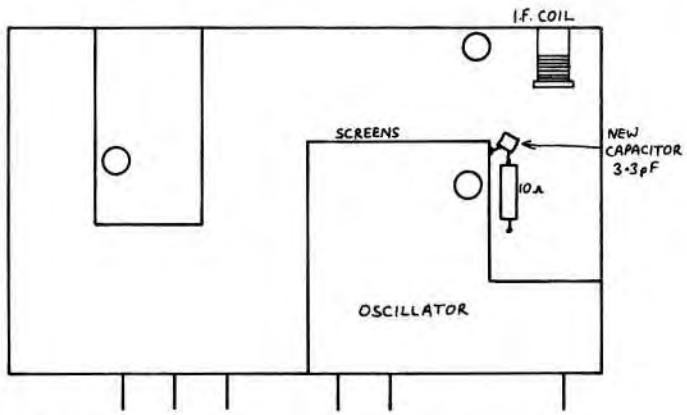


Fig.1 U321 TUNER MODIFICATION

Pull off the side-plate from the tuner on the component side and locate the 10-ohm resistor as shown in Fig.1. Fit a 3.3pF miniature ceramic capacitor between case (ground) and the resistor as shown and re-fit the side-plate. Plug the tuner back into the television and switch the set on. Slight readjustment of the pre-select buttons will be necessary to retune the broadcast stations. One of the pre-set tuning buttons can now be adjusted to receive 70cm ATV signals.

70cm STAND-ALONE RECEIVER

If you are unfortunate enough to obtain a KT3 set in a non-working condition (the CRT on this model is prone to going blind!) then a 70cm receiver can be made using the tuner and IF assemblies separate from the TV set.

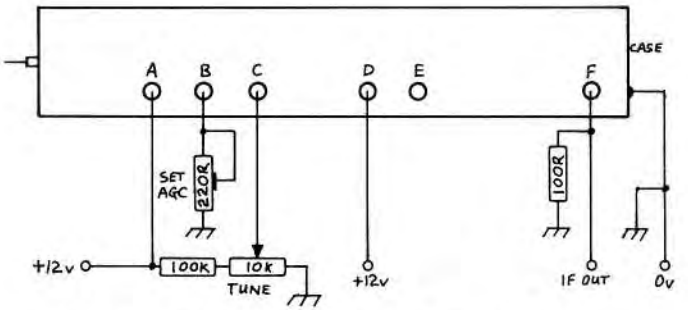


Fig.2 WIRING DIAGRAM FOR ATV OPERATION

Remove the U321 tuner as previously described. Locate the IF module situated next to the tuner and also un-plug by releasing the side retaining clips. Modify the tuner as before and connect a 12 volt supply and 10k tuning control as shown in Fig.2. A 220-ohm potentiometer is connected between earth and the AGC input of the tuner to enable the gain to be optimised (in some cases this control was found to be detrimental to operation, thus experimentation to determine whether or not to include this is necessary).

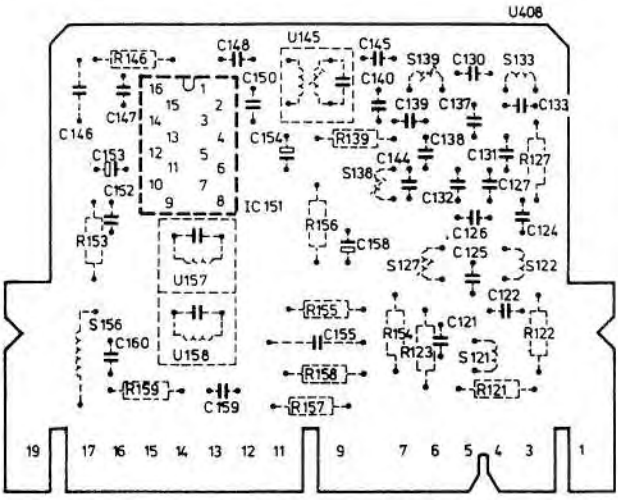


Fig.3 I.F. MODULE (print side)

Fig.3 shows the IF module from the printed circuit side. The necessary connections are listed below:

1) Join pins-1,4,5,7,14, & 19 together and connect them to earth.
2) Connect pin-3 via a screened lead to the IF output (pin-F) of the U321 tuner.

3) Connect pin-9 and pin-15 to +12 volts.
4) Connect pin-11 to the AGC input (pin-8) of the tuner.
5) Connect the video output from pin-17 to the circuit shown in Fig.4

The circuit in Fig.4 will provide a composite video signal from the receiver output of 1 volt p-p into 75-ohms, suitable for feeding a monitor or VCR. The only further requirement for using this receiver is the addition of a 70cm pre-amplifier, to enable the weaker signals to be seen.

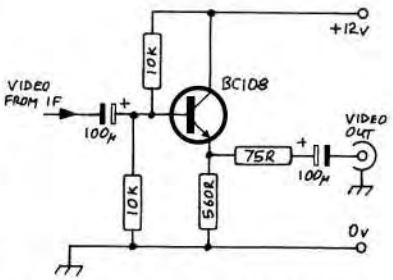


Fig.4 VIDEO EMITTER FOLLOWER

THORNBY ARC EXHIBITION

Stan Goodwin G1ZAV

On Saturday May 21st the Thornby & District ARC held an exhibition to celebrate 75 years of amateur radio. The event was held in the United Reform Church hall in Thornby which was not too good for receiving the Bristol ATV repeater GB3ZZ but OK for ordinary radio reception. We attempted to demonstrate several facets of amateur radio including television and, to this end, we sought help from some of the locals: The Bristol Repeater Group; the North Bristol ARC; the Chepstow ARC and of course members of our own club.

The object and aim of the exhibition was to demonstrate to the public that there can be considerably more to amateur radio than the images normally projected by the media. We also wanted to show local schools that amateur radio could be used by pupils for a variety of educational purposes.

During the day we ran a continuous demonstration of weather satellite reception and the computer programming necessary for tracking satellites. A 24cm hand-portable system made numerous sorties into various local shopping precincts, taking candid shots as it went and sending them back to the hall, where they were viewed with great interest. Several link-ups with local TV'ers were made and these pictures too were much admired by the visitors, most of whom had no idea that ham TV even existed. A 10GHz demonstration duplex link was set up between the hall and the local police station car park - a distance of some 100 metres. This interested other amateurs and has no doubt provided a stimulus to that band for the future.

The public were able to operate a communications receiver and tune over the bands while several club members demonstrated RTTY; Packet; SSTV and two metre operation plus an assortment of computer programs. An RSGB book stall was available as were some fine kits for 20M from C.M.Howes.

By the end of the day a number of people had expressed an interest in amateur radio, the local clubs and the RAE course itself, all of which have been followed up. I think that those who came found something of interest and in fact, some who only 'popped in' stayed for several hours! A good day was had by all and I would like to express thanks to the sponsors, groups, clubs and individuals who worked so hard to make the exhibition a success.

A LIMITER FOR FM-TV

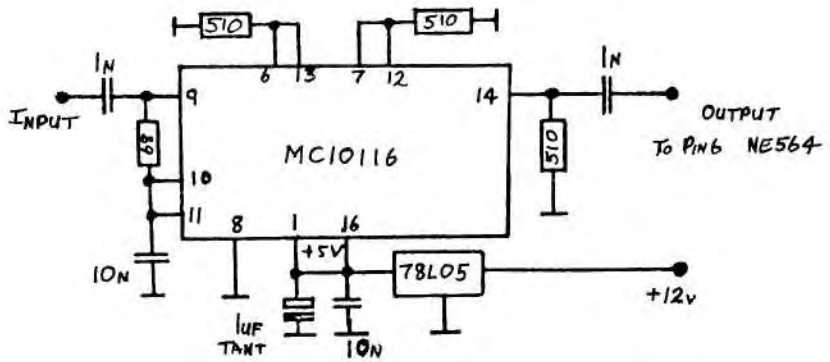
By Klaus Hirschelmann DJ7OO,

This article first appeared in TV-AMATEUR 62/1986 and we thank the editors for their permission to reproduce it here.

The phase-lock-loop integrated circuit type NE564N, which is used extensively by amateurs for the demodulation of FM ATV signals, is easily overdriven by strong input signals. Although a limiting arrangement is built into the device, frequency rejections and signal distortions can still occur. To remedy this problem it must be ensured that the input level of the NE564 is not too high. This can be accomplished by using external signal limiters, and for this the Motorola MC10116 device is very suitable.

The MC 10116 line receiver is used in this application as a limiting broad-band amplifier, with approximately 20dB of IF gain it delivers a stable output of approximately 0.8 volts. The circuit of this simple unit is shown in Fig.1 and can easily be assembled using a small piece of Vero-board. The connection between the output of the last IF amplifier and the input to the NE564 on the demodulator is broken and the circuit inserted. The input and output connections to the limiter must be as short as possible. Power requirements for this modification are provided by the 78L05 regulator shown in the circuit, which is fed from the supply to the demodulator.

This improvement for the NE564 demodulator can be carried out easily and quickly, and is non-critical, in that no further adjustments to the system need be made. It leads to a noted improvement of the receive qualities and should therefore be part of any such equipment.



ATV CALLING..144.750

A FREQENCY COUNTER

By Klaus Hirschelmann DJ7OO,

This article first appeared in TV-AMATEUR 63/1986 and we thank the editors for their permission to reproduce it here.

Now that the 24cm ATV band is being more widely used, and considering the widespread use of satellite TV receivers, there is a real need for a frequency counter in the ham shack capable of measuring much higher than the usual 200MHz types. The instrument described here, because of its programmable capabilities, may also be used as a frequency indicator display for such as a satellite tuner.

For economic reasons a four-digit display has been chosen, resulting in only the full megahertz being displayed. This solution has proved to be perfectly adequate for FM-ATV working. If needed, it is possible to display 100kHz as the fourth digit, but in this case the 1000Mhz digit on frequencies above 1GHz is lost.

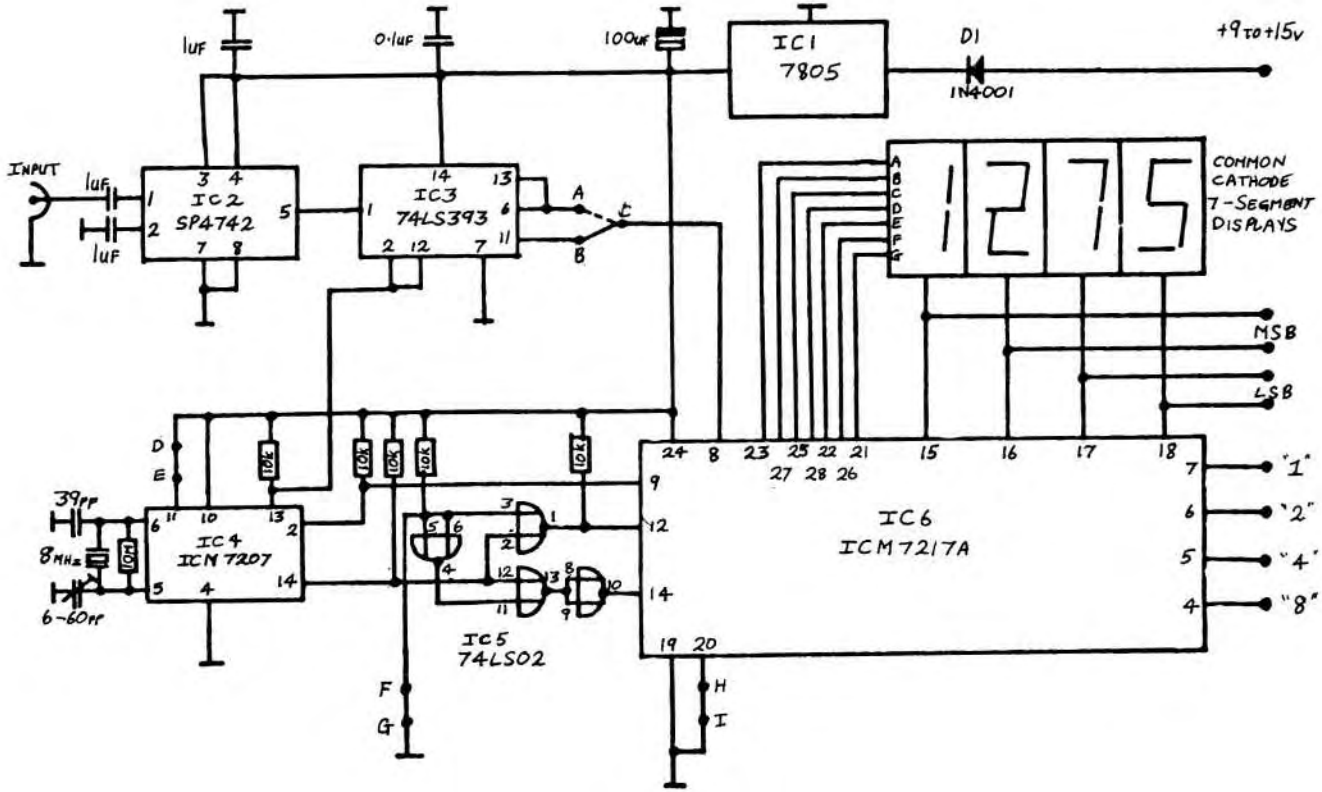
CIRCUIT DESCRIPTION

Fig.1 shows the circuit diagram of the frequency counter. The input signal is fed to an SP4742 pre-amplifier/divider, IC1. The input sensitivity of this device is shown in Fig.2, and as can be seen care must be taken with the input level otherwise the device may be destroyed. The input frequency is divided by 256 by this IC and fed to the following 74LS393 dual four-bit binary counter, IC3. The division factor of IC3 can be set at either 32 or 16, dependent on the output selected by link C-B or C-A respectively. For normal purposes with this design the link is connected at C-B.

The system clock is generated by a crystal controlled oscillator around IC4, an ICM7207. Due to the unusual division factor of IC6 being 8.192mS (or 81.92mS in the 100kHz mode) the crystal frequency must be 8MHz. The mark-space ratio of the clock pulses at pin-13 is 1:1, and this signal is fed to binary counter IC3. To switch the resolution of the counter from full MHz to displaying 100kHz as the fourth digit, the link at D-E must be changed. With the link made the display will be four-figure full MHz, and with it broken 100Khz will be displayed.

The main counting device is IC6, an ICM7217A IC from Intersil. An advantage of this chip is that it can be connected direct to the four common-cathode seven-segment LED displays, without the need for limiting resistors. Another adavantage is its programmable capabilities, examples of which are shown in Fig.3. By including the matrix diodes shown it is possible to program the counter for offset frequencies above or below the fundamental.

Mode selection between direct frequency reading or programmed offset reading can be accomplished by including a switch, to make or break the link F-G. A negative pulse at pin-14 resets the counter to 0000, whilst a positive pulse at pin-12 enables the programmed store value at pins-1, 2, 4 & 8 to be loaded. Thus, switching out the link F-G will give direct frequency readings, and switching it in will give the offset. This switching is controlled by the NOR gates of IC5, a


1uF
0·1uF
100uF
IC1
7805
D1
IN4001
+9 TO +15V
INPUT
1uF
IC2
SP4742
1uF
IC3
74LS393
A
B
C
COMMON
CATHODE
7-SEGMENT
DISPLAYS
MSB
LSB
D
E
10K
39pF
8MHz
10M
6-60pF
IC4
ICM7207
IC5
74LS02
IC6
ICM7217A
"1"
"2"
"4"
"8"
F
G
H
I

74LS02. The link at H-I on pin-20 allows the leading zeros to be displayed, for them to be suppressed break this link.

ELECTRONIC SCALE FOR SATELLITE RECEIVERS

As previously mentioned, this unit can be used as an electronic display of the receive frequency of a satellite receiver, wherein the oscillator swings on half the local oscillator (LO) frequency. This is the case, for example, with the Sanshin Satellite Tuner, covering 900 to 1500MHz.

Changing the link from C-B to C-A results in a doubling of the count impulses of IC6, and thus the value of the displayed frequency. Because the LO in the tuner is 70MHz above the receive frequency, the value 9930 must be programmed into the counter to achieve the necessary offset, then the counter will display the chosen receive frequency.

CONSTRUCTION

The counter should be built on two circuit boards, one for the counter circuitry and the other for the display components. The capacitors in the fast divider part of the circuit around IC's 2 and 3 should be miniature chip types.

AMNESTY!!!

Not guns this time - BATC Library items.

Will any member who has borrowed library items (equipment manuals in particular) please return them to the address below - no questions asked (Honest!).

BATC LIBRARY, Fern House, Church Road, Harby, Nr.Newark, Notts., NG23 7ED.

BONEX LTD.

Please note that the address for Bonex has recently changed. All orders and enquiries to the address below, callers welcome. Remember, they give club members 10% discount, so please quote your membership number.

BONEX Ltd., 12 Elder Way, Langley Business Park, Slough, Bucks., SL3 6EP.
Tel: 0753 49502

CQ-TV AWARD FOR 10G

By Bob Webb G8VBA,

It was my pleasure to present Bob Platts, G8OZP with a Bronze award on June 18th. This award was exclusively for contacts in the 10GHz band, and was the result of many excursions up rather large hills!. The presentation is shown in the photograph below, with myself G8VBA on the left, G8NND (he who drove the dish at the other end) in the centre and Bob G8OZP on the right. Many thanks to GOGZL for the picture. (This smacks a little of collusion what - the new contest manager and the recently appointed awards manager! - The Burton Maffia take up where the Rugby branch leave off!).

Hopefully, this award presentation will induce others of you to count up your points and send in your applications for awards. To date the BATC have issued 21 Bronze, 4 Silver, 14 Gold and 4 Diamond Awards. Only two awards have been issued to stations outside the U.K. It would be a pleasure to issue more awards to the continent or beyond, better still why not collect yours at next year's convention?

The CQ-TV awards were introduced to mark the 100th issue of CQ-TV and encourage activity, so let's see some more of you take the plunge and apply for one.

ATV WORKING - 10.25GHZ

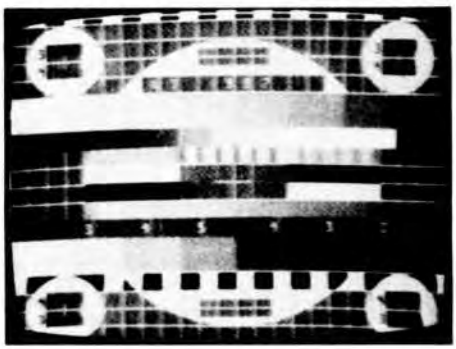
BROADCAST BAND DX-TV RECEPTION

By Garry Smith and Keith Hamer

At the time of compiling this column, the 1988 Sporadic-E season seems to have finally fizzled out. Despite three to four months of activity, the season has come and gone so quickly. The feeling is like returning from a holiday and wishing you were just departing! On the whole it has been an excellent season in many respects, although perhaps this is expressing a personal opinion. However, it may have been a different story if none of the exotics of early June had been received.

WHAT NOW?

It may be the end of the Sporadic-E season but there is still DX around during the winter months, although it does require a lot of patience at times because reception is infrequent. There can be a few good Sporadic-E openings during the winter, usually around Christmas and the New Year. Meteor Scatter DX reception occurs daily, so this is something to fall back on. Be warned though, you won't be able to watch the latest thrilling installment of "Neighbours" from Sweden. Siganls last only for a second or so but it's usually long enough to recognise a test card or caption.



The familiar "UEIT" Russian test pattern.

Then there is tropospheric DX reception, mainly at UHF or in Band III, which can produce top quality reception for days at a time. So keep an eye on the weather map for areas of high-pressure forming, frequently check all the TV bands several times a day throughout the winter for DX reception - it isn't such a daunting task as it might first seem!

JUNE

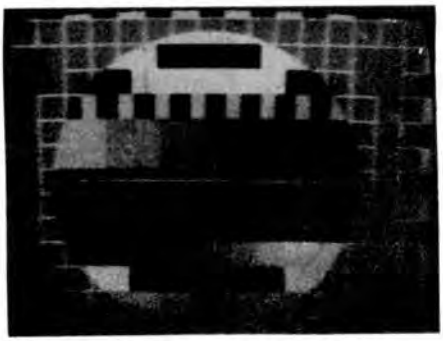
An excellent month for exotics as we briefly reported in the last issue of CQ-TV. The 5th, 6th and 7th were by far the most active days for exotic signals and we hope such an example of DX reception will be repeated in the future. Just to recap, on the 5th there was Sporadic-E in Band III from Iceland on channels E6 and E7 while on the 7th the m.u.f. (maximum usable frequency) rose high enough again to support signals from Algeria on E5 and E7, Libya E6 and Tunisia E6. American and Canadian Band I signals were in evidence throughout the UK just before midnight on the 6th with pictures on channel A5 (77.25MHz) at times. Unidentified 525-line pictures were also noted briefly on the 5th and 7th. Towards midnight on the 25th USA and Canadian pictures were resolved on channels A2, A3 and A4; their quality was better than on the 6th.

Band I signals from the Middle East were not as common as in 1987 but at least two countries were spotted on test card. Firstly Jordan with the PM5534 test

pattern carrying "JTV SUWEILEH" identification and Syria using a similar pattern but with "ORTAS DAMAS" identification. There were other instances of Arabic signals present but unfortunately these were programmes and could not be identified.

A tropospheric lift between June 10th and 14th brought in a few "firsts" from new Danish UHF transmitters. Denmark has just introduced a 2nd service (TV2) using UHF channels. Also the 1st programme (DR) from Copenhagen is now aired at UHF as well as Band I. The Band I outlet will eventually close but there are rumours that a "pay as you view" movie channel will be introduced at VHF once the whole of the DR network moves to UHF.

West Germany has introduced "local TV" to many main cities. Unfortunately, the term "local" in some cases seems to mean relaying satellite material from SAT-1 and RTL+. On June 14th a "DBP Dusseldorf-Burscheid" identification caption was noted followed by colour bars on channel E36. More recently a late-night test pattern has been seen on this channel, perhaps from the same source. The test pattern, without identification, was composed of various coloured bands, bars and squares.



Sporadic-E reception from Norway

JULY

There were a few days worth noting. On the 10th a high m.u.f. allowed Yugoslavia and Rumania to be worked at 144MHz for over 2.5 hours during the afternoon. On the 12th the Greek E3 transmitter was received during the morning and again after lunch with the PM5534 test card complete with video fault!

Many low-power Italian private stations were monitored during Sporadic-E openings to the south-east. On the 25th a chessboard test pattern was resolved on channel IA. Although no identification was present, this could be our old favourite NCT (Nord Centre Television) which has been absent for a couple of years. On the 24th the state-owned service RAI was resolved on channel E2 from the 40W relay at Campione d'Italia, which is actually located in the Ticino in southern Switzerland. Other highlights in Band I included Greece on E3 and Arabic programmes which could not be identified. An Arabic programme seen just before midnight in the Netherlands suggests that it originated in Morocco or Tunisia rather than the Middle East. The latter countries are at least 1 hour ahead of CET.

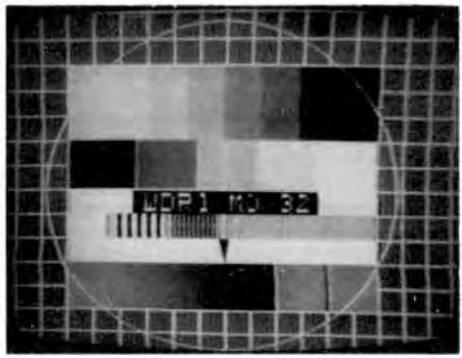
A shining example of excellent quality tropospheric reception from East Germany in Band III.

A tropospheric lift on the 19th centred over Switzerland brought in Austria on E5. Among the French Canal Plus

stations clogging up Band III, an FuBK test card was reported on channel E9 which seemed to have a "+PTT" identification. This was most probably Switzerland with the "+PTT SSR1" FuBK from the low-power (less than 5kW ERP) La-Chaux-de-Fonds transmitter.

AUGUST

The month was short but sweet, according to reports from other DX-ers and from our own observations. There was nothing outstanding in the way of exotics in Band I apart from Morocco on the 5th which appeared just before 1930 BST with the PM5544 test card followed by the Koran. On the 12th, Meteor Scatter activity caused a stir for one enthusiast when Denmark, Sweden and Finland were all identified from test cards in Band III!



The hi-jacking of channel 4 broadcasts from the Belmont transmitter - the West German FuBK test card from Munster takes over!

A tropospheric lift on the 5th and 6th produced several stations of West German origin. At 0424 a quick check through the UHF band revealed a test pattern on channel E46 which resembled an FuBK but with a distinctive cross in the centre; the pattern was switched off at 0450. It has subsequently been identified as Belgium but we don't know at this stage whether it was a one-off showing or not.

SEASON SUMMARY

The following countries were received via Sporadic-E propogation and positively identified in the UK during the summer of 1988:-

USA, Canada, Algeria, Morocco, Tunisia, Libya, Zimbabwe, Iceland, Finland, Norway, Sweden, Denmark, West Germany, East Germany, Austria, Switzerland, France, Corsica, Spain, Portugal, Italy, Yugoslavia, Hungary, Rumania, Czechoslovakia, Poland, USSR, Greece, Albania, Syrya and Jordan.

STATION IDENTIFICATION BOOK

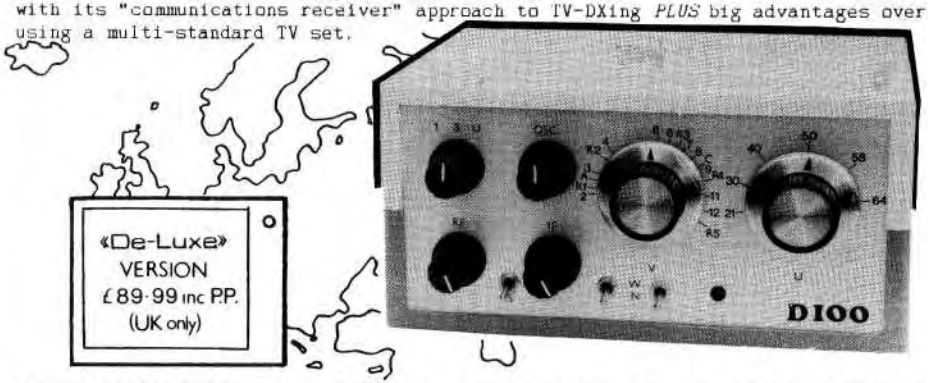
The book entitled "Guide to World-wide Television Test Cards - Edition 2" is now out of print. A 3rd edition is planned but there are no details yet of its release date. Fortunately, another publication "Teleradio News Data File - Bands I and II", which was updated at the end of July 1988, now includes a section featuring some 84 photographs of test cards, captions and clocks, etc. from around Europe. It is the most up-to-date selection available and there is also a supplementary service information section for each country plus full details of all the TV systems in use. Channel relationship charts and a Band I/II transmitter map (with transmitter list) of Europe are also included. The publication is A4-size and the charts, map and photo pages can easily be removed for mounting on the shack wall if required.

The price of the data file (including postage) is £5.99 (UK), £7.75 Surface mail and £8.75 Airmail.

It is available only from HS Publications, 7 Epping Close, Derby DE3 4HR.

The Successful Way to DX!

The Sporadic-E season is now in full swing and it makes sense to make the most of it. For serious DX reception the «DE-LUXE» D-100 Converter is the answer, with its "communications receiver" approach to TV-DXing *PLUS* big advantages over using a multi-standard TV set.



■ **MULTI-SYSTEM SOUND** ■ **VHF-UHF -COVERS BANDS I, II, III, UHF and ATV BAND**

■ **The «DE-LUXE» D-100 CONVERTER SYSTEM** has been specially designed to satisfy the requirements of virtually every DX TV enthusiast from the absolute beginner to the more advanced. It has at least one important advantage over a multi-standard TV -**ITS SWITCHABLE I.F. BANDWIDTHS.**

■ We shouldn't need to tell you that **A REDUCTION IN I.F. BANDWIDTH IS ESSENTIAL** when attempting to resolve extremely weak stations under difficult conditions. It improves selectivity too. Selectivity, to put it bluntly, is how effectively a receiver system will home in on the wanted signal and reject unwanted ones on adjacent frequencies. Consequently a useful separation is possible when signals are present on adjacent DX channels only 1.5 MHz apart, such as E2 and R1 or IA and E3.

■ Also, the «DE-LUXE» version of the D-100 is able to resolve sound ***irrespective of the vision I.F. bandwidth selected.***

■ Its Band II coverage allows extra channels from Russia, certain Eastern-bloc countries, Italy and Albania -also Band III coverage extends well below E5 to Moroccan channels M4 and M5 (just in case!).

■ The «DE-LUXE» D-100 will also resolve French (System L) signals using a normal TV and many radios -please send 18p stamp for leaflet with further details.

■ The «DE-LUXE» D-100 simply plugs into the aerial socket of a normal TV set for vision reception and connects to the whip aerial of an FM radio for the sound.

■ Each unit comes complete with operating instructions containing a useful TV systems map with channel relationship plan for Bands I, II and III.

■ We can also supply **AERIALS FOR SPORADIC-E DX RECEPTION** in Bands I and II -or just the appropriate hardware if you wish to construct your own.
Please send 18p stamp for details.

HS PUBLICATIONS

7 EPPING CLOSE DERBY DE3 4HR ENGLAND

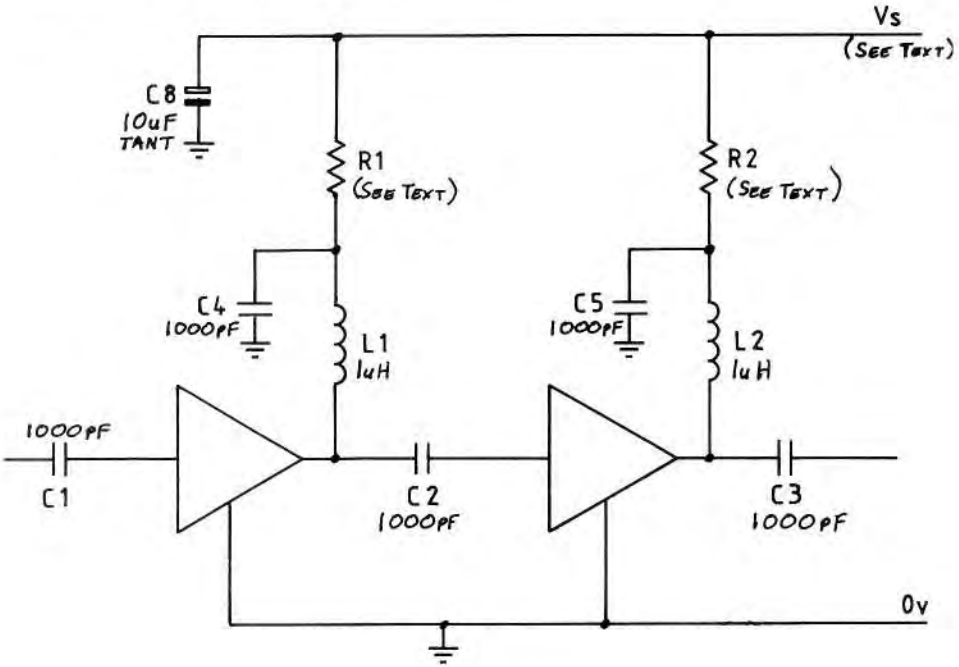
JUST A MMIC!

By Bob Platts G8OZP,

Issue 142 of CQ-TV (pp 40 & 41) contained an introductory article on Monolithic Microwave Integrated Circuits (MMIC's). These devices are rapidly replacing much conventional RF circuitry in receivers and low power transmit systems in the frequency range 100MHz to 6GHz. Basically, MMIC's are single device gain blocks, with an input and output impedance of 50-ohms. The frequency range and output power depends on the device type. The MSA04 range by Avantek, mounted in a four-lead plastic encapsulation are comparativly cheap, easy to use, and readily available.

THE AVANTEK MSA04 RANGE, ABRIDGED DATA:

Device type	Frequency range	Gain @1GHz	Noise Figure	Max output @1GHz	Max Voltage	Max Current
MSA0104	DC - 3.5GHz	15.0dB	6.0db	1.4mW	5.0V	30mA
MSA0204	DC - 4.0GHz	11.0db	6.5db	2.8mW	5.0V	40mA
MSA0304	DC - 3.5GHz	11.0db	6.0db	10.0mW	5.0V	50mA
MSA0404	DC - 2.5GHz	7.5db	7.0db	12.6mW	5.3V	70mA



The design and construction of amplifier stages using MMIC's is relativley easy, as long as good UHF construction techniques are used. Careful attention must be paid to earthing, the use of subminiature components where practical, minimum lead lengths, etc. Take care not to exceed the maximum device current, MMIC's can, if this current is exceeded, go off with a good crack. The devices are designed to be inherently stable as long as construction technique is good. In theory, they can be cascaded in order to obtain the desired gain and/or power required. In practice however, it is better to limit stage gains to 30dB, unless good screening is employed to prevent the input 'seeing' the output.

A DUAL DEVICE AMPLIFIER FOR 100MHz to 2GHz.

The circuit shown in Fig.1 is for a general purpose amplifier usable in the frequency range 100MHz to 2GHz. The devices used will depend upon the exact gain and power requirements of the amplifier, ie: for a small signal RF or IF amplifier then two MSA0104 MMIC's may be used. For a transmit gain block, say between a transmit mixer and output stages, then a MSA0204 for the first and a MSA0404 for the second device could be used.

Fig.2 gives a suitable printed circuit board layout. The circuit should be etched onto good quality 1.6mm double sided glass fibre board, the underside of which should be left intact to form a ground plane. Capacitors C1 to C5 should be surface mounting chip types or subminiature ceramic. Chokes L1 and L2 should also be sub-miniature types, although not essential, it has been found that their inclusion increases the gain. If they are not fitted resistors R1 and R2 should be located in their place, and wire links fitted in the original locations for the resistors.

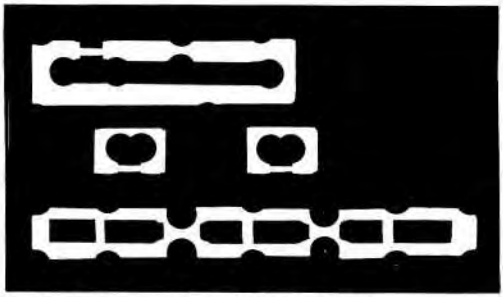


Fig.2 Print pattern (65 x 38 mm)

The values of the supply series resistors R1 and R2 is dependant on the supply voltage to be used. Their resistance can be calculated using the following formula:

$$R = \frac{Vs(supply) - Vd(device\ max\ voltage)}{Id(required\ device\ current\ in\ Amps)}$$

During testing of prototypes and with several units in use, I have found that the optimum device currents for most applications are shown in the table opposite.

Device	Current	R1 & R2 for 12v
MSA0104	18mA	390 Ohm
MSA0204	28mA	270 Ohm
MSA0304	35mA	220 Ohm
MSA0404	50mA	150 Ohm

Once the values have been calculated, select the next highest preferred value. Under no signal conditions measure the voltage across each resistor in turn and check the device current by using the formula:

$$\text{Device current} = \frac{\text{Voltage across Resistor}}{\text{Resistance}}$$

If the current varies without an input signal present, or the amplifier makes a better attenuator than amplifier, instability must be suspected. If this is the case, check the grounding of all the appropriate components. The MMIC's 0-volt leads must be soldered to the earth rail and the ground plane on the top and bottom of the board respectively. Check the relative positions of the input, output and supply leads, which can be a cause of instability, and re-route them if necessary.

If only one MMIC stage is required then the PCB may be reduced accordingly, or the unused location linked out by a small copper strip.

A HIGH GAIN WIDEBAND RF PRE-AMP.

This design, shown in Fig.3, uses the Avantek high performance MMIC type MSA0835, which at 23cms will give 21db gain with an associated noise figure of 3.5db. At 13cms, 14db of gain is available with a noise figure of 4.5db. The device is, in this configuration, driven into compression with a level of drive signal of 13dbm (20mW).

Construction is straightforward with the printed circuit layout shown in Fig.4 The PCB design is for use with a flange mount BNC input and direct connection to a cable at the output. The centre pin of the BNC connector should be cut short and connected to the input capacitor by a short brass or copper strip. The input and output connectors (if direct cable connection at the output is not required) can be configured to suit requirements, some 50-ohm right angle pcb mount BNC's were seen at a recent rally for the sensible price of 30p.

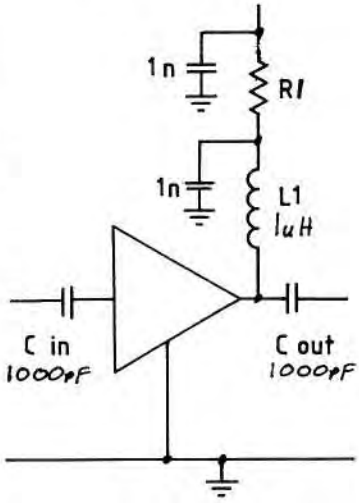


Fig.3

With a GaAsFET pre-amp and bandpass filter at the front end, this device would produce a hot pre-amp combination for masthead use, but take care with the screening.

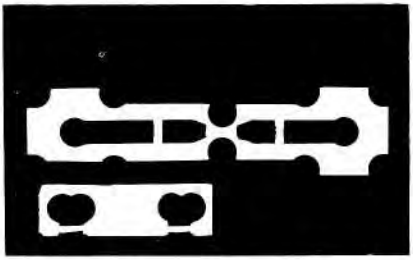
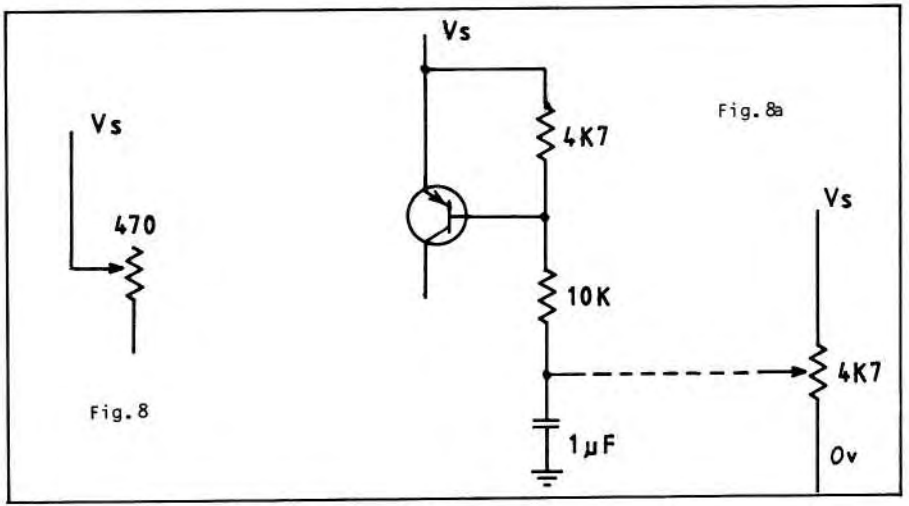


Fig.4 Print pattern (53 x 34 mm)

In Fig's 5, 6 and 7 are shown some other ideas for using MMIC's. Fig.5 shows a suitable line amplifier for a TVRO receiver, working at 900MHz to 2GHz. In Fig.6 is shown how to interface a suitable MMIC line or masthead amplifier to the cable-end receiver, with options for remote powering via the feeder (see below). Finally, Fig.7 shows a pair of MMIC's cascaded to form a line or masthead amplifier, with a bandpass filter at the input and again options for remote powering (see below).


Vs
470
Fig.8
Vs
4K7
10K
1µF
Fig.8a
Vs
4K7
0v

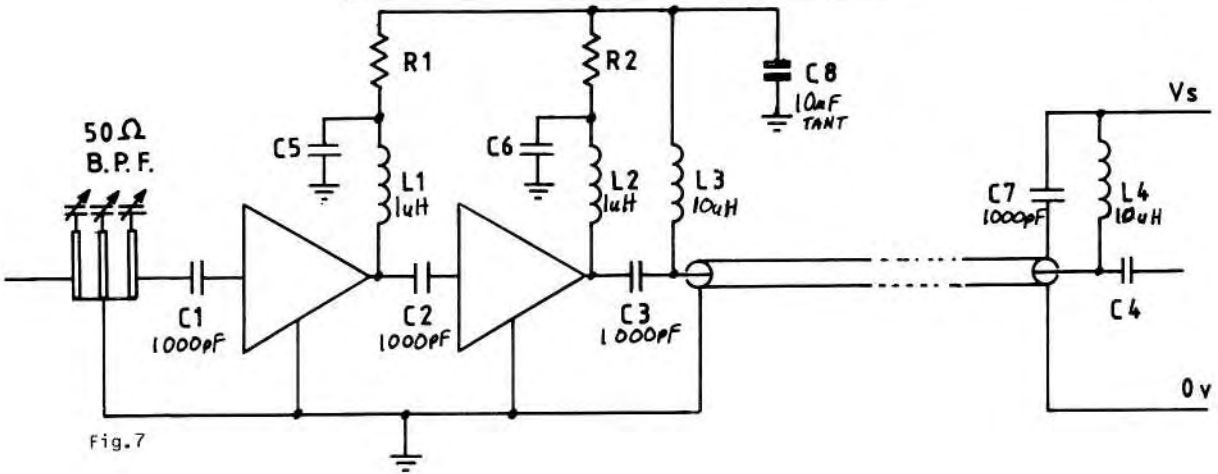

50Ω
B.P.F.
C1
1000pF
C5
R1
L1
1uH
C2
1000pF
C6
R2
L2
1uH
C3
1000pF
L3
10uH
C8
10mF
TANT
C7
1000pF
L4
10uH
C4
Vs
0v

Fig.7

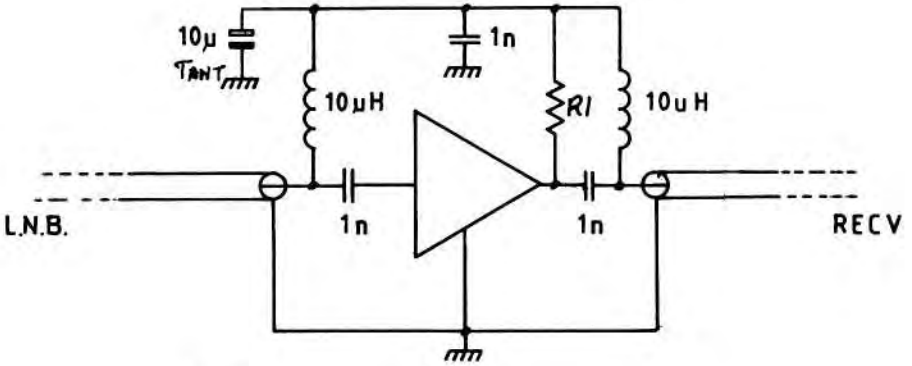


Fig.5

REMOTE POWERING OF MMICS.

MMIC's are ideal devices for remote mounting and feeding both power and signal via the feeder, as in the previous options. Their flat, wideband response makes them ideal for such uses as line amplifiers for satellite receive system LNB's. With Fig's 6 and 7 ensure that the 10uH chokes (L1 and L4 respectively) will handle the current required by the L.N.B. When using an MSA0204 device and an 18 volt LNB supply, R1 in Fig.5, and R1 and R2 in Fig.7 should be 470 Ohms. In this case chokes L1 and L2 are not required due to the relativley high values of the supply resistors.

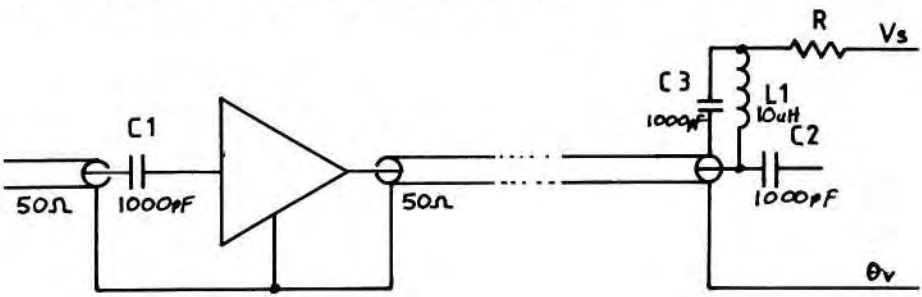


Fig.6

GAIN CONTROL OF MMIC's.

MMIC devices are basically linear in nature, thus their gain may be reduced by reducing the supply voltage. This can be achieved by the use of, either a potentiometer as shown in Fig.8a, or a transistor as shown in Fig.8b, to provide manual or automatic gain control. These controls can of course be mounted remotely from the amplifier if desired, as in the case of a masthead unit.

This ends my brief look at the use of these extremely versatile devices. I presently use various configurations of them with my 10GHz equipment with great success. Considering their very realistic prices I imagine that before long even more very interesting uses and designs will be forthcoming.

SOFTWARE NOTEBOOK

No. 13

By Paul EI7GM,

This short program for the BBC is by no means the best around but it does the job, at least it shows that there is life over here HI! The program produces a set of colour bars (or grey scale for those of us transmitting B&W) with a circle in the middle.

```
 1 REM****** PROGRAM -- COLOUR BARS (GREY SCALE B/W)
 2 REM******              WITH CIRCLE
 3 REM THE SIZE OF THE CIRCLE CAN BE CHANGED BY ALTERING THE
 5 REM STEP AND THE NUMBER OF TIMES THE 'FOR/NEXT' LOOP IS DONE.
 8 REM******PROGRAM DE EI7GM-DUBLIN
10 MODE2:GCOL0,0:MOVE0,1000:MOVE0,500:PLOT85,150,1000:PLOT85,150,500:G
   COL0,4:PLOT85,300,1000:PLOT85,300,500:GCOL0,1:PLOT85,450,1000:PLOT8
   5,450,500:GCOL0,5:PLOT85,600,1000:PLOT85,600,500
20 GCOL0,2:PLOT85,750,1000:PLOT85,750,500:GCOL0,6:PLOT85,900,1000:PLOT
   85,900,500:GCOL0,3:PLOT85,1050,1000:PLOT85,1050,500:GCOL0,7:PLOT85,
   1200,1000:PLOT85,1200,500
30 MOVE0,500:MOVE0,0:PLOT85,150,500:PLOT85,150,0:GCOL0,3:PLOT85,300,50
   0:PLOT85,300,0:GCOL0,6:PLOT85,450,500:PLOT85,450,0:GCOL0,2:PLOT85,6
   00,500:PLOT85,600,0
40 GCOL0,5:PLOT85,750,500:PLOT85,750,0:GCOL0,1:PLOT85,900,500:PLOT85,9
   00,0:GCOL0,4:PLOT85,1050,500:PLOT85,1050,0:GCOL0,0:PLOT85,1200,500:
   PLOT85,1200,0
50 VDU31,0,31:GCOL0,7:MOVE0,0:DRAW1200,0:DRAW1200,1000:DRAW0,1000:DRAW
   0,0
60 SC=444:REM  (-----------    "SC"
70 ox=600:oy=500:MOVE1044,500
80 FOR R=0 TO 54 STEP .4 :REM (============  "RESOL"
90 x=COSr:y=SINr:rx=x^SC:ry=y^SC:x=x+rx:y=y+ry:x=ox+rx:y=oy-ry:DRAWx,y
   :NEXT
99 D=GET:RUN
```

SOLENT TX - AGAIN!

By Richard Carden VK2XRL

Further to the article on the Solent FM-TV transmitter which appeared in CQ-TV 141 (p14), here are some further notes which may help some constructors:

1. Once set up and running no problems are experienced, however, if the transmitter is switched off and then back on the unit often fails to produce any RF. The problem was not, as was first suspected, with the oscillator. but was due to the bias network on TR2. A small ferrite bead placed on the supply side of L6 cured the instability problem.

2. The input video amplifier appears to be driven rather hard. The gain can be reduced by replacing R18 (12R) with 47R.

3. The 8v regulator (IC1) becomes quite hot and, in the interests of oscillator stability, should be re-located on a heatsink or bolted to the inside of the box.

CONTEST NEWS

By Mike Wooding G6IQM,

Well it's that time again, now I have to think up all the rubbish that usually makes up the contest news! I hope that you all had an enjoyable holiday, I certainly did, and I look forward to hearing from you ALL with your contest entries!

PLEASE NOTE: I have been advised by the post office that insufficient stamps are being put on the envelopes that you send to me for the return of certificates, log sheets, entry forms, etc. Please ensure that stamps to the value of at least 34p are on your SAE's, otherwise you may find yourself paying expensive excess postage!

Apart from news and results of the MayDay Microwave and SummerFun contests, this issue also contains the calendar for next year's contests (whoopee!). There are no new contests and I have again included the Slow Scan with the Autumn Vision. Although I do not yet know the outcome of the joint exercise this year, I still intend to run the SSTV contest unless it proves a waste of time by the number of entries I receive. Once again it is entirely up to you, if you want me to run the contest then take part and send me your entries. Don't forget that this years SSTV and Autumn Vision contest takes place very soon on Sunday November 13th - and is a whole-day contest.

CONTEST CALENDAR 1989

WINTER CUMULATIVE	Thur Jan 5th Fri Jan 13th Sat Jan 21th Sun Jan 29th	1900 to 2399 GMT each session	All bands and modes
SPRING VISION (JOINT EUROPEAN)	Sat Mar 11th Sun Mar 12th	1800 Sat to 1200 Sun GMT	FSTV All bands
MAYDAY MICROWAVE	Mon May 1st	0001 to 2359 local	24cm and above
SUMMER FUN (JOINT EUROPEAN)	Sat June 10th Sun June 11th	1800 Sat to 1200 Sun GMT	FSTV All bands
IARU ATV (INTERNATIONAL)	Sat Sept 9th Sun Sept 10th	1800 Sat to 1200 Sun GMT	FSTV All bands
SLOW SCAN TV AUTUMN VISION COMBINED	Sun Nov 12th	0001 to 2359 local	Slow Scan FSTV All bands
WINTER ATV (JOINT EUROPEAN)	Sat Dec 9th Sun Dec 10th	1800 Sat to 1200 Sun GMT	FSTV All bands

NEW CONTEST MANAGER - SEE NEWS PAGES

MAY DAY MICROWAVE

Quite a well attended contest this year, I made ten contacts myself before having to go to work for the night. Conditions were fairly average, although I managed a P2 one way at 137Km into Wales (I have to admit to 50+ Watts of power though!). The best DX notified to me was for a contact between the G4WRA/P group and G4VTD, a one way only at a distance of 139Km giving a P2 picture at G4WRA. The weather in Rugby was pretty good for the time of year, with sunny periods and no rain - somewhat unusual for a BATC contest of late what!! (I must be slipping!).

Many thanks to Bob Platts G8OZP and Gary Shipton G4CRJ for their entries on 3cm, it's a pity that the other two stations didn't send in entries, but never mind. A lot of effort has to go into 3cm TV and I greatly appreciate the interest shown, I hope that more stations will become QRV on this band and hopefully 13cm also. It is probably pertinent to say here that both the above stations are also committee members, we do try to wave the flag!

Precious few comments to note for this contest, I shall be having withdrawl symptoms soon unless more come in!:

Tim, of the G6XDY/P team, makes a very pointed comment aimed at the various Andies and Co. of the G4WRA/P team. He says: "One day G4WRA/P will see our video!" *You'll be lucky Tim, they usually can't see for the smoke from the barbeques!*

Bob, G8OZP, reckons that the line on the contest log sheet headed 'Total brought/carried forward' is a bit *ambishush* for 3cm!

SUMMER FUN

Well I failed miserably! I managed to organise a contest when a lift was evident! Oh woe is me and all that! Yes it's true, there were lift conditions about during the contest which enabled some stations to work into Europe and have good inter-UK DX. Conditions in Rugby were generally quite flat although most pictures received seemed to be stronger than usual. The weather for the weekend was pretty good here, although there were some strong winds reported about the land. Best DX reported on 70cm was a 544Km exchange of pictures by Andy & Co G8LIR/P with ON7MB, nice one lads! The best reported on 24cm was by Steve G4DVN for a one way with G8CMQ, a haul of 258Km. Well worth the struggle I reckon Steve! Once again there are reports of activity being quite sparse in some areas, as Andy G8LIR wrote - 'The contest started with a shout but ended with a whisper! Generally, however, the concensus of opinion is of a reasonably attended and well mannered event. So, once again, many thanks to those who took part, I hope you all enjoyed it as much as I did. To those of you who didn't, lets see you next time.

A few more of your comments gleaned from this batch of entries:

Andy *(which one? you might ask!)* of the G4WRA/P group: '...a good time was had by all here at Broadway - plenty of barbeques and the odd beer here and there and here and there...'. *It's not easy to do a fade-out in print!.*

Viv *(yes it's HER again!)* G1IXE wishes to thank all the members of the Severnside ATV group for their help and says: '...being in sight of a pub outweighs the advantages of mountains in Wales.' *Honestly Viv, you'll be leading this lot up here astray again!*

John G8MNY complains: 'When you choose contest dates they usually end up wet or snowing with us getting muddy, wet and cold. This time you gave us wind!' *Well I do my best John, but I reckon it must have been the Vindaloo!*

Peter G8MMF says:'At last we managed to work more stations on 24cm than we had visitors or donkeys on the site, although it was close with 6 visitors and 5 donkeys! *Does the donkey count include the station operators I wonder.*

And last but not least a cry of joy from Len G8ONX: 'Finally managed to work HER & Co, Hooray.' *See what I mean Viv, just generally a bad influence!*

RESULTS

Congratulations to the now infamous G4WRA group for winning the 24cm section of the May Day Microwave, not bad considering that it was only the second time they have been QRV on this band. Their equipment consisted of a 50 Watt transmitter, mostly homebrew, feeding into a pair of Micromax 38 element quad-loop yagis.

Congratulations also to Gary G4CRJ for just pipping Bob to the winning post on 3cm. Gary notes that a contact over the same path a month earlier yielded a P4 picture, he also complains that 24cm 'hasn't caught on down here in High Wycombe yet'.

The favoured red certificate goes to the G8LIR team of Andy, Fred and Ron once again. The transmit power of 200W and the four 21 element Tonnas certainly earned them a resounding win.

The excellent score of 2191 gives the honours to the G4DVN/P team of Steve and Mark on 24cm. The Tx power was only 10W with a single 28 element quad-loop yagi.

MAYDAY MICROWAVE '88 24cm

Pos'n	Call	Points	QSO'S	Best Dx	@	Km
1	G4WRA/P	2095	18	G8MMF		139
2	G1GST	1596	15	G6YKC		84
3	GW7ATV/P	1456	16	G6IQM		137
4	G6IQM	795	10	GW7ATV/P		137
5	G4CRJ	660	6	G4WRA/P		83
6	G8ONX	452	8	G6YKC		69
7	G6XDY/P	414	8	G4CRJ		70
8	G6SKO	164	4	G6IQM		84

MAYDAY MICROWAVE '88 3cm

Pos'n	Call	Points	QSO'S	Best Dx	@	Km
1	G4CRJ/P	51	1	G8LES/P		51
2	G8OZP/P	47	2	GØFNH		25

SUMMERFUN '88 70cm

Pos'n	Call	Points	QSO'S	Best Dx	@	Km
1	GW8LIR/P	16733	52	ON7MB		563
2	GW7ATG/P	9501	43	ON1AHT		478
3	G4DVN/P	8392	39	PE1HXD		544
4	G8MNY/P	6221	28	ON7MB		292
5	G7ATV/P	5514	37	G4DVG		220
6	G4WRA/P	3474	23	G4DVG		179
7	G4VTD	2908	16	GW8LIR/P		277
8	G1COI	2042	10	GW8LIR/P		224
9	GØHOV	1681	12	G7ATV/P		148
10	G8ONX	1637	13	G8MNY/P		158
11	G6IQM	1584	13	GW8LIR/P		151
12	G1GST	1437	10	G7ATV/P		143
13	G1NQM	853	8	GW8LIR/P		263

SUMMERFUN '88 24cm

Pos'n	Call	Points	QSO'S	Best Dx	@	Km
1	G4DVN/P	2191	12	G8CMQ		258
2	G4WRA/P	1521	13	G4DVN/P		125
3	G7ATV/P	1293	14	G4DVN/P		213
4	G1GST	865	7	G4WRA/P		87
5	G8MMF/P	652	7	G8LES		71
6	G6IQM	535	8	G4DVN/P		105
7	G8ONX	453	8	G4DVN/P		90
8	G4VTD	440	6	G4CRJ		57
9	G3YQC	342	7	G4WRA/P		54
10	G1COI	246	3	G4VTD		54
11	GØHOV	202	6	G4WRA/P		47
11	G1NQM	82	2	G8MMF/P		26

The address for information, entry forms, log sheets and contest entries is shown below. Please remember to enclose an A4 size SAE when requesting the above, or if wanting contest certificates. Remember, every contest entry is awarded a BATC certificate if you send an A4 SAE.

MIKE WOODING G6IQM, 5 WARE ORCHARD, BARBY, Nr.RUGBY, WRKS, CV23 8UF.

Forthcoming contests
(see also the calendar for 1989):

SLOW-SCAN & AUTUMN VISION
0001 TO 2359 HRS LOCAL
SUNDAY NOVEMBER 13th

TV ON THE AIR

Andy Emmerson G8PTH

Once again it's time for our quarterly activity report: most names are familiar (thanks for writing, folks!) so how about some new names next time?

Professionalism at the NEC

Ah well, we can hope. Good news ... you may remember that the BATC was asked by the RSGB to televise the royal opening of this year's national convention in Birmingham. This was a great success - eventually. At the RSGB's expense the club hired in professional equipment, the idea being that unlike our home-brew and pre-owned stuff, this does not go wrong. That was the theory anyway. The camcorder was a Betacam and this provided excellent pictures, so no complaints there. The cable which fed the vision from the Lucas Suite to the main hall went down during rigging but the problem was located and fixed in time. The hired-in sound mixer failed on the shoot, leaving the only sound recorded being that from the camera's own mike. All went well otherwise, and the recorded sound and pictures seem to have satisfied the 'client'. The BATC lighting was used by Central Television for their coverage and the BBC local radio people used a feed of 'our' audio. Not bad for a bunch of amateurs, though when you turn up with professional equipment people always think you know what you are doing.

So it was a job well done and congratulations to Trevor G8CJS and his team of willing helpers for their successful effort. Thanks, too, to the RSGB for having the confidence to use the BATC, to Bob Platts and Bob Robson for their work on the shoot. The latter Bob travelled 775 miles to pick up the camera and return it, also collecting a dub of the rushes to play on the BATC stand afterwards.

SSTV misunderstanding settled

You will recall the arguments for and against the 'migration' of SSTV from its traditional (and band-plan) home of 14.23 MHz. Lew Tepfer W6FVV of the International Visual Communications Association (IVCA) writes "Mr Stone is reporting out of context. At the SSTV meeting in Dayton, a question was raised about heavy QRM on 14.230. It was suggested that 14.35 MHz be used as an alternative frequency, not a replacement; possibly to hold some nets and to be used as an alternative during contests. IVCA would never suggest giving up or abandoning 14.230. It is, and should be, a standard. However, we are encouraging growth in the numbers of SSTVers and consequently, are suggesting alternative frequencies so that all may enjoy this activity.

"I believe RSGB should get involved in any item that materially affects ham radio, but should be sure all the facts are accurately known prior to making a stand. Best 73s to you and your members."

This seems to make a lot of sense and I am happy to set the record straight: we certainly need to stand together on this issue.

... and so say all of us

On the same topic, Roland G4UKL writes "IVCA seem willing to grasp the nettle no-one else has the courage to do. It is up to the three IARU Region band planning committees to get their act together, at the very least agree with each other! IVCA has a very considerable international membership and the representations it can make directly to controlling bodies are on that basis. They claim to be the only organisation whose interests are entirely SSTV-orientated, staffed entirely by volunteers and unlike other organisations, not ham-strung by ponderous committees of reactionary 'old-timers', which having but a vague notion of the needs of modern amateur television, are confined to memories of the defunct P7 era.

"I have mentioned before how utterly stupid it was to site SSTV in the middle of the bands. The 'younger generation' of SSTVers are ham-strung with the short-sightedness of earlier planners. WB0QCD's defence of 14.230 as the sole SSTV frequency may have had some credence 25 years ago, but with the great increase in the numbers of people in the hobby all wanting air-space coupled with current technology - colour transmissions taking 72 seconds and even 96 seconds to complete are becoming commonplace - the need for an alternative QRM-free location is of paramount importance.

"Today, as fast as one R/T station is persuaded to move from 14.23 or nearby, another opens up. His solution of sweet reason is decidedly inadequate: you can spend more time trying to clear the frequency than using it! The world-wide numbers of radio amateurs, many of who have no knowledge of HF band plans, ensure a never-ending stream of interference on 14.23. Try asking an Italian group or DX net to QSY!

Dark hints!

"I am intrigued with the vague reference to SSTV 'cliques' Mike Stone writes about; can we be enlightened? Equally fascinating is the darkly hinted motivation behind IVCA's attempt to get some sense into the SSTV scene. Details please. It would also be useful to know what the other bodies claiming to represent SSTV interests have done in this respect. The RSGB ought to be doing something: how about some publicity in the weekly bore (sorry, news bulletin) and why not a full-page in Rad Com on HF band plans? The RSGB are members of the IARU Region 1 which is due to meet again soon ...

"WB0QCD draws attention to the 'established' phone-patch groups at the top end of 20 metres. Does he not know this activity is illegal in the UK and most other Continental countries? Are amateurs in these countries to be denied access to these frequencies so that the privileged can enjoy cheap phone calls? Mike Stone knows as well as anyone that under the present licence conditions no amateur has an exclusive right to a frequency, slow-scanners included. I think SSTVers show remarkable restraint in keeping to the IARU band-plans. It will be a sad day for amateur radio if hams choose, as so many DXers, phone patchers and nets do, to ignore band-plans and work all over the bands."

Strong stuff and well argued - does anyone disagree? In the meantime, if you wish to get in touch with the IVCA this is the address. International Visual Communications Association, 99 Oenoke Lane, New Canaan, Conn. 06840, USA. And say we sent you!

Trigain-a-deg cm

That's supposed to be seventy centimetres in Welsh; I wonder how you say amateur television in the same language. Never mind, here is a report from Eric GW8LJJ in Barry, south Glamorgan ...

"It was a nice Sunday so I decided to take the 70cm mobile (well, it was either that or gardening!). I clamped a camera on the dash of the estate car and set up the transmitter on the passenger seat. I drove with a colinear on the roof from Barry (s. Glamorgan) to Blackwood (Gwent), stopping at times on high spots but with little result. Carrying on through the valleys, Peter GW4EAI called on two metres, saying "Watch that car in front!". He was receiving my mobile pictures six miles away, P5 at times. Near to Blackwood, Keith GW8TRO joined in to say he was receiving colour pictures.

"The following Sunday I set off again (the back garden is soon to be a large patio with the shack in the centre), this time calling in on Ray GW8GKF at Caerphilly (s. Glam.). We went to a local high spot, Pen Yr Heol - even the locals have trouble with the pronunciation. I left the colinear at home this time, bringing with me a J-Beam 88 element and 20 ft. aluminium pole (cut in half and sleeved). The transmitter was fired up from the 12 volt car battery. Peter GW4EAI came back with a report of P5, and pictures were also received from Peter at P5. Norman GW8UCQ was our next contact, with P5 both ways. Les GW8MTJ (the father of ATV in South Wales) received pictures but was not in a position to transmit. Keith GW8TRO joined in and gave us a P5 (colour) while we gave him a P3 for his 100 mW. Another Keith, GW1BDF from the Rhondda Valley, called: we had no TV contact due to his locality but thanks to him for trying.

"Guess who was receiving our pictures over in Bristol? Yes, Viv G1IXE, with a P5 both ways. She had the latest PIP (picture in picture) transmission, with multiple test cards on screen. Thanks Viv. Well, if nothing else Ray and I created some activity in the Welsh valleys again. How am I going to get out of gardening next weekend? Ah - there is always 24 cm to check out!"

Repeater and other news

GB3ET, the ATV repeater on top of the Emley Moor television mast in Yorkshire, has been licensed. The aerial will be installed in the near future, followed by switch-on soon after. GB3RT, near Rugby, was finally switched on a few months back and continues to give excellent service over a sizeable area. When it moves to a more elevated site coverage should be further improved.

Michael ZL1ABS has been busy in New Zealand after his trip to dayton. He is currently building an amplifier for 70 cm ATV using two 12 volt BLU45 transistors and also helping out another BATC member, Ray ZL1BDU, by wiring up a ZL2TAR-type colour pattern and callsign generator. Wayne ZL1TVW is working on several projects: frame store, colour genlock for his SAA1043/1044 sync pulse generator and 5.5 MHz subcarrier sound for the CQ-TV 122 transmitter. Michael is now attempting to send messages to the UK via the GB2UP UOSAT satellite and says that amateur facsimile is getting quite popular in New Zealand.

And that's all for this time. I look forward to receiving many more reports for the next round-up. Please send them to me at 71 Falcutt Way, Northampton NN2 8PH. Tel: 844130 (answerphone).

THE ASTEC TVRO TUNER

The item in the last issue of CQ-TV entitled 'ASTEC TVRO TUNER' (p.6) provoked several responses. If you remember the piece enquired whether it was possible to increase the range of the AT1020 tuner to cover the top end of the satellite band.

Several members contacted me to say that by simply increasing the tuning voltage to up to 24v, the tuner would then cover Sky and Super Channel etc. I have to point out though that the manufacturer's data sheet stipulates a maximum on this pin (4) of 22v, so if you try it and blow your diode, don't say you weren't told! It is my opinion however that 24v should do no harm to the diode at all.

An article in the July 1988 issue of 'Radio & Electronics World' magazine dealt with expanding the R&EW TVRO satellite receiver project (which uses ASTEC modules), one part of which described how the tuning range could be extended. This too recommended an increase of the tuning pin voltage to up to 22 volts.

The following letter from G4WPB was also received on the same subject:

'With regards to the ASTEC tuner AT1020, I at one time did considerable research into the problem of trying to cover the top end of the satellite band. It became clear after looking in detail at the '1020 that to increase the voltage to the unit beyond its design capabilities could be fatal - this was of course after I had ensured that the shift in voltage to its permitted maximum would not push the unit up the band sufficiently.

The cost of the ASTEC AT1020 and also its complexity prevented me going any further with the tuner itself, so it was decided to tackle the problem in a much safer and easier way. This was done in a very simple manner by altering the 10GHz oscillator in the LNB on the dish. No special equipment was needed.

Remove the LNB cover to expose the frequency adjust trimmer. Tune into the Music Channel (MTV) with the MAIN TVRO unit. When this is done, and ONLY at this time, de-tune the MAIN TVRO unit to just below the MTV signal, making sure that you can still see a trace of the signal coming through. Now adjust the LNB oscillator and note which way it turns to bring the MTV signal back onto tune. Repeat this process until Music Channel tunes in towards the bottom of the main TVRO unit's scale, this will allow the IF (tuner) to effectively cover the top of the band without the possibility of blowing it up. This modification was done to my own unit using a Comex TVRO receiver but I'm sure that other LNB's will be as easily re-tuned'.

Finally, I understand that Astec UK Ltd would be happy to supply TVRO modules to clubs or individuals ordering several at a time. They regret they are unable to deal with 'one off' orders.

SSTV FREQUENCY - 144.5MHZ

GB75TV

By Mike Wooding G6IQM,

After several weeks of organisation and spending the previous weekend at my QTH with Barry G6IKQ feverishly working on the 24cm set-up, the weekend of the special event arrived. Late afternoon on Friday my car was loaded to overflowing with most of the equipment from my shack, food, barbeque, charcoal, clothes, children, myself and my lady Kim. The one-hour journey from Barby to Shenington took us across the beautiful countryside of the Dasset Hills in glorious sunshine, although we were told by the men at the Met' that it was not going to last. For once they were right! The car was unloaded into Barry's front room, much to the chagrin of wife Shirley, although most of her complaints were levelled at Barry, who had earlier unloaded most of the contents of his van into there as well!

After further minor adjustments to some of the equipment in Barry's shack (not forgetting to dodge the dogs!) and a meal we loaded the van and at 18.30 set off for the hill, which fortunately was only five minutes drive. A quick call in to see Tony to let him know that we were going on site and to ask if he could bring the generator and the tent up on his tractor to lighten the van's load. By this time it was damping considerably and the hillside grass was very wet. However, quite surprisingly we made it up in one, although at times the van, with its low ground clearance and narrow track, was traversing sideways across the hill at an angle of about forty degrees from the vertical. Time for a can of beer I thought!

So, we arrived at the top of Shenlow Hill in very damp conditions, Tony wished us well and left, and we started to pitch camp. This was interesting to say the least. We were using Barry's 17 foot square frame tent. OK you say, so what? The interesting part was that neither of us had ever erected it before, let alone in wet, and by now windy weather! However, by dusk we had managed to get most of it up intact, and then Shirley and daughter arrived to put us right and complete the task. Lights were hung in the tent, the cooker fired up and we settled down for a cuppa and a can and wondered what on earth we were doing on the top of this wet and ever increasingly windy hill! Having not solved this riddle, even after emptying some more cans we turned in at midnight.

During the course of our fight with the tent Andy G4TGM and Andy, of the G4WRA group arrived. Andy 'TGM was towing the trailer and mast whilst the other Andy (you think it's getting complicated, you wait!) was in his escort. The escort made it to the top of the hill without problem. However, the transit and trailer were doing a pretty good waltz about a third of the way up, so it was decided to leave the trailer at the bottom 'till morning so that Andy could get the van up on its own.

G6IKQ (L) enjoys a cup of tea with contest manager G8OZP.

Saturday morning, 06.15: I was brought to full awareness by Barry offering me a can of beer! I declined his kind offer and accepted a cup of tea instead. The wind was still blowing well, as it had been all night, and it was very damp underfoot. It may have been said many times but for once it was true, I truly had my head in the clouds, our horizon was reduced to about 100 feet! Anyway, we breakfasted (yet more beefburgers) and set about getting the station together. Barry had to nip home to make some business calls, so he called to see Tony and arranged for him to haul the trailer to the top of the hill with his tractor. Meanwhile, I started unloading the radio and TV gear from Barry's van.

The 10GHz set up.

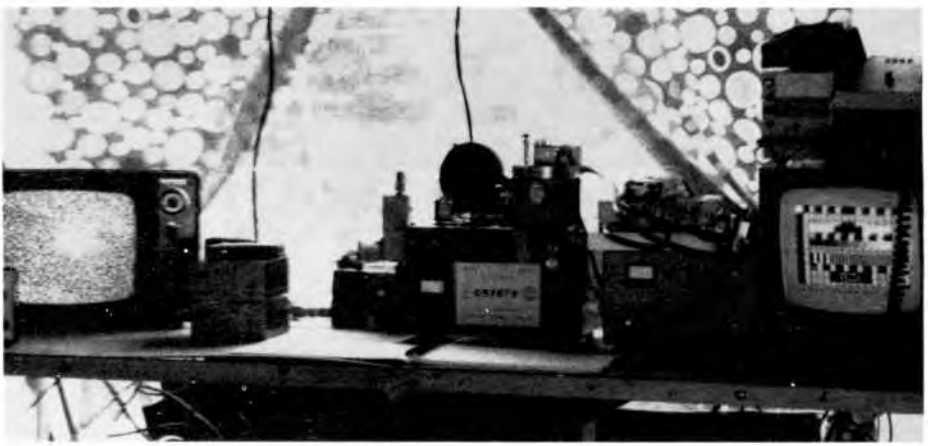
PANIC!!! where were the 70cm linear PSU and the 24cm linear and PSU? Andy (which one?) dashes me home to Barby and back again at warp factor ten in the escort to collect the gear. We arrive back at the hill after ninety minutes to find the tower ready for hauling up. This done I finished setting up the station and we are ready - I think.

Suddenly the wind increases from its playful force-8 to about force-10. Stern measures were taken to stabilise the tent, which seemed to be preparing for earth orbit. We found some ropes and started to storm-rig the tent from every available point we could find. What to tie it to? Why not the triangulation point? That's a five foot tall concrete pillar, if that moves we're doomed anyway!

Problem sorted, its 1155; "CQ ATV" we had made it, GB75TV was on the air. Our first contact was Bob G8OZP who was on his way with his 3cm gear, shortly afterwards followed by Bob G8VBA and son

Andy (yes another one!) with his 10GHz set up. A busy day's operating brought a lot of contacts, mostly on ATV. Weather conditions improved greatly during the afternoon with the wind abating to a mere howl. Unfortunately, band conditions on 3cm were abysmal so the two Bobs mostly drank tea and exchanged stories with Barry and Andy and Andy. A very enjoyable contact was made with the two Andies who took their portable 70cm gear and a camera up to their more usual portable location at Broadway Tower, sending P5 pictures back to us over the 20 mile path.

The station worked well into the early hours, with copious supplies of hot dogs, yet more hamburgers and cans of the usual, until at 0200 Sunday morning the generator ran out of petrol. We decided that it must have been a message from the long dead buried under us (Shenlow Hill is actually a burial mound) so we turned in.



The sharp end!

Sunday morning 07.30 saw Barry offering me tea this time. The genny was filled up and started and GB75TV was again on the air. A very busy morning saw lots of contacts around the country with conditions seeming quite good on both 70 and 24cm. Dave G8VZT came over from his QTH hiding behind the Wrekin (Shropshire) to test his 10GHz gear with the two Bobs (or was it half-a-crown?). he also worked us on the way with his 70cm portable gear sending us P3 pictures at times.

The two Andies having a previous commitment had to leave us in mid-afternoon, so that meant that the tower with the 70cm and 2m aerials had to be disassembled. This involved shutting the station down for about an hour. After they had departed we were left with the box of four 24cm quad-loop yagis on their mast and the 2m beam lying on top of a fence. The last contact for the main station was with Tony GOHOV (another member of the GB3RT group) who was operating the GB75TCF ATV station at the Town and Country Festival at Stoneleigh. In truth, we spent most of the weekend in contact with Tony by way of John G1IJT (yet another member of the GB3RT mob), who was keeping Tony and the public entertained at TCF by re-radiating our pictures received on 70cm into Tony on 24cm whenever he could.

The only 10GHz contact was at first across the field between the two Bobs, then between them and Dave. Finally, Dave went to Broadway Tower and sent a picture to Bob G8OZP across the 35Km path.

The station was closed down at 15.15, the gear and tent dismantled and loaded back into Barry's van, and we left the site (a lot quicker going down!) at 5.30. After dropping some of the gear off at Barry's, yet another cup of tea (he never stops!) we transhipped my gear into his car and came home to Barby.

Sunday 2200, back home, a cup of something warm and a relax in a comfortable chair.

Enjoy it - yes I did.
Successful - yes it was.
Will I do it again - NEVER!, well not until the next time anyway!

I wish to extend my grateful thanks to the following for their help and assistance in making the event a success, and to the 63 stations we worked. Barry Trigger G6IKQ, Andy Sherrat G4TGM and Andy, Bob Platts G8OZP, Bob Webb G8VBA and son Andy, Tony Middleton of Hill Farm Shenington, the Wordsley Amateur Radio Group, the RSGB, the BATC, Shirley Trigger and last but by no means least my wife Kim (for giving me a weekend pass!).

TROUBLESHOOTING THE G3WCY SSTV SCAN CONVERTER

By J.Brown G3LPB,

I have had many enquiries over the last few months from people experiencing problems with getting the G3WCY Slow-to-Fast scan converter working correctly. This project is featured in the BATC publication 'The Slow Scan Companion', and printed circuit boards are available from Member's Services.

The problems reported have been mainly due to incorrect fitting of components onto the circuit boards, solder splashes, etc. In order to help overcome these problems I have drawn up some charts showing the interconnections between the major components. Thus, continuity and short-circuit checks can be made before the boards are powered up.

Two problems which are constantly reported are listed below with their possible causes:

1) Black horizontal bars across the picture - these bars vary from a single thick one to fifteen thin ones, all horizontal. A faulty 74LS153 in position IC33, 34, 35 or 36 is the cause. Swopping them around will change the number of bars present on the picture and will thus locate the offending chip.

2) Parts of picture missing - this is usually due to one of the 4116 RAM chips not making contact on all of its pins.

Having built the boards and carefully visually checked for short circuits and incorrectly inserted or placed components, use the charts below to check for continuity before applying power.

READ ROW COUNTER - IC27

Pin number	Connects to
2 & 12	IC20 Pins-8 & 12
1 & 8	IC34 Pin-11
3	IC34 Pin-5
4	IC35 Pin-11
5	IC35 Pin-5
6	IC36 Pin-11 & C209
9	IC33 Pin-5
10	IC33 Pin-11
11	IC23 Pin-3 & 4
13	IC21 Pin-8 &
13	IC22 Pin-5

WRITE ROW COUNTER - IC29

Pin number	Connects to
2 & 12	IC26 Pins-2 & 3
1 & 8	IC34 Pin-3
3	IC35 Pin-13
4	IC35 Pin-3
5	IC30/36 Pins-13
9	IC34Pin-13
10	IC33 Pin-3
11	IC33 Pin-13
13	IC19 Pin-13 &
13	IC26 Pin-11 &
13	IC20 Pin-4 &
13	IC32 Pin-5

ROW COUNTER SET - IC23

Pin number	Connects to
1	IC19 Pin-1
5	IC20 Pin-6
6	IC37/38/39 & 40 PIN-4

VERTICAL SYNC SET - IC25

Pin number	Connects to
1	IC21 Pin-5 &
1	IC20 PIN-1
5	TR202 C &
5	TR203 B via 10k

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.....	THE BEST OF CQ-TV (130gm) By J.Wood G3YQC & T.Marsden G6JAT (130gm	£3.50	.....
.....	THE SLOW-SCAN COMPANION (165gm) By Grant Dixon, John Wood & Mike Wooding.	£3.50	.....
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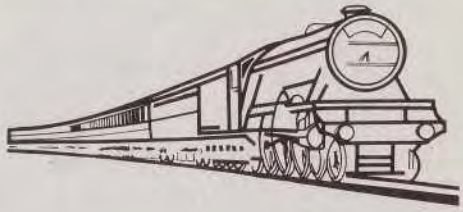

Items from these lists can ONLY be supplied to CURRENT members of the BATC. These lists supercede all previous ones. Components for club projects are not available from Members Services unless contained within these lists.

PUBLICATIONS should NOT be ordered on this form. A separate form is provided for that purpose elsewhere in this supplement.

QTY	CAMERA TUBES, SCAN COILS, BASES & LENS MOUNTS	EACH	P&P	TOTAL
.....	1" Vidicon scan-coils (low Z focus coils)	£6.00	£1.20	.....
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.....	Vidicon bases - 2/3"	0.65	0.19	.....
.....	C Mount for lenses	£4.00	0.19	.....
.....	Vidicon camera tubes - see below	-	-	
.....	Image Orthicon camera tubes type 9565 **	£10.00	+	.....

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1" vidicon tubes are available in different heater ratings (95 and 300mA) - 6" long, and also a 95mA 5" long version; (EMI types 9677, 9728 and EEV types P849 and P8031). 2/3" tubes have 95mA heaters (EEV type P8037). All tubes are of separate mesh construction, with magnetic focus and cost £25 each, including postage. Electrostatic vidicons, Leddicon and Ebitron tubes are available, to special order. Members requesting information on different types of tube or equivalents for other manufacturers are asked to send a stamped, addressed envelope for their reply.

QTY	VIDEO CIRCUIT BOARDS AND COMPONENTS	EACH	P&P	TOTAL
.....	'Project 100' sync generator (CQ-TV100)**	£3.00	0.30	.....
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.....	Sync processor (CQ-TV129)	£3.00	0.30	.....
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.....	SPG, greyscale, char gen (MTP)	£4.set	0.60	.....
.....	Keyboard add-on (for above char. gen) (MTP)	£2.25	0.25	.....
.....	Colour test card (set of 3-double-sided)	£15.00	0.60	.....
.....	TBP28L22 PROM for test card circle	£10.00	0.25	.....
.....	PAL colour coder (CQTV 134)	p.o.a.	0.30	.....
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.....	13.14MHz TV TX crystal (HB2)	£5.00	0.19	.....
.....	70cm TV transmitter (TVA and CQ-TV122)	£3.00	0.30	.....
.....	108.875MHz TV TX crystal (TVA)	£7.00	0.19	.....
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.....	TVRO receiver (CQ-TV135) **	£4.00	0.30	.....
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.....	6MHz audio generator (CQ-TV139)	£1.50	0.20	.....
.....	G3WCY SSTV to FSTV RX & reprint (COM)	£10.set	0.60	.....
.....	G4ENA mods for above (CQ-TV127,COM) set of 4	£5.set	0.30	.....
.....	G4ENA SSTV transmit board (CQ-TV129,COM) Add on to G3WCY - incorporates LSC & width circuit as in G4ENA SSTV mods. set (above).	£6.00	0.30	.....
.....	G4ENA SSTV aux board (CQ-TV130,COM)	£2.00	0.20	.....
.....	G8CGK SSTV pattern generator-inc notes (COM)	£3.00	0.35	.....
.....	SSTV pattern/sync generator (HB2)	£3.00	0.30	.....
.....	2732 E-PROM. SSTV program (HB2)	£12.00	0.19	.....

OTHER PCBS AND COMPONENTS

.....	Power supplies - 2 +ve and 2 -ve rails	£3.00	0.30	.....
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.....	4.433618MHz PAL colour subcarrier crystal	£2.75	0.19	.....

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All Club crystals are HC18/U (wire ended).
HB1 = ATV Handbook (blue); HB2 = ATV Handbook vol.2, or revised edition;
TVA = TV for Amateurs; MTP = Micro & Television Projects; COM = SSTV Companion.
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++ Callsign badges are sent for engraving on the CQ-TV close-for-press date.

OVERSEAS MEMBERS should ask for a quotation of postage costs and acceptable forms of payment BEFORE ordering from Members Services. Please enclose an International Reply Coupon for reply.
CHEQUES should be made payable to "BATC" and should be for English banks only please, in pounds sterling.

ORDERS PLEASE TO:- Mr. P.Delaney. 6 East View Close, Wargrave, BERKS RG10 8BJ, England. Tel: 073 522 3121 (evenings/weekends only please)

name	call
address	
	post code

BLOCK LETTERS PLEASE

SALES NOTES

MEMBERS SERVICES

BATC Members Services does not hold stocks of BATC publications, and vice versa. Please send your order to the appropriate address, as otherwise extra delay and expense is caused in fulfilling the order. Please note that only the items listed in the CURRENT "Services for Members" leaflet are available - a description of the various pcbs and components can be found, in CQ-TV 140 onwards. To avoid delay and inconvenience, please be careful to include the correct amount of VAT with your order, (U.K. residents) ie 15% of total goods and postage. Payment should be by cheque or crossed postal order in favour of BATC - do not send cash or stamps please.

Batches of callsign badges are sent to the engravers once per magazine cycle. Please ensure that your order reaches BATC Members Services by the CQ-TV close for press date, given at the foot of the 'Contents' page in each issue. Badges are distributed to members as soon as they have been engraved.

Some new boards are in preparation, including the PAL coder from CQTV134 and the Spectrum Freezer from Micro and Television Projects (which is usable with other types of computer). Details will be announced on the BATC Prestel pages, or you may send a suitably stamped and addressed postcard to Members Services, if you can't wait for the next CQ-TV.

VIDICONS

We have now arranged for an additional source of vidicons to be made available through Members Services. Tubes available include electrostatic focus or deflection, and low light types not previously available to club members. Prices vary depending on the size, type and grade of tube. Please contact Members Services for information on equivalents and price and delivery times. The stripe filter tubes used in domestic type colour cameras are not available through BATC, and normally must be ordered direct from an equipment supplier.

NORTH AMERICAN MEMBERS

The BATC has an agency in North America where orders for Subscriptions, Publications and Members Services sales items may be placed and paid for. This should considerably ease the old problem of sending money overseas. A special Members Services sales form, priced in US Dollars, is available on request from our agent, as is a 7-page handout briefly describing the items and PC boards available. A large, stamped, self addressed envelope should be enclosed for these items.

Orders please to WYMAN RESEARCH Inc., Box 95, Waldron, IN.46182 and checks made payable to Wyman Research. All goods will normally be despatched from the UK so please allow sufficient time for delivery.

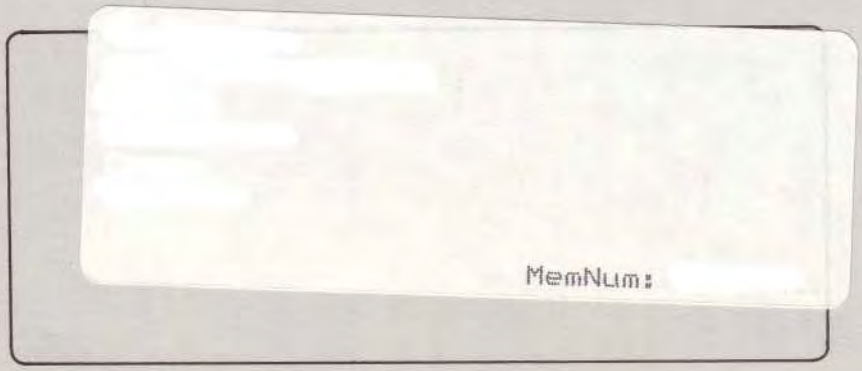
Your membership number is printed on the address label below.

The first two digits indicate the year that your subscription has been paid up to, and the rest is the club's database number.

Please keep your current membership number as it is possible that it may be needed in the future to obtain club discounts as well as club sales items at rallies and shows.

You will also note that we are again able to print your callsign on the address label.

KEEP YOUR MEMBERSHIP NUMBER SAFE



READ COLUMN COUNTER - IC28

Pin number	Connects to
2 & 12	IC22 Pin-8 & 12
1 & 8	IC34 Pin-10
3	IC34 Pin-6
4	IC35 Pin-10
5	IC35 Pin-6
6	Ic36 Pin-10 & C213
9	IC33 Pin-6
10	IC33 Pin-10
13	IC20 pin-10 & 11
13	IC21 Pin-1 &
13	IC22 Pin-4

WRITE COLUMN COUNTER - IC30

Pin number	Connects to
2 & 12	IC11 Pin-6 & 9
1 & 8	IC34 Pin-4
3	Ic35 Pin-12
4	IC35 Pin-4
5	IC36 Pin-12
9	IC34 Pin-12
10	IC33 Pin-4
11	IC33 Pin-12
13	IC29 Pin-5 &
13	IC36 Pin-13

HORIZONTAL SYNC SET - IC24

Pin number	Connects to
1	IC21 Pin-13 &
1	IC22 Pin-1
5	IC26 Pin-11 &
5	TR201 C &
5	TR204 C via 10K

COLUMN SET - IC31

Pin number	Connects to
1	IC37/38 PIN-15
1	IC39/40 PIN-15
3 & 4	IC19 Pin- 6 &
3 & 4	IC33/34 Pin-14
3 & 4	IC35/36 Pin-14

READ/WRITE - IC32

Pin number	Connects to
1	IC37/38 Pin-3
1	IC39/40 Pin-3
5	IC19 Pin-13 &
5	IC20 Pin-4 &
5	IC29 Pin-13 &
5	IC26 Pin-11
6	IC35/36 Pin-2
6	IC33/34 Pin-2

POWER RAILS

Rail	Connects to
-5v	IC37/38 Pin-9
-5v	IC39/40 Pin-9
+5v	IC37/38 Pin-9
+5v	IC39/40 Pin-9
+5v	IC33/34 Pin-16
+5v	IC35/36 Pin-16
+12v	IC39/40 Pin-8
+12v	IC37/38 Pin-8

4116 RAM pin connections

From	IC37	IC38	IC39	IC40
-5v	1	1	1	1
Inputs ABCD	2	2	2	2
IC32 Pin-11	3	3	3	3
IC33 Pin-9	5	5	5	5
IC34 Pin-9	6	6	6	6
IC33 Pin-7	7	7	7	7
+12v DC	8	8	8	8
+5v DC	9	9	9	9
IC36 pin-7	10	10	10	10
IC35 Pin-7	11	11	11	11
IC34 Pin-7	12	12	12	12
IC36 Pin-9	13	13	13	13
IC41 Pin-13	14	x	x	x
IC41 Pin-12	x	14	x	x
IC41 Pin-5	x	x	14	x
IC41 Pin-4	x	x	x	14
Earthy	16	16	16	16

LM3914 IC5 & 6

IC5 Pin	IC5 Conn	IC6 Pin	IC6 Conn
1	IC7 Pin-12	1	IC8 Pin-10
2	Earth	2	Earth
3	+5v DC	3	+5v DC
4	IC6 PIN-6	4	R129
5	IC5 Pin-5	5	IC5 Pin-5
6	IC6 Pin-7	6	IC5 Pin-4
7	R151	7	IC5 Pin-6
8	Earthy	8	RV101/128
9	+5v DC	9	+5v DC
10	not used	10	IC7 Pin-11
11	not used	11	IC7 Pin-10
12	not used	12	IC8 Pin-4
13	not used	13	IC8 Pin-3
14	IC7 Pin-4	14	IC8 Pin-2
15	IC7 Pin-3	15	IC8 Pin-1
16	IC7 Pin-2	16	IC8 Pin-13
17	IC7 Pin-1	17	IC8 Pin-2
18	IC7 Pin-3	18	IC8 Pin-11

+5v POWER RAIL

IC19 Pin-14...IC20 Pin-14...IC20 Pin-9 (2.5v)...IC21 Pin-14
IC22 Pin-14....IC22 Pin-9 (2.5v)...IC23 Pin-9....IC26 Pin-5
IC24 Pin-9 via RV203....IC24 Pin-9 via RV201.....IC31 Pin-8
IC27/28/29 & 30 Pin-14...IC31 Pin-9 via R223...IC32 Pin-9 via R208

EARTH RAIL

IC19/20/21/22/23/24 & 25 Pin-7...IC26 Pin-10...IC27/28/29/30/31 & 32 Pin-7.....,.IC33/34/35 & 36 Pins-1, 8 & 15.....IC37/38/39 & 40 Pin-16

I hope the above tables prove helpful for pre-checking your circuit boards, or even as an aid to fault finding. If you have any further queries please contact me QTHR and I shall do my best to help, although I do not have all the answers yet HI!

A DOT MATRIX UNIT

During a recent quiet period on the construction side I came across some communications from my late friend ZL2RP. ZL2RP was the person who sent me the original ZL1LH/VK2XY information on a digital SSTV scan converter which we now know as the G3WCY system.

On looking through the literature I came across what appeared to be a never before mentioned circuit for character (pixel) rounding. In the basic converter the pixels are quite square in appearance, however the addition of this circuit to round off the sharp corners improves the resolution of the picture and reduces the 'digital' look about it. The unit is known as a 'dot matrix generator' and is used in several commercial applications, therefore I see no reason why it couldn't be adopted in other similar projects.

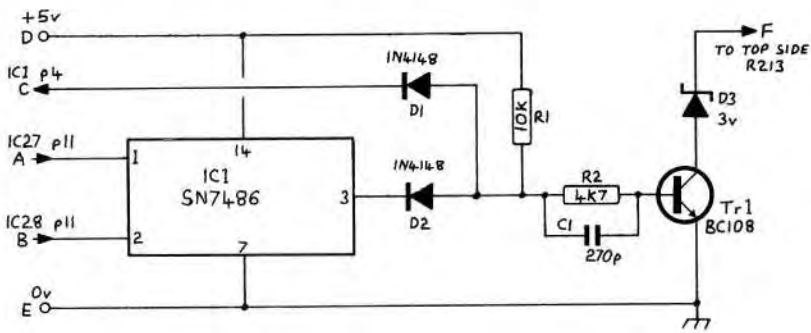
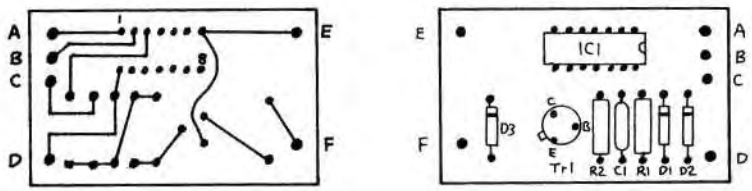


Fig.1 Dot matrix generator circuit

Fig.1 shows the circuit diagram which, as you can see is very straightforward. It may be built on a small piece of stripboard although I have included a suggested PC board pattern and component layout diagram (Fig.2 - not full size). The zener diode can conveniently be a BZY88C3V3 or similar, the actual value is probably not critical.

I shall be trying out the unit soon but include it here so that others may experiment with it. It will be interesting to see how we get on.



Print pattern Component side

Fig.2 Printed circuit detail

AMATEUR TV MODULES

As mentioned in the ast issue (p5) Wood & Doug as Ltd are stil very much in the amateur kits market and continue to produce a range of kits for amateur TV. BATC member G6IKQ has kindly sent a recent price list which contains the following ATV modules:-

Code	Product	Assembled	kit
UFM01	50mW 420MHz FMTV source (video input)	£41.25	£28.25
VIDIF	50MHz FMTV IF processor	£63.75	£47.60
1250DC50	1250MHz Downconverter (50MHz IF (boxed)	£79.95	-
1250PA2	1250MHz preamplifier (boxed)	£49.95	-
SCT-2	Transmit sound modulator	£16.50	-
SCR-2	Receive sound demodulator	£24.95	-
VP/D1	De/Pre-emphasis module	£10.50	-
1240TVT	20mW Frequency locked FMTV source (boxed)	£145.00	-
TVUP2	70cm receive converter (UHF channel 36 output)	£38.40	£28.75
TVM1	TV modulator (for AM transmission)	£11.60	£ 7.25
TVMOD1	Channel 36 modulator (for TV injection)	£11.04	£ 6.90

The prices quoted include VAT and are believed to be correct at the time of going to press, however they should be checked first before placing orders. Postage on orders is £1.00.

Wood & Douglas. Unit 12-13 Youngs Industrial Estate, Aldermaston, Reading, Berkshire RG7 4PQ. Tel: (07356) 71444

BY APPOINTMENT: BATC - PERVEYORS OF VIDEO TO THE RSGB

By Trevor Brown G8CJS,

The day had been typical for July, overcast, dull and boring. The phone had not rung for days and I was beginning to wonder if there was anyone out there. When it finally did ring it was a guy from the RSGB asking 'had I heard of their outfit?'. I grunted 'don't they come a long way after the BATC in the yellow pages?'. It seemed they were in need of some television coverage of the Royal opening of their rally at the National Exhibition Centre. Right then I needed a job in Birmingham like Custer needed more Indians! I gave him my standard reply, 'I'll get back to you'.

The first thing to do was to locate some hardware, but that was where the simplicity ended. Hardware comes in many shapes and sizes, all tailored for specific types of television work. The best choice would be a professional Betacam camcorder, but one of these is likely to set you back £40,000 or so. This was not a job to do alone so I let my fingers do the walking. My first call was to the City to Graham (The Yuppie) Shirville. By midday 'Taffy' Robson and 'Gun-Diode' Platts were also keen to add a little muscle to the act. The hardware was finally located at a respectable £200 per day hire charge plus expenses. It seemed we were off the starting grid! I didn't like the odds though, it seemed there were too many Indians out there, but what the hell, I had more technical help than TV-AM (ED: I reckon this must be an in-joke!). It was time to give Crazy Horse a run for his money!

I found the RSGB guy in the Yellow Pages and told him that recorder coverage was possible. "How about some live pictures around the hall as well?" says he. Why did I feel like another tribe of Indians had just signed on?

"How's about if we cable the pictures back to our stand and record them, and then distribute them live with replays throughout the event".

"Just what I had in mind, where is your stand?".

"We don't have one, due to cash flow caused by being long on the dollar" (we blew it at Dayton!).

The phone went quiet..."OK", he said "you now have a stand, but make it good!"

At this point I didn't know if we were winning or losing, but the stakes had just been raised and I wasn't about to see this hand!

D-Day found us at the NEC. The hardware was short of an eyepiece, the sound mixer was playing up, the video cable had more reflection than a hall of mirrors and our stand was a DIY kit out of the Krypton Factor, but apart from that things seemed OK! I asked my first question of the day, "what time does the bar open?". By close of play the mixer was under the screwdriver of Tom 'BBC' Mitchell, George 'Krypton Factor' Mayo had triumphed over the stand, and yours truly had found the cable fault which was, according to Murphy's Law, the last joint I checked. I set off for the bar somewhat later than I had intended!

BATC Chairman Trevor Brown mans the camera whilst committee member Bob Robson supervises.

Three hours to the shoot and counting. We arrived at the Lucas Suite with a pair of redheads (the kind you plug in unfortunately). The camera was unpacked for the last time and lifted into place on its legs. The stage was lit and the camera white balanced. The iris on the auto sat at F2.8, the stand reported P5 pictures, the sound mixer would not produce sound on the Betacam audio meter but the cans were now working. I switched one of the audio tracks to the on-camera microphone, the camera was near the stage and it would at least yield some results, even if interspaced with zoom noise. The tape path was cleaned and the first tape loaded (the tapes last 20 minutes).

The moment of truth was approaching, panic number 2654837, the volunteer professional cameraman had not turned up. I was resigning myself to this task when Richard 'ENG' Gutteridge, a guy with the same day-time QTH, showed up and pitched in. By midday the camera was rolling. Central TV (who?) sent an ENG crew who seemed pleased with our lighting. The BBC local radio arrived and plugged into our mixer.

When the speeches ended and the Lucas display was in the can I hoisted the camera onto my shoulder, snapped in a new tape, switched on the battery pack an set off hot-foot (not easy under those conditions!) to follow the Royal tour. The tour took in most of the stands, including a long pause at the DARC stand, where Karl Taddey DL1PE greeted Prince Philip. When the battery, the tape and myself were exhausted I returned to our stand to see what we had captured on the backup recorders.

The pictures via the cable were fine, but less the sound, which should have been via S23. The Royal walk-about was covered by using a 24cm link, and had some large holes in it. (I should point out here that the Betacam has no replay facilities, and as the tape is run at high speed, a special replay machine is required and was out of our budget range.)

Prince Philip delivers the opening address.

We kept the pictures recorded via the cable running all the rest of the day, and ducked the RSGB when they asked for sound. Close of play found Bob Robson driving south to return the camera, and me driving north to check the Betacam recording at the work's QTH. The bottom line was that the pictures were excellent, but that the only sound recorded was from the on-camera mike.

Saturday found Bob driving north to pick up a U-matic copy of the Beta tapes and a return trip to the NEC to show the RSGB that we had found the sound. Silly of us to lose it really! The recording, with sound, was left running all day Saturday and Sunday.

Monday: Don 'The Sound' Atkinson set to work on lifting the sound and removing the rumble and zoom noise, by late afternoon it sounded like a compact disc and yours truly could edit the tape.

The tape is now with the RSGB and, to quote D. Evans, they are well pleased with the results.

It would seem the Indians are in retreat! Whatever happened to Crazy Horse?

PRODUCTION (SHARP SHOOTERS): Graham Shirville G3VZV, Bob Platts G8OZP, Bob Robson GW8AGI and Richard Gutteridge.

POST PRODUCTION (CAVALRY): Don Atkinson, Trevor Brown G8CJS,

STAND (INFANTRY): George Mayo G4EUF, Tom Mitchell G3LMX, Andrew Emmerson G8PTH, Peter Delaney G8KZG,

AMATEUR TV TEE-SHIRTS

Now that summer's here you will need some thin cotton Tee-Shirts. What better then than a customised one bearing a picture of a modern TV camera and the legend 'AMATEUR TV'? The shirts are white with Royal Blue printing and are available in small, medium and large sizes (state which). Price £4.80 each, inclusive, from Mike Wooding G6IQM, 5 Ware Orchard, Barby, Nr. Rugby CV23 8UF. Cheques payable to 'Rugby TV Repeater Group' please. All proceeds for the upkeep of GB3RT.

PROPOSAL AND ISSUES FOR
AMATEUR TELEVISION ON FUTURE SPACE MISSIONS
TO ALLOW WORLDWIDE PARTICIPATION

BY

HENRY B. RUH KB9FO

FORMER PUBLISHER: AMATEUR TELEVISION MAGAZINE,

BROADCAST SYSTEMS DESIGN ENGINEER AND ATV'ER

540 OAKTON STREET, DES PLAINES, ILLINOIS 60018

MARCH 10, 1988

ABSTRACT

Amateur television is enjoyed by an estimated six thousand hams world wide. A proposal for ATV on a future space mission should consider the alternatives available which would allow participation by hams in all countries. This would foster international good will, allow exchange between stations in different countries and demonstrate our interest and concern for hams in other countries. A review of any proposal should include peer review, community support and attract participation by other hams. In addition a committee of ATV hams and interested parties should be formed to judge the possible participation, interest and technical achievablity of any proposal and its impact on the ham radio community.

1. PURPOSE

To review current proposals for potential interest, offer alternatives, propose world wide participation in ATV experimentation on future space missions. To promote technical advancement, improve international good will, increase the pool of potential participants and allow hams without extensive technical know-how an opportunity to engage in limited participation.

2. OBJECTIVES

A. To increase the level of participation through cost reduction and simplification of the equipment and procedures required to participate in space TV.

B. To reduce critical technical elements to allow less technically skilled hams to participate.

C. To raise issues of support, potential interest and alternative methods of transmission.

D. To offer alternatives which would allow world wide participation to avoid the "Ugly American" syndrome and lessen national chauvinistic attitudes.

E. Consideration of frequency choice to allow international participation with a minimum impact on band users and to comy with international frequency allocations.

3. DISCUSSION

There is currently at least one proposal for amateur televison operation for future space missions. My own experience as an amateur (since 1969) as an ATV'er (since 1971) as a TV engineer (since 1967) and former publisher of Amateur Television Magazine (1975-1981) draws me to express interest, investigate and support for space ATV. In addition after reading the proposal by the Motorola ARC I am moved to inquire and add issues not addressed in thier proposal while expressing my concern about some issues which were raised in the Motorola proposal. It is my ffeeling that there are issues which could benefit from public discussion and consideration by the ATV community and by the general ham community before a decision is made as to the value, viability and practicality of their proposal.

4. PUBLIC SUPPORT

Any proposal should be able to bear public scrutiny. A good proposal developed in open discussion with input from other ATV'ers and hams has a better chance of offering a collection of technical parameters which can be met by a larger number of potential users and therefore be of more benefit to all. I would ask what public discussion has been provided by the proponents of the current ATV proposals? This would prevent the issue of making a proposal which can only be fulfilled by the proponent or a severly small number of stations which have a unique collection of technical equipment and operator skill. It would behoove any ham who porports to speak for any group of users to demonstrate an interest and consensus for the proposal. To be successful any ATV in space proposal must attract support from a fairly large number of potential users. These users must be allowed time to construct their station facilities, acquaint themselves with video and ATV operations and other technical requirements of the project. Antennas must be installed and tuned, equipment checked and perhaps trial "dry runs" to allow new stations opportunity to practice. In some cases equipment may be able to be purchased in other cases it may need to be constructed which then requires check-out and probable modification. Potential participants will require time to execute these steps and a long lead time to build public support and provide needed help is required to satisfy this issue.

5. POTENTIAL PARTICIPANTS

The Motorola proposal section 6.1 indicates that the potential participants in its system is very small. It indicates that the pool of users would be ATV'ers which are few in number and that the number is further reduced by the power requirements of the Motorola proposal. It would seem that a proposal which admits that the number of users would be very small because of its technical limitations must bear scrutiny. A proposal which reduces the technical requirements and critical technical matters would be of benefit to a larger number of hams and therefore getting larger general support would be easier and the overall benefit greater to all.

6. POWER REQUIREMENTS OF MOTOROLA PROPOSAL.

The Motorola proposal takes great lengths to explain why various modes and bands and power levels are necessary to support its full bandwidth ATV signal system. The conclusion in the proposal indicates that not all modes on all bands were investigated. The proposal further states that in its conclusion the best operation is on 439.25 Mhz and requires a power of 1500 watts PEP to a 17db gain antenna. There is no mention how a potential user would achieve such power. Lets look at the TV signal and how such power could be generated. First, commercial equipment to generate high power on UHF frequencies is very limited. The proposal indicates that 1500 watts PEP is typical of high power amateur stations. The proposal does not indicate how many ATV stations are capable of operating at this level.

My personal experience and knowledge of ATV operators indicates that very few, perhaps as few as 10 or 20 stations are equipped to transmit with such power levels. Simple calculation of transmitter efficiency in class AB mode for wideband video transmission usually demonstrates that an amplifier would generate about 30% efficiency. This indicates that an imput power of 4500 watts is necessary to generate the 1500 watts output required of the Motorola proposal. Current FCC regulations do not allow input power levels of this kind. While some few hams may be able to construct such facilities and some may have already acquired the necessary expensive tubes and equipment to produce such power levels it is not a typical ATV power level. Commercial equipment such as the Henry 2004A amplifier will produce 600 watts PEP when operated for TV. At a cost of $1500 this is a sizeable investment for a one time venture. A larger amplifier is also available for $2300 which might achieve 1500 watts. Otherwise the ham must build his own power amplifier capable of video transmission. To explain the power limitation noted above, while the FCC does allow 1500 watts PEP in general, the 450 band is limited to 50 watts PEP in many areas of the US, generally in the western states as listed in 97.61b7. Also many other countries do not allow high power on this band.

7. OPERATION ON HIGHER FREQUENCY BANDS

Operation on higher frequency bands such as 900 or 1280 Mhz is not recommended in the Motorola porposal. I would add that the availability of commercial equipment for high power operation at these frequencies is limited to 150 watt or 200 watt units using 2C39 tubes sold by Transverters International. Higher power levels at these frequencies can be generated using expensive tubes and very careful construction techniques following projects in the Handbook or the few articles published in ham magazines.

8. TRACKING OF SPACE VEHICLES BY TERRESTIAL STATIONS

The Motorla proposal points out in section 3.16 that commercial antenna rotators lack the speed and in some cases have other limits which prevent accurate tracking of the space vehicle. It is put forth that the potential user should construct a more accurate and higher speed antenna pointing system. No specifications for degrees per minute is provided the reader.

It would appear that the ATV'er potentially interested in participating must now construct an EME antenna pointing system which will provide fast accurate tracking of the space vehicle. This apparently will also require a computer and very accurate high resolution control systems, software and programs for antenna control and the last minute broadcast of of orbit information to all users to download into their computer for use. The data must be modified by the user or sender to correct for terrestrial coordinates. This raises the issue of practical limits to such a system, distribution of data and construction costs of the equipment or availability of commercial hardware for those unable to construct such antenna pointing systems. Thus the ATV'er must essentially build an EME or OSCAR tracking system to participate.

9. FREQUENCY USEAGE BANDWIDTH, TRANSMISSION MODE AND INTERNATIONAL ALLOCATIONS

If the Motorola proposal is only for US hams then a great deal of the potential benefit of the ATV space mission is lost. Their proposal is based upon fullbandwidth NTSC video transmission. This excludes participation by over 2/3 of the world's population which use PAL or SECAM transmission. While it has been stated that the Motorola proposal can be successful provided that the technical requirements of very high power, accurate and rapid antenna orientation etc can be met these severly limit the number of potential participants. In addition the use of NTSC only signals demonstrates a nationalistic chauvanistic attitude which is diametrically opposed to the use of space for the general welfare of all nations.

There are at present three major television systems, NTSC, PAL and SECAM. These systems are not compatable because of different scan rates and color subcarrier frequencies. There is at present no cheap and easy way to provide simultanous transmissions in the three systems nor for the conversion of one system to another.

However, if monochrome transmissions are made there is a means of transmitting a signal which all can view. The near compatability rests in the close frequency relationship of the vertical and horizontal scan rates of the three systems. The two verticle rates are 50 and 60 Hz. Most TV sets with a very minor parts value change in the vertical hold circuit can be made to operate at either frequency. Likewise, a similar part value change can allow the receiver to work on both 625 and 525 line systems. This is very easilly done as I have modified TV sets to operate at scan frequencies as high as 120 hz vertical and 1050 hz horizontal for commercial operation. In addition, multi-standard monochrome receivers are commonly available for less than $200 at most large electronic stores.

International frequency allocations preclude operation in some countries in the 440-450 Mhz band and 420-430 Mhz band. Also there are forbidden areas in the US along the Canadian and Mexican borders. Further there is severe interference to ATV operation at 439.25 Mhz from FM repeaters which have outputs below 444 Mhz. This is because ATV as normal broadcast operations, operates with upperside band video. Thus the video extends from 438 Mhz (limits of a vestigial lower sideband) to 444 Mhz (limit of upper sideband. Standard NTSC audio subcarrier is 4.5 Mhz above the video carrier and falls at 443. &5 Mhz, which is often interfered with by FM repeaters which have been "coordinated" on this frequency for their output. The color subcarrier is 3.58Mhz above the visual carrier at 442.83 Mhz. This is also subject to interference from FM repeaters.

Video and color sidebands fall between 438 and 444 Mhz and also are subject to interference. Keep in mind that a TV signal will experience visible interference from a signal which is 50 db below the visual signal. This is not true for other modes which enjoy interference immunity to as little as 6 db between desired and undesired carrier levels. ATV operation in 420-430 Mhz is also subject to interference from high power radar systems and the mis-allocated FM repeater link facilities. Therefore, the only choice for international space ATV operation which is subject to the least interference and the widest frequency allocation is 434 Mhz.

10. UTILIZATION OF NON NTSC VIDEO TO ALLOW INTERNATIONAL PARTICIPATION

In countries with only 10 Mhz of frequency allocation, full bandwidth ATV operation is not used because it would occupy too large a share of the spectrum. In these countries, mostly in Europe, a system of narrow bandwidth fast scan TV is used. This is called narrowband or smallband TV.

The basis for NBTV is the same as for most video recording systems. Examination of the video signal components will reveal that sidebands from carrier to .5 Mhz represent area fill or flat field portions of the video. Sidebands from .5 to 1 Mhz represent small transositions and or slope shading. Sidebands above 1 Mhz represent edges and detail. Non professional video recorders and most older color TV receivers had luminance bandwidth of 2 to 2.5 Mhz. This is sufficient to provide perfectly acceptable full motion black and white pictures. This same bandwidth can be used in transmission with equally good results. Besides conservation of frequency useage, it also has the advantage of lower system noise.

11. CONSIDERATIONS OF POWER AND BANDWIDTH

Use of narrowband TV signals provides a noise bandwidth improvement since the receiver can be tuned for a narrower bandwidth. Since a major component in the link calcaulations is receiver noise by using the narrow bandwidth TV mode a 3 to 6 DB improvement can be gained in system performance. This can translate to the use of lower transmit power, lower antenna gain or higher signal to noise ratios. Reflecting back on the power requirements of the Motorola proposal, this would reduce the power required to a few hundred watts which is much more likely to be achieved by a potential user of space TV This is also an advantage in less critical antenna pointing when using the higher power since less antenna gain is needed giving more beamwidth between 3 db points.

Another factor is that TV sideband energy generally decreases as the sidebands are more and more removed from the video carrier. Weak TV signals are first received as narrowband signals and only large lettering is visible because the weaker sidebands are below the noise floor of the receiver. As the signal level increases these lower energy sidebands emerge from the noise floor providing more and more detail to the picture. Thus a system user with marginal equipment can be helped since his system would never receive the weaker detail sidebands. Video preemphasis in the transmitter can be used to provide an increase in sideband energy levels above 1 Mhz. This also compensates for passband roll-off caused by antenna Q, poor IF response and variations in transmitter RF passband response. A 3 DB per octave preemphasis from 1 Mhz to 2 Mhz is sufficient to increase edge detail in NBTV.

12. AUDIO TRANSMISSION

Nearly all TV receivers utilize inter-carrier sound detection. This system simple demodulates the difference in frequency between the aural and visual carrier frequencies. The use of full bandwidth TV with associated NTSC or PAL/SECAM sound subcarriers has been shown to be less than optimum for space ATV. The various broadcast sound subcarriers are at a frequency of 4.5 Mhz or more above the visual carrier. In addition, while the sound subcarrier can be mixed with the video carrier, this can cause distortion of the video. If subcarrier sound is to be used it should be generated from a separate transmitter operating at 5 to 10% of the video carrier level. However, this costs more power and equipment weight and space considerations for the space vehicle.

Since intercarrier sound must have a recoverable level of both carriers at the receiver it generally suffers from an inability to be recovered from weak signals.

The alternative is to FM modulate the video carrier. The receiving station can use simple readilly available FM transceiver to recover this signal as a voice only reception. The TV user can generate his own subcarrier locally with a low power oscillator. The advantage of locally generated subcarrier is that the user can use what ever frequency is needed for his nations TV system and the space vehicle need not concern itself with different subcarrier sound frequencies. It also reduces the space vehicle equipment needs and conserves power. This system is compatable with NBTV as well as fullbandwidth TV. Thus this system is fully internationally useable!

13. INTERFERENCE TO FROM OTHER STATIONS

The terrestrial station located within close proximity to UHF commercial Tv stations operating on channels 14-28, or near to commercial and amateur repeaters/transmitters operating on frequencies betwen 470 Mhz and the ATV frequency in use may be subject to interference. This is manifest as crossmod or intermod products. The use of the mast mounted GasFET preamp required in the Motorola proposal will be more subject to this interference because of overload in the presence of these external signals. The use of a filter either helical resonator or interdigital will prevent this to a great extent but adds to system receive noise figures. Typical insertion loss of a five pole bandpass interdigital filter as is available from Spectrum International is .6 to 1 DB. This factor must be taken into account for link calculations.

Conversion noise facotr was also not mentioned. The use of state of the art downconverters must be assumed otherwise an additional signal degradation factor of converter noise must be added. Converter noise generally exhibits itself as positional noise in the video. Many ATV stations still cling to older receive converters such as modified Tv set tuners or old UHF TV converters. There must be sufficient signal level at the input to the converter to overcome the noise introduced in the converter. This can be accomplished with a post RF amp located at the receiver input to insure RF levels are above the AGC threshold of the TV set or encourage the improvement in the user station to better technology.

14. EQUIPMENT AND HOW-TO HELP FOR POTENTIAL USERS

In order to encourage and attract support and wide spread interest in the TV space venture it should be recognized that the general ham population must be educated in UHF, ATV, OSCAR and EME. A series of articles in magazines of wide circulation should be generated which allow step by step construction of needed equipment, theory of operation and how-to information. A list of recommended commercial equipment available to those unable or unwilling to build their own should be available. Because of the nature of the TV signal articles on how to observe the signal and evaluate the equipment operation is also needed. Fortunately most of this information has already been published in the ATV magazines, Orbit and is available. A bibliography of articles should be compiled so that potential users have a reference library of necessary information.

Build it projects would be especially helpful to potential users who live in countries where there is not a ready supply of commercial equipment or the equipment is too expensive for the average person to purchase.

CONCLUSION

The use of narrowband Tv on a frequency of 434.0 Mhz using on carrier FM sound appears to be a better alternative to fullbandwidth NTSC for space ATV operation. The advantages of NBTV are international non parochial access, lower power requirements, simplification of many critical technical parameters and universal receiveability. Full motion pictures can be transmitted in NBTV fulfilling the desire to have live picture exchange. The detail of the picture is sufficient to beable to enjoy the picture and supply useful information. Lower power requirements, less critical antenna pointing and other cost reduction factors of NBTV make it more attractive to the average ham, increase the odds for sucess and allow more margin for unknown system losses and performance factors.

Public discussion and educational materials to assist the non ATV, OSCAR, EME station owner would allow wider participation and reduce the nationalistic chauvinism aspects of the Motorola proposal. It would serve little purpose and provide essentially no benefit to NASA, the ham community or thw world good will if a proposal was accepted which can only be achieved by an extremely small number of stations which currently have a unique collection of extremely high power UHF TV transmitters, large EME type antenna arrays, OSCAR tracking rotational equipment and computer antenna tracking programs with a highly technically skilled operator being able to coordinate and operate this array of equipment. There are in my estimation perhaps 5 such stations including clubs with access to radio telescopes currently equipped for such operation.

In order to attract support and participation in any space TV venture it must be within reach of a substantial number of potential ham stations. This requires that information necessary to provide a resonable assurance of success in equipment and operation be provided in order to intice the station to invest the time and money necessary to engage in this severly limited opportunity. Further the proposed operation must be economically within reach, and have if possible an after the event use for recovery of the stations investment in time and money.

A committee of experienced ATV'ers should evaluate any proposal and give its comments and recommendations to NASA. This committee would be best able to judge the potential of participation by number of stations, probable success of the venture and suggest alternatives or additions which would enhance the ventures public benefit. There are a number of such hams who would be willing to donate the necessary time and effort for such a cause if they were asked to do so. These individuals have high technical skills and credentials as well as being knowledgeable and experienced in video, RF and UHF operations.

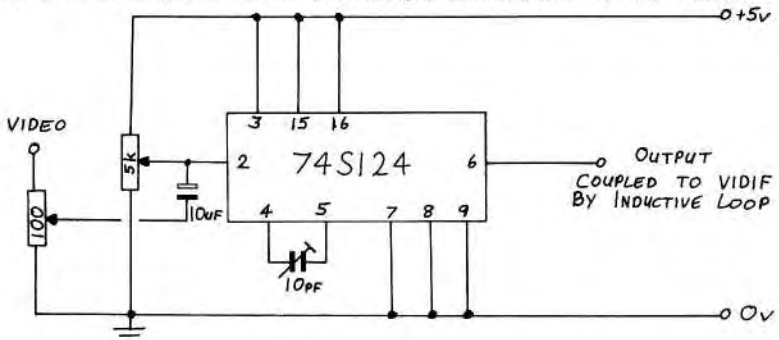
50MHZ FM TEST SOURCE

By Trevor Brown G8CJS

Having a Wood & Douglas FM VIDIF strip that appeared to be causing loss of colour on received pictures, I decided that I needed a 50MHz colour source that could be fed into the input of the strip instead of the receiver. The following simple circuit was the outcome, in fact it works so well that it is worth considering adding a black level clamp and turning it into a permanent piece of test equipment.

The circuit is based on a 74S124 dual voltage controlled oscillator IC. Only one of the VCO's is used in this design, so it could be worthwhile configuring the other VCO to provide a 6MHz source for troubleshooting sound demodulators.

The design is simplicity itself. Course tuning to 50MHz is provided by the 10pF trimmer capacitor and fine tuning by the 5k potentiometer. The video source is connected to pin-2 via a 100-ohm potentiometer, thus allowing the deviation to be adjusted whilst providing a termination for the video.



A switchable pre-emphasis network could also be included before the deviation control to allow for the testing of units with de-emphasis networks on-board. Using the circuit to test IF's without incorporating any matching pre-emphasis network could possibly mask any faults that may be present.

Although the demodulated chrominance is not to broadcast specification, measured in the green bar it was within 10% and the burst was found to be slightly less, presumably due to the differential gain characteristics of the IC. It is, however, satisfactory as a test signal and should prove a useful aid in the shack for working on 24cm FM-TV receivers.

UK ATV REPEATERS

U.K. ATV REPEATER STATIONS LICENCED SO FAR:

CALL SIGN	LOCATION	CHANNEL	CONTACT
GB3AF*	DURHAM	RMT-2	G1FBY
GB3CT	CRAWLEY	RMT-2	G4ZPP
GB3ET	EMLEY MOOR	RMT-2	G3PTU
GB3GT*	GLASGOW	RMT-2	GMOGIB
GB3GV	LEICESTER	RMT-2	GOCND
GB3HV	HIGH WYCOMBE	RMT-3	G4CRJ
GB3NV	NOTTINGHAM	RMT-2	G6YKC
GB3RT	RUGBY	RMT-2	G6IQM
GB3TV	DUNSTABLE	RMT-2	G4ENB
GB3UD	STOKE-ON-TRENT	RMT-2	G8KUZ
GB3UT	BATH	RMT-1	G4JQP
GB3VI+	HASTINGS	RMT-1	G3ZFE
GB3VR	BRIGHTON	RMT-2	G4WTV
GB3ZZ	BRISTOL	RMT-2	G8VPG

* Temporary beacon mode only.

\+ Not yet operational at the time of going to press.

Input and output frequencies for the three channels at present available in the U.K. are as follows:

CHANNEL	I/P MHz	O/P MHz
RMT-1	1276.50	1311.50
RMT-2	1249.00	1318.50
RMT-3	1248.00	1308.00

Repeater stations on RMT-1 will accept either AM or FM signals, whilst inputs on RMT-2 and RMT-3 are in FM only. Repeater output on RMT-1 is AM only, and the outputs on RMT-2 and RMT-3 are FM only.

Repeater video identification is standard 625 line Fast-Scan TV (system I), with negative going video and positive going syncs. A morse code ident is also present on the 6MHz audio carrier detailing callsign and location. FM transmissions are limited to a maximum peak deviation of +/-6.5MHz and they can employ CCIR pre-emphasis as an option. The intercarrier sound subcarrier is at 6.0MHz and repeater access is by the presence of a standard 625-line video signal at the input.

Although the actual coverage of each repeater will depend on local geography, and in some cases aerial directivity, the average area covered is in the order of a 30km radius from the repeater. Apart from one or two exceptions aerials are omni-directional. ALL ATV aerials operate horizontally, regardless of band.

IN PLACE OF THE TUBE

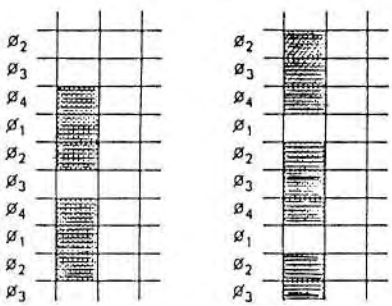
Part-4

Peter Delaney G8KZG

In parts 1, 2 and 3 we looked at the basic design of a typical CCD, - the EEV P8602 - which converts an image into a voltage waveform, without scan coils, etc - and suggestions for circuits to produce the scan drive pulses and amplify the video signal. We now look at a different CCD, from Mullard, working on similar principles, that can produce colour pictures. It has the same advantages as its monochrome 'cousin', although the structure and drive requirements are slightly different.

The Mullard device is an NXA1021, which is fitted with an on chip colour stripe filter - the otherwise similar NXA1011 is suitable for monochrome use, or in a "3-chip" (well, 3 sensor chip) camera. The image area is a little smaller than the device considered so far, being 6.0mm x 4.5mm (equivalent to a 1/2 inch vidicon type target), as are the sensor elements at 10 microns x 15 microns. The same frame transfer method is used, in which the sensor elements build up a charge pattern corresponding to the image during the 'integration time', which is then rapidly moved, to minimise frame smear, to the storage section. However, the electrodes are connected differently in the Mullard device, so that it needs a 4-phase pulse sequence, rather than the 3-phase one described before. The provision of interlace is also by a similar process, as in field 1, the charge collection is centred under electrode 3, with electrode 1 as a barrier between charge collection areas, whilst in field 2 the centre of collection is electrode 1, electrode 3 becoming the barrier. (Fig 12).

For integration of first field. ϕ_4 to ϕ_2 are high, and ϕ_3 is low, forming a barrier.



For integration of second field ϕ_2 to ϕ_4 are high, and ϕ_1 is low, forming a barrier.

Fig.12 Interlace patterns

The line readout section also uses similar principles to the other devices, but the charge pattern is streamed into three channels - top, middle and bottom. In the monochrome device these are multiplexed together, but in the NXA1021 these correspond to the cyan, green and yellow stripes on the integral filter. The pulse sequences to drive the Mullard device are therefore quite complex. (Ref 3)

Fortunately, there is a special set of ics to help, which actually makes the design relatively easy. The complex pulse patterns are generated by the Multi-Norm Pulse Generator, SAD1019, in conjunction with a Pixel Generator,

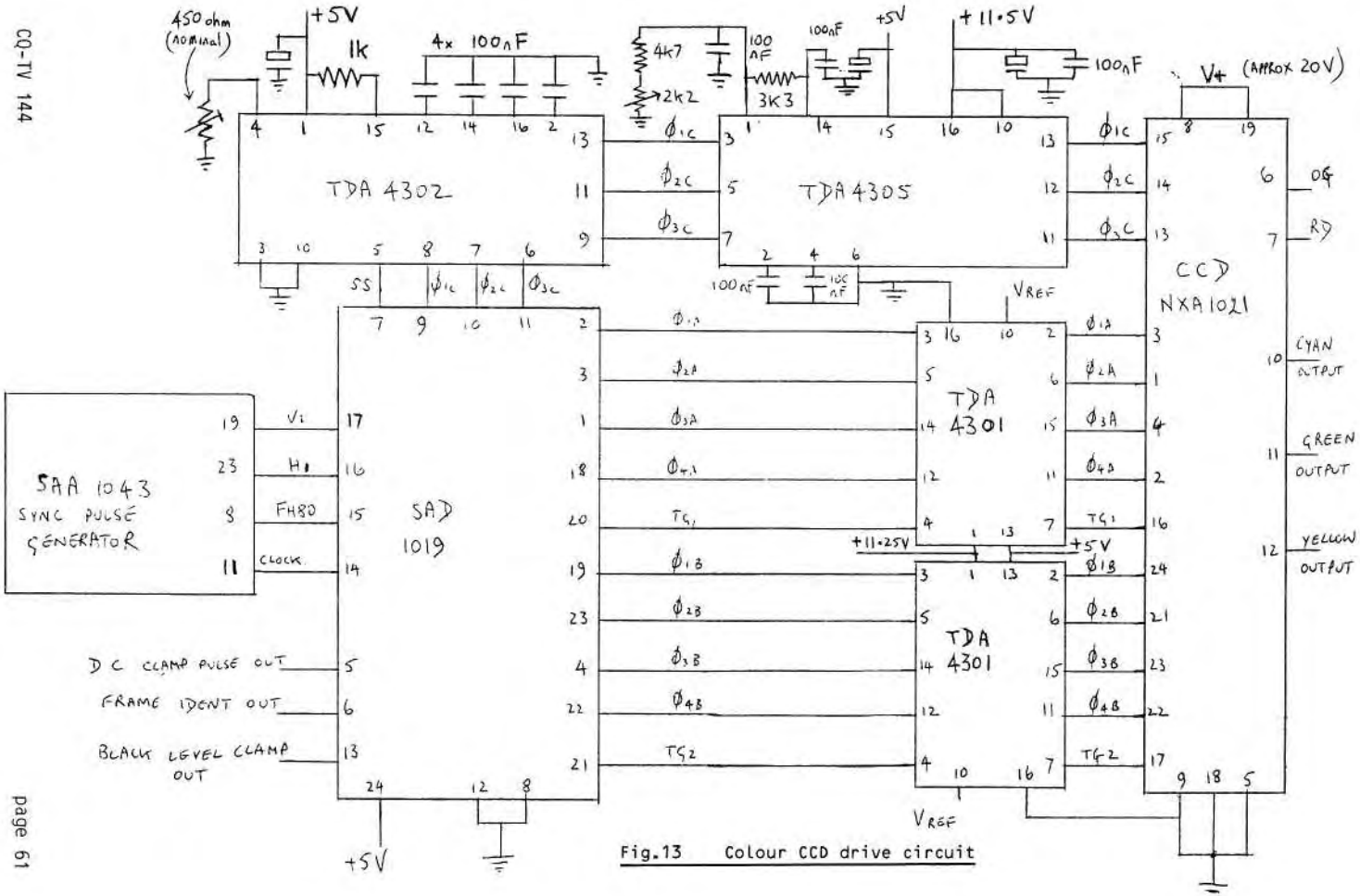


Fig.13 Colour CCD drive circuit

TDA4302 for the line readout section. The SAD1019 needs a source of clock pulses that are line locked to the sync pulses. Mullards SAA1043 can provide these, or the BATC P100 spg, running at 5MHz, should be suitable. A line sync phase locked loop clock oscillator would be an alternative solution for those not wishing to use a full spg in the camera head. The pulses generated need to be matched in level to the CCD requirements. For the line readout section a TDA4305 does this, whilst the image and storage sections are each driven by their own TDA4301. These six ics with the CCD therefore generate the video signals. (Fig 13). The output video signals have, of course, to be buffered, as shown, and then encoded. Even with this additional circuitry, it makes a very compact camera.

Perhaps, at this stage, a few words of caution are needed. The CCD is, of course, a silicon device, and is static sensitive. Rubbing the 'window' to clean it will generate quite a bit of static! - if it must be cleaned, never do it 'dry', but use either acetone or alcohol and rub gently, carefully and slowly. One of the popular uses for CCDs is in film and slide scanning - but the film, being non-conducting of course, will also build up a static charge if care is not taken. The CCD is ideal for slide scanning, as it will not suffer from burn in from looking at a static image, in the way a camera tube does. Secondly, it is suggested that the CCD be socketed, rather than soldered in place, to avoid damage due to heat. Thirdly, the descriptions assume a 625 line 50Hz picture. If different systems are used the devices will work, but the aspect ratio would be wrong, i.e. the CCD should ideally be used on the line standard for which it was designed. Mullard produce variants of the NXA devices designed specifically for 525 line 60Hz countries, driven by the ics mentioned earlier, as these are multi-standard. It should be mentioned that the various support circuits available are dedicated to a specific CCD family.

One of the advantages of the CCD is that the picture geometry is very good, and free from 'magnetic influence'. As a result, it can be used, with a computer, in shape recognition. One current development project is to use CCDs to inspect biscuits. In the past, inspection was by human eye for mis-shapen produce - the CCD does not get 'bored', and so is more consistently 'attentive'!

So, there now exists the necessary hardware to produce a television picture with a totally solid state camera. At present, the CCD devices are fairly expensive, although lower grade devices are available for circuit development work at a lesser price. Hopefully, the price will drop as demand increases. The set of six Mullard ics mentioned (not including the CCD) cost around £50 at the time of writing.

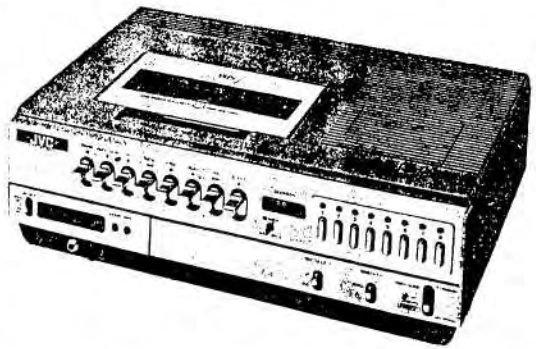
Ref 3 - The full pulse patterns are shown in the Mullard data sheet on the SAD1019.

Remember a while ago we suggested a good use for old video and audio tape was to stretch it across the garden to keep the birds off? One member did this in the spring and it seemed to do the trick at first, imagine his surprise then when he looked out the window to see a blackbird hightailing it over next door's fence trailing a VERY long streamer of tape behind him! Wonder how it made up into a nest?

'VIDEO' TUNERS FOR 70

By Eric Edwards GW8LJJ,

As with televisions, video recorders can be found on the surplus/second hand market at very reasonable prices. Due in part to the rapid technical advances in VCR design, many of the 'old' piano-key operated (mechanical) machines can be found on scrap heaps in pretty good working order.



The particular models I considered were all manufactured by the JVC company and appeared under disguise as Ferguson, Baird, etc. These machines gave good results when new but now, after years of sterling service, they will be suffering from worn bearings, capstans and motors, thus rendering them uneconomical for repair. Hence, they can be bought for as little as £15. You might even find one being 'binned'! The interesting aspect of these machines from our point of view, is that the UHF tuners in them readily tune to below 430MHz with some useful gain, making them ideal for a 70cm receive station.

The first thing to do is extract the required panels from the VCR. This is done by removing the two screws at the top back of the machine to remove the cover. This will reveal the tuner control panel on the right. Remove this panel (two screws) and the IF and tuner will be revealed and can be removed, complete with the various cables connected to them via the plugs and sockets. It is preferable for our needs to remove the channel change and tuning buttons, leaving just the tuner and IF strips. Retain the small PCB attached to the tuner as this contains the decoupling components.

Fig.1 shows the connections to the tuner and Fig.2 the circuit of the Tuner PWB Assembly (IF panel). The tuner board is easily recognised by the pre-set controls labelled Video Equ., Noise, Video Level and Audio. Adjacent to the smaller of the two screening cans is a four pin connector labelled 11, 12, 13 & 14. The plug connected at this point will have a red lead (+12v), a yellow lead (AGC) and a phono plug (IF). The red and yellow leads are soldered to the appropriate connections on the tuner unit as listed below, and the phono plug connected to the phono socket on the tuner.

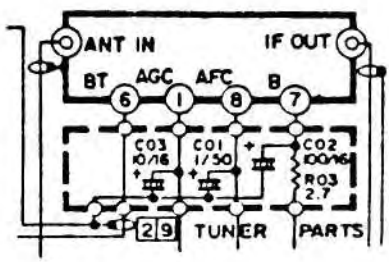


Fig.1 Tuner Connections

If the cable harness from the VCR is not available, the connections to be made are as follows:

1) Connect pin-11 on the IF panel to pin-1 on the tuner (AGC).
2) Connect pin-12 on the IF panel to pin-7 (via RØ3) on the tuner unit.
3) Connect the IF output from the tuner (phono socket) to pin-13 (signal) and pin-14 (earth) on the IF panel.

Locate the socket near the large screening can labelled 31 to 36.

4) Connect a 12 volt supply, positive to pin-32 and negative (earth) to pin-31.
5) Connect to pin-36 (signal) and pin-35 (screen) for the video output.

The same tuning arrangement as used for the ELC1043 and U321 tuners can be used here. Connect pin-6 of the tuner to the slider of a 100k potentiometer, having +30 volts at one end and 0v (ground) at the other. This will allow the module to be tuned over its entire range therefore limiting resistors may be incorporated to restrict the range if desired.

The video output from the panel is controlled by the Video Level control and should be set to 1 volt p-p into 75-ohms.

This unit works extremely well and, with the addition of a switchable pre-amplifier for weaker stations, makes a very useful 70cm receiver.

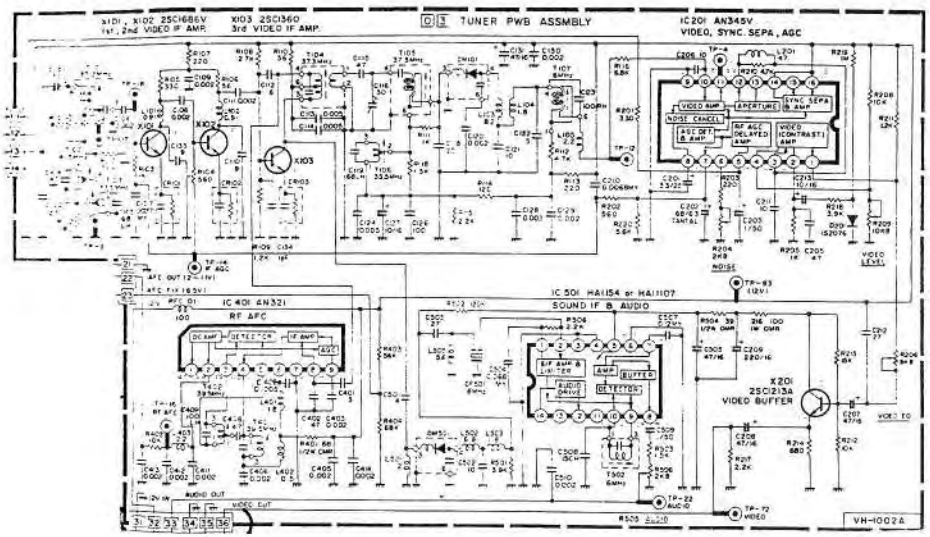


Fig 2 Tuner PWB Assembly (IF).

TEST GEAR EXPLAINED

By Mike Wooding G6IQM,

This article is in response to a letter from GW1SXU, asking for advice on the practical use of test equipment. Without wishing to go into great detail, I shall attempt to provide some basic guidelines for the application of the various pieces of measuring equipment found in many ham shacks. I shall also be pointing out some of the pitfalls encountered when making measurements.

MULTIMETERS

It is probably fair to say that most of us own a multimeter of some sort, and probably a digital one at that (DMM). However, as easy to use as the digital variety is, it is not always the better instrument. The 'old' analogue variety still has a lot of uses.

When measuring static DC voltages and currents the digital meter is by far the easiest and more accurate to use. However, when the parameter being measured is varying it may be more appropriate to use an analogue type, as this will show instantly whether the parameter is falling or increasing in value. Under these conditions the digital meter read-out has to be studied for several seconds to determine the nature of the change. (It must be pointed out here that digital meters can be found with relative functions available, whereby changes relative to the original input level can be measured, but these are generally the very expensive types).

Alternating voltages and currents can also be measured by both types of meter. The drawback with digital meters is that the accuracy falls off rapidly as the frequency of the signal being measured increases. For most DMM's the usable maximum frequency of the signal being measured is in the order of 20 to 50KHz. On the other hand, analogue meters will generally measure satisfactorily up to a frequency of 500MHz or so. With both types of instrument for true RMS readings the assumption is made that the signal being measured is truly sinusoidal. If this is not so the reading given will only be approximate, becoming less accurate as the waveform becomes more complex.

An important question to be considered when measuring voltages is the loading effect on the circuit by the meter itself. Most analogue meters have an impedance of the order 20,000 ohms/volt, which for most applications should not cause problems. However, when taking low-level measurements in high-impedance circuits, large errors in the readings will be apparent, due to the meter impedance being similar to that of the circuit, thus causing a high loading factor. In the case of DMM's the input impedance is constant, and usually of the order of 10 to 20 M-ohms, but may even be as high as 1 G-ohm.

One last advantage in favour of DMM's is the over-ranging facility. This feature can be a saving grace when measuring unknowns, and when you have forgotten the golden rule 'always select the highest range and work down'. This feature of DVM's allows any voltage or current up to the maximum permissible by the instrument to be presented to the input whatever the range selected, without causing damage to the instrument. An alternative version of this facility is automatic switching to the appropriate range for the level being measured.

OSCILLOSCOPES

The oscilloscope is an almost invaluable piece of test gear in the ATV shack, for without one it is very difficult, if not impossible at times, to set up or repair television transmission equipment. The ability to be able to view complex waveforms and check for distortion etc., or the presence and correct timing of burst, sync., etc., is vital if we wish the transmitted picture to be of the highest quality.

Oscilloscopes come in various types, some of which are dedicated to particular tasks. The type that is most useful in the shack is the dual-beam, single-timebase variety with a bandwidth of 20MHz or so. Dual-timebase types are more versatile, but for the sorts of measurements likely in the shack not necessary. Apart from the obvious use of a 'scope to view and analyse waveforms, it can also be used to measure frequency, period, voltage and phase. On more modern varieties it is even possible to check resistors, capacitors, transistors and diodes using built-in facilities.

To measure the frequency of a signal the Variable Horizontal Timebase control (X magnitude) is set to the CAL position and the Time/Division rotary switch adjusted until the number (or part) of scale graticules in the horizontal plane (X) occupied by one full cycle can be determined. The frequency of the signal is then calculated by multiplying the number of graticules occupied by one full cycle by the Time/Division value set by the switch. This will give the period of the signal in either nano-seconds, micro-seconds or milli-seconds determined again from the setting of the Time/Div control. Dividing one by this figure in seconds will give the frequency of the signal, eg: 1mS - 0.001 seconds, thus a signal with a period of 1mS has a frequency of 1/0.001 = 1000Hz. An advantage of using a 'scope to measure frequency is that the waveform in question can actually be seen, thus if any distortion, harmonics or spurious signals are present they can be ignored, or taken into account, whilst the measurement is being made.

In order to measure voltage set the Vertical Timebase variable amplitude (Y magnitude) to the CAL position (not all sets will have a variable control). Adjust the main Vertical Amplitude/Division control until the top and bottom of the waveform are visible on the screen. The voltage is then determined by multiplying the value set by the Amplitude/Division switch by the number of graticules occupied by the signal in the vertical (Y) plane. The answer will be in milli-volts or volts dependant on the switch setting. This voltage, however, will be the peak-to-peak (P-P) and not the root-mean-square (RMS) value. In television work we always use the P-P level of a signal when setting up equipment. The RMS value value of a wave is equal to the value of a DC voltage which would deliver the same power, thus it refers to the power delivering capability of the waveform, and is more widely used elsewhere. To calculate the RMS value of a sinusoidal waveform (ie: the domestic mains) simply multiply the P-P level by 0.707, conversely, if the RMS level is known the P-P value is determined by multiplying the RMS by 1.414, eg: the P-P level of the domestic mains is 339.4 volts, thus the RMS value is 339.4 x 0.707 = 240 volts.

The input impedance of the average 'scope is of the order of 1 M-ohm,

with a capacitive element of a few pF's. If the circuit being investigated has a high impedance, such an oscillator, clock generator etc., a high impedance probe may need to be used. This will ensure that the circuit is not loaded by the 'scope. The most usual type of probe available is the X10 variety, which has an input impedance of 10 M-ohm. This should be high enough for most applications. When using this type of probe the voltage amplitude worked out as described above must be multiplied by ten, to allow for the attenuation factor of the probe. Also, an important point to note with these probes is that they need to be matched to the 'scope input. This is fascilitated by either a trimmer capacitor built into the probe, or by a sliding sleeve on the body of the probe. Using the calibrate signal from the 'scope, the trimmer or sleeve should be altered until a perfect square-wave signal is viewed.

FREQUENCY COUNTERS

Digital frequency counters are the most accurate and flexible instruments available for measuring unknown frequencies. The highest accuracy types can approach the accuracy of the caesium atomic standards used to generate the reference time signals used in science and industry.

The most common type of digital frequency meter (DFM) is capable of measuring frequencies up to 200MHZ, but models that can read frequencies up to several tens of GHz are also available. More often than not, multi-mode instruments are to be found which can measure periods and can also be used as event-counters.

DFM's have high input impedances, however, they can still load circuits enough to say, stop an oscillator, or change its frequency. Thus it may often be necessary to use a high impedance probe, such as that described for oscilloscopes, in order to reduce loading. Alternatively, rather than direct coupling the instrument to the circuit under test, if sufficient signal is available a small induction loop can be used to proximity-couple the counter to the circuit without loading it at all.

Another problem that can be encountered when using DFM's is that if several different signals are present the highest level one is the one that the meter will read, or if several signals are of similar amplitude an unstable reading will be indicated. This condition can often lead to confusion, culminating in severe 'tweaking' of the circuit under test.

A similar problem can often arise in the ham shack. Due to the high input impedance of the DFM, any lead connected to its input can pick up enough stray radiation from transmitters to trigger a reading. Thus, confusion can again be brought about if you are having a QSO whilst taking a reading from a circuit, there may be enough pick-up of the tranmission by the leads of the DFM to indicate the frequency you are talking on rather than that which is being measured. If you have never come up against this effect just insert a few inches of single conductor into the input socket of the DFM and key your radio. The counter will more than likely tell you you're frequency (or maybe the fact that you are off frequency!) purely by picking up stray radiation via the 'aerial' connected to its input.

POWER METERS

Finally, a quick look at a piece of test equipment that is also likely to be found in all shacks. Power meters come in a variety of shapes and sizes, with varied bandwidths and even more varied accuracies! The only drawback with power meters (apart from some stations' belief that theirs is the only accurate meter in the universe!) is that they are generally wideband instruments, that is to say, that within the confines of their overall frequency range they are unable to select particular frequencies for measurement. When making measurements the power indicated will be the sum (logarithmically) of all the signals present, the fundamental, harmonics, spurious, you name it it's read. The only way to take an accurate reading of a signal is to either, ascertain that it is the only one present (or confirm that any other signals are so low with respect to the main one as to have no effect) or to use a bandpass filter to remove the unwanted signals, not forgetting to allow for the loss in the filter. Unless the signal being measured is known to be pure, or can be checked on a spectrum analyser to confirm this, allowances must be made for the reading obtained.

This ends this brief look at test equipment and its usage. I hope the information may prove useful and that I may have answered some of your questions.

EDITORIAL CHANGES FOR CQ-TV

Yes it's true, the old chap (sorry, read Boss) is retiring, he is throwing down his red pen and handing on the reins of control to me, Mike. To explain a little better, John Wood, after nine years of producing the magazine, has decided to devote a little more of his leisure time to himself.

The committee would like to express its grateful thanks for the work John has put into the magazine over this period, bringing it from the publication of only a few pages to the 90 odd page editions we now produce. Apart from working on CQ-TV, John has also been instrumental in producing several handbooks and innumerable artwork specials for advertisements and special publications. The amount of hours that he has put into this work is incalculable, and the club will remain indebted to him for many years.

However, John is not abandoning the magazine to me entirely, but will be available for advice. He will also be contributing towards the magazine with advice, artwork and some editorial work as well. For my part, I would like to offer my thanks to John for his patience, teaching, criticism and just plain downright censorship during the period that I have been assisting him with the magazine. I hope that my period as Editor will be as memorable as John's has.

From the Club, the Committee, and from me - **THANK YOU JOHN.**

Please note: as a result of the editorial changeover please send all material for CQ-TV, comments, questions, etc to Mike Wooding G6IQM, at the address shown on the 'Who To Write To' page.

WIDEBAND VIDEO PROCESSING

By Paul Marshall BSc(Hons) G8MJW,

Many 'gain block' integrated circuits have appeared over the years which are capable of passing, with minimal distortion, a 625-line PAL colour video signal. Without exception these have all had drawbacks - some are A.C. coupled, others are only marginally stable, etc. What the video world has been asking for is a device that is as versatile as an ordinary high-quality operational amplifier (op-amp) being used for audio processing. The relatively new Elantec EL2020 comes the closest to this ideal of any of the devices currently available. The amplifier, which has a 50MHz unity gain bandwidth, comes in an 8-pin DIL package for just under £5.00.

THE EL2020 VIDEO OPERATIONAL AMPLIFIER

The EL2020 is not a conventional operational amplifier, but the majority of normal op-amp assumptions still work. The device is a Norton (current feedback) device employing controlled current sources to drive the output stage, rather than voltage sources as used in a normal op-amp.

Consider the simplified internal block diagram of the EL2020 shown in Fig.1. Under quiescent (no signal drive) conditions I+ = I-, I1 = I2 and V(out) = 0V, as everything balances. When current is drawn from I(inv), controlled currents I1 and I2 are no longer equal, so the output voltage V(out) will no longer equal 0V. A small change in input current results in a large change in output voltage (this current amplification is its Transresistance, Ro1 10). V(out) = Ro1 x I(inv), and as Ro1 is very large the current flowing into I(inv) is very small, so normal op-amp assumptions apply, i.e. gain→ ∞, voltage across inputs → 0, current into inputs → 0, etc.

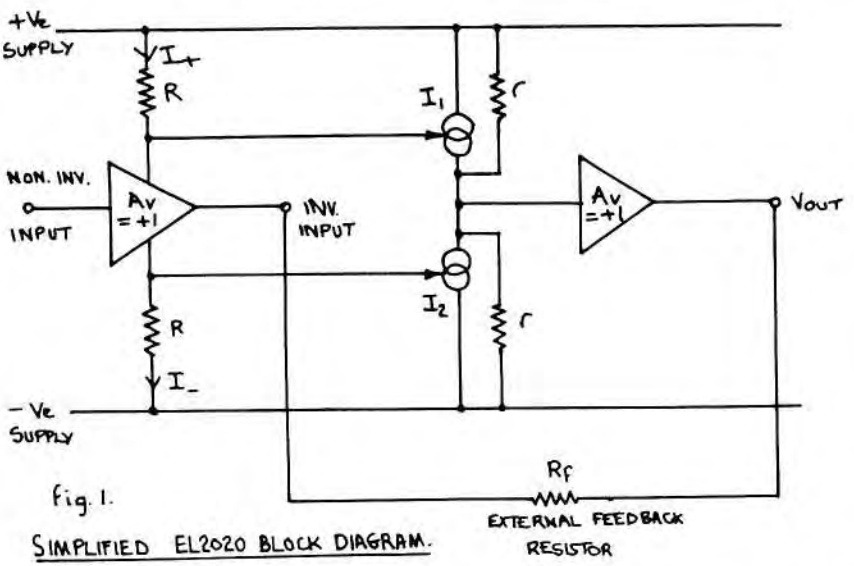


Fig. 1.

SIMPLIFIED EL2020 BLOCK DIAGRAM.

OK - so the device functions as an operational amplifier, what makes it so much better for video than an ordinary operational amplifier? The answer lies in its HF performance. In a conventional op-amp the bandwidth is indirectly proportional to the gain required. For example, if the device has a 100MHz bandwidth at a gain of 20, the bandwidth will be 5MHz. However, with a Norton device this approximation is not true, the bandwidth is fairly constant over a wide range of gains. The device is also much more stable and tolerant of poor component layout and circuit topology than an ordinary op-amp such as the NE5549. In fact the EL2020 is so stable that feedback capacitances should NOT be used - they don't like it and they don't need it.

When it comes to wideband video amplification (20MHz plus) most of the current crop of video op-amps face extreme difficulties, especially when any degree of gain is required. The EL2020 excels in these circumstances, it can provide a 30MHz bandwidth at a gain of 10 and still be able to drive two 75-ohm terminated loads. Bandwidth and slew rate are relatively independent of the closed loop gain. The feedback resistor value recommended by the manufacturer is 1k for optimum stability and bandwidth (even in unity gain-voltage follower mode a feedback resistor is still required with a Norton amplifier of this type).

At ordinary video bandwidths (5MHz) the distortion of the basic amplifier is so low that five x2 stages have to be cascaded to yield differential phase and gain figures that are measurable! (The manufacturers claim differential phase and gain figures of 0.1 degrees and 0.1% respectively).

What can this device be used for in ATV applications? The following are examples of some wideband video processing circuits developed by the author.

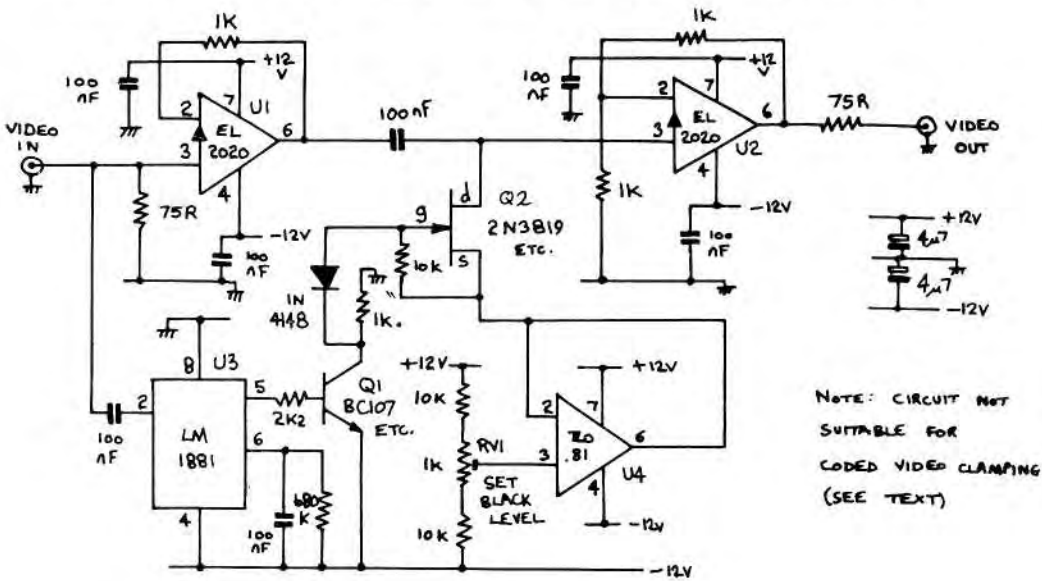


fig.2 BLACK LEVEL CLAMP

BLACK LEVEL CLAMP

The circuit shown in Fig.2 is a simple variable level clamp, which will find many uses in video processing applications.

The first EL2020 (U1) is used as a low impedance buffer, which is then AC coupled into the second (U2). This device is configured as a high impedance buffer. Also fed from the input is an LM1881 Sync Separator IC (U3) which has a burst-gate-pulse output at pin-5. This output is inverted by Q1 and used to turn on the field effect transistor (Q2) strapped between the AC coupled video and a voltage source adjustable by RV1. The result is that the video signal is held at that preset voltage level at the start of each picture line. A more elaborate feedback type of clamp can be built along similar lines using a sample and hold gate.

The circuit as it stands is not suitable for clamping a PAL coded signal as the clamping action occurs during the burst period, but it can be adapted to cope with a colour coded signal in a number of ways, e.g. by delaying and differentiating the clamp pulse to occur after the burst, or by adding a 4.433MHz parallel tuned circuit in the FET drain.

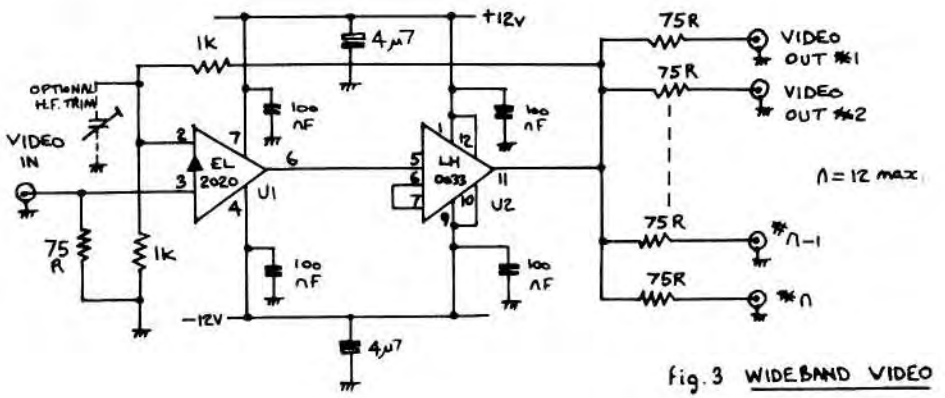


Fig.3 WIDEBAND VIDEO DISTRIBUTION AMPLIFIER

WIDEBAND HIGH-OUTPUT VIDEO DISTRIBUTION AMPLIFIER

The circuit in Fig.3 is of a high-output video distribution amplifier. This circuit has a very low component count utilising one EL2020 and one LM0033 and a few discrete components. The LM0033 is a unity gain current buffer IC and normally has a 'sag' problem commensurate with decreasing load resistance. By including it within the EL2020 feedback loop the sag is removed without a major penalty on speed. Even more output power can be achieved using the LM0063. It also becomes a simple matter to provide a degree of HF compensation (cable loss correction etc.) and differential input as shown on the circuit diagram.

HIGH SPEED VIDEO KEYER

Keying of one video source into another is a powerful tool in the armoury of video effects. A whole host of types are possible, black key, white key, chroma key, self key, etc. The circuit in Fig.4 is the vital high speed switch for any of these effects.

Diodes still represent good value for money in terms of performance when used as video switches. Analogue switches (even the high speed, low charge injection types) have poor switching waveform feedthrough rejection performance, even when used in toggled on/off arrangements. Matched diodes (in a diode array IC) when toggled such that one pair is on when the other is off, so that switching transients tend to cancel each other, can give a very clean high speed switching action.

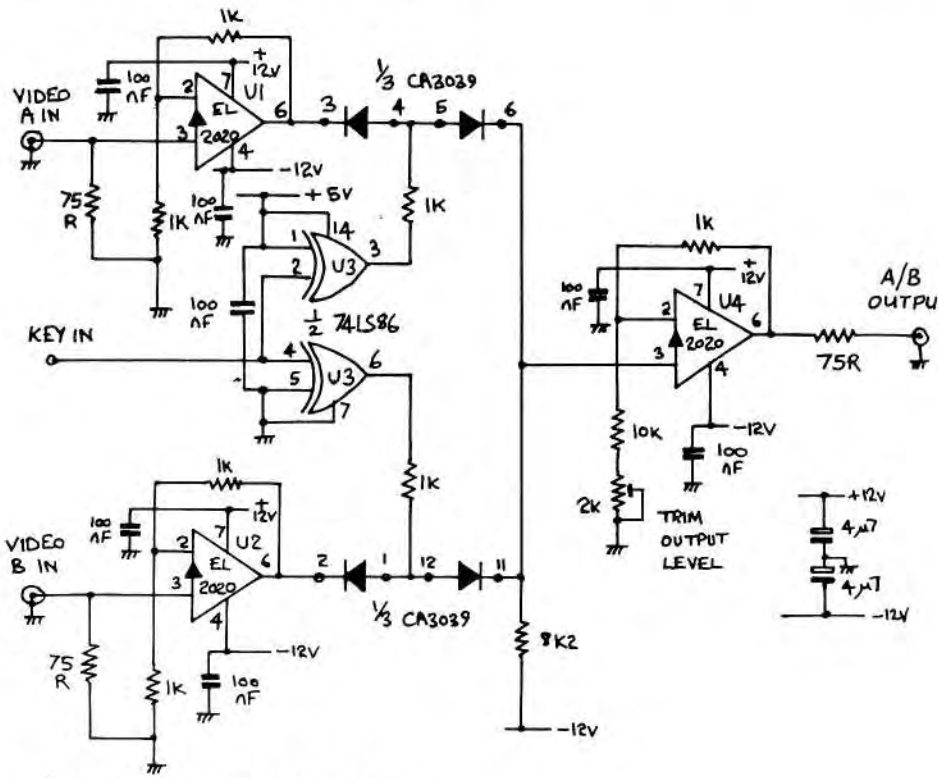


Fig4. HIGH SPEED VIDEO KEYER.

In the circuit shown, U1 and U2 buffer the incoming video sources (which must, of course, be synchronous) and U3 provides the complementary switching pulses for the diode switching pairs. To make up for the small losses through the diode arrays an adjustable gain amplifier (U4) is added at the output.

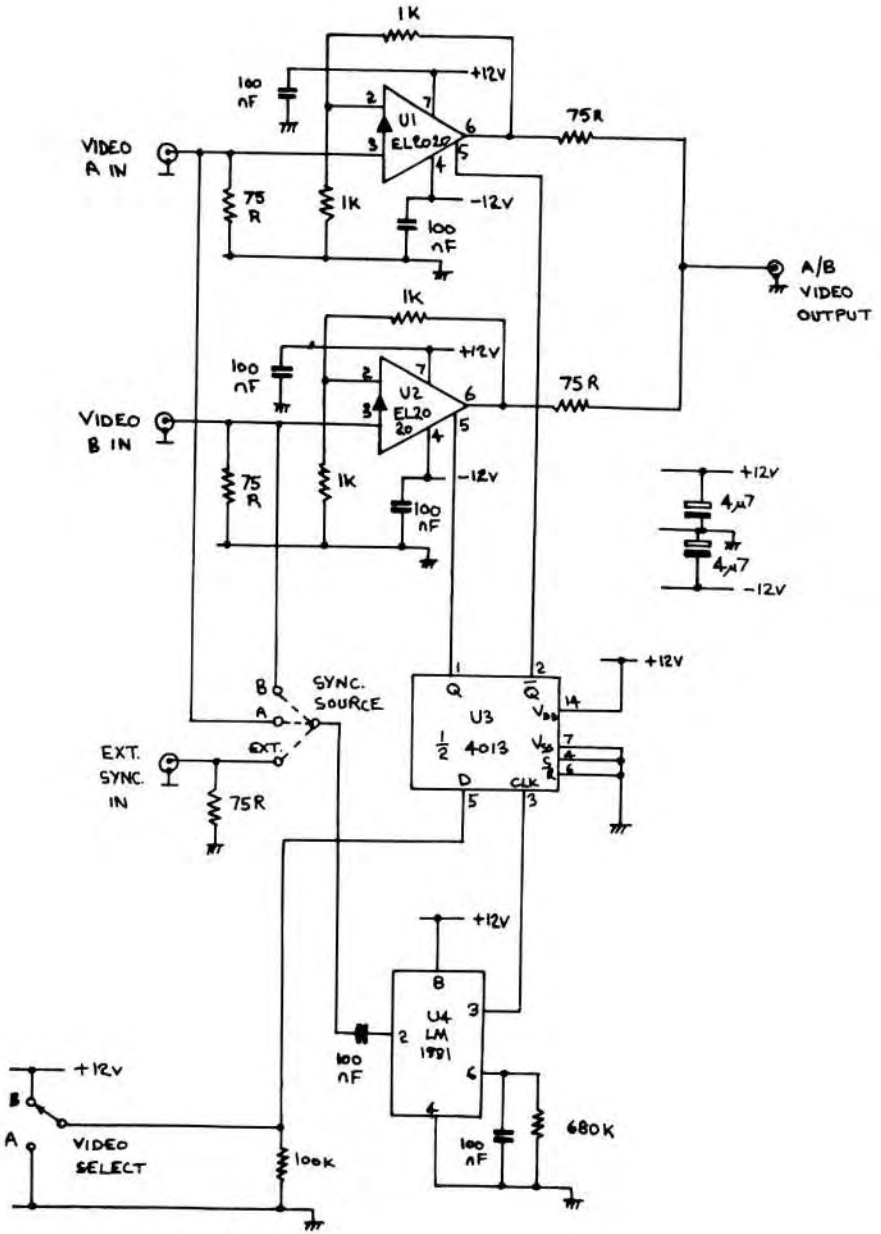


Fig.5. CUT IN BLANKING

RGB video keying is much less greedy on board space using this arrangement as the circuit is very single and printed circuit track layouts are easy to design.

CUT IN BLANKING

When cutting from one video source to another it is preferable that any switching disturbances happen during the field blanking period, thus avoiding lines across the picture at the switching point. The circuit in Fig.5 shows the EL2020 configured for such an application. This device has a disable input on pin-5 which when gated turns off the output from the chip in approximately 5uS, presenting only a 10k load to the output. Thus it is possible to create a useful video switch using this facilty, which requires only a field pulse to achieve cut-in-blanking.

The necessary complementary field gating pulses are produced by U3 and U4. U4 provides sync pulse separation from either the incoming video or from external sync. The field trigger pulse on pin-3 of U4 is used to clock a D-type Flip-Flop (U3), which in turn produces the complementary drive pulses for U1 and U2, the sense of which is determined by the D input of U3.

The foregoing circuit examples are all suitable for wideband high definition work such as computer graphics and High Definition Television applications. The really demanding video processing designer can always try the same company's EL2022 current feedback amplifier - it has a bandwidth of 165MHz!

The EL2020 and 2022 devices can be obtained from Micrelectronics Technology Ltd, Great Hasely Trading Estate, Great Hasely, Oxfordshire, OX9 7PF.

TV REPEATER LOGIC

By Trevor Brown G8CJS

GB3ET, the Emley Moor ATV repeater, is now complete and awaiting the DTI seal of approval before it starts its operational life 900ft up the IBA TV transmitter mast, for the Yorkshire region.

The repeater logic system - TELETRON - uses only four chips and is built on a PCB which us available from BATC Member's Services. There are only four connections between the PCB and the rest of the repeater: one input and three outputs. All these are at standard logic levels. The input signals the logic that a video signal is present at the receiver. This signal is derived by the circuit in fig.1, where sync is selected from the incoming video, filtered and passed to a tone decoder. Its frequency is compared with an on-chip oscillator set to line frequency (15.625KHz) and, if the two signals are close the output will change logical state sending a command to the crosspoint module to switch the transmitter input away from the test card and to the incoming video/audio. The video switching system used is the one illustrated on page 46 of CQ-TV 141, and which uses TEA2014 switch IC's. These chips may be available from Member's Services - please enquire.

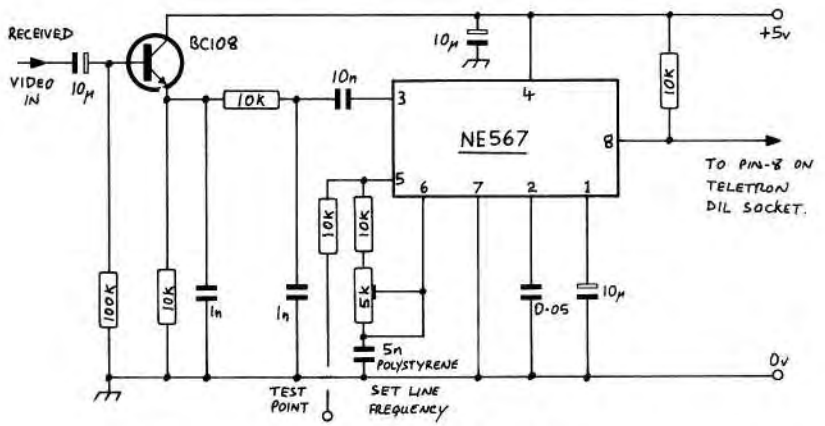
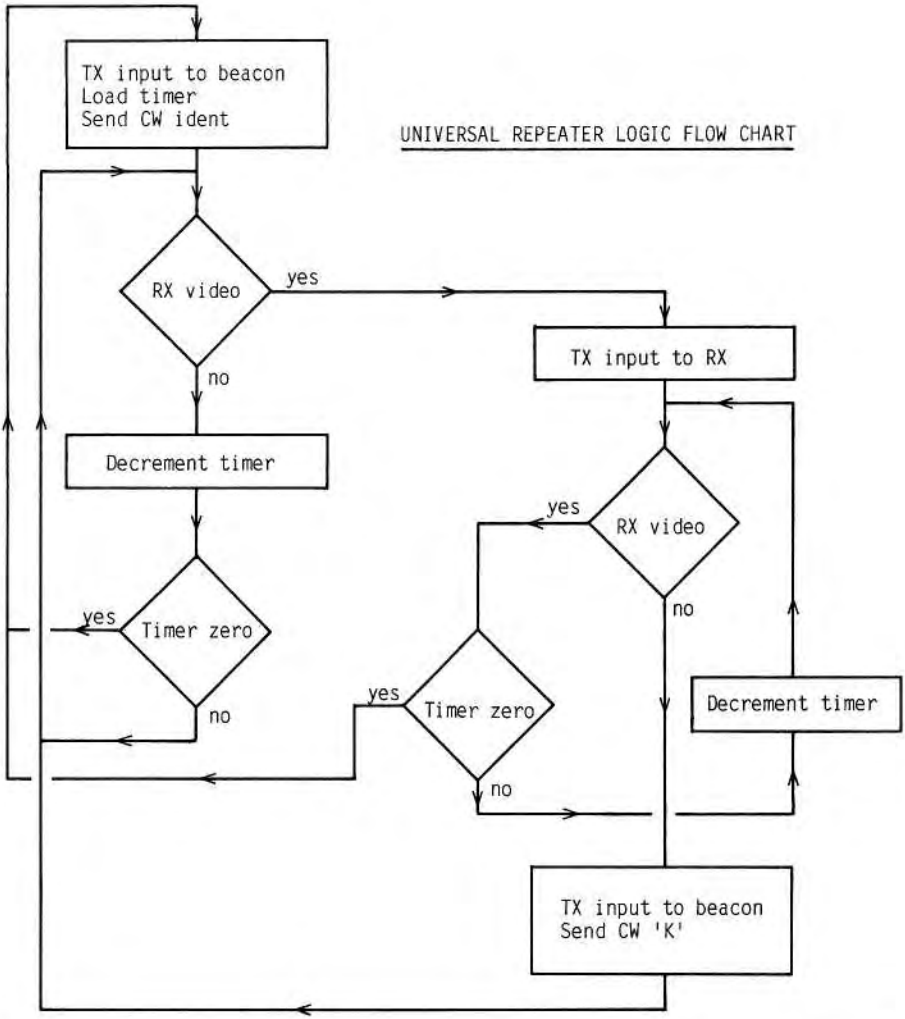


Fig.1 Sync detector PLL circuit

The second output from the logic card is for morse code ident. A logic-level squarewave which, when filtered as in fig.2, produces a passable audio tone. The logic is such that it sends out a morse ident every ten minutes, interrupting the repeater if it is in use, and a 'K' after each over. The logic board generates this period internally. The third output is peculiar to GB3ET in that it is used to alternate between aerials pointing North and South, because omni-directional aerials are not possible at Emley Moor.



SILENT KEY

It is with the deepest regret that we record the death, on the 29th of July 1988, of Arthur Rix, G3RYF. Arthur, a long time member of BATC was for a number of years Treasurer of the club. A familiar figure at summer rallys down the years he also served on the official board of the old East London Group of the RSGB. Arthur was also a keen RTTY man and will be greatly missed by all those who knew him.

The BATC committee wishes to express its sincere condolences to Arthur's family.

The logic card is quite a powerful board considering it comprises only four chips. It generates the callsign in morse every ten minutes and a 'K' at the end of each over. It provides the logic to drive the crosspoint switches and it responds to the 'video present' detector. This is achieved because it is actually a micro computer. The four chips are; Z80, SN74LS04, 2715 EPROM and 8255. Most people are put off as soon as I mention micro's so I have deliberately called it a logic card. All you need to know if you would like to incorporate one in your repeater is how to interface to it, treating it just like a piece of TTL logic.

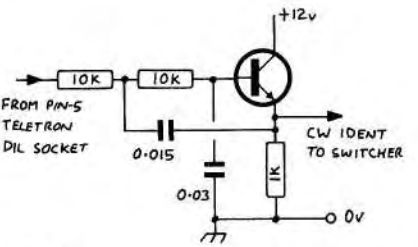


Fig.2 Tone Oscillator

The computer card can be built and tested in a couple of hours. The 2716 needs programming and the program is different for each repeater because of the callsign, but if you will accept the rest of the logic as outlined the I can supply you with an EPROM for your repeater. I must stress that I can program you an EPROM ONLY if you accept the standard program as outlined, the only customisation then being the callsign.

IN RETROSPECT

BOARDS FOR THE CQ-TV134 PAL CODER - CQ-TV 143

One or two gremlins have crept into the circuit on page 83: IC5 (74LS86) shows both inputs of each gate connected together. This is incorrect. All gates should have one of the inputs connected to +5v except IC5d where one input should be grounded.

The three components in series associated with the 'sync level' control are shown in a different order to their positions on the described printed circuit layout. If the layout is used then their order (L to R) is 10k control, R25 and C15.

IC49 is omitted from the diagram. It is an 'adjust on test' component and connects in parallel with R22 at pin 3 of IC1.

SPECMANSHIP Part-5 - CQ-TV 142

There is a small broblem with the brackets () around parts of line 190. Quite simply there are too many, so the last bracket character on the line should be removed.

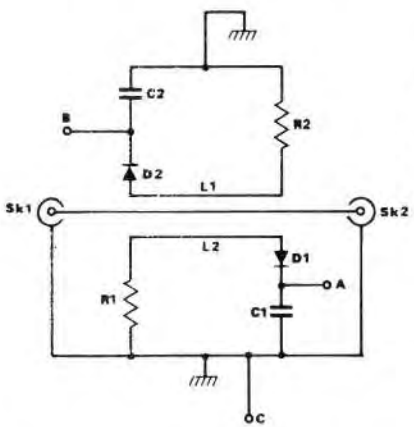
A VSWR BRIDGE

By Martyn Williams,

This article first appeared in 'Amateur Radio' magazine for June 1987, and we thank the editors for their permission to reproduce it here.

A useful piece of shack equipment that is often difficult to find covering UHF and SHF frequencies is the SWR meter. Although it should not be used as a Bible the meter, however, can provide useful indication of possible problems.

There are several different ways of designing the meter, but the usual method is to provide sampling loops alongside the feeder line, arranged in such a way that you can measure both the forward and reverse powers. This is shown schematically in Fig.1. It is possible to construct the sampling loops by simply feeding some insulated wire underneath the outersheath of a piece of coaxial cable, and this is commonly the way that HF SWR meters are built. Once you get above 30MHz it is not possible to maintain the symmetrical layout that is required to get equal sensitivity in both lines. This is easier to obtain if the whole unit is made on double-sided PCB material as shown in Fig.2.



R1,2 47R, ¼W
D1,2 OA91, GEX66 etc
C1,2 1n disc ceramic
Sk1,2 as required

Fig 1 *Schematic diagram*

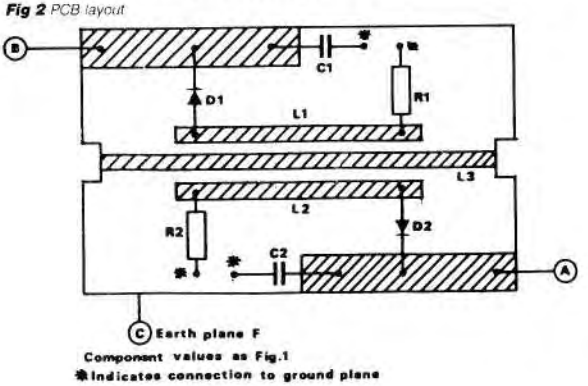
CONSTRUCTION

The details of the all important dimensions are listed in Table 1. From this it is possible to select data for the bands that you are interested in. The data is given to provide good operation on two bands, but you will usually find that the performance is also adequate on the next band up. The widths of the centre track and the two coupling loops must be adhered to so as to obtain correct impedance matching of the lines. The reverse side, or ground plane, must not be etched away. The overall size of the board is not important and should be of a convenient size to fit te box which will house the unit.

The length of L3 is not important and is shown running the length of the board, and connecting directly to the input and output sockets. The use of connecting wires is not recommended as they may seriously affect the matching impedance and thus the operation of the meter. The sockets should be BNC or

N-type and the earth plane soldered directly to the body of the socket if possible, or via solder tags fitted to the mounting screws. These earth connections should be as short as possible.

Fig 2 *PCB layout*



COMPONENTS

The two diodes and capacitors should be mounted using the shortest possible lead lengths, and the earthy ends of the two capacitors are taken through holes drilled in the board and soldered to the ground plane on the reverse side. The strips marked for connections A and B should not be shortened down on the highest frequency unit, as the capacity between these lines and the ground plane is used to give more satisfactory decoupling than would be provided by the capacitors alone.

Table 1

LENGTHS OF L1 AND L2

MHz	
50 + 144	95mm
144 + 432	65mm
432 + 1296	35mm

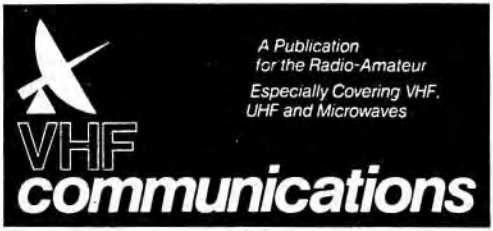
Spacing between L1, L2 and L3 is 2mm L1, L2 and L3 are all 3mm wide

METERING

The meter used is not critical, and something in the range of 100 microamps to 1 milliamp full scale should suffice. Stick to something nearer the 100 microamp end if you consistently run very low power. The circuit is shown in Fig.3. This part of the unit may be built in the same box as the sampling lines, or the sampling unit may be mounted at the aerial and lines brought down to the metering box. To make a two meter unit simply duplicate the circuit for the single meter and used a ganged sensitivity control as shown in Fig.4.

SETTING UP

Connect the unit into the coaxial line to the aerial and set the sensitivity control to minimum. Now switch on the transmitter and set the sensitivity control for full scale reading on the meter. switch to reverse reading and measure the SWR using the calibration shown in Table 2. These figures assume that the meter movement is calibrated with a 1 to 100 scale, but if this is not the case it is a simole matter to adjust the readings. To check that you have reasonable accuracy, connect the meter into the line in the opposite direction and re-run the test. You should end up with the same reading which indicates a fully balanced unit. It is unlikely that you will get this, but it should be close.



VHF COMMUNICATIONS magazine is published four times per year and is available via our U.K. agent: Mike Wooding, 5 Ware Orchard, Barby, Nr.Rugby, CV23 8UF (Tel: 0788 890365). The yearly subscription is £8.50, which is payable by personal cheque, postal orders or bankers draft made payable to M.J.Wooding. The magazine is a MUST for the radio amateur interested in VHF, UHF and Microwave working, containing, as it does, detailed constructional articles for equipment operating in these bands.

SPECIALIST 'THEME' COLLECTIONS

VHF COMMUNICATIONS has collected together selected articles from previous magazines on common topics for the convenience of specialists. One such 'theme' is amateur television, in which nine selected articles taken from VHF COMMUNICATIONS form this collection. Supplied in a smart blue binder at the very reasonable price of;

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This is only one example from a total of 24 theme collections listed in the table below all at £10.00 including postage. Every collection comprises nine to eleven articles in a blue binder. As well as the subject articles, each collection contains many pages of interesting publications carefully selected from VHF COMMUNICATIONS.

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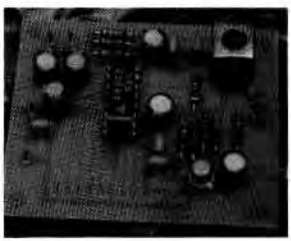

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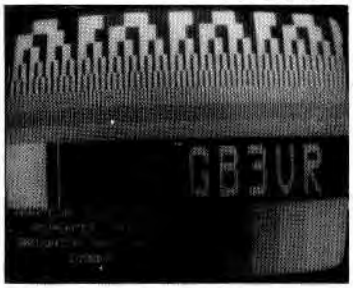

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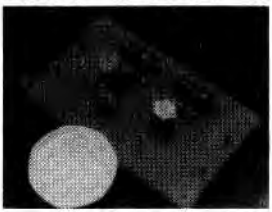

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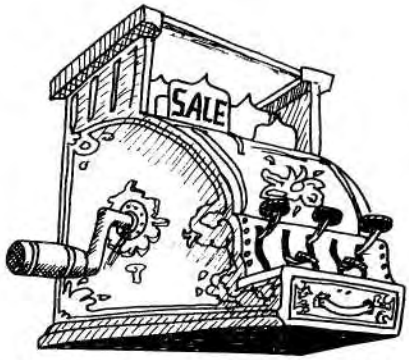

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Copy should be sent to the Editor at 5 Ware Orchard, Barby, Nr.Rugby CV23 8UF. Tel: (Ø788) 89Ø365 before 2Øth December.

FOR SALE

AUDIO TAPE OF BRITISH TV STATION IDENTS - BBC, many defunct ITV stations, etc, etc. Supplied on quality C-6Ø cassette with notes, for £5 post paid. Money back if not satisfied! Please allow two weeks for delivery. Andy Emmerson, 71 Falcutt Way, Northampton, NN2 8PH.

3CM TEST TRANSCEIVER originally used for aerial demonstrations, AC powered transmitter, receiver consists of a cavity mounted diode feeding a meter thus indicating received strength. Will swop for anything interesting. J.Brown, 45 Marlborough Avenue, Falmouth, TR11 4HS.

TEKTRONIX 535A OSCILLOSCOPE in need of repair and complete with service manuals. Several working plug-in modules, spare valves and CRT. Will exchange for camera or WHY. Pete Carliell, 12 Huntsmoor road, Ewell, Surrey, KT19 ØJJ. Tel: Ø1 337 9688.

WOOD & DOUGLAS 125ØDC5Ø 24cm down converter, VIDIF demodulator c/w pre-emphasis, SOUND demod & TV MODULATOR...£75. SOLENT 1Watt FM TV transmitter c/w frequency synthesiser...£45. 15/2ØWATT SOLID STATE PA for 24cm using SC-1Ø4Ø module (CQ-TV 138)...£5Ø. LMW 1296PP4 low-noise 24cm pre-amp...£1Ø. DAIWA 9ØØ-13ØØMHZ SWR bridge and power meter, 2ØW max...£25. All equipment complete and boxed, in working order with full instructions. QUAD LOOP AERIAL for 24cm...£1Ø. 9" B&W MONITORS uncased, 75 ohm input/output, in working order...£25 each. K.Miles G1OTO, 99 Kenrick Road, Mapperley, Nottingham, NG3 6EZ. Tel: Ø6Ø2 5Ø3312.

OLYMPUS video tuner/timer VR-2Ø2, never used...£25. Colin Redwood G6MXL, 45A Lulworth Avenue, Hamworth, Poole, Dorset BH15 4DH.

WOOD & DOUGLAS SCT2 sound subcarrier transmit modulator, new...£9. BACK COPIES of CQ-TV, issue 1Ø7 on. WORTHING GROUP video AGC kit, new...£12. Paul Chamberlain G4XHF, 9 Goffs Close, Southgate, Crawley, West Sussex RH11 8QB. Tel: (Ø293) 515Ø1

EDITING U-MATIC: JVC CR 8500 LE in good working condition. Variable speed forward & reverse search, insert & assemble edit, pre-roll, balanced XLR audio connectors etc. Ex BBC complete with service manual...£390. PORTABLE U-MATIC: JVC CR 4400 E in good working condition, but case scuffed. Full Bell & Howell overhaul and new video heads. Modified for balanced XLR audio inputs, phantom powering, ¼" jack headphone socket and CH1 & CH2 recording level controls. Complete with service manual...£390. PORTABLE COLOUR CAMERA: JVC S-100 E in very good working condition. Single 25mm Saticon, superb Canon 10x servo zoom lens, 1.5" viewfinder, sound zoom microphone, 0/+6/+12dB video gain with AGC, etc. Not to be confused with domestic video cameras, this is a professional unit. With VTR cable suitable for the above recorders and service manual...£390. SONY U-MATIC VO-1810 in working condition, clean with built-in RF modulator and service manual. Only...£90. I can deliver any TWO items up to 50 miles otherwise buyer collects or pays carriage.
Peter Eggleston G8KGA, 4 Bushfield Road, Albrighton, Wolverhampton, West Midlands, WV7 3PD. Tel: 90 722 4509

CONCORD B&W CAMERA, solid state, uses internal/external sync for US or UK, complete with 5" viewfinder. C-mount lens fitting (lens not included). Uses common vidicon, working old one included. Will trade for 25 assorted recent issues of CQ-TV or sell for $100 (approx £50). Will pay camera shipping if you pay CQ-TV shipping. Also NTSC broadcast encoded CHROMA KEYER and processing amplifier, CDL. Will not work on PAL, but great to convert and clean up NTSC video...$300 each.
Henry Ruh KB9FO, 540 Oakton St. E., Des Plains, IL 60018.

RINTOUL VERTICAL APERTURE CORRECTOR 1UI with circuits...£35. MARCONI SOUND DISTRIBUTION AMPLIFIER 3in 3U rack...£15. CAPTION FRAME to take camera and illuminated caption card, 11-inch rack unit...£5 collect. SINE-SQUARED PULSE & BAR GENERATOR...£15. MASTER CLOCK SYSTEM, four foot high electric pendulum clock with slave clocks (potential antique)...£25. TEKTRONIX 528 HANDBOOK, EMI 2001 Vol.1 HANDBOOK, both free to good homes. PROWEST 19-inch MONO MONITORS, solid state, nice but big...free - buyer collects.
Tel: Brian Summers 01 998 4739 or Paul Marshall 0522 703348.

LMW 1700Rx2 METEOSAT RECEIVE CONVERTER new and unused other than initial testing...£50 ono. Special offer on the last few BGY22 70cm hybrid devices, 50mW in for 2.5W at 435MHz, 12v operation ...£12.50 each or make me an offer for the batch. Mike Wooding G6IQM, 5 Ware Orchard, Barby, Nr.Rugby, CV23 8UF. Tel: Rugby (0788) 890365.

HITACHI FP40SK VIDEO CAMERA c/w Viewfinder, EFP Viewfinder and AC power adaptor. Fitted with Fujinon lens 1:1.7/9 - 108mm. Operational panel OP40K, VF adaptor, 2 off PAG Batteries and PAG 5000 speed charger...£1450. SONY 12" COLOUR MONITOR...£125. RED-HEAD lighting kit. IANEBEAM 800..£460. VINTEN tripod, Vinten dolly, Signet post head, Miller wooden tripod and Miller fluid head...£250. Mains U-MATIC NV9210 PAL...£400. AKG-CK9 GUN MICHROPHONE with windshield and interview michrophone converter, plus two SONY tie michrophones...£120. Comprehensive VIDEO CART...£35.
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COLOUR TV PANELS for BRC 3000/3500 series televisions, salvaged, untested, but checked visually for completeness: Power £3.50, Frame £2.50, I.F. £2.00, Video £2.00, Convergence £2.00, Decoder £2.50. Other parts available, prices on application. (Postage £2.50 with order). NEW 14" COLOUR CRT (made for colour monitor), very high resolution, complete with scans coils. Several available, technical data on request...£75 each delivered. RF CO-AXIAL CABLE 75-ohm. UHF aerial distribution cable made for MATV/CATV systems, will handle high level VHF/UHF signals with very low loss and very low leakage. Solid copper core, solid copper tape sheath and braid...60p per metre. (Postage £2.50 per cut length). Sample on request (50p stamp please). EX-BBC equipment, see advert in CQ-TV 143 - some items still left and some prices reduced, especially for callers. Telephone for latest details. SEMICONDUCTERS - wide range of diodes, zeners, transistors, integrated circuits - SAE for list. VALVES - wide range of new TV, Radio, Ex Military, etc. Some vintage wireless types - SAE for list or phone/write with details of your wants.
Ken Bailey, 1435 Pershore Road, Stirchley, Birmingham, B30 2JL.
Tel: 021 472 3688.

MARCONI Mk8 auto line-up cameras, complete, can be seen on UK mainland, bargain price for superb broadcast camera. 9" COTRON B/W monitor, hi-spec, A/B input, pulse cross, external sync...£45. 2M DISH and tripod with DX LNB and scalar feed, complete or will separate. 3 MITSUMI satellite RX modules, unused...£60. WØLMD SSTV character gnerator, complete...£80. FSTV CHARACTER GENERATOR, as per page 3 ATV handbook...£60. WOOD & DOUGLAS WDV 400/1200 23cm PA...£40. TONNA 70cm ATV aerial...£30. J-BEAM 70cm ATV aerial; MBM46...£15. TONNA 23cm aerial, 23 element, unused...£20. COSMICAR C-mount macro lens, f1.4, 25mm...£25. No reasonable offer on any of the above items refused.
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EARLY COLOUR TV's, 1968 (approx), Baird 700 dual standard 25"; Decca CTV19 19"; Thorn 2000 dual standard 25". Suit collectors, offers or WHY? SOLARTRON CD1014.3 and Hartley CT436 oscilloscopes, both dual beam and with manuals...£59 each o.n.o. R107 receiver...£49. SONY KV2000UB, tube u/s but good panels, offers.
Jim Coad G6IZQ, 424A Archway Road, Highgate, London N6 4JH. Tel: (01 340) 0230

SONY AVC 4200 ACE viewfinder camera, with 16mm lens, mint condition...£80. SONY TV zoom lens (manual) 17 - 102mm (1.2:1)...£50. HITACHI sync generator (monochrome), model SG-105L...£15 and one new and boxed...£20. SONY video and audio distribution amplifier PL259/UHF and jack connectors, model DA-11...£10. HITACHI SV 40SK CCTV camera, with Cosmicar 25mm lens...£45. ADVANCE stabilised power supply, 30v, model PMG 30-2x5...£25. HITACHI video monitor (mono) model VM 900E/K with audio modification...£55.
Desmond Bell, 5b Ferndale House, Dunmurry, Belfast, BT17 9DB. Tel: (0232) 613225 (after 6pm please).

SOLENT MINI FM-TV 24cm transmitter...£20. WOOD & DOUGLAS SCT-2 transmit sound modulator, boxed...£10. CATRONICS mono TV camera...£24. RS Components 0.5A variac, in case...£24. TONNA 1250MHz antenna...£15. All items as new and operational.
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Andy Emmerson G8PTH. 71 Falcutt Way, Northampton, NN2 8PH. Tel: (0604) 844130 (answerphone).

OLD CAMERA TUBES, (and similar imaging devices) of various type and age, for collection. Tubes that are not operable, or have burn marks ARE suitable for our use! Please contact Peter Delaney G8KZG, 6 East View Close, Wargrave, Berks. Tel (07352 23121).

SONY KV1810 receiver/monitor wanted, any condition considered, complete or otherwise. Am looking for the 'P.R.' PCB and the 'V.H.' PCB. W.H.Y?
George Mayo G4EUF, 'Carlton House', Broad Lane, Markfield, Liecs. LE6 0TB. Tel: (0530) 242378.

MANUALS & CIRCUIT DIAGRAMS required for the following: SONY AVC-4600CE video camera and AVC-4600CE control unit. SONY CMW-110CE video camera wiper. SONY CMS-110CE camera switcher. SONY CMA-3CE video adaptor. Also required lenses for the 4600 camera - this has a 72mm diameter clamped flange and NOT a C-mount. Cabling for all the above also wanted. All postage costs repaid. Information can be copied here or reasonable copying costs repaid.
John Attlee SM6FZD/G0ATT, Rods Bygatta 1, S-42334 Torslanda, Sweden.

CIRCUIT DIAGRAM of CHANNEL (or 'NOMBREX') miniature RF generator.
Doug Pitt, 1 Burnwood Drive, Wollaton, Nottingham, NG2 2DJ.
Tel: 0602 282896.

MARCONI Mk8 camera spares and accessories. VINTEN pan-and-tilt head for approximately 100lbs camera weight. CIRCUIT for P.O. Waveform Monitor No.11. MARCONI Mk5 camera line-phasing module. U-MATIC EDIT SUITE (cheap!) or single machine.
Tel: Brian Summers 01 998 4739 or Paul Marshall 0522 703348.

SERVICE MANUAL for SONY DXC1610P CAMERA, purchase or copy, all expenses met. Bob Platts G8OZP, 8 Station road, Rolleston-on-Dove, Burton-on-Trent, DE13 9AA. Tel: 0283 813181.

CIRCUIT DIAGRAM or any information for ROBOT 630E SSTV, made for commercial use.
Chris Statham G0HME, 24 St.Johns Close, Heather, Leicester. Tel: (0530) 60849

NTSC to PAL TRANSCODER wanted. G Hofling, 18 Calytrix Road, Karama, N.T.0812, Australia. Tel: (89) 276747 (reverse charges).

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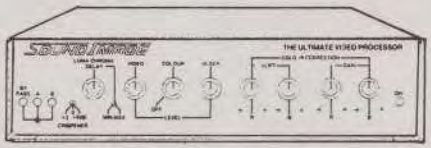

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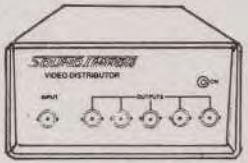

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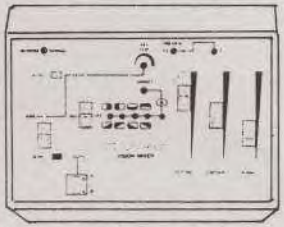

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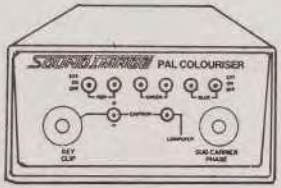

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