CQ-TV MAGAZINE No. 153

BRITISH AMATEUR TELEVISION CLUB

FEBRUARY 1991

THE BATC ON LOCATION AT THE LINCOLN HAMFEST

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MEMBERSHIP

FULL YEAR: Subscription to the club is £9.00 per year. All subscriptions fall due on the first of January. Membership application forms are available by sending a stamped addressed envelope to Dave Lawton, whose address may be found on page-2 of this issue.

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

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

The BATC is registered under the DATA PROTECTION ACT - all queries to Dave Lawton, and VAT registered - number 468 3863 01.

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

The BATC is a non-profitmaking club run by a committee elected from the mebership for the benefit of the membership.

Please note that any opinions expressed in this magazine are those of the writers, and do not necessarily reflect the opinions or official policy of the committee or the editor.

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CLOSE FOR PRESS FOR THE NEXT ISSUE ..... **20th MARCH 1991**

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WHO TO WRITE TO

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

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

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

MEMBERS SERVICES - PCB's; components; camera tubes; accessories etc. (other than publications); queries related to such supplies: PETER DELANEY G8KZG, 6 East View Close, Wargrave, Berkshire RG10 8BJ. Tel: (0734) 403121

MEMBERSHIP - Anything to do with membership including new applications; queries and information about new and existing membership, non-receipt of CQ-TV; subscriptions; membership records; data protection: DAVE LAWTON G0ANO, 'Grenehurst', Pinewood Road, High Wycombe, Bucks HP12 4DD: Tel: (0494) 28899

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

PUBLICATIONS - Anything related to the supply of BATC publications. IAN PAWSON G8IQU, 14 Lilac Avenue, Leicester LE5 1FN Tel: (0533) 769425

EXHIBITIONS AND RALLIES - also arrangements and information about lectures and talks to clubs; demonstrations etc: PAUL MARSHALL (address as above).

CLUB LIAISON - and anything of a 'political' nature; co-ordination of ATV repeater licences: GRAHAM SHIRVILLE G3VZV, The Hill Farm, Potsgrove, Milton Keynes, Bucks MK17 9HF. Tel: (0525) 290 343

PUBLIC RELATIONS AND PUBLICITY - IAN SHEPHERD, Grosvenor House, Watsons Lane, Harby, Melton Mowbray, LE14 4DD. Tel: (0949) 61267

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

CONTESTS - BOB PLATTS G8OZP, 8 Station Road, Rolleston-on-Dove, Burton-on-Trent. Tel: 0283 813181.

CQ-TV AWARDS - BOB WEBB G8VBA, 78 Station Road, Rolleston-on-Dove, Burton-on-Trent, Staffs, DE13 9AB. Tel: 0283 814582

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

POSTBAG

HELP WITH REMOTE TV LINKS

Dear Mike,

Unless you've been inundated with letters this time round, perhaps you could put in this request for information. I work for a computer communications company which makes, amongst other things, some medium and higher speed multiplexers, running at 64Kbps and 2.048Mbps. We are interested in finding sources of video equipment to be able to give demonstrations of remote monitoring (e.g: security applications) via our units.

I am very much out of touch with the commercial/amateur suppliers and that is why I hope that other club members can give me suggestions for contacts, or even block diagrams of their own kit, assuming pieces can be purchased "off the shelf" (e.g: getting a Comet security system, camera and monitor for £xxx, linking it up to an XXXX computer running YYYY software.

It may be that a set-up based on a home-micro with SSTV hard/software would be adequate and not too costly, compared with say a Robot system. Contact names for prices of commercial equipment (even quotes!) would be a help. since I don't even know where Robot units can be purchased.

The equipment we manufacture can support synchronous data at 48, 56, 64 Kbps, and we have voice cards which use 64, 32, 24Kbps (PCM or ADPCM). Since this is quite a low priority thing at present - we are busy on various optical fibre projects - I cannot offer any cash incentive, unless you supply equipment and get an order one day. However, I'm sure if I get a response I can generate an article for the magazine to give you all a round-up of the solutions and credit to the authors.

73 ... Peter GW6VKM, P.O.Box 580
Wrexham, LL11 1XH.

G3WCY/G4ENA SSTV

Dear Ed,

After reading Steve Hodgetts letter in CQ-TV 150 regarding a 48-second mode for the G3WCY/G4ENA SSTV converter, I have made some modifications to my unit which may be of interest.

By fitting a 100k Log potentiometer in series with RV5 you are able to slow the unit down to any scan rate required. I have found that this modification allows for 32-second B&W and 48-second colour.

The resolution of the picture is of course unaffected and remains as for the 24-second colour mode, but it does at least allow amateurs who are new to SSTV the ability to see how the "experts" do it at these slow speeds.

May I say as an amateur who is new to the BATC that I find the magazine the best for content I have found.

After recently spending a day trying desperately for an SSTV contact on HF during the recent contest on Nov 11th I was very surprised to find no other amateur participating in this event. Was it no-one could be bothered, or had I the wrong day?

73 ... Robin Dexter G0ITP

Don't worry Robin, you definitely had the right day, I also found virtually no activity on the FSTV side of things, although business did preclude me from participating during the afternoon and evening. Perhaps old "Gunn Diode" Platts will have some comments in the Contest News .... Ed

HELP WANTED IN STOKE-ON-TRENT

Dear Mike,

would you please insert the enclosed advert in Market Place. After 32 years of being licenced I now find at the age of 72 that I am going blind due to a complaint called retinopathy, and in spite of Laser treatment every 4 weeks I have been told

that the inevitable will happen in the not too distant future due to diabetes.

Because of this I am unable to construct equipment, much as I would like to and have done in the past. This is why I am advertising for a ready-built rig for 70cm ATV.

I have a TX and RX for the GB3UD repeater whiwh I use most evenings - the trouble is that the three signatories for the repeater have all lost interest. So, if it ever goes off air the locals are all in the cart, as most who still use the repeater are either too old, or non-technical.

How do we stand Mike? Cannot an appeal be made in CQ-TV? At the moment the repeater runs 5W, and because of problems with the DTI had to have the deviation turned down. Thus, at this point interest appears to have gone, which is a pity as the repeater was received over a 40 mile path at P4/5 with full colour, and now I'm lucky to get a P4 mono pictures from only 4 miles away. The range and interest has henceforth diminished considerably.

Sorry to appear to be a wingeing pensioner but I would appreciate any help you can give in trying to get interest back in the local repeater group. Thanks for reading this Mike and hope that perhaps the odd word from yourself might help.

Yours .... Alfred Frost G3OGD

Sorry to hear about your failing eyesight and the local problems with 'UD Alf. Unfortunately I know the problem of raising local interest, and, more importantly cash, only too well. I hope that the inclusion of your letter here helps, but in the light of my comments in the Editorial perhaps 'UD may be one of the first to go ... Ed

RE: COLOUR ON 70CM

In the light of the argument concerning the use of colour and/or sound on 70CM ATV I have decided to reproduce my letter to John G4MNY concerning his article published on page-60 of this issue ... Ed.

Dear John,

Many thanks for your letter and article for CQ-TV. Owing to the nature of the subject matter which, as you may not realise, was not just a matter of Editorial comment, but a Committee decision, I have circulated the article to the Club Committee for their advice and comment. Although I hold total Editorial control over the magazine I feel that this course of action is only fair considering the subject matter.

I would also like to attempt to clarify the Club's stand on this matter: Essentially we are concerned that the improper use of the shared and heavily occupied 70 CM band, and the pressure placed upon us and the legislative bodies concerning the future of the section of the band used for ATV, may cause the Authorities to carry out the veiled threats to remove the ATV (and other) sections of the band.

Whilst I understand the nature of your comments, and the practicality of VSB colour transmissions on 70CM, I still contend that the majority of amateurs, particularly the majority of our members, are neither technically competent enough, nor practically equipped to build and align VSB equipment. Therefore, it would be inadvisable of the Club's representative body to promote the use of such equipment and modes on a band that is already under attack, both from within the amateur world and from without.

Finally, I see no mention in your article of possible interference to the Satellite operators on 70CM. They also operate as well as the narrow-band users you often refer to, and as our favoured mode is, by its very nature, extremely wide-band, anything we can promote to reduce our required spectrum should be urged with the greatest endeavour.

You finish your article with the statement "... and maintain the historic use of this DX band for ATV". This sentiment is one which I and the Committee wholeheartedly support, but we cannot promote the use of

colour transmissions on this band for the reasons I have just detailed.

I hope that you appreciate our position and are now more aware of the reasoning behind our advice. I will advise you of the Committee's decision/comments re your article.

73 ... Mike

GaAsFET CONVERTER

Dear Mike

I thought I would drop you a line to let you and other members know about the difficulties I had with instability when I built the DD9DUK GaAsFET 24CM converter (The ATV Compendium) configured for a UHF IF output.

I found that the RF and mixer stages were oscillating at several settings of the trimmers. I was using the CF300 GaAsFETs. I had a chat with Alan G3UMF, who had also built this converter and had had the same trouble, which he had cured by fitting two screens across the GaAsFETs on the back of the PCB, securing them to the earthy side of the coffin capacitor with solder.

This gave me some improvement, but the tuning up was very critical. I noticed that the original design used 3SK96 devices, which exhibit lower gain than the CF300 ones. I changed the CF300 in the mixer stage for a 3SK97 and found that the converter was stable, even without the screens.

I would be interested to hear of other members' experiences with this converter.

73 ... F.A.Jefferies G8PX

NEWS ROUNDUP

AN ODE TO SEVERNSIDE

Just a note to give our thanks
for help with JOTA last weekend;
For all the effort and the pranks
I know we drove you round the bend.
Thanks young Jean for being there,
for spending timer with us and scout;
And for chatting on the air,
well that's what it's all about.
Thanks for pictures on TV
and for spending all that time;
At least you got P5 off me
and the shack, with mugs in line.
Thanks to Brian who gave up time,
with girlfriend he could have spent;
As QSL card and a rhyme
and pictures of himself he sent.
Thanks to Ivor and to Viv,
for carting over all your gear;
As we supplied you coffee with,
can you come back again next year?

Tony G6WLX, Gordano Amateur Radio Group.

I²C PRINTED CIRCUIT BOARDS

Unfortunately, the supplies of PCBs for the I²C projects so far described in were not in stock at the time of going to press.

However, should you wish details of these, or notification of stock and prices etc., please send an SAE to Members' Services and details will be sent to you as soon as they are available.

We wish to apologise for this extended delay, but as they say in the best of circles

'this is due to, circumstances beyond our control"!

MEMBERS' SERVICES

BATC Members' Services does not hold stock of BATC Publications and vice versa.

Please note that only the items listed in the CURRENT 'Services for Members' supplement in this magazine are available – a description of most of the various PCBs and components can be found in the 'What's What' supplement included with CQ-TV 149.

To avoid delay and inconvenience, please be careful to include the correct amount of VAT with your order, i.e: 15% of total; goods AND postage (unless an overseas member).

Payment should be by cheque or crossed postal order in favour of BATC -do NOT send cash or postage stamps please.

Batches of call sign badges are sent to the engravers once per magazine cycle. Please ensure that your order reaches BATC Members' Services by the CQ-TV close-for-press date, given at the foot of the 'Contents' page in each issue.

Badges are distributed to members as soon as they have been engraved. Members are advised to check the availability of items limited to stock (marked ** in the Members' Services list) before placing their order.

VIDICONS

Tubes available from Members' Services include electrostatic or deflection, and low-light types not available prior to CQ-TV 152 to club members. Prices vary depending on the size, type and grade of tube.

A tube guide appeared in CQ-TVs 149 and 150. Please contact Members' Services for further information.

The stripe filter tubes used in domestic-type colour cameras are not available through the BATC, and normally must be ordered direct from equipment suppliers.

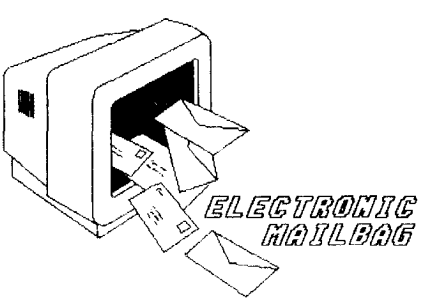
WIDEBAND VIDEO SWITCH IC

Siliconix has developed a new wideband video switch IC, the DG894, which offers significant performance and integration benefits within TV switching systems based on the Philips I²C bus and the internationally recommended SCART interface.

The new circuit is ideally suited for use in modern TV installations where the TV set is used in conjunction with video recorders, home computers, satellite and cable inputs, and audio HI-FI systems.

Unlike previous approaches involving numbers of separate decoding and switching ICs, the DG894 offers all the necessary switching, control and interface functions on a single chip. Two of the most outstanding parameters of the new device re its ability to switch analogue or digital signals with a bandwidth of up to 100MHz and very low cross-talk performance of -70dB at 5MHz.

The DG894 is fabricated in Siliconix' high-performance D/CMOS technology and consists of 14 change-over switches arranged in two groups of four plus three groups of two. It can be used for switching both RGB and Super-VHS luma/chroma (Y/C) signals with control either by DC addressing or via the Philips I²C bus. Its signal handling capability is 4V peak-to-peak.



PLEASE WRITE!

EDITORIAL

Mike Wooding G6IQM

REPEATER LICENCING

Those of you who are members of the RSGB may have already read in RadCom the news concerning repeater licencing, or you may have heard rumours via the grapevine. The essence of the situation is that backdated to 01/07/90 repeater groups will be charged for their repeater licences.

For the uninitiated, until now all repeater licencing has been administered and paid for by the RSGB, for all repeaters and beacons, on all bands and operating in all modes. However, with the current problems being experienced by the RSGB the decision to pass on some (not all) of the costs to repeater groups has been taken. I have reproduced here verbatim from the RSGB publication "Repeater Report", which is sent to all repeater managers.

"As you know, the RSGB is going through a difficult period financially, as indeed are many other companies and organisations in the U.K. The deficit for the year 1989-90 is into five figures, so cost cutting and staff reductions are the order of the day. Improved accounting techniques have enabled the Society to cost the administration of the repeater service. This has been worked out to be £50 per year.

This sum includes the cost of the licence (£12), and third party insurance (£15). Council has decided that repeater groups should contribute to these administrative costs to the tune of £25 per year, and it is anticipated that these groups will recoup this cost from their users.

In this context, an article will be published hopefully in the December RadCom aimed at users and explaining the behind-the-scenes work that is entailed in administering the repeater network. The Society will still pay for the licence and the insurance, but a fee of £25 per repeater unit will be levied for administration as from 1/7/90. You will be billed from Headquarters and you should reply promptly once billed.

I am sorry that groups are now having to pay for something that they have come to take for granted. Unfortunately it is inevitable, and hopefully we can provide an even better service to groups in the future"

Whilst I can sympathise with the situation that the RSGB finds itself in I find myself in somewhat of a cleft stick position. I am manager of GB3RT and the new, now operational, GB3RV. The Rugby TV Repeat er Group exists essentially only in name. There are around four or five "paid-up" members, but the whole affair is very informal. There is apparently just not any interest in a formal group (probably because of the famous British don't volunteer syndrome!), only in an informal group of operators.

GB3RT was designed and built by John Wood G3YQC and myself with help from various "group" members with the installation and on-site aerial maintenance etc. The funding essentially came from John, myself and the Bring-and-Buy stall that the "group" ran at the Conventions when they were held locally. GB3RV (3CM) has been, apart from the donation of a few items, totally financed by myself.

Thus, my problem is, where am I going to find £50 for licence fees -the answer is that I am not. GB3RT will have to be financed by the "group", GB3RV will quite probably, as the situation stands at the time of writing this, only be operational for a short time, after which I may have to return the licence!

The outcome of the decision from Headquarters is that the special interest projects, 3CM ATV repeaters, single operator microwave beacons, etc., will disappear. The technical innovations produced by these projects will perhaps stagnate.

We do not all have infinite resources, perhaps just a desire to carry forward the well respected technical inventiveness of the radio amateur fraternity, perhaps a desire to do something for the majority and extend whatever knowledge we may have to the advantage of our peers.

Once again it seems that blind bureaucracy is totally out of touch with the grass-roots activity. I wonder how many of the ATV repeaters, shown on the map on the rear of the label-carrier enclosed with this issue, will still exist in a year's time?

CLOSEDOWN

Owing to the "no room at the inn" problem I am faced with with this issue I have foregone the rest of the editorial space (very magnaminous of me what!) in order to fit in a few last-minute stop-press items. The moral of the story is **DO NOT LEAVE YOUR COPY, ADVERTS OR WHATEVER FOR THE MAGAZINE UNTIL THE LAST MINUTE, THE CLOSE OF PRESS DATE MEANS JUST THAT - I DO HAVE ANOTHER LIFE TO LIVE - EH BRIAN!!!**

To close with I would like to wish you all a belated Happy New Year ... 73 Mike.

STOP PRESS MARKET PLACE

Now available from Members' Services, but not on the supplement in the centre of this issue, will be found several new items for the I²C project. The following items are now available: I²C VDU Euro card through-plated hole PCB, SAA5243 Teletext IC, SAA5231 Genlock IC, PCF8583 Real-time clock IC, 6MHz crystal and 13.875MHz crystal. The 32.678kHz clock crystal is readily available from several sources, e.g: Maplin under part no: 304-447. Those who want advance information on future items for the I²C project should send a suitably stamped and addressed envelope to Members' Services.

FOR SALE: 74510 ICs, brand new. Maplin price is £1.80 each. Stock up now at sensible prices ... £5 for a tube of 15, or 10 tubes for ... £40 (i.e: less than a sixth of list price). **SONY AV3400CE PORTABLE VIDEO RECORDER,** in good clean working order, with original carrying case ... £30. Carriage at extra cost - larger items are best collected. peter Delaney G8KZG, 6 East View Close, Wargrave, Berkshire, RG10 8BJ. Tel: 0734 403121.

FOR SALE: PHILIPS LDK 44 COLOUR CAMERAS, 4 channels + 1 spare head. May need new Plunbicons, but when I last tried them 2 gave good pictures. Must go so best offer secures, no matter how small (or large). Jon Rome G8BPH, 21 Southbrook, Sawbridgeworth, Hertfordshire, CM21 9NS. Tel: 0279 723583.

WANTED: OLD CAMERA TUBES (and similar imaging devices) of various type and age, and related data etc, for historic (!) collection. Particularly welcome would be an Orthicon, EMI 9831 Vidicons, an Ebitron, and Image Isocon or a 1.5" Vidicon. Peter Delaney, 6 East View Close, Wargrave, Berkshire, RG10 8BJ. Tel: 0734 403121.

VIDEO MIXING DESK AND EFFECTS GENERATOR

Part–3

The series of articles making up this project first appeared in the January, February, March and April issues of Elektor Electronics, and we wish to thank the Editors for their permission to reproduce them in CQ-TV.

A. Rigby and G.Dam

In this third part of this article the keyboard module is described, with its many switches and controls for picture mixing and special wipe effects.

The keyboard circuit forms the user interface of the video mixer. The block diagram in Fig.11 shows the general structure. Each of the switches shown in a horizontal row roughly at the centre of the diagram has its own LED indicator. The switch states are demultiplexed to give two or, in some cases, four independent control signals. The diagram also shows that the output signals of switches S5–S12 and S30–S35 are synchronised to the VSYNC signal. This means that any action on the keyboard does not take effect until the VSYNC pulse is generated in the mixer. The synchronisation eliminates unexpected switching effects occurring at random instants during the current raster.

The lower part of the block diagram contains an EPROM, plus associated logic control circuits. The loading of state levels supplied by switches S1–S4 and S14–S29 is synchronised by VSYNC to ensure that the effect associated with a particular switch becomes visible at the start of a new raster only.

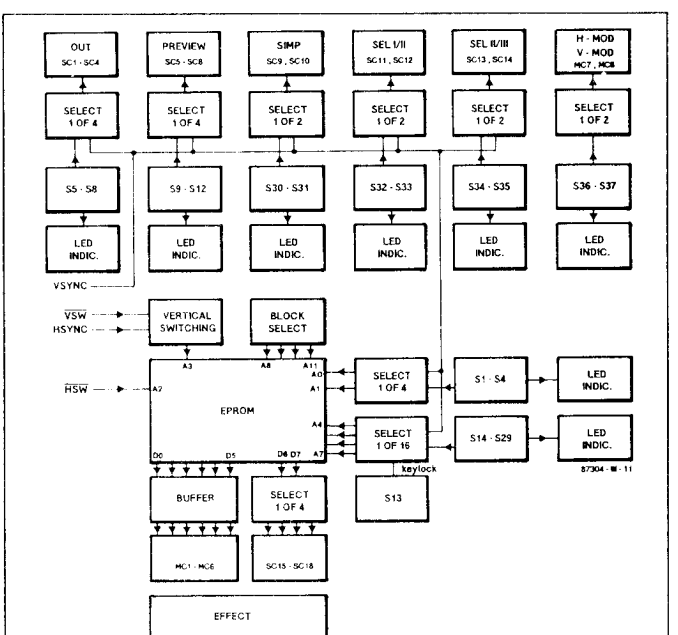


Fig.11 Block Diagram of the Keyboard Unit

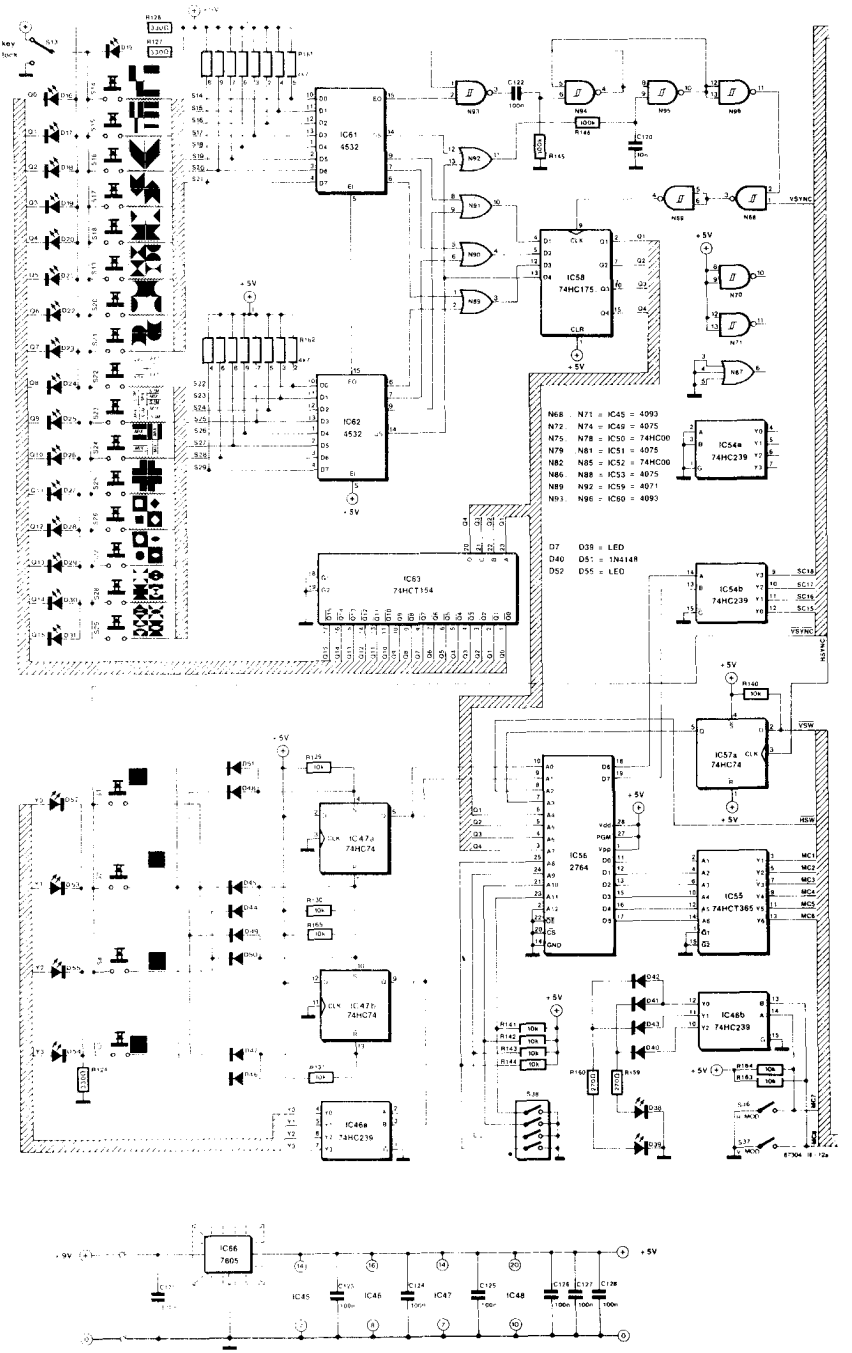
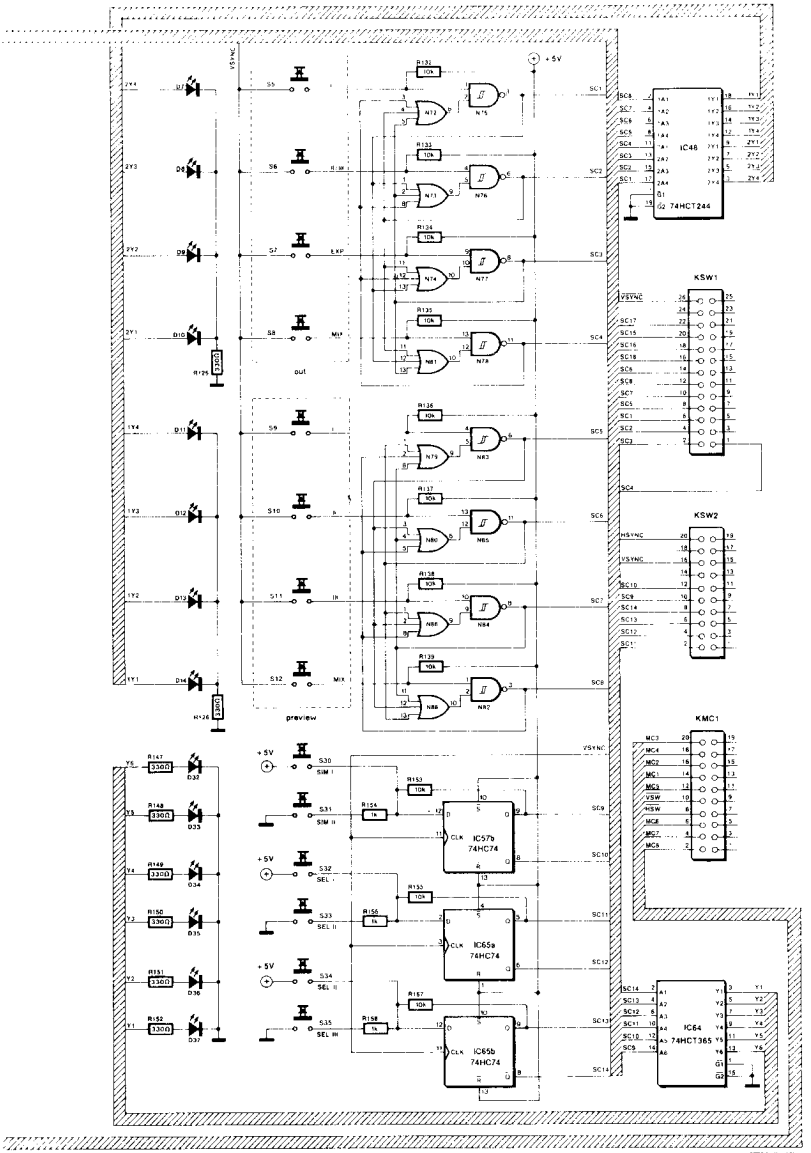
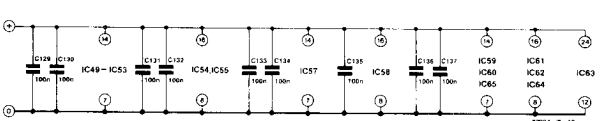


Fig.12 Circuit Diagram of the Keyboard Module


+5V
VSYNC
IC46
74HCT244
KSW1
KSW2
KMC1
IC57b
74HC74
IC65a
74HC74
IC65b
74HC74
IC64
74HCT365
out
preview


+5V
IC49 – IC53
IC54,IC55
IC57
IC58
IC59
IC60
IC61
IC62
IC63
IC64
IC65

After buffering, EPROM datalines D0–D5 are used direct in the mixer. Datalines D6 and D7, however, are first applied to a 1-of-4 decoder to give the required control signals SC15-SC18. The combination of control lines MC1-MC6 and buffered datalines D0–D5 provides a total of 64 different combinations, or 256 combinations if SC15–SC18 are added. Each combination represents a particular picture wipe or mixing effect.

Clearly, a total of 256 possible combinations results in an unwieldy number of effects. Therefore, a selection has been made on the basis of practical use. Obviously, this selection is subjective, but the user of the mixer is free to design and store his own set of effects, as discussed later.

In the basic version of the mixer, the EPROM contains only one of 16 possible banks of picture effects - up to 15 may be added if required. The effects obtained from the above selection are stored in the first bank of the EPROM, and may be called up by a total of 20 keys.

The first keyboard area consists of 16 keys, S14–S29; while the second area consists

	S1	S2	S3	S4	S1	S2	S3	S4	S1	S2	S3	S4	S1	S2	S3	S4
S14: XX00-XX0F	75	75	35	35	35	75	35	75	75	35	75	35	35	35	75	75
S15: XX10-XX1F	77	7D	3D	37	37	7D	3D	77	77	3D	7D	37	37	3D	7D	77
S16: XX20-XX2F	65	05	45	25	25	45	05	65	65	05	45	25	25	45	05	65
S17: XX30-XX3F	67	07	47	27	27	47	07	67	67	07	47	27	27	47	07	67
S18: XX40-XX4F	6D	0D	4D	2D	2D	4D	0D	6D	6D	0D	4D	2D	2D	4D	0D	6D
S19: XX50-XX5F	6F	6A	2A	2F	2F	2A	6A	6F	6F	6A	2A	2F	2F	2A	6A	6F
S20: XX60-XX6F	09	69	29	49	49	29	69	09	09	69	29	49	49	29	69	09
S21: XX70-XX7F	66	06	46	26	26	46	06	66	66	06	46	26	26	46	06	66
S22: XX80-XX8F	50	40	00	10	10	00	40	50	50	00	40	10	10	40	00	50
S23: XX90-XX9F	B5	BD	F5	F5	F5	BD	F5	B5	B5	FD	B5	F5	F5	FD	B5	B5
S24: XXA0-XXAF	BD	B7	B7	BD	BD	37	77	BD	3D	B7	B7	7D	3D	37	77	7D
S25: XXB0-XXBF	35	35	75	35	35	35	35	75	35	75	35	35	75	35	35	35
S26: XXC0-XXCF	7F	0F	4F	3F	3F	4F	0F	7F	3F	0F	4F	7F	3F	4F	0F	7F
S27: XXD0-XXDF	0A	6E	2E	4A	4A	2E	6E	0A	0A	6E	2E	4A	4A	2E	6E	0A
S28: XXE0-XXEF	6F	6F	2F	2F	6F	2F	6F	2F	6F	6E	2E	2F	2F	2E	6E	6F
S29: XXF0-XXFF	0E	6E	2E	4E	4E	2E	6E	0E	0F	6F	2F	4F	4F	2F	6F	0F

Table.1 Contents of the EPROM type 2764

		Mixed inputs bits: D7-D6				Reference bits: D5-D4					V-waveform bits: D3-D2				H-waveform bits: D1-D0			
	High nibble	input I	input II/III	mixed	superimpose	invert	normal	slide pot	vertical	Low nibble	key	ramp	parabola	triangle	key	ramp	parabola	triangle
Bin.	D7–D4	00	01	10	11	D5	D5	D4	D4	D3–D0	00	01	10	11	00	01	10	11
00 00	0	x				x			x	0	x				x			
00 01	1	x				(x)		x		1	x					x		
00 10	2	x					x		x	2	x						x	
00 11	3	x					(x)	x		3	x							x
01 00	4		x			x			x	4		x			x			
01 01	5		x			(x)		x		5		x				x		
01 10	6		x				x		x	6		x					x	
01 11	7		x				(x)	x		7		x						x
10 00	8			x		x			x	8			x		x			
10 01	9			x		(x)		x		9			x			x		
10 10	A			x			x		x	A			x				x	
10 11	B			x			(x)	x		B			x					x
11 00	C				x	x			x	C				x	x			
11 01	D				x	(x)		x		D				x		x		
11 10	E				x		x		x	E				x			x	
11 11	F				x		(x)	x		F				x				x

x = function selected.
(x) = function selected but overridden

Table.2 Correlation between EPROM content and Effects

```
014 0000: 75 75 35 35 35 75 35 75 75 35 75 35 35 35 75 75
          S1 S2 S4 S3 S1 S2 S4 S3 S1 S2 S4 S3 S1 S2 S4 S3
          HSW = 0     HSW = 1     HSW = 0     HSW = 1
          VSW = 0                 VSW = 1
```

Table.3 16 Bytes are reserved for each switch in area 1

Signals bar-VSW and bar-HSW are taken from the modulation board to ensure that all switching of video signals arranged by the EPROM runs synchronously with the vertical as well as the horizontal sync pulses.

of four keys, S1-S4. The latter allows the user to select one of four effects offered by one key from the first (20 key) area. If you find this difficult to follow, look at the front panel layout in Fig.14, which provides all the necessary information for effective control of the mixer.

As already stated, only a small part of the EPROM capacity is used, which leaves the user plenty of room to store new effects combinations.

The possibilities and rules that apply to customising the effects set are detailed further on in this article. The banks with custom-designed effects are accessed with the aid of the block select circuit.

PRACTICAL CIRCUIT

The circuit diagram of the keyboard circuit is shown in Fig.12. Although a sizeable circuit, it is the simplest in the video mixer.

Push-buttons S5-S8, like S9-S12, form a group of four switches of which only one is selected at a time. This selection is arranged by a combination of NAND gate and 3-input OR gate. Each switch has an associated activity LED which is driven by an output of buffer IC48. The 8 switching

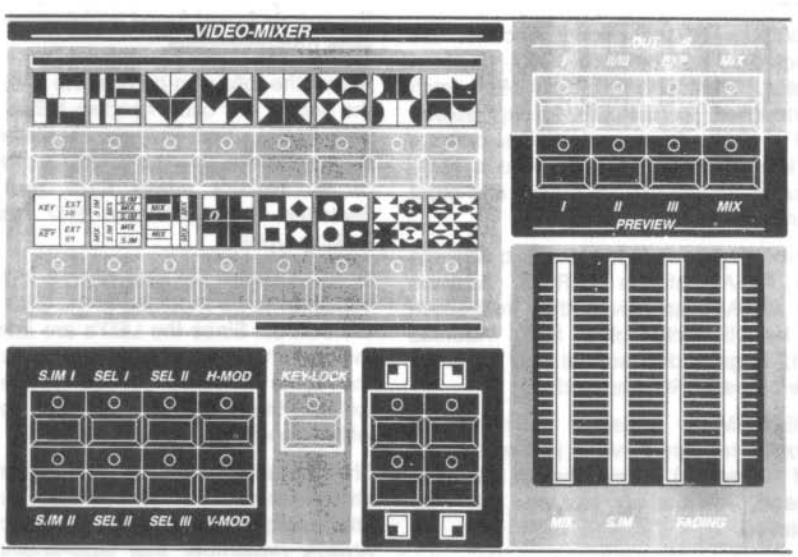


Fig.13 Front Panel layout shown approximately 30% true size

signals supplied by S5–S12 leave the PCB via connector KSW1.

Switches S1–S4 provide the two address signals A0 and A1 which select EPROM-resident effects and patterns. Switches S30–S35 are alternately connected to ground or the positive supply rail. Actuation of one of these switches is recorded by the bistable that follows it. The bistables are configured as set-reset (S/R) types whose output signals are fed direct to other parts of the circuit as well as to buffer IC64, which drives five switch-status LED's.

The two IC's in the top left-hand corner of the circuit, IC61 and IC62, form a priority encoder for switches S14–S29. If one of the eight encoder inputs is made high, the output supplies the binary value of the number of the relevant input. If two keys are pressed simultaneously, the highest value is passed to the output. Since two independent decoders are used, IC61 and IC62 are cascaded via their EI/EO (enable in/out) pins. This ensures that IC61 is disabled if one of the keys S21–S29 is pressed.

The outputs of the priority encoder are connected to a 4-bit latch, IC58, via three OR gates. The fourth data input of the latch is connected to the GS (group select) output of IC62. As a result, IC58 supplies a 4-bit key identification code. Gates N93–N96 suppress key bounce pulses and other interference.

The 4-bit key code is fed direct to address inputs A4–A7 of the EPROM. Address inputs A8–A11 are given their respective levels by DIL switch block S38. Address line A12 is grounded, so that only the lower 4Kbyte of the EPROM is used.

The EPROM is obtained from Elektor Electronics readers services (address at the end of this article). All switches in S38 must be closed. Alternatively, four wire links may be installed.

EPROM address line A3 is connected to the bar-VSW signal. Bistable IC57a ensures that level changes of the bar-VSW signal are synchronised to the line sync signal to prevent video source switching in the current picture line.

Address line A2 is switched by the bar-HSW signal, while the levels of A0 and A1 are determined by switches S1–S4. The relation between the EPROM address and the effect on the picture is discussed later.

CONSTRUCTION

The last module of the video mixer desk consists of two printed circuit boards which are available ready-made from Elektor Electronics (details at the end of this article). The PCB is double-sided and through-plated. First, use a jig-saw to cut out the part which is to hold the mains transformer and the two PCB terminal blocks. the edges of this part of the board are indicated by holes.

Mount the transformer and the terminal blocks on the supply board and put it aside for fitting into the enclosure later. The hole in the keyboard PCB created by removing the supply board forms a clearance for the slide potentiometers.

Mount the following parts at the EPS side of the board: IDC cable headers KSW1, KSW2 and KMC1, and voltage regulator IC66. Be sure to observe the opposite orientation of SIL resistor arrays R162 and R163. Switches S13, S36 and S37 are self-locking types.

In some cases the size of C12 forces this capacitor to be mounted at the EPS side of the board. Since the LED's are integral to the switcher, these parts are mounted at the same time. To reduce cost all IC's except the EPROM may be mounted without sockets.

The remainder of the construction is straightforward. Work accurately and use little solder to prevent short-circuits. Always remember that fault-finding in a circuit like this can be costly and time-consuming.

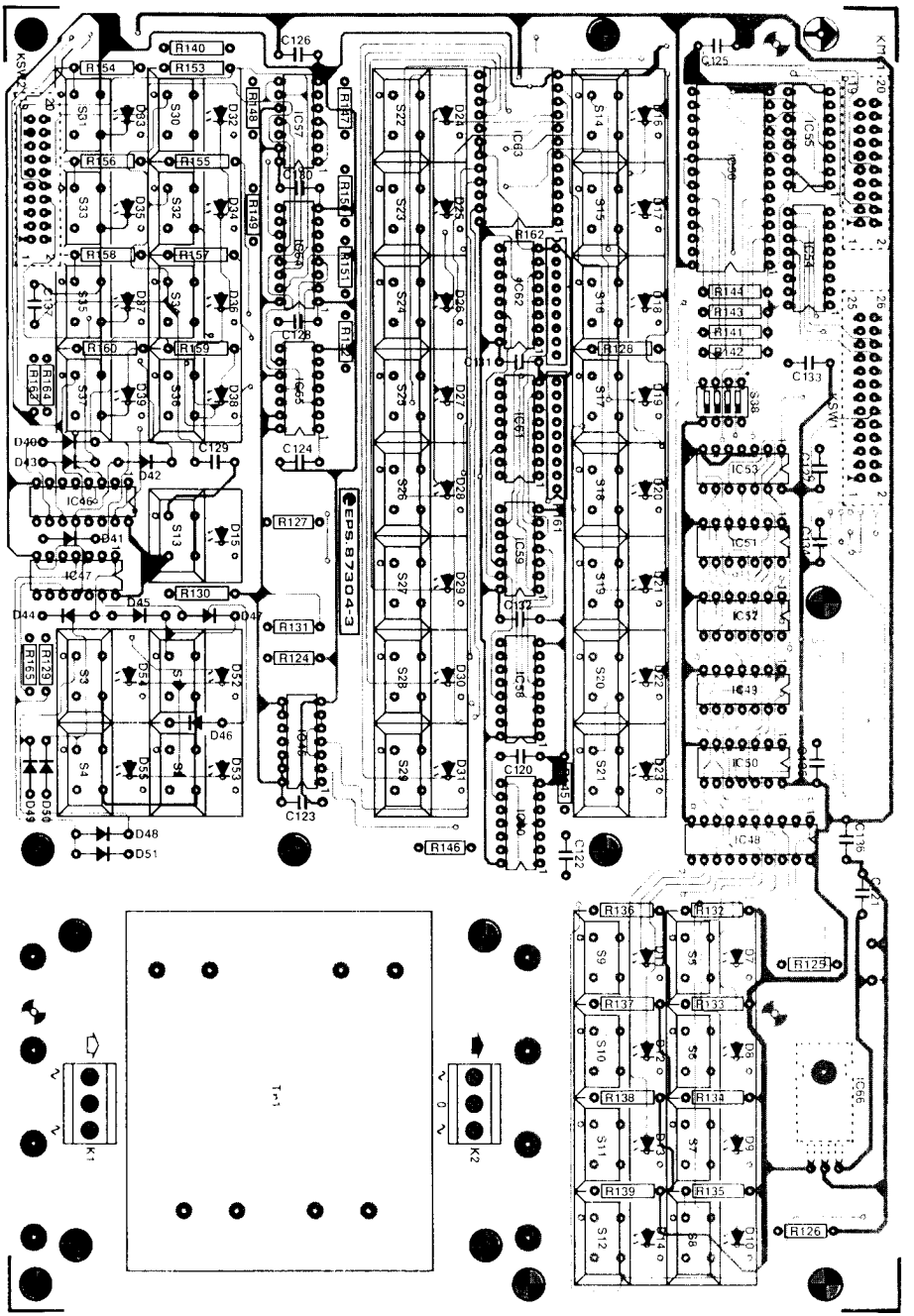


Fig.14 Component Overlay for the keyboard PCB

Resistors:
R_{124}–R_{128};R_{147}–R_{152} = 330Ω
R_{129}–R_{144};R_{153};R_{155};R_{157};R_{163};R_{164};
R_{165} = 10k
R_{145};R_{146} = 100k
R_{154};R_{156};R_{158} = 1k0
R_{159};R_{160} = 270Ω
R_{161};R_{162} = 4k7 (8-way SIL resistor array)

Capacitors:
C_{122}–C_{137} = 100n
C_{120} = 10n
C_{121} = 330n

Semiconductors:
IC_{45};IC_{60} = 4093
IC_{46};IC_{54} = 74HC239
IC_{47};IC_{57};IC_{65} = 74HC74
IC_{48} = 74HCT244
IC_{49};IC_{51};IC_{53} = 4075
IC_{50};IC_{52} = 74HC00
IC_{55};IC_{64} = 74HCT365
IC_{56} = 2764 (order number 5861; see Readers Services page)
IC_{58} = 74HC175
IC_{59} = 4071
IC_{61};IC_{62} = 4532
IC_{63} = 74HCT154
IC_{66} = 7805
D_7–D_{39};D_{52}–D_{55} = LED (in switches S_1–S_{37})
D_{40}–D_{51} = 1N4148

Miscellaneous:
S_1–S_{12};S_{14}–S_{35} = push-button with integral red LED (Dataswitch 61 10404010*).
S_{13};S_{36};S_{37} = toggle switch with integral red LED (Dataswitch 61 20404010*).
S_{38} = 4 way DIP switch block.
Tr_1 = mains transformer 2×9 V/2×9 VA)
K_1;K_2 = 3-way PCB terminal block.
KMC_1;KSW_2 = 20-way PCB header.
KSW_1 = 26-way PCB header.
Qty. 2: 26-way IDC plug.
Qty. 4: 20-way IDC socket.
Qty. 1: 25 cm 20-way flatcable
Qty. 1: 40 cm 20-way flatcable
Qty. 1: 60 cm 26-way flatcable
Enclosure: e.g., ESM EP30/20+
PCB Type 87304-3 (see Readers Services page).
Front-panel foil Type 87304-F (see Readers Services page).

* ITW Switches • Division of ITW Limited • Norway Road • Hilsea • PORTSMOUTH PO3 5HT. Telephone: (0705) 694971.

+ ESM • 119 Rue des Fauvelles • 92400 Courbevoie • France. Telephone +33 1 47.68.50.98. Telex: 630612.

Components List

CUSTOM EFFECTS – OVER TO YOU

Table-1 shows the structure of the 2764 EPROM for this project. The 8 databits of the EPROM control a number of functions of the mixing desk. The relations between the bits and the functions are summarised in Table-2.

The two least-significant bits, D0 and D1, select one of four horizontal effects voltages. Similarly, D2 and D3 select one of the four vertical effects voltages. Databits D4 and D5 select the source that determines the horizontal reference voltage for the switching of HSW: this source is either the vertical effects voltage or the horizontal wipe potentiometer.

Databit D5 controls the inversion of the picture. The two most significant databits, D7 and D8, select the input signal source. The table and the bit assignment should enable you to analyse the function of each databyte in the 'standard' EPROM fairly quickly.

The logic levels present at the EPROM address inputs determine which of the databytes is applied to the EPROM datalines. This address emanates from switches S1-S4 and S14-S29, and the HSW and VSW signals. The functions of the entries in Table-2 are explained below. First, however, assume that the remaining address lines are low.

The table contains 16 lines, one for each effect switch in area 1. The remaining address locations in the 'standard' EPROM are empty. each line invariably contains 16 bytes, each of which can be selected individually by applying the relevant address. Table-3 lists the functions of all variables. If, for instance, switches S1 and S14 are pressed (horizontal wipe), the first byte in the EPROM is initially put on the databus.

From Table-1 we see that with switches 1 and 14 selected the HEX value of 75 is output from the EPROM. THis HEX value equates to a binary number of '01 11 01 01'. From Table-2 it can therefore be seen from the 'High Nibble' section that the data value of '01 11' causes input II/III and the horizontal reference voltage from the potentiometer to be selected. The 'Low Nibble' data value of '01 01' causes the selection of a ramp for the horizontal effects voltage and the vertical effects voltage.

When HSW is active – as a result of the horizontal ramp exceeding the reference level set with the potentiometer – the fifth byte is applied to the databus. Again referring to Table-2, input 1/2 is selected.

This mode causes a horizontal wipe effect with the position of the picture transition being determined by the slide potentiometer for the horizontal effects

The function of the EPROM-based control words is similar for the vertical effects (assume that S2 and S4 are pressed). Designing and storing one's own picture effects is not simple. The tables and analysis of the 'default' effects in the EPROM, however, should provide sufficient information to get you started.

In the final part of this series to be featured in the next issue full details will be given for the construction, alignment and practical use of the mixer.

The three PCB's are available from Elektor Electronics (Publishing), Down House, Broomhill Road, London SW18 4JQ. Tel: 081 877 1688.

The PCB reference numbers and their respective prices (inc VAT) are as follows: Part-1 ref. 87304-1 is £31.36, Part-2 ref. 87304-2 is £18.71 and Part-3 ref. 87304-3 is £18.69. If the PCB's are ordered singly add £2 post and packing.

If all three PCB's are ordered together please enquire for p&p amount to be added. A pre-programmed EPROM is also available under part number 5861 at a cost of £11.50.

ATV & HOW TO GET GOING

Peter Delaney G8KZG

From time to time, Members Services receives requests from newcomers to the hobby for information on transmitting amateur television. A typical request asks "where can I get (1) transmitter, (2) sensitive aerial, (3) good cable, (4) rotator, (5) feeder cable. As a new member, I would like your advice as to how to go about it." To help others who may be in the same position, here is the reply.

The first comment that I feel I must make is that you may not realise that a licence is required to operate a TV transmitter. (- as you do not quote a callsign). The licence is issued by the Department of Trade and Industry, and is the normal Amateur Radio licence. Information on this is available from the Radio Society of Great Britain, Lambda House, Cranborne Road, Potters Bar, Herts, EN6 3JE, who also have available a 'Radio Amateurs Examination Manual' at £6.47 to non RSGB members.]

A pass in the Radio Amateurs Examination set by the City and Guilds of London is required before a licence can be issued - your local technical college may offer evening classes to prepare you for the examination, or try contacting the local radio club. -your local library should be able to tell you who to contact.

Now to try to answer your questions about equipment: The BATC does not supply the fairly normal items, such as aerials, cables and so on. The club tries to supply the specialised parts for television work that cannot be obtained elsewhere (such as camera parts) and printed circuit boards. You may not mention which of the amateur bands you intend to use, but the following principles may help:

Firstly, the aerial and cable. Buy the very best you can afford, use good quality connectors, make sure all the joints are

well made, and absolutely watertight. Any losses in this part of the system will affect what you receive as well as transmit. To achieve similar results with poorer cable will need money spending on an extra receive pre-amp and an extra transmit power amplifier.

Domestic television 'low-loss' cable is not good enough, nor the cables readily available for CB. The H100 made by Popes is used by many amateur television stations, and there is now a more flexible cable of similar performance, the Westflex 103. These are suitable for either 435MHz or the 1.3GHz bands. Even then, you only get about a quarter of the signal you put in at the far end of a 50 metre length on 1.3GHz.

Both these cables are available from W.H.Westlake (addresses are at the end). The W103 costs 95p per metre, plus postage (6p per metre -minimum post of £2 per order). Westlake is to be found at most of the radio rallies around the country, where you will save postage, and may pick up a bargain offcut.

Do remember to keep the cable dry before it is installed - it will be useless if moisture gets in - and seal all joints. Fit the proper connectors - N type is usual - the normal tv plug (Belling Lee) and even the screw on CB type (PL259) are no good at the frequencies we use. Westlake can supply good quality connectors at reasonable prices.

To seal the joints between cable and plug, use self-amalgamating tape. If you have not used it before, you pull it tight, stretching it as you wind it on tightly, and it bonds to itself. Take it a little way along the cable - 5 or 6 cm say. It tends not to like ultra-violet light (sunlight), so protect it either with a suitable outer tape or paint (Hammerite seems to work). Arrange the cable to loop so that any raindrops run to the bottom of the loop away from connectors, and have as few connectors as possible - each one adds more losses to the system.

Aerials for television need to have sufficient bandwidth for the signals. At 435MHz, the J-Beam 48 element multibeam and 18 element parabeam both work well, and should be available through any of the amateur radio dealers. For 1.3GHz, the Severnside TV Repeater Group produce a good aerial for local working, or JVL Electronics at Hayling Island make a sensitive long loop yagi aerial to order for this band. In any event, it is preferable to have a preamp as close to the receive aerial as possible - preferably at masthead. This can be fitted with changeover relays (or similar) to allow the aerial to be used for transmit as well, but at frequencies above 435MHz it is better to use independent aerials for receive and transmit (helpful when using the repeaters, as well). Suitable preamps are made by Wood and Douglas (kit for 435MHz), Microwave Modules, Camtech, and Severnside Group (for 1.3GHz).

The choice of rotator and its cable is more difficult to define. It depends on the total load to be rotated, both in terms of actual weight, and also the wind resistance offered by the aerial array. The type available to turn domestic TV aerials will do for a simple set up - the 435MHz aerial is very similar in size to the UHF domestic aerials. Do not forget that the effect of an extension mast above the rotator puts a sideways force on the rotator bearings. It is a good investment to add an additional alignment bearing to spread the load -the extra expense should easily repay itself in extended rotator life.

Suitable rotators are available from any of the reputable amateur radio dealers, who would advise you on the suitable loadings for your aerial array. (It MAY be worth buying a stronger rotator, to allow for future aerial system improvements). Alternatively, second-hand rotators can be found in the advert pages of various amateur radio magazines, or sometimes CQ-TV. Do remember, however, that it will have been out in all weather, so do check

for corrosion, worn bearings, etc. Suitable cable can be bought with the rotator, or from Westlake.

It is a licence requirement that you be able to receive transmissions of the kind you want to make, so you may need an up-converter (for 435MHz) or a down-converter (for 1.3GHz). The BATC can supply a PCB for this task, if you want to make your own, (£1.50 for the up converter, £3.50 for the down converter PLUS post and then 15% VAT in each case), or the Worthing Repeater Group offer a kit for a 1.3GHz receive converter. Alternatively, ready built units are offered by Wood and Douglas and Microwave Modules. The received signals can then be fed to a standard TV monitor or domestic tv set, depending on the output of the converter/receiver.

So, now to the possible transmitters for amateur television. Most amateurs build their own, either from a BATC board, or from a kit of parts. For 435MHz, there are 2 BATC designs. The single board design (PCB is £3 plus post and VAT) uses a 108.875MHz crystal in a circuit that develops about 500mW or so. It is fairly straightforward to build and set up, and could be used to drive a LINEAR power amplifier. Because it is a double sideband circuit, there is insufficient room on the band for a colour signal, so a suitable filter circuit must be used to remove this part of the signal before it reaches the transmitter. A PCB to do this using pre-aligned filters is available from BATC (£1 plus post and VAT).

The other project uses seven PCB's to generate around 1W of vestigial sideband signal. It is a project only suitable for those experienced in UHF construction techniques, with suitable alignment equipment.

For 1.3GHZ, a kit to make a 1W FM transmitter (that can carry colour signals and the sound signal) is available from the Worthing Repeater Group. It comes with detailed notes, and provided care is taken in construction (especially using the correct box and using minimum lead lengths on components) works well.

The group also offer a board for crystal locking the transmissions. If you prefer to buy a ready made transmitter, then Microwave Modules offer one for 435MHz, and Camtech do one for 1.3GHz. A 1.3GHz transmitter is also marketed by the Severnside TV Group. Incidentally, it is the latter band on which the amateur TV repeaters will be found.

Hopefully, the notes above will help. By the time you can receive the amateur transmissions, you are half way to transmitting them! - that aerial and cable are all important.

Lots of helpful information, including the details of the up-converter, 435MHz transmitter and filter circuit, are to be found in the BATC book "TV for Amateurs". This is written to suit newcomers, and is available from BATC Publications (£1.75, incl post).

A list of useful addresses is given below. Please remember to enclose a stamped self addressed envelope when sending to any of the people mentioned.

Camtech Electronics, 21 Goldings Close, Havehill, Suffolk, CB9 0EQ

JVL Electronics, 26 Fernhurst Close, Hayling Island, Hants, PO11 0DT

Microwave Modules, Brookfield Drive, Aintree, Liverpool, L9 7AN

Severnside Repeater Group, 15 Witney Close, Saltford, Bristol, BS18 3DX

W H Westlake, Clawton, Holsworthy, Devon

Wood and Douglas, Unit 12 - 13 Youngs Industrial Estate, Aldermaston, Reading, Berkshire, RG7 4PQ

Worthing Repeater Group, Toftwood, Mill Lane, High Salvington, Worthing, Sussex, BN13 2SX

VIDEO FILTER FOR 70CM

Roy King G8CHK

The reprinting of this article, which first appeared in CQ-TV 120, has been requested by the Committee, in order to provide you with the necessary information to build a simple but effective video filter. This filter, when fitted into the video input line of your 70CM transmitter, will reduce the bandwidth of the transmitted signal and hence conserve the crowded spectrum of the 70CM band.

It appears to be not appreciated by many, that the effect of using a modulating video waveform with a bandwidth of say 5MHz, produces a transmitted signal with a bandwidth of 10MHz, as the method used by the majority of amateur TV systems on 70CM produces a double-sideband signal. This 10MHz wide signal, or whatever, takes up a large portion of the 70CM band in one fell swoop, hence our request that it is in the interests of all of us to help alleviate the problems and interference caused by reducing the bandwidth of our signals.

With the advent of digitally generated video sources, including computer outputs, care should be taken that the high frequencies (caused by fast logic switching) are not radiated, as they may extend out of the top of the 70CM band. Also, because of the crowded nature of the 70CM band, it is recommended that the colour content of all video sources is also removed, leaving a video bandwidth of around 3MHz for modulation onto the carrier.

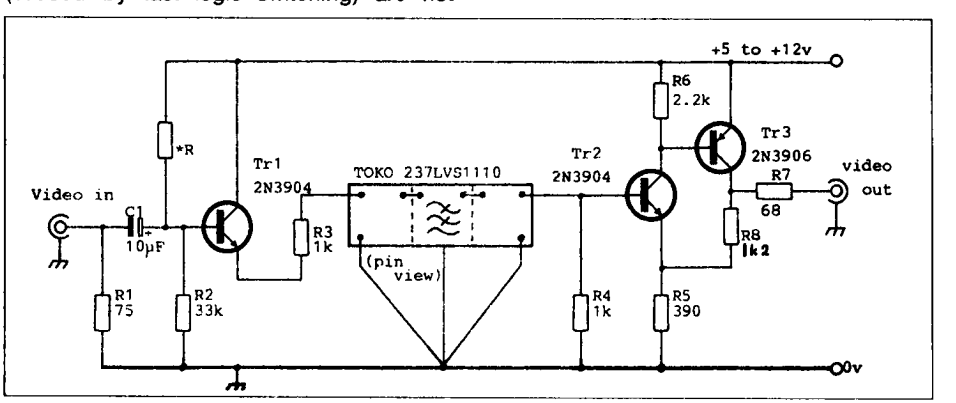
An easy way to accomplish this reduction in bandwidth is to feed the video through a low-pass filter with a cut-off at a suitable frequency. The circuit described here uses a filter module from the range manufactured by Toko, part number 237LVS1109 available from Bonex (Tel: 0753 49502, FAX: 0753 43812).

This filter has a -3dB cut-off point of 2.3MHz, which will effectively remove the colour subcarrier and any digital transient signals present in the video signal.

The impedance of the Toko filter unit is 1k, so simple input and output matching circuits are required to present 75 ohm impedances at input and output.

Note that the value of R3 must be selcted as shown to suit the voltage supply in use.

A PCB is available from Members' Services.



Value of *R ... 22k for 5V supply, 33k for 9V supply and 47k for 12V supply.

USING OSCILLOSCOPES

Part–6

Mike Wooding G6IQM

Having discussed the various functional parts of an oscilloscope we now move onto making measurements and examining waveforms. I shall begin with a review of waveform shapes and characteristics, go on to discuss the safety precautions necessary when making measurements and then finally, in this part, I shall go into the details of how to set your oscilloscope up correctly when making measurements.

WAVESHAPES

The definition of a wave is 'a disturbance travelling through a medium', while the definition of a waveform is ' a graphic representation of a wave'.

Like a wave, a waveform is dependant on two things: movement and time. The ripple on the surface of a pond exists as a movement of water in time. The waveform on your oscilloscope's screen is the movement of an electron beam during time.

The changes in the waveform with time form the waveshape, the most readily identifiable characteristic of a waveform. Fig.1 illustrates some common waveshapes.

Basic waveshapes include sine waves, and various non-sinusoidal waves such as triangle waves, square waves and sawtooth waves. A square wave has equal amounts of time for its two states. Triangle and sawtooth waves are usually the result of circuits designed to control voltage with respect to time, like the sweep of an oscilloscope, and some television circuits. In these waveforms one (or both) transitions from state to state are made with a steady variation at a constant rate, a ramp. (Changes from one state to another on all waveforms except sine waves are called transitions).

The last two drawings in Fig.1 represent aperiodic single-shot waveforms. The first is a pulse; all pulses are marked by a rise, a finite duration, and a decay. The second waveform is a step, which is actually a single transition.

Waveshapes give a great deal of information about the signal. Anytime you

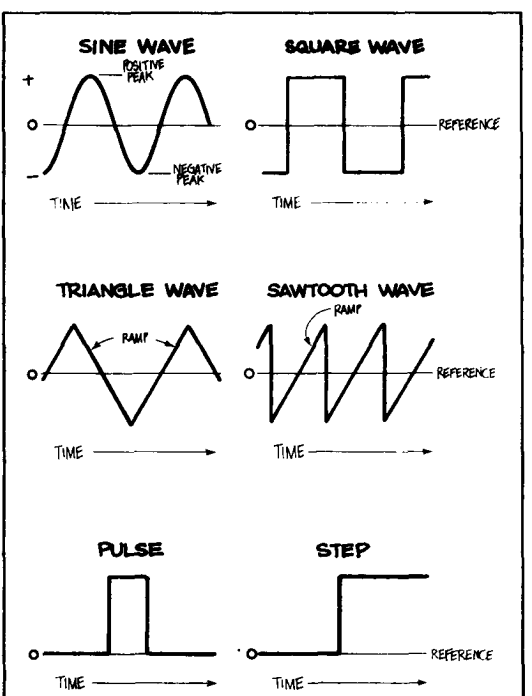


Fig.1 Basic Waveshapes

see a change in the vertical dimension of a signal, you know that this amplitude change represents a change in voltage. Anytime there is a flat horizontal line, there was no change for that length of time. Straight diagonal lines mean a linear change, equal rise (or fall) of voltage for equal amounts of time. Sharp angles on a waveform mean a sudden change.

But waveshapes alone are not the whole story. When you want to completely describe a waveform, you will want to find the parameters of that particular waveform. Depending on the signal, these parameters might be amplitude, period, frequency, width, rise time, duty cycle or phase.

AMPLITUDE (Fig.2) is a characteristic of all waveforms. It is the amount of displacement from equilibrium at a particular point in time. Note, that without a modifier, the word means the maximum change from a reference without regard to the direction of the change. In the first two drawings in Fig.2 (sine wave and square wave) the amplitude is the same even though the sine wave is larger from peak-to-peak. In the third drawing, and alternating current waveform is shown with peak (or maximum) amplitude parameters annotated. In oscilloscope measurements, amplitude usually refers to peak-to-peak amplitude.

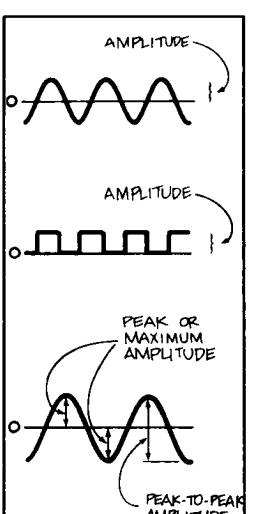


Fig.2 Amplitude

PERIOD (Fig.3) is the time required for one cycle of a signal if the signal repeats itself. Period is a parameter whether the signal is symmetrically shaped like the sine and square waves in Fig.3, or whether it has a more complex asymmetrical shape like the rectangular wave and damped sine wave. Period is always expressed in units of time. Naturally, one-time signals like the step or uncorrelated signals (without a time relation) like noise have no period.

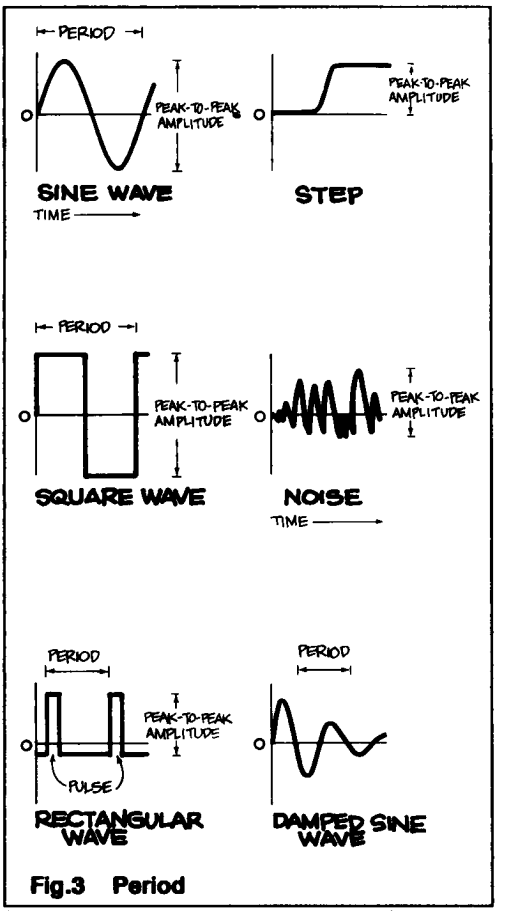


Fig.3 Period

FREQUENCY (Fig.4) is the number of times a signal repeats itself in a second, and is measure in Hertz: 1Hz = 1 cycle per second; 1kHz = 1000 cycles per second and 1MHz = 1000000 cycles per second. If a signal is periodic it has a frequency.

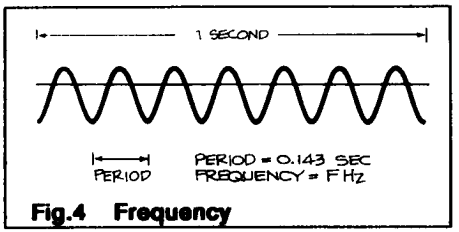


Fig.4 Frequency

Period and frequency are reciprocal, that is 1/Period = Frequency, and 1/Frequency = Period. For example: a 7Hz signal has a period of 0.143 seconds: 1/7Hz = 0.143s, and 1/0.143s = 7Hz.

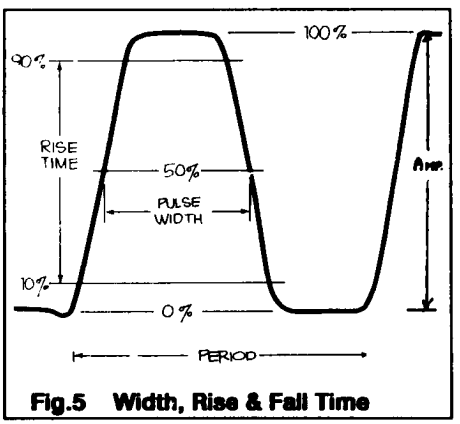


Fig.5 Width, Rise & Fall Time

WIDTH and RISE & FALL TIME (Fig.5) are parameters usually applied to pulses. The parameters of a pulse can be important in a number of different applications. Digital circuitry, X-ray equipment, and data communications are examples. Pulse specifications include transition times measured on the leading edge of a positive-going transition; this is the rise time. Fall time is the transition time on a negative-going trailing edge. Pulse width is measured at the 50% points and amplitude from 0 to 100%. Any displacement from 0V for the base of a pulse is the baseline offset.

DUTY CYCLE, DUTY FACTOR and REPETITION RATE (Fig.6) are parameters of all rectangular waves. They are particularly important in digital circuitry. Duty cycle is the ratio of pulse width to signal period expressed as a percentage. For square waves, it is always 50% as shown in the top drawing in Fig.6. The lower drawing shows a pulse wave with a duty cycle of 30%. Duty factor is the same thing as duty cycle except that it is expressed as a decimal, not a percentage. A repetition rate describes how often a pulse train occurs and is widely used instead of frequency to describe waveforms like that in the lower drawing of Fig.6.

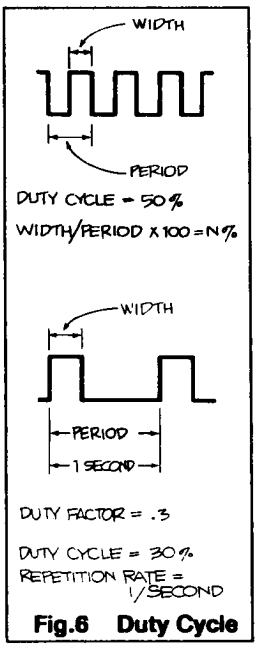


Fig.6 Duty Cycle

PHASE (Fig.7) is best explained with a sine wave. Remember that this waveform is based on the sine of all the angles from 0 through 360. The result is a plot that changes from 0 at 0 degrees, to 1 at 90 degrees, to 0 again at 180 degrees, to 1 at 270 degrees and back to 0 again at 360 degrees. Consequently, it is useful to refer to the phase angle (or simply phase, when there is no ambiguity) of a

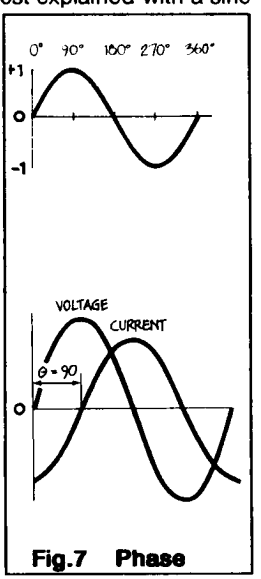


Fig.7 Phase

sine wave when you want to describe how much of the period has elapsed. Another use of phase is found when you want to describe a relationship between two signals. Picture two clocks with their second hands sweeping the dial every 60 seconds. If the second hands touch the twelve at the same time, the clocks are in phase; if they do not, then they are out of phase. To express how far out of phase they are, you use the phase shift in degrees.

To illustrate, the waveform labelled current in Fig.7 is said to be 90 degrees out of phase with the voltage waveform. Other ways of reporting the same information are 'the current waveform has a 90 degree phase angle with respect to the voltage waveform', or, 'the current waveform lags the voltage waveform by 90 degrees'. Note that there is always a reference to another waveform; in this case, between the voltage and current waveforms of an inductor.

SAFETY

Before making any oscilloscope measurements it must be remembered that care must be taken as you will be working on live equipment. Always observe all safety precautions described in the operators or service manual for the equipment being worked on.

Some general rules about servicing electrical equipment are worth repeating here. Do not service electrical devices when on your own. Know the symbols for dangerous circuits and observe the safety precautions for the equipment you are working on. Do not operate an electrical device in an explosive atmosphere. Always ground the oscilloscope to the circuit, and ground both the circuit-under-test and the oscilloscope.

Remember, that if you lose the ground, all accessible conductive parts - including often as not knobs that appear to be insulated - can give you a shock. To avoid personal injury, do not touch exposed connections and components in the circuit-under-test when the power is on. And remember to consult the service manual for the equipment being worked on.

Then there are a few rules about the oscilloscope itself. to avoid a shock, plug the power cord of the oscilloscope into a correctly wired receptacle before connecting the probes.

Only use the power lead for the oscilloscope, and not one that is not in good condition (cracked, broken, missing ground pin, etc.).

Use the correct fuse to avoid fire hazards.

Do not remove covers and panels on the oscilloscope.

GETTING STARTED

Accurate oscilloscope measurements require that you make sure that your system is correctly set up each time that you begin to use the oscilloscope.

Compensating the Probe: Most measurements made with an oscilloscope require an attenuator probe, which is any probe that reduces voltage. The most common are 10X ('times ten') passive probes which reduce the amplitude of the signal and the circuit loading by 10:1.

But, before making any measurements with an attenuator probe it should be checked to see if it has been correctly compensated. The photographs in Fig.8 show the results that will be obtained with a variously compensated probe. The photographs on the right-hand side show the effect on the screen when displaying the compensation (calibration) signal avail;abnle at the front of the oscilloscope, with an under compensated, normally compensated and an over compensated probe. The photographs on the right-hand side show what the effect would be when displaying a square wave signal with 'ringing' present.

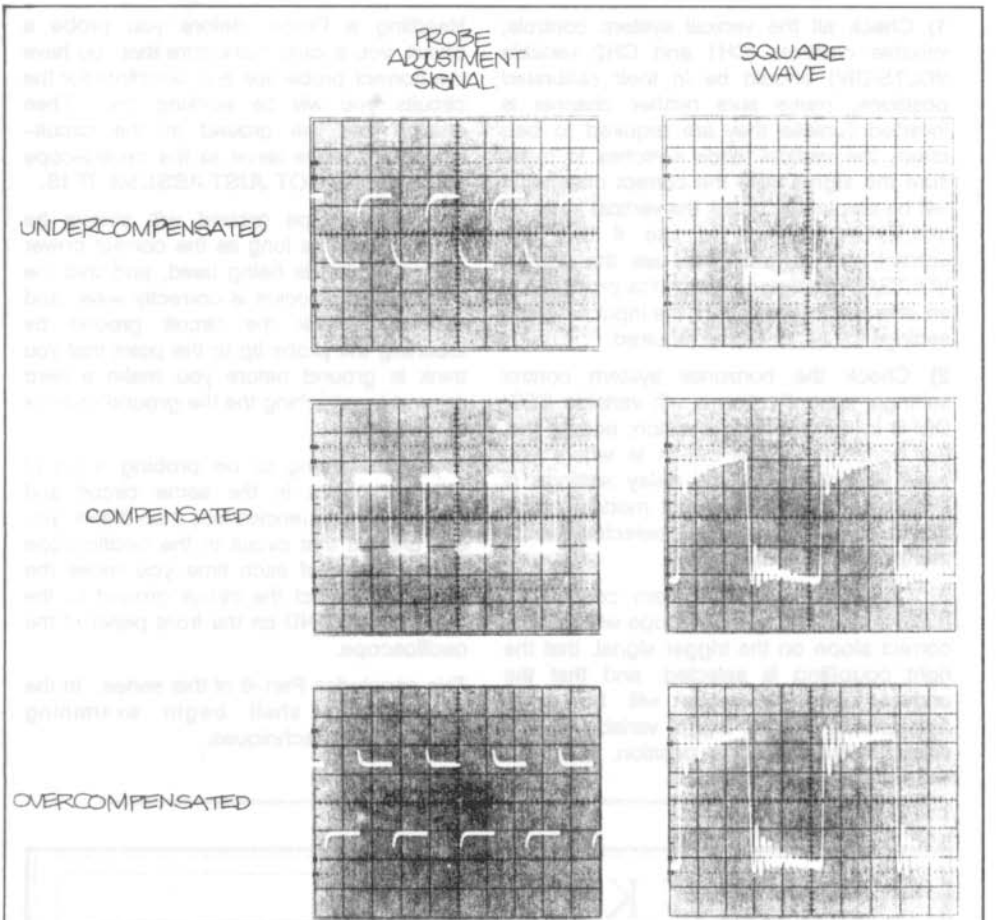


Fig.8 Probe Compensation Waveforms

Note that not only does incorrect compensation cause distortion to the displayed waveform, but that it also causes the amplitude of the displayed signal to change.

Note also that when compensating a probe it should be carried out with the accessory tips on the probe that will be used when making the measurements. Furthermore, compensate the probe in the vertical channel that is going to be used when making the measurements (if more than one is available that is).

Checking the Controls: The most common mistake in making oscilloscope measurements is forgetting to compensate the probe. The second most frequent source of inacuracies is forgetting to check the controls to make sure that they are where you think they are. Here are some things to check on your oscilloscope prior to making a measurement:

1) Check all the vertical system controls; variable controls (CH1 and CH2 variable VOLTS/DIV) should be in their calibrated positions; make sure neither channel is inverted (unless they are required to be); check the vertical mode switches to make sure the signal from the correct channel(s) will be displayed; check the vertical systems VOLTS/DIV settings to see if they are correct, not forgetting to use the correct VOLTS/DIV setting to match the probe if it is an attenuator type; check the input coupling settings for AC or DC as required.

2) Check the horizontal system control settings; magnification is off; variable SEC/DIV is in its calibrated position; ensure that the horizontal mode switch is where you need it; check that the delay settings (if available) are in the correct modes; check that the correct timebase is selected (where more than one is available).

3) Check the trigger system controls to make sure that the oscilloscope will pick the correct slope on the trigger signal, that the right coup[ling is selected, and that the correct operating mode will be used. Also ensure that the trigger variable holdoff control is at its minimum position.

Handling a Probe: Before you probe a circuit, you should make sure that you have the correct probe tips and adaptors for the circuits you will be working on. Then ensure that the ground in the circuit-under-test is the same as the oscilloscope ground - **DO NOT JUST ASSUME IT IS.**

The oscilloscope ground will always be earth ground as long as the correct power lead and plug is being used, and that the mains supply socket is correctly wired and earthed. Check the circuit ground by touching the probe tip to the point that you think is ground before you make a hard ground by attaching the the ground strap of the probe.

If you are going to be probing a lot of different points in the same circuit and measuring frequencies less than 5MHz, you can ground that circuit to the oscilloscope once instead of each time you move the probe. Connect the circuit ground to the jack marked GND on the front panel of the oscilloscope.

This concludes Part-6 of this series. In the next part I shall begin examining measurement techniques.

SILENT KEY

It is with deep regret that I have to inform you all of the death of one of our longest serving Committee members Cyril Chivers, who passed away on December 4th.

Cyril joined the club early in 1965 and soon became an active member of the club, being elected to the Committee in May 1966. He continued to serve as a Committee member continuously until his death.

We wish to extend our deepest sympathies and condolences to his family.

IN THE STUDIO

Part-11

John Goode

CHROMA-KEYING – TAILPIECE

Since writing In The Studio Part-10 I have come across a textbook ("Television Engineering, Broadcast, Cable & Satellite" Vol.2) with a chapter on vision switching & mixing written by Michael Cox in which he describes the derivation of a keying signal for chroma-key known as "exclusive blue".

This signal is formed by subtracting the red and green primaries from blue. In practice this means summing the blue signal to inverted red and inverted green in a resistive matrix. Like (B-Y) the result is bipolar, and so a slicing stage is necessary to remove the negative excursion, so

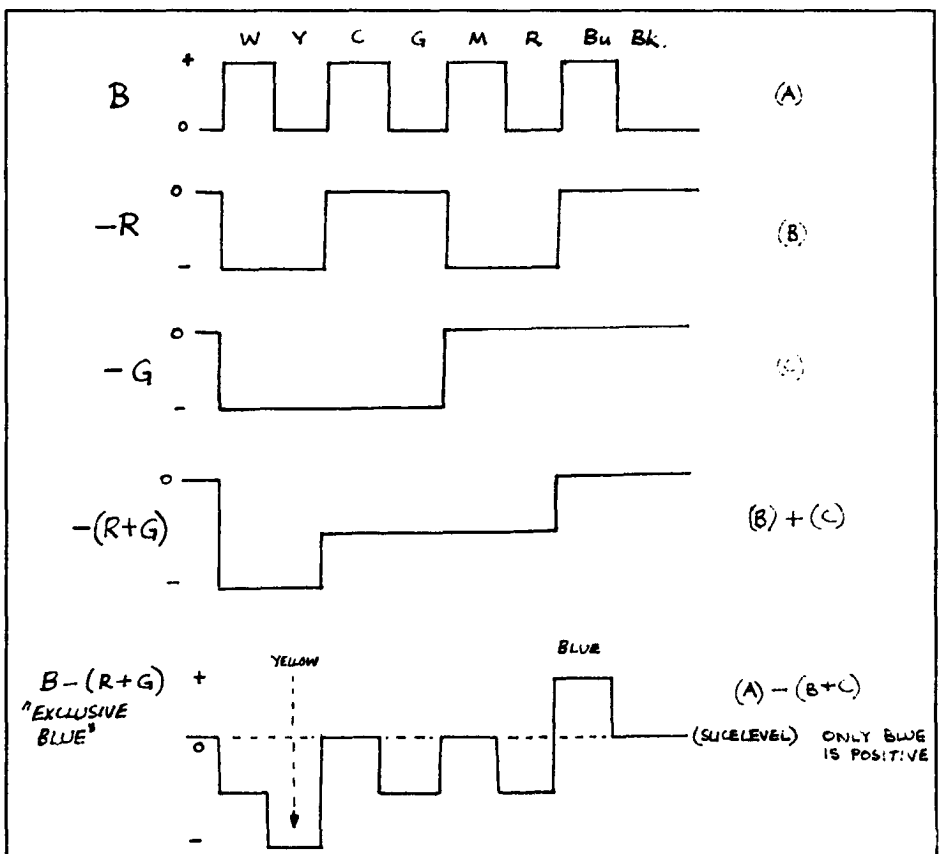


Fig.1 Exclusive Blue

making it suitable for use with an effects amp. Fig.1 (overleaf) shows the derivation of the signal. Like the (B-Y) signal, inversion allows keying from yellow instead of blue.

A circuit is shown in Fig.2. In practice I have found that the "exclusive blue" signal is too exclusive! Compared with (B-Y), the hue acceptance range is much narrower. With colour bars or computer-generated blue, where the saturation approaches 100%, the signal is perfect, but with camera signals it is almost impossible without professional studio lighting to televise a blue or yellow background of sufficient saturation and hue accuracy to give a high enough output level for reliable keying.

I am therefore continuing to use (B-Y), but "exclusive blue" may be useful for keying computer generated signals.

CHROMA-KEY FROM PAL SIGNALS

There are two problems associated with trying to generate a chroma-key signal from encoded PAL - delay, and the reduced bandwidth of the chroma. The PAL signal can be quite easily decoded to B-Y; however, delay will occur in the process, meaning that the main and inlayed signals must be delayed accordingly at the input to the keyer. Additionally, the recovered B-Y signal will have been bandwidth-limited in the original encoding process, and so the edge rise-time of the recovered signal will be relatively poor.

This may increase the delay-time required for the main and inlayed signals. In practice it will be found that delays of 400-500nS will be required, with full 5MHz bandwith, as we are delaying composite PAL, not just luminance (as in a receiver decoder). Nevertheless, with appropriate equalisation, a receiver luma delay-line might work.

For anyone interested in experimenting in this area, decoding PAL to (B-Y) can be achieved fairly simply using a 1496 IC as a balanced demodulator. Because we are not interested in the (R-Y) signal, which is the component that is phase-alternated, the (B-Y) can be demodulated by a subcarrier accurately phased to the (B-Y) axis; no glass delay-line or subcarrier

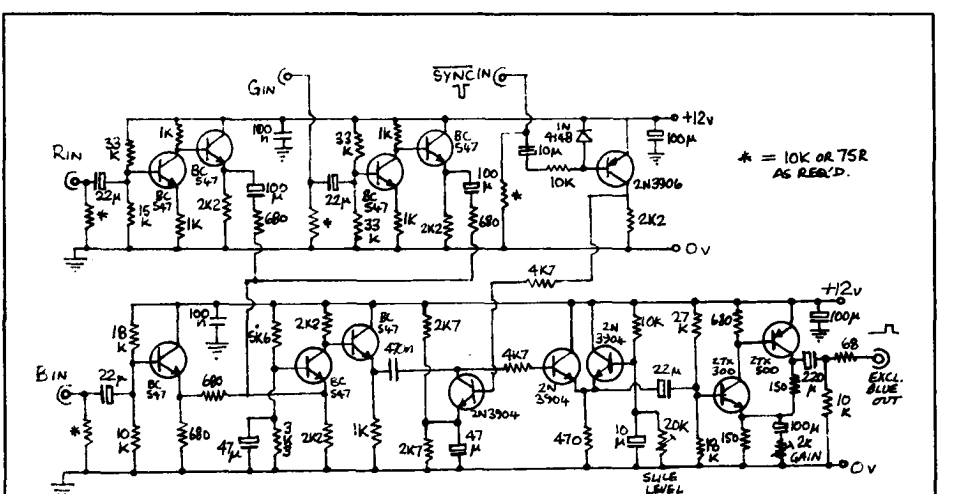


Fig.2. Exclusive Blue Generator

alternation is necessary. See Fig.3. With a colour-bar input, the subcarrier phase is adjusted whilst 'scoping the output for the recovered (B-Y) signal with minimum line-by-line "twitter". It is then necessary to clamp the signal and slice the negative excursion as explained above.

The subcarrier is from the station SPG, or alternatively a burst-locked oscillator such as that built around the TDA3950, and published previously in CQ-TV, can be used.

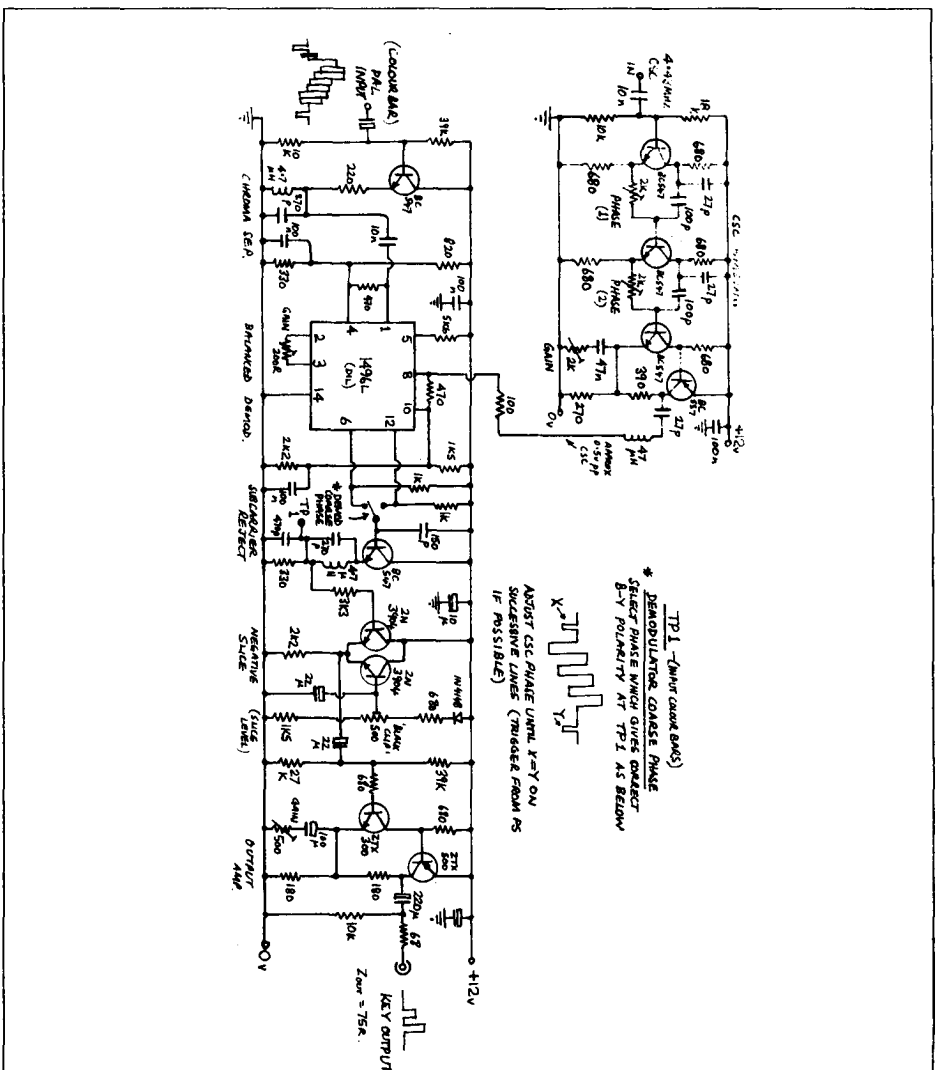


Fig.3 (B-Y) Demodulator

GB3ZZ - THE INSIDE STORY

Brian Kelly GW6BWX

GB3ZZ has been mentioned and even praised many times in these pages, but users outside the Severnside Television Group who have accessed it have shown little knowledge of its capabilities. This is an attempt to right that situation and describe exactly what the repeater can do.

Like most repeaters GB3ZZ started out life simply being able to pass received sound and pictures through a transmitter, and show a test card in the absence of incoming signals. The Severnside group has a wide range of skills available within its membership, and a decision was made to put those skills to use in improving the repeater.

Rather than modifying the existing hardware, which inevitably results in a "birds nest" of wires and extra boxes bolted on everywhere, we wanted to isolate each section of the system and replace it with modules, so that easy replacement for repair or upgrading became possible. This has been achieved to a great extent although there is still room for some improvement.

The needs of the users were analysed before any of this work commenced and it became clear that a great deal could be done to improve GB3ZZ and eliminate some of the problems of the original unit. The most significant problems were:

A) Some users had difficulty passing good quality pictures through the repeater although their transmission was fine direct to another station.

B) Few users had any idea of the picture quality being re-radiated because desensitising problems in their own location prevented them receiving GB3ZZ while transmitting.

C) The TTL logic control was unreliable, particularly the sync pulse detector, which occasionally triggered on interference. GB3ZZ is sited next to a major road junction and a mile from an airfield, so the background radar and ignition noise is very high.

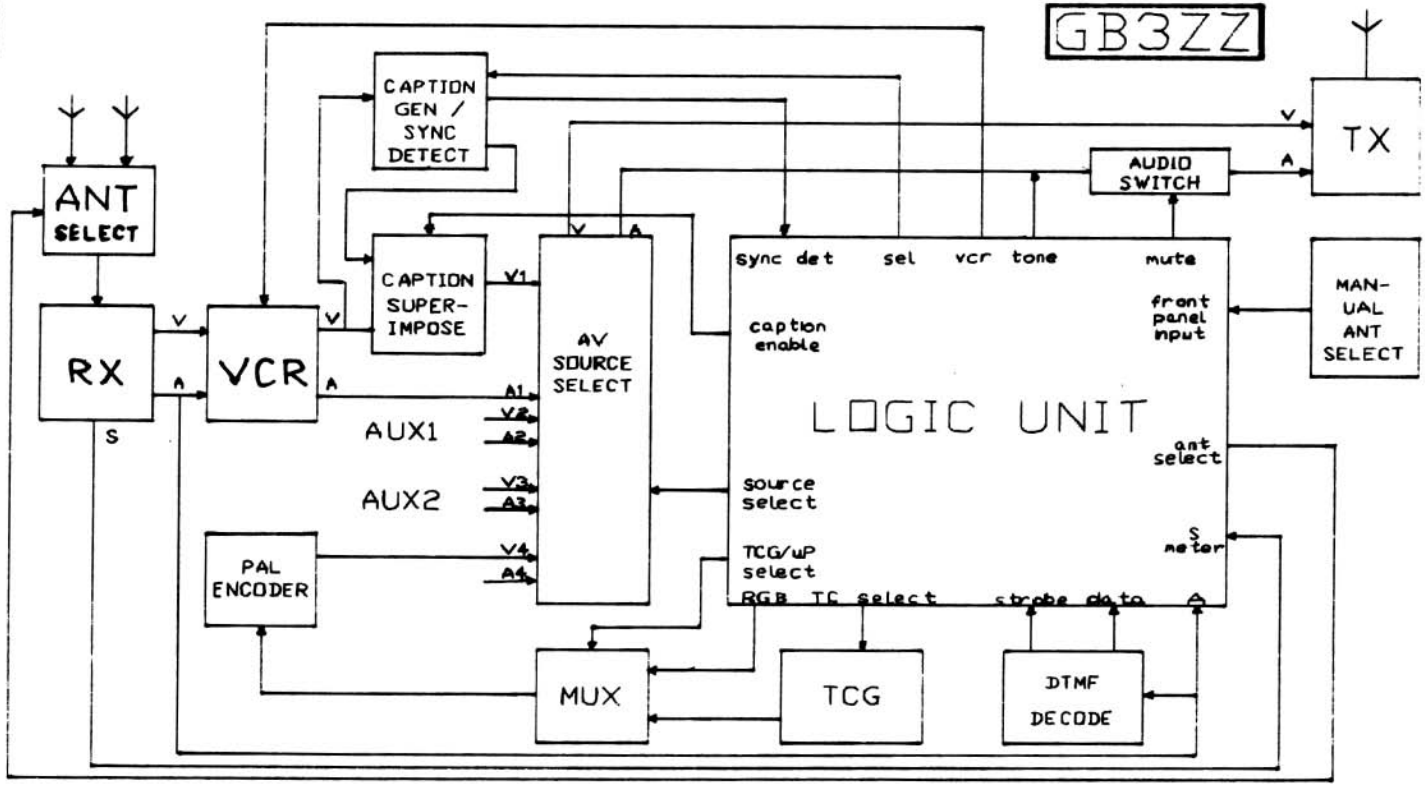
The first problem clearly stems from the relative locations of the user and repeater. Unfortunately the repeater is surrounded by tall buildings, including several aircraft hangers, which make excellent reflectors and therefore cause ghosting. Tests with directional antennas at the repeater site confirmed that the reflections were causing most of the problems, and they varied in severity from visible ghosting to sound or chroma subcarrier cancellation.

Problem B could only be resolved by somehow holding the picture after the user had dropped transmission, so they could see the signal they had just sent. A frame store was the obvious solution.

Sync detection was carried out by looking for any line frequency component in the video from the receiver using the 'standard' PLL detector circuitry. This proved unreliable because of the high ambient noise level and its dependence on the strength of the incoming signal.

The solution was to use a design by G8KUW, which senses the equalising pulses in the sync pulse train. This proved extremely reliable, and as a bonus the circuit also generates a phase locked 6MHz clock, which is used elsewhere in the repeater.

The need to select directional antennas for reception and to control the frame store made the inclusion of a microprocessor based logic unit mandatory. Based on available systems for developing the control software, the 6502 was chosen.


GB3ZZ
CAPTION GEN / SYNC DETECT
ANT SELECT
TX
AUDIO SWITCH
CAPTION SUPER-IMPOSE
AV SOURCE SELECT
sync det
sel
vcr
tone
mute
front panel input
MAN-UAL ANT SELECT
caption enable
RX
VCR
LOGIC UNIT
AUX1
AUX2
ant select
source select
TCG/uP select
S meter
RGB TC select
strobe data
PAL ENCODER
MUX
TCG
DTMF DECODE

When designing a microprocessor based repeater it makes good sense to see what other features can be incorporated into the system, to make use of all the available computing power. Text of some sort to introduce the repeater to new users was the first choice and the 64K of memory made available could store 40 full screens of information, while still keeping memory clear for the program itself and its workspace. Rather than reinventing the wheel the now standard teletext format was chosen. It gives clear easily readable pages and has limited graphics and colours available. Above all, the dedicated IC's to produce the text are inexpensive and easy to use.

On screen displays of signal report and repeater status are generated by the logic unit, and these are genlocked to the incoming video by using the 6Mhz clock from the sync detector circuit. These displays are shown superimposed on the received picture in the top left corner of the screen.

With all these features available an interesting problem arises, how does a user tell the repeater what to do ? The answer is to send DTMF (Touch-tones to US readers) codes over the sound channel. The keypads to do this are available through several retail outlets, including Radio Shack/Tandy shops, and are inexpensive to buy. Sproggit & Sylvester dafter investors can even use their access beepers held against their microphone to make the tones.

Inside the repeater a tone detector works out which function was requested and sends control signals to the antenna selector, text generator or whatever device needs activating. The frame store is part of a VCR with picture freeze capability. The front panel switches of the VCR are disconnected and the logic unit provides the contact closures instead. The normal operations of a VCR are available too, and a short length of tape is installed in the machine to allow recordings to be made for test purposes. All function selections on the VCR are reported on the screen in the same way as the signal reports.

Some text pages are stored inside EPROMS in the logic unit, these hold information on the repeater and instructions to use the DTMF commands, pages which do not require frequent updating. Other pages are held in RAM, so that the text can be changed quickly. Typically these announce forthcoming events and changes to the repeater, similar to the engineering pages from CEEFAX and ORACLE on Broadcast TV.

Any of these pages can be selected by keying the appropriate tone sequence, but the first ten pages are also shown automatically for a few minutes every half hour, starting 30 minutes after the last repeater access. These are the introductory pages and give a name and address to contact for more information.

The sectored receive antenna is activated by keying one of six codes. If access is lost the omnidirectional antenna is reselected to give all round coverage again. Although all the directional yagi antennas have no additional gain over the omnidirectional Alford Slot antenna, the improvement in apparent strength and picture quality can be dramatic to say the least.

It should be stressed that only the receive antennas are switchable, the transmit antenna is always omnidirectional.

There has been much talk about interlinking TV repeaters, GB3ZZ has program code installed in readiness for this to happen, though for the time being an acknowledgement beep is all that happens if a network code is keyed in. Similarly, control over another transceiver is possible (on 10GHz ?) should this be allowed by the DTI in the future. For now all these features are disabled and the necessary hardware is not installed.

In the very near future the logic unit will be replaced by a more comprehensive system based around a 16-bit microprocessor, which will allow full diagnostics of the incoming signal to be given, including an oscilloscope-like trace of the video signal shown in pixel graphics.

A new receiver offering better sensitivity and video resolution is under construction, and this will report modulation level of sound and video and any deviation of the users transmit frequency back to them on the screen. An Aztex transmitter will replace the existing transmitter, which is now several years old and not up to the very high standard demanded by today's users.

GB3ZZ is already acknowledged as being the most advanced repeater on both sides of the Atlantic, and the Severnside TV Group are determined to maintain the leading edge in TV repeater technology.

For further information about GB3ZZ and the Severnside Repeater Group write to: The Severnside Repeater Group, 15 Witney Close, Saltford, Bristol, BS18 3DX.

CONTEST CALENDAR

SPRING VISION JOINT EUROPEAN

Saturday March 9th - Sunday March 10th

1800 GMT Saturday to 1200 GMT Sunday

FSTV all bands

MAYDAY MICROWAVE

Monday May 12th

0001 GMT to 2359 GMT

FSTV 24CM and above

SUMMER FUN JOINT EUROPEAN

Saturday June 8th to Sunday June 9th

1400 GMT Saturday to 1400 GMT Sunday

Slow Scan & Fast Scan TV all bands

Due to popular request I have changed the times for the Summer Fun contest -- so that the /P stations have more time for the bar-b-q's and the beer HI.

CONVENTION 91 - SUN MAY 5th

Your Committee is pleased to announce that we shall be holding the 1991 convention at **HARLAXTON MANOR**, nr. Grantham again. This location, as those of you that came last year know, is superb. For those of you that didn't, or couldn't, come the photograph below shows the Manor in all its glory. The Manor house is set in many acres of ground and gardens, with ample space for parking. We shall be using various areas of the house for the show and will be giving you final details in the next issue.

The location is superb, it is a family spot, we will have lots of room, thus hopefully alleviating the crush of past years. There will be realistically priced refreshments available too! and the usual get-together Saturday night, this year actually in the bar inside the Manor. Also this year there will definitely be a CRAFT AREA (the one I promised last year!) in a room of its own.

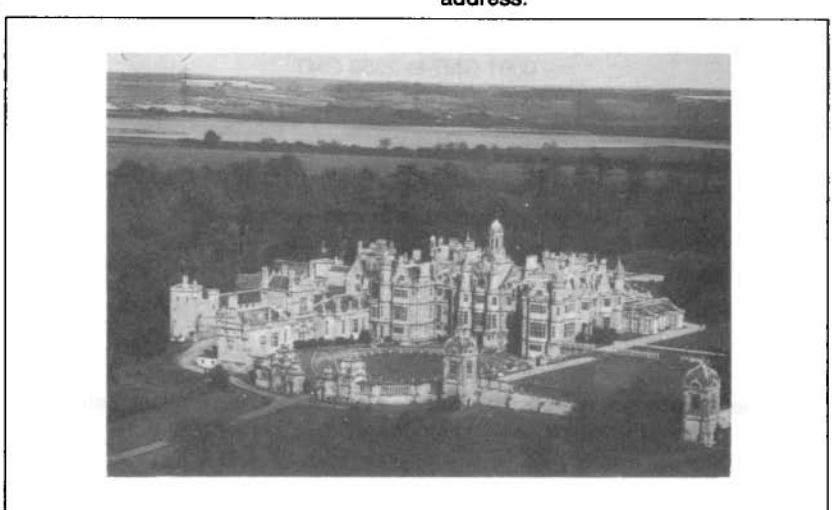
There will be the usual mix of ATV related dealers plus, we hope, a very up-market dealer display of TV and associated equipment.

Outside there will again be the official flea-market/car-boot sale area, for which there will be a nominal charge of £5.00 upwards per vehicle. Please register your place with Paul Marshall otherwise you may not get one!

Those of you wishing accomodation on-site will be pleased to know that we will have the same arrangements as last year - that is we should have the entire "Cottage" building at our disposal, at the same economical rates. Please contact Paul Marshall for further information **BEFORE** contacting Harlaxton Manor staff.

Those of you wishing to bring your caravan/tent please register with **ME** as soon as possible. Again there is a very limited number of pitches (£6ish/night).

For further details and offers of help (!) or ideas for demos etc, please contact convention organiser Paul Marshall, BATC Secretary at the address shown on the 'Who To Write To' page at the front of this magazine, or myself at the Editorial address.



MOTORING AROUND

This article first appeared in the November 1990 issue of What Satellite and we wish to thank the Editor for his permission to reproduce it here.

Rather than fork out £600 plus for a multi-satellite system, John Barker built his own motorised polar mount from a few bits and pieces.

Although multi-satellite systems cost £600 and more, they are little more than Astra systems with a motorised dish and controlling positioner. With this in mind the temptation was strong for me to convert my existing Astra system to track the Clarke belt of satellites myself.

It took some work, but for an outlay of only £50, I now have a steerable dish, controlled from the armchair.

I wanted the motor controllable from indoors, and rather than attempt to build a control system myself, I made use of an aerial rotator. These are readily available devices designed to turn TV or radio aerials. They cost about £40-£50 complete with the controller box, from the likes of Tandy or Maplin Electronics.

The rotator motor unit is meant to drive a vertical mounting pole. This meant adapting the system to drive a satellite polar mount - not as simple as it first appeared.

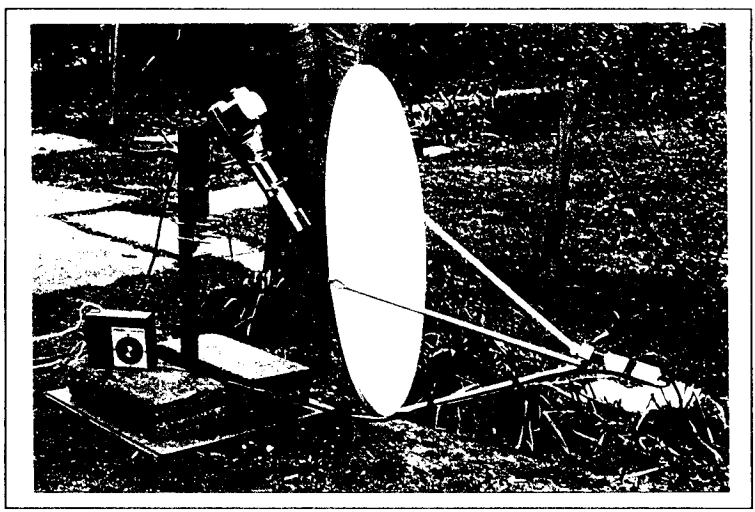
The secret, I soon found out, is to mount the rotator upside down and reverse the bracket on the back of the dish.

Virtually any dish can be converted if it clamps onto a pole, although it may need altering so the elevation will go lower. In most cases, this will involve drilling a new pivot hole. If the back bracket can be reversed then so much the better,.

Amstrad owners can obtain a converting bracket to enable their dish to clamp to a pole.

A 60cm dish will not give good results - you will find other satellites, but they will be "sparklie".

I chose an 80cm offset dish, which is relatively cheap, easily available, and had



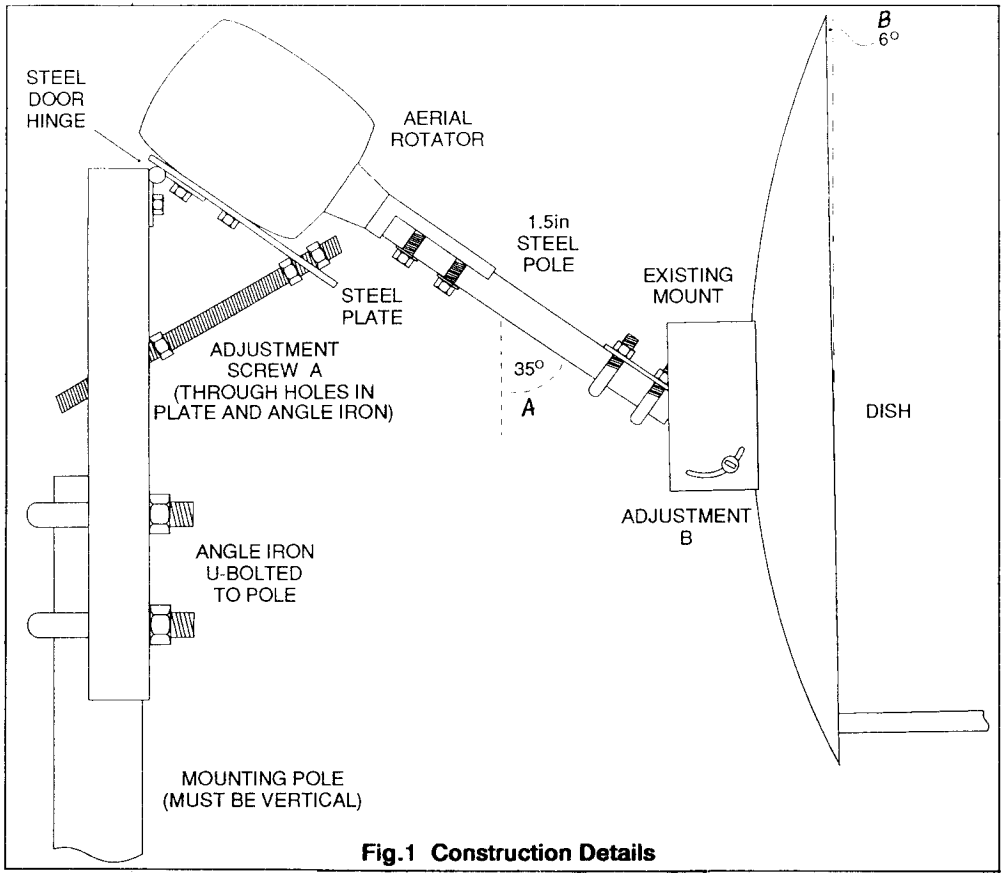


Fig.1 Construction Details

the elevation adjusted by a screw thread, which suited my purpose for experimenting.

The LNB is a 1.7dB unit with a ferrite polariser. This dish comes with a selection of clamps to take virtually any LNB, including the popular Marconi. The fact that the rear bracket could be turned upside down was just plain luck, and in hindsight makes it the perfect choice.

The results were surprisingly good, achieving virtually "sparklie-free" pictures on *RAI Uno, CNN, Super Channel* and *Discovery,* which was the one channel I really thought I was missing out on.

Most other channels, although suffering from "sparklies", are quite watchable. All the Astra channels are of course perfect.

The accuracy of the rotator is also surprisingly quite good.

CONSTRUCTION

Construction speaks for itself, but where I used welding a nut and bolt would have done just as well. The diagram in Fig.1 shows how mark two would look, which is more simple and better than the experimental model.

The whole thing needs to clamp onto a vertical pole, which can be a pole attached to base, a pole clamped to a good wall

bracket, or just a pole sunk into the lawn. In fact, the particular dish I used comes with a wall bracket which would do the job perfectly.

Setting up requires a little patience and some understanding of what the object of a polar mount is. If you intend to wall-mount it, I suggest you have a practice on the ground first.

First, set your satellite receiver up with a portable TV in the garden next to the dish and refer to channel information - frequencies and so on. A signal meter will not be required.

By turning the rotator controller, set the dish exactly central to the rotator (measure each side from the edge of the dish to the hinge). Now adjust angle **A** by adjustment of nuts **A.**

Adjust angle **B** using the elevation adjustment on the dish. Swing the whole assembly about the mounting pole to find a channel on 1 degree West. If it cannot be found, adjust angle **B,** When you have found 1 degree West tighten the clamps to the mounting pole. Do not loosen or move this again.

Now tune your receiver for a channel on each satellite along its arc. Turn the rotator controller to find if the arc is correct. When a new satellite is found manually, push the dish up or down to see if the signal improves, and therefore whether your arc fits the arc of the satellite. Fine tune the adjustments accordingly.

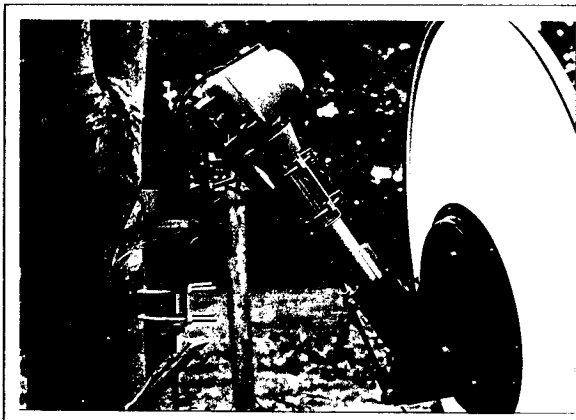
CONCLUSIONS

One very useful piece of information which I wish I had had the first time is a "marker" for each satellite. That is, one channel on each satellite which is a strong signal, in PAL, not scrambled, and in the normal frequency band, with on-screen identity and broadcast 24 hours, or showing a test card when off. Table 1 gives six channels I have found suitable for this purpose which can be used to set up this (or any other) polar mount.

The end result is, of course, not in the same league as a proper multi-satellite system when it comes to convenience. You have to tune the receiver and then adjust the dish position with a dial, rather than the single push button most commercial systems offer.]

However, this is a small price to pay compared to the savings made, and the rotator system, at the very least, gives you the opportunity to try out a multi-satellite system for very little cost before plumping for the real thing.

Pos'n	Channel	Freq	Polaris'n
23.5 E	3SAT	11.598	Vertical
19.0 E	SCREENSPORT	11.214	Horizontal
13.0 E	SUPER CHANNEL	11.674	Vertical
10.0 E	RAI DUE	11.640	Horizontal
1.0 W	TV NORGE	11.016	Horizontal
27.5 W	DISCOVERY	11.175	Horizontal



DIGITAL VIDEO for ATV VIA PHASE 3 & 4 SATELLITES

This paper was first published in The Amsat Space Symposium report 1990 and we wish to thank the editor for his permission to reproduce it here. We consider the innovations discussed here to be important and that they may have a significant impact on terrestrial ATV in the n not too far distant future.

Dr.John Champa K8OCL

On May 7-9 1990 AMSAT-DL hosted the first international meeting of Amateur satellite experimenters in Marburg, Germany in order to begin the development of the plans to construct an advanced communications satellite in the Phase 3 series. Starting prior to this meeting the AMSAT-NA Phase 4 Project Study team has been developing suggested communications criteria for geostationary Amateur satellites. Both groups are considering the inclusion of a hard limiting wide bandwidth digital transponder generally in the range of 56-64 Kbps, but up to and including a full T1 (1.544 Mbps) has been discussed.

This paper examines the design of a PC based coder/decoder (CODEC) which can be used to digitise the baseband video output from an NTSC source, such as a home video camera or VCR. Using data compression techniques such as vector quantisation, the digitised video can be taken from its uncompressed digital form of approximately 92 Mbps to as little as 56 Kbps. Current techniques, even at this tremendous compression ratio, provide acceptable colour contrast and image resolution, and moderate motion compensation. This type of highly compressed digital video signal is more than sufficient for Amateur television contacts, but more pertinent to this paper, is the suitability of digital video for relay through Amateur satellite transponders, with acceptable signal-to-noise ratios for Amateur ground stations. It could also provide a type of terrestrial digital ATV transmission which is considerably more spectrum efficient than the presently used AM or FM analogue video transmissions.

In the effort to get even more data into the signal, it may be necessary to use quadrature phase shift keyed (QPSK) or a comparable modulation scheme. This is similar to BPSK, which is a type of modulation with which Amateurs are already somewhat familiar, however it uses two additional phase angles to impress more data onto the signal.

Some of the current experiments being conducted using commercially produced CODECs at both 56 and 112 Kbps are briefly reviewed, plus the time frames in which the cost of such equipment is expected to come within the range of the Amateur community.

Just How Efficient Is Voice Communications?

Researchers in the field of psycholinguistics have observed that in the typical face-to-face meetings of human beings, as much as 80% of the communications which takes place is non-verbal in nature. this important observation causes us to wonder just how efficient is a

PictureTel Corporation's video conferencing systems make two-way digital video communications possible over special dial-up digital phone lines (two "Switched 56" Kbps circuits = 112 Kbps total bandwidth). The system is based on a specialized computer called a codec (coder/decoder) which does the digitalization of the video and audio and then compresses the signal. (PictureTel Corporation photo)

voice only contact in communicating ideas and concepts. Yet, when we are not meeting face-to-face, this is the most personal mode of two-way communications modern telecommunications technology generally provides. When we converse via the telephone we are somewhat limited (perhaps unconsciously) in the extent to which we can most clearly communicate. In the typical Amateur QSO it's even worse. Most on-the-air conversations between Amateur Radio operators are half-duplex in nature. This is true even when Amateur Radio satellite communications allows a much more interactive full-duplex method of operating. Only the more experienced operators are normally observed adjusting their equipment so that a "normal" voice conversation can take place.

But, no matter how it is structured, voice only communication has its limitations. Try this simple experiment to illustrate my point. Pick up a copy of the AMSAT Journal (Volume 13, No.3) and turn to page 4. Now try to describe to a friend who has never seen a Lindenblad aerial the exact appearance and functionality of this device. I suggest you use the telephone and time your experiment. You can use a local repeater, if you have a very cooperative one such as the AMSAT oriented one we have here in Detroit, but that will take even longer. If you really have a lot of time on your hands, try doing the same thing via Packet radio or RTTY. How about CW?! Packet radio and other text communications methods certainly have their place, and their is no current efficient substitute for them in the case of non-real time communications, but you can see by this example that they do have limitations.

Let's get back to the typical Amateur one-on-one voice contact. There is no illusion in my mind that after reading the above you are all going to go out and assemble ATV stations. If for no other reason, there is no Amateur satellite on the drawing boards that could handle wide bandwidth analogue television signals, so your maximum range would be limited to 50-100 miles at best, under normal terrestrial propagation conditions.

As an aside, this discussion may make some wonder, from a purely commercial point of view, what is the attraction of Amateur Radio to today's population? After all, we've grown up with a worldwide telephone system, which can now even be accessed via cellular phones from automobiles or just about anywhere else. Newer highway signs even tell you to dial

911 instead of the old "State Police monitor CB Channel 9" type. Well, you might say, "Packet radio will hook that new blood Amateur Radio so badly needs. It involves computers, and we know how much people are fascinated by computers!". Oh yea? Have you checked what landline based BBS systems can do and where they can reach? Yes, you say, but Amateur Radio is "free". Its "free" only after you've obtained a licence, a TNC, a transceiver, associated aerial system, PLUS the computer. Then there are certain subjects which should not be discussed on the air, remember. Etc., etc.

Before I get taken out of context and classified as "anti-" something, let me explain that I've operated about every mode Amateur Radio has to offer and I try to sell everyone I meet on the fascination of the hobby.

What I've described above are merely some of the arguments I've received in my efforts to recruit new Hams, and the argument has some merit in every area except one: ATV. There is no readily available commercial substitute for the two-way ATV contact. True, businesses have been using digital video for teleconferencing for years, but this equipment has tended to be very expensive to obtain and to operate. Even after equipment costs have come down, it will be years before an effective video phone is used by a substantial percentage of those presently using the telephone service.

Perhaps it will be a blessing if cellular phones are never replaced with cellular digital videophones. Most people driving the Detroit freeways at 80 mph don't need the distraction!"

There are more uses we can put to ATV than local two-way contacts. But before that can be done, the nature of how we handle the television signal must be changed in order for it to be used within the practical power and bandwidth limitations placed on the Amateur Satellite Service. Investigations are being carried out into the feasibility of digital video instead of the current bandwidth hungry analogue methods, either AM or FM, for conducting ATV contacts.

You have been watching digital video for years and probably didn't know it! To digitise an analogue video signal takes about 92 Mbps. The national TV broadcast networks take this digitised video signal, compress it at 2:1, and broadcasts it to their affiliated stations.

Why Digital Video?

For the national television networks, the digitisation and compression of their video broadcasts allows them to send their programming over special terrestrial

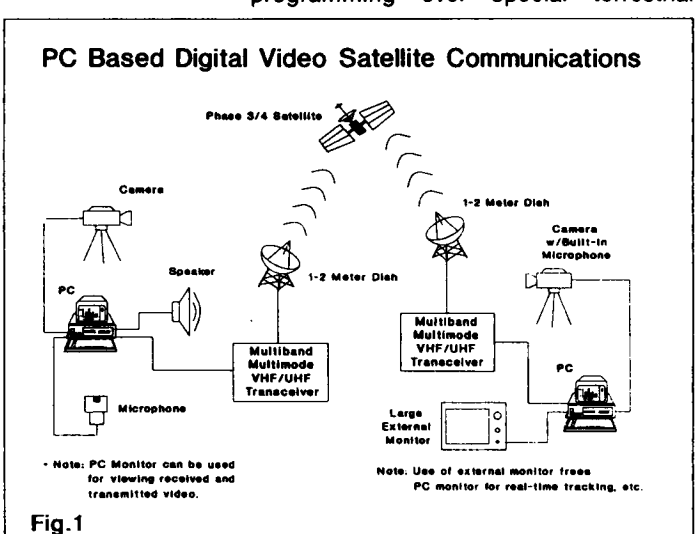


Fig.1

circuits known as DS-3, T-3. or sometimes T-45 circuits because they will handle the 2:1 data compression which results in a 45 Mbps digital video signal. Digital video compression at this level, when converted back to analogue, retains nearly all of the characteristics of the original video (NTSC).

It didn't take industry long to realise that if video signals are further compressed, say by a factor of 60:1 to 1,5 Mbps, that there is still more than sufficient quality remaining to use digital video for relatively economical two-way communications without having to travel to the distant location. True, you would probably not want to use this medium for sending images of a fast action football game, but for purposes of meetings and presentations, it's more than adequate.

Further developments in data compression techniques have allowed for the commercial use of digital bandwidths down to 76 Kbps (120:1 compression ratio), and recently, even to 384 Kbps (240:1 compression ratio) while still maintaining acceptable quality.

Although these developments are impressive from a commercial perspective they do not provide many alternatives for Amateurs. However, Amateurs are more resourceful and deal more effectively with reduced quality of communications, in order to put a new technology to use in a different way or in a manner they can afford.

Thus recent developments to reduce the video bandwidth to as little as 56 Kbps start to look promising. In case you haven't realised yet what an accomplishment digital compression to this level means, stop to think about what data compression rate is required, i.e. nearly 1700:1. This is roughly equivalent to putting a truck load of sand into a grocery bag!

At the bandwidth of 56-64 Kbps the television image quality is significantly less, but it is still more than adequate for most Amateur television communications. More importantly for the Amateur Satellite Service, future OSCAR satellites may be able to transpond such a signal. Because of the bandwidth and signal-to-noise requirements of present ATV analogue signals it is not feasible for either current envisioned Phase 3D or 4A satellites to transpond these signals. Digital video techniques must be used. According to Dr. Karl Meinzer DJ4ZC, based on a guideline of 350 bps per Watt EIRP, approximately 64 Kbps are achievable on the Phase 3D satellite. By using QPSK or some similar method of modulation, such a transponder would probably be suitable for digital ATV purposes.

It is clearly possible by the time either the Phase 3D or 4A satellites are launched, acceptable digital video may be possible down to a compression ratio of almost 5000:1. This would be equivalent to a digital bandwidth of 19.2 Kbps. Although this is twice the speed of the highest Amateur satellite communications accomplished to date, it is only about one third of the digital transponder bandwidth now considered feasible for the next generation of high flying OSCAR satellites.

This means that three digital video transmissions could be handled at the same time. More likely, one or two video channels would be used, with the balance of the digital transponder for high speed packet communication trunks. There are tremendous possibilities in the Amateur satellite community for technology which allows handling of television signals in this manner.

What's All This Cost?

Presently, the commercial CODEC with the largest installed base used for digital video conferencing sells for approximately $65000! This figure is expected to drop to approximately half over the next 18 months. Newer CODEC manufacturers are introducing models of CODECs which operate satisfactorily at 384 Kbps and currently sell for about £35000. These prices are well beyond the Amateur market, but as all of you who may have long ago

purchased a 300 baud MODEM for $200 well know, that's not the end of the story.

Within the next few months, a CODEC chip set is expected to be introduced which will initially sell for between $1500 and $2500. This price will fall rapidly as supplies become plentiful, other manufacturers enter the market, and the initial supplier has recouped its research investment.

Digital video CODECs which are PC based are already on the market, but their bandwidth requirements for good images are too high (384 Kbps) and they tend to be expensive ($20000, including the PC). That all will change too, with the increasing availability of the CODEC chip sets.

Further along, it is likely that a CODEC-on-a-chip will be introduced which will make PC based system,s even more economical. In addition, a new international standard (CCITT) for digital video telecommunications was recently passed.

All these and other factors will quickly combine to drive prices rapidly downward. I expect that by the time either the Phase 3D or 4A satellites are launched there will be available for well under $1000, a card which can be inserted in a slot on your PC (see Fig.1). This card, coupled maybe with a minor modification to your satellite transceiver, will allow you to receive a full motion digital video transmission from an Amateur satellite or terrestrial source. The output would be displayed on your CGA, EGA or VGA video monitor, and you could do this without inferfering with an application you may have running on your PC at the time, such as satellite tracking for automatic aerial pointing, etc.

By connecting a small one-chip CCD camera or other NTSC video source such as your home VCR, you can digitise the video and uplink it for a two-way digital ATV QSO via satellite.

With the current developments in commercially manufactured Amateur Radio equipment, perhaps even the minor modification to your radio will not be necessary in order for it to handle the wide bandwidth data channel. Even if it is, this shouldn't be much more difficult than the simple modification now being made to allow radios to handle the 9.6 Kbps signals used by UoSAT-OSCAR 14.

Compressed Digital Video Opens a New Realm for Amateurs

Digital ATV contacts will not only be possible for future OSCAR satellites, but the terrestrial use of ATV could be handled in a much more spectrum efficient manner. This would allow far more users to be accommodated in the increasingly popular 440 MHz and 1,2 GHz bands.

Once the feasibility, efficiency and economy of digital video is demonstrated, existing AM ATV operations will go the way AM voice communications did when SSB was introduced. Just as importantly, it will be possible to have a wide area digital ATV telecast vis Phase a 3d or 4A satellite.

Spacecraft, such as the solar sail, could send back full motion images (instead of packet radio still frame images as WEBERSAT-OSCAR 17 does) of the sail, the Earth or the Moon, from the sail's on-board camera.

Digital ATV from the space shuttle or the space station could be uplinked to an OSCAR for viewing directly by HAMS or digital; ATV satellite gateway stations. This would give new meaning to the phrase "See you on the bird!".

Anyone for an ATV contact with the astronauts?

G8MWR MICROWAVE PROG

Mike Wooding G6IQM

Specifically aimed at those of you playing portable at short end of the spectrum, this PC based program from the Glen Ross, G8MWR of the Microwave Society could prove to be quite useful. It is a suite of routines for calculating various parameters involved with microwave TX/RX paths, site details, aerial calculations, etc.

The program presents itself firstly with an identification screen and then with a menu. The initial version I received tried to play a short Morse message, but my 386 machine effectively scrambled that into gobbledegook, so I think that Glen has now removed it - certainly from my review copy anyway.

```
        G8MWR Microwave Progam.

FOR PATH CHECK.............TYPE..1

FOR SITE DATA..............TYPE..2

TO EDIT DATA...............TYPE..3

FOR PATH ANALASYS..........TYPE..4

FOR DISH CALCULATIONS......TYPE..5

FOR NGR CALCULATIONS.......TYPE..6

TO RETURN TO SYSTEM........TYPE..7


          WHICH CHOICE.....
```

Fig.1 Main Menu

The menu offers a choice of 6 routines or a return to system (DOS) as can be seen in Fig.1.

- PATH CHECK ... this routine prompts the user for details of the heights of two sites and then plots a graph illustrating the effect that the Earth's curvature will have on the path.

- SITE DATA ... this routine accesses the program's database of site information, and presents on screen, after the user has input various details about the chosen site, a list of all the sites that are within the maximum distance input by the user from the chosen site, see Fig.2. Obviously, as comprehensive as the site list is not all sites that might be used are known by the database, this is where the next routine comes in.

DATA FOR PATHS OF LESS THAN 130 KMs FROM THE BARR BEACON SITE

PATHS OBSTRUCTED BY EARTH CURVATURE ARE NOT SHOWN

DISTANT SITE.	NGR	OUT	IN	KMs	MILES	Ft
ALPORT HEIGHT	SK 306 516	34	214	59	36	108
AXE EDGE	SK 027 703	6	186	73	45	180
BLACK LOW HEAD	SK 092 958	10	190	98	60	206
BLORENGE	SO 270 188	236	56	112	69	183
BOSLEY CLOUD	SJ 904 637	355	175	68	42	111
BRILL	SP 640 700	121	301	64	40	65
BROADWAY	SP 115 364	183	3	61	38	100
BROWN CLEE	SO 594 867	269	89	48	30	177
BURBAGE MOOR	SK 275 814	23	203	87	54	139

Fig.2 Site Data

• EDIT DATA ... this routine allows the user to add to, or edit data in, the program's database of site information.

• PATH ANALYSIS ... this routine prompts the user for information regarding the the equipment being used at either end of the path (i.e. powers, aerial gains, etc.) and also the path length, and then outputs a projected analysis of the results that could be obtained.

• DISH CALCULATIONS ... choice 5 from the menu enters the dish parameter calculating routine. After answering the necessary prompts from dish size, depth and frequency to be used on the routine outputs the focal length, beamwidth and gain of the dish (See Fig.3).

```
Diameter of dish in inches ..........? 60

Enter depth of dish in inches .......? 4

Enter the frequency in GHz ..........? 10

Gain reference a dipole is  39.3 db.

The +/- 3dB beamwidth is   1.3 degrees.

Focal length of dish is  56.2 inches.

Another calculation ...( Y / N )..... ?
```

Fig.3 Dish Calculations

• NGR CALCULATIONS ... the last routine on the menu is a standard distance and bearing routine, the calculations being made after the user has input the National Grid Reference for each site (see Fig.4).

The output from any of the routines can be directed to either the screen or the default system printer.

I found the program rel;eatively easy to use (eventaully – but that's another story!). The menu structure was easy to use and the error traps all seemed to work – although my super PC did its best! I would imagine that the program could prove extremely useful for those of you who feel this arcane necessity for tramping about on the top of hills on cold wet wintery Sundays.

The program will run on any XT/AT based computer system (at least, it will now won't it Glen!!) running any video display system. It is available at a cost of £10 (5.25" disc and p&p included) from: The Microwave Society, 81 Ringwood Highway, Coventry, CV2 2GT.

```
                Bearings and distance from NGR.

          ____ You MUST use the six figure NGR _____

EXAMPLE ENTRY....     SD   < ENTER >        163927   < ENTER >

First NGR letters...? SK     NGR figures...? 251830

Second NGR letters..? SO     NGR figures...? 270188


          Distance is 311 Kms at 341 degrees magnetic.


                    Type R to rerun or M for menu..
```

Fig.4 NGR Calculations

I²C Part-2 - THE CPU

This chapter deals with the building of the CPU (Central Processor Unit) board, interconnecting it with an ASCII keyboard and the VDU card, which was described in the previous chapter. This section also covers installing and operating the custom software that controls the unit. The end product will be a unit which generates an I²C bus (the two wires called SCL and SCA, as described in the last section), which will connect to, and control all, the future modules. The only other connections to this pair of cards will be RGB and Sync, which are the outputs to a monitor to display the control menu's that will help you operate the unit, or display decoded Teletext or locally generated teletype messages, and a power supply.

The video input, which is two-fold, will enable you to genlock the RGB to the rest of your station for superimposition work, and, if the video at that input is complete with Teletext data on it, will allow you to decode it. The video feed can be an off-air feed of broadcast TV signals (not off-tape), but it could also be an off-air feed from a satellite receiver, where some channels also carry Teletext data.

Decoding Teletext is nothing new, but being able to edit and superimpose that data onto your station output is something you don't see every day.

NOTE: As with all new and complex state-of-the-art projects such as this we encounter unforeseen problems as we go along, and of course uncover the odd mistake or two. To cover this eventuality, as and where necessary, each part of this book will feature a "*Field Bulletin(s)*" listing any problems etc. encountered with previous parts of the project. This field bulletin(s) will appear on the rear page(s) of each part and will be included with each PCB it relates to. If you are building this project without using the Club's PCBs send me (Trevor Brown) an SAE marked I²C field bulletin. If you send more than one SAE I will send out further bulletins as they are issued.

CARD INTERCONNECT

The PCB cards are in a format known as Euro-card, and as such they are a standard size for housing in a card frame. The edge connectors are called DIN 41612 and are indirect edge connectors, i.e: they come in two parts; a plug which solders directly to the PCB, and a socket which it plugs into. They are available with a choice of one, two, or three rows of connectors (a, b and c), and there are 32-pins in each row. They also have two kinds of plastic housings, one that only allows for two rows of connectors, and one that will take all three.

It is suggested that the type with the wider mouldings is used incorporating a connecter having three row of pins. This is not necessary for any of the cards yet designed or planned for the future, but allows us to set a standard at the outset, which will mean that cards from any one system will plug into another, useful for testing and fault finding. Also, the use of an extender card is extremely helpful when working on racked card systems such as this, and if you standardise one one type of connector system you will only need one type of extender card.

The diagram in Fig.1 shows the interconnections between the VDU card and the CPU card. Unfortunately, try as hard as we did we could not avoid a design that has some wires crossing, the cards are quite small and the circuits complex. The a,b and c rows are identified on the plugs and sockets, as are the pin numbers, but you do need 20/20 vision or

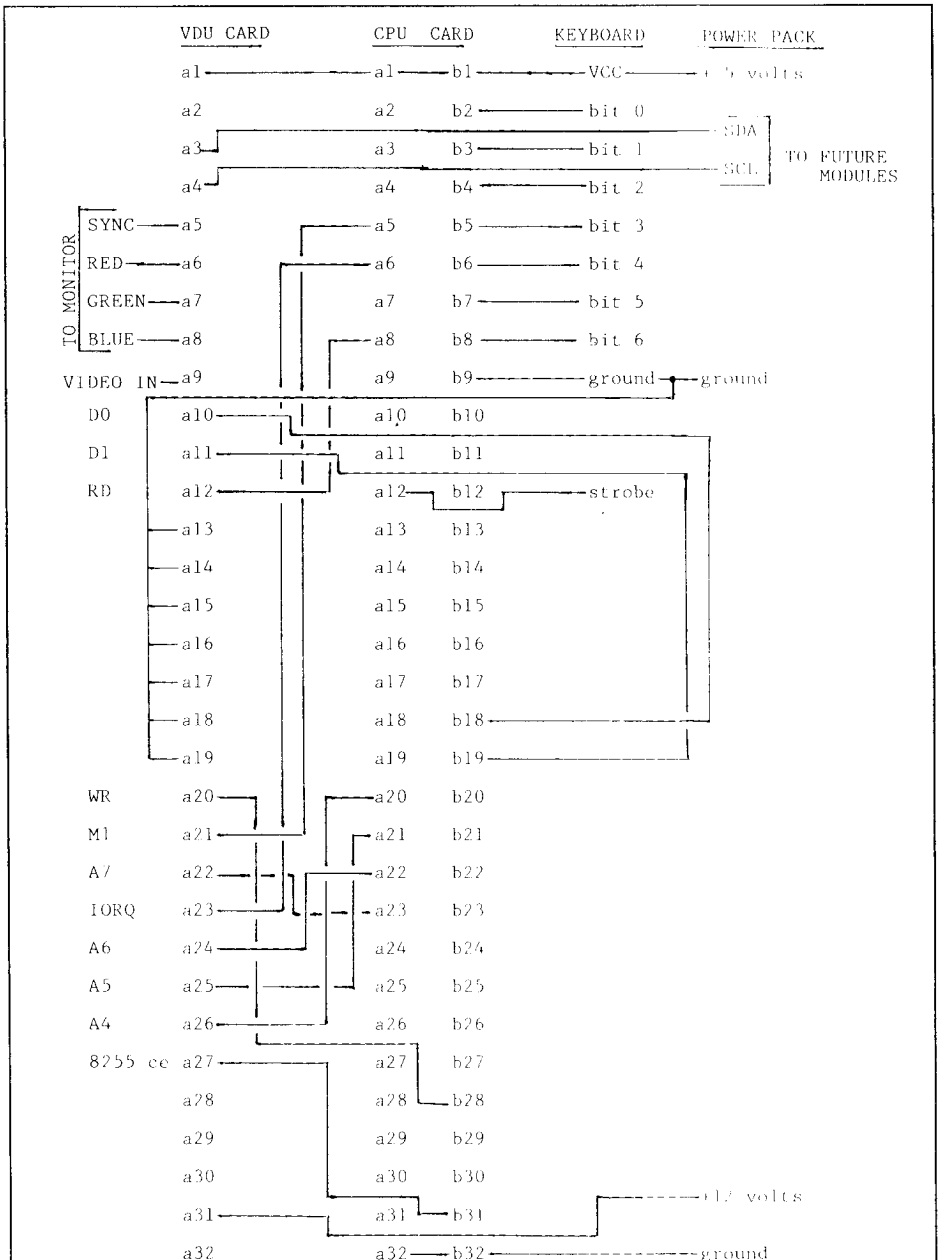


Fig.1 Card Interconnections

strong glasses to see them. The wires between the cards should be kept as short as possible and the cards should ideally be mounted vertically, as is the case in a card frame. The power supply needs to be "clean" and well regulated.

The only external connections are to the monitor and keyboard, video in (only required for Teletext or genlocking), the power supply and the I²C bus (SCL and SDA), which is the interconnect for all forthcoming modules and any commercial I²C equipment.

THE CENTRAL PROCESSOR UNIT (CPU) CARD

This card is the brains of the system. It is where the Z80 microprocessor is to be found, along with the RAM and EPROM memory, where all the software instructions that run the system are stored. The CPU circuit evolved from the original Teletron CPU, which appeared in the BATC publication "Micro and Television Projects". The original CPU can still be used for this project, but it will require some changes. If you have one and would like to uprate it please send an SAE to me (Trevor Brown) and I will let you have the details.

The new CPU is shown in Fig.2, and although compatible with an uprated Teletron CPU the pin-outs are different and interconnections must be made with care. I will assume that all constructors of the I²C project are using the new CPU printed circuit board. The component overlay is shown in Fig.3. Like the VDU circuit board this board is through hole plated, so IC sockets can be fitted for all the chips.

NOTE: on page-5 it was stated that the VDU circuit board would not feature through plated holes, which was the original intention. However, the problems encountered by the Committee Guinea pig (yours truly) in building the prototype convinced me that, *hang the expense,* we would go for plated through holes.

There are several link connection options on the PCB and these are as follows:

- **CON2** - should be made so that pin-6 of the 8255 is routed to B31 of the 41612 edge connector.
- **CON3** - should be made A-C because we are using a 62256 RAM chip.

The other connection configuration of CON2 allows the CPU to be used independently of the VDU, and the other configuration for CON3 allows the use of the smaller 6264 RAM chips to be used for less ambitious projects.

The back-up battery B1 is a luxury and need not be fitted in this application. The interconnection diagram in Fig.1 shows how to connect the two cards together and also how to add an ASCII keyboard to drive the system.

IC6 is a preprogrammed EPROM containing the I²C software and must be purchased from Members' Services. When the EPROM is fitted the two units can be powered up and, if all is well, the start-up menu will appear on the monitor. This is irrespective of whether a keyboard is connected or not.

The video signal produced by the VDU module can be connected to an RGB monitor, or to a PAL monitor via a suitable coder, such as the Maplin kit described on page-45 of CQ-TV 152.

The same rules apply if using this coder kit with the I²C VDU - R0 and R1 are joined together for the red input, G0 and G1 for the green and B0 and B1 for the blue. Pin-3 of PL4 on the coder (blanking) should be grounded.

The keyboard should be an ASCII type and have a negative strobe. Most keyboards have a strap facility for selecting the strobe polarity, if yours does not and is of the incorrect polarity, then you will have to add an invertor chip, having first read John Wood's series on Logic Circuits in CQ-TV 145 onwards.

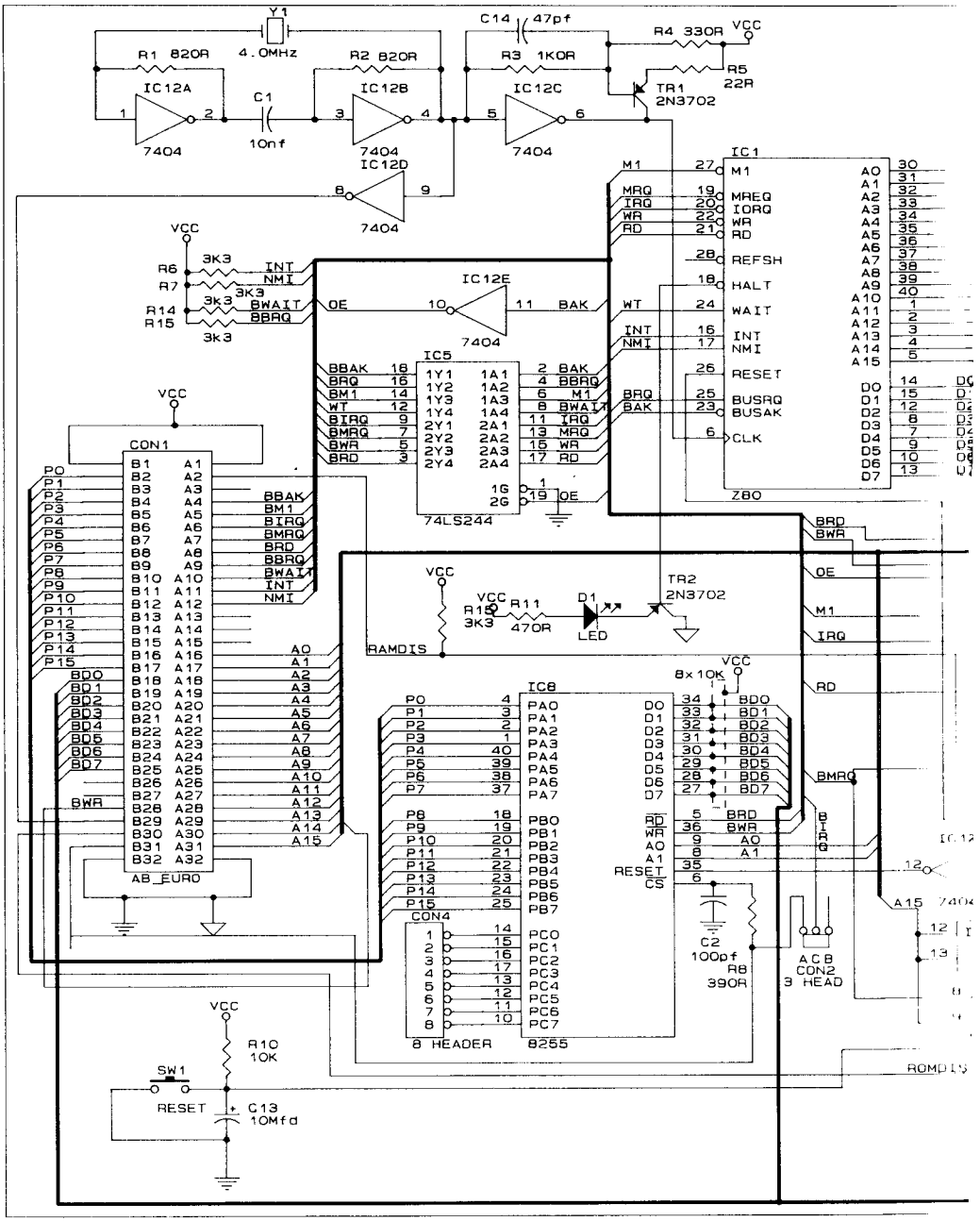
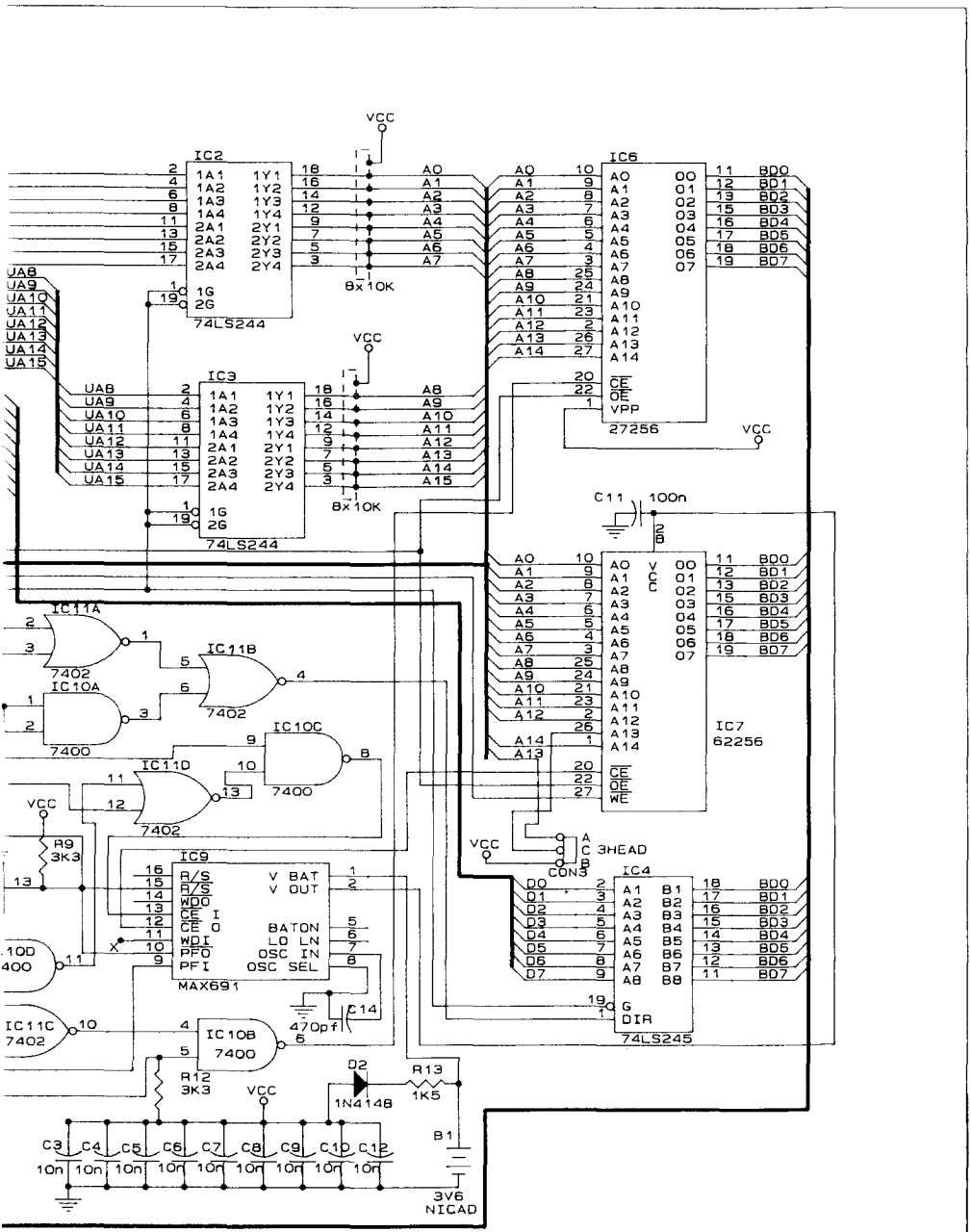


Fig.2 CPU Circuit Diagram


VCC
IC2
74LS244
8x10K
IC3
74LS244
8x10K
IC6
27256
C11
100n
IC7
62256
IC11A
7402
IC11B
7402
IC10A
7400
IC10C
7400
IC11D
7402
IC11C
7402
IC10B
7400
R9
3K3
R12
3K3
IC9
MAX691
C14
470pf
IC4
74LS245
CON3
3HEAD
D2
1N4148
R13
1K5
B1
3V6
NICAD
C3 C4 C5 C6 C7 C8 C9 C10 C12
10n

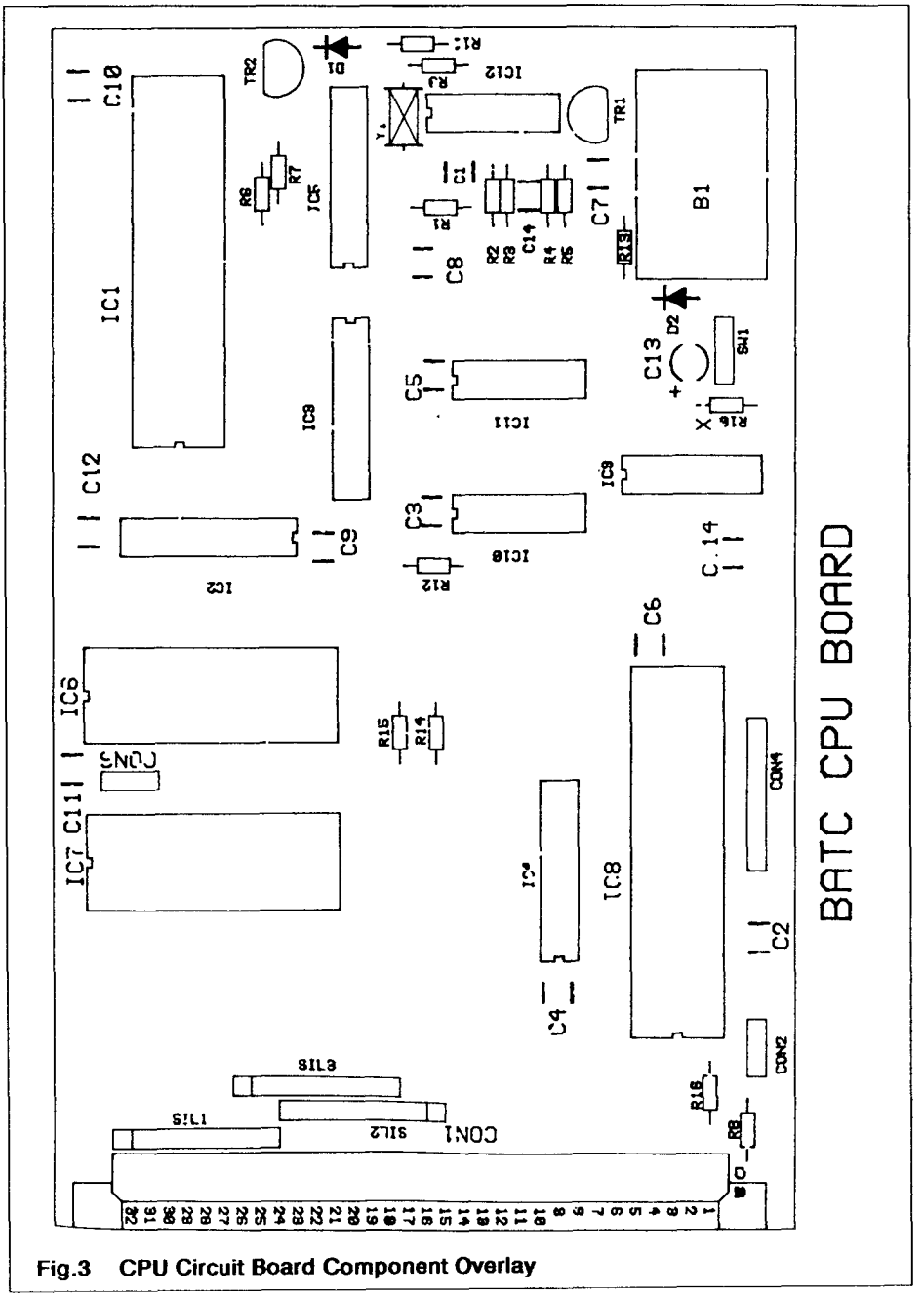


Fig.3 CPU Circuit Board Component Overlay

It should go without saying that you will not get a menu on the screen, or even a sync pulse out of the unit, if you have not fitted the custom EPROM IC6, and correctly wired and populated both the CPU and the VDU cards and the interconnects.

In the next issue we shall be describing a vision switcher that has eight inputs and is controlled via the I²C bus.

DRIVING THE I²C VDU USING THE EXISTING TELETRON CPU

TELETRON VERSION 2.22

This is the documentation that goes with version 2.22 of the Teletron firmware, which is supplied in a 32K Byte EPROM (27C256) and contains all the code necessary to run the new Teletron CPU card and the new teletext display card.

Future upgrades will be provided at a nominal charge and will provide support for all the I²C projects as they appear in the I²C booklet, attached to CQ-TV.

Upon switch-on a menu system is displayed which allows you to display a built in test card, enter a teletype mode for caption generation, set the date and time, and has provision to include future I²C projects, such as a vision switcher, audio switcher, and so on.

The TOS option on the first menu places you in the command line environment, the commands for which require some explaining. The commands recognised from TOS are as follows :-

CALL, CLS, DISASSEMBLE, EXAMINE, FILL, IN, MENU, MODIFY, OUT, REGISTERS, SEARCH

Each of these commands will now be looked at in some detail.

CALL

This allows you to call a machine code routine held anywhere in the Z80's memory map. Typically, you will enter a routine into RAM and use this command to start running it.

The syntax for this command is: CALL xxxx ... where 'xxxx' is a four digit hexadecimal address, i.e: 0000 to FFFF.

Example: CALL 9A00. This command will transfer control to the address at 9A00h.

Tips : If your code keeps the stack tidy, you may return control to TOS by executing a RETurn instruction. The registers are saved on return to TOS and may be examined using the REGISTERS command - see later.

CLS

Perhaps the simplest of the commands, this will clear the screen and return the cursor to the top left hand of the screen. The syntax for this command is: CLS ... there are no parameters.

DISASSEMBLE

This command will disassemble machine code from the address passed. This part of the system has only just been written and may still contain some bugs, but on the whole it will disassemble machine code in the Z80's memory map quite effectively.

The syntax for this command is: disassemble xxxx ... where 'xxxx' is a four digit hexadecimal address, i.e: 0000 - FFFF.

Example : disassemble 0000. This will start disassembling the machine code at 0000h. (The start of the operating system EPROM).

Tips : Try disassembling from address 0000 and follow the code through, the first instruction should be 'DI' then 'IM 1' and 'JMP xxxx' after you see the JMP instruction press ESCAPE and start disassembling from the address after the JMP instruction. This is the start of the operating system itself.

Don't look too hard though, you'll see all my bugs !... Chris Smith.

EXAMINE

This command allows you to dump area's of memory to the screen for examination. This command will display the area of memory you pass it, so if you ask it to display more than one screenful at once, it will do so. The display will scroll when the bottom of the screen is reached.

The syntax for this command is: EXAMINE xxxx yyyy ... where 'xxxx' is a four digit hexadecimal start address and 'yyyy' is a four digit hexadecimal stop address.

Example : EXAMINE 1200 12FF. This will display 256 bytes of data from 1200h to 12FFh (Part of the EPROM) the display is in the following format :-

Address Hex data bytes Characters

1200 41 53 43 49 49 20 54 65 ASCII Te

1208 78 74 2E 00 01 02 03 04 xt.....

If the data is a valid ASCII character then it will be displayed on the right if the data is not an ASCII character, then a dot will be displayed instead.

Tips: Use this command to look at the text in the EPROM, you never know what you'll find !

FILL

This command fills an area of memory will the value you pass it. The syntax for this command is: FILL xxxx yyyy zz ... where 'xxxx' is a four digit hexadecimal start address, 'yyyy' is a four digit stop address and 'zz' is a two digit hexadecimal value to fill the memory with.

Example: FILL 9000 9100 AA. This will fill the area of RAM from 9000h to 9100h (256 bytes) with the value AAh.

Tips: Remember you can only alter the contents of RAM, if you try to fill the EPROM nothing will happen. Try to keep away from the areas of RAM between 8000h and 87FFh, as this is used by the operating system and altering values in that range can cause the CPU to crash, or produce some strange results.

IN

This command will display the data at a port on the I/O map. The syntax for this command is: IN xx ... where 'xx' is a two digit hexadecimal address.

Example: IN 00. This will input the data at I/O address 00h (Port A of the 8255 chip - what the keyboard is connected to) and display it on the screen.

Tips: Use this command in conjunction with the OUT command to control devices on the CPU's I/O map, i.e:: Port B and C of the 8255 can be connected to external devices and these commands will allow you to control them.

MENU

This command has no parameters and once executed will transfer control back to the menu driven system, leaving TOS.

MODIFY

This command allows you to modify data in the CPU's RAM. Data at the current address is displayed, you may then alter it or scroll forwards or backwards through the memory map.

The syntax for this command is: MODIFY xxxx ... where 'xxxx' is a four digit hexadecimal start address.

Example: MODIFY 9000. This will display the contents of RAM at address 9000h and allow you to alter it, or move forwards or backwards through memory, one byte at a time.

The above command will produce a display something like this :- 9000 00. The '9000' is the current address, the '00' is the contents of RAM at that address (this will vary), the '.' means the data byte is not an ASCII character (If it was an ASCII character, it would be displayed), finally the '_' is the cursor and is waiting for you to enter some data. At this point you have four options,

1) Enter new data as a two digit hexadecimal byte.

2) Press the 'full stop' key - this will take you back to the command line.

3) Pvess the 'PLUS' key - this will move to the next address, without altering the contents of memory.

4) Press the 'MINUS' key - this will move to the previous address, without altering the contents of memory.

Tips: Use this command to enter machine code programs that you write. Then execute them with the CALL command.

OUT

This command is the opposite of the IN command and allows you to output data to the CPU's I/O ports. The syntax for this command is: OUT xx,yy ... where 'xx' is a two digit hexadecimal address and 'yy' is a two digit hexadecimal data byte.

Example: OUT 01,55. This will output the value 55h to port 01h (Port B of the 8255 chip).

REGISTERS

This command will display the contents of the CPU's registers, as they were on return from the CALL command. If you have not used the CALL command yet, the displayed values will all be zero. The syntax for this command is: REGISTERS ... this will produce a display on the screen as follows:

HL DE BC

0000 0000 0000

IX IY AF

0000 0000 0000

Meaning that the contents of all registers were zero (usually only seen when the CALL command has not been used yet).

Tips: See the memory map at the end of this document and locate the address of the RAM where these values are held. If you then use the MODIFY command to alter them, when you next use the CALL command, the registers will be set to the values you have entered BEFORE your routine is called.

SEARCH

This command allows you to search through the entire memory map for a particular sequence of hexadecimal bytes, or for a particular sequence of ASCII characters.

The syntax for this command is: SEARCH xxxx yyyy aa bb cc ... where 'xxxx' is a four digit hexadecimal start address, 'yyyy' is a four digit hexadecimal stop address and 'aa' 'bb' 'cc' are two digit hexadecimal data bytes.

or: SEARCH xxxx yyyy "STRING" ... where 'xxxx' is a four digit hexadecimal start address, 'yyyy' is a four digit hexadecimal stop address and STRING is a string up to 80 characters long of ASCII characters, enclosed in double quotes.

Examples: 1) SEARCH 9000 FFFF 55 AA. This will search for the sequence 55h AAh in memory from 9000h to FFFFh.

2) SEARCH 0000 7FFF "BATC". This will search for the string "BATC" in memory from 0000h to 7FFFh.

If the search is successful, the message 'Match found at xxxx' will be displayed, where xxxx is a four digit hexadecimal address corresponding to the address at which the search succeeded.

If the search was not successful, the message 'No match found' will be displayed.

MEMORY MAP:
ADDRESS DESCRIPTION

0000 Start of EPROM containing the code to run the CPU board.

7FFF End of the EPROM. It is 32K bytes long, not all of it is used.

8000 Start of RAM

9FFF End of RAM if only 8K is fitted

FFFF End of RAM if the full 32K is fitted.

Within the first 2K of RAM are the variables used by the operating system, these can be safely looked at with the EXAMINE command. However, it is not advisable to alter any of them, apart from the area used to store the registers before using the CALL command.

For completeness the locations used are as follows :

8000 Two byte vector for the INTerrupt line
8002 Two byte vector for the NMI line
8004 Two byte vector for the error handler
8006 Two byte pointer to the error table
8080 Two bytes used for temporary storage in some routines
8082 Length and frequency of the beep
8084 Copy of the contents of the 8255 control register
8085 Maximum length of string input

The following locations are those used to hold the register values:

8086 AF Register
8088 HL Register pair
808A DE Register pair
808C BC Register pair
808E IX Register
8090 IY Register
8092 RAMTOP Variable, holds the current top of RAM
8094 FLAGS Holds various system flags
8096 Current key press
8097 Last key pressed
8098 Flash rate for cursor
809A Temporary storage for interrupt routines
809C Cursor row (For old Teletron vdu board)
809E Cursor column (For old teletron vdu board)

The following locations are variable used to control the I²C bus:

80A0 Teletext chip register 1 RAM copy
80A1 register 2
80A2 register 3
80A3 register 4
80A4 register 5
80A5 register 6
80A6 register 7
80A7 register 8
80A8 Page zero row position (For the cursor)
80A9 col position
80AA Page one row
80AB col
80AC Page two row
80AD col
80AE Page three row
80AF col
80B0 Page four row
80B1 col
80B2 Page five row
80B3 col
80B4 Page six row
80B5 col
80B6 Page seven row
80B7 col
8100 IIC message buffer (1K Bytes long)
8500 String input buffer (7Fh bytes long)
8580 Disassembler workspace
8600 Operating system buffer

I/O Map

The I/O map has only two devices connected to it (at the moment !) and there is plenty of free space to add your own devices - i.e: Speech synthesisers, Music synthesisers, Control ports to switch other items of equipment on and off, Input ports to monitor activity in the outside world, Printer ports, Serial ports, the list is endless.

The address's used so far are :

00 Port A of the 8255 chip
01 Port B
02 Port C
03 Control port for the 8255 chip.
60 IIC I/O Port.

FIELD BULLETIN 1

CIRCUIT ERROR

IC4 is incorrectly drawn on the circuit diagram and the edge connector pin numbers for IC3 pins-4 and 3. Also the input connections to IC4 are shown incorrectly. The printed circuit board is correct and will not need modification. the corrected part of the drawing is shown below.

The real time clock crystal is Y3 and not Y2 as annotated on the circuit.

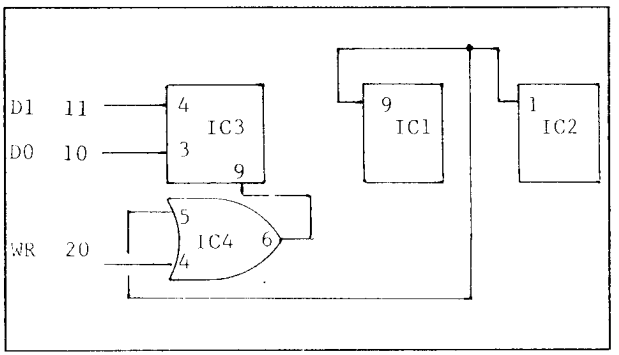
PCB LAYOUT

C12 and C14 are not shown on the circuit diagram. They are decoupling capacitors.

R21 is wrongly labelled and should be R25 (there is no R21).

IC5 is an open-collector IC and requires pull-up resistors on its outputs, i.e: RGB and Sync.

These components have been added on the production PCBs.



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FIELD BULLETIN 2

DRIVING THE I2C VDU WITH THE TELETRON CPU

At this point in time it is hoped that we will be marketing the new CPU circuit board to drive the I²C system. The new CPU is an improved version of the Teletron CPU that first appeared in the BATC publication "Micro and Television Projects", which is still available from BATC Publications.

For those of you that already have a Teletron CPU and wish to use it to drive the I²C VDU, following is a list of the modifications that will need to be carried out to the memory map in order that it will accommodate the larger 27256 EPROM that the system will use to store the I2C program. The RAM part of the memory map will also need to be enlarged to accommodate the 32k single chip static RAM. The modifications are not so great that those of you with existing Teletron CPUs cannot add them.

EPROM MODIFICATIONS

Pin-27 needs rerouting to pin-4 of the Z80

Pin-26 needs rerouting to pin-3 of the Z80.

Link-2 should be put to A-C.

RAM MODIFICATIONS

The RAM socket needs changing from a 24-pin to a 28-pin type.

Two holes will need to be drilled in the PCB above pin-1 and two above pin-24, and the four new pins connecting as per the diagram opposite.

Counting the pins of the new socket arrangement as a 28-pin, then pin-23 will need rerouting to pin-1 of the Z80, pin-26 will need rerouting to pin-3 of the Z80 along with pin-26 of the EPROM to which it is joined.

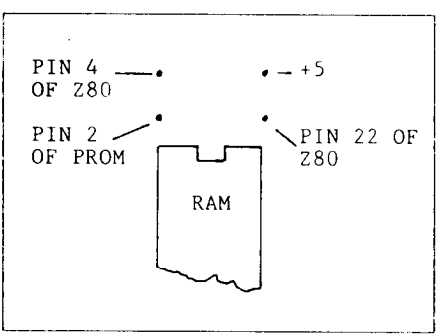
The socket should now be fitted with a 32k static RAM chip type 62256, available from Maplin under part number UH40T.

8255 MODIFICATIONS

The 390 ohm resistor connected to pin-6 will need rerouting to the VDU by disconnecting it from pin-20 of the Z80 and connecting it to edge connector pin-27 of the VDU.

All the other CPU/VDU interconnects are available on the pads in the centre of the PCB, except M1 and IORQ, which are available on pins-27 and 20 of the Z80 respectively.

If you now add an RGB monitor, or PAL coder and composite monitor, to the VDU, fit the custom EPROM and switch on you should see the start-up menu.



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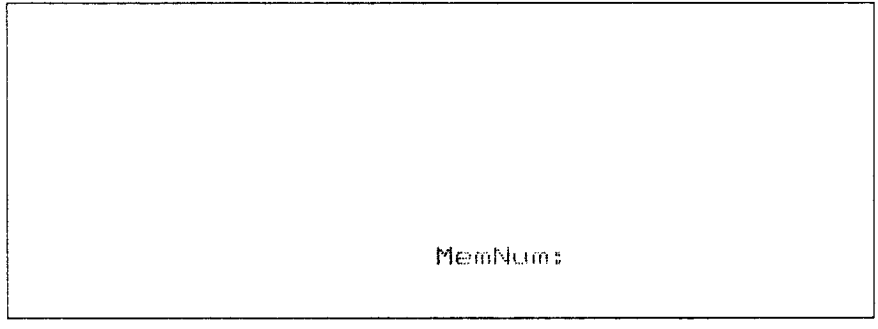

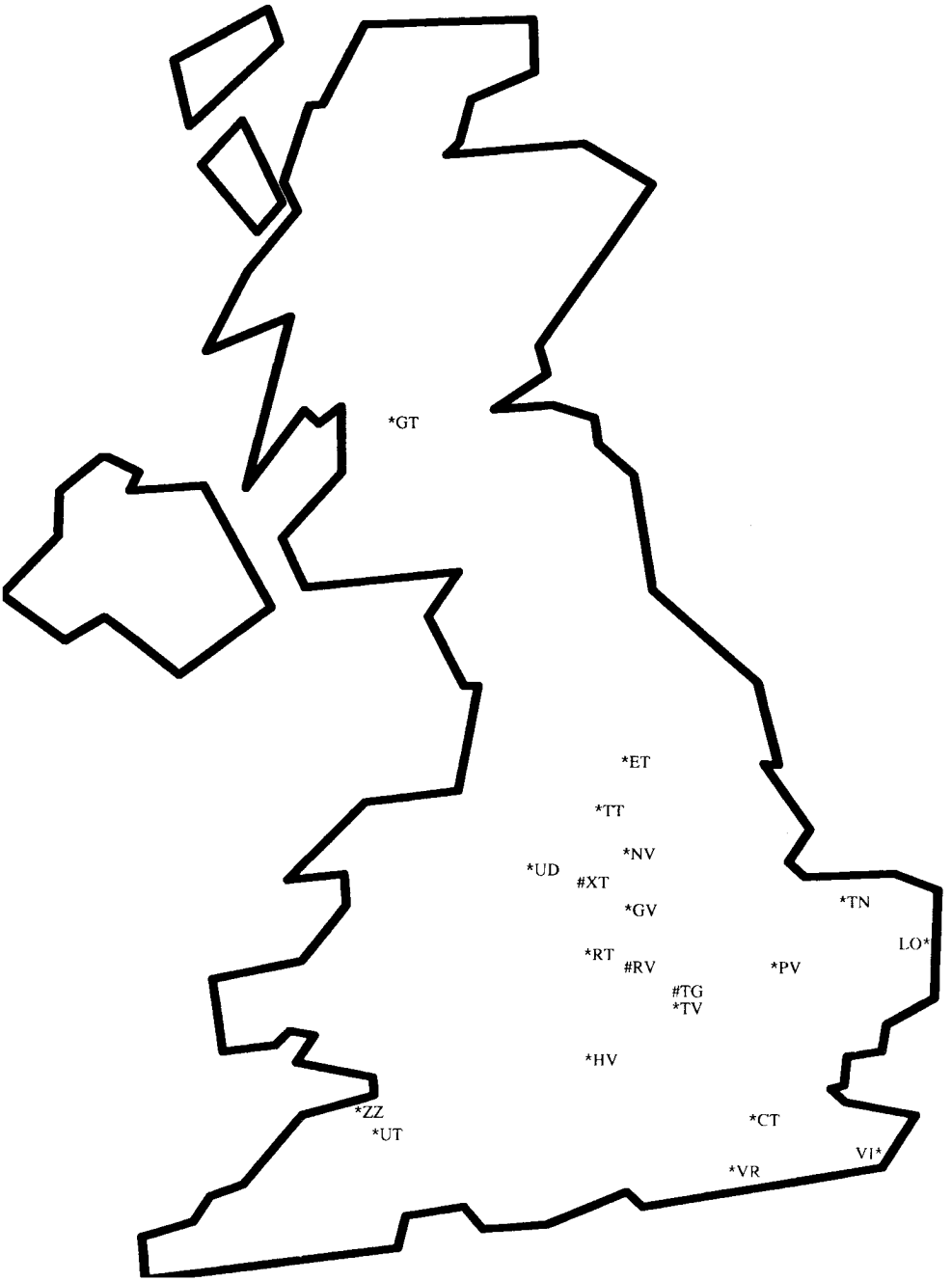

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PUBLICATIONS should NOT be ordered on this form. A separate form is provided for that purpose elsewhere in this supplement. We reserve the right to change prices without notice. All Club crystals are HC18/U (wire ended).
HB1 = ATV Handbook (blue); HB2 = ATV Handbook vol.2, or revised;
TVA = TV for Amateurs; MTP = Micro & Television Projects; COM = SSTV Companion; ATC = Amateur Television Compendium.

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

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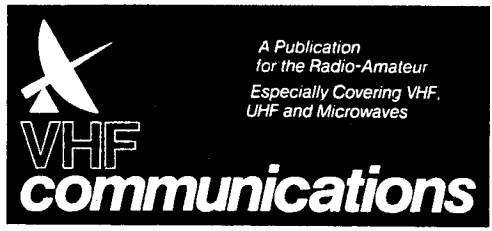

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VHF COMMUNICATIONS has collected together selected articles from previous magazines on common topics for the convenience of specialists. One such 'theme' is amateur television, in which nine selected articles taken from **VHF COMMUNICATIONS** form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

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There are approximately 90 pages of detailed constructional descriptions of all the modules necessary for the construction of a 70cm band, AM-TV transmitter and colour test pattern generator.

This is only one example from a total of 20 theme collections listed in the table below all at £13.00 including postage. Every collection comprises nine to eleven articles in a blue binder. As well as the subject articles, each collection contains many pages of interesting publications carefully selected from **VHF COMMUNICATIONS.**

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LOGIC CIRCUITS

Part–8

John Wood G3YQC

Encoders and decoders are expressions in common use which describe some process of conversion from one system of transmission to another. For example, a PAL encoder changes RGB TV signals into a more easily transmitted form. This is the basic reason for conversion – to make things easier. However, in this article we are concerned only with digital means of conversions and codes in particular.

Perhaps the most common form of digital coding occurs because there are 'too many wires'! This happens when a control or indication function has to be performed. Coding provides a means of reducing the number of wires and decoding recovers the information after transmission.

A frequent code is the binary code which we all know is based on powers of 2 because there are only two states in most electronic digital systems – on or off, (logic 1 or 0). Unfortunately we count in tens and so to change from our decimal system to digital systems we have to encode, then perform the electronic business and finally decode for display purposes. The simplest method of conversion from decimal to binary is by means of a counter. Fig.1 shows this. If the binary counter has four stages it is called a four-bit counter and has a maximum count of 16 before repeating itself (2 to the power of 4 equals 16). The states of the four bits are shown in Table 1. Note that the first state is when all Q-outputs are low, or 0, and that the count finishes at 15.

Table 1
THE STATES OF A 4-BIT COUNTER

Decimal	Binary DCBA
0	0000
1	0001
2	0010
3	0011
4	0100
5	0101
6	0110
7	0111
8	1000
9	1001
10	1010
11	1011
12	1100
13	1101
14	1110
15	1111
16	0000
17	0001
etc.	

The least-significant bit is A and the most-significant bit D (LSB & MSB).

For decimal counting purposes the count is limited to 10 and the sequence from 0000 to 1001 is known as the Binary Coded Decimal sequence – BCD. A BCD counter is therefore a counter which counts in

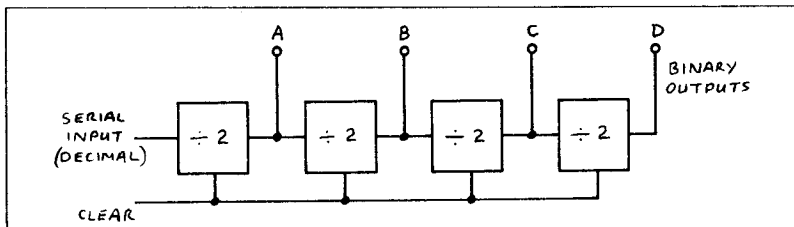


Fig. 1 Binary Counter

Table 2 COMMON 4-BIT CODES

Decimal	BCD (8-4-2-1)	2-4-2-1	Excess-3	Excess-3 Gray
0	0000	0000	0011	0010
1	0001	0001	0100	0110
2	0010	0010	0101	0111
3	0011	0011	0110	0101
4	0100	0100	0111	0100
5	0101	1011	1000	1100
6	0110	1100	1001	1101
7	0111	1101	1010	1111
8	1000	1110	1011	1110
9	1001	1111	1100	1010

multiples of 10 and gives out this binary sequence from each part. This type of counter would be found in a frequency meter or a calculator. The problem of decoding each BCD section into a decimal display remains of course.

It is possible to calculate in normal binary code and then to decode the entire system in decimal outputs for display, but the amount of logic required would be unwieldy to say the least.

There is an IC, the 74185A, which will convert Binary to BCD and also another, the 74184, for converting BCD to Binary. Both will handle six bits but for more than this, can be inter-connected with other converters. However, the TV applications of these devices are virtually nil.

The BCD code is not the only 10-digit code that can be derived from four bits i.e. 10 from 16. There are many more possibilities with various advantages and disadvantages and Table 2 shows three popular ones. Of these the Gray code is one in which only one bit changes at a time. This has applications in digital angular-position indicators. Compare this with BCD where all four bits change in ripple fashion when going from 7 to 8. A recognisable feature of a Gray code is that it is a reflective type of code. i.e. the second half is a mirror-image of the first half except for the MSB.

Features of these codes are that the 2-4-2-1 code consists of the first five and the last five states of the sixteen possible. The excess-3 code has the centre ten.

Both the 2-4-2-1 and Excess-3 are weighted codes in that they can be converted directly into their decimal analogue form. Weighting means giving a value to each bit. Thus to decode BCD, D is given a weighting of 8, C4, B2 and A1.

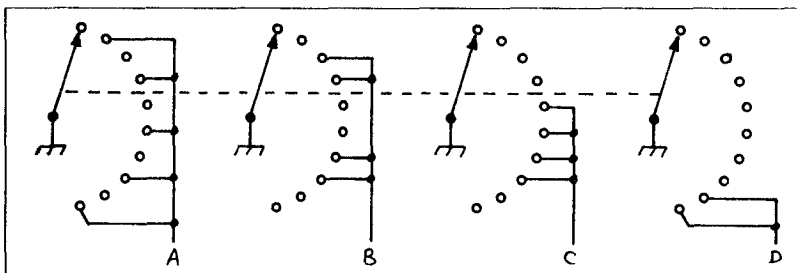


Fig.2 Decimal-to-Binary Coding with a Switch

Table 3 5-BIT CODES

Decimal	5-1-1-1-1	8-6-4-2-1	Unweighted
0	00000	00000	00000
1	00001	00001	10000
2	00011	00010	11000
3	00111	00011	11100
4	01111	00100	11110
5	10000	00101	11111
6	11000	01000	01111
7	11100	01001	00111
8	11110	10000	00011
9	11111	10001	00001

Table 4 DECODERS (DE-MULTIPLEXERS)

Function	Type No.	No.pins	Comments
BCD - Dec	7442	16	TTL outputs } same pins
XS3 - Dec	7443	16	TTL outputs } same pins
Gray - Dec	7444	16	TTL outputs } same pins
4 to 16	74154	24	TTL outputs, 2 strobes
Dual 2-4	74155	16	TTL outputs
Dual 2-4	74156	16	TTL outputs (open coll.)
BCD - Dec	7445	16	Lamp Drivers 30v, 80mA
BCD - Dec	74145	16	Lamp Drivers 15v, 80mA
BCD - Dec	7441	16	Nixie-tube Drivers
BCD - Dec	74141	16	Nixie-tube Drivers (improved)
BCD - 7seg.	7446	16	Lamp Drivers 30v, 40mA
BCD - 7seg.	7447	16	Lamp Drivers 15v, 40mA
BCD - 7seg.	7448	16	TTL outputs (non-active)
BCD - 7seg.	7449	14	TTL outputs (open coll.)

Hence decimal 7 = 0111 = (0x8) + (1x4) + (1x2) + (1x1). The total is 7. Again in 2-4-2-1. D = 2, C = 4, B = 2 and A = 1. Decimal 8 is 1000 i.e: 1x2+1x4+1x2+0x1 = 8

The excess-3 code is rather different. The excess-3 refers to the value being the BCD equivalent minus 3. Thus decimal 6 = 1001 = 1x8 + 0x4 + 0x2 + 1x1 - 3 = 9 - 3 = 6. It is not essential to stick to four bits when forming a code. For example, there are several well known five-bit codes. The method of converting digital numbers to analogue ones will be described in part 10.

The unweighted code is perhaps the most common as it is generated by a twisted-ring or Johnson counter. The decoding of this into decimal is achieved by means of ten, two-input AND-gates each fed from adjacent bistables. Incidentally, it can also represent Morse code numerals for those who are trying to make automatic callsign generators.

DECODING BINARY TO DECIMAL

This is more difficult than its counterpart as we require some system which will provide one of ten outputs from any four inputs.

Straight logic can do this without any clocking or counting. For example, to decode the binary equivalent of 5 (0101) a four-input AND gate is required. In fact, a four-input gate is required for each of the ten states. Fig.3 shows the systems where Boolean Algebra terms are shown; A = A at 1 and not-A = A at 0.

This system can be simplified somewhat since it is not always necessary to have all four inputs to define a particular number. For example, the 8 and 9 can be detected by the presence of a 1 in D and a 0 or a 1 in C. It is not necessary to have A and B. Fig.4 shows the simplified system. If the input source has more than the ten possible states of the four variables then false answers will be obtained with this simplified system.

The decoding of four-bit binary to decimal is often called 4-line to 10-line decoding and there is a special IC for doing this - the 7442. This is of the unsimplified logic and contains ten, four-input gates and eight inverters. This does not make much difference to us as it is all inside a single package and all we are concerned with is what it does. The 7442 does in fact convert TTL BCD to TTL decimal, but there is another type of decoder which can drive

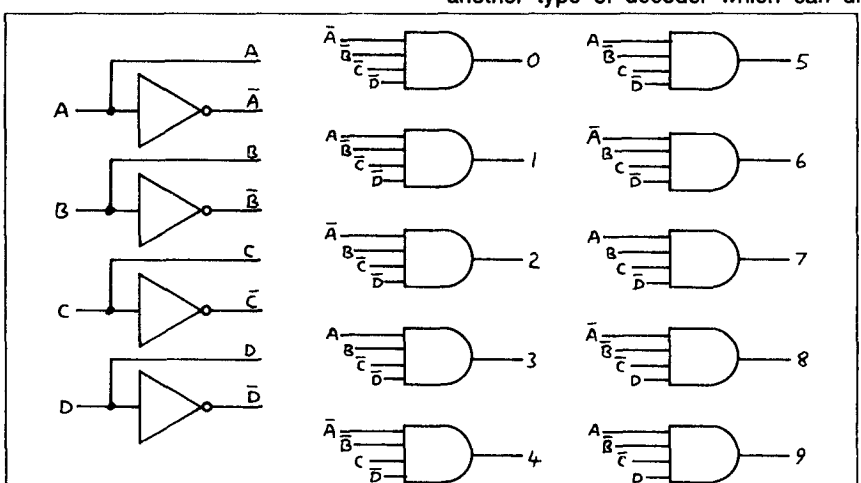


Fig.3 Binary-to-Decimal Coding (7442)

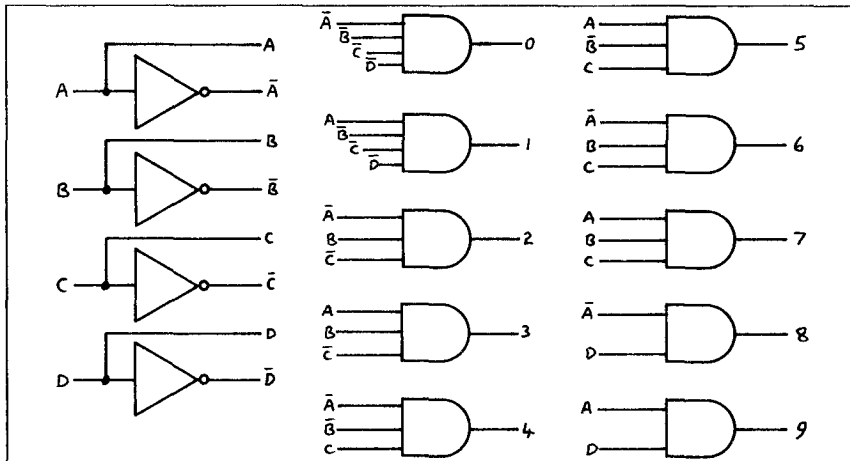


Fig.4 Binary-to-Decimal Decoder (Simplified)

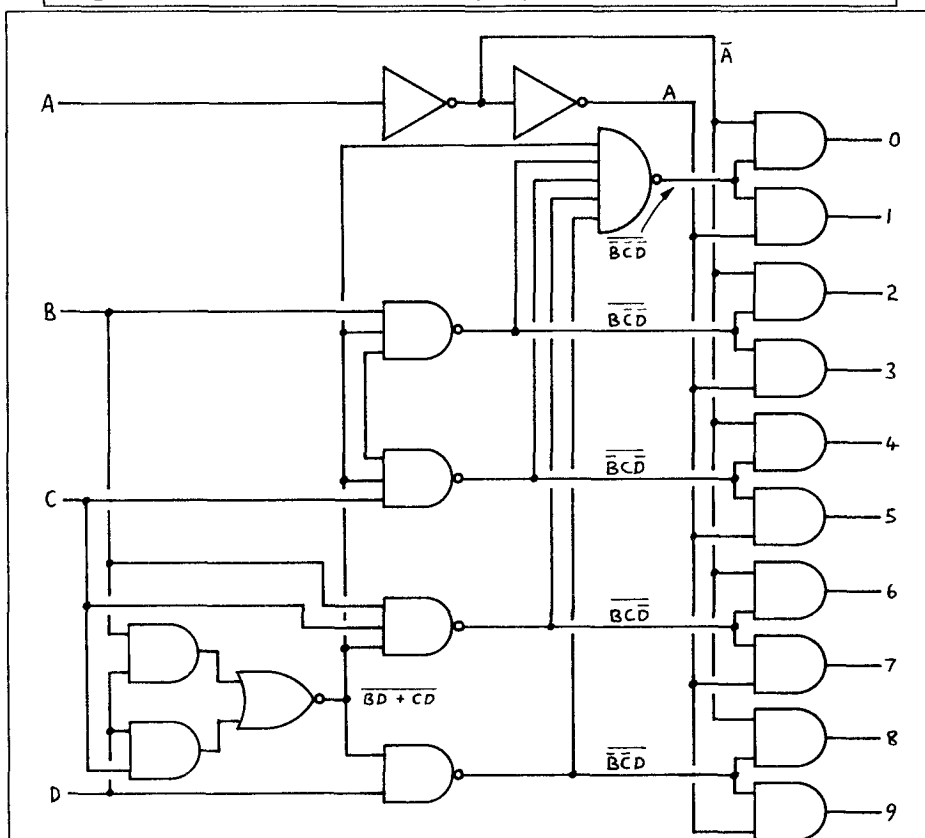


Fig.5 Binary-to-Decimal Nixie Tube Driver

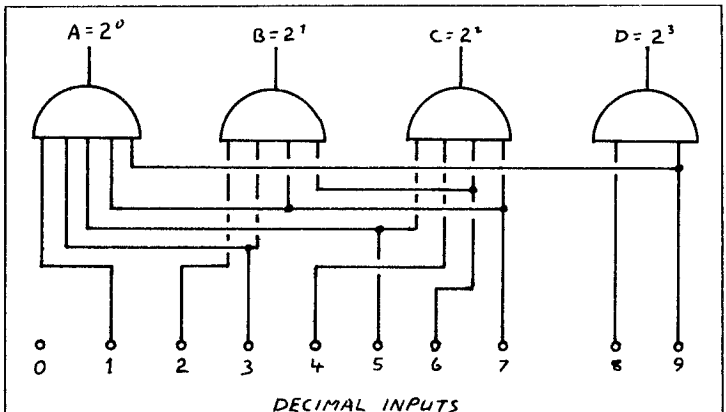


Fig.6 Decimal-to-Binary Decoder

lamps or Nixie tubes (7445, 74145 etc). This merely ends up in some sort of open-collector transistor arrangement suitable for driving the indicators.

The 7441 and its improved version the 74141, are for driving the Nixie tubes. The internal logic is entirely different too in that the output transistors act as AND gates. This arrangement is very complicated and really requires the use of Boolean Algebra to understand it. Suffice to say it works.

There are several types of decoders available in TTL packages. These are shown in Table 4. (Decoders are also known as demultiplexers).

SEVEN-SEGMENT DECODERS

There are several versions available to drive either TTL or lamps of various voltages. The displays are cheaper than decimal systems.

Part 10 will describe seven-segment indicators and decoders and will give circuit details of their use. Also, it is hoped to describe a system to display seven-segment numerals on an oscilloscope trace.

So much for Decimal-to-binary and vice-versa. Incidentally, there is a package, 74147 which converts decimal to binary in logic form in a manner somewhat as shown in Fig.6. It has some extra logic which gives priority to the highest number if more than one input is selected. This is called a 10-line to 4-line Priority Encoder.

SINGLE LINE ENCODING

This is the ultimate - putting all the information onto one wire. It is probably the most useful system for TV purposes and a common requirement is to select one of several sources for routing to one

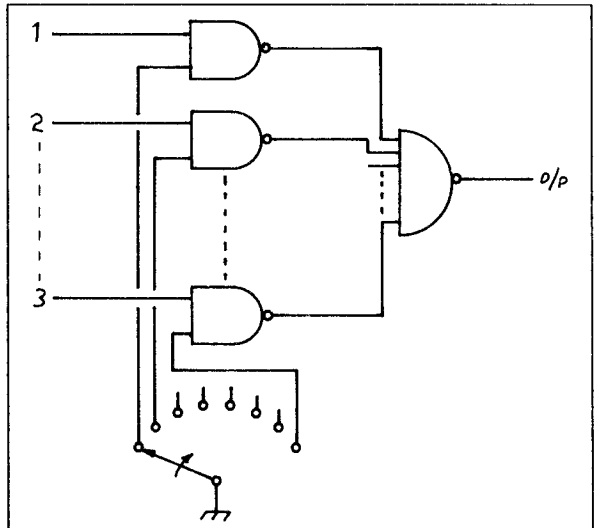


Fig.7 8-Input, Single-wire Encoder

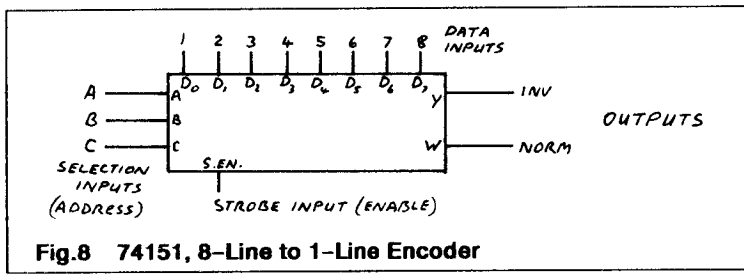


Fig.8 74151, 8-Line to 1-Line Encoder

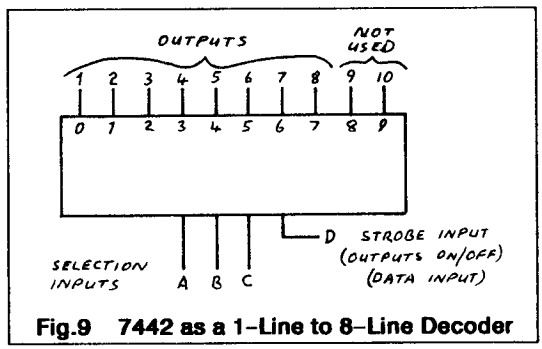


Fig.9 7442 as a 1-Line to 8-Line Decoder

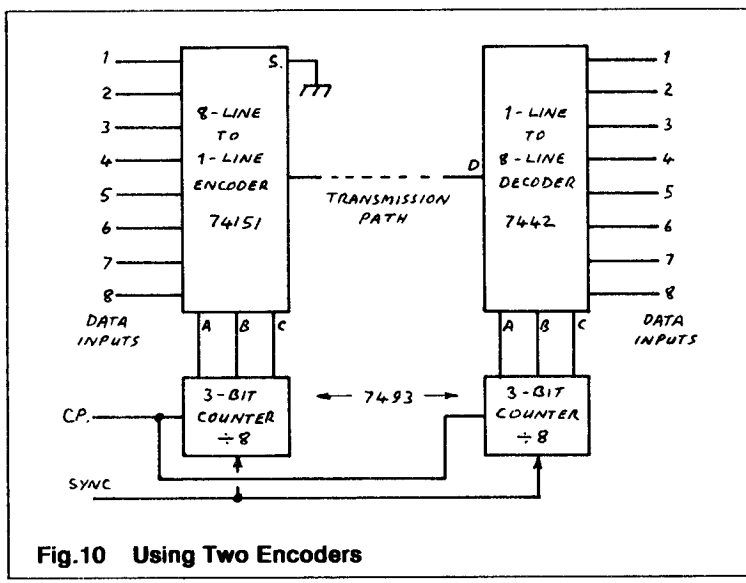


Fig.10 Using Two Encoders

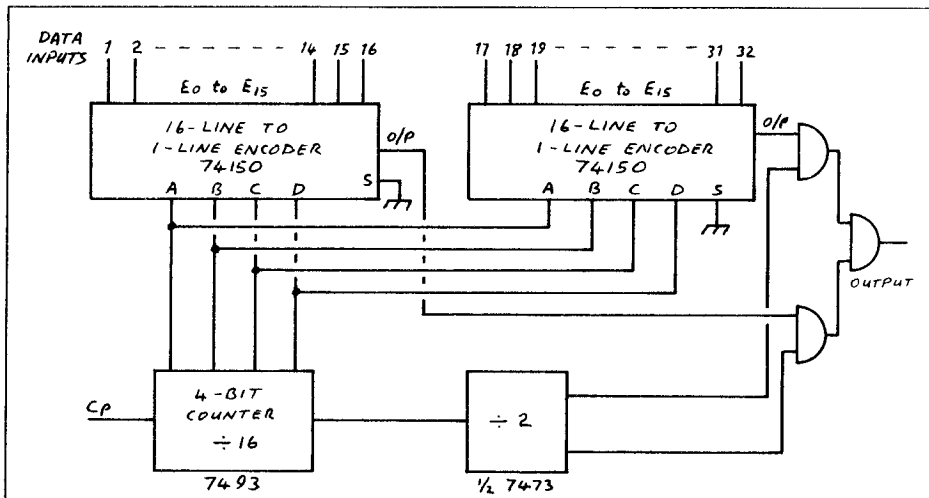


Fig.11 Using Two Encoders

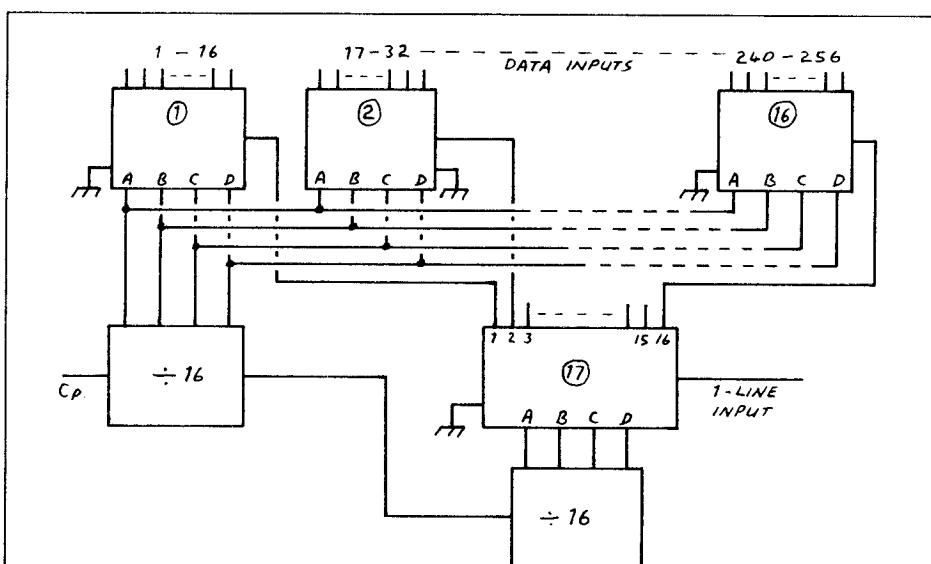


Fig.12 256-Line Encoder with 74154's

destination. This is analogous to an n-way, single-pole switch.

The basic arrangement is shown in Fig.7 and consists of, say eight, AND-gates and an OR-gate. The AND-gates are controlled by the switches. This is expensive and so a special IC has been produced. The 74151 is an 8-line to 1-line encoder but the eight switching inputs have been replaced by three binary-coded inputs since this saves on pins. (2 to the power 3 = 8).

There are only eight possible ways of selecting three inputs so the eight sources cannot be selected in parallel at all. The device is therefore indeed an eight-way switch with a very high possible rate of rotation. Normally, the three selection inputs would probably be fed from a three-bit counter. See Fig.8.

The converse device is a 7442 1-line to 8-lines decoder which is effectively eight single-pole switches. This also has a three-bit selection input system. Actually, the 7442 is a 1-line to ten-lines decoder as we have just seen but it can be used to select any number less than ten. In the above application it selects eight and the fourth selection input acts as a strobe input. This is shown in Fig.10 which depicts the whole encoding and decoding system for eight bits. Note that the two eight-bit counters have to be kept in step at all times.

Strobe inputs are used to turn the outputs on or off independently of the addressing code - usually during the code changing intervals to avoid the problems of ripple counters.

Sixteen-line systems are also available for the encoder in the form of the 74150. Suppose we want more than sixteen? A second encoder can be used to double the number of inputs and one more bit added to the counter. This is shown in Fig.11 and in more complex form in Fig.12.

This shows a 256-line encoder using seventeen such devices. The first sixteen select groups of sixteen inputs and the seventeenth one selects the outputs from the other sixteen. Eight bits are required in the counter (2 to the power 8 = 256). This system could be even further extended.

In Fig.12 we have the basis of a TV character generator. The 256 inputs can be arranged to fit a portion of the raster by splitting the counts between line and field. To form the characters the 256 inputs are earthed, or left open-circuit as required as each represents one dot in the matrix. No diodes are necessary. Mind you, there are a lot of ICs, and the system would have to be tidied-up considerably. Nevertheless, it would work. Of course nowadays character generation is made relatively simple because special chips for the purpose are available. The principles are included here mainly for illustration purposes.

Another use for encoder ICs is to generate pulse-type waveforms. e.g. Syncs. To do this the waveform is divided into convenient sections and the repetition rate arranged to fit the number of bits. Appropriate earths on the inputs will then define the waveform.

For use in an SPG a more complex approach is used. The Line Blanking period is arranged to fit the number of bits, say 16, to cover the time from the end of Broad Pulses to the end of Blanking (nearly 16uS). Blanking is then the last 12 of these pulse-periods, Sync 6 to 10, and so on. Generally each type of pulse could be generated by a different encoder, but it is possible to reduce the number by sharing. This can be done for Syncs, Equalising and Broad Pulses.

A similar system could be used for Field-rate pulses - in particular those for generating the gating pulses for the Equalising pulses and Bruch Blanking (for PAL Burst Gate).

The advantage of the use of encoders is of course that the waveforms can easily be retimed merely by altering a few earth connections.

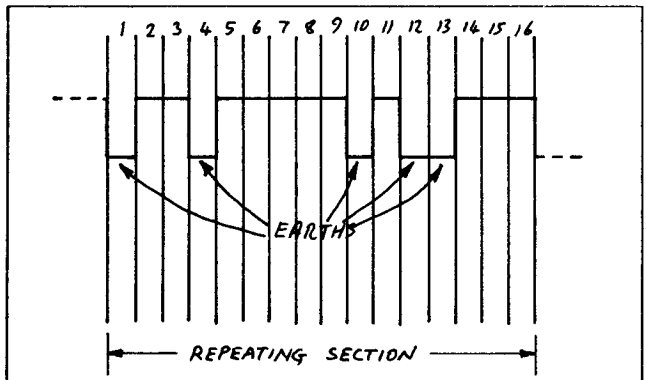


Fig.13 Waveform Generations with Encoder

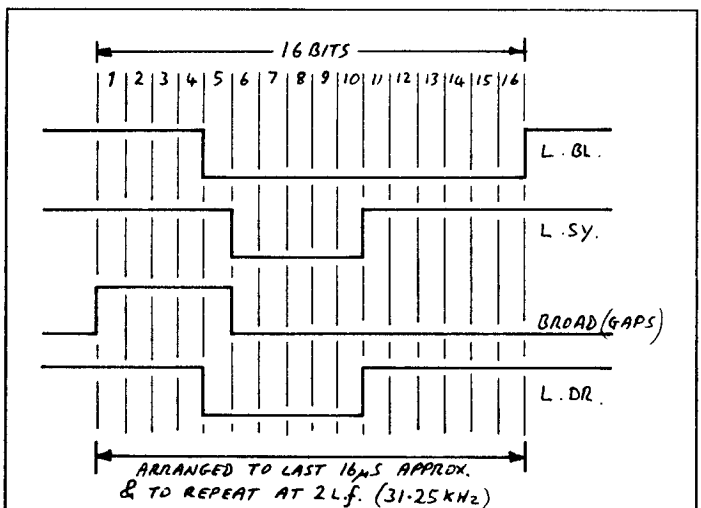


Fig.14 Line-rate Pulses Generation

TUNED UHF PREAMPLIFIER

This article first appeared in the October 1990 edition of Elektor Electronics and we wish to thank the Editor for permission to reproduce it in CQ-TV.

K.Kraus

For the reception of weak UHF-TV signals a good aerial is, of course, indispensable, but by itself it may not be good enough. If that is the case the preamplifier described in this article may be just what the doctor ordered.

It could be well worth experimenting with this simple circuit in your 70CM receive chain, perhaps at the bottom end of the feeder, with perhaps a GaAsFET device, or whatever, at the top ... Ed.

It is fairly straightforward to couple an aerial to a wideband amplifier, but that could give troubles if the weak signals to be received are close in frequency to strong signals. Even if the amplifier is a good quality type, the most likely result is a fair dose of cross modulation and all that goes with it.

This may be prevented by making the amplifier tunable over a relatively narrow range of frequencies.

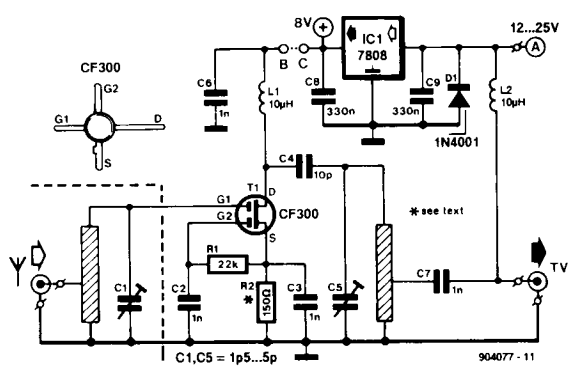


Fig.1 Circuit Diagram

Even a strong transmitter in a channel adjacent to that of the weak signal can then be suppressed to a fair degree, but the present preamplifier can cope only to some degree if the wanted weak signal is surrounded by a number of strong signals.

SPECIFICATIONS

- Frequency range:
  C1 & C5 = 1.5-5pF 400 - 750MHz
  C1 & C5 = 0-5pF 400 - 800MHz
- Bandwidth @ fcentre = 500MHz:
  492 - 513MHz
- Gain at 500Mhz: 15dB
- Maximum attenuation outside pass band: about 40dB
- Output noise (measured at 50 ohm impedances: <= -80dBm

THE CIRCUIT

Basically, the circuit in Fig.1 consists of two tuned circuits and a dual-gate MOSFET. The signal from the aerial is fed to the MOSFET via a tap on the input circuit, which consists of a 30 x 3.5mm stripline. This arrangement ensures that the input impedance is 50-75 ohms. The input is tuned with C1.

MOSFET T1 is arranged as a grounded source amplifier in which C3 forms the ground connections for HF signals. The drain impedance is formed by the second tuned circuit, which also consists of a stripline and a small trimming capacitor C5. The gain of T1 is at a maximum at the resonant

frequency of the second tuned circuit. Capacitor C4 prevents the DC supply to the MOSFET being short-circuited by the tuned circuit. At the same time, inductor L1 prevents the HF signals being short-circuited by the power supply.

The output of the unit is taken from a tap on the second tuned circuit to obtain and output impedance of 50-75 ohms.

The DC operating point, determined by the voltage between gate 1 and the source of T1, is set by R2. Owing to the spread of parameters of the MOSFET, the operating point may differ from type to type, and it may therefore be necessary to alter the value of R2, to ensu re that the source current is about 10mA.

In the prototype a value of 150 ohms resulted in a source current of around 12mA. The value of R2 will be somewhere between 100 and 220 ohms.

Network R1-C2 ensures that gate 2 is at ground potential for HF signals, so that these signals are processed via gate 1 only.

POWER SUPPLY

There are various ways of providing power to the amplifier. If it is mounted near the aerial the supply may be connected via the coaxial feeder cable - see Fig.2.

The DC voltage is applied to voltage regulator IC1 via L2. the output of the regulator is fed to the cable via the circuit shown in Fig.2.

If the supply is not via the coaxial cable L2 may be omitted and an unregulated voltage applied to point A.

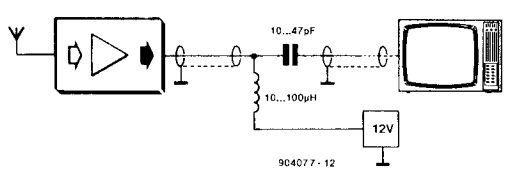


Fig.2 "Phantom" powering via Coaxial cable

If a regulated supply of 8V is available IC1 and C8 may be omitted. the wire bridge between B and C must then be replaced by one between A and B.

CONSTRUCTION AND ALIGNMENT

The preamplifier must be constructed on the PCB shown in Fig.3 (shown actual size). Note that the component side is also the track side. It is important to ensure that the dimensions of the striplines are exactly right.

Mount disc capacitors C2, C3 and C6, followed by surface-mount capacitors C4 and C7. Next, install the MOSFET between C2 and C3. Solder gate 2 and the source of this transistor to the top terminals of C2 and C3 respectively. Solder gate 1 and the drain to the tracks underneath them.

Solder R1 between C2 and C3 above the MOSFET (although Fig.3 shows it alongside the transistor).

Next, solder the remaining components in place. Connect R2, L1 and wire bridge B-C (or A-B: see under "Power Supply") to the top terminal of the relevant disc capacitor. Mount capacitor C1 as far away as possible from T1, C2 and C3 to ensure that the screen - shown by the dashed line - fits neatly between them.

Then solder a 45 x 20mm screen made of thin tinplate in the position shown by the dashed line on the component overlay in Fig.3.

Finally, connect the coaxial cables to the relevant terminals and secure them in place with cleats as shown in the photograph of the completed prototype board.

The alignment is pretty straightforward: turn C1 and C5 until the wanted signal is at maximum level and any unwanted ones at

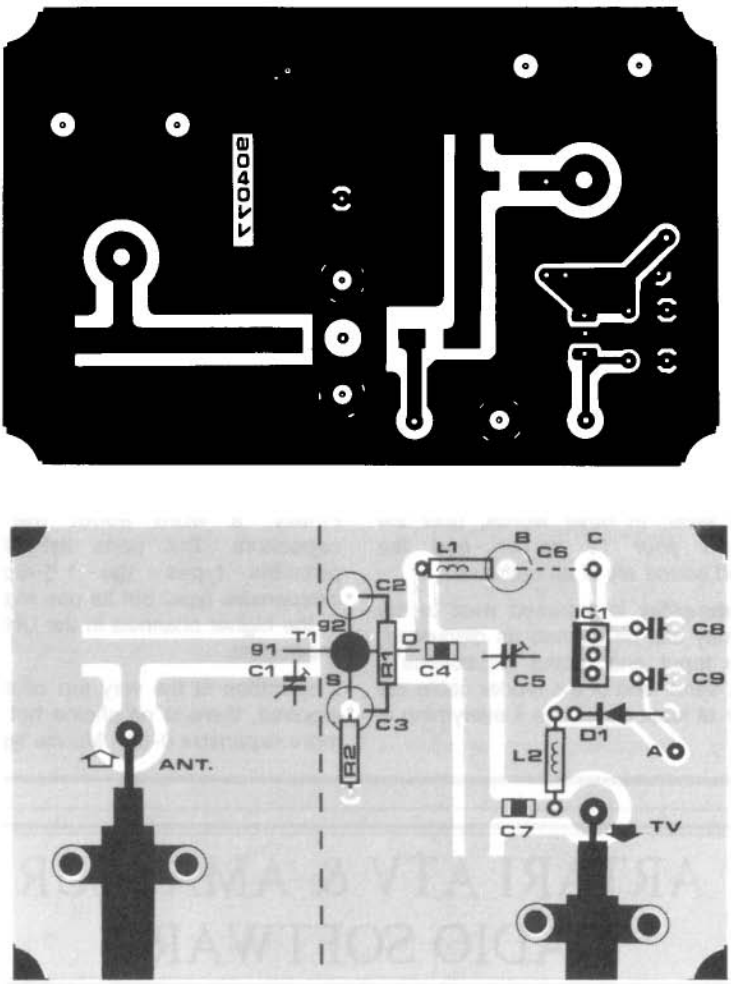


Fig.3 PCB Layout & Component Overlay – Actual Size

Resistors:
R1 = 22 k
R2 = 150 Ω (see text)

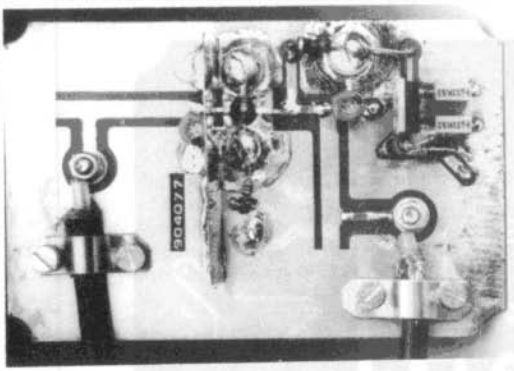
Capacitors:
C1, C5 = 0–5 pF trimmer (Murata); 1.5–5 pF is permissible (see Technical Data)
C2, C3, C6 = 1 n disk
C4 = 10 p*
C7 = 1 n*
C8, C9 = 330 n

Inductors:
L1, L2 = 10 µH

Semiconductors:
D1 = 1N4001
T1 = CF300 (Telefunken)
IC1 = 7808

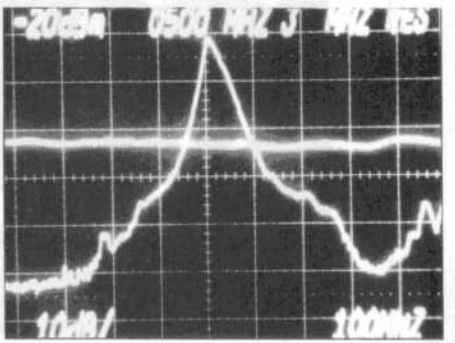
Miscellaneous:
PCB Type 904077

* surface mount type



The Assembled Prototype

Typical Preamplifier Response



minimum level; in other words, until the picture on your TV screen and the associated sound are at an optimum.

If the preamplifier is mounted near to the aerial it may still be aligned as discussed, since the input and output impedance it "sees" at either end of the feeder cable are equal (or at least should be if everything is all right).

Finally, a word about the trimming capacitors. The parts list shows two possible types: the 1.5-5pF is an inexpensive type, but its use makes tuning to the higher channels in the UHF TV band impossible.

If operation at the very top of the band is required, there is no choice but to but the more expensive 0-5pF Murata type.

IN RETROSPECT

A PATTERN GENERATOR – THE SLOW SCAN COMPANION p–p 89–92

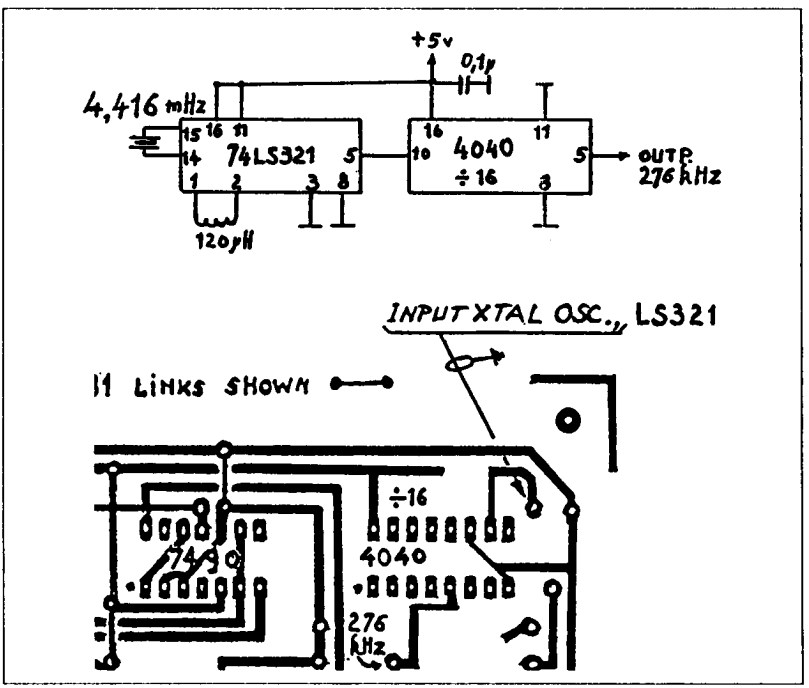
A letter from Thomas GM4CAU tells us that he has been asked by a Belgian member of the club, ON5NM, to pass on information concerning a modification to the pattern generator circuit on pages 89–92 of the Slow Scan Companion.

The modification provides an alternative crystal controlled oscillator using a 74LS321 followed by a 4040 (divide by 16) producing an output frequency of 276kHz (the alternative crystal controlled master oscillator circuit described in the text gave a frequency of 277.01kHz).

The original oscillator in the circuit was based around a 7413, which is now replaced by the 4040. A few circuit tracks require cutting plus the addition of two extra holes to allow a 16-pin DIL socket to be fitted.

The 74LS321 can be mounted on a piece of Vero or circuit board and fitted alongside the 4040. The modification performs satisfactorily with the 5V supply rail.

The circuit diagram of the modification is shown below, plus a partial reprint of the original PCB layout showing the location. Unfortunately, neither Thomas nor ON5NM has given me any details of the tracks to be cur etc. However, I fell sure that anyone wishing to try this will have few problems working them out.



COLOUR ON 70CM ?

VSB IT !

John Stockley G8MNY

Although I exercise total editorial control I decided to include this article only after discussion with other members of your Committee, in consideration of the fact that it was agreed at Committee that the BATC would continue its advice to all ATV'ers to avoid colour transmissions on 70CM (see page-20 this issue). It is still the opinion of the Committee that such transmissions should be self-restricted to the higher bands, where less interference is likely to be caused to other users. I have been accused, because of my referral of this decision to Committee, of being biased and unfair, this I dispute, I was, and I hope to continue so, just exhibiting regard for others and their interests, irrespective of their actions towards me or my interests ... Ed

Most ATV transmitters, whether kits or finished units will run colour fairly well. However, they all produce double-sidebands and therefore should not be run where other band users will be affected. (They may be satisfactory for pedestrian mobile at shows etc.).

The trouble with colour or high-definition sources, such as computer graphics etc., is the increased width of the signal, due to the high-frequency content of the video signal. With the band reductions over the years, wide double-sideband ATV signals no longer fit into the 70CM allocation. The band is also now in greater use as more narrow-band modes such as mobile, repeaters, packet, satellite and SSB are using it.

TV SPECTRUM

The BBC1 spectrum (Fig.1) shows that 95% of the transmitted vision power is within +/- 100kHz of the carrier. This is why detail is lost with weak signals, as the high frequencies fall below the receiver noise floor. Reducing the receiver IF

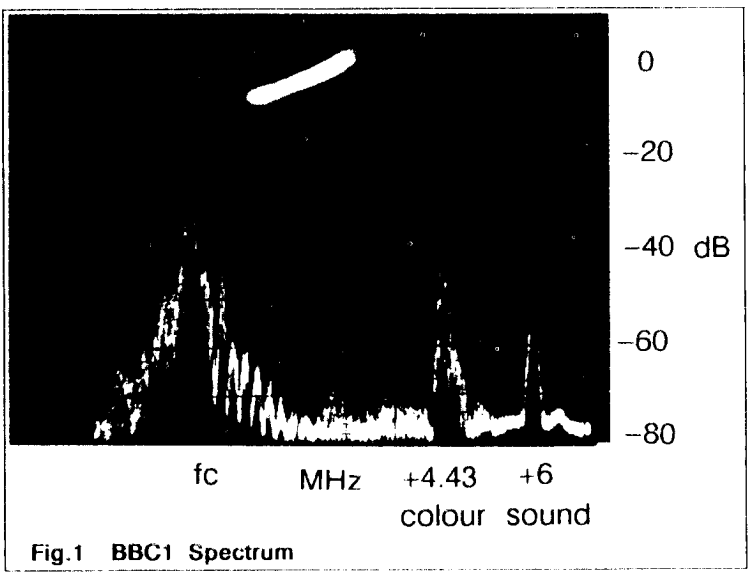


Fig.1 BBC1 Spectrum

bandwidth on weak signals will improve the picture signal-to-noise ratio without apparently degrading the already reduced detail.

The lower energy in the high frequency parts of the signal used to allow ATV to co-exist with other modes due to the then relatively low amateur population of the band, but this is just not so any longer.

B&W ATV AND CONTESTS

When working contests lower definition is no disadvantage, and a 75 ohm 2MHz video filter can easily be used without much loss of picture content.

This allows for carrier frequencies to be placed well up the top of the band at, say, 437.5MHz (Fig.2), thus minimising interference to and from narrow-band users (*what about the satellite operators? ... Ed).*

COLOUR

For colour ATV on 70CM the carrier must be below 435.4MHz to fit the 4.43MHz colour subcarrier and colour information bandwidth below the upper band edge.

However, at the same time the frequency should be as high as possible to keep the interference at a minimum to narrow-band users, it cannot be done.

This is where Vestigial SideBand (VSB) comes in, as it is the only way to reduce bandwidth.

Vestigial SideBand ATV

There are several methods of producing an effective VSB colour signal.

1 ... Build a low-level VSB source such as the BATC design. However, maintaining the sideband suppression whilst amplifying the signal is a problem.

2 ... Filter off the unwanted sideband 430-434MHz after the transmitter, PA, or linear. This requires stable, high-power, high-Q, 70CM filters that will not be affected by the aerial match. Such a filter will exhibit losses of around 6dB (i.e. output = 25% of input). Suitable filters can be made from the multi-suck-out type of "UHF repeater aerial couplers" found at the odd show. Alternatively, a directionally-coupled high-q suck-out over a stripline van be manufactured (a G8LES design).

3 ... Use a high-q valve PA tuned HF. They are often too narrow for colour as they stand, but power and gain will be reduced. (N.B: The more efficient the valve circuit the lower the bandwidth).

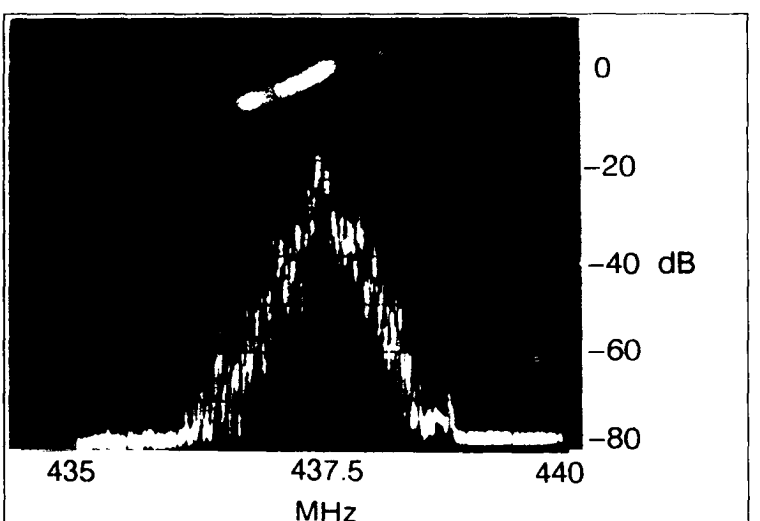


Fig.2 437.5MHz ATV transmission using a Video Filter

MY STATION

Over the last few years I have tried out several methods, but I have had best success by using a variation of 1 and 2 together. I am now running some 400W peak sync of fairly clean VSB colour ATV (see Fig.3). This has enabled me to hear local 70CM repeaters, SSB stations, etc., while on the air.

The idea of combining the HF lift and a narrow valve PA to produce a VSB signal was no accident, as colour proved to be very low from efficient valve PAs using normal AM exciters. However, I was surprised how well it looked on my spectrum analyser.

For the exciter I use an MMT 144-432 transverter with the 144-28MHz down-mixer fed with 31.2MHz and used as the modulator stage. The 28MHz IFs are tuned HF and so are the three low-power filters following the up-mixer. This results in a exciter with the colour burst larger than the sync tips (+10dB at 440MHz). This is a fiddle that cannot be accomplished with ordinary AM exciters.

The 8W of uplifted colour drive is applied to a 65W transistor stage running at 25W. This in turn drives a homebrew K2RIW type linear (pulse-tested at 800W psp) to deliver the 400W fairly linearly, but having lost the HF uplift in the PA, also providing very little lower sideband power.

THE FUTURE

Use it or lose it! I do not want colour or B&W TV to disappear on 70CM. The increasing popularity of the 24CM line-of-sight band is no compensation for the simplicity that 70CM ATV receive offers the beginner. Also, the 24CM band has even bigger, 1 GigaWatt, interference problems of its own.

I hope that this will encourage more ATV'ers into VSB colour and maintain the historic use of this band for ATV.

There you have it then - the one overriding impression that I get from this article is that: yes John and his colleagues do run colour on 70CM without causing any extra interference to other band users. However, it also comes across to me that John and his colleagues are also quite highly technically competent electronic engineers, with a sophisticated level of test equipment readily available.

Let me be the first to congratulate them, and the first to apologise if I seem to be

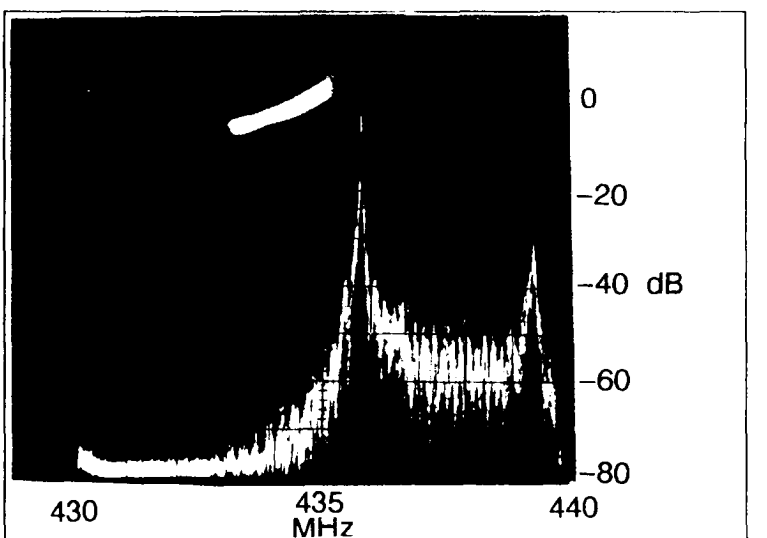


Fig.3 A Spectrum of my own VSB transmission

patronising to the majority of you members of the Club, but I doubt that the majority of you have either the technical expertise or the equipment available to construct and align such a system.

Please accept my sincere apologies if I am wrong.

*To state the Club's official Policy again: we **DO NOT** advocate the use of colour or sound with **70CM ATV**, but **WE DO** advocate the use of 70CM as an ATV band, **B&W ONLY**. As John said, it is an ideal band for beginners and old hands alike, it has things to offer the ATV'er that the bands do not ... ED*

AS YOU CAN SEE
YOUR CLUB IS
DOING ITS BIT

MEET THE BATC
"YOUNG AMATEUR
OF THE YEAR" !!

A little bird tells me
that
our Hon. Treasurer
was
not overly impressed !

HAMS SHOULD BE SEEN AS WELL AS HEARD!

A PICTURE IS WORTH 100 WPM/CW!

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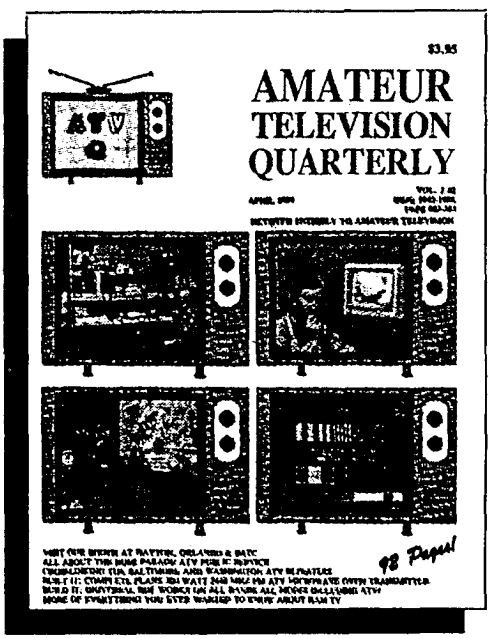

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10GHZ ATV THE EASY WAY !

Part 2

Jim Toon G0FNH

Following on from my first article in the last issue, "10GHz The Easy Way", I am now going to describe in detail how to manufacture the following:

- Waveguide Flanges
- The Dummy Load
- The Cross Coupler
- The Diode Detector

all of which are used in the main unit. The only tools I was *ALLOWED* to use by Editor Mike, were a file, a hacksaw and a drill and bits. All of the materials used, excepting the waveguide and the detector diode are obtainable from your local hobby shop and DIY store.

WAVEGUIDE FLANGES

Brass waveguide flanges are very easy to make, all that is required is some 1/8 to 3/16" brass plate. With reference to Fig.1, carefully mark out the plate with a scribe (Mike will do - he's a scribe!) and square. Drill the bolt holes for 3BA size bolts and then drill a series of small holes on the inside of the lines marking out the middle hole.

Place the brass plate on a very firm surface, an anvil or steel plate for example, and with a sharp chisel, carefully cut through the holes and punch out the middle rectangle of brass. File the hole until all the angles are square, and then continue filing until the flange is a tight fit over the end of the waveguide. When satisfied with the fit solder in place **ON THE OUTSIDE ONLY.**

NOTE: The type of solder I use and recommend is **LEAD-FREE,** which can be obtained from your local DIY store or from a friendly plumber. Remember, microwaves adore Lead, they will do anything to disappear into Lead and not come out again. Second only to open waveguide or LDM material (Lossy Dielectric Material - see next section), Lead is probably the most lossy substance you

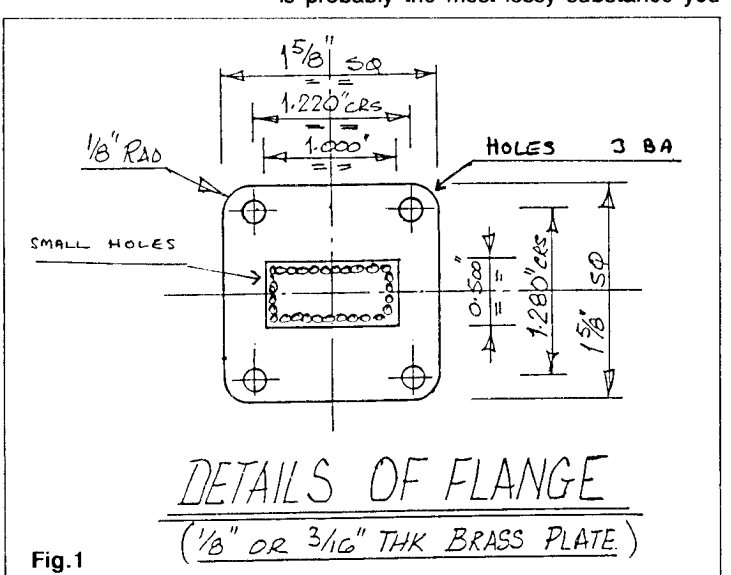


Fig.1

can use. Ensure that any solder containing lead is carefully scraped out from the inside surfaces of the waveguide.

DUMMY LOAD

Referring to Fig.2, you will require a 2" section of waveguide with the ends nice and square, a flange and a small brass plate measuring 1" x 1/2" x 1/16". Solder the flange on one end and seal the other end by soldering on the brass plate.

You will need to obtain some Graphite powder (approximately 70p per box) and ready-mixed wallpaper glue **(DO NOT** use the resin or solvent type, they will not work - only water-based paste) from your local DIY store. The wallpaper paste can be purchased in small handy-sized tubs.

Now to make your own Lossy Dielectric Material. Prepare a small piece of PCB (at least 2" x 1") and remove the copper surface. Mix together a small amount of the wallpaper paste and graphite powder to form a thick paste.

Cut the PCB to the size shown in Fig.2 and then apply a thick coat (1/16") to both sides and all edges of the piece of PCB and make it as smooth as possible. Put in a warm place (the airing cupboard above the home-brew will do, but keep it clear of the washing!) for 24 hours until dry, then smooth it up with sand-paper to remove any irregularities (what a big word!). Cut some expanded polystyrene to the sizes shown in Fig.2.

NOTE: Expanded polystyrene is transparent to microwaves. A useful tip is to fill the end of your Solfan (or whatever) heads with it - it will keep the warmth generated by the Gunn diode in and the cold, damp air out.

Sandwich the PCB coated PCB board between the two pieces of polystyrene and push the whole assembly into the piece of waveguide, making sure that it is a tight fit, and that it is the correct way round, as shown in Fig.2, and that's it.

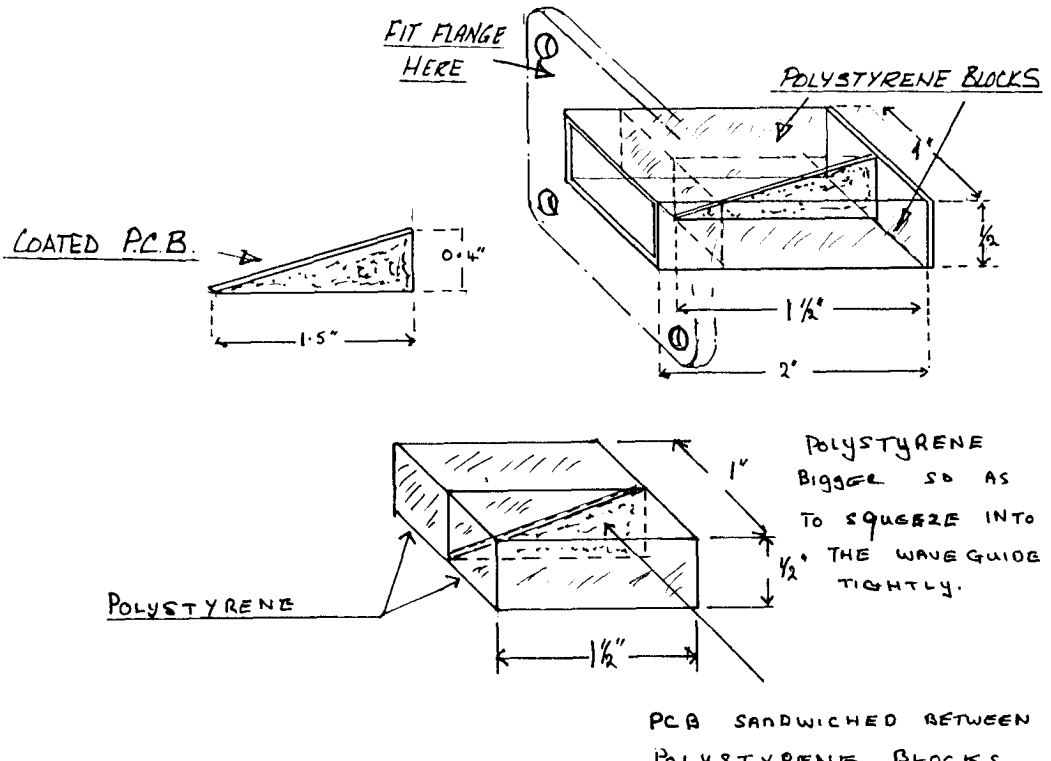
THE CROSS COUPLER

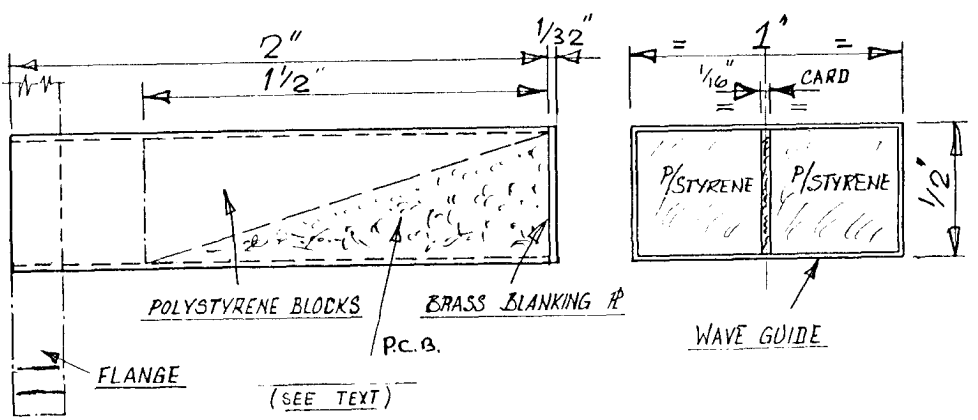
The details of this unit are shown in Fig's.3a and b. For this unit you will need two pieces of waveguide, each 3" long, and four flanges. Make sure that the end faces of the waveguide are nice and square. Study the drawings in Fig.3a and b carefully, do not be put off by the apparent complexity, you will find that it is really very simple. Take your time and mark out everything carefully, take care with the construction and the results will be excellent.

We will start with section-A. Mark off the middle point of the piece of waveguide (across the broad side) and then mark off 1/2" on either side of the centre line. Mark down the sides of the waveguide 1/16" and then scribe along. With a fine hacksaw carefully and slowly cut across the waveguide on the centre line side of the scribed lines until you just break through the waveguide. Then, with a small fine file, file along the edge of of the waveguide (but not below the 1/16" line) until a fine crack appears. Do this on both sides. With a small screwdriver at the corner, lift up the middle section, remove and discard. File the slot section carefully until the other piece of waveguide will fit across the slot with a nice tight fit and **FLUSH** on the inside.

Now to section-B. As with section-A, mark off the centre line on the broad side of the waveguide and then **VERY** carefully mark of the centres of the three holes at the positions shown in Fig.3b. Centre-punch the holes carefully and gently (we don't want to tune the waveguide!). Drill the holes with a 1/8" pilot hole first and then the 13/64" hole, and finally the two 5/16" holes. Clean out any burrs inside and out.

Fit the two sections of waveguide together, again ensuring that the inside surfaces are flush. When satisfied solder the two pieces together on the outside. Solder on the four flanges and clean out all solder from the inside surfaces, and that's it.





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DETAIL OF DUMMY LOAD

Fig.2

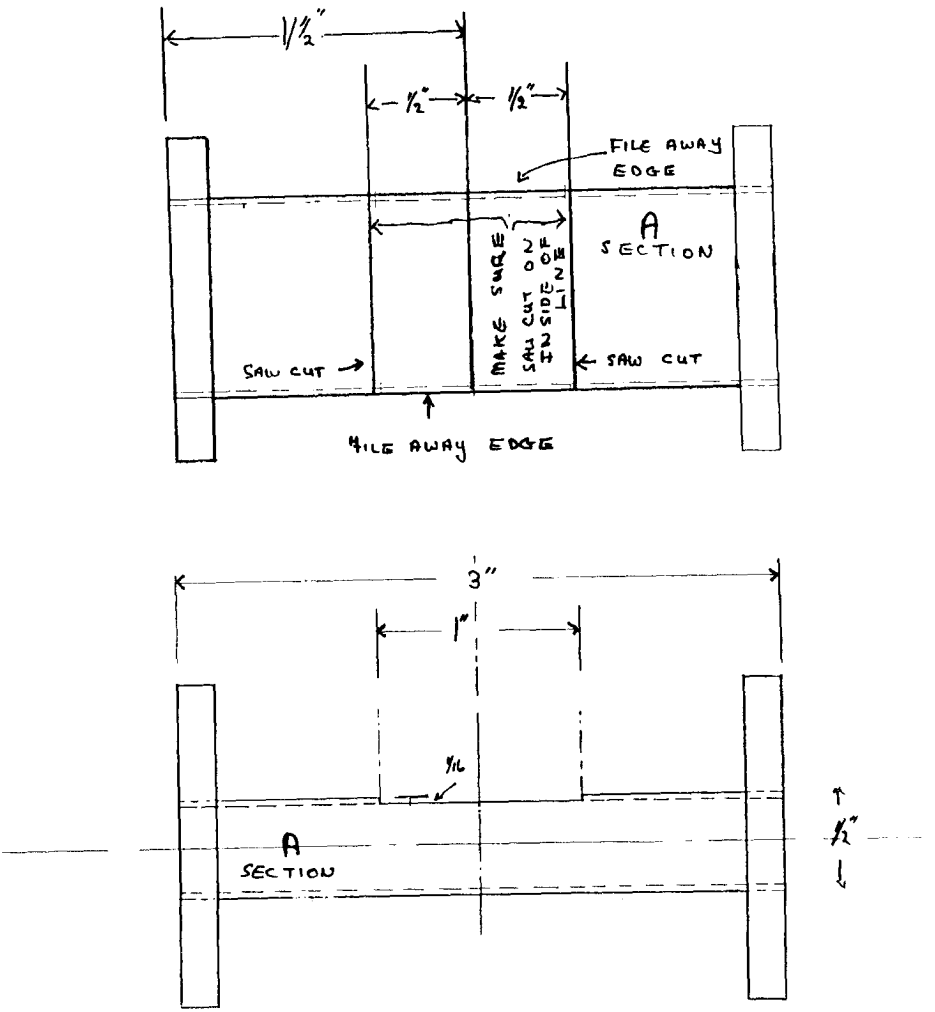


Fig.3a The Cross Coupler

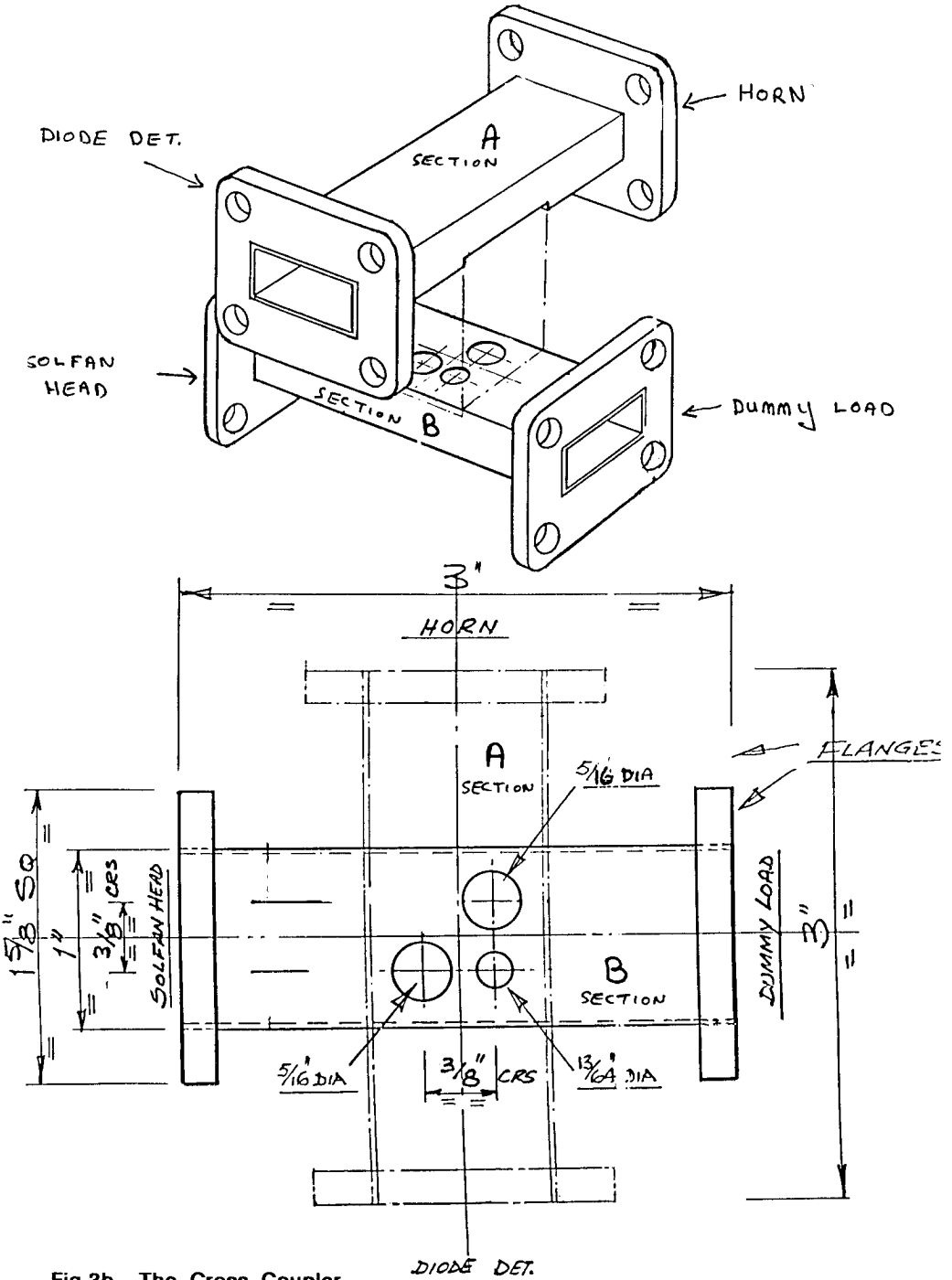


Fig.3b The Cross Coupler

DIODE DETECTOR

The details of this, the most complicated unit, are shown in Fig's.4a and b. To fabricate it you will need a type CV2154 coaxial diode, these are available at most rallies or from J.Birkett, Lincoln (0522 520767). Also required are: 1 flange, a piece of waveguide 1.5" long, a brass plate 1" x 1/2", a short length of 3/8" outside diameter brass tube and a short length of 13/32" outside diameter brass tube (the brass tube is readily available from model/ hobby shops, as is the brass plate). The larger size of tube will just slide over the smaller size, and also the coaxial diode will just fit into the smaller tube. A small length of 3/32" brass rod (non-fluxed brazing rod is just right) and a 75 ohm BNC socket (MUST be 75 ohm) will also be required.

Starting with the BNC socket, cut around the small burr at the end as shown in Fig.4a with a small hacksaw, not too deep as the PTFE bush inside will be required later. Carefully push out the centre pin and the two PTFE spacers. Discard the case.

Take the piece of waveguide and square up the end faces. Scribe a line 3/8" from one end across the broad side and also down the two narrow sides. Mark off the centres of the faces on the lines just scribed (i.e. 1/2" for the broad side and 1/4" for the narrow side). Carefully and gently centre punch the centre points and drill a 1/8" pilot hole in each. Drill the holes in the narrow sides out to 3/16" and the single hole on the broad face out to 3/8". Clean out any burrs and then solder the flange on the **OPPOSITE** end to the end

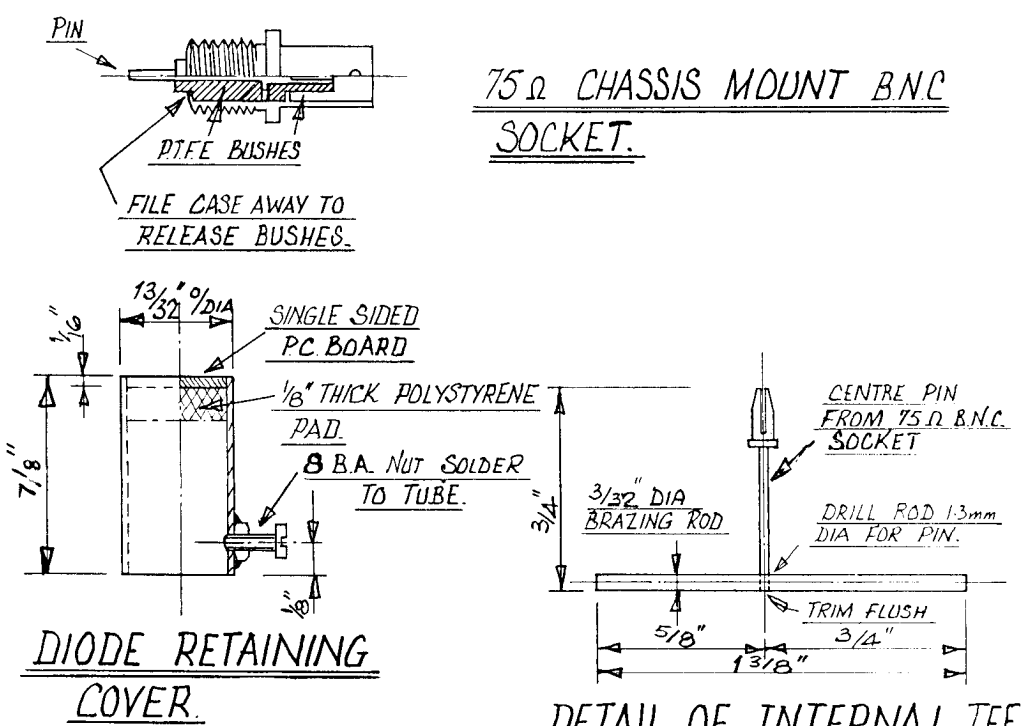
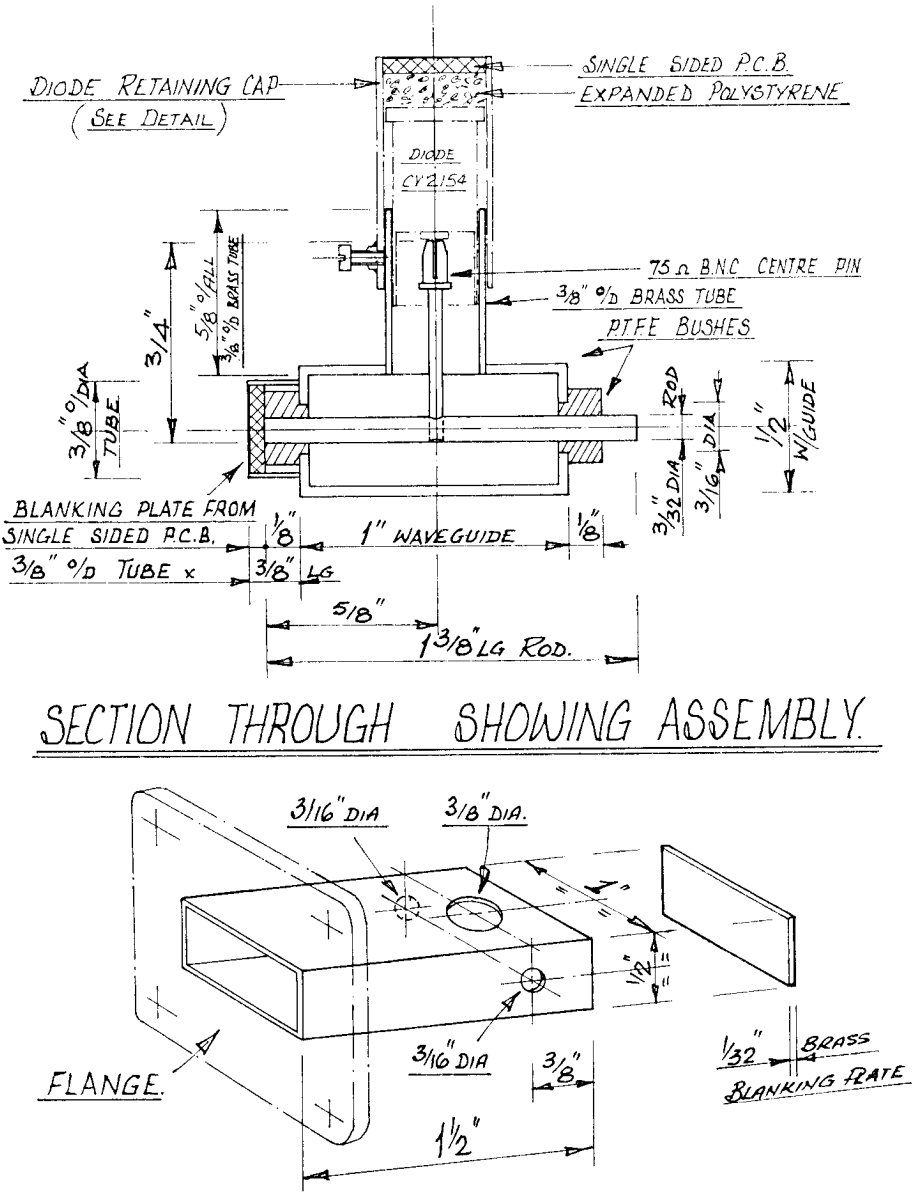


Fig.4a The Diode Detector



SECTION THROUGH SHOWING ASSEMBLY.

DETAIL OF DIODE DETECTOR BODY.

Fig.4b The Diode Detector

with the holes. Clean out any solder from the inside of the waveguide.

Prepare a 5/8" long piece of the 3/8" OD brass tube and solder it into the 3/8" hole in the broad side of the waveguide, ensuring that it is flush on the inside face. Prepare a 3/8" long piece of 3/8" OD brass tube and solder it centrally over one of the 3/16" holes in one of the narrow sides.

Prepare the two PTFE bushes as shown in Fig.4b and fit one into both of the 3/16" holes in the narrow sides of the waveguide (one of the bushes from the BNC socket should fit as is - if you have another spare BNC socket you will not need to manufacture the second bush from the spare block of PTFE, but just use the one that already fits from the second socket).

Cut a small round disc from a piece of singled-sided copper-clad board, and solder it into the piece of 3/8" tube soldered to the **NARROW** side of the waveguide. Solder it flush with the top of the brass tube.

Now cut the 3/32" brass rod to length (one inch and three eighths). Mark off 5/8" from one end and centre punch. Drill a hole through the brass rod to the size of the centre pin from the BNC socket (a PCB size drill is the correct size). Fit the brass rod into the waveguide as shown in Fig.4b, pushing the rod through the holes in both PTFE blocks so that it is firmly in place.

Temporarily assemble the pin and the diode into the brass tube allowing the pin to pass through the hole in the brass rod (handle the diode with care - static charges may have a harmful effect - use a dud one if available). When the diode is fully home in the brass tube cut off the excess pin projecting through the brass rod. Remove the diode and the pin, ensure that the hole in the brass rod is central with the brass tube, re-insert the pin and solder in place. Clean away as much solder from around the pin as possible. Now solder the end plate onto the waveguide being careful not to get any solder on the inside, as it will now be extremely difficult to remove - this is really a must for using lead-free solder as it will not matter.

All that is left to do now is is to make the top cover for the diode holder as per Fig.4a. Fabricate the cover from a 7/8" long piece of the 13/32" OD brass tube and solder an end cap on one end using a piece of copper-clad PCB or brass plate. Drill an 8BA clearance hole 1/8" from the other end of the piece of tube. Solder an 8BA nut to the outside of the tube over the hole and fit an 8BA screw into the nut.

Fit the diode into the holder ensuring that it "clicks" into place on the pin. Place the retaining cover over the diode and tighten in place.

I suggest that you make a small box from brass plate to house the preamp (page-62 CQ-TV 152). Drill a hole through the bottom plate of the box to enable it to fit over the PTFE bush and the brass rod extending from the side of the detector unit. Solder or glue the box in position and connect the preamplifier input to the end of the brass rod. The IF output and DC power connections to the preamplifier should be made using coaxial cable.

NOTE: Don't forget the 10k resistor to be soldered from the diode connection at the input of the preamp to earth - strange video effects may occur otherwise!

I spray my units with matt black paint after first covering the flanges with tape to protect the inside surfaces. If you take care in building these units the end results will be very good.

I would like to thank Ted G4GLY for his help in the preparation of the drawings and the RSGB for the information gleaned from the VHF/UHF Manual. I hope that you have as much fun playing with microwaves as I do.

What was that? How do you make large horn aerials? Watch this space!

BROADCAST BAND DX-TV RECEPTION

Garry Smith and Keith Hamer

F2 reception conditions returned during the autumn, but the number of openings were fewer when compared with the same period last year. A variety of signals materialised, including Australia, Iran and Dubai, plus a few African ones. Even Thailand was identified in the Netherlands on November 12th - identified by the '3' logo in the right-hand corner of the picture!

Sporadic-E propagation was evident on a regular basis throughout the autumn, with sustained openings on many days. Most European countries were logged during this period.

Tropospheric reception has been excellent with a good variety of signals. One enthusiast discovered Finnish signals in Band-III from the YLE-1 and 2 networks. The same opening brought in Russian signals at Band-III and UHF. There were reports of Polish TV in Band-III and at UHF in Scotland.

The following logs are edited highlights of those which appear in "TeleRadio News" (issues 49 and 50). Many thanks to the following enthusiasts who have supplied reception reports: Simon Hamer, Peter Chalkley, Garry Smith, Chris Howles, Bob Brooks, David Glenday and Stephen Michie.

SEPTEMBER LOG

01/09/90: Sporadic-E reception throughout Band-I from Italy, Germany, Norway, Iceland, Sweden, France, Hungary, Yugoslavia and Spain.

02/09/90: Sporadic-E from the USSR, Hungary, Poland and Sweden.

16/09/90: F2 signals on channel R1 (USSR/China) noted on a scanner. The signals were not strong enough to resolve pictures.

25/09/90: Unidentified F2 signals at 1000 UTC on channel-E2.

OCTOBER LOG

06/10/90: African announcer or news reader at 1520 on channel-E2 via TEP.

10/10/90: Sporadic-E Czechoslovakian and Spanish signals at high strength.

12/10/90: Excellent tropospheric reception from Germany, Denmark and Sweden. Polish UHF transmissions were identified on channels-R30 (TVP-1) and R35 (TVP-2).

16/10/90: Sporadic-E reception from the USSR, Italy and Spain.

20/10/90: F2 opening including Dubai on channel-E2 with the PM5544 test card and sample Teletext pages.

21/10/90: Sporadic-E signals at various times throughout the day. These included Switzerland on "+PTT SRG1" FuBK at 0710. Later in the day Hungary, Spain and Portugal, followed by the USSR at closedown at 2110.

22/10/90: Norwegian Band-III signals via tropospheric reception during the morning. Programmes from Spain during the afternoon with Norway throughout Band-III, Sweden at Band-III and at UHF with regional news programmes. An unidentified station was resolved on channels-R10 and R37 showing a film or play with Russian dialogue. Signals faded before station identification at 1900!

23/10/90: Early morning F2 reception with Iran and Dubai identified on channel-E2. Spain noted via Sporadic-E reception from Denmark, Sweden and Germany.

24/10/90: F2 opening with reception from Dubai at 1200.

27/10/90: Excellent F2 opening with Australia channel-A0 resolved at 0740 UTC. Unidentified signals were present on channels-E2, R1 (China or the USSR) and E3 until noon. At 1525 an African station was received with a -5kHz frequency offset.

28/10/90: F2 reception from the USSR on R1 and unidentified African countries on E2. Basketball from Spanish TV was logged on all Band-I channels during a late morning Sporadic-E opening.

29/10/90: F2 reception consisting of an unidentified PM5544 test card on E2.

30/10/90: Italy and Yugoslavia received during an early evening Sporadic-E opening.

21/10/90: Sporadic-E reception throughout the day with high strength signals from the USSR, Spain, Czechoslovakia, Finland, Sweden and Italy (including a low power private station). Tropospheric reception during the evening produced Norwegian and Swedish transmitters in Band-III and at UHF.

NOVEMBER LOG

04/11/90: Unidentified F2 reception from the south east at 0930 from a station with a -10kHz offset. Around midday a Sporadic-E opening produced pictures from Hungary, the USSR, Yugoslavia, Italy and possibly Romania.

06/11/90: Tropospheric reception from Denmark, Germany and Norway.

07/11/90: Tropospheric reception throughout the afternoon and evening from Denmark and Germany at UHF, plus an unidentified E6 station from the north, thought to be the Faroe Islands.

08/11/90: An excellent tropospheric opening from Scandinavia and central Europe. Highlights included Austria (ORF-2 Gaisberg TX E36), Czechoslovakia R10, Finland YLE-1 E7 and YLE-2 E9 (first time in the U.K.) and the USSR at Band-II and at UHF.

10/11/90: F2 reception from Africa at 0915. A logo was present in the right-hand corner of the screen - this is thought to have been Zimbabwe. Reception peaked at 1010.

11/11/90: An excellent log with plenty of F2 reception during the morning from Australia, Dubai, Iran, the USSR, plus many unidentified signals on E2 and R1. A 50MHz transatlantic opening occurred during the early afternoon. USA/Canadian TV signals on channel-A2 were also resolved.

12/11/90: Unidentified F2 reception at 0915 on E2. Sporadic-E signals from the USSR, Czechoslovakia, Germany, Italy and Denmark.

16/11/90: F2 signals from the USSR, plus unidentified programmes on E2.

18/11/90: Unidentified F2 signals from Africa (-5kHz offset) at 0950.

19/11/90: F2 reception from Zimbabwe. Sporadic-E reception from Spain, the USSR and Czechoslovakia.

EURO NEWS

GERMANY ... Joint ARD/ZDF programmes now commence at 0600 UTC with a Breakfast TV programme shown until 0900 Mon-Fri. It is produced by RIAS-TV in Berlin and an on-screen logo is shown.

CZECHOSLOVAKIA ... The new TV network identifications are:

- 1st Network = F1
- 2nd Network = CTV
- 3rd Network = OK3

The third TV network will eventually become totally commercial. Additional transmitters will be necessary to expand the present third network to provide national coverage. The existing third network was at one time used for relaying TSS-1 for Soviet troops, but has recently carried rebroadcasts of satellite material, such as CNN News and ScreenSport. The existing two networks will form a main national programme offering a split between the Czech and Slovak republics. On the 1st network the letters 'TCH' are displayed at times in the lower right-hand corner of the screen.

STEREO TRANSMISSIONS

Austria ... commenced on 05/09/90 on both networks (system not known).

Belgium ... tests using the NICAM system via BRT-2 transmitters at Schoten (channel-E62) and Egem (E46) transmitters.

Spain ... TVE is expected to commence tests using the NICAM system. TVE Catalunya has been using the German 'Zweiton' (twin carrier) system for several years.

Finland ... NICAM tests taking place in the South.

Sweden ... Kanal 1 and TV2 are using the NICAM system via some transmitters. The service will be expanded over the next few years.

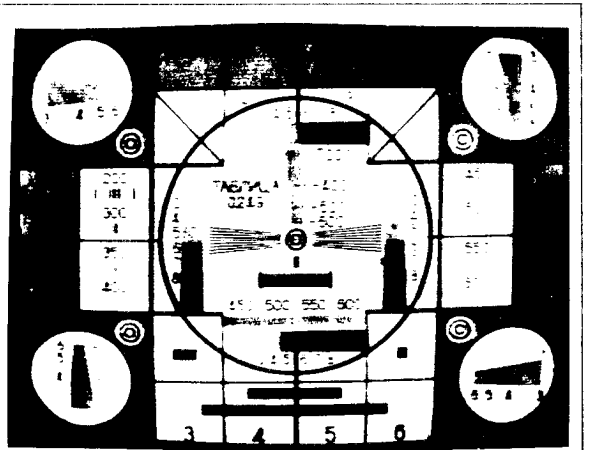
Yugoslavia ... HTV (Croatia) are testing using the 'Zweiton' system.

UNITED KINGDOM ... BBC Enterprises have formed a subsidiary company with the intention of providing subscription TV programmes throughout the night via the BBC2 network. It will be partly financed by advertising. Meanwhile, there is a possibility that the ITV regions will abandon their all night broadcasts!

NETHERLANDS ... The third network now stays on air 24 hours a day to provide an outlet for the night-edition of the NOS teletext service. After closedown, the PM5544 (PTT NED-3) test card is shown without sound.

POLAND ... The header on the TVP teletext service is 'PRiTV', and page-104 has the latest news headlines in English!

SPAIN ... The following channels have been assigned for use with the new Canal Plus (Spain) broadcasts - Barcelona E27, Sevilla E41, Valencia E40, Majorca (Alfabia) E58 and Madrid E31, E32 and E59.

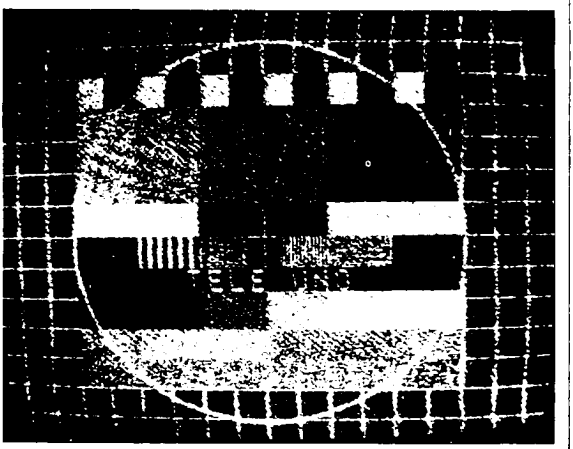


Perhaps one of the oldest test cards still transmitted. This test card, the Russian 0249, was received via stable Sporadic-E propogation during summer on channel-R2.

ITALY ... New government regulations mean that RAI is limited to 7 minutes of advertising per hour, 11 minutes for private stations. All channels must provide a news programme, and 40% of programmes must be of European origin. There are also restrictions on the showing of films - those for the over 18's are banned, and those suitable for the 14-18 year age group can only be shown after 2230.

LUXEMBOURG ... new channels include:

- RTL-4 Dudenlage E24 100kW
- RTL-4 Marnach E41 30kW
- RTL-4 Luxembourg E49 320W
- TVCF Marnach E28 100kW



Many Italian private stations broadcast this type of electronically generated test pattern. This picture shows it in use by Tele Uno on channel-IA.

LEBANON ... A new station called "The Action Channel" has opened using the USA 525-line system in Band-I. Programmes are of USA origin with Arabic subtitles.

Information kindly supplied by: Gosta van der Linden and the BXDC, Netherlands; Bernd Trutenau, West Germany; Roger Bunney, U.K.; Dalibor Frkovic, Yugoslavia; Bertrand Prince, France; David Glenday, U.K.; Garry Smith, U.K.

TVLIST ... by Günter Lorenz.

Reviewed by Garry Smith

A rather important publication arrived recently. I say important, because once you flick through its pages you begin to realise how invaluable it is for TV-DXing. This particular publication is a complete directory of TV stations throughout the World operating on frequencies between 44 and 108MHz. The information it contains is far more useful than anything published so far.

The publication is called "TVLIST" and is compiled by Günter Lorenz in Germany. With the co-operation of various clubs and individuals throughout the World, a 36-page A4-size publication has been produced which gives full characteristics of virtually every Band-I and II transmitter operating on this planet.

The information includes channels, TV systems, ERPs, and even more importantly, the frequency offsets of each transmitter. Geographical coordinates are given and so are the height of the transmitters and locations, etc.

The publication is arranged in two sections: Section 1 lists countries in alphabetical order, continent by continent, in a similar way that the EBU lists theirs. Very low power relays are also included. Section 2 lists transmitters, continent by continent, in ascending order of frequencies and descending ERPs. Only stations over 1kW ERP are included in this section.

In both sections, not only are the initials of the various TV services given, but so are the different operating regions. In Europe,

many Italian private stations have been identified and catalogued. In the USA and Canadian listings the station call signs and network (CBS, ABC, etc.) are shown, which is extremely useful information. Stereo broadcasts are also indicated.

The only criticism is the use of the ITU code throughout the publication. Anyone unfamiliar with the code may find themselves a little lost at first! Sub-headings which included the names of the countries would have been most welcome.

To summarise: it is an excellent publication, with all Band-I and II transmitter characteristics to hand. Anyone using a scanner will find that this information is just what they have been waiting for.

TVLIST is available direct from Günter at Mittlerer Graben 35-37, D-8050 Freising, West Gemany, or from HS Publications, 7 Epping Close, Derby, DE3 4HR, U.K., who are the U.K. distributors of this publication. The price, including p&p, is £5.85 (U.K.), £6.25 (Europe via Airmail) and £7.50 (Worldwide via Airmail).

INTERESTED IN TELEVISION NOSTALGIA?

"TV GRAPHICS REVIEW" is a new quarterly publication for all those who are interested in the development of TV and radio graphics used throughout the World over the years, with particular emphasis on BBC Television and Radio.

Each issue of the 20-page A5 size magazine will feature graphics of every description - from Trade Test Transmissions, to on-screen identification symbols, from television captions to radio publicity material used throughout the World. Photographs and articles will appear, reflecting the graphics used by various services around the World over the past seven decades. Old test cards will be featured, which should prove to be of interest to DX-TV enthusiasts.

The U.K. subscription rate for four issues of "TV GRAPHICS REVIEW" is only £7.00 (£9.50 Worldwide via Airmail). The first issue was published in December 1990.

We would particularly like to hear from anyone who may have photographs or videos available showing old test cards, identification symbols, captions, tuning symbols, logos, etc., especially those used prior to 1980. Please write to the address below if you have any material available.

Apart from graphics used around the World, there will also be information about BBC test card music used from the 1940s, so, if you are an enthusiast, this is the magazine for you.

If you are interested in subscribing to this new magazine, or if you have any archive material available, please write to the following address with full details:

Keith Hamer, c/o 7 Epping Close, Derby, DE3 4HR. Tel: 0332 513399.

CONTEST NEWS

Bob Platts G8OZP

IARU REGION-1 ATV CONTEST 1990

Twenty nine entries for this year's international produced some good results, which are at present with this year's organising body VERON, and the full international results listing will be published in the next issue.

The general standard of the logs was very good. However, some minor and one major adjustment had to be made. The decision to use the multiplier system does not come into force until the 1991 contest, not this year's as was believed and published in CQ-TV 152. This meant that yours truly had to get the slide rule out and recalculate the 24CM and above scores.

Once again it was a close run between the GW7ATG/P and the G7ATV/P groups on 70CM. The 600+km contact the 'ATG group managed with PE1HDX appears to have been the decider. Congratulations to the group and the fine effort.

The Bristol ATV group's efforts were well rewarded with a first on 23CM and a second place on 70CM. Once again, very well done.

Despite the generally flat conditions several good DX hauls were managed on both main bands. The advantage of high ground and a clear take-off worked well for Steve G4DVN/P and Co., working both Belgium and Ireland from their 1600 foot ASL location near Leek in Staffordshire.

Craig EI3FW was well pleased with his contact with Steve. Ron G4SHC also managed to get signals over to Craig, giving Ron a new country, but Craig's 17 Watts was not quite enough to make it a two-way.

John, Andy and Peter 'MNY/'WGZ operated with great success from their site at Stokenchurch, producing good scores on both bands, despite the p(r)acket coming from London on 70CM.

Bob G8VOI nominated himself for the disaster award on 70CM. Technical problems struck just before the contest, the details of which I shall spare you, but after a valiant rebuild (lashup) a total of 3W peak sync was extracted from his 100W amplifier I was one of the many who struggled to see Bob's normally healthy signal.

I was pleased to receive two logs for 3CM. G0ETZ/P and G1XRC/P, the Exeter Radio Club group, had a two-way on the band. Keep up the good work.

INTERNATIONAL 90 UK AND EIRE RESULTS

BATC CONTEST RULES

As promised in the last issue, and hopefully

70CM SECTION 1

Callsign	Pts	QSO's	Best DX	@Km
GW7ATG/P	10020	45	PE1HDX	652
G7ATV/P	9470	35	G8EQZ/P	316
G8MNY	6584	33	G8EQZ/P	316
G4DVN/P	6425	29	ON4YZ	550
G8OZP/P	2982	14	G4VTD	220
G7AVU	2363	12	G4NNG/P	210
G1XRC/P	2310	10	GW7ATG/P	250
G6IQM	2204	15	G7ATV/P	169
G8ONX	1747	14	GW7ATG/P	150
EI3FW	1515	6	G4DVN/P	272
G8GKO	1239	11	G1XRC/P	156
G8VOI/P	805	7	G7ATV/P	121
G6WLM	781	9	G8MNY/P	90
G8EGG	479	5	G3NNG/P	74
G4TEP	212	2	G3NNG/P	86
EI6EV	198	7	EI3FW	32
G0ETZ	46	1	G1XRC/P	23

24CM SECTION 1

Callsign	Pts	QSO's	Best DX	@Km
GW7ATV/P	3123	26	G4DVN/P	213
G4WGZ/P	2550	15	GW7ATG/P	223
G4DVN/P	2128	10	G7ATV/P	213
GW7ATG/P	1686	7	G4WGZ/P	223
G6IQM	1140	8	GW7ATG/P	168
G8VOI/P	910	8	G7ATV/P	121
G8EGG	497	5	G3NNG/P	74
G8ONX	352	6	G4DVN/P	90
G8GKQ	304	5	G7ATV/P	72
G6WLM	53	3	G6IQM	24

3CM SECTION 1

Callsign	Pts	QSO's	Best DX	@Km
G0ETZ/P	50	1	G1XRC/P	25
G1XRC/P	50	1	G0ETZ/P	25

to clear up any uncertainty, here are "the rules":

1) Eligibility ... Contests are open to all British and Irish members of the BATC, who are equipped to transmit and/or receive pictures, by either Fast Scan or Slow Scan TV.

2) Dates and Times ... As published in CQ-TV.

3) Location ... Operation must be within the terms of the licence, from either the main station or /A or /P.

4) Frequencies ... Within the allocated segments of the 70CM, 24CM, 13CM, 3CM and 1.5CM bands. Operation via repeaters does not constitute contest contacts and as such is not admissible for scoring purposes.

5) Power ... Output power must not exceed that set out in the terms of your licence.

6) Exchange ... Call sign and a four-figure code number must be conveyed via video. Confirmation of reception by transmitting back the sum of the code numbers on the talk-back channel. Consecutive or repeated figures in the code are not permitted.

7) Score ... 1 point per kilometre for each band for a one-way picture - times 2 for a two-way exchange.

8) Logs ... Separate log sheets should be submitted for each band worked. Each sheet should indicate: Band, Date, Time in GMT, Station worked, Report and Serial numbers exchanged (each contest log for each band should begin at serial number 001). The code number sent by the distant station should also be recorded on the log sheet (but not dictated on the talk-back channel - only the sum of the figures in it) and the distant station's Maidenhead locator.

A contest cover sheet should also be submitted indicating the following: Contest title, Call sign used, Location (QTH), Locator (Maidenhead), Operator(s) name, Band(s), Points claimed, Number of contacts, Code number used for each band, TX power, Aerials, best DX and distance. Logs must be signed to indicate that the information is correct, and must be received by the Contest Manager within four weeks of the last day of the contest.

9) Awards ... A certificate will be issued to the winner in each band. Other certificates will only be issued on receipt of a large (A4) SAE with the entry. Full results will be despatched with each certificate, and will be published in CQ-TV.

10) Disputes ... The decision of the Contest Manager is final.

APPENDIX

A) The definition of consecutive or repetitive figures in the code number: that is number groups which follow a pattern or sequence which could be obtained by means other than direct observation - e.g: 1234, 1212, 2468, 7777, 0000.

B) Log sheets and cover sheets are available from the Contest Manager on receipt of an SAE.

Log sheets, etc. can be obtained from: Bob Platts G8OZP, 8 Station Road, Rolleston-on-Dove, Burton-on-Trent, Staffs., DE13 9AA.

TV ON THE AIR

Andy Emmerson G8PTH

As I write these words everyone is full of anticipation for Christmas, for the festive season is about to befall us. Of course, by the time you read these words Christmas will be just a memory, but I hope a pleasant one. Down to business, anyway, with our quarterly round-up of video activity on the airwaves.

REPEATER NEWS

The Kent Television Group has sent me its first newsletter and this makes interesting reading. They certainly seem to know where they are going, as these excerpts will prove.

The Group has now had three formal meetings to discuss proposals for the 24cm ATV repeater project and some site testing has been carried out by G6GHP and G4AYT. The most suitable site was concluded to be Dunkirk, a few miles west of Canterbury. Various parts of the project have been allocated to members, the receiver to G6GHP, the transmitter to G8SUY and logic to G4BBH and G4CZJ. General testing and setting up will be carried out by G8GHH. The RF drive unit proposed to use is the familiar Solent 1 watt transmitter.

The debate continues with respect to the most suitable aerials relative to the main coverage area - that of North Kent in particular. If all continues to go well, the Group hopes to have a system on test by the time you read these words.

Andy G8SUY has agreed to be Group Spokesperson (I doubt if there's anyone bigger than him who wishes to argue!), so the latest on progress can be obtained from him, either by telephone or calling on 144.750MHz evenings and weekends. Some group members also monitor 432.750MHz to avoid congestion on the two metre channel.

At the time of writing the Group has nine members fully paid up - the subscription for the first year being £10. This may seem a bit expensive but it was felt that costs would be high in the early stages. Any new subscriptions should be forwarded to G4AYT, Group treasurer and general dogsbody (*their words, not mine!*).

G4GJA has volunteered to run a Group Net weekly on Thursdays at 2000 local time on 144.725MHz (possibly starting on 144.750MHz). Part of the aim of the Group is to increase the use of amateur television in the area so any television related news input to the Net will be most welcome (*and to this column please!*).

AND MORE MICROWAVE TV ...

It is reported that the 1.3GHz repeater GB3GT is off the air for maintenance and that information on its re-appearance can be had from GM0GIB. Up on X-band, Mike G6IQM tells me that GB3RV the Rugby 3CM TV repeater should be on the air by the time these words appear in print, while near Burton-on-Trent GB3XT will be on the air as soon as the licence is received.

From the Wess Vinglun came a nice letter from Viv G1IXE with a video tape showing some of the features of GB3ZZ, their 24cm TV repeater and the news that manned trials are underway of their new 10GHz repeater, which is on the same site as the 24cm one.

The group continues to grow at a fast rate, she says, and even more developments are planned for the near future. Well done and thanks for the promo video: perhaps other groups would like to send me similar tapes (*I always refund their costs*).

It's nice to see so much activity in the provinces, though it has always been a source of wonder to me that so little goes on in London or in other major cities.

SOUTH MIDLANDS

A welcome letter arrived on the very day I put fingers (*both of them!*) to keyboard to write this article. It is from Jeff G8PX and I like his opening line.

"I know that you cannot write your column unless members send you their news and so I thought I had better let you know what is going on in the Oxford area.

On 70CM the Oxford net meets on Tuesday and Thursday evenings and Sunday mornings. Those to be found are G1YDI, G3CU, G3UMF, G6YTW, G8PX and G8FKY. Chris, G1YDI is a new BATC member and is putting out a good signal from his QTH which is the top of a tower block. We must talk to him about installing a 10 GHz repeater!

Moving up to 24CM, over the last few months several stations have started up on this band. In Oxford there is Alan G3UMF who is putting out a fine signal from his hill top QTH using a varactor tripler which uses nine 1N914 diodes soldered to a brass bolt for a heat sink. Jeff G8PX has at last got his quad Yagi on the top of his mast and is running about two watts from a Solent-type transmitter. Terry G0CFN has nearly finished building the 24cm FM transmitter as shown in the ATV Compendium by DJ7OO.

In Bicester there is Bill G6NB and Mike G8EKN all with quad Yagi aerials and about 2 watts output. Bill runs the DD9DUK converter and can work through the GB3TV repeater at Dunstable.

By the way, our party to Harlaxton Manor thought it was the poorest rally to date as there was not much ATV gear on show and no ATV lectures. We know that you depend on people coming along with the gear and to give the lectures, maybe you have moved too far north. There was too much ordinary radio gear which you can see at any of the other rallies."

Thanks for your words of wisdom, Jeff. I'm sure the BATC committee are sorry that you were disappointed by your day out at Harlaxton. I think a lot of people were unsure about making the trip to a new venue, but it should be better this year. Of course I did enjoy it, so I see things in a different light. Thanks too for your news, but isn't it a shame all those ATVers with only two-letter calls, must be something in the water there. Perhaps the local club could have a whip-round and get them some "real" three-letter callsigns.

TYNE-TEES TERRITORY

A letter arrived from Johnny Lawrence, G0KYL, who resides in Dipton, County Durham. He writes: "I have just obtained equipment for 70CM fast-scan television. A brief description of the equipment is a Wood & Douglas transmitter with 1W output, a 10W linear amplifier, Microwave Modules 70cm converter, Hitachi CCTV camera and a Multibeam 48-element antenna. As I now have a great interest in fast-scan TV and as there is very little activity in this part of the country, it is very difficult to get information and help on how to set up and use this equipment.

I have a good take-off on VHF/UHF and I have realised there are more operators around the west of Scotland on ATV. It would be great to get my system into operation in order to both transmit and receive from that part of the country. I can talk into Scotland under flat band conditions on 2M FM."

It sounds as if Johnny has all the right equipment, so let's hope people can listen out for him on 144.750 and give him some TV contacts.

EAST KENT

And now down the coast all the way to Thanet, from where Roy G6OKB sends another of his fascinating reports on the East Kent ATV Network.

"The 70cm Monday net is still going strong. It will have been running non-stop for two years this November (*really? I know how some people drone on ... don't they ever sleep? They certainly send me to sleep! Anyway, tell the Guinness Book of Records immediately!*). Two new stations are now active on 70CM - G1OJZ Cecil, at Kingsdown (waiting for his G0 callsign) also G4NPM Brian at Whitfield near Dover. (*Why on earth is Cecil waiting for a G0 call? Don't people know that the higher the digit, the more prestige? That's why G8s are the most select band of operators, and as for us G9s, well ... only joking!*).

Dover Amateur Radio Club had two special event stations this year at which the EK Net set up ATV demonstrations. First the Waldershare Vintage Vehicle weekend in June, at which Brian G8ZYZ and David G0DQI set up 70cm transmitters and 24cm receivers, working duplex sound and vision. The 24cm pictures were remarked on by visitors as being very impressive. The second special event station was at a special scouting camping weekend during September. ATV was again provided by Brian and David on 70cm and 24cm.

Finally there was a special event station run by Bedford Amateur Radio Club at the old Hawkinge airfield to commemorate the Battle of Britain, the callsign being GB50BOB. Dover club was helping out and Brian provided a 24CM receive ATV station. Everybody was quite impressed again by the improved picture quality on 24CM.

A visit by a hovercraft to the Goodwin Sands a submerged "island" in the English Channel uncovered at low tide] during the summer carried some members of the EK Net. So the following Monday was devoted to some very interesting video shot on that trip.

Some of my own DX activity has been on 70CM TV, including F6IFR, Dieppe (10.3.90); F6HEA, FC1GNV and FE1HKV, all in Lille (26.8.90); and F3YX relaying FC1DL, FC1HKT and F6FZO from 24CM (11.10.90). I also heard KS8JM/AM in a balloon on 144.750 calling for pictures on 70CM (14.10.90)."

Thanks for your detailed report Roy. KS8JM is an unusual callsign (to me, anyway) but I am assured it is for real as I had one phone call about it. Yours is the only written report I have received, so I conclude that no-one else worked him. Whether that's a safe assumption I'm not sure: from the lack of letters I would be bound to assume slow-scan TV was now extinct but there may be someone out there still ploughing a lonely furrow.

GERMANY

The regular newsletter from our German ATV colleagues indicates that they have been having some aggro from the primary users of the 2.3GHz band. This is quite a popular band for ATV repeaters over there but it is also used for commercial TV links. A compromise solution has been secured and from now on the repeaters will switch off for a short period every 5 to 10 minutes and check if there is a TV signal on the output frequency. If so, they must shut down. The difficulty is distinguishing commercial TV signals from ATV operations.

One solution would be for all ATV signals to have a pilot tone but this would interfere with sub-carrier sound. The commercial signals have no accompanying audio signal, but not all ATV signals have this either.

The commercial TV signals straddle the whole 13CM amateur band and are used for surveillance in industry and at reactors, also for police and military purposes. Of course, we have similar covert users who share our 70CM and 24CM bands as well, but they seem to evade notice most of the time.

I note, too, that the DTI has licensed portable video + audio links at 2.440 GHz for commercial purposes, and some suitable transceivers have recently been

launched by Optex. Weighing just one pound, the units clip onto a camcorder and can be powered by the camera's battery. Prices start at under £10,000. No further comment, but can anyone spot a business opportunity there?

IRELAND

We don't get enough letters from the Emerald Isle, so this one from Craig EI3FW in Templecarrig, County Wicklow is all the more welcome.

"Just a short note to let you know that all is well here in EI and is going strong. After my last letter I got a few phone calls and now have regular TV contacts with GW3FDZ and more recently GW7BZY.

Picture quality varies wildly with conditions and is anything from P1 to P4. We still haven't managed a P5 but are working on it!

At present the only other station I can work is Donal EI6EV who recently put up a new aerial and is putting a great signal out down the EI coast. He is north of Dublin and is well placed to work the northern coast of GW.

It would be nice to stir up a bit more activity from GW, even Derek GW3FDZ can't work anyone else on your side of the water and he has had his ATV equipment for years. We are on up to three nights a week, usually around 9 o'clock and even if we aren't a phone call (877366) will get the rigs warmed up and ready! Had hoped to make it to the convention but it will have to wait for another year".

NEW ZEALAND

The indefatigable Mike ZL1ABS has been busy in his workshop again but he has still found time to write a couple of letters to us. "Lately Wayne ZL1WK and myself have got stuck into teletext video generators. He builds 'em, I program the EPROMs. An article on programming for CQ-TV is underway: it will be a good follow-up to the article in the "ATV Compendium". I've sent an EPROM of some of the designs I've made to Trevor G8CJS (*nice thought, Mike!*).

"Spring time has arrived in ZL - daffodils, daisies, irises and geraniums in my garden ... and lawns to mow! But with the warmer temperature and longer daylight there has been the opportunity to go portable and test 23CM antennas. Best gain is the 48-element loop Yagi from Down East Microwave (USA), a 12 feet monster but easy to assemble though.

At last I have been able to have a two-way TV contact through the Auckland ATV repeater. Bruce ZL1BLB was the man at the other end. It has taken so long because of the intermittent (until a month ago) operation of the repeater and lack of someone with 615MHz aerial to receive via the repeater.

At the moment, repeater mode is standard-selective and 625 line signals open the squelch, 525 line ones don't. The XR2201 Phase Lock Loop must have a narrow lock range and I must ask Ian ZL1TOQ (a repeater trustee) to build a second PLL for 525/60 operation to be ORed with the existing PLL, as NTSC tapes from the USA have been a feature of 70CM simplex operation.

These days reception is a bit better as I chroma-convert the colour to 4.43MHz false PAL using the Panasonic VCR I bought in London. Sound is no problem as I modulate the separate sound TX which is 5.5MHz up from the vision frequency."

OLD FILM

Finally, a plea. If anyone has any old film of ATV activity of more than 20 years ago, please let me know. The archives of ATV are pretty thin and nobody has managed to trace any film records, even though they are known to exist (or used to exist). Please drop me a line if you can help - all costs will be refunded.

Please send your avtivity reports etc, to Andy Emmerson, 71 Falcutt Wat, Northampton, NN2 8PH.

The BATC Hon. Treasurer receiving "first aid" after receiving the Committee expenses for 1990 – note the newly commissioned "club" helicopter!!!!

(Grateful thanks to British Telecom for the use of the photograph).

NARROW BANDWIDTH TELEVISION ASSOCIATION

The Narrow Bandwidth TeleVision Association, founded in 1975, specialises in the mechanical and low definition aspects of ATV, and offers genuine (moving) TV within a basic bandwidth of 6 - 7 kHz.

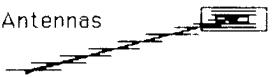
The techniques, basically an updated form of the Baird system, are a unique mixture of mechanics, electronics and optics.

Membership is open World-wide on the basis of a modest yearly subscription (reduced for BATC members), which provides an annual exhibition and quarterly 12-page newsletter, together with other services.

For further details write to: **DOUG PITT, 1 BURNWOOD DRIVE, WOLLATON, NOTTINGHAM, N28 2DJ.** Telephone: 0602 282896.

Severnside Television Group

STG 24cm Antennas

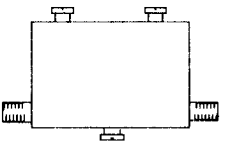


Our ever popular 24cm 18 element wideband Yagi is a must for all ATV stations. Specially designed to cover the whole band for repeater working. Look at some of the features....

* Frequency coverage 1240 - 1325 MHz
* Gain is 10db across the band
* SWR about 1 :1.5 across the band
* Length only 900mm weight 300gm
* Neat and unobtrusive, looks like a small UHF ant.

Price still only £14.00 + £2.50 p&p
(UK delivery only)

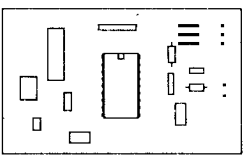
3 Pole & 5 Pole 24cm Filters



Precision made 3-pole and 5-pole interdigital filters for 23/24cm. Low insertion loss of 0.5db and 1db respectively. Wide passband of 60MHz, and -30db/-60db stopband at 70MHz offset. To order, state lower frequency of pass-band, and either BNC or N type connectors.

Price £49 (3pole) £79 (5pole)
plus £2.50 p&p

RGB to PAL Encoders



Our latest offering is ready built and aligned RGB encoder. It accepts 1Vpp ANALOGUE RGB and SYNC and gives 1Vpp composite PAL encoded video (75ohm) Suitable for converting a computer RGB output for transmission. Can be configured for TTL level RGB Based on the SONY CX1145 chip. All circuits and connection details supplied.

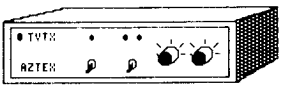
Introductory price £32.00 inc p&p

Severnside Television Group

15 Witney Close Saltford Bristol BS18 3DX
(0225 873093) after 7pm & weekends
Please allow 28 days for delivery.

Aztex Electronics

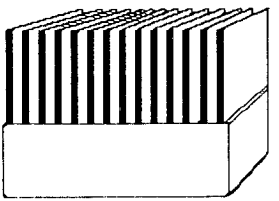
24 cm Transmitters



This state of the art FMTV transmitter gives a solid 2.5 W on either of the two switchable channels,1249 & 1255 MHz. This ready assembled and tested unit accepts both line and mic inputs for intercarrier sound and front panel audio and video gain controls are provided. See CQTV 150 for review.

Price £245.00 + £5.00 p&p

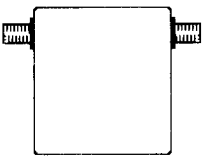
24cm Power Amplifiers



A 20 Watt PA using the SC1040 module is now available to accompany the AZTEX TX

Price £150.00 + £5.00 p&p

24 cm Pre-amplifiers



This GaAsFET pre-amp offers a gain of 17db with a noise figure of only 1db. Designed to go between the RX antenna and your receiver The gain is flat across the 23/24cm band but has an 8db roll-off at around 700MHz to help reduce broadcast TVI. A highly stable design based on the ATF10135 GaAsFET utilises SMT components and is boxed and aligned. NB.the device does not contain RF switching.

Price £52.00 + £1.50 p&p

AZTEX Electronics

Ken Stevens G4BVK 20 Coberley Footshill Rd
Hanham Bristol BS15 2ES (0272 677005)
after 7pm and weekends. SAE for full details.
Please allow 28 days for delivery.

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Market place ads - Free*
Full page - cover - £50.00
Full page - inside - £40.00
Smaller displays - proportional

*Advertisements are placed in this column free of charge to paid up members only, please quote your membership number. Addresses will be included unless otherwise requested. All paid advertisements are subject to standard rate VAT.

Copy should be sent to the Editor at 5 Ware Orchard, Barby, Nr.Rugby, CV23 8UF before 20th March. Tel: 0788 890365.

FOR SALE

BIRD POWER SENSORS for Bird Thruline Power Meters. Each sensor has recently been calibrated on a Hewlett Packard calibration rig. Phone for types. All at £20.00 each p&p included. Mike Wooding G6IQM, 5 Ware Orchard, Barby, Nr.Rugby, CV23 8UF. Tel: Work 0788 576125 x35, Home 0788 890365 (answerphone).

ONLY A FEW LEFT! The *famous* **"AMATEUR TELEVISION" T-SHIRTS.** The only size now available is Medium (small/medium adult, large child/teenager). Only £2.00 including p&p. Cheques payable to M.Wooding (p.p Rugby TV Repeater Group). Mike Wooding G6IQM, 5 Ware Orchard, Barby, Nr.Rugby, CV23 8UF.

SONY VIDEO PROJECTOR (separate screen and projector) - has composite video and sound inputs. Uses a high brightness Trinitron tube so there are no registration problems. 1.2M diag. screen. Portable(ish) ... £180. **VIDEO PROJECTOR** , combined screen/ projector - the type with three eidophores. Composite video and audio inputs as well as a UHF tuner. 1M diag screen. Not portable. Needs looking at, hence ... £50. Jeremy Power G1WVK. Tel: 0442 871386.

NEW ASTEC AT-1020 TVRO tuner head and AT-3010 TVRO IF/demodulator + CQ-TV board ... £68. Used AT-1020 TVRO tuner head ... £22. **DRS1** packet radio (dual port) PC card with G8BPQ/AA4RE software ... £110. Paul G4XHF. Tel: 0293 515201 (evenings preferred).

Want to move your satellite dish? I have one or two 18" **CHROME ARMS** (heavy), also handles ... £12.50 each. Also **POSITIONERS** ... £50. Sell or exchange for 70 or 24CM ATV gear. Plus p&p at cost. Have you anything to sell me for ATV? Len Sutton, Kildare Bungalow, Baghill Lane, Pontefract, West Yorkshire, WF8 2HE. Tel: 0977 797063.

VIEW-FINDER TV CAMERA ITC VF301, 5" viewing screen, C-mount, no lens. Size 13" x 6" x 8", weight 20lbs ... £10 ono. **FLYING SPOT SCANNER,** TV Analyst model 1076 by Dynascan Corp. 58KPU-1 scanning tube, 16 valves. Video output and many other features. Size 17" x 10.5" x 9", weight 28lbs ... £10 ono. Buyer arranges collection, but I will be travelling to Sussex in March and can deliver on route. N.R.Wright G4IYI, Lancs. Tel: 02572 73976.

SONY PROFESSIONAL COMPOSITE ENCODED CHROMA-KEY UNIT. It is one rack unit high in a rack-mounting frame. Model number CMK-350P c/w manual ... around £220. Five **B&W CCTV** cameras. All come with a lens, two also have wall bracket mounts ... £30 each. **SONY C6** front-loading Betamax VCR. Non-working but may be of use for spares ... offers. I am willing to have a haggle on the pricing of the above, but post and packing (or collect) must be added. John Taylor G6JZS. Tel: 0689 831339 any time.

YAESU FT290R 2M transceiver, complete with NiCads, charger, shoulder strap and soft case. In good working order except that the dial-light does not work. Also included are an external pre-amp with variable gain and a 30W PA (FM only), both RF switched ... £185. **BBC model B** computer, no disc interface, but does include RAM/ROM expansion board and some ROMs. Intermittent fault but does work (on a good day), useful for spares, hence only ... £50. **5.25"** disc drive, 40/80 track switchable, double-sided, for BBC computer, perfect working order ... £35. **Over 60** 5.25" discs, some full of BBC software ... £10. BBC joysticks, leads and books ... £5. **All BBC** bits, including computer, offered together for ... £85. Buyers must collect or pay carriage as I am visually handicapped and unable to drive. Terry Hadley G4NNO, 34 Rydal Bank, Bebington, Wirral, Merseyside, L63 7LL. Tel: 051 645 5346 evenings or weekends.

30FT FIXED AERIAL TOWER, professionally built ... £45.00 ono. **EX. EQUIPMENT VALVES** with bases: QQVO-320 ... £3.00 ono, QQVO-640(2) ... £5.00 ono. Suitable **MAINS TRANSFORMER** for 1000V PSU ... £4.00 ono. **3kVA AUTO TRANSFORMER** 240/110V ex. Gov't ..;. £20.00 ono. B.J.Dandy G4YPB. Tel: 0562 824265.

FOR SALE: for use with conmmodore Amiga computer one **RENDALK 8802' GENLOCK.** Brand new & never used- - abandoned project. Use your Amiga to add captions and titles to videos, etc. ... £200 ono. **SHARP PC1246 POCKET COMPUTER/CALCULATOR.** Brand new & never used ... £30 ono. **AMIGA "BASIC INSIDE AND OUT"** book and program disc, new ... £15. **INTERFACE UNIT** for Citizen 120D printer model Commodore S2/BIP. Suitable for Commodore computers. Brand new ... £35 ono. Tel: John 0253 594381.

And now ... "TV TEST CARDS OF EATREN EUROPE" but that is an understatement. For this tape covers not only the East bloc (East Germany, USSR, Poland, Czechoslovakia, Estonia and Romania) but other exotic locations such as Mongolia, Lybia, Algeria, New York, "BBC London" and many west European countries, as well as satellite channels. In all there are over 80 test cards, station idents, news programmes and start-of-day recordings, lasting 49 minutes in all. Explanatory captions describe each segment and the recordings were made on broadcast equipment in a TV studio "somewhere in Eastern Europe". Wages there are a tenth of what we earn and the recordist desperately wants a dual-standard colour TV, so all profits on this remarkable tape will go to him. Recorded in PAL on a quality E-180 VHS tape, the price is £10. If DX-TV is your hobby here are the rare test cards in living colour, like you've never seen them before! Please allow 14 days for delivery. Andy Emmerson, 71 Falcutt Way, Northampton, NN2 8PH.0.

WANTED: To borrow or buy a Realistic DX302 shortwave receiver service handbook. Also Intel 8048 CPU user manual. D.Smith G8RUZ. Tel: 081 460 7131.

TEST CARD VIDEOS FOR SALE: 55 minute video presentation made for the BATC "The Development of the TV Test Card". Andrew Emmerson interviews George Hersee, designer of Test Card F. Lots of old test cards included. 625 lines, VHS only. Recorded on E-180, so you can put other material on the tape ... £5 including postage. Please allow 14 days for delivery. Andy Emmerson, 71 Falcutt Way, Northampton, NN2 8PH.

FOR SALE: C-mount lenses: 75mm Yvar, f2.9; 12mm Vidital, T1.5. Both £25 plus postage. Illuminated diascope for I.O. camera, new condition, with power supply for lamp. Slides onto lens, takes two 2" x 2" slides ... £50 or swap. Dallmeyer motorised 2" lens, not C-mount but screws direct onto front of Pye Lynx ... £5. High voltage capacitors, ideal for your linear! Four 220uF at 400V with clips, new ...£6. Two 1000uF at 400V, ex recent equip ... £4 pair. Postage £1.50 extra. Video Circuits Ltd 625 line sync pulse generator and pattern generator. Valve, quite big, beautifully made, about the size of a grocery box. Circa mid 60s, with orig. handbook. Produces Line Drive, Field Drive, Mixed Blanking, Mixed Syncs, plus the usual crosshatch, greyscale etc ... £10. BBC "white" units 405/525/625 lines. One does sawtooth and lift, the other does crosshatch or dots. Needs external drives, see above! Solid state, compact ... £5 each. A nice compact Sony video and audio distribution amplifier, one input (term/unterm), three outputs ... £10. All above not tested but probably working - you sort them out. All items very cheap if collected! Practical Television: I have many 1950s and 1960s issues for disposal, 50p each including postage. Send me your wants list! Andy Emmerson G8PTH, 71 Falcutt Way, Northampton, NN2 8PH. Tel: 0604 844130.

EXCHANGE & WANTED

WANTED: Has anyone got the circuit diagram of a **NEMCO (Jap) CN110** Mini Camera, or the importers address. J.Brown, 45 Marlborough Avenue, Falmouth, Cornwall, TR11 4HS.

WANTED: Any items relative to John Logie Baird. Good price paid for signed letters. For private collection. Tel: Piers Bedford 081-747-0069.

WANTED: Handbook/service info for **Philips VR2020 VCR.** Also **back numbers** of QST, Ham Radio, 73, BBC Acorn User, The Micro User, A&B Computing, BeeBug, Risc User, and any monthly computing discs. Tim Makins, Coupland Farm House, Coupland, Northumberland, NE71 6TQ. Tel: 06686 275.

WANTED: in excellent condition **FORTOP TVT435/R** ATV transceiver. Details to Alf Frost G3OGD, 30 Bevan Avenue, Stoke-on-Trent, ST7 1QU. Tel: 0782 785865.

WANTED: CIRCUIT DIAGRAM for a Hitachi 1455 monitor. Also, has anyone any info on converting a Motorola MCX100 to 70CM. It is a synthesised rig and PROM programmable. Ian Douglas GM4FGS, 47 Meadow Park, Ayr, Scotland, KA7 2LW. Tel: 0292 285565.

WANTED: CIRCUIT DIAGRAM of a Telequipment Serviscope, or one to loan and copy (Please). J.Brown G3LPB, 45 Marlborough Avenue, Falmouth, Cornwall, TR11 4HS.

WANTED: Please has anyone got a circuit for the hardware required for an **SSTV interface** from "Ham Radio Special" discs for the Amiga 500, or any other data/software for SSTV. I will refund all costs. Please send any info to: Mr. Mathews G3RGC, 38 Foxhill, Wybers Wood, Grimsby, DN37 9QL. Tel: 0472 884060.

WANTED: Basic Television (Technical Press), volume 2 only. Murphy industrial TV camera (the one with a fibreglass case!). Band I set-top antenna, the type with a large loop and a walnut bakelite base. All old TV literature, especially CCTV sales leaflets and catalogues. 2" x 2" slides of test cards and captions to borrow and copy or buy. Callsign generator or similar using real diodes in a matrix. A. Emmerson, 71 Falcutt Way, Northampton. Tel: 0604 844130.

THE WORTHING AND DISTRICT VIDEO REPEATER GROUP

GB3VR ATV REPEATER BRIGHTON

1W FM-TV 24cm TRANSMITTER THIS TRANSMITTER GENERATES ITS SIGNAL DIRECTLY AT THE WANTED FREQUENCY WHICH MAY BE SET ANYWHERE IN THE BAND. ON-BOARD INTERCARRIER SOUND AND FIXED PRE-EMPHASIS ARE STANDARD FEATURES. THE KIT INCLUDES THE DIECAST BOX AND COSTS £70.00

23/24cm ATV CONVERTER THIS UNIT BLOCK CONVERTS THE 1.3GHz TO THE DOMESTIC UHF TV BAND. USE THIS KIT WITH A STANDARD TV TUNER AND BATC IF PCB, FOR A COMPLETE FM RX SYSTEM. APPLICATION NOTES INCLUDED. £40.00 INC DI-CAST BOX.

TWO CHANNEL PLL THIS NEWLY DESIGNED TWO CHANNEL PHASE LOCKED LOOP WILL IMPROVE THE OVERALL STABILITY OF THE SOLENT 1WATT TRANSMITTER. TWO CRYSTAL LOCKED CHANNELS, AND A THIRD FREE RUNNING TUNING POSITION ARE AVAILABLE. KIT PRICE ONLY £30.00. CRYSTALS FOR THE PLL ON CHANNELS RMT1, 2, 3 OR SIMPLEX 1255MHz £7.00 EACH. OTHER FREQUENCIES TO ORDER.

VIDEO AGC KIT. THIS UNIT ACCEPTS A COMPOSITE VIDEO SIGNAL IN THE RANGE 0.15 TO 2V p-p AND OUTPUTS A CONSTANT 1V p-p ACROSS 75-OHMS. THIS UNIQUE AMATEUR DESIGN IS A MUST FOR TV STATIONS AND REPEATERS. £16.00 EACH.

EXPANSION BOARDS FOR THE CIRKIT CROPREADY TEST CARD GENERATOR. BOTH 2 AND 8-WAY EXPANSION BOARDS ARE AVAILABLE ENABLING THE SELECTION, BY S/POLE SWITCH OR BCD, OF EXTRA EPROM PATTERNS. PRICE: 2-WAY £7 & 8-WAY £18.

EPROM SERVICE FOR THE CIRKIT TEST CARD GENERATOR. A FAST RELIABLE SERVICE WITH A RANGE OF DESIGNS INCLUDING BATC, IBA LOOK-ALIKE, EBU TYPES 1 & 2 TEST CARDS, CONTEST NUMBERS, TEXT, GREY SCALE PLUS MANY MORE. THESE EPROMS ARE TO THE FULL SYSTEM I STANDARD. SAE FOR FURTHER DETAILS OR TEL. GEOFF ON (0903) 32161 (7 TO 8pm). PRICE: £6.50 PER CHIP. PLEASE STATE B/W OR COLOUR WHEN ORDERING.

COLOURISER KIT FOR THE CIRKIT TEST CARD GENERATOR. BY THE ADDITION OF THIS KIT, THIS POPULAR ELECTRONIC TEST CARD CAN BE UPGRADED TO PRODUCE COLOUR IN ANY GREY SCALE AREA, ON EXISTING OR NEW EPROMS. AN IMPROVED DESIGN TO THE CIRCUIT DESCRIBED IN CQ-TV 139. PRICE £20.00.

THE 'NEW ATV' PROGRAM FOR THE 48K SPECTRUM. THIS VERSION HAS OVER 60 COMMANDS, WHICH INCLUDE 7 TESTCARDS, MEMOPAD, CLOCK WITH ALARM, MAPS, TONES, LOCATOR CALC (OLD & NEW), FLAG, X-HATCH, VARIOUS SIZE TEXT PRINTING PLUS A DISK TRANSFER COMMAND AND MUCH MUCH MORE. ALL THIS FOR ONLY £6.00. OPUS DISK VERSION £8.00. A MUST FOR ALL SPECTRUM OWNERS.

BBC AMATEUR TELEVISION PROGRAM FOR THE BBC MODEL 'B' AND MASTER. PROGRAM INCLUDES 8 TESTCARDS, MAIDENHEAD LOCATOR SYSTEM, VARIOUS MESSAGE PADS, PLUS MANY MORE FEATURES. AVAILABLE ON 80 TRACK DISC OR 40 TRACK D/SIDED DISC, FOR ONLY £8.50. SEND NAME LOCATOR AND CALLSIGN WHEN ORDERING.

ORDERS TO THE TREASURER OF GB3VR,:-
R.STEPHENS G8XEU, 21 St. JAMES AVE., LANCING, WEST SUSSEX, BN15 0NN.

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HAVERHILL SUFFOLK
CB9 0EQ ENGLAND
TEL: 0440 62779
FAX: 0440 714147

Camtech VIDEO-IF board.....

Camtechs VIDEO-IF board is a complete video IF amplifier and FM demodulator system designed for the amateur TV market, with specifications comparable to a professional system. The VIDEO-IF board also has an audio sub carrier demodulator and AF amplifier, all on a single Euro card size PCB.

The circuits employ some novel techniques and established circuit ideas, which together with todays state of the art semiconductor devices, puts this product at the top of its class.

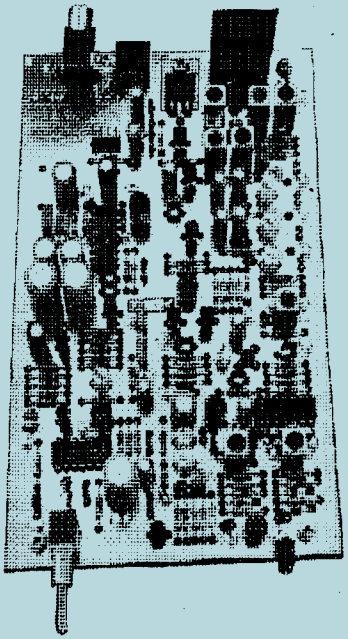
The VIDEO-IF board is available as a kit or built and tested assembly. The kit however is not suitable for the inexperienced, as there are over 180 components! A comprehensive technical description is supplied with each kit, together with detailed assembly instructions, test procedure and circuit diagram. Test equipment requirements are as follows:

1) Oscilloscope, 2) Multimeter, 3) 30 to 50 MHz signal source.

Details of a simple FET Colpits oscillator signal source are enclosed with each kit. This can be tuned to the required frequency by listening to the harmonics on a domestic VHF FM radio.

SPECIFICATION:

1	IF INPUT IMPEDANCE	50 OHMS
2	IF INPUT FREQ	40 MHZ
3	IF 3DB BANDWIDTH	16 MHZ
4	IF SENSITIVITY	50 uV PD
5	IF AGC DYNAMIC RANGE	60 dB
6	AFC OUTPUT (IF +/-7MHZ)	2V +/-0.5V
7	VIDEO 3dB BANDWIDTH	12 MHZ
8	VIDEO S/N RATIO	70 dB
9	VIDEO OUTPUT LEVEL	1V PK/PK
10	VIDEO OUTPUT IMPEDANCE	75 OHMS
11	AUDIO SUB CARRIER RECEIVER	6 MHZ
12	AUDIO OUTPUT INTO 8 OHM SPEAKER	1 WATT
13	AUDIO S/N RATIO	60 dB TYP
14	AUDIO DISTORTION	<5%
15	POWER SUPPLY REQUIREMENT	12V DC (0.5A)



FEATURES:

6 MHZ AUDIO SUBCARRIER DEMODULATOR

VIDEO SIGNAL INVERT SWITCH

STANDARD CCIR VIDEO DE-EMPHASIS

AUTOMATIC FREQUENCY CONTROL OUTPUT FOR TUNER

EURO CARD SIZE PCB 160 X 100 MM

KIT..... £79.95 EXC VAT
BUILT AND TESTED ASSEMBLY..... £99.95 EXC VAT
(UK) PLEASE ADD P&P @ £2.00 AND VAT @ 15%
OVERSEAS (ZERO VAT) PLEASE ADD P&P @ £6.00