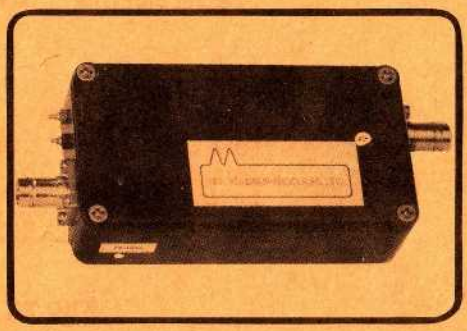
CQ-TV MAGAZINE No. 113

BRITISH AMATEUR TELEVISION CLUB

February 1981

REVIEWED IN THIS ISSUE



MICROWAVE MODULES

AMATEUR TV CONVERTER

Also....

THE NEW HANDBOOK.
MULTI-FREQING THE TX-A5 TV TX.
A COLOUR VIDEO MATRIX D.A.C.
A MONITOR CABINET TO BUILD.

PLUS ALL THE REGULAR FEATURES.

COMMITTEE

Mike Crampton	G8DLX	Chairman
Trevor Brown	G8CJS	General Secretary
Arthur Rix	G3RYF	Treasurer
John L. Wood	G3YQC	Editor (corresponding member)
Brian Summers	G8GQS	Membership Secretary
C. Grant Dixon	G8CGK	Club sales & Library
Ian Pawson		Publications
Alan Watson		Equipment Registry
Graham Shirville	G3VZV	Contest Manager

Jeffrey Borin		Dave Lawton	G8ANO
Cyril Chivers		Paul Marshal	
Mike Cox	G8HUA	Don Reid	
Eric Edwards	GW8LJJ	Paul Surtees	G8OVX
Lewis Elmer	G8EUP		
John Lawrence	GW3JGA		

WHO TO WRITE TO:

CQ-TV copy & advertisements	J. L. Wood. 47 Crick Road, Hillmorton, Rugby, Warks. CV21 4DU Tel: (0788)846220
Subscriptions & changes of address	A. Rix. 17 Forest Drive East, London E11 1JX Tel: 01 539 1468
Membership enquiries	B. Summers. 13 Church Street, Gainsborough, Lincolnshire. Tel: (0427) 3940
Orders for equipment and components	C. Grant Dixon. Kyrles Cross, Peterstow, Herefordshire. HR9 6LD Tel: (0989) 2715
Orders for books & publications	I. Pawson. 14 Lilac Avenue, Leicester, LE5 1FN Tel: (0533) 769425
General Correspondence	T. Brown. 25 Gainsbro Drive, Adel, Leeds. LS16 7PF Tel: (0532) 670115

PLEASE NOTE: If, when writing to a committee member, a reply is required, please enclose a stamped addressed envelope or, in the case of an overseas member an International Reply Coupon.

Editorial

I would first like to thank all those who have said nice things about CQ-TV 112. So far I have received no adverse criticism and therefore I start assembling this issue with a little more confidence.

In common I suspect with most editors I am coming against the problem of lack of material. For this issue I have had to scratch around a little and, had it not been for a couple of regulars chipping in at the last minute the magazine would have been a bit thin.

I'm sure that out of all our hundreds of members there are many of you who have something to contribute. It doesn't have to be technical although such articles are the magazines life blood. How about writing about yourself, your shack, your activities etc and sending along a photo or two? It is always interesting to know what other members are up to.

If anyone is not sure how to go about writing an article please let me know and I will attempt to make it a bit easier. But please get the thinking caps on and the pens out and tell us what you are doing.

In an attempt to ensure that the news information contained in the magazine is as up to date as possible I have brought the dates of closing for press and publication closer together, therefore, since this leaves little time for the magazine to be finalised I must ask for all material intended for a given issue to meet the deadline otherwise it will have to be held over till the next one.

John L. Wood. G3YQC

CONTENTS

Microwave Modules ATV converter	4
Committee meeting minutes	10
Opto-coupling for electrostatic tubes	12
Computer SSTV picture, G8CGK	13
Amateur Television Handbook	14
A Colour video matrix D.A.C.	16
TV on the air	17
3 Frequencies for the TX-A5	21
Building a monitor cabinet	22
The Beeb's new clock	25
Market place	27

CLOSE FOR PRESS DATE FOR THE MAY 1981 ISSUE..... 20th March.

EDITORS POSTBAG

Dear Sir,

I thought these two items might be of interest to the readers.
The 96364 Thomson chip is used in many VDU's and it is limited in its graphics capability by the fact that it operates with a 12x8 dot matrix of which only the area for ASCII characters -7x5 can be used.
One of our members has produced a module which allows the full 12x8 area to be accessed via EPROM, ROM or RAM. The cost of the module is £12.35p but members ordering through club sales can get one for £11.35p.

A member has donated some colour sub-carrier crystals and delay lines. (no data available on the delay lines). These are offered on a "untested" basis. Order from club sales:- Crystals 40p. Delay lines 60p post paid in each case.

C.Grant Dixon G8CGK

Dear Sir,

I hope you can assist me. I have been interested in TV for a long time. I am also a member of the BATC.

I have applied to our department of posts and telegraphs for an extension to my licence - but have been informed by them that the "experimenters licence" in 'EI' does not cover TV transmission - so I have asked our national IARU society IRTS to take up the case for me, it will be a "test case", and if successful will open the door to amateur TV in 'EI', so I would be grateful if you could send me information on the licensing conditions and requirements in the UK, pertaining to amateur TV transmission.

By the way we do have SSTV which is granted without any trouble, so thanks in advance for your help.

Bob Loftus, EI7DG
2 Glenwood Road,
Raleny,
Dublin 5.
Ireland.

Dear Sir,

I have recently purchased a SSTV message generator by G8HBR with the addition of an ASCII keyboard using Hall effect switches and made by 'Micro Switch' Freeport, Illinois, USA (No 66SW6-11).

I find that I cannot write into the unit using the keyboard but I can see random letters and figures displayed on my SSTV monitor when in the 'read' mode. The fault would seem to be in the keyboard interface and I wonder if anyone is able to help with information for using this type of keyboard with the G8HBR main logic board. I will of course pay for information and refund expenses.

Mr. P.Kaminski.
5 Tytler Street,
Forres,
Morrayshire,
IV36 0EL

BATC AT THE SHOWS.

The club hopes to have stands at the VHF convention at Sandown Park, the Alexandra Palace RSGB show (or alternative location) and of course at the next Leicester exhibition, all taking place this year.

DEMONSTRATION TAPES/SLIDES.

Anyone interested in borrowing video tape and tape/slide lectures etc. on amateur TV subjects should contact Trevor Brown G8CJS, 25 Gainsbro Drive, Adel, Leeds. LS16 7PF Tel: (0532) 670115

Trevor would also like to hear from anyone who has suitable material for use in these lectures or who would be willing to assist in the production.

NEW MEMBERS 'DOWN UNDER'.

Our treasurer reports that we have received several new membership applications from Australian amateurs and he suspects that one of our members is on a recruiting drive. Well done Ausies, keep it up.

CQ-TV BINDERS.

The binders sold for "VHF Communication" magazine will hold about a dozen copies of CQ-TV and may be obtained from the UK distributers.

THE G4DYP UP-CONVERTER.

It seems that some members are having difficulty in locating the BFR34A transistors used in the RF amplifier and mixer stages. These are available from; Modular Electronics Dean House, 95 High Street, Selsey, Nr. Chichester, Sussex. (024361)2916 and from; Burns Electronics, 43a Chipstead Valley Road, Coulsdon, Surrey CR3 2RB. Tel: 01 668 7766

SUBSCRIPTIONS FINAL REMINDER

Have you paid your subscription for 1981 yet? If not this will be the last magazine you will receive. To re-join you will have to pay the enrolement fee of 50p.
Subscriptions are £3 and should be sent to the Hon. Treasurer;
Mr. A.Rix. 17 Forest Drive East, London, E11 1JX. Please do it NOW.
Any further delay will mean your name being deleted from the membership list.
Members who have renewed their subscription before February 1st will receive their free windscreen sticker with the next magazine.

BANKERS ORDERS

Would all members please note that all bankers standing orders for subscription renewal have been cancelled and no further subscriptions will be paid in this way. Would members who have paid by bankers order in the past please ensure that their subscription renewal is sent directly to the treasurer.

MEMBERSHIP APPLICATIONS.

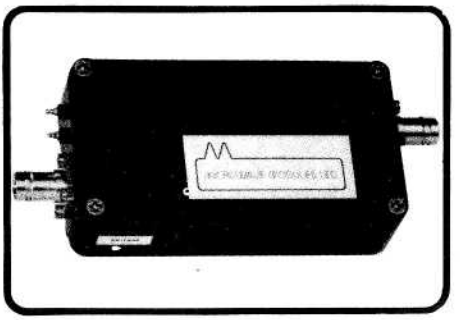
Anyone wishing to aquire copies of the latest (gold) general information sheet and membership application form, may obtain them from M.Crampton, G8DLX. 16 Percival Road, Hillmorton, Rugby. Warwickshire.
The current subscription fee is £3 and there is an enrolement fee of 50p. This enrolement fee also applies to persons re-joining the club.

QUICK QUOTE

The only person to write in with the answer to 'quick quote' which appeared in the last magazine was Ray Cox G4HZC of Leicester.
The quote was from St. Lukes Gospel, Ch.14 verse 28.

REVIEW

MICROWAVE MODULES ATV CONVERTER



A. F. Wood. T. Eng(CEI), MITE. G3RDC and John L. Wood. G3YQC

INTRODUCTION

The amateur TV converter model MMC 435/600 is a recent addition to the Microwave Modules range and enables amateur 70 cm television transmissions to be received on a domestic UHF 625 line television set without modification.

Almost all amateur television stations today are equipped to use the commercial 625 line negative-going modulation standard known as system I. Many also transmit PAL colour pictures so it seems logical to make use of readily obtainable television sets.

DESCRIPTION

The converter is housed in a small black durable diecast box. It requires a 12.5v nominal power supply and has 50 ohm BNC connectors for the aerial input and IF output sockets. The specification is given in Fig 1.

The converter uses two bipolar RF amplifier transistors and a dual-gate MOSFET mixer. The local oscillator is free running and is applied to gate two of the mixer.

Stripline techniques are used for the tuned circuits and a high-Q IF output filter is incorporated. All circuitry is constructed on a single high quality glass fibre printed circuit board.

SPECIFICATION (Fig 1)

Input frequency	: 430-440 MHz	**RF connectors**	: 50 ohm BNC
Output frequency	: Tuned to Channel 35 but can be retuned over Band IV	**DC Power requirements**	: 11-13.8 Volts : 12.5V nominal
Typical gain	: 25 dB	**Current consumption**	: 75 mA maximum
Overall noise figure	: Better than 1.9 dB	**Size**	: 110 x 60 x 31 mm
		Weight	: 260 g.

EVALUATION

Tests were carried out on two converters to ensure that the results obtained were typical. The units tested were standard and not specifically supplied for this review. Two types of tests were carried out : (a) Measurement of the receivers performance using instruments. (b) Objective tests to determine on-the-air performance in amateur service.

MEASUREMENTS USING INSTRUMENTS

The converter parameters measured were bandwidth, overall gain, noise figure, gain compression and dynamic range. The tests were carried out using two Hewlett Packard 8640B signal generators, a hybrid combiner, a Hewlett Packard 8554L spectrum analyser, a Wiltron 640 RF analyser and a Rhode and Schwarz noise generator type SKTU.

BANDWIDTH & OVERALL GAIN

The RF analyser was adjusted to sweep across the band using an input signal level well within the handling capability of the converter. Bandwidth at the 3dB points was 20 MHz (420 to 440 MHz), the units were found to peak at approximately 434 MHz where the overall gain was typically 20dB. The passband characteristic was slightly eccentric and exhibited a more gentle roll-off on the LF side of the passband. Investigation showed that this was due to the fact that the high-Q IF filter did not quite tune correctly and one of the trimmer capacitors was observed to be fully open on both units.

NOISE FIGURE

A low-noise amplifier was connected to the IF output of the converter and fed to the spectrum analyser to obtain a measure of the converters noise output when terminated at the aerial socket with a 50 ohm resistive load. The noise generator was then used to measure a noise figure of typically 2.2dB. This was felt to be sufficiently close to the manufacturers claim of 1.9dB and the error was due to the noise contributed by the IF amplifier used during the test.

DYNAMIC RANGE

Dynamic range is one of the most important parameters in a modern amateur weak-signal receiving system. The presence of very strong interfering signals throughout the spectrum can, and often does produce many in-band spurious signals.

These are primarily caused by intermodulation distortion, cross-modulation, gain compression (de-sensing) and reciprocal mixing. Fortunately the cure for any one of these effects will generally cure them all (except where reciprocal mixing takes place due to the local oscillator noise sidebands).

There are many ways of assessing dynamic range and receiver manufacturers each have their own ideas or simply ignore this part of the specification. Recent literature has shown a great interest in the "third order intercept point" method. Perhaps the most significant contribution to in-band spurious is due to the third order intermodulation distortion products, ie when two strong in-band signals f1 and f2 are present then third order intermodulation products (2f2 - f1) and (2f1 - f2) will be produced, as the strength of the interfering signal increases the distortion products will also increase but more rapidly. Thus it can be seen that a point will be reached where the distortion products reach the same amplitude as the incoming signal, this is known as the intercept point.

Fig 2 shows a graph of input signal to output signal and input signal to intermodulation products. The intercept point and gain compression point is also shown.

The third-order intercept point for the converters was measured by feeding two 70 cm signals spaced 100 KHz apart and of equal amplitude to the aerial input and monitoring the IF output on the spectrum analyser. The level of both signals was increased in 10dB steps and the third-order products were measured and plotted on the graph.

Obviously one cannot increase the signal levels indefinately so care was taken to remain within the gain compression figure.

The graphs, being straight lines can be projected upwards beyond gain compression until they intercept. Although this point can never be reached in practice it nevertheless gives a meaningful figure by which dynamic range can be judged.

The intercept point on these converters was of the order of 0dBm. But what does this mean in practice?

Assuming that an S0 signal is 1uV and that one 'S' unit is 6dB then an interfering signal of S9 would be necessary to produce third order intermodulation products just above the noise level.

Gain compression was measured using the test set-up described above and increasing the output of one signal generator until the output level due to the other signal dropped by 1dB. The 1dB gain compression point was measured at -30dBm or, to put it another way, de-sensing will not take place until the interfering signal is greater than S9+20dB.

The final check using instruments was to connect the spectrum analyser to the aerial input socket and it was found that the local oscillator radiation (about 150 MHz) was -42dBm in both cases.

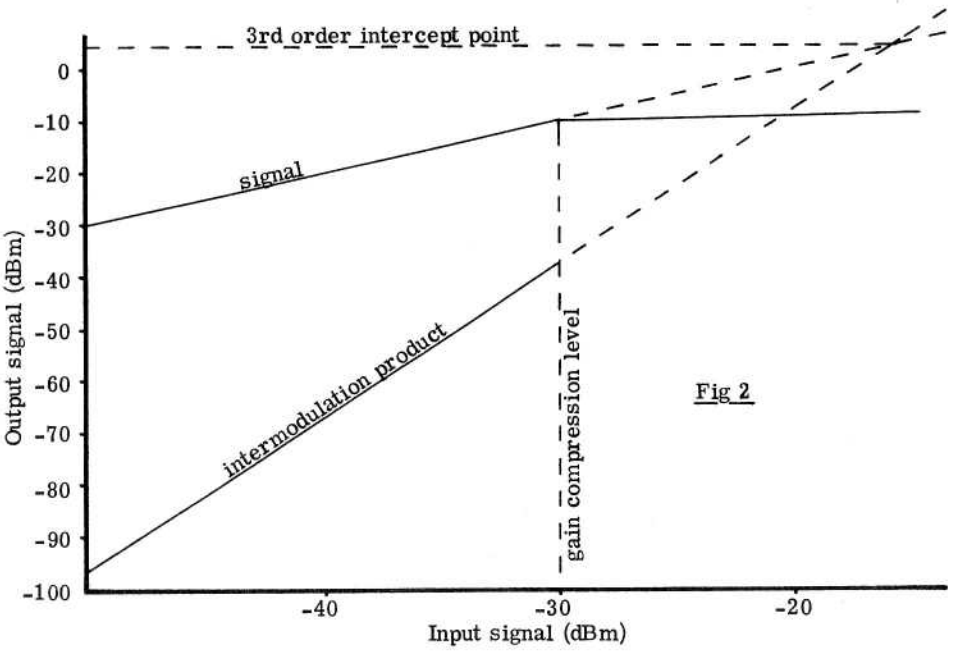


Fig 2

MEASUREMENT ERRORS

Due to the limited time available with the highly sophisticated test equipment used it was not possible to accurately determine the measurement errors but it was felt that the results obtained were sufficiently accurate to enable a proper assesment of the receivers capabilities to be made.

OBJECTIVE TESTS

At the station of G3YQC the converters were checked on the air and directly compared with the main station receiver which consisted of a re-tuned ELC1043/05 tuner preceded by a commercial stripline low-noise pre-amplifier using a TP491 transistor, and aligned using typical amateur setting up procedures (tuned for maximum smoke!). This receiver was generally regarded to be pretty "hot" and was good for DX. The Microwave Modules converters showed a noticeable improvement when receiving television signals from regular but distant stations, fine detail could be seen more easily due to the reduction of background noise and one station which was often not seen at all could actually be locked and identified.

Both converters were unconditionally stable under all operating conditions.

NOTES AND CONCLUSIONS

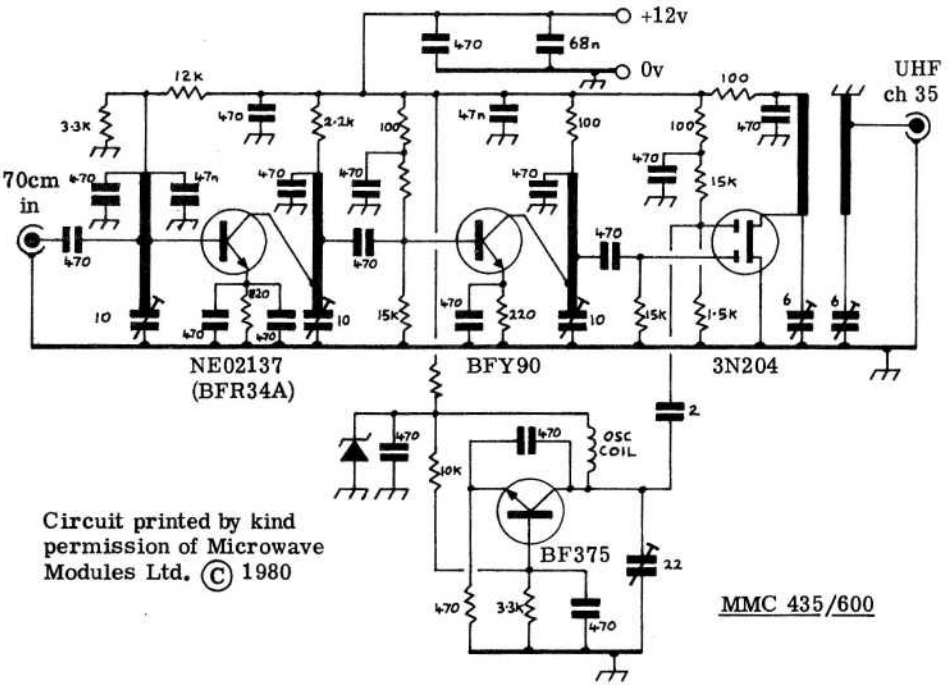
The converters as supplied are adjusted to operate around channel 35 in the UHF TV band but this can easily be shifted to avoid interfering broadcast stations. Small changes in oscillator frequency will not necessitate re-adjustment of the high-Q IF output filter.

As an experiment a re-alignment of one of the converters was carried out using the test equipment but no significant improvement in any parameter could be made.

The Microwave Modules amateur TV converter type MMC 435/600 was found to be an excellent unit for its intended purpose. It was built to the usual high standards expected from this company and had clearly been well designed. Dynamic range was very good, noise figure is excellent and on-air performance showed that the converter represents a unit of outstanding quality for the amateur market.

This converter will enable anyone who posesses a modern broadcast television set and a 70cm aerial system to obtain at low cost an excellent receiver for amateur television purposes and it is hoped that it will encourage many amateurs to explore this fascinating and absorbing aspect of amateur radio.

The converters are available from stock priced £27.90p plus 80p postage.

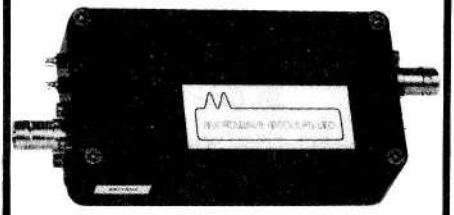


Circuit printed by kind permission of Microwave Modules Ltd. © 1980

MMC 435/600

MICROWAVE MODULES LTD

AMATEUR TV CONVERTER: MMC435/600



FEATURES

- ★ **Ultra Low-Noise First RF Amplifier Stage**
- ★ **High-Q Output Filter For Minimum Spurious Responses**
- ★ **Output Tuneable Over Band IV**

SPECIFICATION

Input frequency	: 430-440 MHz	**RF connectors**	: 50 ohm BNC
Output frequency	: Tuned to Channel 35 but can be retuned over Band IV	**DC Power requirements**	: 11-13.8 Volts : 12.5V nominal
Typical gain	: 25 dB	**Current consumption**	: 75 mA maximum
Overall noise figure	: Better than 1.9 dB	**Size**	: 110 x 60 x 31 mm
Only £27.90 + 80p postage (includes VAT)		**Weight**	: 260 g.

DESCRIPTION

This 435 MHz converter is intended for use with a standard domestic UHF TV set to produce a high reliability receive capability for amateur television communication.

Incoming 435 MHz signals are fed to the first RF amplifier stage, which incorporates one of the latest silicon bipolar transistors, yielding a genuine overall noise figure of better than 1.9 dB. The signal is further amplified by a BFY90 transistor, before being passed to gate 1 of the 3N204 dual-gate MOSFET mixer. The local oscillator signal is fed to gate 2 of this mixer, to produce the required intermediate frequency.

The use of printed stripline techniques together with a high Q IF output filter, and an ultra low-noise first RF amplifier transistor, give this converter substantial advantages over the commonly used UHF TV tuner approach.

The converter is housed in a highly durable black diecast case, and all circuitry is constructed on high quality glass-fibre printed circuit board.

MICROWAVE MODULES
BROOKFIELD DRIVE, AINTREE, LIVERPOOL L9 7AN, ENGLAND
Telephone: 051-523 4011 Telex 628608 MICRO G

MINUTES OF THE COMMITTEE MEETING HELD AT RUGBY SPORTS CENTRE ON 23.11.80.

The meeting opened at 2.05pm.

PRESENT

Mr reid	Chairman	Mr Elmer
Mr Brown	Secretary	Mr Pawson
Mr Rix	Treasurer	Mr Lawton
Mr Dixon		Mr Surtees
Mr Summers		Mr Crampton

Apologies for absence were received from Mr Shirville, Mr Chivers and Mr Watson.

MINUTES

The minutes of the previous meeting were agreed as a true record.

MATTERS ARISING

The secretary read a letter from John Ingham thanking the club for the video tape which was sent to Australia.

The secretary asked for finance to purchase a Betamax and VHS cassette so that copies of the BATC and Australian tapes could be made. This was approved.

TREASURERS REPORT

The treasurer presented and circulated copies of his cash statement to all members of committee.

MEMBERSHIP RENEWALS

The Secretary agreed to write a reminder letter to be sent to lapsed members and Mr Summers agreed to copy and distribute them.

A policy to deal with subscription renewals was discussed and agreed. A reminder note is to be sent to all members with the last CQ-TV of each year. The February issue will be sent to unpaid members and if renewal has not been received then a reminder letter will be sent instead of the May issue.

TV REPEATERS

The committee discussed an application to provide a TV repeater. Mr Shirville was appointed repeater co-ordinator so that queries could be dealt with as quickly as possible. Mr Shirville is a corresponding member of the RSGB repeater working group.

A repeater sub-committee was appointed consisting of Mr Lawton, Mr Brown, Mr Crampton, Mr Elmer and Mr Summers.

Mr Shirville will circulate any repeater developments to this sub-committee and 14 days will be given to receive comments.

Mr Shirville is also to take over RSGB VHF Committee liason as a corresponding member.

HANDBOOK

The Secretary reported that the new handbook was nearing completion and it was expected to be published very early in 1981.

The Secretary asked for finance to be approved for the purchase of printed circuit boards and PROMs for the electronic test card generator. This was agreed.

PUBLICITY

Mr Pawson agreed to arrange publicity for the new handbook when it is published.

EXHIBITIONS

Mr Crampton reported on the success of the stand at the Leicester show and said that stand space had been requested at the VHF convention.

ANY OTHER BUSINESS

It was agreed that the BATC should apply to the Home Office for the call-sign G6ATV (or G6ATC), the licence to nominate Mr Shirville as the licensee.

Mr Crampton reported that he now had a volunteer to make addressograph plates and as soon as the current back-log is cleared he will take over.

The complimentary CQ-TV list was reviewed and the Secretary was asked to request a reciprocal exchange agreement with other clubs.

The next committee meeting was set for 29th March 1981 at Rugby.

T. Brown. General Secretary.

Opto - coupling

Ladislav Vig.

Electrostatically deflected CRT's such as the 3FP7 are still used in SSTV monitors but coupling the video signal to the cathode or grid 1 is rather difficult. A transformer is often used as a part of the SSTV demodulator which isolates the video circuits from the high potentials present on the tube electrodes.

For SSTV scanning the deflection plates must be DC coupled to the deflection amplifiers, transistorised amplifiers will produce a DC bias of around 120v. The potential of the last accelerator plate must not differ from that on the deflection plates (to avoid astigmatism) but 120v as an accelerator voltage is not enough-even if post deflection acceleration were used-so it is necessary to take the cathode to around -1500v. It can be seen then that there is no way of avoiding this large potential.

Fig. 1 shows an opto-coupler used in place of the transformer, this has the advantage of completely isolating the high voltage circuits from the video stages thus reducing the chance of insulation breakdown. A photo transistor is used to shunt the voltage drop between cathode and G1.

The opto-coupler must be capable of working at the high voltages present and the video amplifier should have a low impedance output to protect the circuitry in the unlikely event of a breakdown. A zener diode protects the photo transistor from transients.

I have had no problems with linearity and the circuit is fast enough for NBTV. For FSTV it may be difficult to find a suitable opto-coupler.

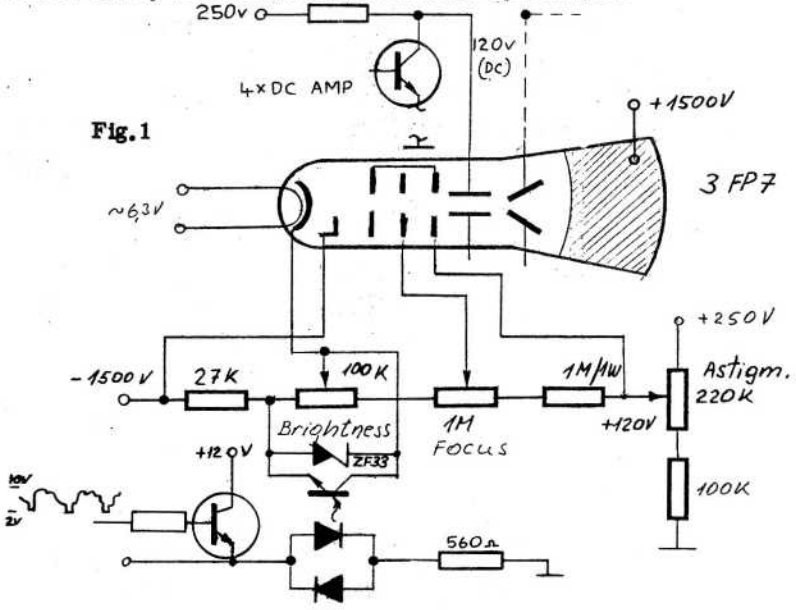
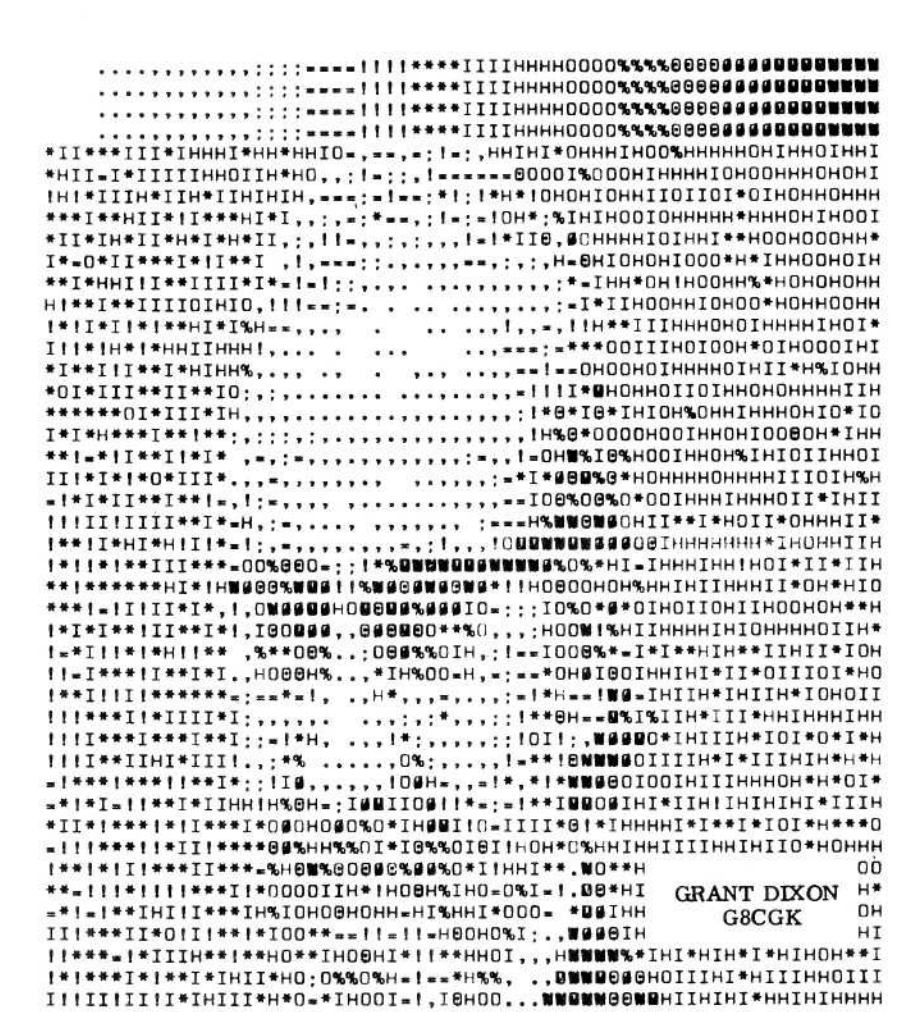


Fig. 1



Is this the first time that SSTV pictures have been displayed automatically, using TTY techniques, by a computer ?

only £1.50p

PLUS 35p POSTAGE

(Non-members £2. plus 35p postage)

ISION HANDBOOK

PROJECTS INCLUDE....

ATV RECEIVER.
70cm TV CONVERTER.
TRANSMITTER MODULATORS.
SOLID STATE LINEAR AMPLIFIER.
ELECTRONIC CHARACTER GENERATOR.
CHARACTER GENERATOR PAGE MEMORY.
VISION SWITCHER.
PAL COLOUR CODER.
COLOUR SUB-CARRIER GENERATOR.
HORIZONTAL APERTURE CORRECTOR.

AND THE STAR OF THE BOOK.....

AN ELECTRONICALLY GENERATED
FULL COLOUR TEST CARD.

ALL THIS AND MORE!

A video matrix D.A.C.

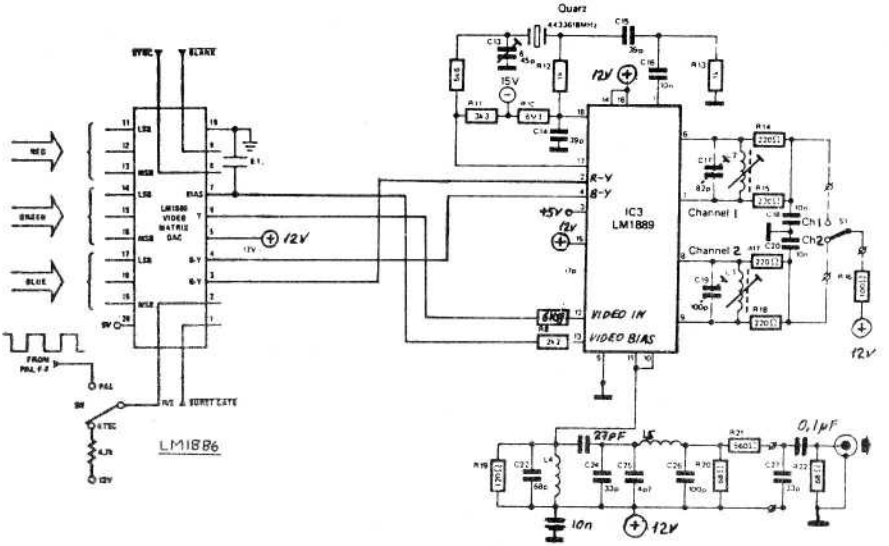
Ladislav Vig.

In CQ-TV 103 (page 26) I described the use of the National Semiconductor LM1889 video modulator chip and discussed the problems of alternating the R-Y signal from line to line to produce a PAL signal. A new ic that solves this problem for digitally produced colour pictures is now available and is called the LM1886 video matrix DAC.

The LM1886 has RGB inputs each of which are three bits wide. It could typically be used in colour pattern generators or in a colour SSTV to FSTV display.

In addition to the three-bit RGB signals the chip needs $\overline{\text{mixed sync}}$, $\overline{\text{mixed blanking}}$, $\overline{\text{burst gate}}$ and an H/2 TTL input. After internal matrixing it delivers Y, B-Y, R-Y and the DC reference all at the correct levels to interface with the LM1889 video modulator.

I have connected this circuit into my video games board with good results and I intend to use it in a colour graphics display in conjunction with my 6800 microcomputer.



L2 9t 6mm i.d. 20 swg enamelled copper close wound.
L3 7t " " " " " "
L4 3t " " " " " "
L5 6t " " " " " "

TV ON THE AIR

COMPILED BY ANDREW EMMERSON, G8PTH

New stations in Britain, cross-Channel activity, video recorders, intercarrier sound, foreign magazine summaries ... well, yes, there is plenty to report this time so let's not waste any more time.

We start with a well known station, that of Brian Summers, G8GQS, which has been physically re-arranged, possibly at the instigation of Elaine, his XYL. Elaine now sports the call G8XUU and we congratulate her on getting the call and also on achieving the first YL-YL video contact with Pat, G8VRJ, who is the better half of Joe, G8CTG, at Lincoln. Brian also mentions a possible ATV repeater at Stoke on Trent. I understand the proposal is at the RSGB now and will be inband at 24 cm.

Welcome back to Brian, G8DTQ, up in the clouds at Caterham. He says he has been out of circulation for some months but is now back on the air with a vengeance. Colour is catching on either side of the Thames Estuary. Clive, G8EQZ, set the trend by obtaining the lower-priced Ferguson colour camera and startled everyone with the excellent results. Nick, G4IMO and Andy, G8SUY, just had to follow suit! Andy also bought the Ferguson: it has now been discontinued and you may be lucky to find it at £300 or less; Nick bought an Akai portable outfit, also in a sale. Welcome, too, to two new stations in this part of the world, Bob, G4IOG, at Newington, Kent, and Terry, G4BFS, near Grays Thurrock. Modesty prevents me from mentioning which transmitter they use, but they're catching on!!

A couple of recent QSOs with Larry, F6GOX, in Valenciennes revealed a high level of local activity with "TVA", as they call it over there. Unfortunately conditions have not been good enough for a "QSO visuel" but Larry passed across a list of stations to listen and look out for. The talkback net is on 144.75 and video on 438.5 MHz, mostly positive modulation only. Incidentally, several of the stations have crystal controlled receive converters and thus cannot see stations which transmit lower in the band. Because the French 70 cm band is split, ATV activity is confined to the upper segment.

LILLE/VALENCIENNES AREA

F1EIF	*QRO station, 80 watts of SECAM colour!*			*F1FVI*	*new station*
F6DIC		*F1EPW*		*F6DPA*	*colour, 15 watts*
F1CMQ		*F1DFM*		*F6BUE*	*RX only*
F6GQH	*RX only*	*F6GOX*	*RX only*		

COASTAL AREA

F2XO	*Boulogne*	*F6BQH*	*Calais*	*F1ESA/F1EXR*	*Oye Plage*
F6GSD	*Grande Synthe, Dunkerque (club station)*				

While we are on the subject of roll-calls there are a few additions to the map of stations published last time, viz. G4CPE (Luton), G3NOX (Saffron Walden) - shouldn't have forgotten that one! - G4FXB (Newbury), G8BWC (Nottingham), G8GUN (Birmingham) and GI3MBB. Absolutely nil response to the suggestion for a SSTV map which confirms my suspicions about interest in SSTV within BATC. (NB This is deliberately intended to arouse sacks of protest letters, if that doesn't work ...)

Last time I mentioned that it would be pleasant to hear of any TV activity in the Emerald Isle (either half), and in response came a missive from Allen McMurtry, GI3MBB, in Bangor, County Down. He says he has been active in fast and slow scan for about nine years. Varied video sources include a Marconi Mk 6, Hitachi and Sony Trinicon colour cameras, plus apparatus to give colour captions, effects and inlays. An Apple micro also provides colour video, while station syncs and test waveforms are derived from a CQ-TV spg. On slow scan he has a WB9LVI slow/fast, fast/slow converter and an LMD keyboard. The Apple also does slow/fast conversion. Returning to fast scan, Allen uses the 'classic' combination of PC modules and SOTA EDL432P to an MBM 48/70 at seventy feet. Scotland is about 20 miles away (houses and fields visible on a clear day!) but very little RF leaks across. How about a GM-GI ATV first? Allen would be delighted to fix up skeds, so write to him at 20 Towerview Crescent, Bangor, BT19 2BA, Northern Ireland.

Another station looking for contacts is David, G3TKR, who has moved to a new, better, QTH near Keighley in West Yorkshire. He has been active with slow scan on HF since 1975. All equipment is homebrew, and judging by the pictorial QSL card David sent, he has been quite busy. Working YL TV stations is becoming a trend! The previous incumbent of this column, John Wood, G3YQC, records working Pauline, G8HQW from Tamworth in Staffs. She is the XYL of G4FZV. In response to John's "Quick Quote" puzzle a letter arrived from Ray Cox, G4HZC, in Leicester. He gives the answer as St. Luke's Gospel, chapter 14 Verse 28, and adds that he has just realised he has most of the ingredients for fast scan. As a few other locals share an interest in ATV there may be a few new signals out of Leicester soon. That's what we like to hear!

Quite a few stations are equipping with video recorders now, especially as the cost of secondhand machines comes down. There are many advantages, apart from being able to record your favourite broadcast TV programmes. It means you can do off air ATV recordings and use them to impress your contact or point out technical problems, also record those classic DX contacts. If you are buying new I don't think you can beat the VHS system for compatibility and worldwide acceptance. On the other hand, if you are looking for a budget machine go for a secondhand Philips 1500 or 1700, which will incidentally give you better pictures than any current production model. This is not the place to discuss the ins and outs of choosing a VCR but if you would like to read some unbiassed advice look out for a new magazine called 'Electronics and Music Maker'. In it you will find a monthly column by me under the title 'Working with Video' and you may find this useful.

Now that many stations can put out colour, the remaining hurdle to cross is intercarrier sound. Let nobody kid you that this is essential: it isn't and it will never replace 144.75. But there is no denying that intercarrier sound is an attractive idea and one or two stations are looking for simple ways to add it to an existing transmit setup. It appears that 439.970 is as close as you can safely get to the band edge while still coming within the capture range of an unmodified TV set, and this means you will have to use 434.0 as video frequency in these experiments. The simplest solution is a separate FM transmitter and aerial until someone comes up with a practical VSB filter and combiner (keep reading!), and for the FM transmitter you can use anything from a Wood and Douglas strip to an IC-451 as Clive, G8EQZ, very successfully does. However, low-cost help may be just around the corner. The Activity Group for High Frequency Bands (AHFB) in Germany has announced a design for a 13 watt TV transmitter (very similar to the PC Electronics one, also using the MHW 710 hybrid PA) featuring a separate sound TX, VSB filter and combiner. I hope to have full details in time for the next issue of CQ-TV, and it sounds very interesting - if it works! The accessories so to speak should be suitable for users of the PC modules.

I am pleased to say I have now received two VHS tapes of ATV activity in the United States - TV repeater operation is amazing! If any of our readers outside Britain would like to exchange VHS tapes please get in touch with me.

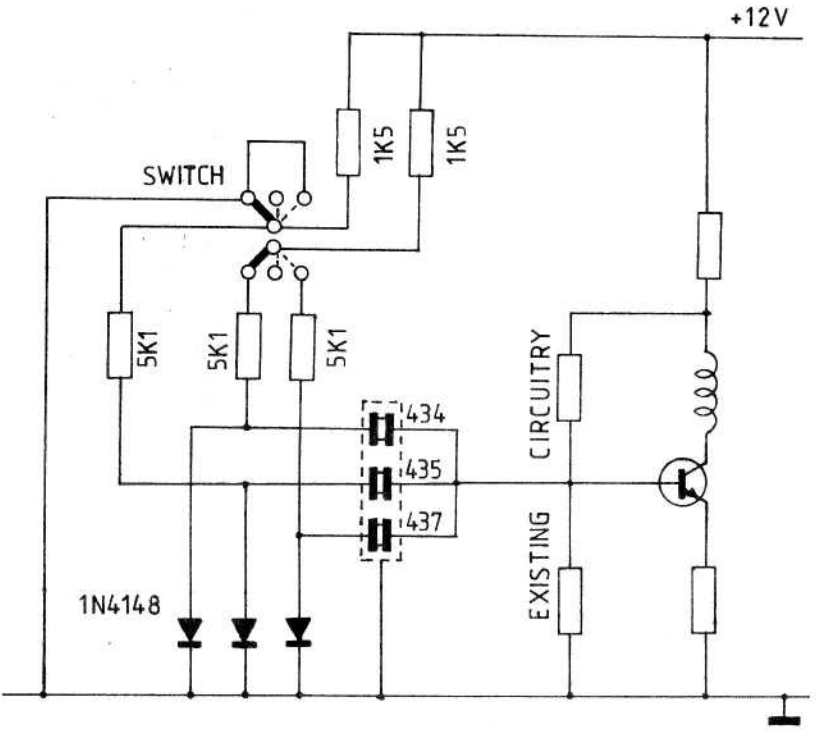
Talking of ATV outside these shores we now have contact with A5 Magazine in the States - their editor recently sent over a bundle of promotional copies. Subscription is $10 a year and I am also listing recent contents. If you need photocopies of any particular article I can probably oblige.

A5 Sept./Oct. 1980 Sync decoder, Sync Stretcher, GP-4 camera review, 1200 MHz stripline preamp, Narrow band TV, Video modulators, Simple camera.

A5 Nov./Dec. 1980 Low cost DOMSAT receiver, .45dB NF GaSFET 450 MHz preamp, Wraase SC-422 scan converter review, SSTV news, 2C39 application notes.

Thanks for all the letters - please send more! Contributions to Andy Emmerson, G8PTH, 4 Mount Pleasant, Blean Common, Canterbury, Kent, CT2 9EU.

MULTI-FREQING THE TX-A5 Modifications to circuit



FREQUENCIES FOR THE TXA5

Designed by Clive Reynolds, G8EQZ Described by Andy Emmerson, G8PTH

There are a number of reasons why ATVers on 70 cm may wish to have a choice of more than one frequency at their disposal, and this little modification makes it possible. The latest version of the TX-A5 transmitter does in fact have provision for two frequencies (and sync stretching) but this little mod gives you three frequencies and can be 'reftrofitted' to existing rigs. Obviously your chosen frequencies should still be fairly close together to avoid tuning problems and the risk of the oscillator refusing to start. The modification involves removing the original crystal, refitting it with two others in parallel and switching so as to enable only one crystal at a time. The use of a submin.DPDT centre off toggle switch minimises drilling of existing cabinets. Length and layout of wiring to the switch are not critical but should not be unduly long. The wire grounding the crystals, however, must be as short as possible. When soldering to the crystal cases use a really hot soldering iron so as not to dwell on the job. Make your connection to the side which does not already have solder on it, otherwise you may destroy the airtight seal. Apart from this the diagram should be self explanatory. When you test and retune the transmitter afterwards peak it for maximum smoke at the highest frequency since this will tend to emphasise the upper sidebands of the lower frequencies.

We now have 434, 435 and 437 MHz at our disposal. The 434 crystal was of course supplied with the TX and if you wish to produce the effect of 6 MHz inter carrier sound this is still the frequency to use. 435 moves you sufficiently far from potential repeater QRM but still gives you room to run colour. 437 is definitely for monochrome only but is very much a 'clear channel', useful in lifts and contests, and we have found that two local stations cause virtually no co-channel interference if one transmits on 434 and the other on 437. So you can have two local working frequencies! Another virtue of 437 MHz is that it might squeeze through the converters centred on 438.5 which the French stations use. Many can receive negative modulation even if they only transmit in positive.

Suitable crystals in HC 25/U format can be ordered from Quartslab Crystals who advertise in Rad.Comm.. You need to divide the output frequency by four, thus for 435 order 108.750 and for 437 specify 109.250.

A monitor cabinet

So you're building a monitor-there's no need to leave it naked for all the world to see. Put it in a proper cabinet. Here we show you how.

By. Lewis Elmer G8EUP

The modern television CRT has a tensioned metal rimband around the front of it. This strengthens the glass ans so provides implosion protection. Attached to the band are four mounting lugs for easy fixing. In this design the CRT is surrounded by a metal frame which enables the monitor to be placed on any side or the back, but not the front, for ease of servicing. If you prefer a slim-line design then it is simple to adapt.

The frame is built from aluminium angle $\frac{3}{4}$" x $\frac{1}{8}$" thick and is suitable for tubes up to 22" diagonal. Above this size the tubes get quite heavy and a stronger frame is necessary. Lay the tube face down on a soft surface where it won't get scratched, then, using two pieces of wood as straight edges, measure the long and short sides of the CRT. Measure over the widest part which will probably be the mounting lugs. Add $1\frac{3}{4}$" to both dimensions and cut four pieces of angle to both these sizes, a total of eight pieces. Both ends of each piece should be cut at 45° on one edge like a picture frame. These pieces form the front and rear frames.

Next measure the depth of the CRT from the mounting lugs to the tube base, add $\frac{3}{4}$" or so to allow for the socket, and cut four pieces of angle to this size. These are the side pieces and should be cut at 90°. 4BA clearance holes of 5/32" should be drilled in these side pieces 5/16" in from the ends and the edges as shown in Fig.1, a total of four holes in each piece. It is a good idea at this stage to mark the ends of all twelve pieces with a letter to indicate which corner is which.

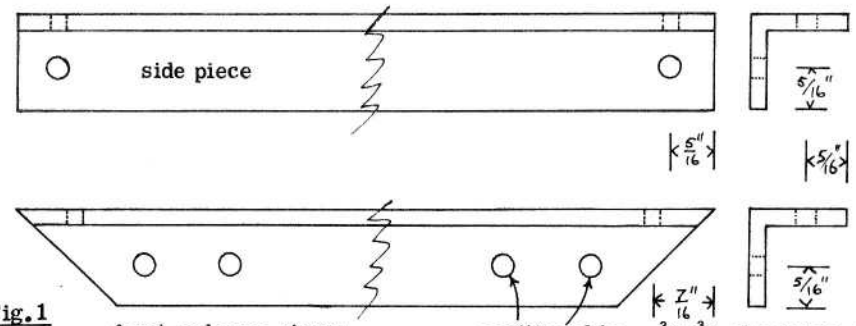


Fig.1

front and rear pieces. lengths to suit CRT

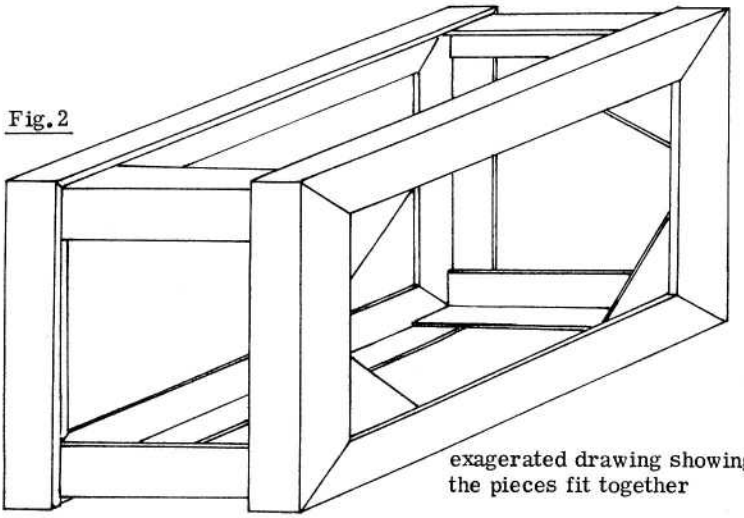
positioned to suit corner pieces

$\frac{3}{4}$"x$\frac{3}{4}$" aluminium angle. Holes, 5/32" diameter.

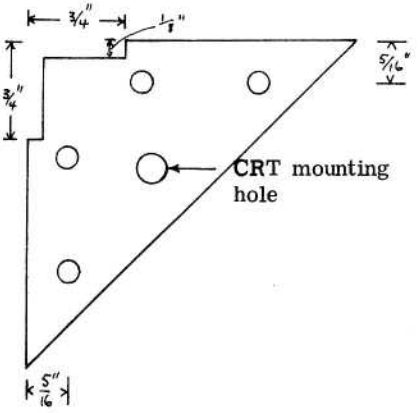
Now, for each corner in turn, place the three pieces together with the side piece on the inside, and mark the outer pieces through the holes in the side piece using a pencil or scriber. Drill these holes in the outer pieces and countersink them.

Assemble the frame as shown in Fig.2 and position it over the CRT. Now measure the size of the corner pieces required to mount the tube. Cut these from 10swg aluminium sheet and shape them as shown in Fig.3 drill the holes in the corner piece and then, using this as a template, mark the holes in the frame. Drill and countersink these holes.

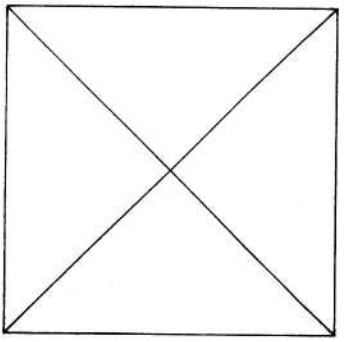
Fig.2



exagerated drawing showing how the pieces fit together



Corner piece



cutting four corner pieces from a square of aluminium

Fig 3.

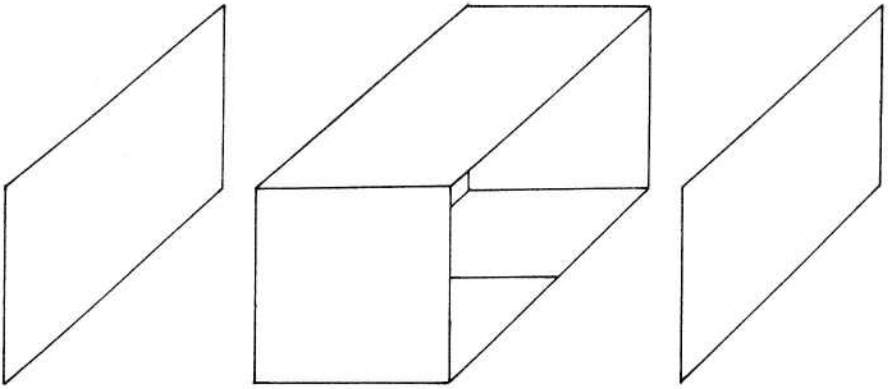
Before mounting the tube it is advisable to make a template for the front mask. To do this, lay the tube face down on a piece of card and mark the outline of the tube using a pencil held vertically against the tension band. Cut the card slightly undersize so that when forced onto the tube face it takes up the shape of the tube.

You now have a strong frame for your CRT. Components and PCB's can be mounted directly on the frame or on $\frac{1}{2}$" x $\frac{1}{8}$" aluminium strip fixed across the frame members.

If the monitor is to be built into existing furniture then two shelves can form the top and bottom covers, it just remains to fill in the sides as necessary.

A free standing monitor will require a metal or wooden box.

A metal cabinet can be made from 18swg aluminium sheet. Two pieces the same size as the width and height of the frame should be cut for the back and front. The back should be screwed directly onto the frame. This can be done with quick release screws if you have some available. For the front you need to cut out the hole for the tube using the template previously made and then fix it to the frame with long bolts fitted with extension tubes. About 1" is the spacing required for a 19" tube. Now measure the distance from the front mask to the rear and add about 1" to give the depth of the sides. The side piece is a single wrap-around piece bent as shown in Fig.4. It it fixed to the monitor frame at the bottom only. To complete the cabinet you need four rubber feet and a coat of paint.



"wrap around" case.

Fig 4.

A wooden cabinet can be made from 3/8" plywood. The front is cut to the frame width plus $\frac{3}{4}$" by frame height plus $\frac{3}{4}$". The hole for the CRT is marked using the template and cut out with a fretsaw. The back can be cut from hardboard and fixed directly to the frame. Its size is the frame width by the frame height. Now measure the distance from the back of the front mask to the back of the hardboard, this is the size of the sides, top and bottom. The sides are cut equal to the frame height and the top and bottom equal to the frame width plus $\frac{3}{4}$". All five pieces are now fixed together using strong adhesive and $1\frac{1}{4}$" x 4 countersunk woodscrews. Cascamite resin adhesive is strongly (pardon the pun) recommended. The cabinet can be covered with Fablon or similar material or you might like to try your hand at veneering. The monitor frame is slid into the cabinet from the rear and secured with screws passing through the base.

The monitor frame should slide easily into the cabinet and a clearance of no more that 1/16" should be allowed on the dimensions given to allow for this. This is why it is better to build the cabinet around the finished monitor. If you make a mess of the aperture for the CRT you can purchase a flexible plastic U-shape channel from ironmongers or motor accessory shops and fit this around the hole to hide any inaccuracies. Finally on the subject of ventilation, the wooden cabinet will require a row of holes at the top and bottom of the back panel. A transistorised monitor does not generate as much heat as the old valve types and the metal cased monitor may be able to dissipate this without any problems.

The Beeb's new clock

Did you know that the BBC2 clock is now being produced electronically, and that the BBC1 clock is expected to follow suit in the near future? You did? Well what you may not know is that one of our members, one Richard Russell of the BBC's designs department was responsible for the electronics.

The new digital system has done away with the old cameras, slide scanners and mechanical clocks, it is cheaper to run and takes up far less space. It is also more reliable and has better resolution than the old system.

The picture seen by the viewer consists of the clock face with the BBC logo indicating the channel. The network logo for BBC2 is generated using run-length encoding where the data is stored in a PROM. Colour changes are limited by the size and speed of the data memory. The use of a buffer memory permits at least 64 changes on each line.

What else has Richard been up to? Well, just take a look at the electronically generated colour test card featured in the new 'Amateur Television Handbook' and you will find out.

Publications

THE FOLLOWING ITEMS ARE AVAILABLE FROM BATC PUBLICATIONS:-

AMATEUR TELEVISION HANDBOOK by John L.Wood G3YQC & Trevor Brown G8CJS, published by BATC. First edition.
£1.50p members, £2. non-members. Plus 35p post.

SLOW-SCAN TELEVISION by B.J.Arnold G3RHI, published by BATC.
Second Edition. 35p plus 14p postage.

CQ-TV BACK ISSUES. The following back issues are still available although stocks of some are low: CQ-TV 68, 69, 73, 76, 77, 79, 82, 83, 86, 87, 89, 90, 91 and 93 onwards. PRICE.... CQ-TV numbers up to 92 25p, CQ-TV 93 and later 50p each. Please add sufficient postage.

REPRINTS (photo copies) of any article in past issues of CQ-TV can be supplied at 5p per sheet plus postage. Payment preferably in UK postage stamps.

INDEX of all main articles in past CQ-TV magazines including page count for all articles - essential if ordering reprints. PRICE 40p (preferably in UK postage stamps) plus a large (9" x 4") S.A.E.

ALL PUBLICATIONS ARE AVAILABLE FROM;

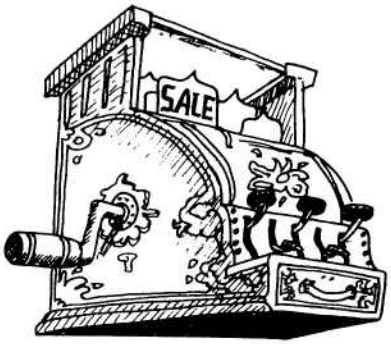
BATC Publications.
14 Lilac Avenue,
Leicester,
LE5 1FN

Please do not order publications from club sales.

No 112

SOLUTION TO CQ-TV 112 CROSSWORD.

Sorry if it was a bit hard!



MARKET PLACE

Adverts are placed in this column free of charge to paid up members. an address label from a recent CQ-TV envelope should accompany your ad.

ADVERTISING RATES.
Classifieds - 3p per word.
Full page (cover) - £20.
Full page (inside) - £18.
Smaller displays - proportional.

FOR SALE
EUMIG vidicon camera type 551, 625 line interlaced, zoom lens, pistol grip. £95 or near offer.
T.Mitchell G3LMX. 27 Hanmer Road, Simpson, Milton Keynes, MK6 3AY
Tel: (0908) 670817

BY ORDER
OF MY XYL, does anyone have a use for 405 line only receivers?
Cossor 937, KB QV20 'queen', RGD deep 17, the ancient circuits for these and others are available.
Complete manual for EMI portable tape recorder type L4.
Transformer, ideal for linear PA. 675v, 500v, 0 x 2 (total KVA 0.4) 240v 50Hz primary, £4.

FOR SALE
The BATC has obtained the following TV tubes and are able to offer these to members brand new at the remarkable price of £10 each.
M38-104-GR/R, green phosphor, (ideal for computer VDUs).
90° deflection angle, 28mm neck.
Please phone Lewis Elmer G8EUP on Rugby (0788) 87324 weekends.

FOR SALE
TWO SURVEILLANCE 1 of 8 switchers, made by ITC. Self contained in large Verobox with PSU, calculator style keypad and LED digital display. SO239 connectors. Very smart! Used but in good condition. £16 each + 50p post.
SIMPLER 4 way switcher, built in PSU. £5 plus 50p post.
Manor supplies colour bars PCB. £5 plus 50p post.
Computer keyboard (47 alphanumeric + 10 aux keys) encoded in funny ASCII (best to re-build with encoder chip). Used. Very sturdy. Ideal for TV typewriter. £20 incl. carriage.
30PCB mounting keyboard keys, not engraved. £2 plus 25p post.
MONOSCOPE tube, type C913C (test card C). Prefer swop for another pattern, or make me an offer.
FRENCH colour TV set by ITT. 20" screen. SECAM colour, CCIR monochrome, also 819 lines and video out. Almost new, with stand. £250 ono. Ideal for DX.
SONY KVC-181 PAL/NTSC colour TV set, 18" screen. Excellent condition. £250 ono.
CHARACTER generator IC (2513) unused with data £2.

WANTED.
Reasonable industrial colour effects generator, anything considered.
Andrew Emmerson, 4 Mount Pleasant, Blean Common, Canterbury, Kent. CT2 9EU. Tel: (0227 77) 471 after 8.30pm, anytime, weekends.

FOR SALE
PHILIPS 1" VTR. EL3400.
Lewis Elmer. Tel: (0788) 87324 weekends.

FOR SALE
MONOCHROME monitor tubes, boxed, unused. M50 120 WA/R, 110° 28mm neck, (improved white phosphor for professional TV monitors) 2 off.
M38 100 W/R, 90° 28mm neck, (standard white P4 phosphor) 1 off.
Offers please to R. Piper G3MEH. 26 Finmere Crescent, Aylesbury, Bucks. HP21 7DG Tel: (0296)88239 late evenings and weekends.

WANTED
Information and/or circuits for min' oscilloscope type CT52 (part of AP68622) and Ultra Valiant transceiver (tuned to 160 MHz)
M. J. Bonner. G8ALB. Feltham, Middx. Tel: 01 890 0444

FREE
A SMALL quantity of manuals for Bendix Radio frequency meter type BC221 (SCR-211-M) are available for the cost of postage to members of the BATC. These manuals are new and unused.
J. Wood. G3YQC. 47 Crick Road, Hillmorton, Rugby. CV21 4DU. Warks.

PC ELECTRONICS 10 Watt ATV transmitter. Unequalled at under £100. Compact, solid state and reliable. Used at over 20 UK stations. For details send large SAE to;
Blean Video Systems, 4 Mount Pleasant, Blean Common, Canterbury, Kent. CT2 9EU.

EXCHANGE
MAZDA A31-18W CRT (12" 110°) new, complete with scan coils and data. FOR, 5" viewfinder CRT or similar.
R. Hanes. 13 Pinebank, Bishops Cleeve, Glos. Tel: Bishops Cleeve 2976.

WANTED
MIRAGE HD800 camera.
Technical data on EMI cylindrical camera type BC601A and associated CCU.
Cold cathode tube G1-371K (3 off).
A. Emmerson G8PTH, 4 Mount Pleasant, Blean Common, Canterbury, Kent CT2 9EU

PCB's

Printed circuit boards for projects in the new "AMATEUR TELEVISION HANDBOOK" are available from Club Sales. At the time of writing prices have not been fixed but details may be obtained from Club Sales.

A set of three double sided PC boards for the Colour Test Card is under development and it is hoped to make these available within a few weeks.

CLUB SALES

CAMERA TUBES	Price	Postage
EEV Leddicon	£ 82.	nil
½" E.M.I. 97777 Ebitron	£ 28.	nil
2/3" E.M.I. 9831 amateur grade vidicon	£ 12.	nil
1" E.M.I. 9677 amateur grade vidicon	£ 12.	nil
1" E.M.I. 9728 amateur grade vidicon	£ 12.	nil
4½" E.M.I. 9565 Image Orthicon	£ 10. for 2,	buyer collects
1" E.M.I. 9706 amateur grade vidicon (5" version)	£ 12.	nil
VIDICON SCAN COILS		
1" ex-industrial (limited number only)	£ 6.	£1.
2/3" E.M.I. ex-industrial (limited number only)	£ 6.	0.60p
ACCESSORIES		
Paxolin sockets for 1" or 2/3" vidicons	0.32p	.12p
'C' mount lens mounts	£ 1.00	.17p
STATIONARY		
BATC headed notepaper & envelopes (50 sheets)	£ 1.75	£1.
EEV test card	£ 2.90	.50p
BATC test card	.50p	.20p
BATC reporting chart (illustrated)	.12p	.15p
Lapel badge - diamond shape (button hole type)	.40p	.12p
Lapel badge - latest circular shape (pin type)	.40p	.12p
Lapel badge - new pin type with call sign	.70p	.12p
BATC key fob	.50p	.12p
Equipment stickers - latest circular shape 1" dia	.15p	.12p
Windscreen stickers - latest circular shape 2½" dia	.10p	.12p
Ties - printed with the latest club badge	£ 1.80p	.20p

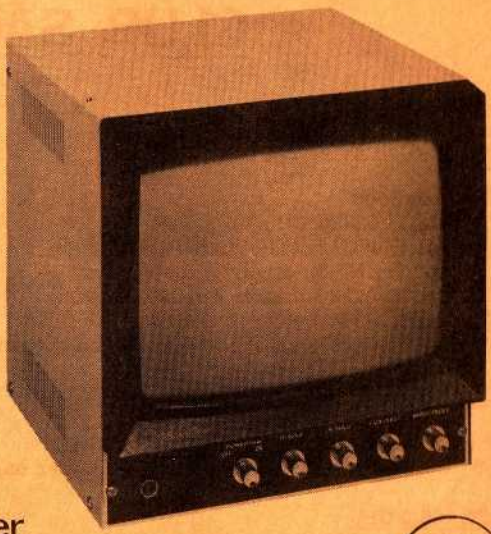
Will overseas members please ask for a quotation of postage costs before sending their cash. For small items it is cheaper to send several items in the same package, please try to estimate the correct amount. Our thanks go to those members who estimate on the high side and suggest that any balance be put to club funds.

Please send orders to; Mr. C.G. Dixon (BATC club sales). Kyrles Cross, Peterstow, Ross-on-Wye, Herefordshire. HR9 6LD.

Project 100 printed boards are available from Tom Mitchell. 27 Hanmer Road, Simpson, Milton Keynes. Bucks. MK6 3AY.

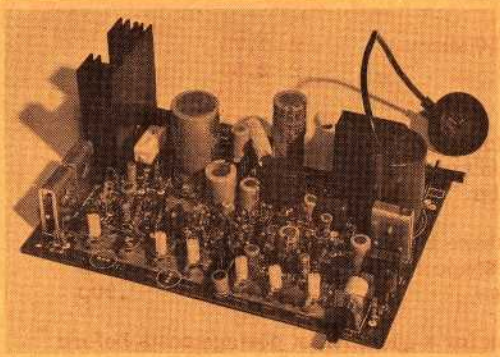
PLEASE NOTE THAT THIS LIST CANCELS ALL PREVIOUS ONES.

Self-contained 10" MONITOR



* Totally enclosed
* All transisterised
* Suitable for analogue signals or alpha-numerics
* Operable on 220v Mains or 12v DC power
* Comparable to wire frame monitors

ONLY **£85.00**



Self-contained MONITOR PCB

* Compact size, 5"x7"
* Complete with power and video plugs+leads
* Scan coil assembly as standard supplied

ONLY **£35.00**

* Transformers, tubes and surrounds available
* 15v Mains or 12v DC power * Ideal for O.E.M. use

CROFTON ELECTRONICS LTD.

35 Grosvenor Road, Twickenham, Middx. Tel: 01 891 1923 (PRICES ARE EX VAT & P&P)