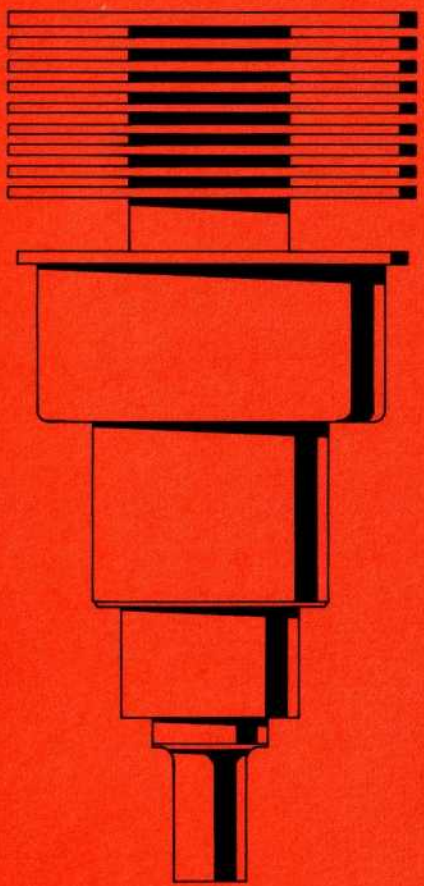
CQ-TV MAGAZINE No. 119

BRITISH AMATEUR TELEVISION CLUB

AUGUST 1982



2C39 1·26 GHz TELEVISION AMPLIFIER.

ALSO.....

A 2C39 TV MODULATOR.
70cm to 2m & ATV CONVERTER.
THORN TX-9 VIDEO/AUDIO CONVERSION.
F.M. TELEVISION.
FLASHING CAPTIONS.
DOMESTIC V.C.Rs.

Plus heaps more...

COMMITTEE

Roger Appleton		PRESIDENT
Mike Crampton	G8DLX	CHAIRMAN
Trevor Brown	G8CJS	GENERAL SECRETARY
Arthur Rix	G3RYF	TREASURER
John L.Wood	G3YQC	EDITOR, CQ-TV
Brian Summers	G8GQS	MEMBERSHIP SECRETARY
Peter Delaney	G8KZG	MEMBERS SERVICES
Ian Pawson		PUBLICATIONS
Paul Marshal	G8MJW	LIBRARY
Alan Watson		EQUIPMENT REGISTRY
Graham Shirville	G3VZV	CONTEST MANAGER

Jeffry Borin		Lewis Elmer	G8EUP
Cyril Chivers		John Lawrence	GW3JGA
Mike Cox	G8HUA	Dave Lawton	G8ANO
Grant Dixon	G8CGK	Don Reid	
Eric Edwards	GW8LJJ	Paul Surtees	G8OVX

WHO TO WRITE TO:

CQ-TV copy and advertisements	J.L.Wood. 47 Crick Road, Hillmorton, Rugby CV21 4DU. Tel: 0788 846220
Subscriptions and change of address	D.Lawton, Grenhurst, Pinewood Road, High Wycombe, HP12 4DD. Tel:0494 28899
Membership enquiries and applications	B.Summers. 13 Church Street, Gainsborough, Lincs. Tel: 0427 3940
Orders for components and printed circuit boards	P.Delaney. 6 East View Close, Wargrave, Berks. Tel: 073 522 3121
Orders for books and other 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.

MEMBERSHIP

Full year £3**(1982 Only) or 0.75p for each remaining quarter in the year. All subscriptions fall due on the first of January each year. Overseas applicants should please not send foreign cheques.
** Subscription for 1983 - £4. (please note new address for renewels).

CONTENTS

5	24cm TV POWER AMPLIFIER. At last! A proven design for the 2C39 valve.	R.Timms	G8VBC
13	SLOUGH CANAL FESTIVAL. A report on the Home Counties Video Group outing.	J.Betts	G4HMG
14	CIRCUIT NOTEBOOK. No. 34. A versatile sync. seperator.	J.Lawrence	GW3JGA
16	CONTEST NEWS.	G.Shirville	G3VZV
17	A 2C39 MODULATOR. An AM TV modulator for the TV power amplifier.		W6OR
18	A U.H.F. MODULATOR. Adding sound to the Astec UM1233.	B.Procter	G8AWN
19	70cm to 2m & ATV CONVERTER. A dual purpose converter - to build.	G.Leighton	
25	CONVERTING THE THORN TX-9 FOR AUDIO/VIDEO IN/OUT. A useful conversion for this outstanding set.	A.Warne M.Crampton J.Wood	G4EZO G8DLX G3YQC
31	TV ON THE AIR. News and views from home and abroad.	A.Emmerson	G8PTH
34	FM TELEVISION. More useful gen and circuits for this fast expanding mode.	J.L.Wood	G3YQC
40	FLASHING CAPTIONS. Make your character generator flash.	D.Haines	G4IPZ
42	THE DOMESTIC V.C.R. Considerations when using domestic VCRs for amateur TV.	J.Goode	
45	PLUGS AND SOCKETS. Those awkward Japanese home video plugs unravelled.	A.Emmerson	G8PTH
46	MARKET PLACE. A cornucopia of bargains - and some of it's free!!		

CLOSE FOR PRESS DATE FOR THE NOVEMBER ISSUE.....20th September 1982

EDITORS POSTBAG

Dear Ed,

I have been following with interest the articles on 24cm ATV and the ensuing correspondence concerning AM vs FM.

Whilst agreeing that FM is the obvious choice for wideband microwave transmission, I feel that the first ATV repeaters, which would necessarily be of an experimental nature, should use the AM standard, conforming to CCIR system I. This would, of course, not preclude the use of FM for simplex working.

The advent of TV repeaters is bound to generate a focus for those already interested in ATV, but who have not yet ventured onto 24cm. At the same time, newcomers to ATV maybe encouraged by the knowledge that, if they are within the primary service area of an AM TV repeater, regular reception may be guaranteed by the addition of an inexpensive converter and a physically small aerial, to a standard broadcast receiver. With such a set-up, performance need not be compromised by slope detection and no mods to the TV are necessary.

If future research PROVES that the problems of AM outweigh the advantages, we can always change to FM, but I think a trial period would be a wise course of action.

Peter Harston, G4JQP

Dear Ed,

.....Amateur radio in Australia is an expensive hobby. It is almost impossible to obtain any component that is only slightly out of the ordinary - thus requiring overseas ordering.

To give you an example of costs I will relate my experience in purchasing some PCBs from the BATC. First, the PCBs cost £51. The postage is valued at £14 for air mail, a bank cheque and postage to the UK costs £2. Unfortunately it doesn't end there - the customs department charged 35% duty (on something that can't be made or purchased locally) plus 17½% sales tax, (we must be thankful that there is no VAT in Australia), this came to £27!

So you see the whole excercise cost me £94 for the 13 boards compared to the original cost of £51.

My thanks are extended to the BATC - your assistance makes life a little easier for the ATVer in Australia.

Rod Henderson, VK6RH/T

Dear Ed,

.....With the lack of ATV amateurs to date, the Russian FM-TV satellite on 714MHz makes an interesting project here. It's taken me over a year of fiddling to get an acceptable picture with sound, being only just above the horizon. From September to April, European Band 1 DX-TV stations usually make-it this far south, sometimes with brilliant results. So I keep myself busy!

Jim Maden.
Rep. of South Africa

Dear Ed,

Could some thoughts be published so as to encourage discussion on the TV standards to be adopted for ATV repeaters. I believe that some 3 repeaters are being considered at present Worthing and Luton being two, The Luton one appears to be held-up for the want of a decision on an operating mode, ie whether to transmit with FM mod. similar to SHF TV links and satellites (professional) with the advantage of easier RF power generation but non-compatable with current receivers, or AM whereby amateurs could immediately use the repeater - with only a down-converter.

Barry H Twist, G8NCL

MONEY, MONEY, MONEY.

ALL payments to the BATC should be in UK cheques or postal orders. Cheques from overseas members should be on banks with a UK branch. Sterling currency or International Money Orders may also be used.
Please ensure that ALL CHEQUES Etc. are made payable to "The BATC". Please do not make cheques payable to individuals.

NEWS SERVICE.

Owing to a low response to the request for comments regarding a BATC news service, and bearing in mind the widely differing suggestions by members who did reply, the committee has decided to defer any further action until sometime in the future.

1983 SUBSCRIPTIONS.

The day to day running expenses of the club, including the production costs of CQ-TV magazine, have now risen to a figure which is well in excess of the clubs income from anual subscriptions. Therefore the committee has decided that as from the first of January 1983, the annual subscription to the BATC will be £4. Persons joining or re-joining the club will no longer have to pay a 50p enrolment fee.

Hon. TREASURER.

The Hon. Treasurer of the BATC has moved QTH. His new address is:-

Mr. A.W. Rix.
5 Wick Drive,
Wickford,
ESSEX.

DIGITISING VIDEO.

Owing to the pressure on magazine space for this issue, the second part of 'Digitising Video' has had to be held over till next time. Sorry!

ED

UOSAT NEWS.

The University of Surrey issued a bulletin concerning UOSAT on the 21st of April this year. The substance of this bulletin is that owing to a malfunction, the main computer has issued a false command so that both data beacons have been activated and are generating pure tones. This has effectively deafened the command receivers, making control of the spacecraft extremely difficult.
To get over the problem, the aerial system needs to be extended and the power of the command transmitter increased. The correcting commands can then be sent when the spacecraft is directly overhead. This could take several weeks.
In view of the above problem, the vision experiments can not go ahead at present. Members who wish to obtain details of circuitry and printed circuit boards for this experiment should contact AMSAT UK who will be handling these items.
At the time of writing (June), although the PCBs have been designed, they will not be manufactured until prototypes have been proved in service.
The BATC regret that, despite an earlier announcement, the club will not be handling printed boards for the project.
The address of AMSAT UK is:-
The Secretary, AMSAT UK, 94 Herongate Road, Wanstead Park, London E12 5EQ.
Please enclose a SAE with all enquiries.

SOUND ON SCREEN!

Intrigued by audio flashing across his TV screen when tuned to 70cm, G8CER fell to wondering if it would be possible to use these flashes to identify the source of the transmission, since the signal could not be heard on the TV itself.
Apparently, by using an opto diode sensor placed in front of the screen and feeding a 741 op-amp, sufficient audio was indeed recovered to enable identification of the signal. The transmission was AM. FM would not work.
G8CER was not forthcoming with a circuit or diagram, however those familier with opto devices may like to try this method for themselves.

MOCROWAVE COMPONENTS AND MODULES.

Members may be interested in a company who specialise in microwave and UHF modules and components.
Modules include a 1296/144MHz receive converter, a 1296MHz RF amplifier, 1296 MHz image rejection filter and an 1152MHz filter/2-way power divider. These modules are available in kit form.
Components include BFR34A, BFT66, 3SK88, NE02137, 100pF chip caps. DAU PTFE 6pF trimmers, 2m & 70cm helical filters etc.
Price lists are available by sending a SAE to Jewell & Powis. 1 Lindum Avenue, Trentham, Stoke on Trent, ST4 8DR.
Tel: 0782 642507.

NEW FORTOP TRANSMITTER.

Fortop Ltd have announced a new version of their successfulTVT432 transmitter, designated TVT435.
This latest product retains the same high performance but with the addition of two switched video inputs and a choice of either 435 or 437MHz. The TX/RX switch has a useful indicator lamp and a modulation sense switch gives a choice of either negative or positive going video - useful for those able to work the continent. Full aerial changeover switching is now built-in.
Of particular note in this new design is the incorporation of a video low-pass filter which cuts off at 2.5MHz (or 4.5 MHz to order). This does ensure that the transmission does not occupy more bandspace than is necessary, and, since digital video sources are becoming more widely used, it is essential that a video filter is used to limit the high frequencies generated by fast logic switching. Another advantage could be that of an improvement in overall system noise performance. To take full advantage of this however, a bandpass filter should be inserted in the receivers IF system.
Fortop Ltd are to be congratulated on their new product and especially for their forsight and attention to the needs of amateur television as well as the operator.

CQ-TV 118.

You may have noticed three rather embarrassing empty spaces accompanied by cryptic captions in the last issue. These spaces should have held photographs of F3YXs shack but unfortunately our printers omitted to print the pictures. I hope to show the photos as space permits.

Ed.

COLOUR BARS FOR THE BATC TEST CARD.

One enterprising member has found a way of converting the new BATC B&W test card for colour use by including a colour bar strip within the circle.
The IBA issue a leaflet describing and illustrating their square type test pattern (ETP1). The sheet No. is EIS120 9/79. By cutting out the colour bar section of this test pattern it will be found to be the correct size to paste onto the BATC card.
The leaflet should be available from the IBA publications dept. Crawley Court, Winchester.
(see back cover R&EW magazine, Aug.'82.)

SSTV FOR THE FALKLANDS.

In order that pictures from the Task Force in the South Atlantic may be received back in England with a minimum of delay, the Ministry of Defence has rushed the latest Gresham Lion slow scan TV system down there and is now sending back monochrome pictures via a satellite link.
'The system first transmits the picture data of one TV frame in digital form. A new feature, known as variable length coding, scans the next frame to identify only where changes or movements are transmitted and combined with the stored picture information from the previous frame. Data transmission requirements can be reduced by as much as 60% over normal frame-by-frame picture transmission.
The equipment will operate through any standard modem in the range of 1.2 to 128 Kbits/sec and field transmission times depend upon the data rate used'.

from 'Broadcast' 24th May 1982.

A 24cm TV

POWER AMPLIFIER

by Rod Timms, G8VBC

This amplifier is based on a design which appears in the RSGB VHF/UHF manual, (third edition page 5:74). In its original form the unit was known to be somewhat inefficient. Doubts were also expressed as to its ability to tune to the ATV allocations around 1.26GHz or if, in fact, it would handle a wideband television signal at all.

The purpose of this article is to bring together a number of modifications published over the years,and some other ideas,to enable the TV enthusiast to construct an amplifier capable of producing over 30 Watts of RF at 1258MHz, with adequate bandwidth enabling full colour transmissions to be realised.

No originality is claimed by the author for many of the ideas in the article. Particular thanks are extended to G4FZL for his help with this project.

SPECIFICATION

Power output	30 Watts
Drive power	2-4 Watts (under linear conditions)
Anode voltage	800 volts
Current consumption	approximately 100mA
Amplifier gain	10dB
Efficiency	40%
Heaters	5.8v ac (floating)

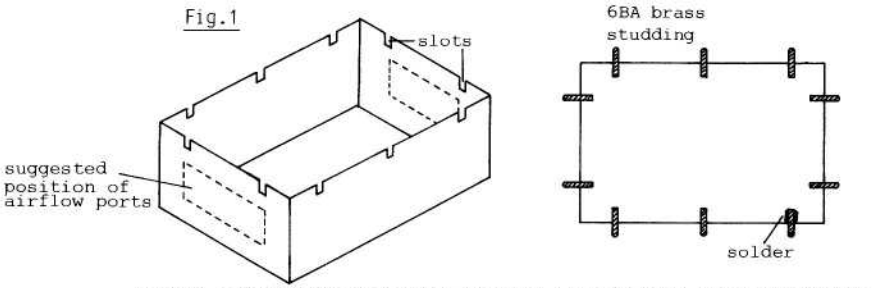
The above figures are those measured on the authors prototype but may be considered as being typical.

DESCRIPTION

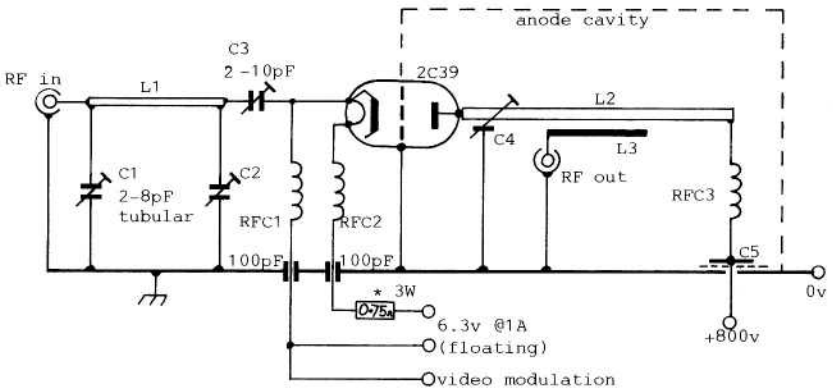
The amplifier uses a 2C39 ceramic or glass valve. The ceramic type has an anode dissipation of 100 Watts whereas the glass has a slightly reduced rating. When purchasing a valve make sure that the radiator has a diameter of 1.2". 2C39 valves with smaller radiators are available but their suitability for this design has not been established. Problems may occur with the cooling and possibly with the capacity effect between the valve radiator face and the cavity base, although this could be compensated for by adjustment of the grid plate.

In the original design the grid plate was bolted to the top of a diecast box but because of the differences found in apparently similar boxes, it proved very difficult to tune the amplifier. To overcome this problem a cavity box, constructed from 1/16" sheet copper was employed and the grid plate cut so as to be a sliding fit within the cavity. This method affords easy coarse tuning of the amplifier over a considerable frequency range. Slots are cut into the sides of the cavity and corresponding screws are soldered to the grid plate to allow it to be firmly fixed after initial tuning, (see Fig.1).

Fig.1



GENERAL ARRANGEMENT OF CAVITY SHOWING SLIDING GRID PLATE TECHNIQUE.



* selected for around 5.8v heaters.

24cm TELEVISION AMPLIFIER CIRCUIT Fig.2

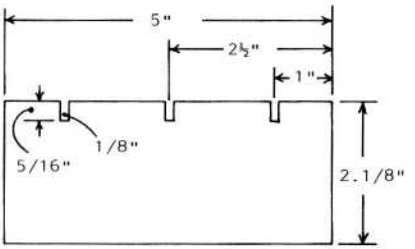
L1. 1" long copper or brass tube, 1/8" dia. (lay across top of C1,C2, not between)
RFC 1,2,3. 7 turns 22swg enam. copper wire on 1/8" former, self supporting.

Other components - see text.

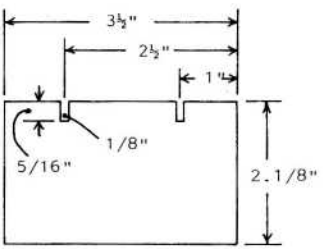
CONSTRUCTION

The cavity is constructed first. Accurately cut out the sides, ends and bottom according to Fig.4 and assemble the box using a vice or clamps. With the aid of a blowlamp or gas torch, solder the joints together using only a small amount of solder. The finished joint should be smooth. After assembly check that the internal dimensions are: 5" x 3.3/8" x 2.1/8". The air vents can be made by either drilling many small holes or by covering a large aperture with fairly fine wire mesh or gauze. Whichever method is used, avoid large gaps as this will disturb the RF field and will allow RF leakage. Exact details are not given for the cooling arrangements since there are many different types of blower fans and air ducting available. Ensure that adequate air cooling is provided otherwise inferior performance and damage to the valve may result.

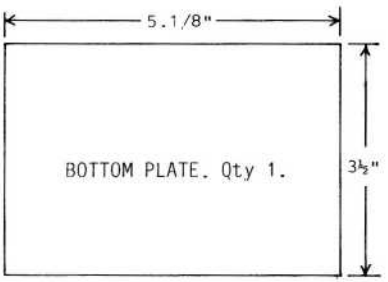
The grid plate should be cut to the size shown in Fig.5 and should be individually tailored to acheive a sliding fit inside the cavity. Drill the holes in the plate according to Fig.5.

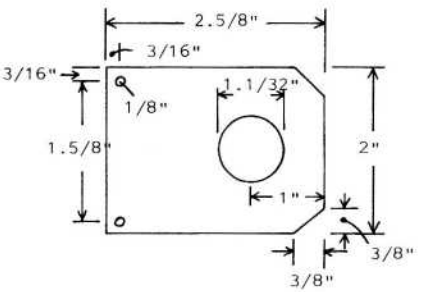


SIDE WALLS. Qty 2.



END WALLS. Qty 2

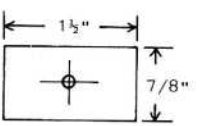




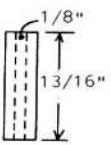
ANODE LINE, L2.

Material for all parts 1/16" thick (16swg) copper or brass sheet.

Fig.4.

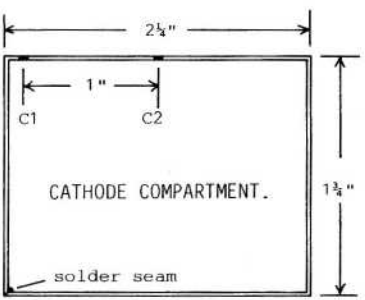


ANODE BYPASS CAPACITOR PLATE, C5.

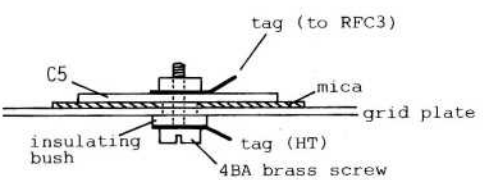


¼" PTFE tube

L2 SUPPORT PILLARS. Qty 2



Bent from 1" wide copper or brass strip, 1/16" thick



DETAIL OF C5 INSULATION.

The fingering used for connection to the valve electrodes plays an important part in the final results. Articles on its manufacture have been published and it can occasionaly be found at mobile rallies. Sota Communications is a possible source of supply. Fingering may be made using phosphor bronze draught proofing strip. The material should be about 5/8" wide and slots should be cut as shown in Fig.9 leaving fingers about 1/8" wide. All burrs should be carefully removed with a fine file. The fingers should then be bent to the shape shown. The finished fingering should be bent to fit into both the grid plate and L2, ensuring that it is a good firm fit over the valve flanges.

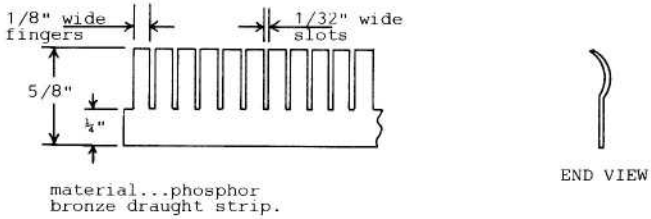


Fig.9. CONTACT FINGERING.

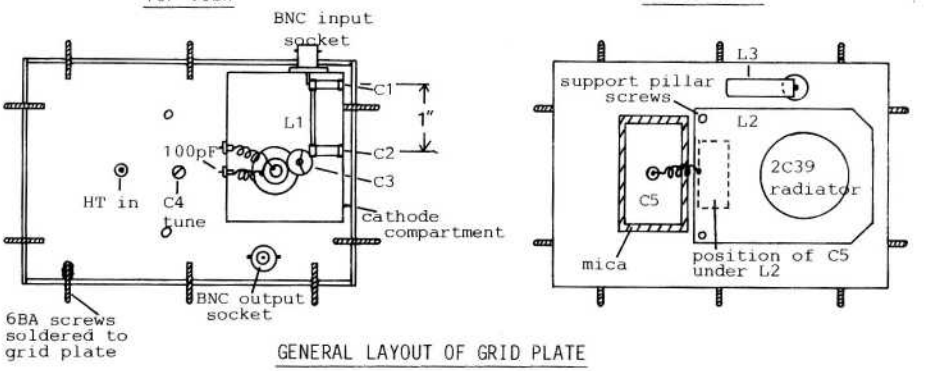
Form the cathode compartment into the shape shown in Fig.5 and solder the following onto the grid plate:-

1] Cathode compartment.
2] Grid fingering.
3] 6 BA brass studs (10 off).
4] Anode tuning capacitor, C4.
5] Anode tuning screw nut.
6] Aerial output socket support nut.

Avoid excessive heat on the finger stock as this will soften it. Copper is an excellent conductor of heat and it is therefore quite difficult to solder parts onto the plate without unsoldering those parts already fitted. This may be avoided by applying tissue or cloth soaked in cold water to act as a heat shunt thus conducting heat away from those components already soldered. This technique may take a little practice to perfect.

Drill holes in the cathode compartment walls (Fig.3) to accomodate the BNC input socket, C1, C2 and the feedthrough capacitors. The height of L1 should be the same as the cathode flange (about ½"). There are three ways of making the connection to the valve cathode: a] by using finger stock. b] by a ¼" wide piece of springy copper or brass bent into a hook which should be a push-fit over the cathode,and c] direct soldering to the valve. Whichever method is used, ensure that the connection is positive. Solder the film trimmer C3 between the junction of L1/C2 and the cathode connector. The heater connection may be made using a small screw or pin that fits snugly inside the heater sleeve. Make sure that the connection is not too tight or the valve insulation may be damaged.

Fig.3



GENERAL LAYOUT OF GRID PLATE

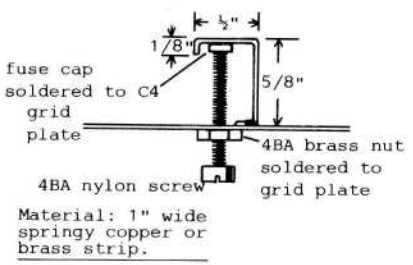
Cut out L2 and drill the holes to the pattern shown in Fig.4. Mount the fingering and solder into place. All fingering should point in the same direction -upwards away from the base of the cavity. The material chosen for the L2 support pillars is most important. PTFE is by far the best but other possibilities are glass or ceramic, it is best to avoid some plastics and bakelite as these may be lossy and could possibly be affected by heat.

A piece of mica should be glued to the underside of L2 to provide insulation from the tuning capacitor C4 (Fig.8). Remember that the anode line will get quite warm therefore a suitable glue should be used. The pillars should be fitted using self-tapping or 4BA screws not longer than about ¼" in length.

C4 is made according to Fig.6. The metal end of a glass cartridge fuse is soldered to the underside of the capacitor. The nylon screw then fits inside this and is therefore not allowed to bend whilst the capacitor is being operated.

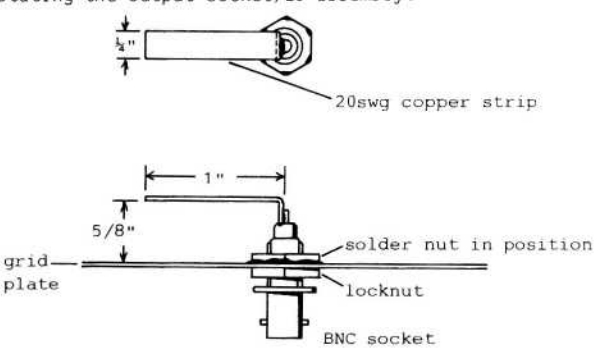
Mica insulation is used in three major places, these are detailed in Fig.8. The thickness required is approximately 0.010" and a suitable supply may be found in toaster or iron elements! The mica used for C5 should be at least 3/16" larger than C5 plate, this ensures that the high voltage does not track between the plate edges and the cavity body.

Output loading is adjustable by rotating the output socket/L3 assembly.



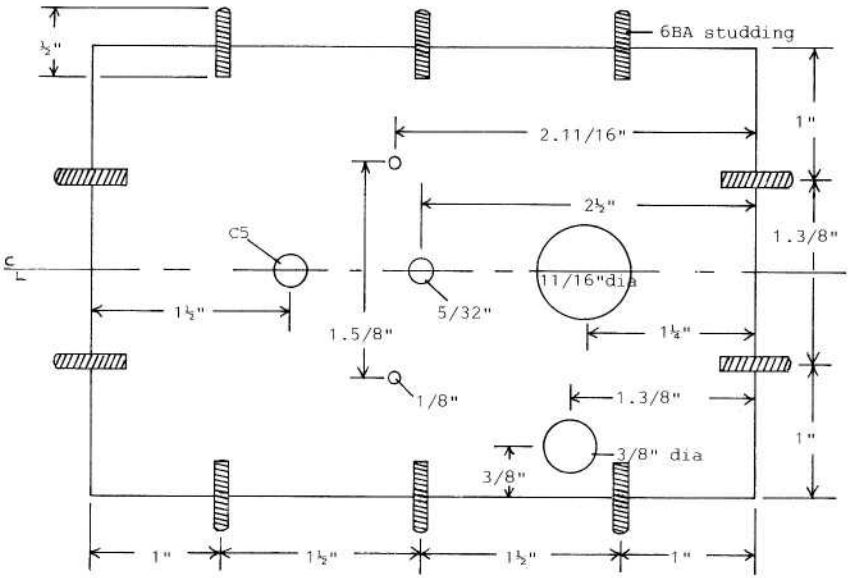
DETAIL OF C4

Fig.6



DETAIL OF OUTPUT COUPLING PROBE L3.

Fig.7



GRID PLATE, INCLUDING DRILLING DETAILS. Material: 1/16" copper sheet.

Fig.5

MODULATION AND VALVE BIAS

AM modulation and bias are provided by the circuit found elsewhere in this issue, it is applied to the cathode via RFC1 as shown in Fig.2. Leads from the amplifier to the modulator should be kept as short as possible.

ALIGNMENT

EQUIPMENT REQUIRED

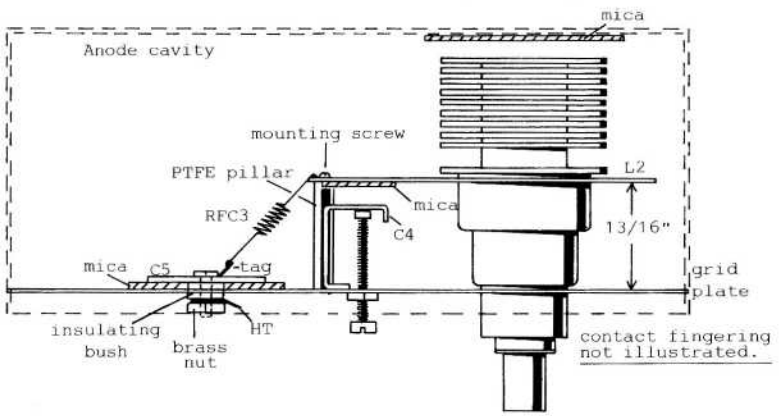
Power meter
RF demodulator probe
Oscilloscope
HT current meter
Volt meter
Aerial or dummy load (50 Ohm resistive)

A preliminary alignment may first be made without HT being applied. This will enable the resonant point of the cavity to be ascertained without endangering the valve.

Adjust the grid plate to the maximum depth available and tighten the securing nuts. Set L3 to a position parallel to L2, (Fig.3) and tighten up the locknut. Connect a thruline power meter between the drive source and the amplifier input, apply drive and adjust C1 and C2 for maximum forward power and minimum reflected. Switch off the drive source, remove the power meter and connect the drive directly to the amplifier. Connect the power meter between the dummy load (or aerial) and amplifier output, switch on the blower fan, apply around 10v of bias to the cathode using the bias control on the modulator, switch on the heaters and allow a warm-up period of at least one full minute. Do not apply video at this stage.

Apply drive but NO HT, adjust C3 and C4 for a reading on the power meter (the reading will be very small) alter the position of L3 for maximum RF indication. If no reading can be obtained, switch off and move the position of the grid plate a couple of millimetres, switch on and repeat the above procedure, continue in this manner until resonance is found. At resonance, C4 should not be set at either extreme of its adjustment, about halfway is ideal.

A reduced HT voltage may now be applied and the amplifier tuned for maximum output power using C1, C2, C3, C4 and L3. Finally apply full HT and repeat the tune-up procedure. Try to obtain maximum output power for minimum current consumption. When the drive source is switched off the standing current should be of the order of 10mA or so, the bias control may be re-adjusted if necessary.



GENERAL ARRANGEMENT OF AMPLIFIER SHOWING POSITION OF MICA INSULATION.

Fig.8

When maximum output power and reasonable efficiency have been attained, apply video to the modulator, an immediate drop in average power should be noted. View the outgoing video on an oscilloscope using an RF demodulating probe and optimise all amplifier adjustment to acheive optimum video/sync ratio, maximum colour burst signal and maximum modulation depth. A sacrifice in power output may be necessary to realise optimum performance. It may take some time to acheive the best results but patience will be rewarded. The major cause of non-linearity is the use of excessive drive, for that reason a variable drive source is advantageous.

It is most important that the amplifier (when used for AM video modulation) is set-up using an RF demodulating probe so that the outgoing video waveform can be monitored.It must be noted that the probe must be of the type that takes a sample of RF from the aerial lead. A loosly coupled probe placed close to the amplifier will give an inverted waveform which is being radiated from the cathode circuit.

NOTES

Adequate cooling is essential. The 2C39 has an anode dissipation of around 100W when forced air cooled but only about 10W without. The valve will almost certainly be destroyed if the cooling is interrupted, for this reason ensure that the cooling fan is operating as soon as the heaters are switched on.

When adjusting L3, MAKE SURE that you don't move the probe too close to the valve or it will touch and will short out the HT. For this reason it is best to switch off the supply, move the probe and tighten up the locknut before switching the amplifier back on.

Please note the following safety aspects when operating the amplifier:-

1] Do NOT look down any gaps between the grid plate and the cavity wall*
2] Do NOT look into the air vent output*
3] Avoid accidental contact with the HT by ensuring that all exposed connections are adequately covered.
4] Ensure that there is a bleed resistor connected from HT to ground so as to discharge the capacitors after the amplifier has been switched off.
5] Fuse the HT at 250mA.

* These only apply when the amplifier is switched on.

If the amplifier is to be AM modulated it will probably be necessary to add extra decoupling capacitors to the HT input connector. These may typically be 1000pF for high frequencies, 0.1uF for video frequencies and a few Microfarads for syncs. Be sure that the capacitor ratings are suitable for the HT voltage used.

In use this amplifier has given excellent and reliable service. Due to the heat generated by the valve, slight expansion of the cavity parts causes a small drift in tuning during the first few minutes of operation, slight adjustment of C4 is therefore necessary. Providing the cooling is adequate, power output remains unchanged after well over an hours soak test at full power.

Air tests have indicated that where a P5 picture is obtained on 70cm with about 30W output, a P4 report can be expected over a similar path using 24cm (assuming average aerials (15/15) and receive converter (G3YQC + LNA - CQ-TV117) and the same power output.

The amplifier may, of course, be used for FM TV, in which case the modulator bias voltage will not be required as the valve can be run in class C. Self bias may be used for this class of emission and will normally be a 3W wire-wound resistor put in the position of RFC2 and connected to ground. (try around 470 Ohms) A higher level of drive power will be required to drive a class C amplifier.

Grateful thanks are extended to the following for their help with this project:- G4FZL, G4LRT and G3YQC.

SLOUGH CANAL FESTIVAL

A large canal festival held at Slough over the early May bank holiday weekend was the location for a demonstration of amateur television, both on the 70cm and 10GHz bands. The Home Counties ATV Group joined forces with the Burnham Beeches Radio Club and Langley College to stage a very fine demonstration of both amateur radio and television in a marquee borrowed from the local Hedgerley Scout Group. On the television side, a station was set up in the marquee, primarily to receive pictures transmitted by a mobile colour television transmitter using 70cm, established on the narrow boat "Lancing" which was providing public trips on the canal, and passing between the 140 assorted craft that visited the festival over the weekend. The trip, which took about two hours, went some two or three miles up the canal to Langley, and throughout the whole of the trip very good colour pictures were received. This mobile station was also received by amateurs in Ealing, Maidenhead and in the Harrow area, other stations received by the base station included a mobile transmitter from the Queen Mother Reservoir at Datchet where sailing was in progress.

The 10GHz equipment was used to transmit pictures from a portable transmitter which was taken around the site, back to the marquee. and in particular, John, G8MNY, was persuaded to climb to the top of a tower, set up by the Army to demonstrate absailing, and obtained some excellent panoramic shots of the Festival from this vantage point. His rapid descent, wearing the full absailing gear, was quite spectacular and the only concession made to him was that our military friends lowered his TV equipment to the ground by rope.

The VHF and HF stations made a wide range of contacts and a particular high spot was when Diana Betts, G4MVV, the wife of the Chairman, joined in a VK YL net on the Monday morning.

Representatives from both the Burnham Beeches Club and Langley College assisted in the operating of the various stations, and several of the group stayed overnight on site to guard the equipment on each of the nights the Festival was in operation.

The Home Counties Video Group have been meeting for about a year, on the 4th Wednesday in the month, in Iver, and a wide selection of subjects have been covered, also one most interesting outside visit was made to Viz News, thanks to the good offices of Dennis Monger, G8VCV. The group now holds the call G6HCT and this was used for the mobile operation on the trip boat at the Festival.

Anyone interested in joining in the activities of the Group is invited to contact G4HMG (QTHR) or phone Iver 651652, or join in the Wednesday activity night sessions, when it should be possible to call members of the Group on 144.750MHz.

John Betts, G4HMG

CIRCUIT NOTEBOOK

By John Lawrence, GW3JGA No. 34.

This edition of Circuit Notebook returns to the topic of sync separators with the combination of two circuits which appeared in the "Design Ideas" section of the January and May issues of EDN Magazine.

CIRCUIT DESCRIPTION.

Incoming video signals are a.c. coupled and d.c. restored before being fed to the inverting input of the voltage comparator IC1 (LM311). This operates as a picture-information-stripping stage. Positive feedback is provided by the 100k resistor taken to the non-inverting input, this speeds switching and gives some hysteresis. The bias level is adjusted by RV1 which is normally set so that switching takes place about half way up the sync pulse.

The inverted sync output from IC1 is taken to the positive trigger input of IC2a, connected as a non-retriggerable monostable. This generates a positive line pulse coincident with the leading edge of the sync pulse, but of somewhat longer duration, about 10μS, set by RV2.

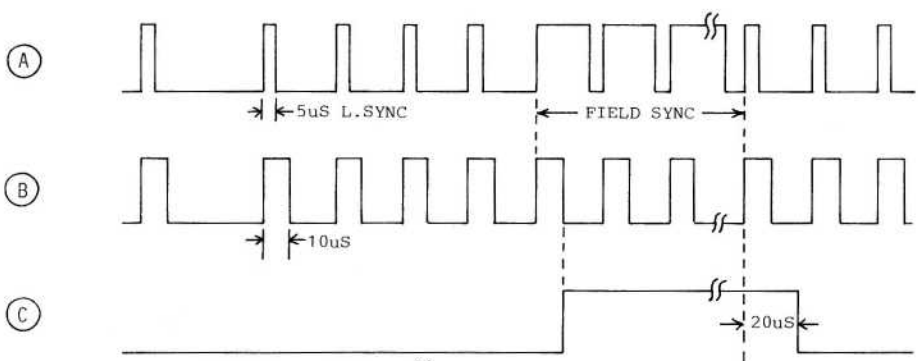
The output from IC2a is taken to the negative trigger input of IC2b, again connected as a non-retriggerable monostable. This circuit triggers only when its C_D input (pin13) is HIGH, a situation that occurs when the input's duty cycle exceeds IC1's time delay (i.e. during the field sync signal). The OR gate IC3a senses this condition.

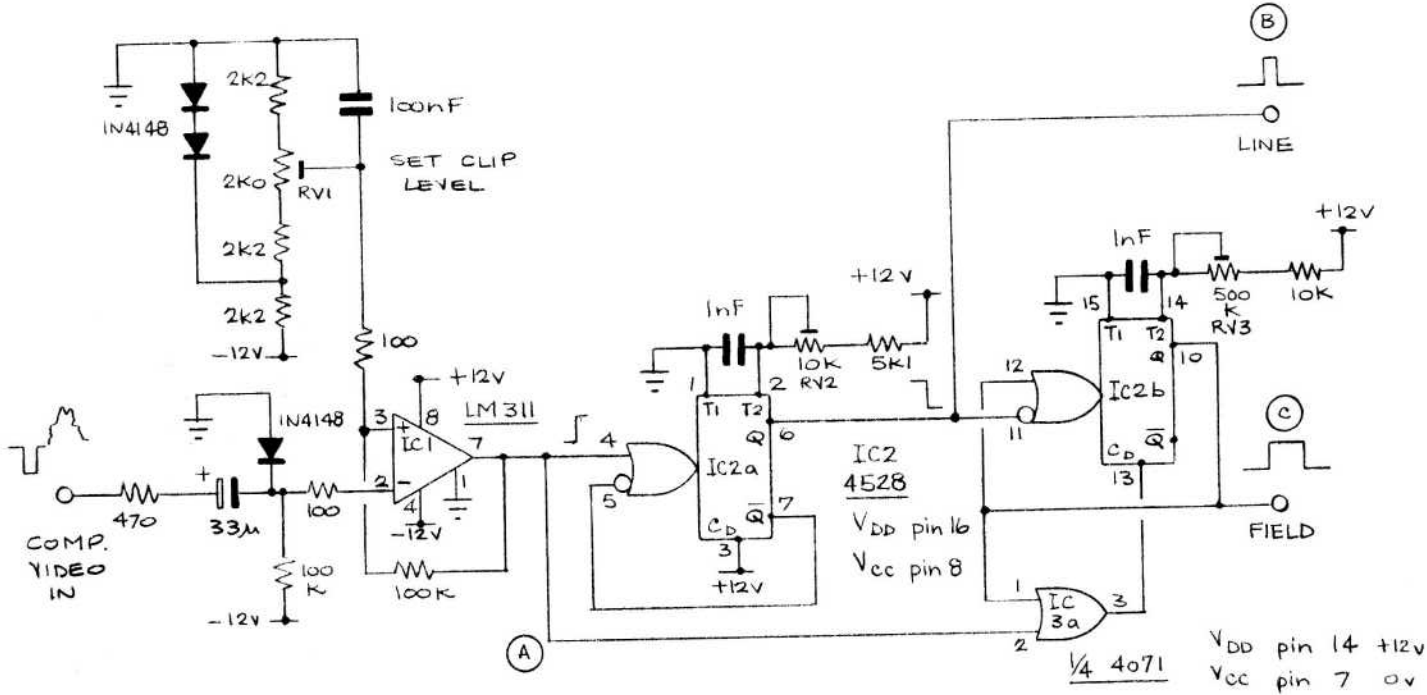
Once triggered, IC2b times-out for a period determined by the setting of RV3. This should be adjusted to give a field pulse duration equal to the field sync + 20μS. This prevents possible retriggering at the end of the field sync.

Negative sync outputs can also be obtained from the $\overline{Q}$'s of IC2a and IC2b.

References

1. Design Ideas "Sync separator provides speed, accuracy" Bradley Albing, EDN January 6th 1982 p.207.
2. Design Ideas "Modified sync separator uses fewer ICs" Stephen J. Bepko, EDN May 26th 1982 p.204.
3. Motorola McMOS data sheet for MC14528 (4528).





SYNC SEPARATOR

GW3JGA

CONTEST NEWS

Not much space this time - so just the rules for the next 2 contests. Results of the Spring Cumulatives not yet to hand but the best DX so far is nearly 700 kms !! Apologies for lack of certificates for the last International Contest - they will be out soon

73's de Graham Shirville G3VZV

1982 INTERNATIONAL ATV CONTEST RULES

Contest period 11-12th September 1982, 18.00 GMT Saturday to 12.00 GMT Sunday.

SECTION A: TRANSMIT/RECEIVE STATIONS

SCORING

Logs have to be entered per band operated
A) Two-way QSO on 70cm: 2 points/km
B) Two-way QSO on 23cm: 8 points/km
C) Two-way QSO on 3cm: 16 points/km

Multi-op stations may only use one callsign.
Crossband QSO's must be entered in the log for the transmit band.
QSO's via repeaters do not count.

EXCHANGES

The following data is to be exchanged;
1) Code group, consisting of four digits, individually chosen by each entrant i.e. 1865 or 9732. All four numbers should not run consecutively. The code group must be exchanged in video only.
2) Call, QTH-locator, report, serial number starting at 001 should be exchanged in video and, if necessary, via phone.

Should one of the stations fail in receiving the picture of the other, the scores for both stations are to be halved. Contacts with "receive only" stations count for half points but see note in Section B.

144.75, 144.80 and 144.17 MHz are well-known ATV calling channels in Europe. Please QSY from these frequencies as soon as a QSO is established.

SECTION B: RECEIVE ONLY STATIONS

For SWL's the same rules as are applied.

Entrants for section B may not 'give' points to stations working in section A.

LOGS: Must include postal address, locator and station details and should be mailed not later than September 30th to:-

Graham Shirville G3VZV
18, Church End,
Milton Bryan,
Milton Keynes,
Buckinghamshire MK17 9HR.

1982 BATC AUTUMN CUMULATIVE

Same rules as International Contest above except:
DATES: 6/14/22/30 November and 8/16 December
TIME: 20.00-23.00 GMT each day
LOGS: To be postmarked no later than 31 December 82.
The best three sessions will count for points

A 2C39 MODULATOR

by W6OR. From an article in "A5 Amateur Television Magazine" Vol10 No.4.

This modulator will drive the 2C39 type of valve with full bandwidth for colour and sound subcarrier to 60 Watts RF output. It was designed specifically for the Sota EDL432 amplifier.

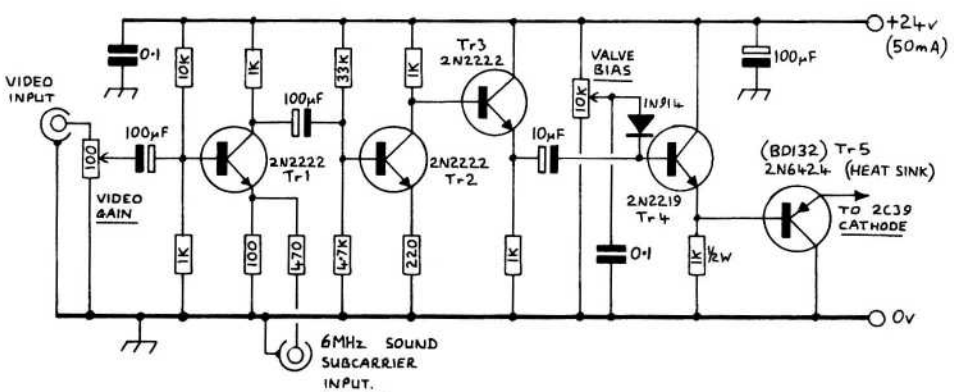
The secret to good colour and sound is keeping the anode circuit bandwidth wide and not using too large a bypass capacitor in the grid circuit.

This modulator has DC restoration and 6MHz sound mixed with the video. The DC restorer pot. is also the valve bias adjust.

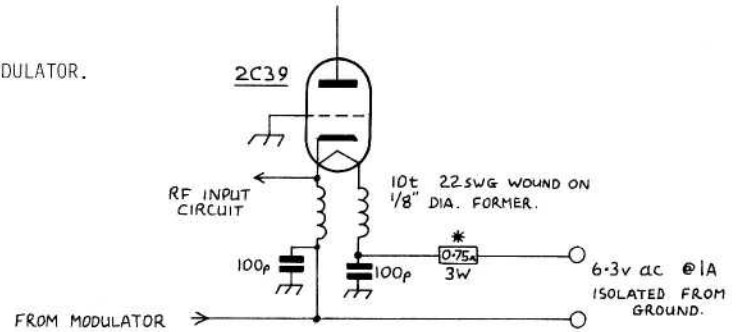
Mount the circuit close to the amplifier cathode. Use wire up to 3" or coax up to 2' from the output of Tr5 and from the board to the transistor. Tr5 is mounted directly onto a heatsink connected to ground.

Apply at least 24 Volts to the modulator (an improvement in mod. depth may be obtained by raising the voltage to a maximum of 30 Volts however above about 28v the 10k base bias resistor at Tr1 should be increased to around 12k), after having first warmed up the valve for at least one minute. Set the bias pot for about 8 Volts at the cathode. With no video input tune the amplifier for maximum output. At no time exceed 200mA anode current, but fine adjust the bias pot. for just at maximum output, then back it off to reduce the RF output by about 10%. Now apply video and adjust the video gain for best picture received by a distant station or on an RF detector probe. If neither of these are available a rough approximation is to increase the video gain until the average RF power output decreases by about 30% from the no-video output.

A ready-built and tested modulator is available from PC electronics in the States. Anyone interested should send an SAE with their enquiry to Andrew Emmerson, G8PTH (address in 'TV on The Air').



A 2C-39 MODULATOR.



* Selected to give around 5.8v heater supply.

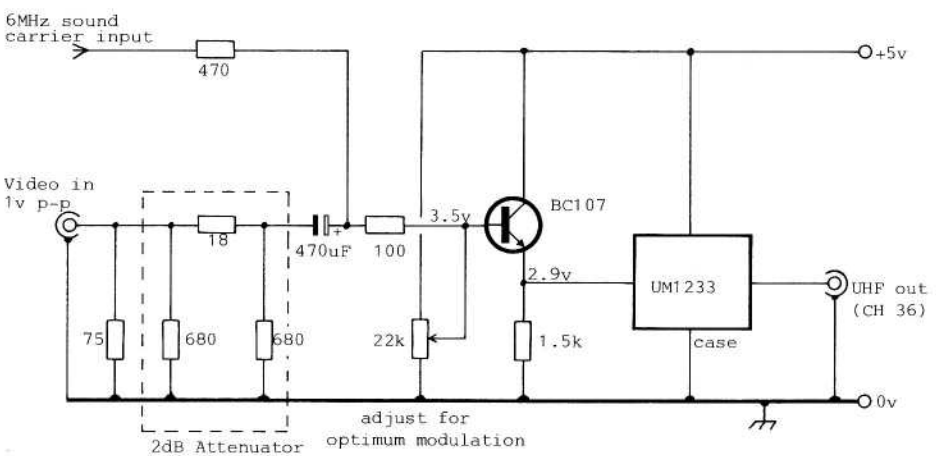
A UHF MODULATOR

by B.Procter, G8AWN.

Following the information in CQ-TV 118 on the Astec UM1231 UHF modulator, I would like to describe my own method of using another version - the UM1233.

The 6MHz sound carrier is generated by the "Elektor" modulator from the June 1978 edition (board No.9925), and in order to keep patterning on the picture to a minimum, the components shown produce a sound carrier approximately 20dB below the vision carrier. Although this is well out of broadcast specification, the results are quite acceptable.

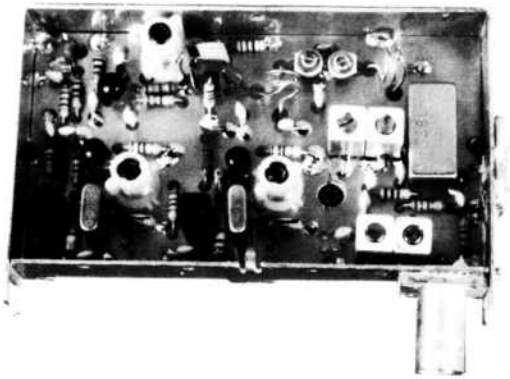
The preset should be adjusted for best modulation and the voltages should be near to those shown. The UHF output compares favourably with that from a Sony C7.



UHF MODULATOR USING THE ASTEC UM1233.

70 CM TO 2 M & TV CONVERTER.

Design by Graham Leighton.



SPECIFICATION

COMMUNICATIONS

Freq. Coverage	8MHz in the band 430-440MHz with a 144-148 MHz IF. 4MHz in the band 430-440MHz with a 144-146MHz IF.
RF Gain	8dB with single filter 6dB with two filters.
Noise Figure	2.5dB (single filter model)
(approx)	5dB (two filter model)

AMATEUR TELEVISION

Freq. Coverage	434-440MHz
IF Frequency	726-732MHz
RF Gain	5dB (single filter model)

GENERAL

Supply Voltage	10V stabilised.
Supply Current	30mA approx

R&EW KIT PRICE £23.50 + VAT

This dual purpose converter is designed to provide very good communications performance - plus a sensitive, stable and convenient amateur TV receive system in conjunction with any UHF TV set. The block diagram is shown in Fig.1.

For communications operation, an output in the 2m band allows the use of any 2m rig as a tunable IF. (Don't press the PTT, please!). The TV output - around channel 52 - permits the use of an unmodified UHF TV set. A single local oscillator and a broadband double balanced mixer provide IFs of 144MHz and 720MHz.

Table 1 gives details of the crystals which may be used together with their various applications. For TV use, use the 97.33 or 98MHz crystal to alleviate the major problems caused by the harmonic relationship of 144/288/432MHz. The two crystals should be within 4MHz of each other, although if slightly inferior oscillator spurii are acceptable this figure may be increased.

If one of your local TV transmissions occurs on Ch 52, the second crystal can be selected to shift the IF frequency and avoid breakthrough - use of the optional input helical filter will also assist - although the filter losses will compromise the noise figure by the degree of insertion loss (3-4dB) - so a 70cm preamp is a virtual must for serious DX work. The bandwidth required for TV must also be borne in mind, or definition may be lost if the RF bandwidth is too narrow.

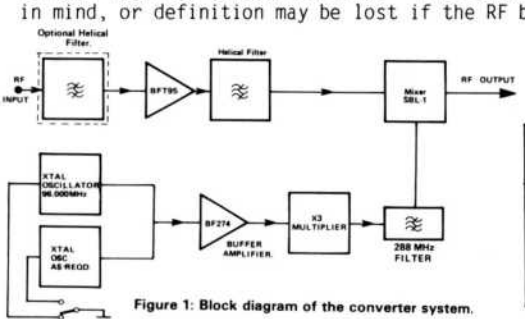


Figure 1: Block diagram of the converter system.

Table 1.

Communications RF Input Freq. (MHz)	IF output (Communications) (MHz)	IF output ATV (MHz)	Crystal Frequency MHz
432-434	144-146		
432-436	144-148	722-728	96.0000
434-436	144-146	724-730	96.6667
436-438	144-146	726-732	97.3333
436-440	144-148		
438-440	144-146	728-734	98.0000

RF designers have at last overcome their passion for gain at the expense of all else, and today's designs are consequently mindful of the importance of correct gain distribution. This converter has been designed with just enough gain to overcome filter and mixer losses to give the optimum balance between large signal handling and sensitivity.

The mixer losses increase marginally when used for amateur TV because of the higher frequency but although the SBL1 is described as a 1-500MHz mixer, no material difference could be detected between the SBL1 and the 1,000MHz equivalent SBL1-X. Most modern TV sets exhibit a fairly high noise figure of 6-11dB (by modern communication standards), so a further amplifier between the converter output and the TV set may be beneficial - although the inadequate strong signal handling performance of most TV sets is likely to be a limiting factor.

CIRCUIT DESCRIPTION

The input stage is a low noise UHF PNP transistor, the BFT95. One of the main advantages of a PNP device at UHF is the simple way in which the collector load is returned directly to ground (via the filter). Low inductance decoupling of the emitter is essential and by virtue of this capacitance from emitter to ground, a degree of low frequency roll off can be established.

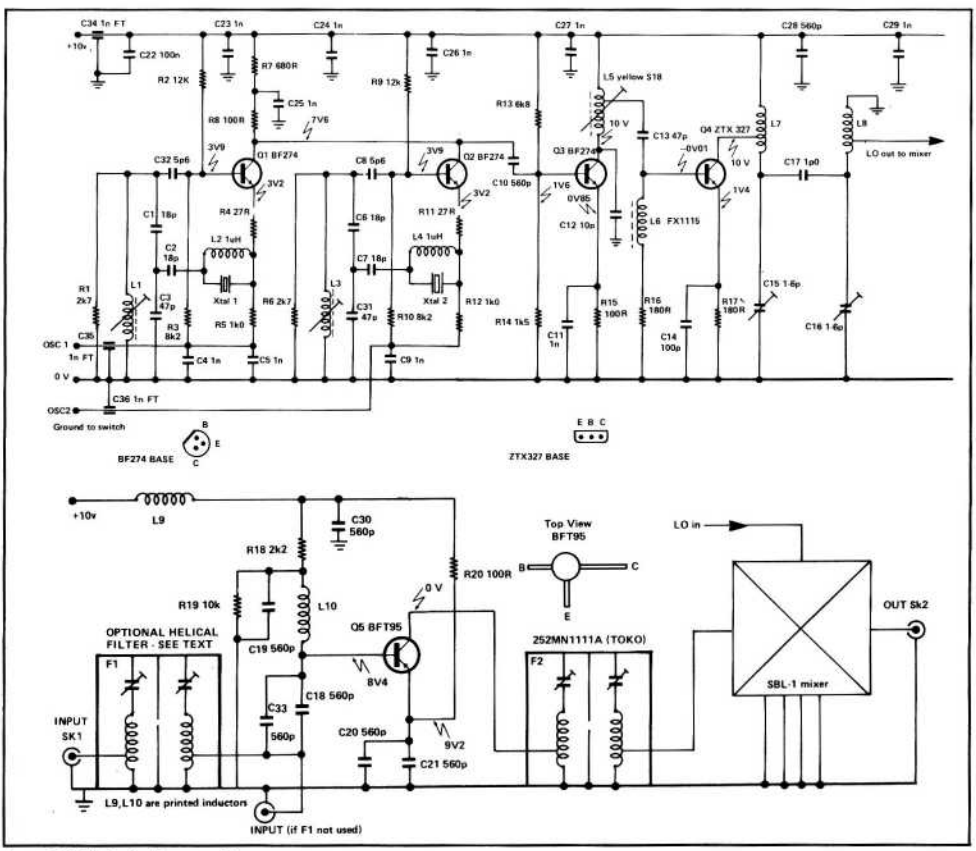


Figure 2: Full circuit diagram of the converter.

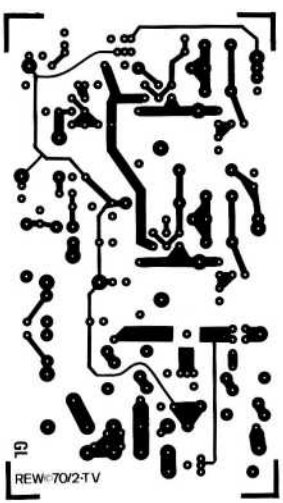
The optional input filter has already been mentioned. Where it is not used, the space on the board may be populated with a simple high pass filter to alleviate the unwanted attentions of 27MHz. The filter tapping points are at 50 Ohm impedance, and thus are suitable for direct connection to the mixer. Ideally, such mixers should be terminated with a resistive load to maintain best intercept performance, but this is not likely to compromise this unit, since the mixer is primarily employed for its wide band characteristics.

The local oscillator chain provides a choice of two crystals to cover the entire 70cm band within the scope of a 2m receiver's coverage. 5th overtone crystals are not generally the friendliest of quartz devices, and frequently tend to disappear on some obscure parasitic resonance unless carefully cajoled onto the right frequency. The resonant circuit established by L1/C1/C3 must therefore be reasonably reliably 'presettable', so TOKO S18 moulded coils are used to avoid ambiguity. L2 is placed in parallel with the crystal to enforce overtone operation.

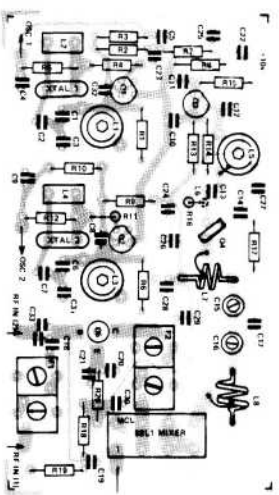
Note that switching is performed at DC, therefore the switch may be mounted as remotely as you like (within reason). Switching crystals mechanically is very difficult at these frequencies and should be avoided.

The multiplier chain uses a ZTX327 in the 'final', driving a bandpass coupled filter which produces a clean LO drive to the mixer. The mixer requires a high level (+7dBm) injection, and the ZTX327 or ZTX3866 are necessary to achieve the required gain and power. In view of the broadband nature of the mixer, it is important that the LO should be kept free from excessive spurii, or various unexpected mixing processes will occur.

Careful decoupling is provided throughout, and the whole unit is built into a screened box with capacitive feedthrough terminations.



PCB Foil Pattern – Bottom.



PCB Component Overlay.

INDUCTORS.

L1,3	4½ turn coil
L2,4	1uH
L5	4½t tapped at 1¼t.
L6	Ferrite bead on lead of R16 (FB2)
L7,8	2t 20swg t.c wire spaced 1 mm, 5 mm inside dia, tapped at ½t (photo).
L9,10	Printed on PCB.

HELICAL FILTERS.

F1, F2	Toko 252MN 1111A

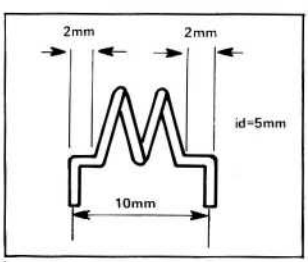


Figure 3: Winding details of L7 and L8.

PCB is double sided and shown here less than full size.

CONSTRUCTION

The printed circuit board is an integral aspect of the circuit design. No attempt at alternative constructional techniques should be attempted unless you are quite confident of your skills. A plated through hole PCB is a delightful luxury, but by no means vital on this small scale - soldering component leads top and bottom of the earth plane will suffice - but get it right first time, since extraction can be painful! All leads must be kept as short as possible. Check through the photographs and diagrams to establish the correct constructional procedure. Note that components with an earth connection (barring mixer and filters) have one lead formed at right angles to the end soldered to the earth plane (topside). This is easier than soldering to both the earth plane and the pad on the track side of the PCB.

The layout has been designed to accommodate either BF274 devices or 'centre base' types (2N918 etc,). Take care to use the correct holes for Q 1,2,3. The tripler stage, Q4 may be a ZTX/2N3866, in which case R17 is 68 Ohms - but comparative tests indicate that the ZTX327 is a shade better suited in view of the supply voltage (10v)

ASSEMBLY DETAILS

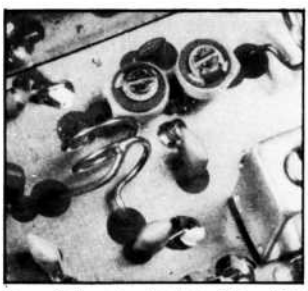
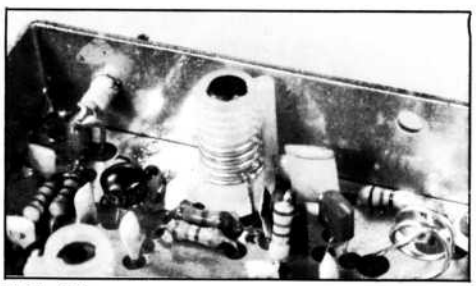
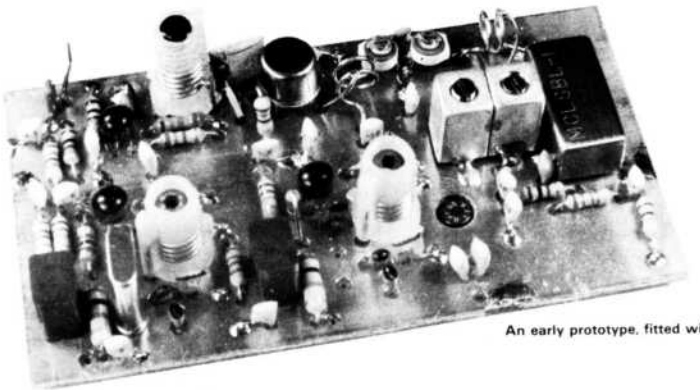


Figure 4: Mounting details for C15 and C16.



Details of L5.

1. Thread some tinned copper wire through the earth holes around the mixer, and solder top and bottom. Make certain that this does not raise the mixer more than a mm or so from the face of the PCB.
2. Solder all the resistors to the PCB - and don't forget the ferrite bead (L6) over the 'hot' end of R16.
3. Fit F2 (and F1 if required). Solder the pins to the track side, and also the can to the topside.
4. Solder L5 to the PCB - care must be taken to attach the tap at 1¼ turns from the Q3 collector end. This is best achieved by soldering a piece of 22swg to the PCB and forming it so that it just touches L5 at the correct point. Briefly (or the coil former will melt) tin the tapping point on L5 with a fine tipped iron, and then complete the soldering process quickly.
5. Wind L7 and L8 (2 turns on a 5mm diameter drill bit), and form the leads as shown in Fig.3. Solder to the PCB. Fit the taps at ½ turn to L7 and L8 as described for L5.
6. Fit C15 and C16 as shown in Fig.4. This will keep the tuning screw at ground potential, making adjustment much easier.
7. Fit the remaining capacitors.



An early prototype, fitted with one helical filter.

8. Fit the remaining components, taking care to observe the mixer orientation and the transistor pinouts.
9. Solder about 2cm of wire to the external input/output points indicated on the PCB.
10. Drill the box (WR&E 21-06052) as shown in Fig.5. and fix the feedthrough capacitors and sockets into place.
11. Place the PCB in the box and solder the lugs to the earth plane - take care not to overheat the whole thing. Solder the PCB to the earth plane close to the RF terminations.
12. Complete the external connections to the feedthroughs and the sockets.

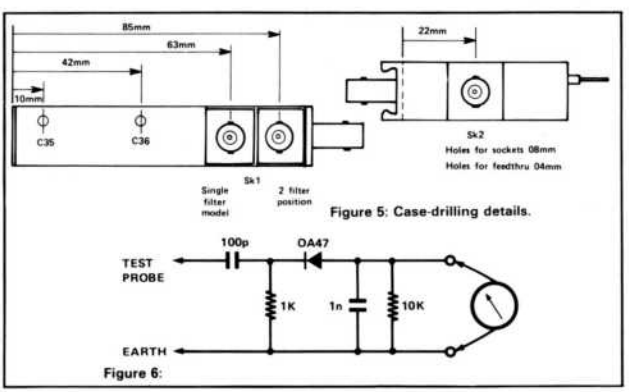


Figure 5: Case-drilling details.

Figure 6: Diode probe, used for setting-up the tripler.

TESTING

1. Perform the usual visual checks for solder bridges and incorrect insertions.
2. Adjust cores of L1 and L3 to about 2mm below the top of the formers. The core of L5 should be level with the top of the former - and C15,C16 to mid position (slot in line with the pins).
3. Connect a 10v power supply (preferably one with current limiting at 100mA), and check that the current consumed is not excessive. It should be around 18mA with neither crystal oscillator connected.
4. Connect a volt meter between Q3 emitter and earth. An initial voltage of

about 1v should be observed. Earth the centre of C35 to turn on Q1.

5. Connect a volt meter to Q4 emitter. Adjust L1 until a reading is obtained and adjust L5 for maximum reading for Q2 after earthing C36 centre. Switch between Q1 and Q2 whilst adjusting L5 to ensure an even level on both frequencies.
6. Using either an RF millivoltmeter or diode probe (Fig.6), adjust C15 and C16 for maximum RF voltage at the output tap on L8. With the oscillator chain correctly aligned, the current consumption will have risen to approximately 28mA.

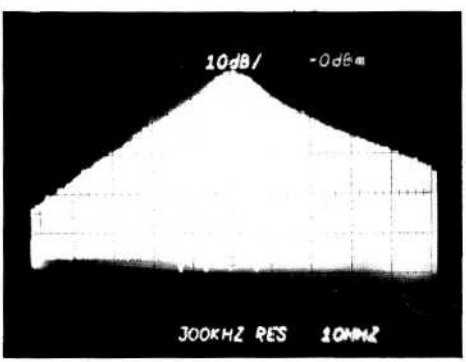
If additional test equipment is available (ie. spectrum analysers) further adjustment of F1 and F2 may be undertaken.

RESULTS

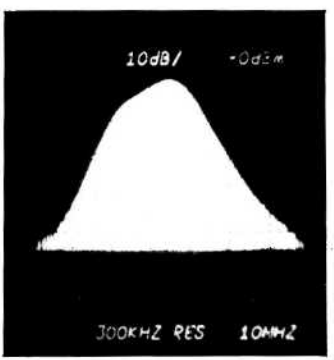
Using the converter in conjunction with an FT290 (mic removed to avoid accidental transmission), the converter out performs most commercial counterparts - with the added convenience of 432-440MHz coverage. The FT290 was modified for 144-148MHz operation - a simple job of programming links.

When used for ATV, the improvement over the usual modified TV tuner (ELC1043/05 with modified BFR91 input) was significant. Using a chequer board pattern source, the pattern was resolvable down to an input of 7uV.

The Editor would like to thank "Radio and Electronics World" magazine and Graham Leighton for allowing the publication of this article and for providing the artwork copy. The design appeared in the January 1982 issue of the above magazine.



Bandpass response of converter (fitted with one filter). Centre frequency 435 MHz, 10MHz 10 MHz/division horizontal; 10 dB/division vertical.



Bandpass response of converter (fitted with both helical filters). Centre frequency 430 MHz, 10MHz/division horizontal; 10dB/division vertical.

Kits of parts and printed circuit boards are available for this project from Radio & Electronics World, 200 North Service Road, Brentwood, Essex. CM14 4SG.

Full kit	£23.50 + VAT	specify crystal(s) required.
Kit, less case & one osc. section	£17.36 + VAT	
Printed circuit board only	£ 3.29 Inc.	

MEMBERS SERVICES

Items from these lists are available to club members only.
This list supercedes all previous ones.
CHEQUES should only be made payable to "The BATC" and should be drawn on English banks only please.

ALL ORDERS TO:- Mr. P.Delaney. 6 East View Close, Wargrave, BERKS RG10 8BJ England. Tel: 073 522 3121

QTY	TV CAMERA TUBES AND SCAN-COILS	EACH	P&P	GOODS TOTAL
.....	EEV Leddicon	£82:00	nil	.....
.....	½" EMI 9777 Ebitron	£30:00	nil	.....
.....	2/3" EMI 9831 Vidicon - amateur grade	Temporarily discontinued		
.....	1" EMI 9677 Vidicon - amateur grade	£15:50	nil	.....
.....	1" EMI 9728 Vidicon - amateur grade	£15:50	nil	.....
.....	1" EMI 9706 Vidicon - amateur grade (5" type)	£15:50	nil	.....
.....	4½" EMI 9565 Image Orthicon	£10 per2	collect	.....
.....	1" Vidicon scan-coils (low Z focus coils)	£6:00	£1:20	.....
.....	1" Vidicon scan-coils (high Z focus coils)	£6:00	£1:20	.....
.....	2/3" Vidicon scan-coils	£6:00	0:80	.....
.....	Vidicon bases (1" or 2/3", state which)	0:50	0:16	.....
.....	TV camera lens mounts, 'C' type	£1:00	0:24	.....
	STATIONERY AND ACCESSORIES			
.....	BATC test card - latest - with instructions.	0:50	0:24	.....
.....	BATC reporting chart (illustrated)	0:12	0:20	.....
.....	BATC lapel badge - diamond - button hole	0:40	0:16	.....
.....	BATC lapel badge - round - pin fastening	0:50	0:16	.....
.....	BATC callsign* lapel badge-round-pin fastening * Write callsign CLEARLY. Item sent from supplier	£1:50	nil	.....
.....	BATC headed notepaper/envelopes (50 each)	£1:75	£1:20	.....
.....	BATC key fob	0:50	0:16	.....
.....	BATC equipment stickers, 1" round	0:15	0:16	.....
.....	BATC windscreen stickers, 2½" round	0:10	0:16	.....
.....	BATC club tie printed with round badge (dark blue)	£1:80	0:30	.....
			TOTAL this page	£ :

PUBLICATIONS SHOULD ONLY BE ORDERED FROM THE PUBLICATIONS DEPARTMENT (see seperate list)

QTY	PRINTED CIRCUIT BOARDS	EACH	P&P	GOODS TOTAL
	"Amateur Television Handbook"			
.....	Wide-band 70cm TV tuner	£3:00	0:30	.....
.....	Amateur television receiver	£1:50	0:30	.....
.....	Electronic character generator	£3:00	0:30	.....
.....	Character generator memory	£3:00	0:30	.....
.....	Colour test card (set of 3, double sided)	£15:00	0:60	.....
.....	Horizontal aperture corrector	£3:00	0:30	.....
.....	Video switching unit	£3:00	0:30	.....
.....	PAL colour coder	£3:00	0:30	.....
.....	'Project 100' sync.pulse generator (CQ-TV100/101)	£3:00	0:30	.....
.....	TX-9 Video/audio in/out (CQ-TV 119)**	POA		
.....	G4DYP 70cm ATV up-converter (CQ-TV 112)**	POA		
	**New items. Sae or phone for prices/avail.			
	COMPONENTS			
.....	5MHz SPG crystal (P100)	£2.75	0:25	.....
.....	TBP28L22 PROM, pre-programmed for colour test card circle. (eqt. 74S471)	£10:00	0:25	.....
.....	TMS4036 memory IC for char. gen. memory board	£5:00	0:25	.....
.....	4.433618 MHz PAL colour sub-carrier crystal*	0:40	nil	.....
.....	Colour TV delay line*	0:60	nil	.....

*surplus, untested.

total this page £.....

total from page 1 £.....

***postage £.....

TO ENCLOSED £.....

It is cheaper to send several small items in one package. Please try to estimate the correct amount of postage. All enquiries requiring a reply should enclude an SAE or IRC.
***OVERSEAS MEMBERS SHOULD ASK FOR A QUOTATION OF POSTAGE COSTS BEFORE ORDERING LARGE ITEMS. Please send 2 IRCs and state whether air or surface mail is required. PUBLICATIONS should be ordered seperately from the publications department, (see seperate list) otherwise delays and extra expense will ensue.

name	call
address	
	post code

receipt goods sent (office use only)

CONVENTION

TRADE STANDS

LECTURES

82

EXHIBITS

OUTSIDE BROADCAST

A.G.M.

PULLOUT GUIDE

SEPT. 5TH.

POST HOUSE — LEICESTER

TRADE STANDS - bring lots of cash.

HANDBOOK HOSPITAL - a chance to discuss any problems with 'Handbook' projects.

EXHIBITION STANDS - lots of lovely equipment to ogle over

MEMBERS SERVICES - All the advertised goodies plus a full range of publications.

MEMBERS CONSTRUCTION DISPLAYS*- This is how the other guys do it.

Anyone requiring space or power for sales or exhibition stands, please contact the Hon. Secretary as soon as possible.

* There will be a prize of a complete set of printed circuit boards to build the 'Handbook' colour test card, for what is judged to be the best home constructed piece of equipment on display.

THE G8GQS OUTSIDE BROADCAST UNIT WILL BE IN ACTION FROM THE CAR PARK OUTSIDE THE EXHIBITION HALL.

SATURDAY EVENING (4th Sept.)

INFORMAL GET TOGETHER in the Post House bar at 8pm. Wear your badge.

SUNDAY (5th Sept.)

DOORS OPEN - Wyggeston room	10am	
ANNUAL GENERAL MEETING	11am	Wolsey room

AGENDA

1. Apologies for absence.
2. Chairmans report.
3. Treasurers report and adoption of the accounts for 1980 and 1981. As published in CQ-TV 118.
4. Treasurers report on the current year to date.
5. Election of Committee members.
6. Announcement of the members of the new Committee.
7. Any other business.**

** Members wishing to raise a topic under item 7 should send details to the Hon. Secretary not later than seven days before the meeting.

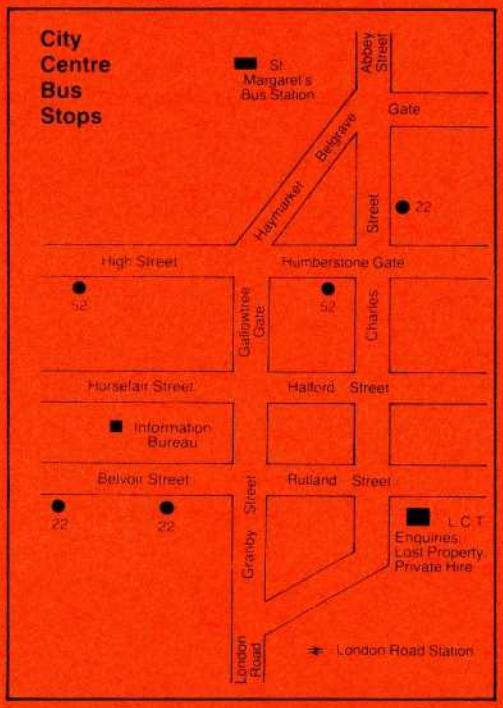
Nominations for members to serve on the new committee should be received by the Hon. Secretary not later than seven days before the meeting. Please include your name and address as well as that of the nominee.

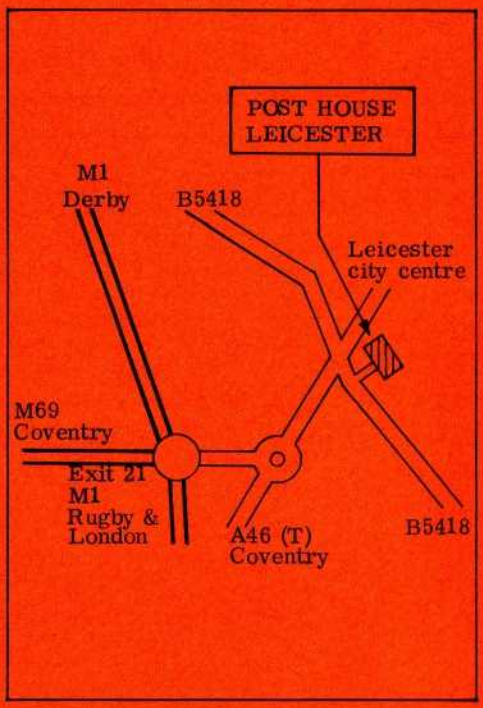
VIDEO TAPES. Amateur Television - UK. and Amateur Television - Australia.	12.30	Wolsey room
REPEATERS FOR AMATEUR TELEVISION. Lecture by Graham Shirville, G3VZV.	2pm	Wolsey Room
VESTIGIAL SIDEBAND TV TRANSMITTERS. Lecture by Paul Marshall.	2.45pm	Wolsey room
FM TELEVISION. Lecture by Peter Blakeborough, G3PYB.	3.30pm	Wolsey room

LUNCH in the Licenced Restaurant is between 12pm and 2pm. It is advisable to book this in advance since the meal is very popular. Tel: 0533 - 896688.

There is also a splendid Buttery Bar at the Hotel.

—ADMISSION FREE—





HOW TO FIND THE POST HOUSE HOTEL

The hotel is located at the junction of Narborough Road (A46) and Braunstone Lane East (B5418).

BY ROAD

If you are travelling on the M1 motorway, leave junction 21 and follow the signs to 'City Centre' which is a dual carriageway. The Post House is about one mile along this road on your right at the junction with the B5418 signposted 'Aylestone'. There are traffic lights at this junction and you should turn right to gain access to the hotel. If travelling from the City direction, follow the signs for A46 Coventry and the M1, these will take you along the Narborough Road when the Post House will be on your left at the junction with the B5418 as above.

BY TRAIN

The bus service No.52 leaves the city centre at 8 and 38 minutes past the hour, this takes about 15 minutes to reach the Post House.

Return buses leave the Hotel at 26 and 56 minutes past the hour for the City centre.

THERE IS A LARGE FREE CAR PARK IMMEDIATELY ADJACENT TO THE EXHIBITION HALL. EXCELLENT RESTAURANT AND BAR FACILITIES ARE AVAILABLE.

PUBLICATIONS

QTY		EACH	P&P	GOODS TOTAL
.....	AMATEUR TELEVISION HANDBOOK. B.A.T.C by J.L.Wood. G3YQC and T.Brown. G8CJS	£1:50	0:40	.....
.....	SLOW-SCAN TELEVISION. B.A.T.C. by B.J.Arnold. G3RHI (second edition)	0:35	0:16	.....
.....	CQ-TV BACK ISSUES. The following issues are still available although stocks of some are low.(circle)			
	68,77,82, 88,89,90,91,92.....	0:25	*	.....
	93,94,95,96,97,99,100,101,102,103,105,106,107, 108,109,111,113, 116, 117, 118, 119.....	0:50	*	.....
	*please estimate appropriate postage			
.....	RE-PRINTS. Photocopies of any article from past issues of CQ-TV are available. Payment (if ordered seperately) in UK postage stamps please	0:20 per sheet	0:16	.....
.....	INDEX. All main articles in past issues of CQ-TV and both handbooks. Including page-count.	£1:00	nil	.....

sub total	£ :
postage	£ :
TOTAL ENCLOSED	£ :

- seperate forms before mailing -

Publications are available to club members.

ORDERS please to:- BATC publications, 14 Lilac Avenue, Leicester LE5 1FN.

AUSTRALIA

Would Australian members please note that the 'Amateur Television Handbook' is available directly from the Wireless Institute of Australia at PO box 150, Toorak, Victoria 3142.

name	call
address	
	post code

SOLUTION TO THE CROSSWORD IN CQ-TV 118.

Hope it wasn't too hard!

1 T	U	2 N	E	3 R	S		4 M	5 O	B	6 I	L	7 E
R		O		I		8 S		S		N		V
9 I	N	P	U	T		10 P	I	C	T	U	R	E
P		L		K		E		A		S		N
11 L	E	A	R	N		12 A	I	R	V	E	N	T
E		T		O		K						S
	13 T	E	N	B	E	L	S	14 G	A	15 I	N	
16 S						O		E		N		17 P
18 I	S	19 E	E	20 Y	O	U		21 N	O	V	E	L
G		S		E		D		E		O		I
22 N	O	S	P	A	R	E		23 R	A	I	S	E
A		E		S		R		A		C		R
24 L	A	X	I	T	Y		25 E	L	D	E	R	S

CONVERTING THE THORN TX-9 FOR AUDIO\VIDEO IN\OUT

by A.S.Warne, G4EZO
M.T.Crampton, G8DLX
J.L.Wood, G3YQC

As more amateur television stations begin transmitting colour pictures, a need arises for an off air colour receiver and video monitor.

The Ferguson 14" "Movie Star" portable, incorporating the excellent TX9 chassis is ideal. It will operate satisfactorily from the mains with input voltages of between 185 and 265v. No mains input adjustment is required, and the set consumes only 58 Watts when displaying a normal picture. As an optional extra, the manufacturers can supply a battery inverter to operate the set from 12 or 24v DC supplies.

When used with an up-converter, the set works superbly and the sync circuits respond very well under weak signal conditions. If the set is to be used for the shack only, the UHF tuner can be modified to cover the 70cm band, but in this case a good pre-amplifier should also be used.

To convert the set to a video/sound monitor, the receiver must first be fitted with a small mains isolating transformer[1.2]. This transformer can mount inside the cabinet on the right hand side (from rear) or, if a DC unit is fitted, inside the rear cover. The transformer should be mounted onto a special bracket and fitted as shown in Fig.1.

The video/sound interface board may be fitted to the spare blank panel in the receivers back cover. A bracket may be made to support the PCB and to form a metal panel for mounting the input/output sockets and video termination switch, (Figs 2 and 3).

Button 6 on the channel selector is already marked "AV" (Audio Visual) and may be used to change over to video monitor when depressed. The normal function of this button, apart from channel selecting, is to switch a 12v supply via R207 to pin 9 of the TDA9503 sync IC. This alters the time constant providing sync correction when using video tape recorders. By utilising this 12v feed it is possible to electronically switch to video.

To maintain the VCR input facility with a UHF input, spare "AV" contacts on button 5 should be wired as shown in Fig.4. This means that button 5 now takes on the previous function of button 6.

Sound may be carried via the interface board using the unused connections of the sound IF and audio output IC - TDA1035S.

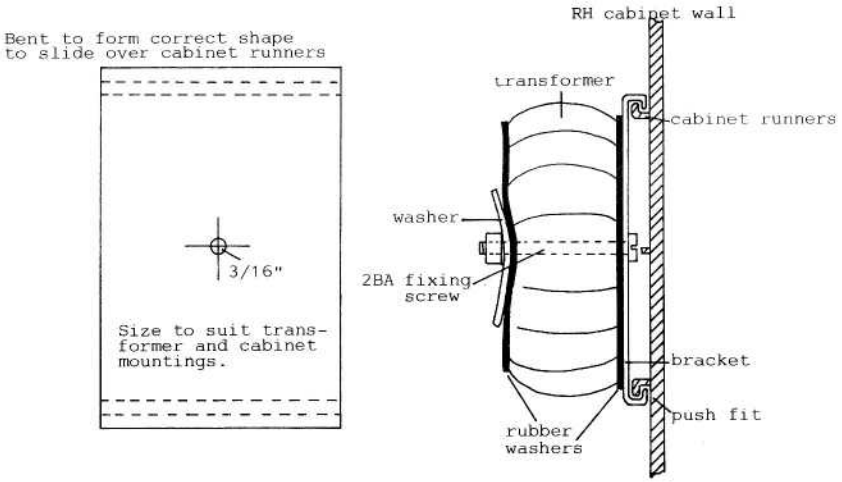


Fig.1. TRANSFORMER MOUNTING BRACKET.

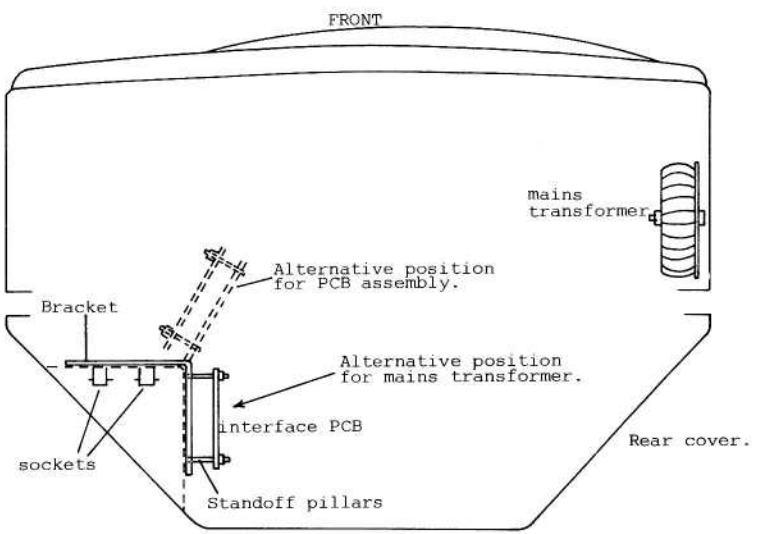


Fig.2. PLAN VIEW OF RECEIVER SHOWING POSITIONS OF NEW COMPONENTS.

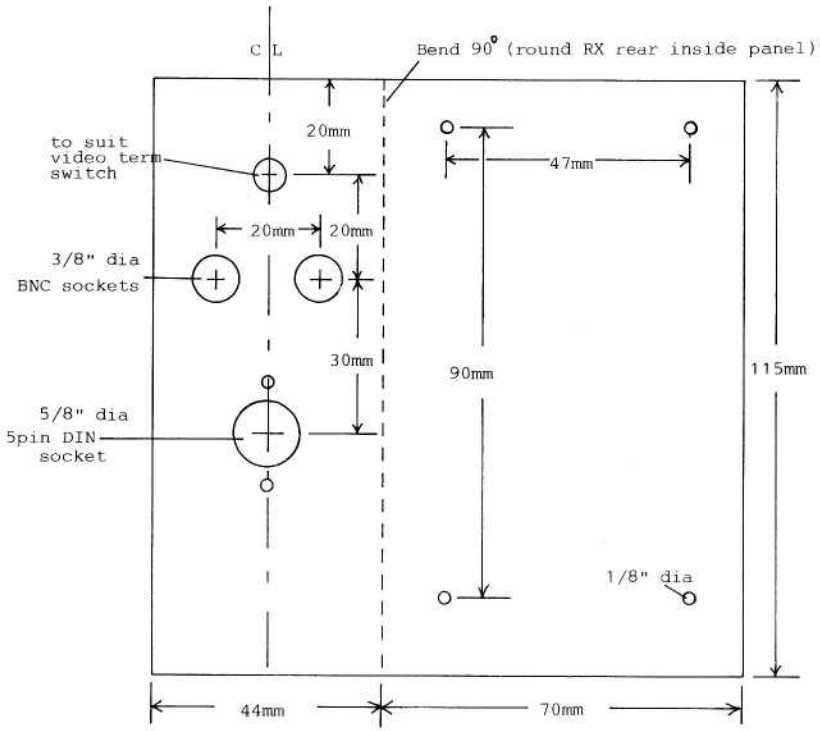


Fig.3. REAR PANEL AND PCB SUPPORT BRACKET.

There are two versions of the TX9 main chassis at present in production. The early type is fitted with an NEC Luma-Chroma Processor - μPC1365C. This chassis is coded 1001. The later type is fitted with a Mullard processor - TDA3560 and is coded 1040. Interface details are given for both types where differences occur.

Fig.5 shows the complete circuit of the interface which is contained on a single printed circuit board. Connections to the board are also shown. Be sure to use 75 Ohm coax cable and screened audio cables where indicated. Fig.6 shows the print pattern of the PCB (not full size) and also the component layout.

The modification may proceed in the following order:-

1] Fit the mains isolating transformer as shown in Figs 1 and 2 and check that the receiver operates correctly.
2] Remove the yellow wire from the centre pin of No.6 channel selector and connect it to the centre pin of channel 5 button (Fig.4).
3] Fit a green link wire between the rear pin of No.6 channel selector and the

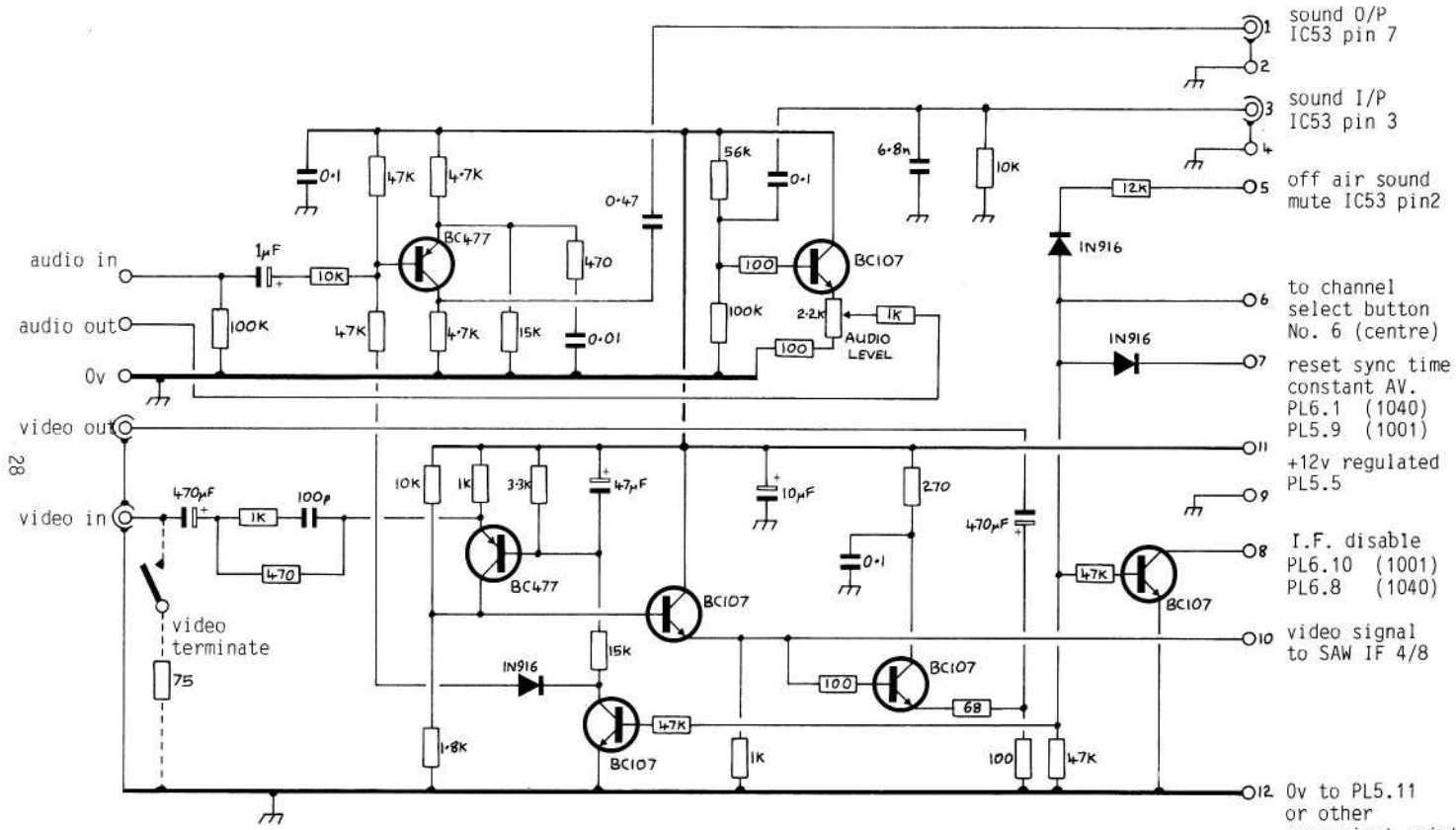


Fig.5 THORN TX-9 AUDIO/VIDEO IN/OUT INTERFACE CIRCUIT PCB pin No.

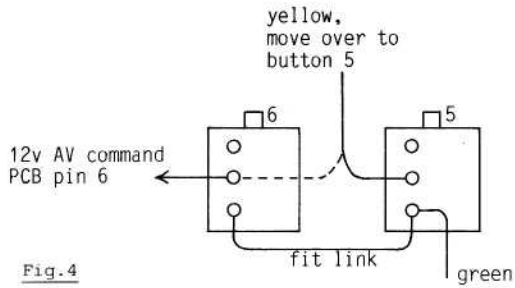


Fig.4

UNDERSIDE VIEW OF CHANNEL SELECTOR

rear pin of No.5 channel selector, leaving the existing green wire in place.

4] Attach suitable length leads to the PC board noting the colours used as an aid to identification.

5] Fit the PC board to the bracket and fit the assembly to the rear cover (Figs 2 and 3).

6] Connect board-pin 6 lead to the centre pin of No.6 channel selector.

7] Pin 3 of the sound IC (IC53) should be disconnected from ground. This may be accomplished either by cutting the PC track around that pin or by withdrawing the pin from its hole and bending it out clear of the main PCB.

8] Connect the audio input and output cables to the IC pins as indicated (Fig.5). The braiding need not be connected at the IC end.

9] Connect all other leads to the receiver PC board as indicated (Fig.5).

10] Connect leads to the input/output sockets on the rear panel.

11] Terminate the video input in 75 Ohms and connect a composite video signal to the input socket.

12] Depress channel 6 button and switch on the receiver. Check that a picture

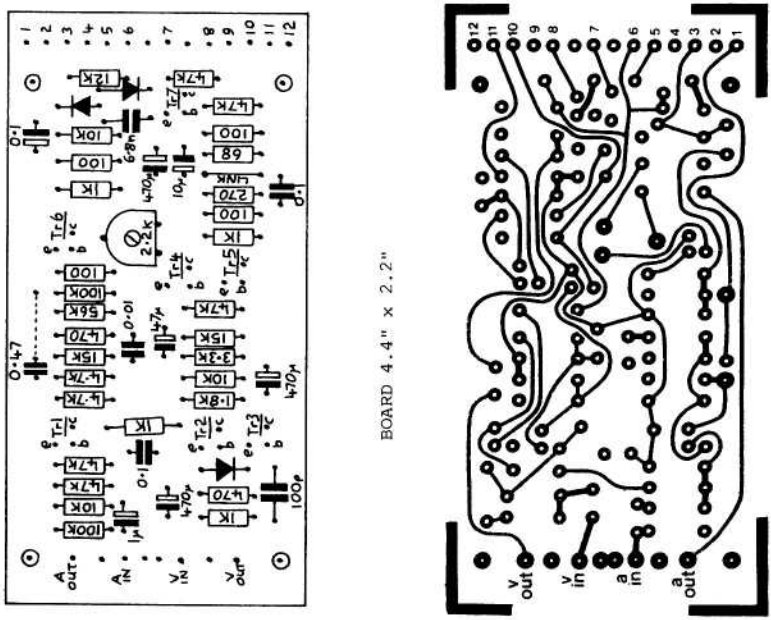


Fig.6 PRINTED CIRCUIT BOARD PATTERN AND LAYOUT

is displayed correctly.

13] Connect the video output to a monitor or an oscilloscope and ensure that a correct picture/waveform is obtained.

14] Check the audio system by applying a low-level signal to the input and then extracting an audio signal from the output - adjusting the level with the pre-set control as required. A VCR or audio tape recorder may be used for these checks.

15] Dress the wires and clip them neatly together to form a cable loom.

All leads which are to connect to the underside of the RX PCB may be routed through an existing hole near to IC53,
this hole (which may be covered by a round sticker) may need enlarging.

To assist in wiring the channel select buttons, two screws may be removed from the rear of the front panel (Fig.7) to allow the panel to drop out making it easier to work on.

The BATC are producing printed circuit boards for this project. These should be available by the time this article is published and prices may be obtained by phoning or writing (SAE please) to the Club Services Department.

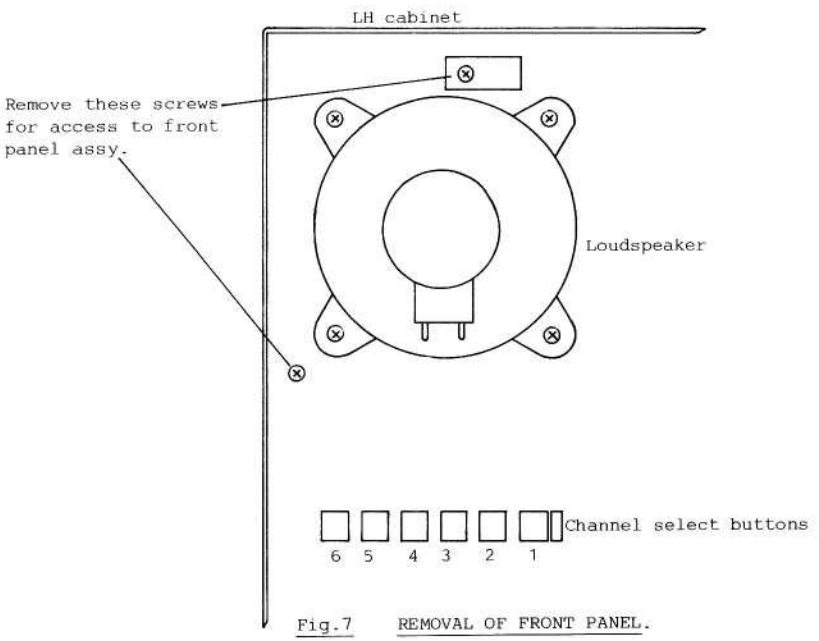


Fig.7 REMOVAL OF FRONT PANEL.

REFERENCES:

1. 3X030, 80VA, 240v secondary. ILP Electronics Ltd., Graham Bell House, Roper Close, CANTERBURY, Kent. CT2 7EP

2. VT24825 isolating transformer. St.Ives Windings Ltd., Industrial Estate, Somersham Road, St.Ives, Cambs. (possibly only in small or large quantities.

TV ON THE AIR

Compiled by Andy Emmerson, G8PTH.

Welcome back again to your activity column, the best place to learn about those openings you missed! Well, as usual I have a full postbag of all your comings and goings over the past three months, so I'll dive straight in and see what comes up first.

Letters, we get letters (as the Americans say) and one comes from Alan G6GTL in Ross-on-Wye, who relates that he and Mike G8ZPQ of Cinderford have just equipped for 70cm TV. Transmitter in use at G6GTL is a Wood & Douglas ATV1 feeding a J-Beam 48 element Multibeam, while a MM 435/600 receive converter and a JVC video recorder capture the incoming signals. Mike's equipment is generally similar. Alan has received pictures from members of the Bristol Group but the path to G8ZPQ includes some 900ft rocks in the way! A one-way contact has, however, been made and by the time you read this they may have sorted things out. The output of the ATV1 is 3W and Alan wonders if anyone has devised a suitable linear to bring this up to 10W. Because of its low cost this rig is quite popular and I guess many members would welcome a design - would someone like to write in with one? Perhaps a G4DYP design from CQ-TV 115 could be modified to suit. (see also CQ-TV 118 p14). Alan pays tribute to the help and encouragement received from Grant Dixon G8CGK: Grant lent him a monitor and supplied lots of information, which is great when you're starting up.

On a personal note, I must say how much I and the other BATC folk enjoyed meeting some of you on the BATC stand at the RSGB Alexandra Palace exhibition: the feedback was very useful. I must also recommend the Belgian VHF convention, which is an annual affair held in Ghent. This year it had a preview in Rad Com and on the strength of that and recommendations from G4FRE I went over. Despite the title, most of the talk is about gigahertz stuff and it is a truly international affair with atendees from G, F, ON, PA and DL. All languages are spoken, including TV! While I was there I learned of an interesting French experiment taking place on the 20th June this year. A radiosonde balloon is being released at Angers-Avrille (ZH48H) with the title Anjou XI. On board is a TV translator: in on 1255MHz FM, out on 438.5MHz AM. Well it's different...

Moving back via the Channel Islands and Jersey in particular, we hear from Lawrence Woolf GJ3RAX who has built a Robot 400 from boards supplied by G4BLL. He also runs 10W of fast scan using W & D bits. Lawrence asks if anyone knows mods to make the MML432/100 run more than 30W on TV and linearly at that. Would someone care to enlighten us? In the same part of the world, well more or less, is Nick Foot G8MCQ who lives in the Bournemouth area. He joined BATC at the VHF convention and is set up to transmit TV using a Storno Viscount mobile TX with grid modulation applied to the PA. Output is about 2.5W and is fed to a 2C39 with 850v on the anode. Under flat conditions Nick can work G4MHF (Broadstone), G2HCG (Barton on Sea) and G4JXC (Fareham) with 2 way pictures. Under lift conditions Nick has worked several of the Sussex coast stations. Nick is considering 24cm and is already working QRP on 10GHz; he goes out portable during comulatives. Finally he points out that you can get cheap(er) microwave components from Jewell & Powis who don't advertise widely: if you are looking for hard-to-get components why not send a SAE to them at 1 Lindum Avenue, Trentham, Stoke-on-Trent, ST4 8DR or phone 0782 642507.

The Essex slow-scan contingent are having a further publicity drive and indicate that the following stations welcome SSTV contacts: G4IMO (Canewdon), G8UUL (Southminster), G4KXN/G4BCH (Chelmsford), G3NOX (Saffron Walden), G3ZBQ (Great Dunmow), G4DVJ (Westcliff), G4MYQ (Clacton), G8RJN (Shenfield), G4JIE (Colchester) and G3LUI (Hullbridge). Thanks for the info. Nick, From Belthorn, Jim Whittle G3EKP writes that he has not

seen Lancashire featured in many activity reports. To rectify this he writes that at least six stations are to be seen in his neck of the woods, notably G3YTI (Darwen), G3EKP (Belthorn), G4GVQ (Blackburn), G4JMO (Blackburn) and G8XXE (Knuzden). On the 18th April Steve G3YTI went portable above Darwen, sending excellent pictures to G3EKP, G4GVQ and a station in Oldham. Jim's own QTH is 850ft above sea level with an excellent take-off to the west coast. The only activity in that direction is G3FNQ (Southport) and Jim hopes that more stations will join in. Talkback is on the usual 144.75 and the TX in use at G3EKP is the W & D 3W, with MM converter and 8 over 8 skeleton slot aerial. By the way, if you are sending me details of when you are going out portable, please send in the details well before the press date noted on the contents page of the magazine. I'm afraid we have had to leave someone out last time because their letter arrived a week too late.

Down South again, Roger G6AIC from near Headcorn, Kent bought a Fortop converter at the AP exhibition and looks forward to getting on the air soon. Also in Kent, John G8UWS in Folkstone and yours truly are both building the F3YX design of 1255MHz TV transceiver. At the moment it's more a matter of laying in all the components and deciphering the cryptic notes on the circuit diagrams but by the time I next write this column I hope to report more concrete progress. The path between John and me is a struggle, even on two metres, so I don't think we'll be working each other direct unless we go out portable (or at least one of us does) but no doubt we can con some locals into setting-up receive stations (and then they're hooked!) Recently a letter came from Miroslav Mate in Ostrava, Czechoslovakia, who is building a Plumbicon camera. He says that nobody transmits ATV regularly in his country but OK1KSD does, sporadically on 70cm. In Athens, Bill Mercer continues to run the local group of TV enthusiasts and should meet up with new member Anastasios Panos. Apparently 70cm is a shared band with the Police there, which makes problems for wideband transmissions like TV. Bill is struggling with SECAM coders and has reluctantly come to the same conclusion as some others, that the Elektor design is fit only for the junk box.

Over at Martlesham, which I know is not in Essex but another BATC luminary does not, ATV is gaining ground among the dah-dits. Malcom Appleby G3ZNU (hope I've got the call right this time!) advises that four locals can now transmit TV (G4FAW, G3ZNU, G8RJY and G6DDK). G6DDK was featured in a half-page special in the Ipswich "Evening Star" on the 10th May (nothing escapes the BATC information service!) and made an excellent case for ATV. Others in the district interested in TV are 'working on it' and G8QNH apparently has designs on a 24cm repeater, which I for one would support. Malcolm 'ZNU was recently involved in a rather remarkable opening: on the night of April 24th around 2130 Malcolm managed to get P3 pictures all the way to Jim GM4JLY in the Aberdeen 20. Malcolm was running 100W: the GM4 had only 50 or 60 and only line syncs were seen at Ipswich. But later on Chris Gibbs G8GHH (Westgate, Kent) found himself right in the sea duct and sent P5 pictures (new BATC test card!) and colour to Aberdeen. Chris also runs 100W and he tells me at times just 1W was sufficient on two metres; he got P2 to P3 pictures back from Scotland, The path was apparently about 680km, which is not bad going at all. Other stations newly worked by Chris include G3YTZ in Orpington and G8ZYX in Lowestoft.

Also across a water path, but a longer one and in magnetic tape form, came a half hour transmission from Tom O'Hara, W6ORG. Allegedly inspired by the BATC demo tape Tom has made a superb programme showing how to get on the air with ATV and also what ATV can do in community service. Dave Bell W6AQ lent Tom his studio and effects generators for a weekend and Tom went to town with the production facilities. The result is a very watchable tape, in VHS format, NTSC system. Copies can be had at cost from Tom and maybe we can transcode it into PAL because it really is worth seeing. ATV on 24cm is starting to take off in a big way in some parts of North America now: Its AM and most stations generate 10W on 426MHz and triple this in a MMV1296 varactor tripler, which works remarkably well. Finally, an unusual anecdote lifted from the February issue of the Benelux DX club magazine. Ryn Muntjewerff in the Beemster, Holland picked up F1AJD from Angouleme, a distance of about 1000km. This may well

be a record for 70cm ATV. Anyway, the funny thing is that all this took place on 28/29 November 1979 and it wasn't until two years later, when some of Ryn's photographs were published in a French DX-TV magazine, that Philippe F1AJD saw his picture in print and realised how far his transmissions had reached! This phenomenon is well known: Whenever we get a lift towards the Continent round here we see Dutch Stations coming through, but they are never listening in the direction of G and probably cannot hear us. Still....

That's it once more. Please continue to send in your reports and stories to me at 4 Mount Pleasant, Blean Common, Canterbury, Kent. CT2 9EU. See you in three months time.

LITERATURE RECEIVED

The following journals have been received by the Editor, for which, many thanks:

A5 Amateur Television Magazine, U.S.A.
The ATVer, Australia.
N.B.T.V. U.K.
CQ Eletronica, Italy.
Zerb Magazine, U.K.
Radio & Electronics World, U.K.
Der TV Amateur, West Germany.

FM TELEVISION

by John L.Wood, G3YQC

FM television is - at least in the UK - in its infancy, therefore practical designs are, to say the least, somewhat scarce.

As Editor I receive several magazines from other ATV organizations in which there appears the occasional circuit relevant to FM-TV. This short piece is a collection of some circuits and ideas, interspersed with a few tips and useful gen that I have picked up in the course of assembling my own FM 24cm station. I hope that this article will help you along the FM way.

In the magazine of the AGAF of Germany (March 1981 issue)[1], there appears an article on an FM ATV system for use with a Gunnplexer in the 10GHz band. Much of the information detailed here is from that article.

Fig.1 shows the circuit of an FM TV modulator based on an NE592 video amplifier IC. Video input is at the standard 1v p-p across 75 Ohms. The video signal is matched to a passive pre-emphasis network by a 'T' pad attenuator. The NE592 is a variable gain video amplifier. The gain adjust control sets the required output from the unit which determines the signal deviation. Both negative and positive going signals are available at the output, selection being made by a single pole changeover switch. The emitter follower provides a fairly low output impedance suitable for feeding the varicap diode. A DC input facility is provided at the units output circuit which allows the output to be raised to the required DC level above ground, this serves as a fine tuning control for accurate setting of the output frequency, and also positions the modulating signal voltage within the linear portion of the varactor diodes characteristic.

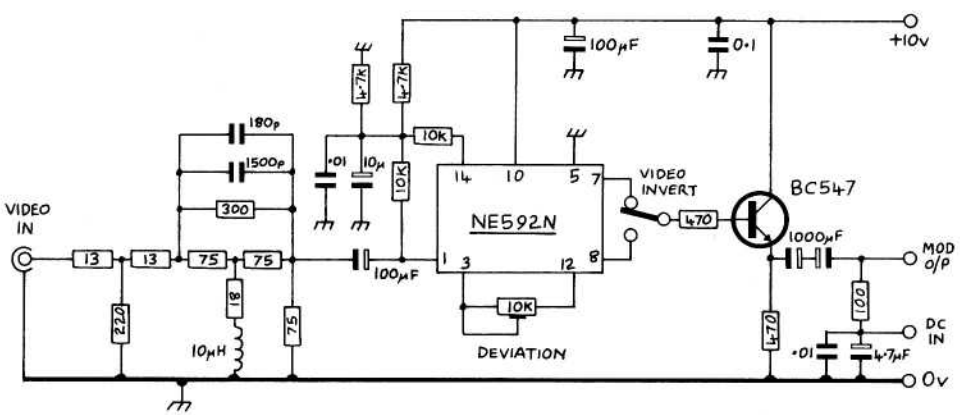


Fig.1. FM VIDEO MODULATOR.

Fig.2 shows an audio modulator which generates a 6MHz FM subcarrier. It can be connected directly to the varactor diode circuit together with the video signal. Audio is fed to a limiter and an amplifier, then on to a varactor diode which forms part of the 6MHz FET oscillator circuit. The output amplifier has an aditional 6MHz tuned circuit which ensures that the output is clean. A dual gate MOSFET is used in order that the output level may be easily controlled.

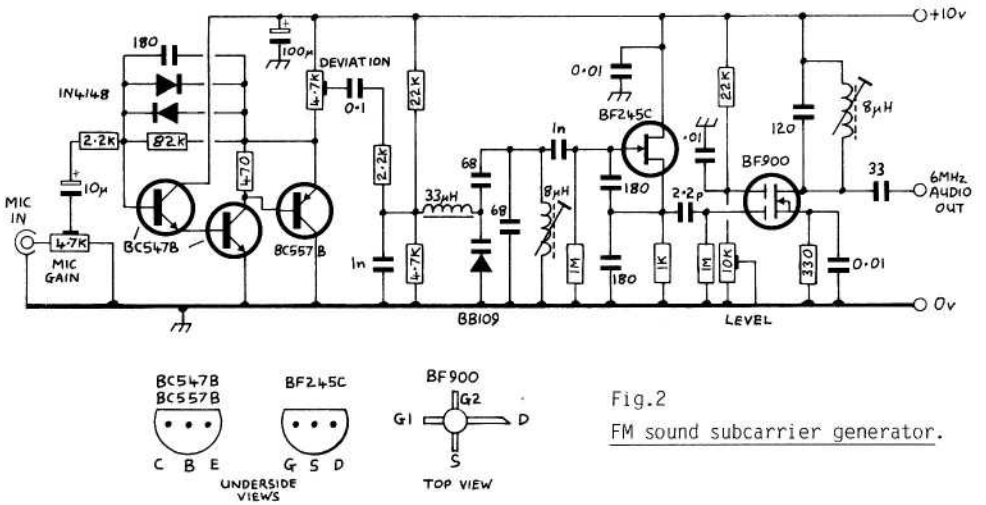
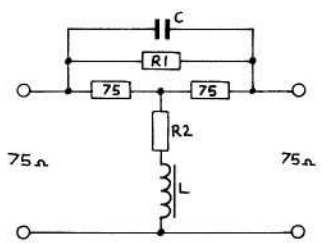


Fig.2
FM sound subcarrier generator.

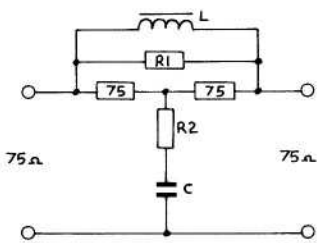
Pre-emphasis and de-emphasis are desirable in an FM system. Fig.3 shows typical passive circuits which function according to the graph shown in Fig.4. These figures are near to those specified in CCIR standards.



PRE-EMPHASIS

R1.....301 Ohms (300 Ohms)
R2.....18.7 Ohms (18 Ohms)
C .....1696pF (1500+180pF)
L 9.54uH (10uH)

Fig.3.



DE-EMPHASIS

R1.....301 Ohms (300 Ohms)
R2.....19.6 Ohms (20 Ohms)
C .....5430pF (4700+680pF)
L 30.55uH (33uH)

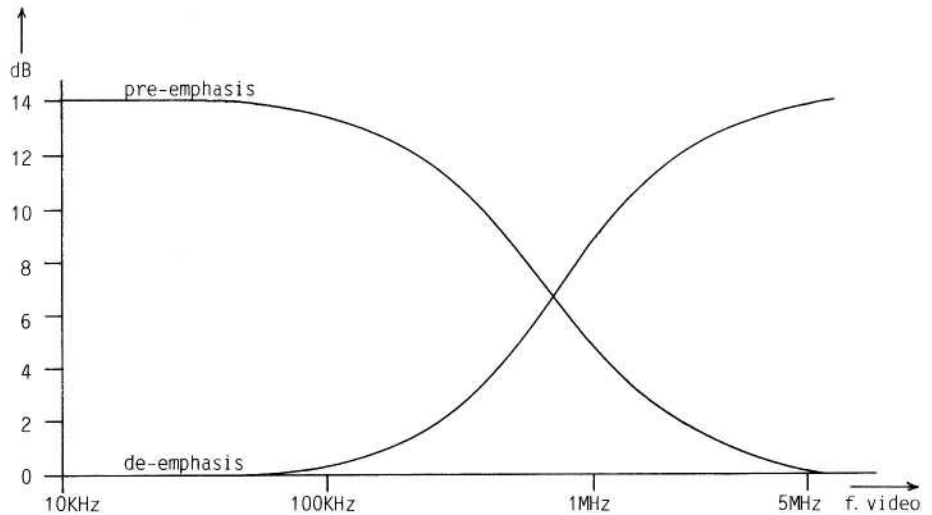


Fig.4.

A typical method of providing FM-TV for the 24cm (and higher) bands is to generate a carrier at 420MHz which can be frequency modulated. The resulting signal may be tripled in a varactor or valve multiplier to the required frequency in the 24cm band.

A block diagram of such a system is shown below in Fig.5

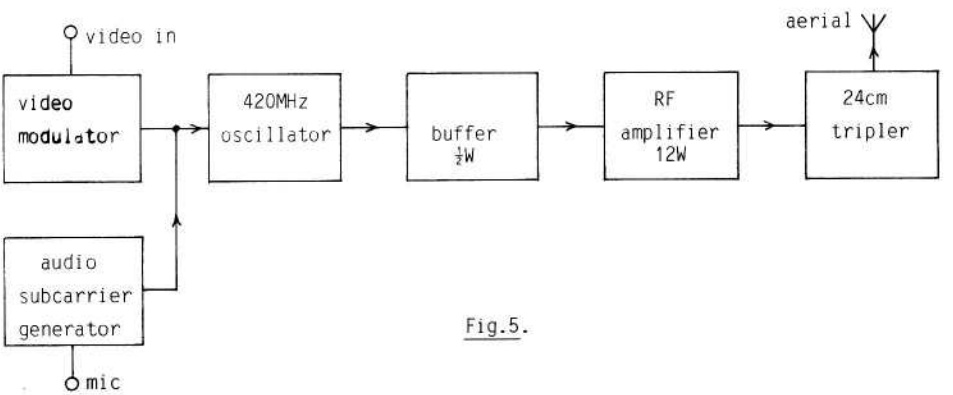


Fig.5.

Most conventional L/C oscillators may be used providing they are stable. Obviously a free running oscillator at 420MHz is liable to instability. Particular attention should therefore be paid to the physical construction, which should be very rigid, and to the regulation of the supply voltages. The output should be buffered by a linear amplifier (Wood & Douglas Lin 3) in order that the oscillator is not pulled by the following circuitry. Perhaps the use of a power transistor for the oscillator may help to minimise the temperature effect.

A typical 420MHz oscillator tuned circuit is shown in Fig.6. showing the biassing arrangement for a varicap diode.

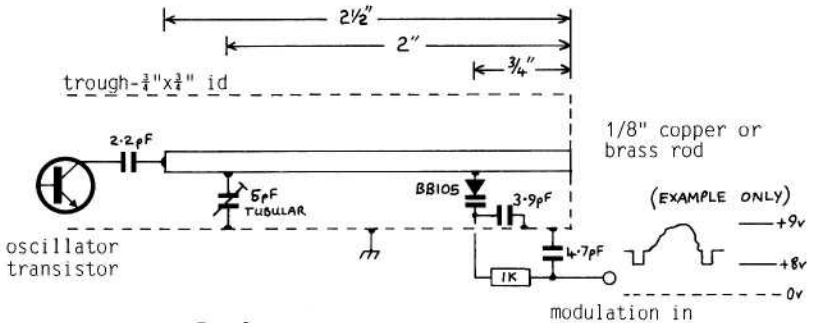


Fig.6.

The tuned line should be fixed in the centre of a trough measuring ¾"x¾" square and as long as required. This may be made from copperclad PC board or from copper or brass sheet.

A suitable varactor diode would be a BB105 which is the type used in the RF tuned circuits in Mullard UHF varicap TV tuners (white tip).

Carrier deviation should be set for around 8MHz. This will make the overall channel bandwidth approximately 8MHz plus the highest modulating frequency, a total of, say, 15MHz, assuming a sound sub-carrier is present. This compares favourably with the bandwidth occupied by a double sideband AM signal.

RECEIVERS

First I should make it clear that it is not essential to have a wideband FM demodulator te receive FM TV. Signals can be readily resolved on a normal domestic/amateur TV set-up by tuning slightly to one side, this technique is called 'slope detection'. In some receivers - particularly those with a SAW IF filter - it is possible to resolve colour from a slope detected signal. Obviously though, to realize the best from the system a proper FM demodulator is required.

Several receive systems have been described in CQ-TV magazine recently[2], and these are usually based on PLL ICs. Do remember that to drive these circuits quite a high level of signal is required. Roughly speaking a gain of more than 40dB would be required between the IF output from a TV tuner and the input of the FM demodulator IC.

A receiver block diagram is shown in Fig.7.

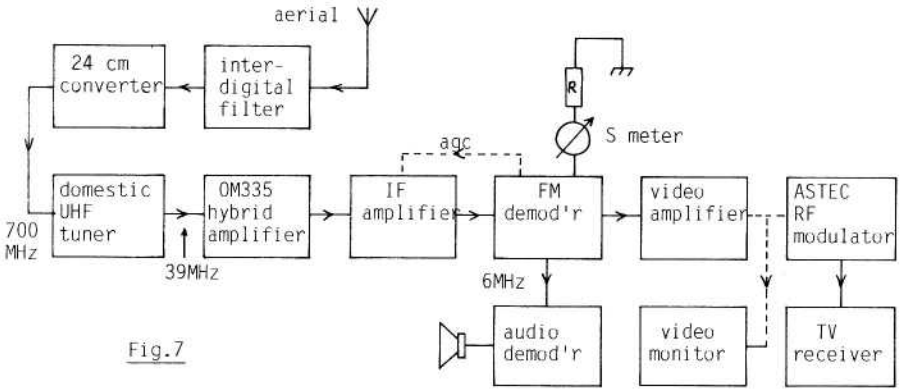


Fig.7

Fig.8 shows the circuit diagram of a FM receiver comprising input amplifier, S meter take off, PLL demodulator, emitter follower and 6MHz sound output, (this may be connected directly to a 6MHz ceramic filter prior to the usual IV sound system), de-emphasis network, variable gain video amplifier and an emitter follower output transistor delivering composite video at the standard 1v p-p level.

I hope that these ideas will provide sufficient information to enable a station to be constructed without too much effort. I hope that soon someone will send in a constructional article for the generation (or reception) of FM TV.

I know that there are several groups now using this mode and I would like to hear how you are getting on. I also know that some repeater groups are actively planning (or converting) their hardware for FM.

I am myself active on 24cm FM using home constructed equipment, the designs of which, unfortunately, are subject to copyright restrictions and are therefore not available for publication. I can however assure you that the mode has a great deal to offer.

N.B.T.V. CONVENTION

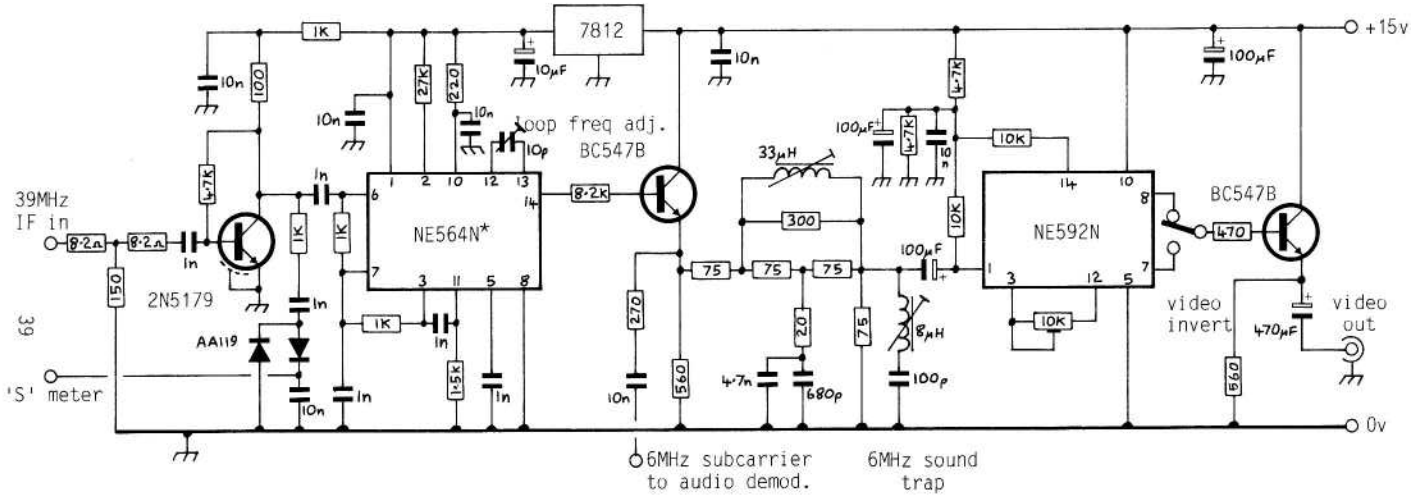
The Eighth Annual Convention of the Narrow Bandwidth Television Association took place on Saturday the 24th of April at the Clifton Polytechnic near Nottingham.

Attendance was low compared to the past few years (is the depression beginning to bite?) but there were a fair number of exhibits and it was a pleasant days outing for many, with good weather for the eighth year running.

Only three working cameras were on display, against six in 1981.

NBTV is currently off the air, but it is hoped to announce further activity in the two metre band this coming autumn. For information on NBTV please send an SAE to:- MR.D.B.Pitt. 1 Burnwood Drive, Wollaton, Nottingham, NG8 2DJ.

SEE YOU AT THE BATC CONVENTION IN SEPTEMBER.



* NE564N, 'Ambit'.

Fig 8. FM-TV RECEIVE SYSTEM

FLASHING CAPTIONS

by D.A.(Slim) Haines, G4IPZ

This article refers to the electronic character generator design which may be found in the BATCs current 'Amateur Television Handbook'.

Having purchased the character generator PCB, I took as little time as possible in its assembly, even though I was still short of the 2513 ROM. On testing, up came the '?' marks just as they should. I had already fitted 2 of the anti-smearing mod's from CQ-TV 116, and so the display looked very good.

As a point of interest there are 2 versions of the 2513 character generator. The PCB for this project is configured for the version requiring a single +5 volt supply. The other version requires -12 and -5 volt rails which are wired to pins 1 and 12 respectively.

Having decided on my choice for the upper and lower lines of text I set about wiring-in the diode matrix. However, on switch-on, some characters exhibited strange distortions. The 'I' of my callsign and the 'T' of TV. This distortion appeared as an additional vertical bar to the left of the affected letters. The diodes of the letters in question were changed but the fault persisted. Interestingly, wiring either an 'I' or a 'T' in any other position did not produce the same fault, they remained perfectly readable. Extra decoupling produced no improvement neither did IC substitution.

When I assembled the unit I observed that the value chosen for the 2513 pullup resistors were surprisingly large, being more used to values of 10 to 15k than 100k. On an impulse I changed these 100k resistors to 47k and instantly my problem vanished. Why only certain letter positions were affected I have no idea.

Having got the unit working, and working very well, I decided that I wanted to flash it up a bit. My chosen video display was to be:-

G4IPZ

CQ-TV

Having programmed in these characters I decided that I would like to make the two asterisks flash whilst the rest of the display remained stationary. This involved making the asterisk matrix seem like a space matrix. How this is accomplished may be seen from the chart:-

A9	A8	A7	A6	A5	A4	
	x	x	x	x	x	SPACE
	x		x		x	ASTERISK

(x denotes that a diode is required in that position)

It can therefore be seen that to change an asterisk into a space requires the addition of diodes in lines A7 and A5. At first it would seem a simple matter to just add two diodes in each asterisk matrix and switch them to 0 volts and back. However as the data lines are multiplexed it means that the switching may only be operative when the matrices for the asterisks are being addressed.

The circuit for this modification is given in Fig.1.

Points X and Y go to the matrixing outputs from the 74154 that drive the respective asterisks matrix.

As yet the unit has not been seen on the air but it works very well. The next step must be the construction of a transmitter. Ah well.....!

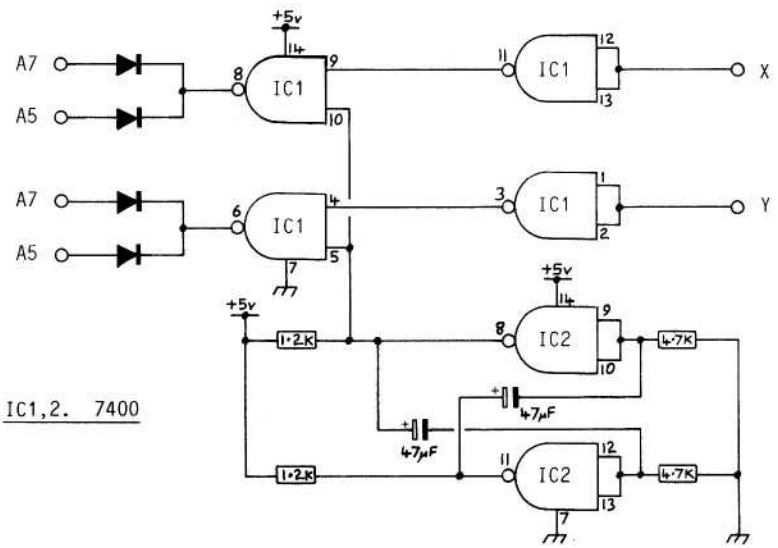


Fig.1. CIRCUIT FOR "FLASHER" MODIFICATION

THE DOMESTIC V.C.R.

by John Goode.

The current range of domestic video recorders on the U.K. market fall into the following format classifications, in order of popularity:-

VHS:-	JVC; National Panasonic; Hitachi; Sharp; Ferguson; Baird.
Beta:-	Sony; Sanyo; Toshiba; Granada.
Philips N1700:-	Philips.
Philips V2000:-	Philips; Grundig.

Of the above, the Philips N1700 machines are now obsolescent, but some are still available at heavily discounted prices. These machines use the old "double-deck" type cassettes which are expensive and becoming scarce.

For amateur use, the Philips formats are less attractive as they are not equipped with video and audio inputs and outputs, and unlike the Japanese formats they do not produce portable machines for use with lightweight video cameras. Having said that, it must be pointed out that the 1700 series Philips does produce marginally better quality pictures than the other formats, but with the shorter playing time and much more expensive cassettes.

Maximum playing times of the formats are:-

VHS	-	4 hours
Beta	-	3¼ hours
N1700	-	2½ hours
V2000	-	2 x 4 hours (double-sided cassette)

However, it is not the purpose of this article to make recommendations as to which format or machine is best, but to point out some of the problems of using any of the domestic recorders as a "production" tool.

As those readers with experience of videotape machines will know, video editing does not involve physically splicing the tape, but is achieved by controlled switching from playback to record. All of the portable and some of the more expensive mains machines offer a simple editing function associated with the pause control. When switching from 'pause' to record the tape is rewound a few frames then run up to stabilise the servo before switching to record. This gives a clean transition between any previous recording and the new recording.

When this facility is used with a portable video camera, it is possible to assemble a programme by recording sequencies in the order required in the final programme - this technique is known as "editing in camera". This method also gives a first generation finished tape, and therefore has the advantage of giving the best technical quality.

The 'editing in camera' method has severe limitations from the production point of view, however. It obviously requires a great deal of planning and organization to shoot all the scenes in the final order, and it may be extremely inconvenient if several locations are to be used. However, to shoot in the most convenient order and then rearrange the sequencies at the editing stage requires two machines, and means that the final programme is a second generation tape. Editing between two domestic VTRs is time-consuming and tedious, but if two keen enthusiasts with machines got together, it would be possible. However, this leads into the question of signal degredation when copying.

PERFORMANCE

Since the fundamental differences between industrial VTRs (such as U-Matic) and the domestic formats is in forward tape speed, what effect on performance does this have? Some forward speeds are shown below:-

EIAJ ½" Open Reel (and Cartridge)	-	7½ IPS	
U-Matic ¾" Cassette	-	3¾ IPS	
VHS ½" Cassette	-	0.9 IPS	) approx.
Beta ½" Cassette	-	0.8 IPS	)

This reduction in forward speed has been accompanied by an improvement in recording heads, but nevertheless audio performance suffers, rolling off above 8KHz, with a s/n ratio of only about 43dB, or 50dB with Dolby 'B' noise reduction.

The effect on the video signal of slowing forward speed is to reduce the video track width to about half that of the 'industrial' formats. In addition, to prevent crosstalk between adjacent video tracks (the guard-band is eliminated in the slow speed formats) the two video heads are set with opposing azimuth. Unfortunately, the suppression achieved by opposed azimuth heads at the luminance FM frequency band is insufficient at the colour under band. Consequently additional processing of the colour signal involving line-by-line phase shifting with a 2 line delay is needed to achieve crosstalk cancellation. The net effect of the track width reduction and the additional chroma processing is to worsen the video s/n ratio. Why, then, is it that whichever video machine specification you look at, the video s/n is always quoted as "better than 40dB"?

In order to understand this, it should be realized that all helical-scan machines use a technique known as "luminance noisecoring". This is a method of improving the "perceived" s/n ratio by selective HF filtering. It gives a measurable improvement in "weighted" noise, but of course not in the 'true' s/n ratio.

Noise-coring occurs as follows: The replay luminance signal is band-split; the HF component which contains the noise, (and any sharp edges in the picture) is then amplified. It is assumed that all low level HF signals are noise, and these are removed by clipping. The remaining signal, containing the HF picture components, are then recombined with the LF component. The result is to leave picture areas with little detail reduced in noise, although any sharp transitions will be just as noisy as before. Subjectively this gives a 'cleaner' picture as the eye notices noise more in large 'flat' areas of the screen.

Because the "real" s/n ratio of the domestic formats is fairly poor, careful examination of the reproduced picture will easily show the noisy verticals. One effect of this is to leave the sync pulse edges noisy, and on fast-lock monitors this can cause horizontal ragging.

Similarly, the chroma signal to noise ratio is not terribly good - the manufacturers don't seem to quote a figure! None of the colour-under video recorders are good at handling saturated colours, due to the fact that the chroma is recorded as an analogue signal (rather than FM), and is therefore susceptible to variations in head to tape contact. This can be very noticable at the top of the picture, particularly if there is any tape tension (skew) error.

All these shortcomings are emphasised and made more noticable when copying to a second generation. Additionally the required limitation of chroma bandwidth (that is part of the chroma processing) becomes noticable as 'colour-spillage' on the second generation. The viability of a second generation VHS or Beta tape very much depends on how good was the quality of the original video signal;- if it was noise-free, with clean edges, no ringing etc. then the copy will probably be acceptable. If not - well the user must be the judge, but, if you expect little, you will surely not be disappointed!

PLAYBACK

Upon acquisition of a video recorder the uninitiated user may think that he now has an additional picture source, just like a camera or flying spot scanner. Unfortunately this is not so. There is no way that a low cost VTR can be a synchronous video source. This means that it is not possible to feed the output of a VTR to a mixer and then mix or wipe to other sources, as the VTR cannot be synchronised to the station SPG. Even with higher grade VTRs, with servos that allow the playback signal to run in vertical synchronism with the SPG, full synchronism cannot be achieved due to the horizontal jitter inherent in all VTRs caused by mechanical imperfections. The only way this jitter can be removed is by use of a timebase corrector, costing several thousands of pounds.

The domestic VTRs exhibit jitter of about ± 30uS. However, despite earlier comments, this does not mean that it is impossible to feed off tape video through a mixer; that is, provided the mixer can use the VTR video as a reference source, extracting its syncs and burst and re-inserting it at the output. This will allow fades-to-black. Some mixers can derive line and field drives from the off-tape video, allowing a monochrome camera to be locked up to tape and captions added. (note that with this system all sources will exhibit the VTR jitter).

Both National Panasonic and Sony market their own "editing mixers" which allow fading and caption keying. By using their own special LSI ICs (developed for use in lightweight cameras) they are able to include a colour regenerator which gives the option of coloured captions. This is something that would be very difficult for the amateur to duplicate, especially as the Sony is offered at around £70 (presumably the Panasonic will be priced similarly).

Because it is not possible to synchronise the tape to the station SPG, it is essential that any tape edited for transmission should contain sufficient black (syncs and burst) "fore and aft" of the programme material to allow servo run-up, and the station to be switched from SPG sync to tape sync. This is best achieved in black, as any frame-jump will then be less obvious.

As I hope I've shown, there are one or two snags that need to be taken into consideration if video is to be successfully employed in amateur TV.

PLUGS AND SOCKETS

by Andy Emmerson, G8PTH.

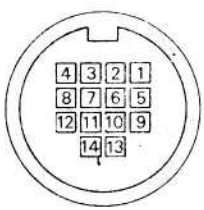
The range of cameras on the home video market seems to increase almost weekly and, with prices coming down, many of us are tempted to 'invest' in a colour camera. Many of these offer excellent value for money, but when it comes to extension cables and power supplies the big ripoff commences. Both items are quite easy to fabricate at home if you have the connection details and the special plugs and sockets. The two diagrams shown here may be of assistance - a similar table for the less commonly found DIN and HONDA (8 pin Japanese) combined audio and video connectors was shown in CQ-TV 109 (p.17).

The 10 pin J-type connectors can be obtained from Comprehensive Video Supply, 565 Kingston Road, London SW20 8BR. Prices around £5 per item. Comprehensive also keep a wide variety of other spares, their catalogue is free.

Loose K-type connectors are less easy to find and I know of no British supplier. They are listed in German catalogues but were out of stock when I enquired last. Perhaps a member knows of a source in the UK.

CAMERA TO RECORDER CONNECTIONS

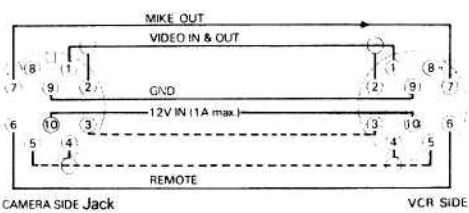
14-Pin Plug to 14-Pin Jack BETA TYPE
(also known as K-type)



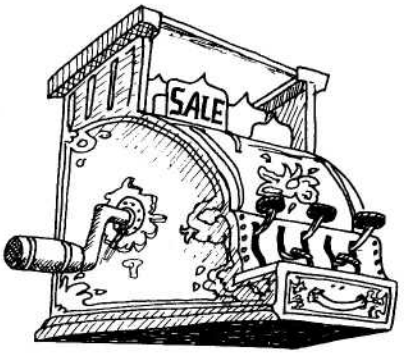
1. VIDEO OUT	8. $\overline{\text{REC}}$ CONTROL
2. GND	9. MIKE OUT (1CH)
3. VIDEO IN	10. MIKE GND
4. GND	11. MIKE IN (1CH)
5. REMOTE	12. MIKE IN (2CH)
6. TALLY SIGNAL	13. 12V
7. MIKE OUT (2CH)	14. GND

Pin 12 is sometimes used for GND (ground, earth)

10-Pin Plug to 10-Pin Jack VHS TYPE
(also known as Hirose or J-type)



Pins 3,4 and 5 may be assigned to a number of different purposes according to manufacturer. Pin 3 may be battery alarm or Vertical Drive; Pin 5 can be audio playback or Horizontal drive. Pin 4 is always ground.



MARKET PLACE

ADVERTISING RATES:
Classifieds - 3p per word.
Full Page - cover - £20.
Full Page - inside - £18
Smaller displays - proportional.

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

FOR SALE

FDK MULTI U-11, 70cm FM. Useable as TV TX (see CQ-TV 105).
2dB noise figure receiver, 12W TX fitted 4 simplex and 8 repeaters. Complete with mobile mount, handbook and original packing. £135.
YAESU FT227R 2m FM, 143-150MHz in 25/5KHz steps. Memory scanner, with mobile mount, handbook and original packing. £135.
144 - 432 Varactor tripler. £10.
Peter Harston, G4JQP. 58 Waterside Way, Radstock, Avon. Tel: 0761 34216 (home)

STARPHONE SF1, handheld, on RB6. With nicads, charger and circuits. £35.
R.Hall, G8KER, QTHR. Tel: (Rugby) 0788 832887.

MONITORS.

Modern 17" Philips transistorised. £20.
18" Peto Scott, valved. £15.
14" Shibaden, valved. £15.
18" Shibaden receiver/monitor. TV, line, VT, and sound inputs. Transistorised very useful. Believed to be in full working order. £25.

David Wilson. 4 Harkness Close, Bletchley, Milton Keynes. Bucks. MK2 3NB.
Tel: 0908 641234

G8GQS SALES LIST

EMI image orthicon camera, model 203, complete with power supply, CCU, control panel, viewfinder, 4 lens turret, one lens, camera cable. Reduced to £50. must go!
3" C-MOUNT LENS, f1.9, NICE. as new £28.50.
STUDIO MIXER, 20 channel! ABCD banks etc. Big and posh! enquiries please.
MARCONI pulse and bar generator, solid state, to clear at £10.
1" VTR, monochrome, Ampex. Phone for details - cheap!
2" VTR tape, 2 reels £5. + postage.
SWITCHING matrix by ABC TV (2x4+1x2) 3½" rack. BNC connectors. £8.
PYE SPG. 625/525 lines. In use in my OB van at present, but redundant soon.
Type 842582 5¼ RK. £40.
FERNSEH colour camera, 3 vidicon tubes, RGB out, CCU, handbook, cable. Tested, takes C-mount lens, solid state, needs drive pulses. £250.
SUPER-8 movie camera. 3:1 zoom, TTL viewfinder, light meter etc. £50.
SOME ITEMS FROM AD IN CQ-TV118 STILL AVAILABLE. SAE FOR LIST.
B.Summers, 4a Knaith Hill, Knaith, Gainsborough, Lincs. Tel: 0427 3940 (evenings)

TV equipment for disposal. A quantity of TV gear is available for disposal including VTRs, VCRs, ½" tape, 1" tape, VCR cassettes, SPGs and other studio equipment. All at modest prices or free!
Mr. G.Smart. Salford University. Tel: 061 736 5843 ext 7256 or 237.

EMI Prowest PM20/5B monitor, 20" monochrome, VGC. £100.
SONY VCZ100 ACE VTRs, one working and one without heads. £100.
JVC NIVICO TKC 300 mixer/fader, mono, as new. £55.
JVC NIVICO TKE 1 effects unit, mono, requires attention. £40.
SHIBADEN SG108 SPG plus grid. Requires attention. £35.
AZTEC Hawk 1" vidicon camera, rack focus, less lens. £45.
PYE Super Lynx 1" vidicon camera, less lens. £45.
VIDEO TAPE, 7" and 8" spools, new and unused. £5 to £8.
SLICK camera mounting bracket ball head. £10.
FOCUSING C-mount lenses - Cosmicar 12.5mm. £35.
FUJINON 25mm CF25B, £40. IZUCAR 20mm - 50mm zoom. £60.
VARIOUS Rank Taylor-Hobson Vidital broadcast mount lenses, fixed focus, 12mm to 80mm, some as new. £15 to £30.
Manuals supplied with all equipment.
McDonald. 147a Roseville Road, Hayes, Middlesex. UB3 4RA

MHW-710 10Watt power modules. 100mW in, at least 10W out on 70cm. £84.50 +VAT from Motorola distributors (yes, you read that right!) Also available by airmail direct from the USA to your doorstep for £38 plus possible VAT/duty. Which would you rather pay? Orders accepted at either price by G8PTH. Blean Video Systems, 4 Mount Pleasant, Blean Common, CANTERBURY, Kent CT2 9EU.

TELEVISION TRANSMITTERS FOR 70cm - choose between Fortop (Ready Built) or PC Electronics (uncased modules). Send large SAE for details and other useful info. to your Southern Agent.
Andy Emmerson, G8PTH. 4 Mount Pleasant, Blean Common, CANTERBURY, Kent. CT2 9EU
Tel: 0227 77 471.

WANTED

TEKTRONIX type 1A1 dual trace plug in (for 547 'scope.
T.Simpson. 58 Cemetery Road, Houghton Regis, Dunstable, Bedfordshire.
Tel: 0582 62621.

YES! I am still collecting monoscope tubes. Contact me if you have one to sell or swap, or even know where there are some hidden away!
VHS tapes transcoded to SECAM. £5 a tape plus return postage. Professional SONY transcoder used. A.Emmerson, G8PTH. 4 Mount Pleasant, Blean Common,, CANTERBURY Kent CT2 9EU.

CLAUD LYONS AVR type TS3-S448, IVC VTR 800 series, EMI 2001 spares, handbook, G101 cable etc. Cash waiting.
B.Summers, G8GQS. 4a Knaith Hill, Knaith, Gainsborough, Lincs.
Tel: 0427 3940 (evenings).

STRAIGHT SWAP, two 24" monochrome monitors with sound for two 9" or 12" monitors.
Andie Wilkes, G4NTV. 34 Tideswell Road, Great Barr, Birmingham, B42 2DT.
Tel: 021 525 5363 (office hours only).

HF BANDS RECEIVER. Heathkit RA-1 or Heathkit Mohican (or similar) Offers and price to:- P.Kaminski, GM3PIB. 5 Tytler Street, Forres, Morayshire, IV36 0EL
Tel: 0309 72019 (evenings).

MICROWAVE dish aerial, any size or type considered.
R.Timms, G8VBC. 16 Butt Lane, Woodville, Nr. Burton-on-Trent, Staffs. DE11 7EL
Tel: 0283 221549.

INFORMATION ON ANY MODS, to Akai VT150 colour VTR (drop-out compensator etc). and source of ¼" tapes.
P.Harston, G4JQP. 58 Waterside Way, Radstock, Avon. Tel: 0761 34216 (home).

FREE! About a bootload of TV miscellanea including B&W monitor, keyboard, waveform generator, FSS corrector, box of data equipment etc. Mostly ex-broadcast. A shame to throw it out. Free to anyone who will collect.
S,Hazlewood. Tel: (Huddersfield) Homefirth 2264.

EVR 1500 HITACHI player wanted, in any condition, but running EHT and deflection circuitry. Ladislav Vig. A. Schindlerstr, 3, 6030 Ebikon, Switzerland.

SERVICE SHEETS wanted for the Sony dual-standard portable TV model 9-306UB, or legible copy thereof, to borrow for a few weeks. All expenses defrayed.
Doug Pitt. 1 Burnwood Drive, Wollaton, Nottingham.

SSTV MONITOR or slow to fast scan converter. Also F/S camera.
Rod Power, EI3CZ. 6 Rockville Park, Blackrock, Dublin, Ireland. Tel: Dublin 893609

SIRKIT

PROJECTS

"BENBOW", WIDECROFT ROAD, IVER, BUCKS. Tel: IVER (0753) 651652

THE G8LES 70CM ATV-TX

NOW AVAILABLE FROM STOCK

10 WATT PEAK SYNC TRANSMITTER £113.50p.

IN KIT FORM WITH BOX £ 88.50p.

OUR UP-CONVERTER, WHICH CAN BE BOXED WITH YOUR TRANSMITTER LATER TO PRODUCE FULL TRANSCEIVE FACILITY, SHOULD BE AVAILABLE WHEN THIS ADVERTISEMENT APPEARS, IN EITHER KIT OR BUILT FORM. RING FOR PRICES.

SEVERAL USEFUL ACCESSORIES IN PIPE-LINE. CALL US FOR DETAILS.

SPECIAL UHF COMPONENTS FOR YOUR ATV PROJECTS AT VERY COMPETITIVE PRICES INCLUDE SD1135, SD1136, BSX20, BD132, BD135 and 2N3866.

SEE US AT WOBURN AND THE BATC CONVENTION AT LEICESTER.

M.J.SANDERS G8LES J.BETTS G4HMG M.J.JOHNSON G8ZRT

FORTOP LTD

Manufacturers & Suppliers of Radio Equipment

THIS IS THE NEW FORTOP AMATEUR TV TRANSMITTER. BASED ON OUR HIGHLY SUCCESSFUL TVT 432 ATV UNIT THE NEW TRANSMITTER HAS EXTRA FACILITIES FOR YOUR OPERATING PLEASURE. LOOK AT THE FOLLOWING FEATURES.

* 15 WATTS MIN OUTPUT
* SYNC PULSE CLAMP
* SWITCHABLE BANDWIDTH LIMITING FILTER
* DUAL VIDEO INPUTS
* DUAL FREQUENCY OPERATION USING PLUG IN CRYSTALS
* POSITIVE OR NEGATIVE MODULATION SENSE
* 12-13·5 VOLT SUPPLY
* AERIAL CHANGEOVER FOR RX CONVERTER BUILT IN

FRONT PANEL MOUNTED SWITCHES ALLOW CHOICES OF TWO VIDEO INPUTS AND VIDEO CARRIER FREQUENCIES TO BE SELECTED AND THE OSCILLATOR CIRCUIT NOW USES PLUG IN CRYSTALS FOR EASE OF INSTALLATION. A VIDEO BANDWIDTH LIMITING FILTER CAN SWITCHED IN TO REMOVE THE WIDER BANDWIDTHS ENCOUNTERED WITH STATION CAPTION GENERATORS AND COMPUTER GENERATED GRAPHICS. WITH THE FILTER IN THE 'OUT' POSITION THE TVT 435 WILL RADIATE EXCELLENT COLOUR TV SIGNALS. THE OUTPUT FROM THE TRANSMITTER IS EXTREMELY CLEAN WITH VERY LOW LEVELS OF OSCILLATOR FEEDTHROUGH AND HARMONIC OUTPUT, MORE IMPORTANTLY THIS MEANS NO VIDEO BUZZ ON YOUR 2 METRE TALK BACK CHANNEL OR BREAKTHROUGH ONTO BROADCAST TV CHANNELS.

ALL THIS FOR ONLY £148·50 INC VAT PLUS £2·50 P&P

OUR TVC 435/40 AMATEUR TV RECEIVE CONVERTER WILL PROVIDE A HIGH PERFORMANCE RECEIVE CAPABILITY WHEN USED WITH ANY STANDARD UHF TV SET. ONLY £24·95 INC VAT PLUS 90p P&P.

FOR FURTHER DETAILS ON THESE AND OTHER PRODUCTS OF INTEREST TO ATVers PLEASE WRITE OR RING

FORTOP LTD, 13 COTEHILL RD, WERRINGTON, STOKE ON TRENT, STAFFS.
TEL ASH BANK (078-130) 2607.