CQ-TV MAGAZINE No. 142

BRITISH AMATEUR TELEVISION CLUB

MAY 1988

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MEMBERSHIP

FULL YEAR: £6 or £1.50 for each remaining quarter of the year. All subscriptions fall due on the first of January. Membership application forms are available by sending a stamped addressed envelope to Dave Lawton, whose address may be found on page-2 of this magazine.

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

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

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

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

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

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

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CLOSE FOR PRESS DATE FOR THE AUGUST 1988 ISSUE.....20th JUNE

NEED ANY HELP?

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

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

MEMBERS SERVICES - PCB's; components; camera tubes; accessories etc. (other than publications); queries related to such supplies: PETER DELANEY G8KZG, 6 East View Close, Wargrave, Berkshire RG10 8BJ. Tel: (07352) 23121

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

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

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

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

CLUB LIAISON - and anything of a 'political' nature; co-ordination of ATV repeater licences: GRAHAM SHIRVILLE G3VZV, The Hill Farm, Potsgrove, Milton Keynes, Bucks MK17 9HF. Tel: (0525) 25343

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

CQ-TV MAGAZINE - Anything destined for publication in CQ-TV magazine or forthcoming BATC publications. Articles; review items; advertisements; other material; queries on the content of past issues. EDITOR: JOHN WOOD G3YQC, 47 Crick Road, Hillmorton, Rugby CV21 4DU. Tel: (0788) 69447

CONTESTS & AWARDS, CQ-TV ASSISTANT EDITOR - Mike Wooding G6IQM, 5 Ware Orchard, Barby, Nr. Rugby CV23 8UF Tel: (0788) 890365.

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

EDITORS POSTBAG

Dear Ed,

Congratulations on such a superb magazine. No disrespect intended, but it never fails to impress me that such a high-class product comes from an amateur group.

I read with interest (page 81 CQ-TV 141) of the way to get composite colour output from the composite video output on the Electron.

I own a BBC Master computer which suffers the same inherent problem of only having a black & white composite video output. As they are in some ways from the same stable I am wondering if anyone knows of a similar link that can be made to give a composite colour video output.

Peter Cross,
8 Broom Mead,
Bexleyheath,
Kent DA6 7NY

Dear Ed,

Just a line from a very ancient member of the BATC to let you know that my original callsign was re-issued about a year ago. I am now actively working on all HF bands, CW/SSB/RTTY and also locally on 2m. So far I havn't included ATV - but maybe whis will come.

Many thanks for continuing to keep me in touch with BATC activities, this is greatly appreciated - as is also the way your team there have developed and established the BATC since those early tentative days in the 50's.

Please pass my regards on to Grant Dixon, Don Reid, and any other members of our original group - also let them know that retirement is rejuvinating the old amateur radio/TV interests!

Doug Wheele, G3AKJ
Honorary life member.

Dear Ed,

I have located a source of 8-pin sockets to fit the plugs on the lenses and viewfinders which the club had on sale at Crick last year.

They are used on the JVC GRC-1 camera and are held under part number PU 52037. They do not come cheap (£3 to £4 each!) - it helps to know a friendly dealer.

I have also heard that Proops (Bros?) of Tottenham Court Road have a quantity of the lenses and viewfinders for sale (not at such bargain prices though).

I have also obtained a couple of the uncased B&W monitors from J & N Bull Ltd who advertise in Practical Wireless and Practical Electronics etc. These are made by Philips and contain a hi-resolution, quick-heat CRT. They have been selling at £8 with faults or £16 working. So far I and a friend have had nothing worse than short or open circuit capacitors on the line oscillator to deal with.

I am busy modifying them to accept composite video and frame flyback suppression and must say that the performance (subjectively) is very impressive.

I also note that Farnell Electronic Components of Canal Road, Leeds are selling 5", 9" and 12" CRT escutcheons and that they will now accept credit card orders, from individuals, by phone. Their number is 0532 636311. It is not clear how an individual can obtain a catalogue but a phone call should sort that out.

Paul Bruckel

Dear Ed,

Many thanks for the CQ-TV magazine and letter. I have shown the mag. around our radio club (Municipal Bucharest Radio Club) and you have our appreciation of your activity. Over here we have the Federatia Romana de Radioamater (FRR) but nothing for amateur TV.

We have made some tests on SSTV in the 20m band and there are a few SSTV'ers in Romania. I am trying to assemble a receive station myself. Most of us use all home built equipment but we are not allowed to transmit television.

I am a DX-TV enthusiast (band-1) and this hobby is very popular over here and we get some good results.

I am very glad to become a corresponding member of BATC and am pleased to see that you sponser others in various European countries.

I am at present attempting to assemble some receiving equipment for satellite reception in the Ku band and would appreciate any technical help in this direction (letters may be sent via the Editor).

Munteanu Corneliu, YO3-2285/B
Bucharest,
Romania.

NEWS ROUNDUP

NOTTINGHAM REPEATER LICENCED

Just before this issue went to press we heard that GB3NV ATV repeater has been licenced. Its input frequency is the usual RMT-2 1249MHz although its output has been shifted to the new frequency 1316MHz. This is presumably as a result of the BATC's paper on FM-TV which may be found elsewhere in this issue.

Other repeaters are still waiting, in particular GB3RT (Rugby) whose application went in long before 'NV!

MEMBERS SERVICES

Please note that only the items listed in the CURRENT "Services for Members" leaflet are available - a description of the various PCB's and components can be found, in CQ-TV 140 onwards. To avoid delay and inconvenience, please be careful to include the correct amount of VAT with your order. If you require a special 'C' mount, such as for a lens turret, please write to Members Services with a drawing of your requirements. Batches of callsign badges are sent to the engravers once per magazine cycle. Please ensure that your order reaches BATC Members Services by the CQ-TV close for press date, given in each issue. Badges are distributed to members as soon as they have been engraved.

BATC Members Services does not hold stocks of BATC publications, and vice versa. Please send your order to the appropriate address, as otherwise extra delay and expense is caused in fulfilling the order.

BONEX LOSES KEY MAN

John Higgins, the man who did so much for BATC members by stocking and supplying components and RF modules, has taken up a new position with LMW Electronics.

LMW are essentially an RF development and manufacturing organisation but they also sell some components as well (see leaflet with the last CQ-TV).

Anyone who has difficulty in obtaining RF components is invited to contact John who may be able to help. He should also be available at the BATC rally at Crick in April.

LMW Electronics.
102 Stamford Street,
Ratby,
Leicester LE6 0JU
Tel:(0533) 386364

ANOTHER BATC!

I see that actress Kate O'mara has set up an organisation called the British Actor's Theatre Company. Anyone have further information?

BATC ON PACKET

Members may contact the BATC via packet radio.

Messages may be left for Graham Shirville, G3VZV on the GB3HQ-2 mailbox where they are usually dealt with within 24-hours.

CQ-TV Magazine may be contacted by directing your message to Assistant Editor Mike Wooding, G6IQM on digipeater DV2 (G4RFG Daventry). Further details on this service may be found elsewhere in this issue.

CONSTRUCTION CONTEST?

A BATC advertiser has suggested that a construction/ideas contest be arranged for members. The sponsor, Satalite TV Services, is obviously most interested in satellite TV related items but is quite willing to consider others.

The company would, if necessary, undertake to make the product and will award cash prizes for the best entries. Interested members are invited to write to the CQ-TV Editors.

SOLDERCON PINS

We are sometimes asked for a source of supply for Soldercon IC socket pins. These are usually supplied in strips and are available from Watford Electronics, 250 High Street, Watford WD1 2AN

ENGLISH ONE-POUND NOTES

Overseas members do, from time to time, send English £1 notes as payment for goods. As from March 11th 1988 these notes will cease to be legal tender and will thus be unacceptable by the BATC.

GB75TV

The Rugby TV Repeater Group is planning a special event station over the August bank holiday weekend (August 27/28). The callsign will be GB75TV. The station will operate ATV on at least 70 and 24cm from Shennington, near Banbury in Oxfordshire, from 12 noon to 8pm on Saturday August 27th and from 7am to around noon on Sunday 28th.

Any enquiries to BATC assistant editor G6IQM.

WANT TO HELP THE BATC?

The BATC has grown in size to such an extent that the few committee members who do the bulk of the administrative work are rapidly becoming overloaded. We are therefore urgently looking for members, who feel they might be able to spare a little time to help out in their own homes, to come forward.

The areas in which we are seeking assistance at the moment are in contests, awards, technical liaison administration, publicity, rallies and exhibitions. If you have an enterest in any of these (or any other) subjects and would like to know a bit more about it before you commit yourself, then please contact, in the first instance, the Editor; John Wood G3YQC, whose address can be found on page two of this issue.

HELP! MAYDAY! ACHTUNG!

Yes it's true, your long-suffering editorial team requires some assistance. We need a volunteer to translate some technical articles written in GERMAN that appear in 'TV-Amateur', the German ATV club's magazine. We do have a committee member who can translate but, like all of your committee, he is already overloaded with club work. So, come on all you linguists out there, PLEASE contact Mike G6IQM at the address on page 2 and help us out.

AN ON-SCREEN VIDEO LEVEL INDICATOR

by John Goode

The purpose of this circuit is to provide an indication of video level that can be superimposed over the relevant video on-screen. The idea came from the viewfinder level display used on some JVC 3-tube cameras, although the circuit is my own. It saves tying-up a waveform-monitor or oscilloscope for continuous monitoring of video level, and, particularly in the case of the oscilloscope, it is much easier to use as there is no trigger level and stability to fiddle with. The level display is shown switchable - in order to ensure complete suppression in the "off" mode the supply rails are removed from all of the circuit apart from the video amplifier.

A typical level display.

As the indication signal is mixed with the video signal it will be realised that this circuit is designed as a monitoring circuit, and should not be inserted in the transmission chain. The input of the circuit is therefore shown as suitable for bridging 75-ohms. In fact, the original circuit is fed from a built-in selection system, and so strictly speaking the input impedance (about 2K) is a bit on the low side for bridging. In Fig.1 I have shown an optional input buffer that raises the input impedance to around 10K for those of you that are keen.

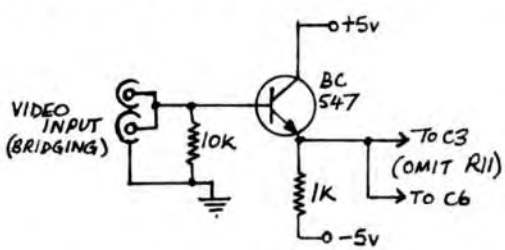


Fig.1 Optional input buffer

Fig.2 shows the screen format. The vertical line on the right of the screen represents the maximum video level (nom. 1v pp), and the wavy line indicates the average level on each line of the TV screen - the further to the right, the higher the level. The indication is derived from the luminance part of the signal, and takes no account of the colour subcarrier. With a black or colour-black signal the line

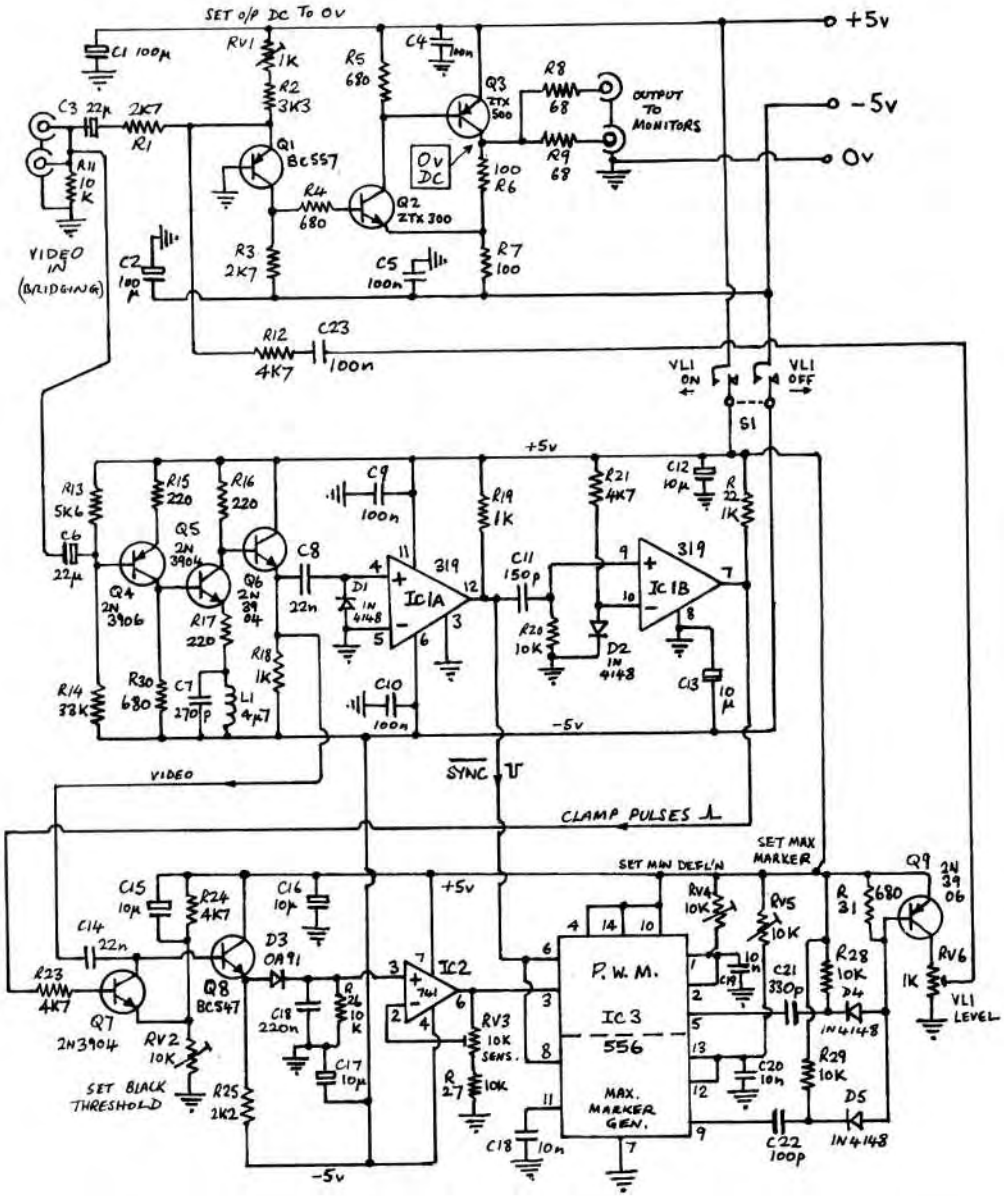


Fig.4 On-screen video level indicator.

IC1 - LM319 DUAL COMPARATOR
IC2 - 741 OP. AMP.
IC3 - 556 DUAL TIMER.

falls back to the position indicated by the dotted line on the screen. As the circuit has a back-porch black-level clamp, no indication of sync level is given.

A block diagram is shown in fig.3. Referring to the side-chain, video is amplified, the colour suppressed, and then clamped by Q7. Sync is separated and clamp pulses generated by IC1. Meanwhile the clamped luminance is rectified and a DC voltage derived dependent on the luma amplitude. This voltage is applied to the "control" input of one half of a dual timer type 556 which is triggered by sync from IC1A. The effect of this is to make that half of IC3 generate a pulse every TV line, the duration of which is dependent upon the control voltage representing luma amplitude (pulse width modulation). Meanwhile, the other half of IC3, also triggered by sync, acts as a monostable to generate the maximum level marker. The outputs from IC3 are differentiated and combined, and then added to the direct video via R12.

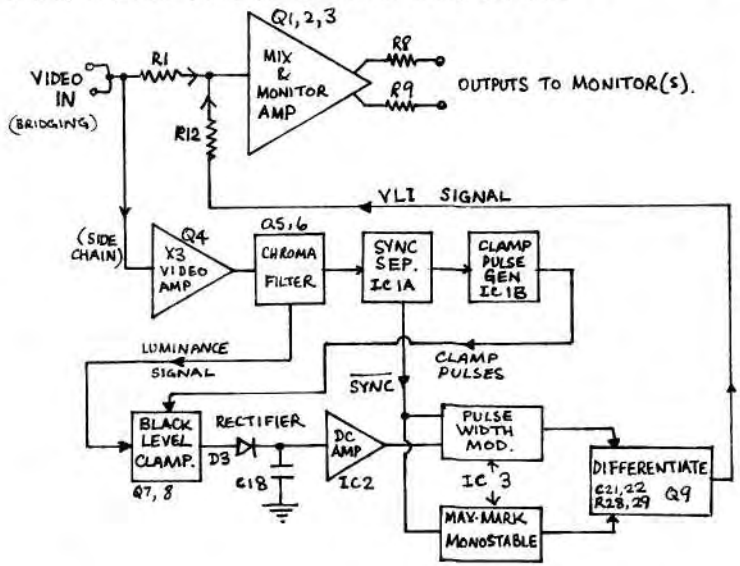


Fig.3 Block diagram

The actual circuit is shown in fig.4. It should be possible to follow this from the above explanation. I'm afraid that a dual 5v supply is necessary for the correct operation of the DC amp IC2. The value of the hold capacitor C18 (220n) was arrived at after considerable empirical experiment, and has been found to give the most accurate indications when compared with the same signal viewed on a professional waveform monitor (one-field timebase setting). The video amp was not mentioned in the earlier description, but is very straightforward, consisting of a common base mixing amp Q1, and a standard feedback pair Q2,3 providing dual 75-ohm outputs for picture monitors.

SETTING UP. Ironically, building this circuit will allow those who don't have access to an oscilloscope to measure video level - however, an oscilloscope is necessary to set up this circuit so that the signals used for calibration can be checked! You will need the following signals for setting-up:-

1. A black (or colour-black) signal, (300mV sync).
2. Staircase (or Colour Bars), 1v pp, 300mV sync, 700mV signal.

Their amplitudes should be as accurate as is possible.

First, power up and allow to warm up. With no input, adjust the DC at Q3 collector to zero volts by means of RV1.

To begin with, set RV2 to minimum (Q7 emitter grounded), and RV3 slider to the IC2 pin-6 end of its track. Centre other presets (except RV1, of course!).

Apply the black signal to the input - making sure that it's correctly terminated. Use a 'scope to check that sync is appearing on pin -2 of IC1, and pins 6 and 8 of IC3. Check that clamp pulses are at pin-7 of IC1.

If the circuit is working properly, there should now be two vertical lines on the screen. The thinner line is the maximum marker. Use RV5 to position it on the right of the screen (see fig.2). Now use RV4 to position the thicker line,(which is the signal indication), at the left of the screen for black level - refer to fig.2 again.

Gradually advance RV2 (black threshold) whilst viewing the screen, until the signal line JUST moves off its black position, and then back off. The idea is to get it on the threshold so that as soon as a video signal above black is applied the line will move.

Disconnect the black signal, and apply the 1v. staircase or bars. Check that the input termination is correct. Now advance RV3 (Sensitivity) until the thick signal line lays JUST to the left of the maximum mark - the two lines should be almost on top of each other. Finally adjust RV6 so that the markers stand out clearly against the video signal on screen.

That concludes the lineup procedure - it only remains to try it with a "real" moving picture, and try comparing the indications given with an oscilloscope display!

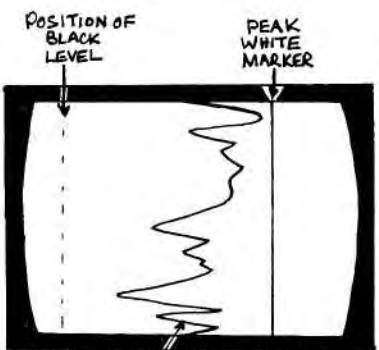


Fig.2 Screen format

FOR THOSE IN NORTH AMERICA

The BATC is pleased to announce that an agency in North America is being set up to handle members transactions. This is to enable cash to be more easily handled between the USA and the UK. Special membership application forms are available as well as prices for Members Services items and publications. Enquiries may be directed to:-

WYMAN RESEARCH INC.
Box 95, Waldron,
IN. 46182

CONTEST NEWS

By Mike Wooding G6IQM,

To all those of you that I met at the convention who said nice things - thanks for your support. To those that didn't thanks anyway - I probably got what I deserved HI!

Also to those who supported myself, John and the rest of the GB3RT group by selling through or buying from the bring-and-buy stall - heartfelt thanks - we need the money!

INTERNATIONAL '87

As promised in the last issue here are the overall results of the 1987 International ATV contest. My crystal ball prediction was correct in that the G8LIR/P team had a resounding win on 70cm. Many congratulations Andy, Ron and Fred from us all and good luck this year. Note also that U.K. stations hold three out of the first five positions and, perhaps even more gratifying, that they are all portable stations. Congratulations also to Peter G1COI/P for his fourth place and to Dave, John and Pete of the GW4ZJY/P team for their fifth position. I know that I have said it before but I really do appreciate the not insignificant effort put in by our portable stations - thanks once again. Commiserations must go out to F3YX for his valiant effort again bringing him second place.

As you can see from the results the treasured winners certificate goes to PE1LZZ for his win in Section-B on 70cm, to F8MM for first place in Section-A on
24cm and to PDØDKT for Section-B.

How about the 13cm entry then? What about the U.K.entry, anyone operational on 2.4GHz yet? Congratulations to DG3RAO for his win on this as yet little used band.

Don't forget this year's International is being co-ordinated by the UBA (Belgium) so I will want an especially large entry - YOU HAVE BEEN WARNED!

SLOW SCAN '87

It's only the second year running that we have held an SSTV contest, so I suppose that an increase from one entry to six should pacify me. However, cosidering the large amount of lobbying I received when I took over as contest manager I reckon that there ought to be more interest and entries. I hate to say that so far only one of the stations that requested the contest has so far bothered to enter.

I accept the criticisms from Peter G4ENA that it could have been advertised more. I say in defence that a full contest calendar appears each year in CQ-TV and that in the issue prior to the contest it is advertised again. OK, due to a typographical error (I punched the wrong keys) the date was wrong in one issue. Complaint was also made that the contest was not advertised in RadCom, if you read this column regularly (you had better!) then you know the answer to that

one. However, I am now QRV on packet radio so perhaps bombarding GB3HQ-2 with information may get some action! This year I am going to try and promote the contest more abroad, attempting to make it an international event, so all you slow-scanners out there whenever you talk to anyone tell them about it and spread the good word.

OK, sorry about that, I will now climb off my soap-box. I have very little in the way of news of the contest and as I personally did not participate I have no knowledge of conditions etc. The winners' garland for the VHF section goes to Dick G4RRX and for the HF section to Peter G4ENA, who also lost!

INTERNATIONAL '87 70cm Section-A

Pos'n	Call	Points	QSO's	Pos'n	Call	Points	QSO's
1	GW8LIR/P	20703	73	47	DF6SM	2001	17
2	F3YX	14178		48	PA0BOJ	1904	11
3	FD1FVX	11494		49	G8GKQ	1847	7
4	G1COI/P	11154	27	50	G8ONX	1794	15
5	GW8VZT/P	10359	46	51	G0HOV	1779	16
6	DL4RBB/P	9425	47	52	PE1JRX	1688	26
7	F6FZO/P	9207		53	PE1IYE	1683	21
8	DL0AAN	8741	55	54	DJ4SA	1591	11
9	F8MM	8619		55	ON2AAO	1568	18
10	PA3BJC	8389	47	56	PI4AMF	1526	21
11	F6APE	8101		57	PA3CHH	1458	28
12	F6FZK	7654		58	ON5VL	1420	15
13	DL0PT	7357	30	59	PA3CVM	1370	14
14	ON7MB	7184	30	60	G6ZHC	1327	10
15	ON4YZ	7135	41	61	FC1LQG	1243	
16	F6IFR/P	6680		62	F6HUS	1168	
17	F1CIA	6500		63	DC7MG	1137	11
18	DF0RC	6350	28	64	G1KUG	1107	13
19	G8MNY/P	6318	34	65	PA0HVB	1061	8
20	FC1DUJ	5884		66	G3UKM	1042	10
21	PA0HCK	5650	31	67	PE1BAO	1015	12
22	G4CRJ	5536	29	68	PE1LZB	978	17
23	G4WRA/P	5237	33	69	ON5NK	946	10
24	PA3DLS	5046	35	70	PA2NDK	931	14
25	G4DVN/P	4983	37	71	DL4FBX	909	11
26	F1BPO	4773		72	DG4SJ	882	9
27	F2FD	4751		73	FF6KRJ	829	
28	F5BV	4591		74	DB5MJ	828	4
29	FC1FHL	4278		75	PA3AOD	789	16
30	G3NAQ	4089	21	76	DD0JX	781	19
31	G0AVG/P	3942	24	77	DK6EU	733	16
32	DL0BTX/P	3924	27	78	PE1LRS	712	18
33	F2RI/P	3883		79	DF1SM	692	9
34	DG9RAO/P	3585	23	80	ON9CAA	514	7
35	PE1BZL	3555	27	81	FC1HPR	406	
36	ON7GG	3506	26	82	PE1LAG	394	16
37	G4VTD	3017	16	83	ON4KBF	318	9
38	G6YKC	2915	21	84	G4TEP	310	5
39	FC1GBS	2885		85	G3RDC	306	1
40	G6HJP/P	2633	20	86	ON1CCX	279	5
41	DH8YAL	2600	26	87	ON1WW	261	5
42	ON5ID	2596	17	88	PA3DJR	244	9
43	PA2ENG	2413	16	89	PE1JMZ	156	8
44	G6IQM	2388	21	90	DK1PZ	78	4
45	PA3AOG	2208	14	91	PA3CRX	59	4
46	G3YQC	2074	18				

INTERNATIONAL '87 70cm Section-B

Pos'n	Call	Points	QSO's	Pos'n	Call	Points	QSO's
1	PE1LZZ/A	3670	28	11	NL10322	1140	15
2	PA3DEA	2045	29	12	NL8506	791	12
3	NL8722	1783	20	13	ONL6687	563	8
4	PE1AFJ	1755	26	14	PE1JAM	448	12
5	PDØDKT	1677	23	15	PA3CAP	391	11
6	NL7795	1443	17	16	DLØRU	259	7
7	NL5184	1262	15	17	DG2YDZ	188	4
8	DC6KCI	1231	17	18	PDONUU	150	4
9	PA3DZA	1211	10	19	ONL2030	10	4
10	PE1JRX	1209	25				

CONTEST RESULTS

INTERNATIONAL '87 24cm Section-A

Pos'n	Call	Points	QSO's	Pos'n	Call	Points	QSO's
1	F8MM	2940		19	G4CRJ	348	4
2	F6FZO/P	2292		20	DH8YAL	329	8
3	FD1FVX/P	2168		21	DLØBTX/P	272	5
4	G4WRA/P	1670	11	22	G6HJP/P	266	9
5	G4DVN/P	1366	11	23	F1BPO	265	
6	PE1CKK	1341	18	24	PA3DLS	254	4
7	F2FD/P	1149	19	25	DDØJX	220	6
8	GW1IXE/P	1056	15	26	DK6EU	156	6
9	PA2ENG	844	13	27	PAØBOJ	135	3
10	PA3CWS	790	9	28	PA3AOD	126	
11	PA3AOG	730	12	29	DG4SJ	86	
12	G6YKC	706	7	30	GØHOV	85	4
13	G3YQC	612	8	31	PE1BAO	80	4
14	G6IQM	592	7	32	DJ9VX	62	1
15	G4VTD	574	4	33	DK1PZ/P	62	1
16	F2RI/P	500		34	PA3CRX	45	3
17	G8MMF/P	466	5	35	G6ZNC	44	1
18	F6FZK	462					

INTERNATIONAL '87 24cm Section-B

Pos'n	Call	Points	QSO's	Pos'n	Call	Points	QSO's
1	PDODKT	648	11	5	DD2EE	76	3
2	NL5184	505	12	6	PE1JAM	46	2
3	NL10322	470	11	7	PE1JMZ	16	1
4	PE1LAG	90	3	8	PE1LZZ/A	12	1

INTERNATIONAL '87 13cm Section-A

Pos'n	Call	Points	QSO's	Pos'n	Call	Points	QSO's
1	DG3RAO	31	1	2	PA3CWS	19	1

SLOW SCAN 87 VHF

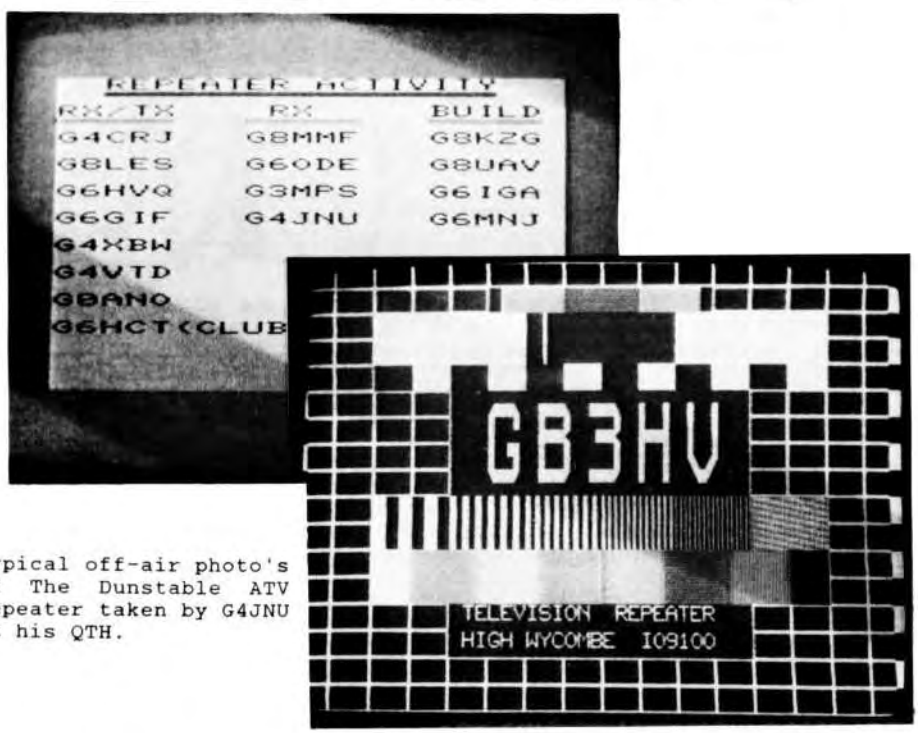
Pos'n	Call	Points	QSO'S	Best Dx	@	Km
1	G4RRX	2066	6	PE1AJP		234
2	G4SJH	478	2	G4RRX		176
3	G4ENA	146	3	G3NAQ		64
4	G8VVY	128	2	G3NAQ		58

SLOW SCAN '87 HF

Pos'n	Call	Points	QSO'S	Best Dx	@	Km
1	G4ENA	976	14	G4ENB		254

The address for information, entry forms, log sheets and contest entries is shown below. Please remember to enclose an A4 size SAE when requesting the above or if wanting contest certificates. Remember, every contest entry is awarded a BATC certificate.
MIKE WOODING G6IQM, 5 WARE ORCHARD, BARBY, Nr.RUGBY, WRKS, CV23 8UF.

Forthcoming contest: SUMMER FUN
1800GMT SAT JUNE 11th
to 1200GMT SUN JUNE 12th
FSTV ALL BANDS



Typical off-air photo's of The Dunstable ATV Repeater taken by G4JNU at his QTH.

MEMBERSHIP MATTERS

Judging by the numerous letters I have received, most of them polite but some not so polite, a great deal of confusion seems to have arisen over the introduction of membership numbers. So I think that now might be a good time to explain a little of how the Committee runs the Club since it is important to understand why things happen as they do and thus, why, for example, membership numbers change.

The Committee members run the club in their spare time, this is done on a voluntary basis and no financial reward is received. We are spread around the country and most of the work is done by phone or letter, but we do meet together four or five times a year.

At times, such as when an issue of CQ-TV is about to be published, much co-ordination has to take place. The address labels have to be printed, magazines collected from the Printers, labels, magazines, envelopes got to the 'Envelope Stuffers' and then all the various postal rates sorted and magazines delivered into the Postal System. Because this all takes many hours of our spare time, and is happening in various parts of the country, it cannot take place all at once.

This year, because of VAT registration, subscription reminders had to go out at the beginning of January. In order to print the 'Reminder' labels and post them - avoiding the Christmas rush - from High Wycombe to Leicester in time to be ready to go on January 1st, I printed them in the middle of December, basically three weeks before they fell on your doorstep. This answers the question "Why have I received a Reminder - I paid two days ago".

The labels for a CQ-TV magazine are normally printed one to two weeks in advance of posting. This year, because of the 'Reminder' notices going out on Jan 1st, I printed CQ-TV 141 labels on that date to get them out of the way. I tend to receive a few extra letters after the renewal notices are sent out. For example, during the first week after the renewal notice I received over 450 letters, the record being 92 on one day. If these are not dealt with as they arrive chaos ensues. The second week was the same. That took approx 18 hours of my so-called 'spare' time each week. Unfortunately the printing of '141 was also a couple of weeks later than usual, due to the holiday period, so the delay from label printing to magazine posting was five weeks. That should answer the questions; "my address label shows '87 but I paid last week, your computer must have hiccupped" or "you seem to have made an error over my subscription".

Moving on to the second example, the membership number is made up of the first two digits (year paid for) and a further four digits (database record number). Obviously the first two digits change as you pay your subscription, the remaining four digits may also change because around the end of October,

non-payers for the current year are deleted from the records. When this happens the database is compacted and record numbers re-issued. The latest number therefore which you receive is the correct one.

Some people have been confused with the words "the first two digits of the membership number indicate the year that your subscription has been paid up to".

Perhaps it should read "....up to and including that year".

Now to a few remaining points.....

I have had quite a few people send in their subscription for 1988 and complain that they have not had a Renewal notice. This is often easily explained, they had already paid for 1988! If this happens they are credited for the following year.

Sorry that we did not include Airmail rates for Europe, or 'All Up' letter rate as it is known - an oversight.

Standing Orders... to put it mildly they are a pain. Several people have asked why they are not available. The answer is simple, it causes us too much trouble. When the amount of the subscription changes it seems imposible to get people to change the amount they pay therefore standing orders are often out of date and we can't stop them ourselves. We still receive amounts varying from 50p to £2.00 dating from years ago, and I suffer from writer's cramp from the number of times I have written to those concerned. Quite simply standing orders cause more work than the system can cope with.

And finally, many thanks to all those who have written to thank us for our efforts, in particular the very high standard of the Magazine. Naturally I have not passed these onto the Editor as it might give him ideas above his station.

Remember, when writing to us please print your name and address clearly, I still suffer from having to guess some of the handwriting that comes through the post.

I usually manage to reply to any letter within 48 hours of receipt, but do allow me some time to myself and don't worry if it sometimes takes a bit longer.

From your hard working Membership Secretary.

Dave Lawton.

TELETRON MONITOR

By Chris Smith G1FEF,

A useful addition for Teletron users is the Teletron monitor E-PROM, providing the user with a comprehensive machine-code monitor, enabling Z80 code within Teletron to be examined and modified.

Whilst not yet complete, the facilities implemented should still prove very useful, they include such functions as:

MODIFY, EXAMINE, REGISTERS, GOTO and TYPE.

'TYPE' allows the user to use Teletron as a caption generator, overlaying characters and graphics on the incoming video. Features of this function include a cursor that can be turned on or off, full use of cursor direction control and a clear screen command.

The monitor allows code to be examined, modified or dumped to a centronics printer. The entire memory, or just a part of, can be filled with a specific byte and the contents of the processor registers can be examined or modified before calling your own machine-code routine in RAM.

The operating system does a non-destructive RAM test on power-up or when reset, setting the stack to the highest available RAM below screen memory. Thus if your program gets 'hung-up' then resetting teletron will not destroy the code. All functions are vectored through RAM allowing more experienced users to use parts of the operating system in their own programs, ie: screen print routines etc.

Future features to be implemented include:

1) A cassette based filing system for storing programs.
2) A full assembler and dissassembler.
3) A simple form of Basic language.

These additions however, particularly the Basic language, may not be available for some time.

All things considered Teletron offers the ATV enthusiast a versatile, cheap and easy-to-customise computer system. This machine is capable of performing many functions in the amateur shack and three versions of the machine will eventually be system controllers for the 24cm repeaters GB3HV, GB3ET and GB3RT.

If anyone is interested in this monitor E-PROM, or has any questions concerning its use etc, or questions concerning Teletron itself, please do not hesitate to contact me on 0767 312164, or Trevor Brown G8CJS, whose address appears on page-2 of this magazine.

The E-PROM is available with full instructions from Members Services (see order form with this issue) and future updates will be provided free of charge as and when they are available.

IN RETROSPECT

SPECTRUM FREEZER - 'MICRO AND TELEVISION PROJECTS'

A mistake appears in the original article (pages 70 to 73) in that the pin details for IC1 show two pin-10's and should be corrected as follows:

the 'pin-10' that is connected to 0 volts (ground) is correct
the 'pin-10' shown connected to IC5 pin-9 should be labelled 'pin-5'.

It is also not advisable to power the board from the +5 volts available at the Spectrum user socket, instead a separate regulator such as a 7805 should be provided.

I would be interested to hear from anyone building this project and also from anyone interested in interfacing it to a BBC, I have done so and the results so far are very interesting. Chris Smith G1FEF, 25 Strande Park, Lightlands Lane, Cookham, Berks SL6 9DU

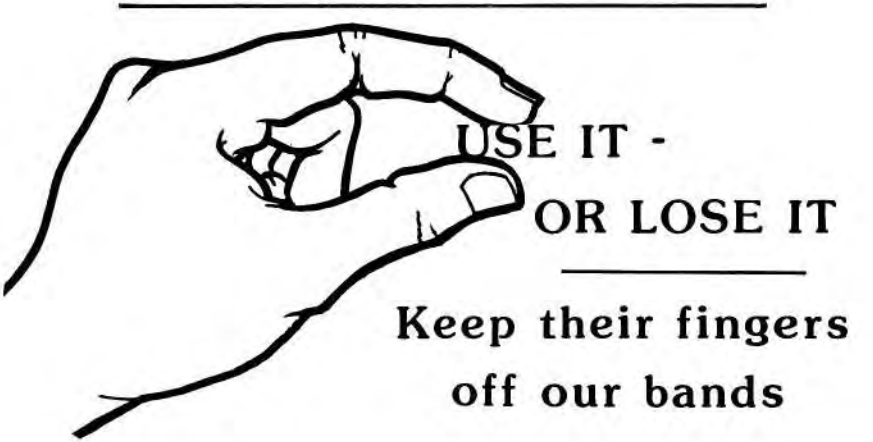
TELETRON - 'MICRO AND TELEVISION PROJECTS'

To use 2764 devices in Teletron set the 2716/32 link to 2732 and disconnect pin-27 of the E-PROM and reconnect to +5v. This is a correction to the information given with the original design.

SOFTWARE NOTEBOOK No 9 - CQ-TV 138

Four little gremlins that crept onto the keyboard whilst this program was being typed in. The entire lines are reproduced where the errors appeared.

```
117 LET H=LN (G)/LN (10)*D
118 PRINT : PRINT "THE GAIN AT ";T;" IS ";H;"dB"
225 PRINT : PRINT "GUIDE DIAMETER SHOULD BE BETWEEN";D2;" & ";D1
260 LET Y=X*1.71: PRINT "CUTOFF FOR DIA";X;"cm IS";Y;"cm OR";Y/2.54;"INCHES"
```



STARTING ON 70CM

In recent years the BATC has enrolled a large number of new members, the majority of which are trying ATV for the first time. Of course, what those members need are some tried and tested designs to help get a 70cm station on the air with a minimum of trouble.

Although information is included in such BATC publications as 'TV For Amateurs' and 'Best of CQ-TV', it has been some time since CQ-TV itself carried designs to fill this need.

It is therefore with no apology that the Editors have collected together some of the best designs which have stood the test of time, and for which PC boards are available for the major units, and offer them here to all our more recent members.

RECEIVERS

There are several ways of receiving amateur TV on 70cm. Some domestic sets - particularly imported and portable ones - will tune directly to 70cm without modification. The only problem here is that the tuner will be operating at the extreme (low) end of its range causing an inevitable reduction in performance. For best results a good low-noise pre-amplifier should be used ahead of the receiver.

There are many surplus 'varicap' (varactor tuned) TV tuners currently on the market which can easily be converted to cover the 70cm band. One of the easiest and best is the type U321. Fig.1 shows the small modification required to bring the tuning range down to about 430MHz. Many domestic sets are fitted with this tuner in which case the modification may be made 'in situ', this will not affect the tuner's use for domestic viewing, but since the coverage will have been shifted slightly lower in frequency it will be necessary to re-tune for the broadcast channels.

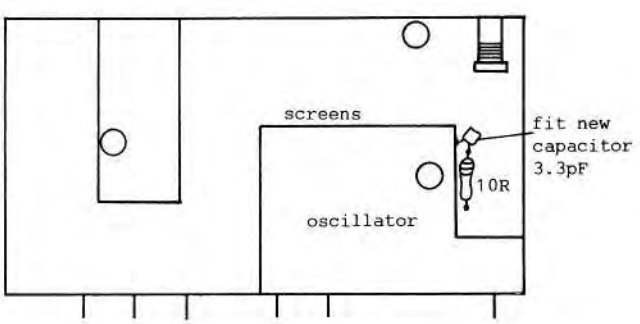


Fig.1 Modification to the U321 tuner for 70cm coverage

If the tuner is to be used externally it should be wired as shown in Fig.2. The IF output (36MHz) may be connected directly into a TV set, but care should be taken first to ascertain whether or not the set has a mains transformer fitted or if it is of the more usual 'live chassis' type. If the latter is found to be the case then a mains isolating transformer of suitable rating must be fitted in the AC mains supply.

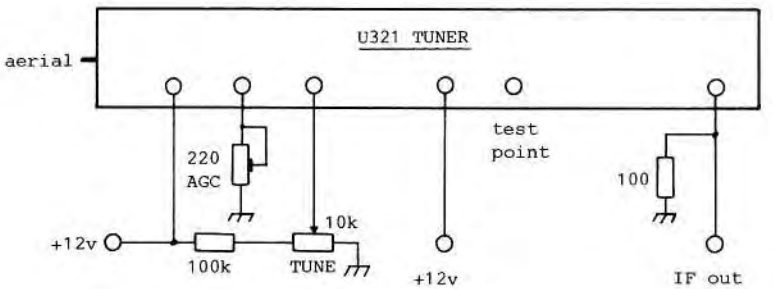


Fig.2 WIRING DIAGRAM FOR ATV OPERATION

Alternatively, a complete IF module may be produced or built and used separately. The output of such a unit will be composite video and suitable for connection (via a buffer) to a video monitor. Since the output from these modules is usually around 2 to 3 volts peak-to-peak across an impedance of about 1k, it is necessary to use a single stage emitter follower such as that shown in Fig.3, this will bring the output level to the standard one volt peak-to-peak across 75 ohms.

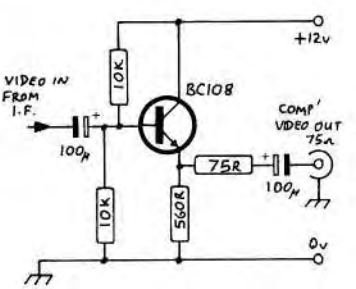


Fig.3 Video emitter follower

AN ATV UP-CONVERTER

Another way of receiving 70cm ATV is to use an up-converter. This unit, as its name implies, converts an incoming 70cm signal to a frequency within the broadcast UHF TV spectrum. Such converters are available commercially from specialist manufacturers such as Microwave Modules and Wood and Douglas, but for those who prefer to build their own this converter, designed by G4DYP, has proved very popular.

The converter circuit is shown in Fig.4 and, if built as originally designed, requires no special printed circuit board. The BATC, however, has designed and produced a printed circuit board for this design for those who prefer. The print and component layout is shown in Fig.5. The unit is intended to connect directly to the aerial socket of a standard broadcast TV set.

The 70cm aerial is coupled to the input tuned line L2 via a 22pf capacitor. The line is tuned to 70 by the 2-10pf trimmer capacitor at one end. A second tuned circuit is used at the amplifier output to further improve the selectivity of the converter and to provide a low impedance feed to the mixer. The mixer collector circuit is tuned to the chosen IF frequency and, although

the tuned line L4 is the same size as L2 and L3, there is sufficient range on the 2-10pf trimmer capacitor to accommodate the higher frequency.

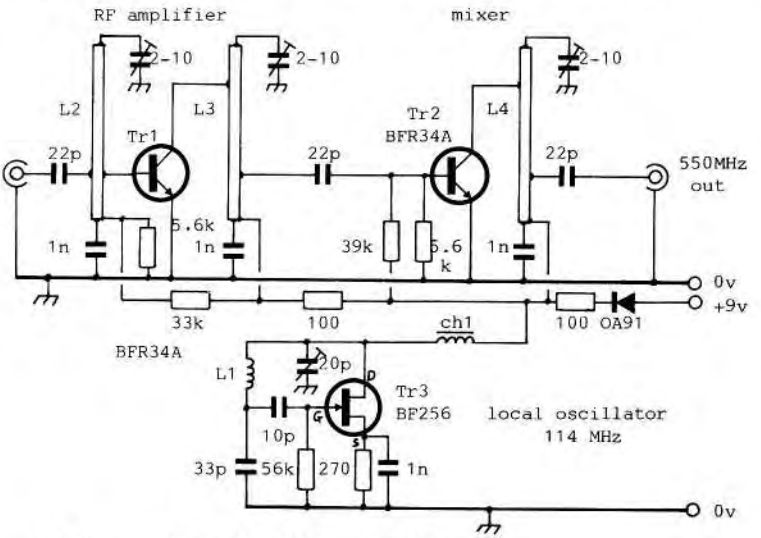


Fig.4 70cm Converter circuit diagram

The local oscillator employs a standard L/C circuit tunable over an approximate range of 100 to 150MHz. Other frequencies could be used by varying the coil L1 and/or the 2-20pf trimmer. Local oscillator injection is somewhat unconventional in that it relies on stray coupling into the mixer. This is achieved by the proximity of the components, especially L1 and for this reason the layout shown in Fig.5 should be closely followed if that method of construction is chosen.

All capacitors should be good quality small plate or tubular ceramic types and resistors should be low noise 1/3W or smaller. Trimmer capacitors may be good quality film dialectric or ceramic types. Choke Ch1 is made by close winding as many turns of 34swg enamelled copper wire as will fit on a single layer wound onto a 1/3W 1M resistor. L1 is 6 turns of 20swg enamelled copper wound onto a 3/16" drill, 3/8" long and self-supporting.

CONSTRUCTION

If you are not using the printed circuit board then take a piece of single-sided copper laminate board 2,3/4" x 1,11/16" and place it copper side uppermost. Now cut the pieces indicated by the shaded areas in Fig.5 from another piece of similar board using a small saw. Glue these pieces, copper side up, to the main board so that the copper is insulated from the earth plane (position as shown in the figure). The small pads are 1/4" square, their actual positions on the board are not too critical but should be close to those in the illustration.

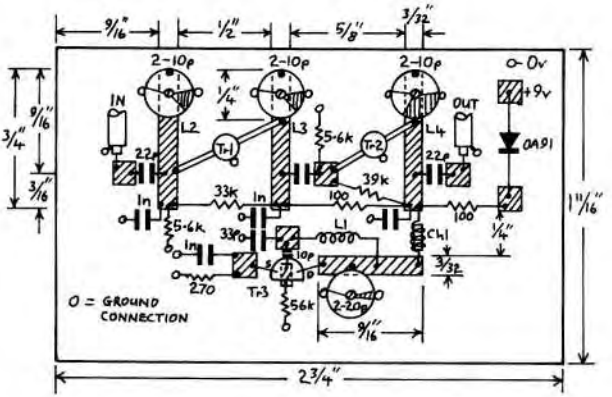
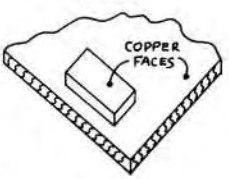


Fig.5 LAYOUT DIAGRAM



Component mounting pads cut from PC board and 'instant' glued to main copper laminate board. Pads are shown as shaded areas. All components are mounted on the copper side.

ALIGNMENT

First check that the oscillator stage is working correctly and that it will tune to the frequency required. Connect the output of the unit to the aerial socket of a domestic TV set tuned to a convenient 'clear' channel around number 30. Switch on the converter and adjust the oscillator and mixer trimmers for maximum noise on the screen. Connect a signal generator to the 70cm input (a local amateur TV signal may be used or, if neither of these are available, the third harmonic of a 2 metre transmission). Carefully tune the oscillator trimmer to receive the signal, finally peak the RF amplifier and mixer trimmers for maximum signal - indicated by minimum noise (snow) on the picture.

The converter should be housed in a suitable screened box fitted with good quality coaxial connectors (N or BNC).

A 70cm TRANSMITTER

This transmitter, which was specially developed for the BATC, is both easy to construct and align, and is capable of delivering up to 150mW of RF output in the 70cm band. It is intended either as a low-power self-contained transmitter or as a driver for subsequent linear amplifiers. The video modulator is included on the printed circuit board and requires only the addition of a 100-ohm carbon potentiometer to provide adjustment of the video input level.

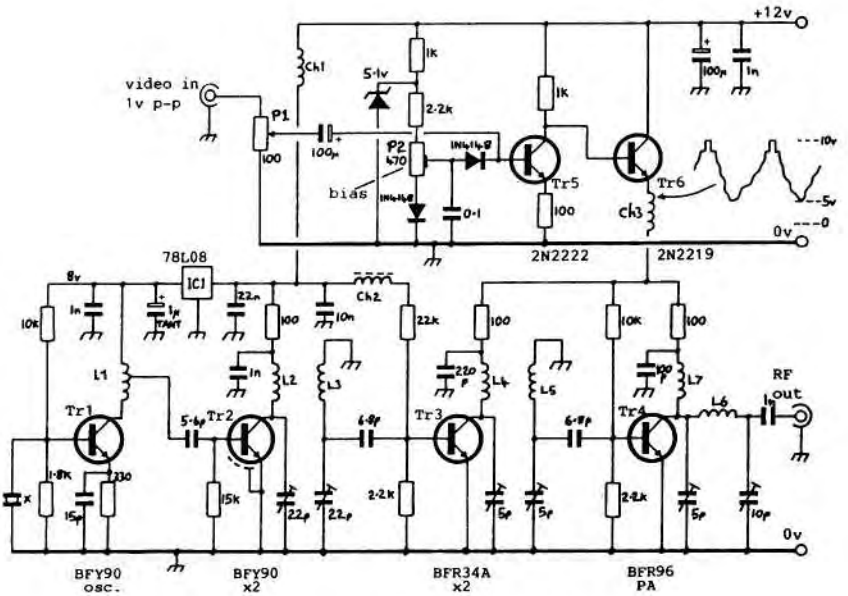


Fig.6 TV TRANSMITTER CIRCUIT DIAGRAM

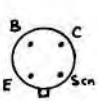
L1 - 10t 26swg enamelled copper on 4.5mm former, with core, tap 3-turns from 'cold' (supply) end.
L2,3 - 1¾t 18swg enamelled copper, 5mm i.d. spaced 2mm from board.
L4,5 - ¾t 18swg enamelled copper bent to shape as illustrated.
L6 - 1¾t 18swg enamelled copper or silver plated, spaced 2mm from board.
L7 - 3t 26swg enamelled copper, 3mm i.d. close wound.

Ch1 - 10t 26swg enamelled copper, 3mm i.d., self supporting.
Ch2 - 3t thin insulated wire on ferrite bead.
Ch3 - 8t 26swg enamelled copper, 3mm i.d., self supporting.

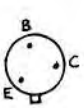
'x' - 108.875MHz crystal

78L08

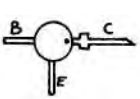
PIN VIEWS



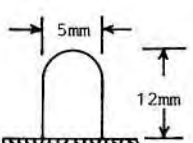
BFY90



2N2222
2N2219



BFR34A
BFR96



Detail of L4 & L5

CIRCUIT DESCRIPTION

Tr1 forms a crystal controlled oscillator which operates at 108.875MHz. In order to ensure maximum stability and spectral purity, the oscillator is powered from a three-terminal voltage regulator (IC1). The output is coupled directly to the base of Tr2 which operates as a frequency doubler. The collector tuned circuit (L2) resonates at 217.750MHz and, together with L3 forms a simple bandpass filter. Tr3 is another doubler stage which brings the signal to its final frequency of 435.50MHz.

The collector of Tr3 also connects to one half of a bandpass filter (L4) but derives its supply from the video modulator. Tr4 is the output amplifier and is also powered by the modulated rail. The collector connects to a simple Pi output stage which provides a low-impedance output suitable for matching into 50 or 75 ohm coaxial cable.

Video modulation is applied to the base of amplifier Tr5 via a panel-mounted 100-ohm variable carbon control providing adjustment of the actual video level. Tr5 base is biassed from a potentiometer circuit fed from a zener stabilised voltage source. DC restoration is provided by a 1N4148 diode. Tr6 acts as an emitter follower and delivers up to 12 volts (modulated) to Tr3 and 4.

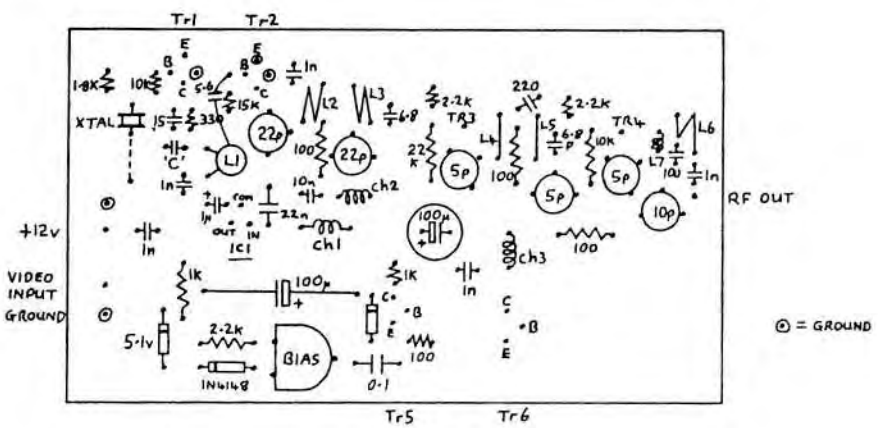


Fig.7 Component Layout

CONSTRUCTION

A double-sided printed circuit board is available for this transmitter from the BATC's 'Members Services' department and its component layout is shown in Fig.7. The component side of the board acts only as an earth plane, and where possible component leads which are connected to ground should be soldered to both sides of the board. Although HC18 or HCU25-U crystal packages are most often used for frequencies over 100MHz, provision is made to use the larger HC6-U style as well. A suitable crystal is also available from BATC. Trimmers should be good quality PTFE film types. Try to use Mullard or DAU makes as these are among the high quality ones available (note that this

type of trimmer is not intended for lots of "twiddling" and may become unserviceable if subjected to too many adjustments). All lower value capacitors are miniature plate ceramic. One 100uF electrolytic is axial mounted whilst the other is a vertical radial type. A small heatsink should be fitted to Tr6.

L2 and L3 are wound in opposite directions and should be wound to fit the holes provided. The screen lead of Tr1 may either be clipped off or soldered to ground on top of the board. It is good practice to ground the crystal case.

A suitable sized hole should be drilled to accept the former used for L1. The former should be glued into position and 3/16" holes drilled in the board at the places indicated for Tr3 and Tr4. These transistors are mounted on the print side of the board and carefully soldered to the tracks provided, the leads being clipped short as required. Care should be taken to ensure that the devices are installed the correct way round. The printing on the transistor package should face downwards.

The completed unit should be housed in a screened metal box fitted with a BNC socket for the RF output. Power is fed in through a 1000pF feedthrough capacitor.

ALIGNMENT

Alignment is straightforward and may be carried out using the minimum of equipment. The RF 'sniffer' shown in Fig.8 should be constructed as shuld the output power indicator in Fig.9. Both units can easily be wired on a piece of Vero board or even across a tagstrip.

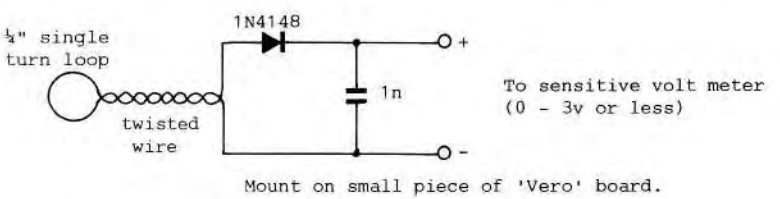


Fig.8 An RF 'sniffer'

Temporarily up-end Ch3 and apply power to the unit. Check that there is +8 volts at the collector of Tr1. Using the RF 'sniffer' probe described (Fig.8) place the loop over the oscillator coil former and adjust the slug until the oscillator starts, indicated by a reading on the test meter.

Now place the probe near to L2 and adjust its trimmer for maximum indication, the correct peak will probably be the one occuring at minimum capacity. Whilst in this position, re-peak the oscillator coil for maximum output then withdraw the slug about a quarter turn, this should ensure that the oscillator starts readily. Switch the unit on and off several times to check that it does.

Re-connect Ch3 and turn the 'bias' control (P1) fully clockwise. Set the video gain control to minimum. Make a test load/detector circuit as shown in

Fig.9 and connect it to the RF output.

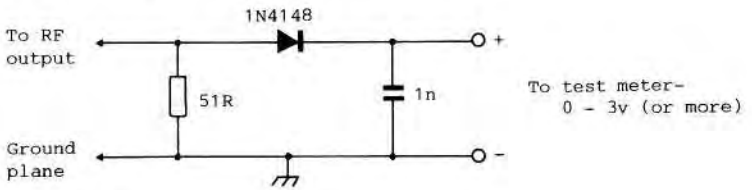


Fig.9 **Output power indicator**

Apply power and adjust L2, L3, L4 and L5 tuned circuits for maximum indication on the test meter. Adjust the Pi output tuned circuit for maximum output (one capacitor should be played off against the other).

At this stage a variation in the output power should be noticed if P1 is adjusted. If all is well, apply a video signal and turn up the video gain control. Turn P1 slowly anti-clockwise and as you do this the output power reading should fall. This indicates that video modulation is present. Do not be troubled if, when modulation is applied the indicated power output falls considerably. This does not mean that the actual PEAK power is degraded, it is merely the effect of the power meter which is averaging the power indication. To establish the peak power level simply unplug the video signal and watch the power meter, it will be indicating the ACTUAL power output level.

Monitor the output signal either using a monitor probe or by receiving the signal on the station ATV receiver, and adjust the bias control for correct video/sync ratio. In practice this is usually almost at the fully anti-clockwise position. The video gain control should be turned up until just before the whites start becoming over-white, which indicates that white crushing or 'flat-topping' of the video waveform is occuring. In other words you are driving the amplifiers into non-linearity.

This transmitter has been carefully designed so that even when adjusted without the aid of a spectrum analyser all harmonics are better than 30dB down. However, if equipment is available the transmitter should be aligned for minimum harmonic content. The following table shows the typical harmonic output levels from this unit after correct alignment.

0.5 x f	-42dB
2 x f	-44dB
3 x f	-38dB
4 x f	-42dB
5 x f	-38dB
6 x f	-41dB

where f = carrier frequency.

TV ON THE AIR

By Andy Emmerson G8PTH

Yes, it's activity time again! A healthy crop of letters has arrived so let's dip in and see if your neck of the woods features this time round.

ACTIVITY ON 70 AND 23cm

And the first communications is from Henning SMOEKG in Gullholmen, Sweden. "Iam not yet active on ATV, only on SSTV," he writes. Fast-scan ATV is not really established in Sweden yet, but hopefully it will grow soon. There is more activity in the Oxford area, from where Jeff Jefferies G8PX writes. "We have been keeping up our local skeds on Tuesday and Thursday evenings, also Sunday mornings on 70cm. As I have no antenna for 23cm I cannot report what is going on but the odd bit of eavesdropping indicates that G3NNG, Des of Faringdon has received G4CRJ and some stations in the Midlands on 23cm, and has a transmitter ready to fire up.

"One new station has appeared on 70cm ATV and is Norman G6ASA. He has a good site on Cumnor Hill and obtained a rig and a Sony camera at a bargain price at the RSGB HF rally (Milton Common). At present he has only one Watt but will soon be running 40 Watts from a linear he is fixing up. Phil G6MKK has reappeared only to go QRT with a blown transistor which should soon be replaced. He has a M/M linear which should increase his power to 30 Watts." Good work in the Oxford region then, and I hear rumours that studies are still afoot to build a TV repeater in the neighbourhood.

THE FROZEN NORTH

Moving north to Ashton in Makerfield (near Wigan) we have a letter from Mike G1LWX, who says "Just a few lines to let you know of activity here in the North West. At the present moment it seems zero in this neck of the woods, although there are quite a few stations down in Stoke working through their local repeater GB3UD. I must admit that I myself have been inactive for 18 months owing to a move of QTH, plus having to go through the throes of obtaining planning permission etc. for what the XYL calls 'that thing in the garden'.

"However, I am now back on 70 and 23, and monitor the calling channel whenever I am in the shack. The lineup for 23 is a homebrew loop yagi, a Camtec preamp, a Wood & Douglas front end and VIDIF board, with homebrew sound demodulator. The transmitting side is a Solent 1 Watt tx - it is hoped to up the power using a BLV93 as soon as funds allow. In spite of being 30-plus miles from the Stoke repeater I receive a P4 signal from it and have managed to access it using just 1 Watt. Stations worked include G3OGD, G4DVN, G1GST, G3DFL, G4CBW and G1OLX. G1DDA and G4CBW have been worked simplex with a strength of P5 both ways. So how about asking for some activity in the North West? I will help as much as possible if any station requires info: they can phone on 0942-72015."

SLOW-SCAN too ...

Some slow-scan news comes from our regular scribe, Roland G4UKL down in deepest Cornwall. "There seems," he writes, "to have been a considerable

upturn in the numbers of slow-scanners on the bands. Seventy-nine new European stations have been on my screen during the past five months, 42 with colour, both line sequential and composite modes.

"The IVCA European SSTV net has been running since 11th October and because of the central location near Lake Constance, DJ0GF calls the net and regulates the traffic, but he has blind spots and cannot see everything, so I act as forward relay, with EA5FIN in La Monga picking up the eastern Mediterranean stations. After a good start, the net encountered some delays caused by individuals taking too much time discussing their specific problems. Some of these, because of language limitations, were not understood by all and as a consequence the transmission and relay of pictures dwindled ... as did the number of stations calling in during following weeks.

"Secondary problems were the time of the net and finding a frequency in the slow-scan band that was not occupied by CW and R/T stations. The latter is always troublesome: R/T DXers may only faintly hear SSTV signals from distant stations and promptly call CQ DX or tune up. One fact of life the SSTVer soon learns is that the IARU band plans are largely ignored or are not known. Even the RSGB typically gets it wrong. I cannot see how overcrowded bands can sustain the rising level of activity without keeping to the recommended band plans. Some interference is malicious and deliberate, whilst others choose to exercise "their right to use any part of the frequency allocation they like" ... bloody-minded because "the licence doesn't mention band plans" and they "know their rights". Perhaps there is a case to be made for including band plan allocations in the RAE syllabus!

A SOLUTION?

"After this digression I will now tell you the manner in which the problem is to be solved and the manner in which the IVCA is to be conducted from now on:

"The net will originate at 1400 GMT using as near to 14.23 for the SSTV calling frequency as possible. The recommended working frequency is to be 14.35 plus or minus, the reason for this being to avoid a clash of frequency with the North American SSTV net. The first hour of the net will be for the transmission and relay of pictures. The subsequent hour or so will allow technical discussion, questions and experiment. Pictures can also be sent. In this way we hope to satisfy all interests. Regular callers into the net include I1HJP, CT1AKD, DJ1KR, DK3UG, HB9ANT, EA5FIN, SP4KM, SM5EEP, SP1UY, PA3CIZ, G0ALV, LZ1OW, PA3EKI, SP5DDJ, CT1PS, OE1HAB, GW0HWK plus DJ0GF and G4UKL. 'Visitors' include K4TGC, WA2FDL and VO1SA.

"ROBOT UK Ltd tell me that they are concentrating more on the commercial side of their activities. The models 450C and 800 have been discontinued but the ROBOT 1200C is still currently available. As a matter of interest, the ROBOT 1200C costs $1499 in the States and is usually haggled down to $1350. With the dollar at 1.48 the UK price was £1395: it is currently 1.83 but the 1200C curiously remains at £1395!"

Hmm, nothing curious about that to my thinking, Roland. Most importers try and justify the one-for-one dollar to pound conversion, with the same kind of arguments you would use for selling snow to Eskimos.

... AND A DISSENTING VIEW

Mike Stone WB0QCD is extremely concerned about the IVCA's move to 14.35MHz. "They want to go near the band edge for better protection against interference, but I must differ. 14.230MHz has been recognised (ever since SSTV was agreed on the HF bands) as the place to met and send ham TV pictures. It has been published in countless articles, journals and handbooks and it would take years to get the word out of any change. Just because the vocal minority wants to see a change does not mean that years of establishment should be uprooted on one weekend's notice. I have questioned the IVCA SSTV organisation many times before and at the risk of opening up new wounds, I think the motivation behind this issue must be questioned. Once agin the IVCA has failed to seek out the opinions of other SSTVers or SSTV supporting groups (such as the larger USATVS membership). This, as they should know, was a near-fatal blow to such rapid decisions in the past. This is, by the way, not the first time the IVCA has sought such a QSY move. It happened before and basically got shot down for lack of support. A whole new generation of impressionable SSTVers are now active who don't remember the past but fortunately so too are a number of us old-timers who do not forget the problems with IVCA so easily. Yes, 14.230 is plagued with interfering DXers who do not nor probably never will respect the beauty of sending visual pictures. Has anyone thought that perhaps, just perhaps, it is the attitude of some SSTVers on QRM responses that infuriates these DX hounds even further? I have been ashamed at some of the language and tactics on 14.230MHz by a few SSTVers over the years. 14.230MHz has enough daily SSTVers monitoring and operating the frequency to keep it respectfully clear for TV contacts. If a battle begins, use tact not higher power. Never acknowledge the interfering station, try and explain why SSTVers are huddled in one small area so not to interfere with other users. Once the culprit realises he is irritating successfully, his ego is inflated.

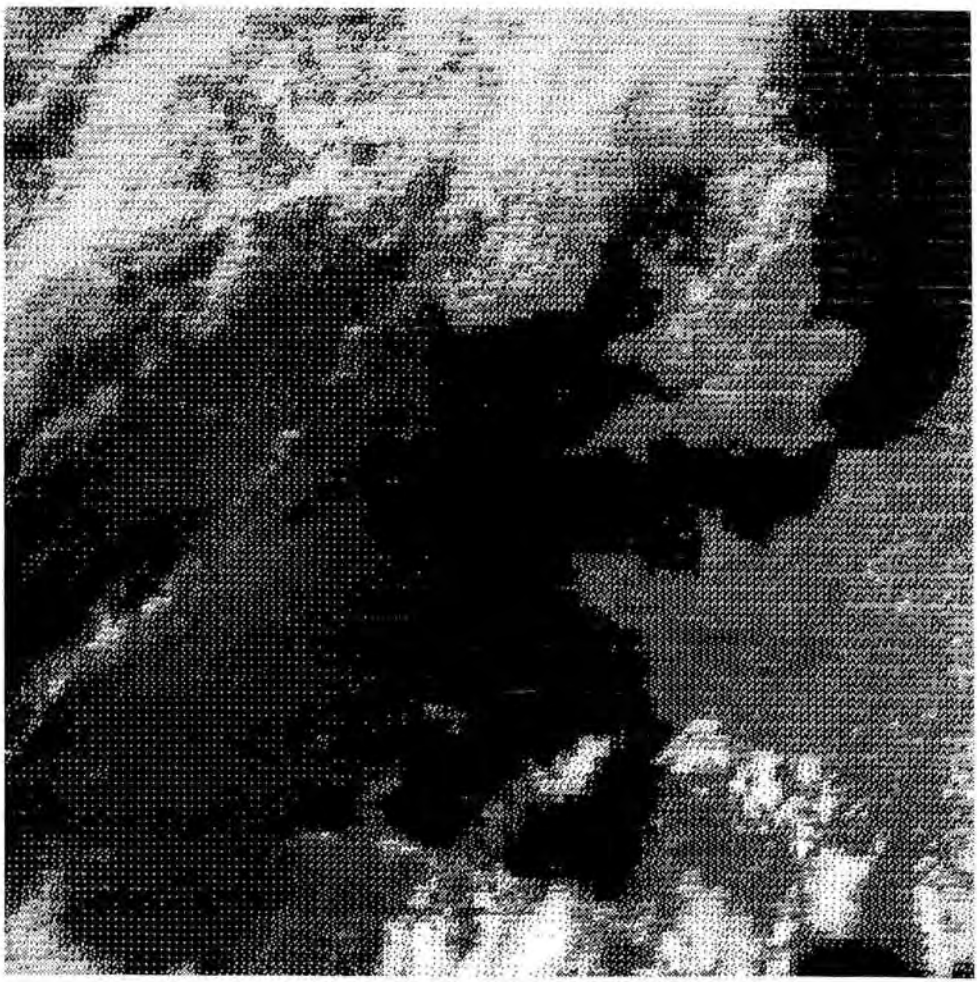
"The idea that moving clear of 14.230 to 14.35 will make the problems go away and make SSTV 'fun again' is very naive to say the least. One must ask the question, what happens to 14.230MHz when everyone QSYs to the other end of the band? Someone is ignoring the established phone-patch groups on the high end of the band. Go there and listen sometime. I don't think they will tolerate the newcomer shrilling SSTV tones any more than the DXers who are already used to it.

"Something else to think about. The commercial interests are always chopping off the very end segments of our precious bands. What happens if that ever takes place on 20 metres? I can tell you the result - 14.230MHz will never be recovered! The fall of 14.230MHz will be the final fatal blow to an already hurting SSTV mode. The mode needs more friendliness, fun and companionship - not just a clear frequency. The IVCA attempt to QSY is clearly yet another il-conceived plan to separate the cliques on SSTV even further."

Strong words - what do YOU think? How much clout has the IVCA got and is it right to take these decisions? Is the situation in Europe comparable? Is the world of SSTV riddled with cliques? Are SSTVers rude and deserve their own fate? Or are there too many DX hounds who ought to brush up on band plans? Can 20 metres muddle on or do we need a wider debate? Should the RSGB get involved? Drop me a line and let me print your opinion! And let me have all your activity news at the same time.

71 Falcutt Way, Northampton, NN2 8PH Tel: 844130 (answerphone).

KEEP A WEATHER-EYE



Grant Dixon, G8CGK has sent in this fascinating picture from his weather satellite receiving station. The picture is computer processed and printed using a standard matrix printer.

Grant started by writing a program for the Triton to produce SSTV pictures but, now that the Triton is almost defunct, has now done a similar one for the Spectrum. Having got that working for SSTV the Spectrum was then interfaced to the framestore of weather satellite receiver and this picture is the first print of that effort.

MAINLY SSTV

By John Brown G3LPB,

Having entered the computer side of the hobby, I was fascinated to find a lot of Spectrum programs available which included SSTV, RTTY, CW and many others. Amongst these was the excellent G8XEU ATV program, this gives all sorts of displays including test cards, maps, colour bars and differing sizes of text. I think G8XEU should be congratulated, he must have spent many hours writing the various routines. It is a must for any shack.

The SSTV programs are too numerous to mention although I have tried all those available. They all loaded without difficulty and all gave different types of screen presentation. In my estimation they are not real SSTV allthough they are effective in operation. They do not really compare with the digitised display, or even the tube type now referred to as 'old hat'. This is probably due to the limitations of the Spectrum's memory size and bit handling capabilities.

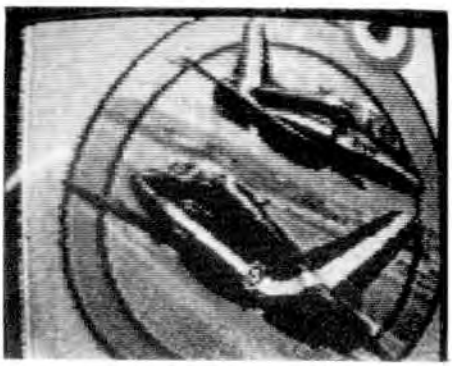
Amongst the SSTV programmes were some from Belgium. Another from ON6LJ produces two screens; one with a larger capacity than the other. Data can be entered during the transmit period quite easily and the required screen easily selected, the result is quite unusual but very effective. Also written by ON6LJ is an RTTY/CW program that requires a simple interface unit between the radio and the computer. Another program was written by ON5KN and is a multimode version that provides SSTV, RTTY and CW, both transmit and receive. Once again an excellent effort.

I am at the moment in the middle of trying the G4ENB system for SSTV. It looks as if it has all the right ingredients, allowing 8 or 24 seconds speeds, with a colour capability at the higher speed selected by keys in either the line sequential or frame modes. There are two circuit boards used; one analogue and the other digital. I have some snags with the system at present which I will no doubt get sorted out easily enough.

Most of the programs use the ear socket on the Spectrum for connection to the radio equipment. Here I found the use of a switched filter necessary to get the best results as that input to the computer lets all sorts of noise through.

Another interesting program, written by G4IDE and known as 'Wefax' is being examined at the moment. It seems that you need a receiver tuned to the Wefax stations and an audio

feed to the computer. A clock timing board has to be plugged into the edge connector of the Spectrum to maintain sync with the incoming data. I have yet to test this system fully as I need to build a little VLF receiver. It is a far cry from the ZX81 which gave such trouble and FUN!



A slight change of tack now as I have a little moan. The SSTV net on Sunday mornings gives a lot of pleasure, not only to those operating but also to those just watching. It would be nice if other users of the bands could avoid the SSTV frequencies. The net uses the allocated spots in the bands yet some stations still cause interference, much of which seems to be intentional. Some operators obviously do not realise that SSTV is being transmitted, but many more do.

Equipment generally in use appears to be Robot, with some DRAE units in evidence - the latter not supporting colour transmissions. The most active band appears to be 80m, where one can find operators sending colour, even in the 96-second mode. Black and white appears to be out of fashion now. All power to their elbows and long may they entertain those of us who just watch.

In closing I have a few queries which some of you may be able to answer for me:

Can the G8XEU program be changed to allow you to enter your own call sign and QTH etc?

Can anyone make up a simple PC board for a Wefax receiver?

Many thanks to G8XEU, G1FTU, JEP Electronics, Scarab, Technical Systems and the ON stations mentioned for all their efforts, which were appreciated at least by me and by many others I feel sure. Last but not least, thanks to G4HLX and Grant Dixon G8CGK for their most fascinating and interesting Satellite programs.

AUDIO DISTRIBUTION AMP'

By Anthony Fouracre

To complement the recent series 'Sound in the Studio' the circuit presented here is a one-in ten-out audio distribution amplifier with balanced inputs and outputs.

The design has plenty of 'head room' delivering up to +16dBm into a 600-ohm load with good frequency response and low noise. Construction is fairly non-critical and may be on Vero or similar stripboard. The transistors should be mounted on suitable heatsinks.

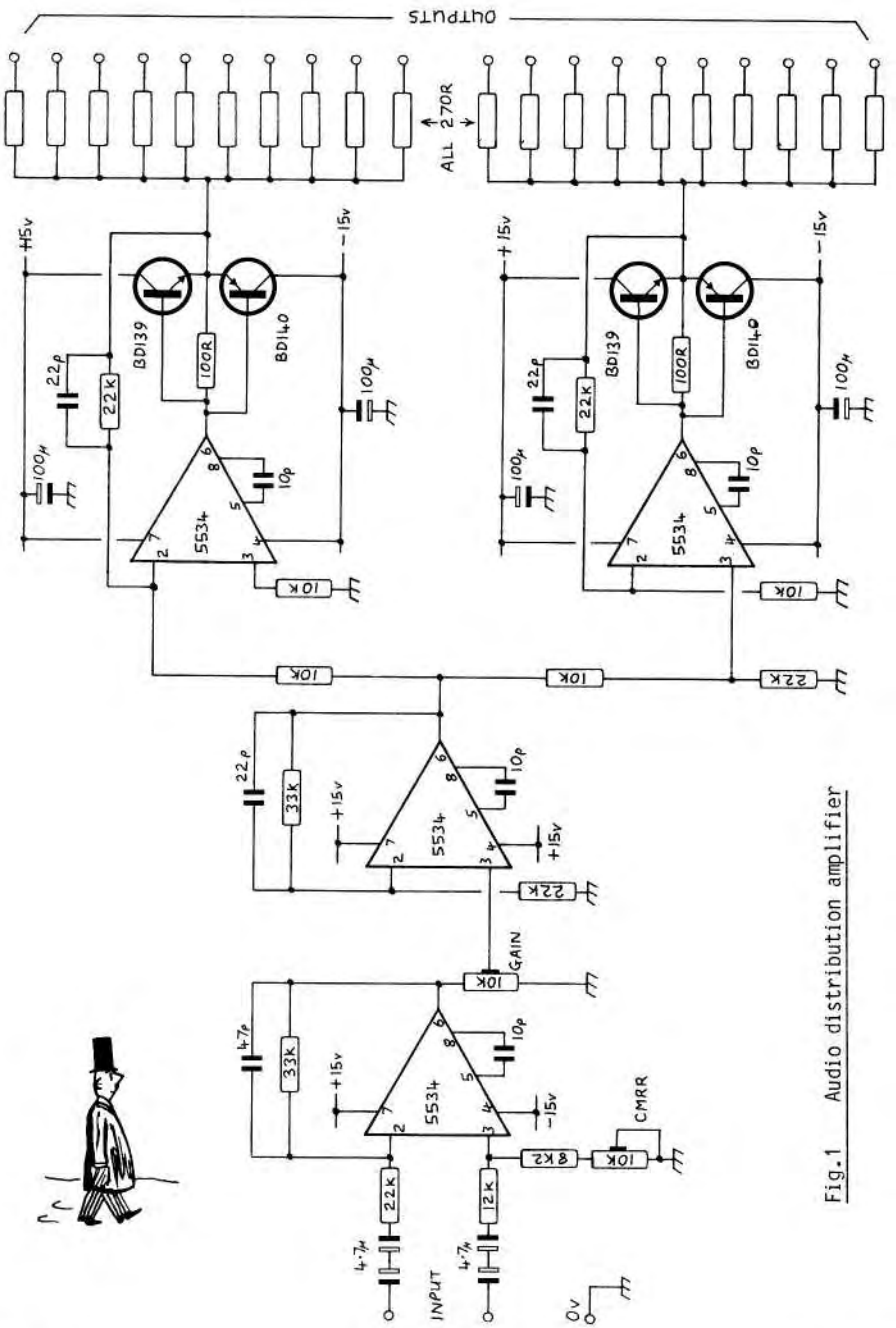


Fig.1 Audio distribution amplifier

AN FM-TV MODULATOR

By Michael Sheffield ZL1ABS and ZL1TBG

The NE564 PLL IC is well known for its use as an FM-TV demodulator but it can be used as a modulator as well. The specified frequency range of the NE564 is up to around 50MHz although many devices will go higher. The use of higher frequencies (such as 70MHz) in receivers though can often cause problems, however no such problems have been encountered whilst using the '564 as a modulator. The design presented here will work over the range 30 to 70MHz.

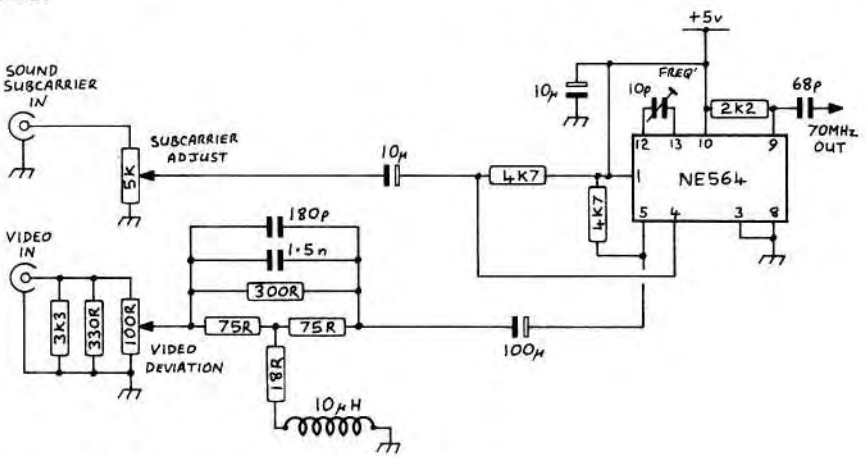


Fig.1 FM Television generator

Because there are two inputs available the one not being used for video can be used to inject a sound subcarrier. This removes the need for a separate mixing stage or any sound traps in the vision path. Since the sound signal is symetrical (sinusoidal) it doesn't matter if it is inverted, therefore if the oposite video polarity is required pins 4 and 5 can simply be swapped over.

Video is applied to an adjustable 75-ohm termination network, the control of which is used to adjust video deviation. Note that video and sound carrier deviations are independent of each other in this design. The video signal passes through a conventional CCIR pre-emphasis network and then on to the NE564.

An audio subcarrier is terminated in a 5k potentiometer (this value can be changed to suit the output of any available sound source) and the signal, whose level is adjustable, is passed to the NE564.

This design is ideal for use with a conventional linear transverter in which case an IF of around 70MHz is about right. It can also be used as a test transmitter for setting-up demodulators, the circuit is then adjusted to the desired IF frequency.

TOWARDS BETTER EDITING

By Trevor Brown G8CJS,

There is no doubt that the Camcorder is finding its way into our hobby. Many of us have always wanted to own an up-market TV camera, and buying one with a built-in VCR makes sense in that it can also be used for making a record of the family growing up etc. However, before starting to amass archives of material that some day we may wish to edit, and because the technology of video editing has arrived, the need to go back and re-shoot missing shots from your daughter's wedding, or son's speech day, or whatever must be eliminated. Video editing may be quite sophisticated, but the technology perceived in H.G.Wells' day has still not arrived, thus the ability to re-take a long past event is as yet still unavailable to us.

Editing is the science of sifting through material and deciding what to keep and what to throw away. It is the science of how to fit bits together and of making the end product full of impact and interest, presented in the best possible way. Wonders can be worked at this stage, but there is no substitute for shooting things correctly in the first place. There are rules to be mastered, and only when you have learnt them all (and perhaps broken a few) will you be in the position of shooting pictures that can be edited together.

The areas where you can apply production planning vary, but a situation that you can control is better than a live event that you can't. There may be some mileage in getting together with another camcorder owner to cover a presentation, where one of you can cover the wide shots and the other the close-ups. Bands and orchestras for example could be covered as a wide shot, but how about getting some close-ups of each instrument making its contribution at the rehearsal and editing these in at the relevant point. Remembering of course to record the sound at the rehearsal in order to find the correct place to edit in the close-up shots. You may not know which fingers produce which notes on various instruments but others will! By shooting a wide shot version of a performance, close and mid-shots from other performances you can end up with a usable take which can be moulded into the finished article on a pair of editing machines.

To shoot something which is useless without editing is very brave, but also very interesting and educational. The subject I have chosen for this treatment is an interview and what follows are a few simple guidelines which, if followed, should result in a good take.

1) The on-camera microphone is never good enough to cover even a one-to-one interview. Take the microphone off the camera and get an assistant to hold it out of shot and provide him with a feed of sound via earphones if possible. If you are short-handed then resort to the interviewer holding the mike.

2) Do not film the whole interview in two-shot fashion or pan back and forwards between the two speakers. Keep on the person being interviewed and when it is over leave the interviewer in position and move the camera around to get some shots of him, not just nodding but repeating one or two of the questions. These shots can then be edited into the take at the appropriate points. If the mike was held by the interviewer keep it out of these shots and also watch the position of the arms which may be wrong and spoil the illusion.

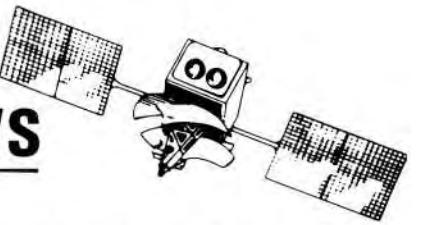
3) If anything illustrative was mentioned in the interview which is at hand, then get some shots of it at this point so that they can also be edited in.

4) The last 'rule' is the golden one. If the interview dries-up and then restarts, change the camera position so that when the two parts are stitched together later it will look like a cut to a different camera. Similar shots from the same angle cannot be effectively joined together. Multiple interviews need linking material between them unless they are in different parts of the room and using different interviewers. If this is the case hand over to the next interviewer at each change to ensure a smooth and continuous flow.

The rule on moving camera positions before restarting the interview could also apply to camcorders, which make edits every time you stop and start, and need not be reserved for projects destined for the editing suite.

All that is needed to ensure a good finished video is a little thought and planning, and perhaps the power to visualise the end product.

SATELLITE TV NEWS



By Gef Ford

Hi there satellite TV fans and welcome back to Satellite TV News. A few changes have taken place on the satellite scene since the last publication:

MTV is now transmitting pop video's, gig guides, news and views 24-hours a day on Intelsat. There have also been new test transmissions on some of the other birds, including a spanish one on channel-10. There is even some BBC TV being transmitted to Scandinavia, however it is scrambled (as a hybrid).

Talking of which Premier is now scrambled, however Sky is still in the clear - but not for much longer so make the most of it while it lasts. There are also a few other scrambled transmissions using different modes including some MAC variations, some of which are only test cards, stills or just blank signals with and without audio tracks. These are on both Intelsat and Eutelsat as well as some other fringe satellites in between, so keep your eyes peeled next time you are switching through from one satellite to another.

Of course if you have a fancy automatic system I'm afraid you won't know what I've been talking about! However, if you have a manual receiver or remote control with scan facilities and a manual dish controller, you can stop the dish where you like and have a good look round.

THE SCRAMBLERS

The continuing practice of scrambling some transmissions will of course serve to make the clear ones more popular. The problems causing scrambled transmissions are quite complex, however a lot of it is caused by economic pressures as the programme providers say thay are not getting their subscription fees (for the pay channels). But their feeble attempts at collecting it are only too evident. Instead of sorting themselves out before the launch of Astra, and no doubt some other high-powered free transmissions on other birds, and thus promoting the use of satellite TV (there are still an awful lot of potential viewers waiting to be wooed), they are following in the footsteps of their American counterparts and scrambling the signals thus limiting the number of viewers. In so doing they hope to increase their revenue by charging extra for the special decoders and, due to a general lack of technical know-how, the honest viewer reaches deep into his pocket and pays for an official decoder.

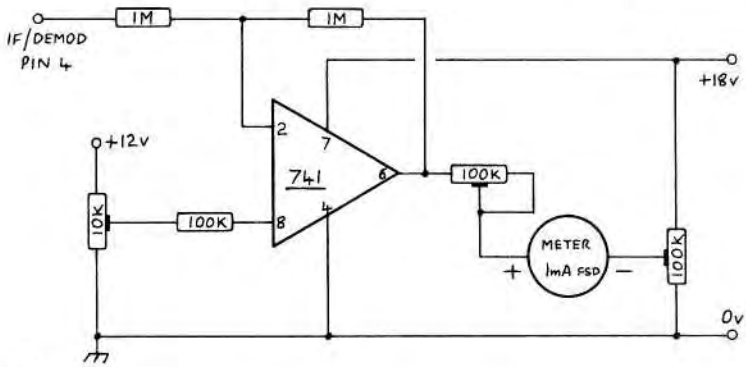
SYMPATHIES

My own sympathies lie firmly in the anti-scrambling camp. But if all the program providers do scramble and each uses a different system, in a very short time the viewer is likely to end up with a bill for decoders larger than what his system cost in the first place! The're not winning though. Within hours of Premier being scrambled I saw a modified decoder working - where there's a will.....

All of this of course is likely to be good news for the cable distributers, however not all of us live in a cabled area so have no choice but to use a direct satellite receive system. Be careful when buying a system though. The

method of scrambling can, and often does change, so don't get a decoder which only works on one system, because it is likely to be made redundant in a very short space of time. Try and obtain one which is not too difficult to have modified when necessary.

Don't forget that it is still illegal to view subscription channels without paying or other channels without permission.



ASTEC 'S' METER

Here's a simple little circuit which enables a signal strength meter to be added to a receiver using the popular Astec modules. The signal sense output is taken from pin-4 of the AT 3010 IF/demodulator module and applied to one input of a 741 op-amp. This voltage is compared with a fixed potential on the other input and the resulting output fed to a 1mA FSD meter movement.

Construction is straightforward and non-critical and may conveniently be on Vero board.

Finally, if you have any news, views, questions or enquiries then please drop me a line care of the Editor CQ-TV (address on page two). Don't forget an SAE if a reply is required.

POPULAR SLOW-SCAN FREQUENCIES

80 metres:	**3.730MHz**
40 metres:	**7.040MHz**
20 metres:	**14.230MHz**
15 metres:	**21.340MHz**
10 metres:	**28.680MHz**
2 metres:	**144.50MHz**

COMMODORE COLOUR BARS

By Len Smith,

This short routine for the Commodore CBM64 computer provides a colour bar pattern, useful for test or transmission purposes. The background colour can be changed by altering the 'Poke' commands in line-50. Line-60 determines the number of bars available and, by changing the order of the data in line-100, the order of the bars may be changed. Line-250 could also have the station call sign in the string.

```
 1Ø REM COLOUR BARS
 5Ø POKE 53280,Ø:POKE 53281,Ø
 55 FOR X = Ø TO 24
 6Ø FOR A = Ø TO 7
 65 READ Z
 7Ø POKE 646,Z
 75 FOR B = Ø TO 4:PRINT"[R] [space]";:NEXT B
 8Ø NEXT A
 85 RESTORE
 9Ø NEXT X
1ØØ DATA Ø,1,7,3,5,4,2,6,Ø,
2ØØ PRINT
25Ø PRINT "COLOUR BAR TEST PROGRAM"
```

WIRE SIZING TABLES

compiled by Peter Delaney, G8KZG

Circuits are often to be found that contain instructions for winding your own inductors. There are several systems for describing the wire diameter in use - most circuits originating in the UK use s.w.g.; in the USA a.w.g. is normally quoted; and in Europe mm dimensions. The following table may help amateurs in various countries to use the winding data provided.

s.w.g	mm	a.w.g	mm
16	1.626	16	1.290
18	1.219	18	1.024
20	0.914	20	0.810
22	0.711	22	0.643
24	0.559	24	0.511
26	0.457	26	0.403
28	0.376	28	0.320
30	0.315	30	0.254
32	0.274	32	0.200
34	0.234	34	0.160
36	0.193	36	0.127
38	0.152	38	0.099
40	0.122	40	0.078

The 'odd'-numbered wire gauges are sometimes used, but these can be easily estimated by reference to the nearest sizes given above. When converting from millimetric sizes, an exact equivalent will rarely be found anyway, but the nearest 'even' numbered gauge wire will normally suffice.

MMICS AT RF

From Elektor Electronics

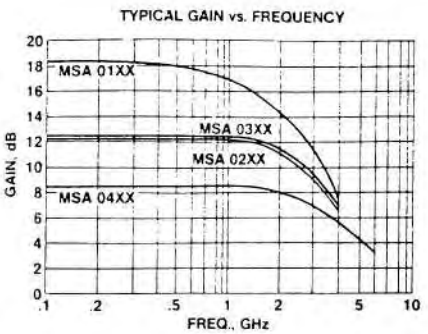
A recently introduced range of devices from Avantek now make the designing and building of wideband high-performance RF amplifiers a great deal easier. The devices are known as Monolithic Microwave Integrated Circuits, or MMICS for short. Previously they were only suitable for use in commercial telecommunications equipment, but this new range is plastic encapsulated rather than of the previous ceramic construction and as such is much cheaper.

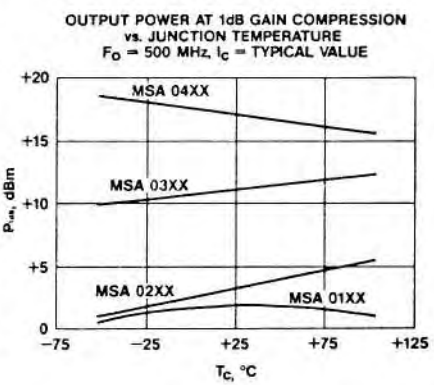
WHAT IS A MMIC?

MMICs are essentially silicon bipolar wideband amplifiers in a hybrid package. They house an accurately engineered Darlington transistor configuration with extremely low stray inductance and capacitance. Internal series and shunt feedback networks ensure high repeatability from amplifier to amplifier.

The four devices in question are the MSA01 to MSA04, and the main differences in operating parameters are shown in Fig.1. As with all devices there extra coding numbers that are added to the device number that indicate electrical performance, package style, supply voltage and performance. A full list of the various options is available from Wave Devices at the address listed at the end of this article.

The gains of the devices in question exhibit a remarkable flatness from 100MHz up to 1GHz, with types MSA03 and 04 reaching up to 2GHz with a gain ripple of +/-1dB. In a standard amplifier based on discrete components this sort of performance is almost impossible to achieve without resorting to elaborate feedback networks and expensive gain-controlled active devices.

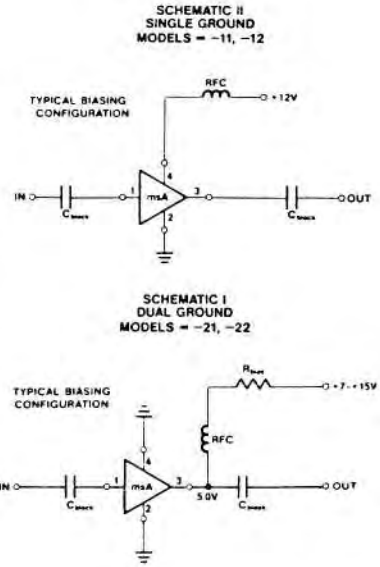




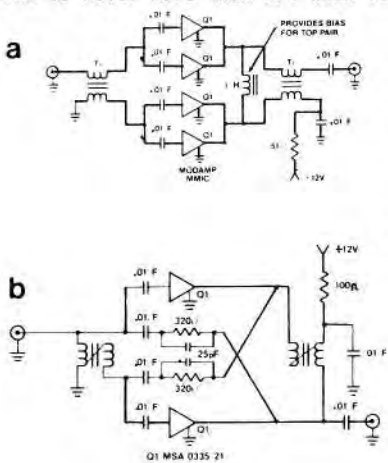
MMICs are wall suited to cascading in 2 or 3-stage wideband amplifiers with total gains of up to 25dB. In general, the RF input stage will be dimensioned for lowest noise figure, whilst the second stage is set up with a MMIC that ensures high gain.

DROP-IN AMPLIFIERS

MMICs are often referred to as drop-in amplifiers, by virtue of their direct matching to 50 ohm sources and loads, their unconditional stability and immunity to source or load impedance variations (eg: as is experienced by filter drivers) and also by the absence of alignment points. Fig.2 shows the remarkably simple basic configurations of amplifiers based on MMICs.



The difference between the circuits is mainly in the connection of the chip to the supply voltage, and this is dependant on the device option being used. The only other components required to make a functional wideband amplifier are two suitable RF sockets (BNC,SMA,TNC) and two blocking capacitors. One of the most striking characteristics of the MMIC based amplifier is the total absence of any form of impedance matching circuitry at the input or output. This obviates the need for difficult to make inductors and of the decoupling of the bias potential applied to the amplifier input. The input and output impedances of the MSA series of devices is 50 ohm and the VSWR is never more than 2:1 when fed with the recommended supply voltage.



The circuits shown in Fig.3 demonstrate the ease with which MMICs of identical type may be connected in parallel, thus increasing the power output. Each chip requires a blocking capacitor at its input, but only one capacitor is required at the output of the amplifier. The input and output impedances of the amplifier are both the same and are equal to 50/number of devices, thus to maintain 50 ohms a balun is required at both input and output as shown.

Fig 3b demonstrates how multiple MMICs can be connected to form a unilateralised push-pull amplifier. This type of circuit provides high isolation between input and output, and is a technique which stabilises an amplifier by cancelling both the imaginary as well as the real terms of the feedback elements.

For further information on this and other devices, and for availabiliy please contact: Wave Devices, Laser House, 132/140 Goswell Road, London EC4 7LE.

The Editors would like to thank Elektor Electronics Magazine for permission to re-print this article, which first appeared in their January 1988 issue.

PULSE & BAR TESTING

By Allan Wood G3RDC

Over the past few years amateur television has made giant strides in technology. Amateurs today are not satisfied with indifferent quality black-and-white pictures and are constantly striving towards the production of near-broadcast quality signals. The nearer we get to this ideal the more sophisticated must be our measurement techniques and the more critical we need to be of our equipment.

When considering the testing of wideband circuits most of us think in terms of the frequency band which it will pass without significant attenuation. Bandwidth is usually measured by applying a constant amplitude sinewave to the input, and monitoring the output whilst increasing and decreasing frequency. The bandwidth limits are the upper and lower frequencies at which the gain falls by 3dB.

In speech or music transmission the exact reproduction of the waveform is not all that important, so long as the magnitudes of the associated spectral components are reproduced with minimum distortion. The concept of sinewave analogies in this case yeilds considerable advantages in simplicity of thinking and in practical measurement.

In practice we are not much interested in measuring large amounts of distortion. Simply displaying the resulting picture on the screen is enough - we hardly need to specify it in terms of the waveform response! Similarly, very small distortions are not usually worth measuring because they will not be discernable to the eye so who cares anyway? What we need is a method of determining modest amounts of distortion and, if possible, do it in such a way that tolerances can be set as a target to work to.

Because of the extreme complexity of the video waveform and the need for more complete testing, it is best to abandon sinewave thinking and to seek another waveform which more nearly matches the types of waveform found in a video signal. Simple waveforms which might be considered are the step function, corresponding to a sudden change from one brightness level (shade of grey) to another, or a narrow pulse, corresponding to a single point of light on a black background (Fig.1). If you think about it, a picture can be built-up using a succession of these two waveforms occuring at appropiate times.

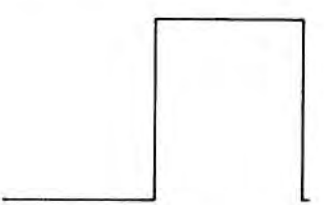


Fig.1a Step waveform

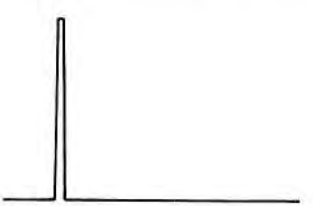


Fig.1b Pulse waveform

In choosing a suitable waveform we must try to make it satisfy the following conditions:

1. It should be representative of commonly occuring parts of a video waveform.

2. It should be simple enough that the presence or absence of modest amounts of distortion can be readily seen on an oscilloscope.

3. It should be mathematically simple in case we need to use it in calculations.

4. Its spectrum should be confined within the frequency band of interest so that distortion information is not presented from things happening out of band.

5. It should provide sensitive indications of distortions of different types likely to be found in practical systems. In theory of course, it is possible to select special waveforms designed to show each different type of distortion product.

6. The chosen waveform must be capable of being generated easily and accurately.

The waveforms which come closest to meeting these requirements are the step function and the narrow pulse as already described. To meet the requirement of '4' above the narrow pulse should not be too narrow. In any case, there is no point in having the pulse narrower than the smallest picture detail which can be displayed on the screen. The waveform chosen is said to follow a 'sine squared' shape, ie: it is derived from the square of one half cycle of a sinewave.

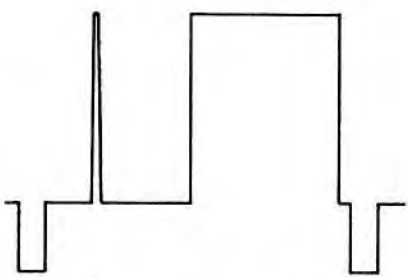


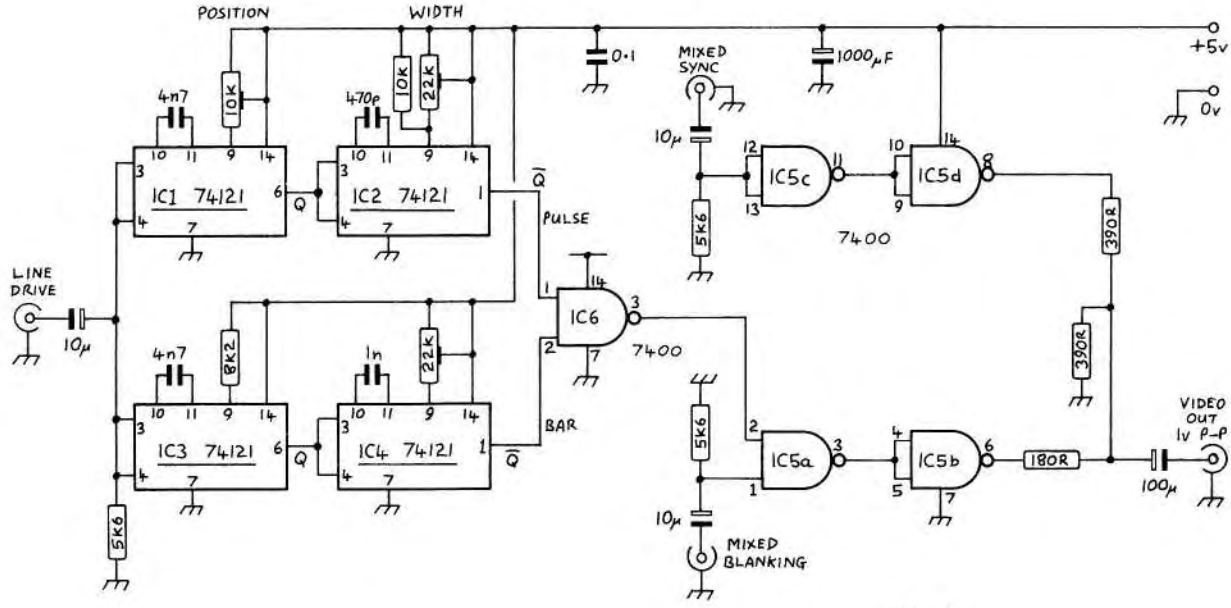
Fig.2 Pulse and bar waveform

If we now add TV sync and blanking pulses so that the results can be displayed on a TV screen as well as observed with an oscilloscope, we arrive at the waveform in Fig.2. This is known as the 'Sine Squared Pulse and Bar' waveform.

REASONS FOR USING THE SINE-SQUARED PULSE AND BAR WAVEFORM

1. The commonly used analogy of a waveform whereby it is considered as a number of harmonics of a fundamental sinewave signal is inappropriate to television testing because of the extreme complexity of a video signal.

2. A sinewave is in no way typical of a television picture, rarely does any part of a video signal look like a sinewave. If one needed a simple signal which could be regarded as more typical of a video waveform, then either a step function, corresponding to a sudden transition from one shade of grey to another, or a narrow pulse, corresponding to a small spot of light in a dark background, could be used.



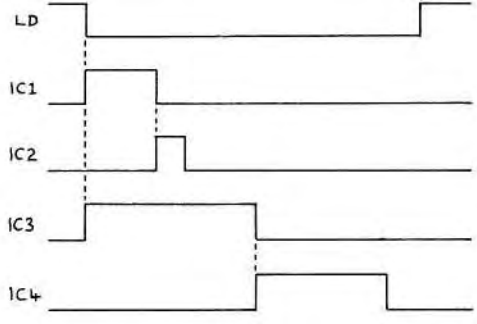


Fig.3
PULSE AND BAR GENERATOR

3. In television, the exact reproduction of waveform is essential for distortionless transmission. For this reason the phase/frequency characteristic is equally important as the amplitude/frequency characteristic. Whilst the latter is easily measured, the former is not - it would require the use of expensive and complex test equipment such as a vector analyser or a TV vectorscope.

4. Even if it were possible to measure both the amplitude/frequency and phase/frequency characteristics, it would still be extremely difficult to interpret the results to determine the effect of distortion on a picture.

5. In practice, the greatest difficulties for the engineer arise when trying to measure modest levels of distortion. If distortion is large it will be readily seen on a TV screen and hardly needs measurement. It has been found that, for practical reasons, it is convenient to specify the response in terms of the tolerances of distortion limits of a sine-squared pulse and bar signal when passed through a video system. These limits can be chosen to correspond to any desired amount of picture impairment.

6. The sine squared pulse and bar waveform itself was chosen as most appropriate for the following reasons:

a) it is representative of commonly occuring parts of a television picture.
b) the shape is simple enough to readily identify distortion when displayed on an oscilloscope.
c) the shape is mathematically defined accurately enough for use in calculations.
d) the spectrum can be confirmed to that appropriate to the frequency band of interest.
e) it is sensitive enough to readily show modest distortion levels.
f) it is readily reproducible by manufacturers.

USING THE WAVEFORM

There are many ways in which the sine squared pulse and bar can be used so let's consider a few of them:

To keep the pulse spectral components within the band of interest its half-height width must be chosen carefully. This pulse width is:

$$\frac{1}{2 \times 5.5\ \text{MHz}} = \frac{1}{11\text{MHz}} = 91\text{nS}$$

If this pulse is passed without modification then the system must be passing all spectral components up to at least 5.5MHz.

EDITOR'S NOTE: since this article was submitted we have received a circuit from Michael Schoffield ZL1ABS for a simple pulse and bar generator. Although this design is not up to full specification it will nevertheless provide a useful waveform for general performance testing.

Fig.3 shows the circuit and also illustrates the various waveforms as well as showing approximately what the finished picture should look like. Construction is quite straightforward and may be on Vero board etc. Sync pulses - at approximately TTL level - are required to drive the generator.

SOLENT 24CM TRANSMITTER REVIEW

By Mike Wooding G6IQM,

Albeit certainly not a new product we still decided to conduct a review of the Solent 1 Watt 24cm transmitter, in order firstly to attempt to dispel the popular misconception that it is unstable, and secondly to introduce a new add-on synthesiser board.

CONSTRUCTION

The kit was supplied as standard from the Worthing Group and included the components, PCB, die-cast box and a comprehensive set of instructions. Although I am professionally involved in electronics I built the kit up and aligned it following the instructions as if I was, like most amateurs exactly that.

The techniques involved are straightforward and as long as good RF construction practices are adhered to the assembly presents no problems. The double-sided PCB is produced to a high standard, and I was very impressed by the use of plated-through holes to facilitate connections between the ground plane and reverse side of the board, this is much better than the usual method of wire stakes.

Most of the components fitted the pre-drilled holes correctly, although one or two of the small capacitors required careful dressing of the leads. This is due to occasional problems with the supply of exact types of components and is beyond the control of the Group. As stressed in the instructions all components should be mounted as close to the board as possible, and where appropriate soldered to both sides. Particular attention should be paid to the diagrams showing the exact placement of components in the RF stages.

Once completed the board can be initially tested before fitting into the die-cast box, but in my opinion this should be restricted to DC tests only. With stages operating at microwave frequencies, instabilities due to incorrect screening and earthing can cause you to spend hours looking for faults that are not really there. A small amount of 'metal bashing' is required in order to fit the board via the PA stage heatsinking aluminium blocks. The input/output sockets, power switch and tuning control are not supplied. The only tools required are a Stanley knife to trim the board to an exact fit (0.5mm spacing all round) and a drill and bits for the various holes. Take care to position the sockets carefully in order to avoid fouling components with fixing bolts, and ensure the availability of a space in which to solder the ground connection to the earth-plane on the PCB. The RF output socket is recommended as being an N-type, but I am quite happy to use a good quality BNC type here, the centre conductor of the socket being soldered directly to the PCB.

TESTING & ALIGNMENT

Instructions for testing and alignment are presented in an easy-to-follow stage-by-stage format and make for very quick and easy adjustment. The only test equipment required is a multimeter and an RF power meter with dummy load. A 1.3GHz frequency counter and an oscilloscope are useful but not essential, as long as you have a working 24cm receiver available.

Following the alignment stages in order not only allows the unit to be adjusted accurately, but also helps in the elimination of any problems that may be present. Some small modifications are noted in the instructions for any transmitters that exhibit low power at the top end of the band or fail to tune high enough. (I must point out here that this is in no way due to the design or construction of the unit, you should see some of the tricks we have to do at work to get microwave units to wobble correctly!)

The Solent transmitter with synthesiser board fitted.

As stated, the review model was built exactly as instructed and aligned on a frequency of 1249MHz. The output power achieved was 1.3 Watts, which dropped to 1.2 Watts after a 90 minute continuous test run. The frequency at switch on when cold was 1251.1MHz, after 5 minutes the frequency stabilised at 1249.7MHz and during the 90 minute test run only varied from that figure by a few KHz. I was unable to detect any spurious frequencies and any sub-harmonics were all better than 56dB down on the carrier. After the initial test run had been completed I detuned the transmitter, retuned with the aid of all the test equipment available to me at work and re-ran the test. To all intents and purposes the results were the same.

SYNTHESISER ADD-ON BOARD

Having achieved the results above I must admit to wondering why this synthesiser board was required. In the initial paragraph of the instructions coming with the unit the preamble suggests that the main reason is to overcome drift. However, if built correctly the unit does not exhibit this problem. Not all transmitters have been enclosed in the correct box though, so many stations will benefit from this add-on to cure drift. Also, another advantage of using this synthesiser is to give the ability to switch instantly to a second known frequency, rather than manually tuning to an approximate one.

DESCRIPTION

The circuit is built around a recently introduced IC from Plessey. This chip contains the circuitry required to carry out the high speed division, phase comparison and filtering. With its on-board oscillator and active elements it enables frequency sources to be crystal locked, thus giving stable and accurate outputs. The unit as supplied will house two crystals. It is impractical to have more than two locked frequencies as the Solent transmitter has a power bandwidth of the order of 25MHz, thus, selecting a frequency beyond this range will result in the transmitter requiring re-tuning. A third manual tuning position is also catered for if required.

CONSTRUCTION

The simple board is easily and quickly assembled, there being few components to fit, and what's more there is no alignment required. To enable the board to be fitted to the transmitter certain components on the main board need their positions adjusting, or, dependant on the options chosen, removed. Thus, if the synthesiser is to be fitted when the transmitter is initially built then attention should be paid to the diagrams and instructions accompanying the synthesiser, in order to make the necessary changes as the transmitter is assembled. Setting the synthesiser up requires no more equipment than was used to align the transmitter, and once again hints concerning possible faults are also included in the write-up.

CONCLUSIONS

The complete system can be built and aligned in a couple of evenings even by the most inexperienced, provided that the instructions are adhered to. The final unit functions extremely well and the ability to switch instantly between the two locked frequencies, or to return to manual tuning, gives a very flexible transmitter. The main complaint that is heard concerning the Solent is that it drifts. The test unit, built exactly according to the instructions does not drift any more than any other system I have worked with, and that includes non-locked commercial transmitters! With the synthesiser fitted even this small amount of drift becomes non-existent. The moral of the story is do as you are told in the instructions, most importantly mount the transmitter in the die-cast box supplied, and it will work correctly.

The final specification of the transmitter is shown below. Having built, used and reviewed the system I can heartily recommend it. For further information please refer to the Worthing and District Repeater Group advertisement elsewhere in this issue.

OUTPUT POWER ---------- 1.3 Watts
After 90 minute soak test ---------- 1.2 Watts

FREQUENCY LESS SYTHESISER ---------- 1251.150MHz
After 90 minute soak test ---------- 1249.725MHz

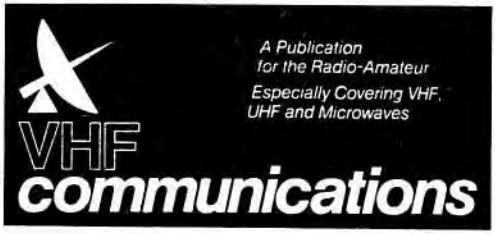
FREQUENCY WITH SYNTHESISER ---------- 1248.995MHZ
After 90 minute soak test ---------- 1248.995MHZ

BANDWIDTH AT 1.2 WATTS ---------- 1245 TO 1268MHZ

SPURIOUS FREQUENCIES -------- BETTER THAN 56dB DOWN
AND SUB-HARMONICS

Test equipment used: Advantest TR4131 Spectrum Analyser.
Racal-Dana 1998 Frequency counter.
Hewlett Packard 435B Power Meter.
Hewlett Packard 8481A power sensor and load.
Fluke 805A Digital Voltmeter.
Farnell D100 Power supply unit.

I wish to thank GEC Plessey Telecommunications Ltd, for the facilities afforded to me and use of the equipment listed above in conducting these tests.



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SPECIALIST 'THEME' COLLECTIONS

VHF COMMUNICATIONS has collected together selected articles on a common topic for the convenience of specialists. One such 'theme' is on amateur television.

There are nine selected articles from VHF COMMUNICATIONS in a blue binder at the very favourable price of;

DM 29.50 (including postage)

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, together with worthwhile information on the subject matter.

This is only one example from a total of 24 theme collections listed in the table below.

Every collection comprises nine to eleven VHF COMMUNICATIONS articles in a blue binder. As well as the subject articles, each collection contains almost 500 pages of interesting publications carefully selected from VHF COMMUNICATIONS.

1. ANTENNAS: Fundamentals
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3. ANTENNAS for 23cm and 13cm
4. MICROWAVE ANTENNAS
5. AMATEUR TELEVISION (ATV)
6. CRYSTAL OSCILLATORS: XO's and VXO's
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8. SYNTHESIZERS
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10. FREQUENCY COUNTERS AND DIVIDERS
11. NOISE FIGURE AND NOISE-SPECTRUM MEASUREMENTS
12. SIMPLE TEST EQUIPMENT
13. HF POWER MEASUREMENTS
14. SHORTWAVE AND IF CIRCUITS
15. MINI RADIO DIRECTION FINDER for 2m and 70cm
16. CONVERTERS AND PRE-AMPS FOR 2m and 70cm
17. CONVERTERS AND PRE-AMPS for 23cm and 13cm
18. TRANSVERTERS AND PA's for 2m
19. TRANSVERTERS AND PA's for 70cm
20. TRANSVERTERS AND PA's for 23cm and 13cm
21. CIRCUITS FOR 9cm and 6cm
22. 10GHz TECHNILOGY Part-1
23. 10GHz TECHNOLOGY Part-2
24. FM EQUIPMENT FOR 3cm and 1.5cm

BROADCAST BAND DX-TV RECEPTION

By Garry Smith and Keith Hamer,

By the time you read this issue of CQ-TV, DX-TV reception conditions should be improving rapidly, producing signals by one of the most exciting and mysterious forms of propagation, known as sporadic-E.

Annually between May and September intensely ionised cloud-like layers form at random at roughly the same height as the E-layer, which is located some 75 miles above the surface of the Earth. These clouds are capable of returning signals back to Earth which would otherwise continue into space - see Fig.1.

In general, frequencies between 40 and 100MHz are effected. This includes the FM radio band as well as Band-I TV channels which are widely used on the Continent but not at all in the UK. To receive these a TV receiver or converter system capable of covering these channels is required. Most large-screen TV receivers manufactured in the UK are only designed for UHF reception in bands IV and V but some small portables, usually of Continental origin, have a scale marked with channels 2 to 4 (Band-I), 5 to 12 (Band-III) and 21 to 68 (UHF). In the case of a converter system, such as the D-100, its output feeds the aerial socket of a normal UHF TV receiver. Tuning is effected by means of the calibrated knobs on the unit.

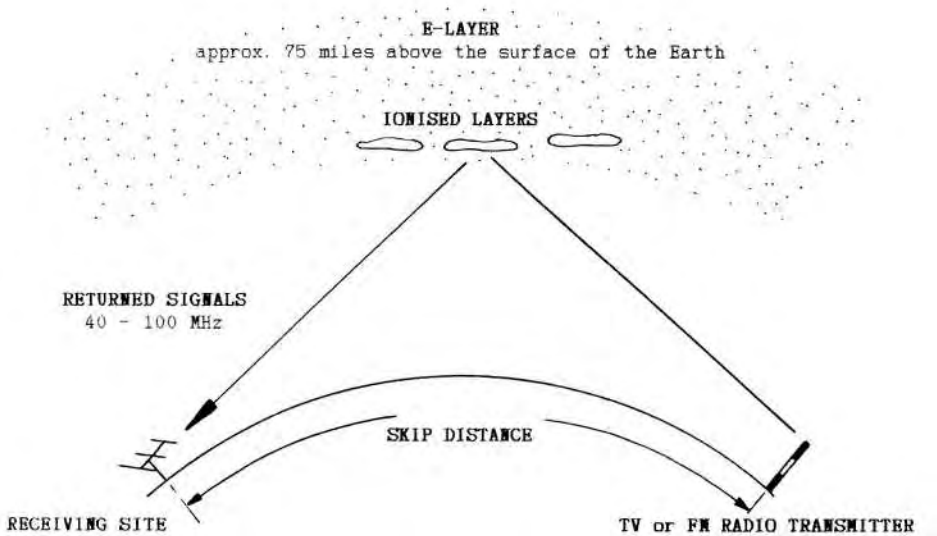
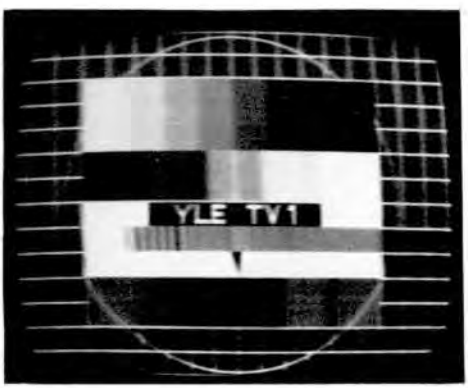


Fig. 1: Receiving distant TV and FM transmitters via Sporadic-E propagation.

Studying Fig.1 illustrates how the returned signal arrives at the receiving aerial at a slight angle, which means aerial height is not of great importance. In many ways the reception process is analogous to satellite transmissions except that the signals vary in strength, quality, consistency and duration. Unfortunately, the source and duration of signals cannot be predicted in advance and TV signals can arrive from transmitters located just about anywhere. Russian signals may be present on one channel while Yugoslavia, Spain or Iceland may be present on another.

Fig.1 also shows that a "skip" distance is involved which means that transmitters located between 500 and 1200 miles from the receiving site will be received more frequently than those at a closer distance. During very intense periods of reception, signals from other Continents are sometimes received when a double "skip" situation arises. Last year, signals from Canada, Africa and the Middle East were received more than once.

Many signals attain very high field strengths which means that simple aerials can be used. A loft aerial can still provide good results if an outdoor one is not possible. A simple horizontally-mounted dipole with each rod cut to 50 inches in length will suffice when signals are strong but for weak signal work a more ambitious aerial, such as a 3-element array, should be considered. Note that some means of rotating either aerial for maximum signal is required, although if this too is not possible then fix it to point around East - South-East.



T test card from Finland received in colour on Band-I.

Once you have installed the equipment and connected the aerial, you may be lucky and receive something immediately on switch-on. On the other hand, due to the random nature of Sporadic-E reception, you may sit twiddling the knobs for hours, or even a couple of days, without seeing anything and then wonder whether it is worth the time and trouble. Usually, the first sight of a foreign test card or some distant identification caption emerging from the snow whets one's appetite and creates a craving for more DX signals!

Now to the summary of DX reception over the last three months, although there's not a lot when compared with the summer months!

DECEMBER

Tropospheric DX was at the fore once again with openings on the 5th, 6th and 15th, followed by an extremely intense one on the 23rd and 24th. As usual, many of the signals originated in France, the Netherlands, Belgium and West Germany but several enthusiasts noted a few juicy "exotics". These included the following:-

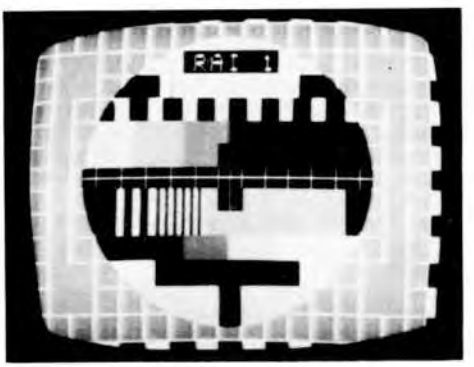
05/12/87: Swedish test pattern on channel E42.
06/12.87: East German test card on channel E34 from Brocken.
15/12/87: Czechoslovakia in Band-III on channel R10 from Plzen.

23/12/87: Sweden on Band-III channel E8 from Emmaboda,
Polish Band-III signals on channel R8 from Kozalin,
525-line American Forces Network TV from Soesterberg
(Netherlands).
24/12/87: Norwegian Band-III signals on channels E5,6,7,8,9,10 and 11.

JANUARY

Sporadic-E signals were evident towards the end of January. On the 20th, Russian and Italian programmes were noted in Band-I and during a particularly good lunchtime opening on the 28th an orchestral programme, thought to be from Poland, was noted with SECAM colour. The OIRT FM radio band towards the upper end of Band-I was also active.

The Quadrantids meteor shower, which peaked in activity at 0200 GMT on the 4th, produced a few unexpected signals in Band-III. Identified signal sources included Sweden and Iceland.



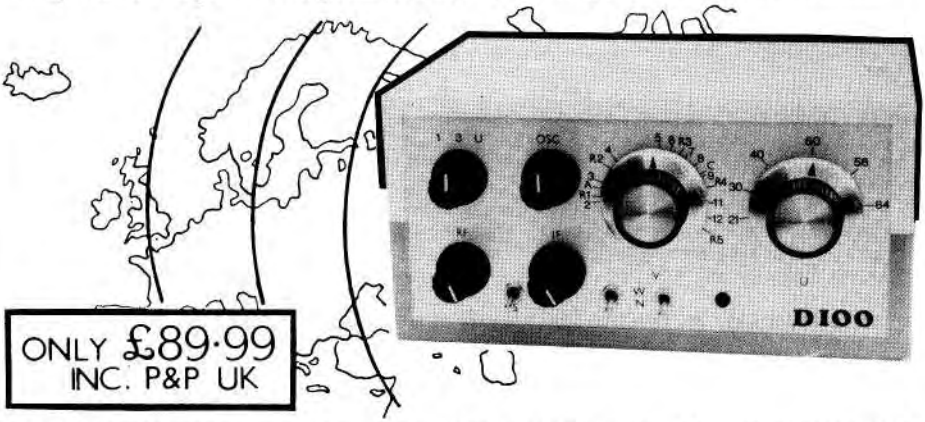
The Italian PM5544 test card received via Sporadic-E.

FEBRUARY

The first half was better than the second. Despite poor conditions on all the bands countries such as Italy, Czechoslovakia, Iceland and Finland were logged in Band-I. A tropospheric lift caused strong signals to materialise from France, the Low Countries and West Germany on the 14th, but these were short-lived.

ACT NOW!

The 1988 Sporadic-E season has commenced. **NOW** is the time to make the most of DX reception and capture TV signals from all over Europe -even other Continents.



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◎ One big advantage that the «DE-LUXE» version of the D-100 has over a multi-standard TV is its ability to resolve sound *irrespective of the vision I.F. bandwidth selected.*

◎ The «DE-LUXE» D-100 will also resolve French (System L) signals using a normal TV -see leaflet for further details.

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

TV DX FOR BEGINNERS -2nd Edition by Simon Hamer
The popular publication «TV DX For Beginners», by Simon Hamer, has been completely revised and expanded to 24 pages (A5 format). The 2nd edition provides lots of useful information to assist anyone with DX reception.

It discusses TV systems, channels, modes of propagation, DX receiver systems, teletext reception, DX recording techniques using a normal VCR plus a section on Amateur and Mobile TV DX-ing. It is illustrated with photographic examples of results obtained in the UK to show just what can be achieved.

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SPECTRUM FREEZER - NEW SOFTWARE

By Chris Smith G1FEF,

The following program listing for the Spectrum computer is for use with Trevor Brown's Spectrum Freezer hardware described in the 'Micro And Television Projects' handbook pages 70 to 73. The program utilises the computer's attributes map and provides an interesting display - if somewhat chunky.

The software freezes the display in approximately one-second and will continue to update the display until key 'F' is pressed. Pressing key 'S' restarts the updating process and key 'B' returns you to basic.

I am developing a routine that will use the high resolution display capabilities of the Spectrum, also a PCB for the hardware described in the original article. Further details will appear in CQ-TV.

A mistake appears in the original article; IC1 has two pin 10's on the original circuit, one of which should have been pin 19. The original software did have one or two bugs, however the new software listing here eliminates these and works well.

```
10 REM SPECTRUM FREEZER
20 CLEAR 49151
30 FOR a=49152 TO 49346
40 READ b
50 POKE a,b
60 NEXT a
65 RANDOMIZE USR 49152
70 DATA 197,213,229,217,197,213,229,17,4,4
71 DATA 217,175,50,8,92,221,33,195,192,1
72 DATA 223,0,30,240,46,32,243,62,254,237
73 DATA 121,205,182,192,22,40,237,120,230,128
74 DATA 40,250,237,120,230,128,32,250,21,32
75 DATA 241,237,89,22,24,237,120,203,127,40
76 DATA 250,221,119,0,221,35,237,120,230,128
77 DATA 32,250,217,21,217,40,14,237,120,230
78 DATA 128,40,250,237,120,230,128,32,250,24
79 DATA 237,217,83,217,21,32,214,251,123,214
80 DATA 6,95,45,194,26,192,205,146,192,58
81 DATA 8,92,230,95,254,70,32,9,58,8
82 DATA 92,230,95,254,83,32,247,58,8,92
83 DATA 230,95,254,66,194,11,192,217,225,209
84 DATA 193,217,225,209,193,201,221,33,0,88
85 DATA 33,195,192,17,32,0,14,32,6,24
86 DATA 221,229,126,47,230,56,221,119,0,221
87 DATA 25,35,16,244,221,225,221,35,13,32
88 DATA 233,201,237,120,230,64,32,250,237,120
89 DATA 230,64,40,250,201
```

The system is described fully in the handbook, but briefly, the TV picture is sampled once per line in a vertical column which advances across the picture at the rate of one sample per frame. This allows 64uS between picture samples which gives time for the A-to-D to work and also time for the computer to

process the samples. The picture sample is measured for brightness and this level is converted into a digital word by the ZN427E and presented to the computer for storage. This system means the picture subject should be stationary for best results. The picture samples are loaded into the screen attributes map for display and each brightness level is represented by a different colour. The Spectrum attributes map is only 32 by 22 so the resolution is not too good.

I would be interested to hear from anyone building this project and also from anyone interested in interfacing it to a BBC, I have done so and the results so far are very encouraging.

VIDEO-PHONE FOR THE DEAF

A newspaper article sent to us recently from Scotland (Scotsman 7/87) proves that once again radio amateurs are spearheading investigation and development of previously untried ideas. In this case it is work being done all over the country by amateurs on 24cm amateur TV.

BATC member Dr.G.W.G.Montgomery, a research scientist at York University, recently presented a paper at the International Congress of the World Federation of the Deaf in Helsinki. In the paper he said that "the public telephone network was not a suitable medium for transmitting video due to the bandwidth restrictions etc. Thus, to enable deaf people to communicate over distances a radio system is required to transmit the video information, be it sign language, text or whatever".

The next constraint to be overcome is the one of cost. For a system to be used effectively by deaf people the equipment must needs be inexpensive to purchase and install, as many such disabled people are on assisted incomes.

Dr.Montgomery continued to say: "In the curriculum of the Donaldson's School for the Deaf in Edinburgh is included classes in the legalities and technicalities of audio/visual radio for the deaf. Under certain conditions international video communication is possible, and no obvious barrier to further development existed other than funding for research".

How do amateurs fit in? It appears that one of the areas being looked at with a view to equipment, modes and expertise is the amateur 24cm band, and particularly the expanding network of ATV repeaters.

Quoting Dr.Montgomery again: "24cm repeaters must have the most useful application for linking households dependant on video communication, as in the deaf community. There has been much interest in the use of fast-scan TV to get round the current communication problems of the deaf, and the help and advice available gives very positive publicity for the ham community".

IN PLACE OF THE TUBE

Part-2

By Peter Delaney G8KZG

In part 1 we looked at the basic design and operation of the CCD. This solid state device converts an optical image into a varying voltage waveform, without the need for scan coils, heaters, or high voltages. It does, however, need a set of suitably timed pulses to work, both to scan the image and to read out the stored data.

The image section needs a pulse train, as Fig.2 in part 1, during the time when the charge pattern is to be transferred to the storage section. This is normally during the frame blanking period. There need to be 290 such pulses in this time, so that all the information is moved down correctly, resulting in a minimum frequency of 180kHz for each pulse. During the active part of the frame, these inputs are kept at a steady level, 'high' for the portion under which the charge is to be collected, and low under the rest. In order to achieve an interlaced frame, these steady levels are different for alternate fields. The resultant two field pattern is shown in Fig 4.

During the time when the charge pattern is being transferred from the image section, the storage section needs to be driven in an identical way. For reading out this information, one line at a time has to be moved down into the line readout section. A set of three phase pulses must therefore occur once per line in the active part of the frame. There is no difference between the two fields, as the charge is stored in the same way no matter how it was collected. The resultant pulse pattern is shown in Fig.5.

The line readout section is also addressed by a three phase set of pulses, but at a much faster rate. As there are 385 elements in the 52 microseconds of the active part of a TV line, each pulse occurs at a rate of 7.4MHz. During the time that the data is being fed from the storage section, the potentials must remain steady, so that each 'column' transfers down before trying to read out the 'row'. This section includes a number of 'blank' elements, into which no data is fed (to the left and right ends in Fig.3, part 1). These will give a reference black level when the signal is read out. A similarly timed pulse is also needed to reset the output, as described later. This set of pulses is shown in Fig.6.

These then are the drive signals that must be generated by the 'scan' circuits. In each case the pulses should be about 10v high, and need to be shaped, so that the charge transfer takes place on the rising/falling edges properly. For the image and store section pulses the rise and fall times should be about 300nS, whilst for the line readout section they should be around 30nS.

So, how might these signals be generated? One solution is to use the CCD manufacturer's dedicated circuit - the ESB365093 AA hybrid in the case of EEV. For the amateur wishing to experiment, however, the first requirement is to generate a clocking pulse, at the appropriate frequency locked in phase to the line sync pulses, and provide a three-phase output. The three-phase circuit is based on a divide-by-three made from two J-K bistables. The output of this can be further divided by 474 to produce a pulse once per line, for comparison

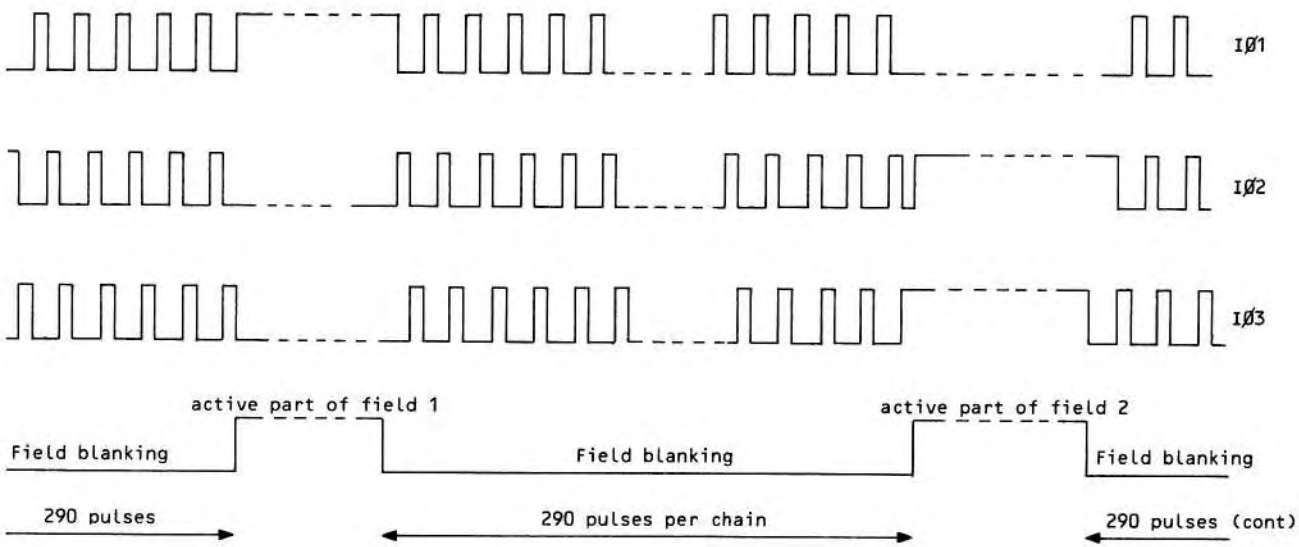
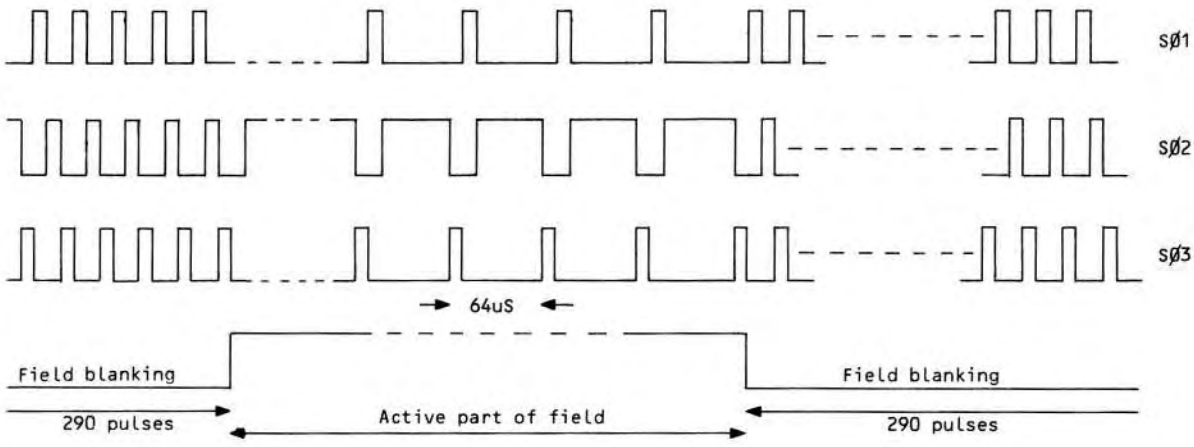
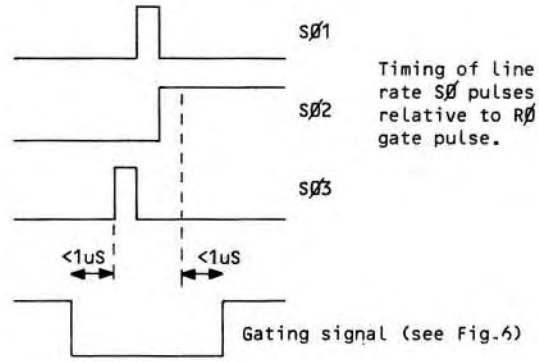

IØ1
IØ2
IØ3
active part of field 1
active part of field 2
Field blanking
Field blanking
Field blanking
290 pulses
290 pulses per chain
290 pulses (cont)

Figure 4





Timing of line rate SØ pulses relative to RØ gate pulse.

Figure 5

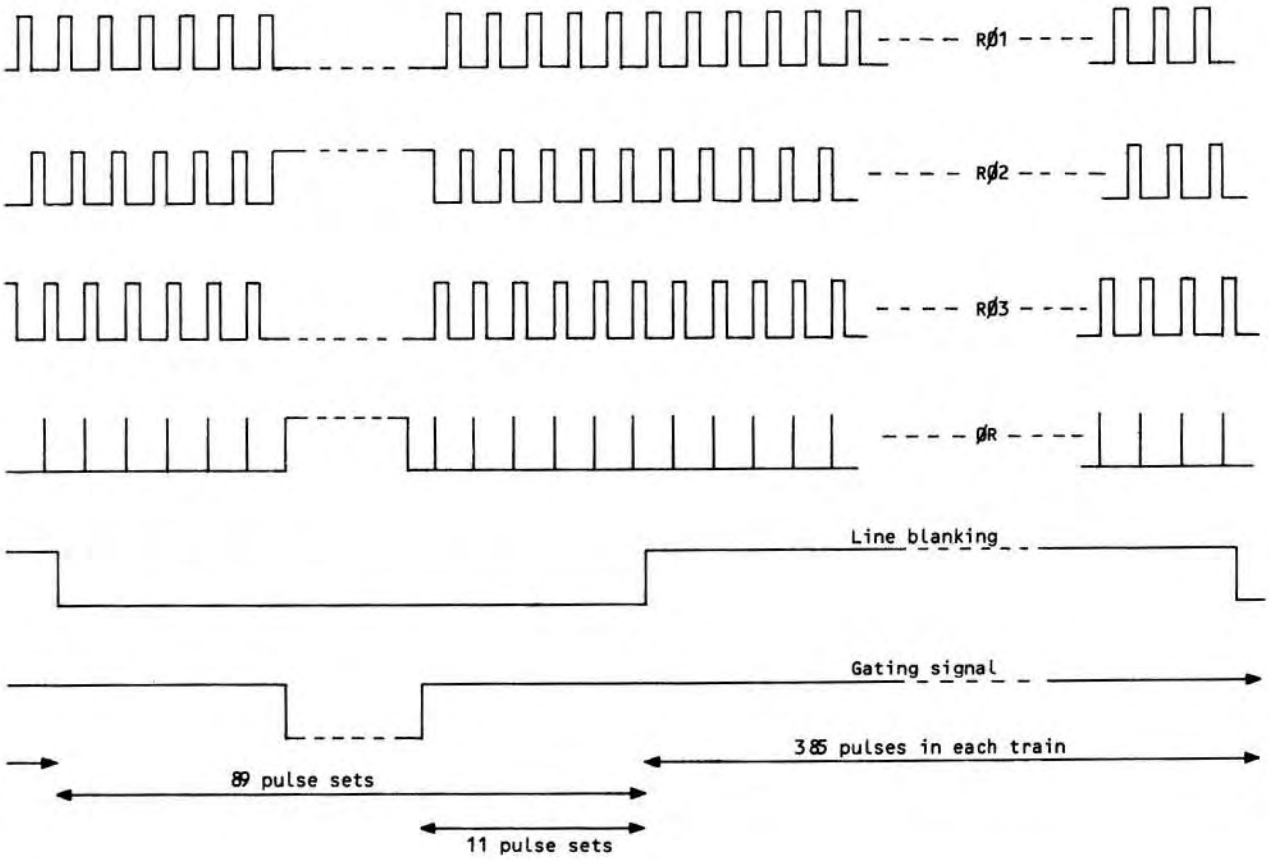


Figure 6

ØR is the pulse to reset the output

with line sync pulses in a phase lock loop comparator. This controls the associated 22.1MHz oscillator, which is the clocking source for the divide-by-three section. A circuit based on an NE564, with 74LS73 and 74HC4040 for the divider is shown in Fig.7. A gating pulse needs to be generated to supress the three-phase output whilst the data is fed from the store to the line readout section. This is done so that eleven sets of pulses clock the line readout section before the end of the line blanking period, to read out the 'blank elements' referred to above, and to leave the line readout section stable for at least a microsecond before and after the charge pattern is loaded from the storage section. This may be achieved by the second 74HC4040 and 7400, controlling a 74158.

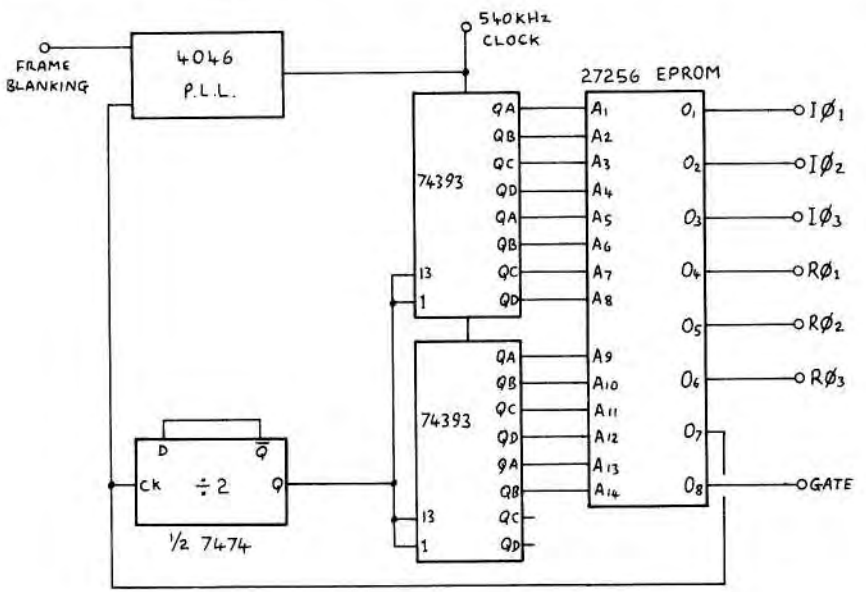


Figure 8

The transfer of pulses from the image section to the storage area is made by identical pulses, so the generation of the respective pulse trains may be combined. Two methods suggest themselves. In the first, a suitable clock pulse is used to address a 27256 EPROM. This has eight parallel output lines, of which 1 to 3 carry the three image pulse trains, 4 to 6 the three store section pulse trains, 7 carries end of field pulses, and 8 gating information for the line readout section. The address counters may be made from two 74393 type devices, reset by alternate end of field pulses. This is shown in Fig 8.

In the second method, a twin J-K bistable three-phase generator is again used. A counter, based on the 4040 again, is able, during the field blanking time, to count to 290, and so produce a gating pulse for the three phase output for charge coupling between sections. For the storage section pulses, the three-phase output is also gated for one cycle during the line blanking time, to move the charge to the line readout section. Lastly, the image section has

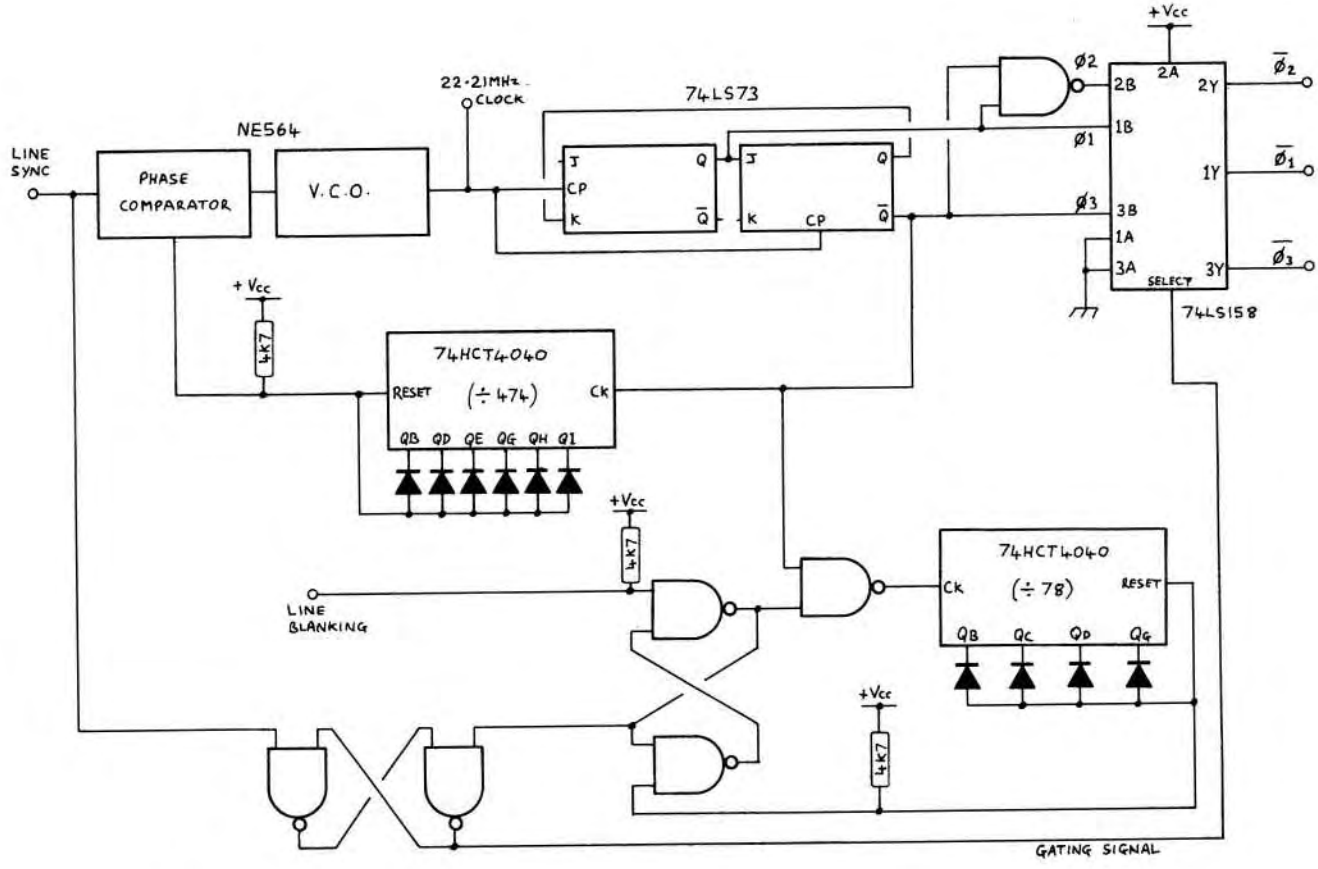

+Vcc
22·21MHz CLOCK
74LS73
NE564
LINE SYNC
PHASE COMPARATOR
V.C.O.
J
CP
K
Q
Q̄
Ø2
Ø1
Ø3
2A
2B
1B
3B
1A
3A
2Y
1Y
3Y
SELECT
74LS158
4K7
74HCT4040
RESET
(÷ 474)
CK
QB QD QE QG QH Q1
LINE BLANKING
(÷ 78)
QB QC QD QG
GATING SIGNAL

Figure 7

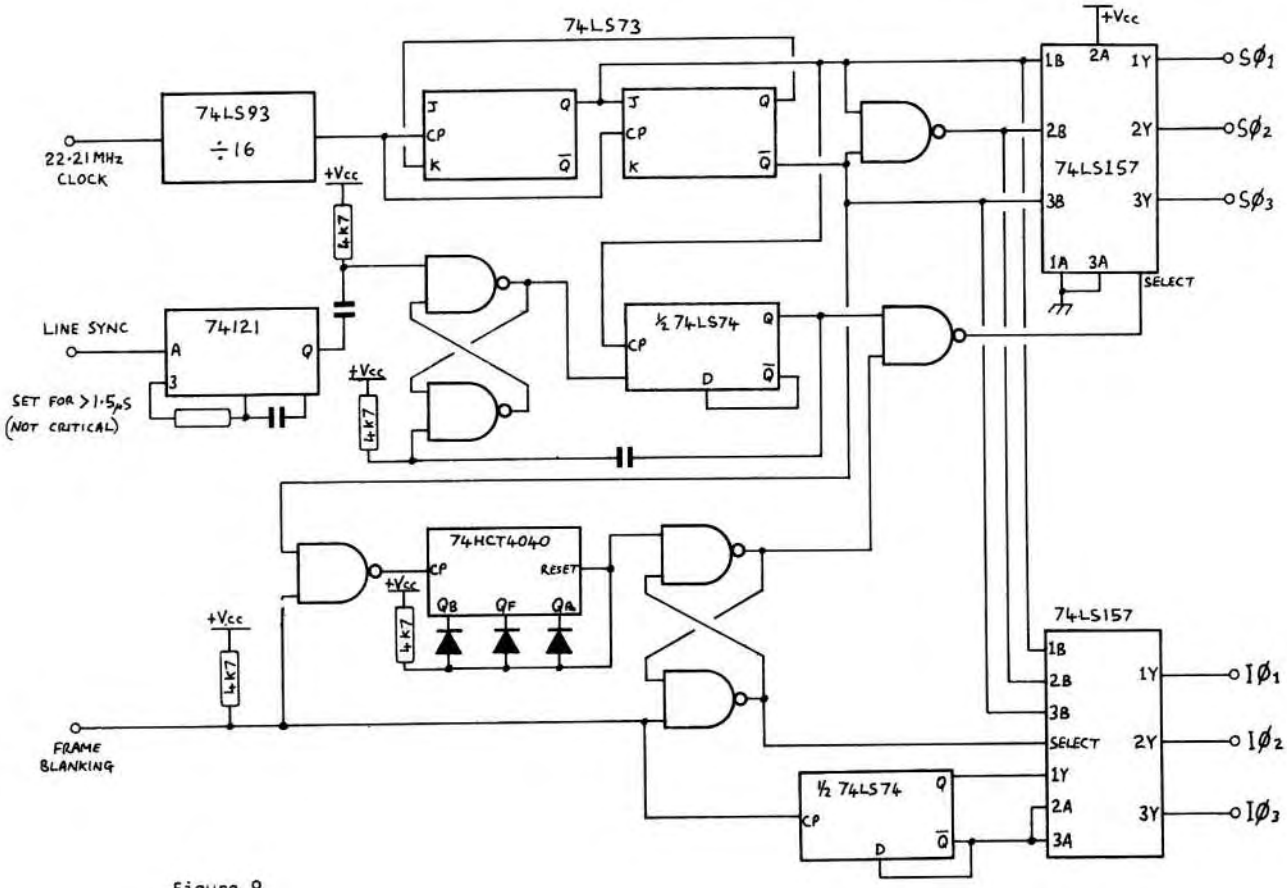

74LS73
74LS93
÷16
22·21MHz
CLOCK
+Vcc
4k7
LINE SYNC
74121
SET FOR >1·5μS
(NOT CRITICAL)
½ 74LS74
74HCT4040
RESET
FRAME
BLANKING
74LS157
SELECT
SØ1
SØ2
SØ3
IØ1
IØ2
IØ3

Figure 9

alternate fields of differing phase during the active part of the field. All this is shown in Fig.9. This method has the advantage that the transfer of charge pattern from image to storage area takes place more quickly, resulting in less field smear. However, there is an increased package count in consequence.

All of the circuitry described so far works from a 5-volt supply. However, the CCD requires 10 volt pulses to drive it. It also requires a suitable video amplifier to follow it. In part 3 these pieces of circuitry will be considered.

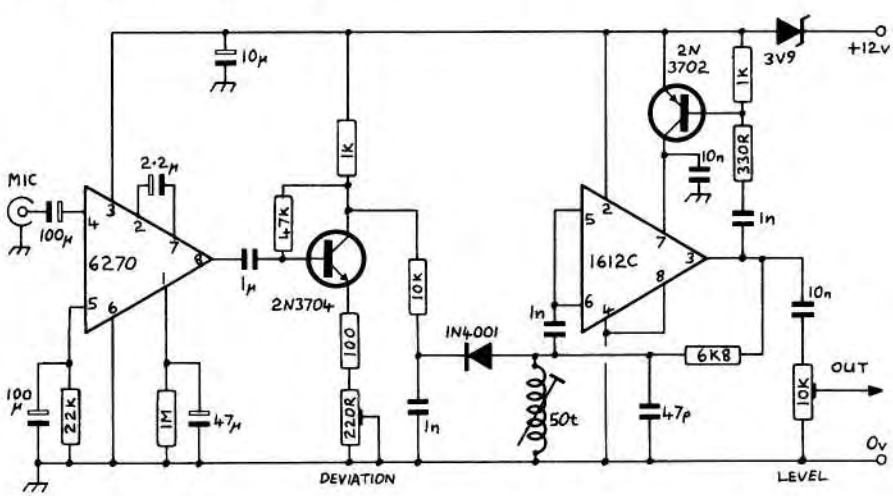
A SOUND SUBCARRIER GENERATOR

By Pete Smith G4JNU

This circuit for a 6MHz audio subcarrier generator should be considered as experimental. Although I have built it and am using it successfully, the use of different components and construction may necessitate some optimisation of the circuitry.

Audio is applied to an op-amp whose output feeds a single transistor amplifier. This amplifier is gain controllable and thereby provides audio deviation adjustment. An ordinary 1N4001 rectifier diode is used instead of a varicap. The inductor can be around 50t of 30swg enamelled wound on a 5mm former although any suitable inductor can be used, the L/C ratio should not be changed too much though so try to tailor the coil to resonate with a 47pF capacitor.

Output from the oscillator is around 2v p-p and is made adjustable by the 10k terminating potentiometer.



Raymond John Foxwell - VK5ZEF

Several months have passed since the untimely passing of Raymond John Foxwell VK5ZEF after suffering a heart attack. He was a well known Australian amateur television operator and also the producer of the occasional publication 'The ATVer'. While the following does not claim to be definative, I wish to put on record something about the contribution that Ray made to the Australian TV fraternity.

My first encounter with Ray was upon my return to the VK5 ATV scene in 1974 after an absence of some 6 years. During that time Ray had become the undisputed mentor of then informal SA ATV Group, which consisted of a handful of ATV experimenters on what was then the new 70cm band.

In the years that followed I got to know Ray as a colleague, a man with the common touch, and one who was always ready with an offer to help a fellow ATVer. There were never enough hours in the day for Ray, not in the sense of his being in a hurry, but that he always had more plans afoot (both of his own and to help others) than any mortal man could possibly hope to accomplish. Indeed, he often used to joke that his middle name should have been 'Gunner', because he was always 'gunner do this, that or the other'.

Ray was very self-sufficient, he would tackle all of his projects single-handedly from go to whoa. For instance, he established his own printed circuit board manufacturing facility. For the 'ATVer' he acquired a photocopier and duplicator, and carried out all the writing, editing, layout, printing, collating and posting himself. He designed and laid out both RF and video ATV circuit projects and he made his printed boards available to whoever wanted them, for next to nothing.

Over the years Ray made significant contributions to the first Australian ATV repeater VK5RT by way of receiver preamplifiers, converters, IF strips and aerials. I think it quite likely that there would scarce be a VK5 ATVer who has not been materially assisted by Ray over the years, and by means of 'The ATVer' even amateurs outside of Southern Australia as well.

I must confess that at times I felt frustration waiting for a promised PC board or the next edition of 'The ATVer' to come out, but the delay would invariably be because of the impossible load that Ray had set for himself. Indeed, if Ray had a fault it was that he just could not say no to anyone who asked of his time!

ATV was richer because of Ray Foxwell VK5ZEF and it has been made the poorer by his passing. His name will be remembered as long as one of his ATV circuits is still in use, and that will be for a very long time.

John Ingham VK5KG for the SA ATV Group

ATV WORKING - 10.25GHZ

VIDEO SWITCHES

by Nigel Pritchard G8AYM.

Members may be interested to know that the TEA2014 IC (CQ-TV 141) is manufactured by SGS-Thomson Microelectronics, a new company (since Jan 1988) formed by the merger of the original manufacturer Thomson Semiconducteurs and SGS Semiconductor Ltd. Of more interest to readers is the fact that there are a range of IC's for similar applications and I have listed them below, with their main characteristics.

These devices were designed for the TV peritel interface circuitry otherwise known as SCART.

DEVICE	(----------SWITCHES----------)				
	VIDEO	AUDIO	BLANK'G	B/W	OTHER FEATURES
TDA8196	NO	1P2W	NO	N/A	DC VOLUME CONTROL
TEA1014	1P2W	1P2W	NO	6MHz	
TEA2014	1P2W	NO	NO	6MHz	
TEA5114	3P2W	NO	1P2W	25MHz	
TEA5115	4P2W	NO	1P2W	25MHz	VID SWITCH VIA FAST BLANKING
TEA5116	4P2W	NO	1P2W	25MHz	VID SWITCH VIA PIN

Any of the above devices can be obtained via SGS-Thomson distributors, a list of whom is shown below (please note that all private enquiries must be made to the distributors).

Other items which will be of interest are a range of flash video converters, both ADC's and DAC's, with bandwidths up to 25MHz and for 6-8 bit conversion. Also, for the more adventurous, there a graphic processors. All these devices are contained in the Thomson Semiconducteurs Consumer IC's Databook (not yet rationalised into a common SGS-Thomson book).

Also in the databook can be found a nice range of multipole low-band high-pass filters in switched-capacitor technology, principally aimed at audio frequencies at present. Anyone into building their own monitors will find something of interest in the TV and Monitor Databook published by SGS Semiconductors and available from the distributors. The total thickness of the two books mentioned is more than three inches, so should provide some good bedtime reading, especially when they get combined into one volume later!

SGS-THOMSON MICROELECTRONICS DISTRIBUTOR LIST

DISTRIBUTOR	LOCATION	TELEPHONE
ANZAC	SLOUGH	06286 4701
BA ELECTRONICS	BEDFORDSHIRE	0462 834777
BARLEC RICHFIELD	HORSHAM	0403 51881
FARNELL ELECTRONICS LTD	LEEDS	0532 636311
IMPULSE	CATERHAM	0883 46433
ITT MULTICOMPONENTS	SLOUGH	0753 824212
POLAR	LEIGHTON BUZZARD	0525 377093
TRANSWORLD SCIENTIFIC	HIGH WYCOMBE	0494 36381
VSI ELECTRONICS	HARLOW	0279 29666

SPECMANSHIP

Part-5 RF POWER

By mike Wooding G6IQM,

The power parameter is probably the most quoted of all, often in QSO the first question asked is "what power are you running?". This can lead to all sorts of misconceptions, particularly with ATV transmissions, due to the complex nature of the waveform being transmitted.

The most common mistake made when quoting the power output of an AM 70cm television transmitter is to give the reading from an in-line power meter. You can hear stations bemoaning that the 50 Watt linear they bought at the last rally is only giving 30 Watts according to their power meter. So then, let's try to lay this one to rest once and for all.

The reading on your in-line power meter is an average power. When the modulating signal is a highly complex one such as video, and the mode of modulation is AM, (as we use on 70cm) then because of the many amplitude transitions of that waveform, the instantaneous value of the output power will vary considerably. Thus, because the power meter is incapable of following such rapid changes it averages out these different levels to give a steady mean reading, usually referred to as the Average or Video power of the transmitter. This power level, however, has very little meaning because it is dependant on both the picture and the depth of modulation. As the video gain control is advanced the output power indicated on the meter usually decreases.

Do not be concerned! The actual effective output power of the transmitter remains the same, irrespective of the video level etc. The peak power of an AM television transmitter is obtained when the synchronisation pulses occur, causing the modulator to provide the maximum voltage to the PA stages giving maximum output power. Therefore, the only constraints on the transmitter power are those which effect the voltage levels of the sync tips, and in a correctly adjusted system the peak voltage available should be the maximum that can be produced by the modulator.

Experience has shown that when receiving the weakest signals, it is always the sync bars that are found first and once locked on screen the vision usually follows. Those who operate very narrow band IF systems can all but negate the video part of the received signal in order to optimise the receiver on the sync pulses, thus pulling the weak stations out of the noise. The remaining part of the video signal is then sufficient to allow us to read the information or whatever, albeit with very low resolution due to the narrow-band working. The point being that from this we can deduce that the maximum instantaneous power of the transmitter is radiated at the time of the sync pulses.

So, going back to power indication on an average power meter, although the meter is only indicating 30 Watts of output, the peak power of the transmitter could actually be closer to 50 Watts.

Summarising then: the real power output of an AM television transmitter is the power generated when sync pulses are presented to the modulator, this power level is known as the PEAK SYNC POWER (PSP).

The easiest method of determining the PSP of your transmitter is to simply remove the video input to the modulator, the power then indicated on the meter

will approximate the PSP. A much more accurate method is to calculate the value mathematically, or as shown below, the PSP of an AM television transmitter can be worked out using a computer. This method also takes into account differing settings of the sync/video ratio.

This short program has been adapted from 'NEWS FROM RHODE & SCHWARZ' 1987 and was sent in by Andy Emmerson G8PTH. It may easily be adapted to suit any computer, although the listing below is for the BBC in particular.

```
 10 REM ADAPTED FROM 'NEWS RHODE & SCHWARZ' 1987/1 p.24
 15 CLS
 20 PRINT "The nominal power of a TV vision transmitter is the peak envelope"
 30 PRINT "power. This power occurs during the sync pulses and is thus "
 40 PRINT "present for a relatively short time. The sync peak power can be"
 50 PRINT " determined if, in addition to the average power, the waveform of"
 60 PRINT " the signal and the amplitude of the sync pulses with respect to"
 70 PRINT " the complete signal are known. The average power is measured"
 80 PRINT " with the aid of a power meter. For the most accurate results"
 90 PRINT " measure the actual depth of the sync pulse below (S), and height"
100 PRINT " of video signal above black level (N) in volts."
110 PRINT "  Otherwise assume= 0.3 and N = 0.7."
110 PRINT
120 PRINT
130 INPUT "Enter S";S
140 INPUT "Enter N";N
150 REM calculate sync amplitude with respect to complete signal.
160 SR=S/(S+N)
170 REM calculate peak power
180 INPUT "Enter average power in Watts";PAV
190 PS=PAV/(0.0735+0.9265*(1-SR)^2))
200 PRINT "Peak sync power in Watts = ";INT(100*PS)/100
```

The nominal power of a TV vision transmitter is the peak envelope power. This power occurs during the sync pulses and is thus present for a relatively short time. The sync peak power can be determined if, in addition to the average power, the waveform of the signal and the amplitude of the sync pulses with respect to the complete signal are known. The average power is measured with the aid of a power meter. For the most accurate results measure the actual depth of sync pulse below (S) and the video signal above black level (N) in volts. Otherwise assume that S = 0.3 and N = 0.7.

Example:

```
Enter S?   .3
Enter N?   .7
Enter average power in Watts?   10
Peak sync power in Watts = 18.95
```

One thing I must stress here is that the peak sync power is not a peak-to-peak value, but is a more meaningful RMS value. For those of you not sure of the difference, simply the peak-to-peak value is the instantaneous highest power output, whereas the RMS value is the actual level of power that does useful work.

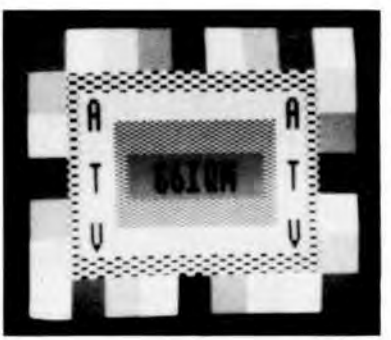
Finally, for those using FM television on 24cm etc the situation is extremely simple. To all intents and purposes the PSP of an FM transmitter is that power actually indicated on the power meter, and at all times remains the same, with or without a modulating waveform applied.

ATV PROGRAM FOR THE BBC

By Mike Wooding G6IQM,

Recently introduced into their range of accessories by the Worthing and District Repeater Group is an ATV program for the BBC computer, this complements the highly successful and commendible Spectrum program.

The suite is supplied on either 40-track double-sided or 80-track single-sided disc. This could unfortunately preclude some stations from purchasing a copy as many people operate only 40-track single-sided systems. however, it would be worth discussing this with the Worthing lads as I feel sure that it could be supplied on two 40-track single-sided discs, with a small modification to the controlling program prompting the user to change discs as required. This would exclude the use of the 'DEMO' facility within the suite, but I feel sure that it would still be worthwhile.



The software comes with a very comprehensive set of instructions and, surprise surprise, it is not protected. In fact many of the instructions are to advise users on customising the program for their own use. There are three test cards available and two sets of grey scale/colour bars. Your call sign, name and locator can be displayed with any of these, and full instructions give the necessary line numbers in which changes should be made.

The BATC logo is another screen available with call sign, Maidenhead locator and talkback frequency. I would have preferred it if the program prompted for the talkback frequency when the screen is selected, rather than it being permanently written into the program. However, once the line number is known it is a simple matter to change the data, but cumbersome nevertheless when one is on the air.

The next screen is perhaps my favourite (second only to the club's logo?). This is the U.K. map, with call sign, name and locator. There is also a flashing dot on the map signifying your geographical location, and full instructions are once again given as to how to position the marker.

The last three screens in the main program are a Union Flag (20 lashes and no supper for the writer of the program - the Union Jack is the small mast that the flag is flown from!), a cross hatch and a permanent message screen. The Union Flag is well presented with call sign and name and the cross hatch has 17 spaces for a message, call sign or whatever. The permanent message screen has available 5 lines of 18 characters each and is changeable at any time and automatically stored on the disc.

Finally, in this first program there is a standard Maidenhead locator distance calculator and a facility to run through all the screens sequentially and continuously until stopped (this is the same facility as in the Spectrum version 'DEMO' mode).

The second program on the disc contains a real-time message screen and a contest numbers routine. Upon selecting the message screen you are prompted to either load a previous message held on a disc, or to type in a new one. Each message is again a maximum of 5 lines of 18 characters each.

The contest numbers routine presents on-screen four large numbers, these being entered each time the routine is selected. I would have liked the routine to have an option for at least two sets of numbers to be held in memory at the same time (dual band working etc.) and also to be able to present each number individually full screen for those difficult contacts!

All in all I found the suite of programs to be of excellent quality and, apart from the couple of little moans, they present a useful set of captions and utilities for the ATV station. At a price of £8.50 it represents good value for money. For further information consult the Worthing and District Repeater Group advertisement elsewhere in this issue.

PACKET BATC

For those of you who are QRV on packet radio - good news! There are now at least two of your committee members also operational.

Graham Shirville, G3VZV the club's Liason Officer and 'Repeater Man' can be contacted by leaving messages on the RSGB headquarters mailbox. The syntax for is:

C G3VZV @ GB3HQ-2

which, when routed via your local digipeater will automatically be forwarded. Queries concerning repeaters and the RSGB may be addressed to Graham.

Mike Wooding G6IQM the Assistant Editor, Contest Manager and Awards Manager is the other committee member who is available. Messages can either be left on his own TNC via the local digipeater DV2 (G4RFG) Daventry, or on his local mailbox, G4MTP-2. The syntax for a direct contact is:

C G6IQM V (other routes),DV2

or to the mailbox: C G6IQM @ G4MTP-2

Messages or queries concerning contests or awards, or information or queries concerning CQ-TV should be addressed to Mike. Messages for 'The Boss' G3YQC, general committee and club enquiries may also be routed via Mike who is monitoring 144.650 24-hours most days.

REPORT FOR FM-TV

The BATC's Technical Liaison Committee has recently been addressing itself to the subject of amateur FM-TV transmissions and their use within the amateur 1.3GHz spectrum (and above). Although the complete report does make certain recommendations concerning the placement of ATV repeater input/output frequencies, these recommendations are presently being considered by the RSGB and the DTI and the results will be published in a future issue of CQ-TV.

Because much research has gone into the preparation of this report, and because it is felt that so much has been learned about our own transmissions, I have decided to reproduce part of the document here so that members may have a point of guidance for their own experiments and operations.

G3YQC

REPORT ON THE POSSIBILITY OF OUT-OF-BAND EMISSIONS FROM AMATEUR TELEVISION REPEATERS USING CHANNEL RMT-2 IN THE 1.3GHz AMATEUR ALLOCATION.

1. INTRODUCTION

This report has been prepared in response to a request from the Radio Society of Great Britain's Repeater Management Committee. The Committee is concerned that amateur television repeaters using channel RMT-2 are liable to transmit signals of significant strength outside the 1.3GHz band allocation.

The British Amateur Television Club's Technical Liaison Committee has considered the question and has conducted a series of measurements on actual amateur equipment.

This report will confirm that some out-of-band radiation is possible under certain conditions. A recommendation is made to re-define the RMT-2 output frequency. The opportunity is also taken to examine the use of frequency modulation in the amateur television service, and to recommend a set of standards for the guidance of amateurs using this mode of emission.

2. DEFINITIONS

This section defines important parameters used in the discussion of frequency modulation of an RF carrier by a complex video signal.

2.1 Peak carrier deviation (ΔFp) is the maximum instantaneous excursion of the carrier from its unmodulated frequency. It is caused by the maximum instantaneous amplitude of the modulating signal.

2.2 Highest modulating frequency (Fm) is the maximum instantaneous frequency of any component within the modulating frequency band. This will usually be the upper 3dB limit of the video bandwidth.

2.3 Modulation index (M) is the ratio between the peak carrier deviation and the highest modulating frequency;

$$\text{modulation index } M = \frac{\Delta Fp}{Fm}$$

Note that this expression gives the largest (worst-case) modulation index which can be achieved in a given system.

2.4 Channel bandwidth (B) is the amount of frequency spectrum required to accommodate the complete FM television signal under all conditions;

$$\text{channel bandwidth } B = 2(\Delta Fp + Fm)$$

An explanation of the derivation of this bandwidth formula is given in 3.9.

3. DISCUSSION OF SIGNAL PARAMETERS

3.1 Broadcast quality signals generally require a video bandwidth of the order of 5.5MHz. The upper limit is determined principally by the requirement to reproduce sharp transitions between black and white. In a video signal these transitions produce a sharp stepped waveform and restriction of HF bandwidth will tend to lessen the steepness of the step and reduce the definition when viewed on a television screen.

A further consideration is the need to accommodate a colour subcarrier on a frequency of 4.433618MHz.

3.2 Modern amateur video equipment approaches broadcast quality and often includes commercially available video generating and monitoring instruments. The use of computers and digital generating devices is widespread. For these reasons it is reasonable to expect the fidelity of amateur video signals to approach that of the broadcasters. In any case it must be wide enough to comfortably accommodate the colour subcarrier but should fall off early enough to avoid interference with the sound subcarrier at 6MHz.

3.3 It is recommended that a video bandwidth for amateur transmissions of 5MHz be adopted.

3.4 The available signal-to-noise ratio at the input to the receiver demodulator is a function of modulation index. The larger the modulation index the higher the signal-to-noise ratio. However, the larger the modulation index the greater is the required channel bandwidth to accommodate the signal. Modulation index therefore needs to be large enough to provide an acceptable signal-to-noise ratio but small enough to keep channel bandwidth to a minimum.

3.5 Experiments have been conducted recently to try to determine what is an 'acceptable signal-to-noise ratio'. A modern solid-state transmitter was constructed which generated the FM signal at around 100MHz and mixed it up to the 1.3GHz band. The balanced mixer was followed by a number of linear amplifiers.

Linearity of the frequency modulator was checked by applying a variable DC bias to the varactor diode, and measuring the resulting frequency of the carrier using a frequency meter. The transmitter was adjusted to use the most linear portion of the frequency modulator's characteristic.

Bandwidth and flatness of the video amplifiers which drive the modulator were checked by applying a constant-amplitude sinusoidal signal from an RF signal generator to the video input socket. The amplified signal was monitored at the modulating varactor diode using an oscilloscope having a bandwidth of 50MHz.

Initial tests attempted to adjust the transmitter in such a way as to produce an acceptable signal-to-noise ratio at the receivers of several amateur stations at different locations.

Peak deviation (hence modulation index) was adjusted to produce an acceptable signal-to-noise ratio at the receiver. The output power was varied to produce strong, medium and weak (but locked) video signals at the receiver. A modulation index was thus determined which was considered overall to be the lowest necessary to achieve a reasonable signal-to-noise ratio under actual operating conditions.

3.6 Without changing any adjustments on the transmitter, the modulation index, - empirically determined in 3.5 - was measured as follows;

A 5MHz sinusoidal signal was applied to the video input socket at a peak-to-peak amplitude equal to the largest video signal which would normally be applied. The RF output from the transmitter was monitored using a Hewlett Packard 8559A spectrum analyser and the modulation index was determined by measurement of the FM side-frequencies. The results were compared with a table of Bessel functions and the modulation index was found to be very close to 0.5.

3.7 It is recommended that a maximum instantaneous FM modulation index for amateur transmissions of 0.5 be adopted.

3.8 Given the above recommendations the peak carrier deviation can be calculated;

$$\Delta Fp = M \times Fm \text{ MHz}$$

ΔFp thus becomes $0.5 \times 5\text{MHz} = 2.5\text{MHz}$

3.9 Because of the complex nature of a video modulating signal it is difficult to accurately determine the channel bandwidth required for a frequency modulated television transmission. A survey of related works in the professional technical press shows that the use of 'Carson's Rule Bandwidth' is universally accepted as giving a close approximation to the actual channel bandwidth required. This is particularly true when modulation indices of less than unity are used.

Carson's Rule Bandwidth (B) is given by;

$$B = 2(\Delta Fp + Fm)$$

In determining channel bandwidth the 'worst-case' figures of peak carrier deviation and highest modulating frequency are used. It is recognised that in actual amateur service, the calculated bandwidth will seldom be achieved, since most scenes will have relatively low lighting levels and contain little or no energy at the high frequency end of the video band. With a television repeater operating near the band edge, it is important to consider the effect of fast switching transients which may be present in digitally derived pictures. These will normally be reduced by the video filter but it is advisable to incorporate a peak clipper at the input of the modulator to eliminate any remaining spikes.

Using Carson's rule, the channel bandwidth necessary to accommodate the recommended amateur FM TV transmission can be calculated;

$$B = 2\ (2.5MHz + 5MHz) = 15MHz$$

3.10 The amplitude of a sound subcarrier signal should be such as to ensure adequate signal-to-noise performance at the receiver, but not so great that it adds unacceptable intermodulation distortion products to the video signal.

Broadcast FM-TV transmissions typically have the sound subcarrier between 20 and 30dB below peak video amplitude. It must be remembered however that broadcasters expect strong pictures at the receiver. Because the signal is so strong it is not necessary for the sound subcarrier to be any larger since an adequate signal-to-noise ratio will always be produced.

Amateurs, however, deal mostly with signal strengths considerably less than those of the broadcasters, often so weak that the picture only just locks. It is important therefore for the sound subcarrier to be as large as possible (without causing intermodulation distortion with video signals) so that maximum signal-to-noise ratio is produced at the receiver.

During the empirical experiments detailed in 3.5, the amplitude of the 6MHz sound subcarrier signal was varied to determine an acceptable sound signal-to-noise ratio at the receiver. Subsequent measurement of the subcarrier amplitude revealed it to be very close to -14dB with reference to the largest amplitude excursion of the video signal (ie. that which causes a peak carrier deviation of 2.5MHz).

3.11 A 6MHz subcarrier of amplitude -14dB with respect to peak video amplitude will produce a peak deviation of 1.2MHz. This results in a modulation index due to the subcarrier of 0.2.

3.12 It is recommended that the amplitude of a sound subcarrier signal be -14dB with respect to peak video amplitude.

3.13 The presence of a 6MHz sound subcarrier will add slightly to the required channel bandwidth. It has been found by measurement that the levels of RF sidebands due to the sound carrier fall by about 20dB per octave. With the sound subcarrier level recommended in 3.12 channel bandwidth will increase by about 2.5MHz. This must be taken into consideration when operating near the band edge.

3.14 Amateurs are permitted to use the CCIR recommendation 405-1 characteristic for pre-emphasis. This characteristic lifts a 5MHz signal by nearly 3dB whilst attenuating LF signals by up to 11dB.

Referring to section 3.8; if the worst-case HF signal of 5MHz is raised by 3dB, ΔFp rises to 1.4 x 2.5MHz = 3.5MHz and channel bandwidth thus becomes 17MHz. Since a potential improvement in overall signal-to-noise ratio of up to 14dB is available, and since amateurs are usually dealing with signal strengths considerably lower than that required for broadcast quality reproduction, the improvement in signal-to-noise ratio due to pre-emphasis is significant and well worth the extra 2MHz of channel bandwidth.

3.15 It is recommended that transmissions be pre-emphasised according to CCIR recommendation 405-1 for 625-line systems.

4. STANDARDS AND RECOMMENDATIONS

4.1 Recommended standards for frequency modulated television transmissions in the amateur service.

Mode of emission	F5/F3
Video bandwidth (3dB)	5MHz
Colour subcarrier frequency	4.433618MHz
Maximum instantaneous modulation index	0.5
Peak deviation (without pre-emphasis)	2.5MHz
(With CCIR pre-emphasis)	3.5MHz
Channel bandwidth	18MHz
Sound subcarrier frequency	6MHz
Sound subcarrier amplitude (with respect to peak video)	-14dB
Sound subcarrier modulation index	0.2

4.2 Further recommendations for amateur repeater stations;

4.2.1 A video filter having a bandwidth of 5MHz should be included in the modulating amplifier.

4.2.2 A video peak clipper should be included after the video filter.

4.2.3 DC clamping of the video signal should be included to prevent the nominal carrier frequency from changing with different television scenes.

4.2.4 An RF output filter should be included to prevent out-of-band energy from whatever source from reaching the aerial system.

5. APPLICATION OF THE PROPOSED STANDARDS TO THE 1.3GHz AMATEUR ALLOCATION.

5.1 The set of standards proposed in section 4 are intended to formalise important parameters of amateur transmissions in order that the likelihood of out-of-band radiation is reduced to negligible proportions. Strict adherence to these standards is only necessary when operating near the band edge (ie. RMT-2 repeater channel).

5.2 The recommendations for repeater stations given in 4.2 are intended as a guide to repeater groups. They will help to ensure that transmissions contain the minimum possible sideband energy outside the bandwidth necessary for effective operation.

John L.Wood - G3YQC
For the British Amateur Television Club.

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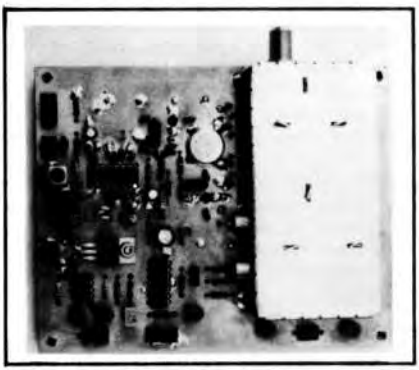

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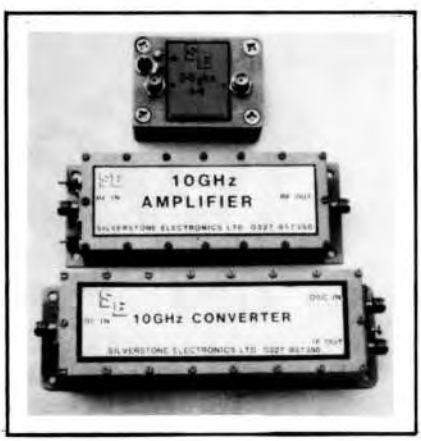

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MEMBERS SERVICES - WHAT DOES WHAT?

Part-3

We complete the potted guide around the items currently available from BATC members services with the boards for RF and SSTV use. Most of the Club's printed circuit boards are 112mm x 176mm (ISEP size), although some may be trimmed to Eurocard size (100mm x 160mm), if desired. Board sizes are given below only for non-ISEP size cards. Although many are designed to use the ISEP 33-way edge connector, the less expensive 32-way connectors can also be used.

The 70cm vestigial sideband (VSB) transmitter project uses 7 printed circuit boards, each 51mm x 102mm. These are a 39MHz signal source, a modulator, a multiplier, a VSB filter, an RF mixer, a UHF driver and a 1 Watt PA. The inductors and filters used are from the Toko range, available from Bonex Ltd. A suitable 13.14MHz crystal is available from BATC. This project is not suitable for those not experienced in RF construction.

A simple 70cm TV transmitter was described in 'TV for Amateurs' and CQ-TV122 and reprinted in 'The Best of CQ-TV'. This single board design produces up to 200mW of double sideband RF, and has an on-board video modulator. Full line-up instructions are given in the original articles. A BATC filter board should be used in front of the video input. The transmitter board measures 60mm x 106mm. A suitable 108.875MHz crystal is available from BATC.

It is, of course, essential to have the appropriate amateur transmitting licence before constructing or operating any transmitter, including the projects above.

CQ-TV112 and 'TV for Amateurs' have details of an ATV up-converter. The printed circuit board is to the same layout as the 'glued copper pads' method, and measures 44mm x 70mm. It enables a 70cm transmission to be received on any unmodified domestic television, at around channel 36. The details can also be found in 'The Best of CQ-TV'.

The amateur television receiver board makes an A.M IF amplifier, using a SAW filter for ease of alignment. The circuit, which appeared in the 'Amateur Television Handbook', is based on a TDA2540, and includes a SL1430 for extra IF amplification. A standard video output is produced from a UHF tuner, such as the ELC1043, at its input, and an AFC output is provided. The board measures 130mm x 65mm.

WITH A BATC PROJECT

CQ-TV135 has the details of a TVRO receiver using the Astec AT1020 tuner head and AT3010 demodulator modules. The rest of the board, which measures 100mm x 214mm, contains video and audio stages based around NE592 and TDA1035 ICs to give two standard 75-ohm video outputs and drive a 15-ohm loudspeaker. The AT1020 is intended to follow a satellite receiver block converter, but as it tunes from 950 - 1450MHz, it will tune the 24cm band directly. For this application a pre-amp' would be advisable. F-type connectors to suit the AT1020 module are available from Video Orderline.

The FM-TV demodulator board, measuring 85mm x 109mm, enables correct reception of the FM TV signals as used on most of the TV repeaters, and for work at 24cm and above. It is intended for a 36MHz input, such as from a standard varicap tuner, but will tune up to about 70MHz. It produces a standard video output. A sound take off point and de-emphasis are provided. The circuit, which uses a phase lock loop demodulator, was described in CQ-TV122 and 'The Best of CQTV' with full alignment instructions.

The details of the following project for slow/fast scan conversion appear in the 'Slow Scan Companion', as well as the sources indicated below.

The G3WCY converter is accomodated on two boards measuring 117mm x 173mm. They accept a slow scan signal and enable it to be displayed on a normal 625-line television. The analogue circuitry is based on 741 type op-amps and LM3914 LED bar driver ICs perform the A-D conversion. The digital circuits use TTL logic and four 4116 memory ICs. The design originally appeared in 'Radio Communication' in Feb. and March 1983.

A set of four boards designed by G4ENA provide modifications and expansions to the G3WCY project. An improved frequency-to-voltage converter is on a board 48mm x 100mm, and one 28mm x 100mm contains a width control and circuits for line sequential colour. The set also includes two boards 38mm x 100mm to provide two more sets of memory ICs. This enables an easy and economic upgrade to colour for the G3WCY system. The details are in CQ-TV127.

G4ENA also designed a board to transmit slow scan TV, by converting a 625-line signal. It is added to the G3WCY system, using the same memory. A width control and line sequential colour circuit are incorporated on this board. Details of this 117mm x 173mm board appear in CQ-TV129.

An auxiliary board, also by G4ENA, completes this system. Described in CQ-TV130 it includes a cursor, colour picture snatch and three video buffer circuits on a board measuring 94mm x 103mm.

The system can be built step by step, starting with a monochrome receiver only, and adding facilities as required. A monochrome transceive system requires the G3WCY and G4ENA

transmit boards. A colour receive system requires the G3WCY and G4ENA mods set of boards. A colour transceive system needs the G3WCY and all the G4ENA boards.

A SSTV pattern generator designed by G8CGK is accomodated on a 134mm x 196mm board. It is supplied with circuit notes and plans and produces a 4-level grey scale, an 8-level grey scale, a chess board, a white raster and a black raster. It is described in the 'Slow Scan Companion'.

The SSTV pattern/sync generator uses CMOS logic and an EPROM to generate the slow scan sync pulses, a chess board and grey scale. The circuit is a modified version of that in 'Amateur Television Handbook Vol-2'. A 4.433MHz crystal is required which can be obtained from BATC. A 2732 EPROM containing the appropriate program is also available from BATC. This EPROM will not function as a plug-in to a BBC microcomputer.

A board to build a power supply comes with circuit diagram and layout plans. Using the popular 78xx and 79xx series voltage regulator ICs it provides 2 positive and 2 negative rails. The rectifiers, which may be discrete diodes or a bridge rectifier, are included on-board, although the transformer must be mounted separately. The board can be trimmed to Eurocard size.

The 4.433618MHz crystal is used to generate a PAL colour subcarrier. It is also used in the SSTV SPG. Like all the crystals supplied by BATC, it is in the miniature wire ended HC18/U style package.

The BATC test card measures 230mm x 304mm. Printed in black on white card, it is designed to be suitable for transmission tests. A space is provided for inserting a callsign.

The BATC reporting chart is illustrated with six black and white photographs. These indicate the grades P5 - P0 for reporting the reception of ATV signals. The card is 219mm x 276mm.

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The companies referred to in this guide are:-
Bonex Ltd, 102 Churchfield Road, London W3 6DH. Tel 01-992-7748.
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A TV IF PREAMPLIFIER

By Mike Wooding G6IQM,

When searching out those weak signals on 70cm ATV the usual answer is to reach out for another RF pre-amplifier. However, as those who have tried this may have discovered, as often as not the only achievement obtained by cascading several pre-amps is to increase the noise rather than the wanted signal. Another problem with providing too much RF gain is that the mixer stages in the up-converter and the TV tuner will become overloaded, thus producing cross-modulation. The end result therefore can be to degrade a received picture rather than enhance it!

IF PRE-AMPLIFIER

One method of overcoming these problems is to provide extra IF rather than RF gain. The reason for this is that when receiving weak signals the IF stages of the TV are working at maximum gain and are not being driven into limiting. The result is that the signal-to-noise ratio of the IF stages is lowered considerably. The inclusion of a pre-amp in between the tuner and IF ensures that the IF stages receive maximum signal under all receive conditions, thus improving the S/N ratio. The overall effect of this is to give considerable improvement in strength of received pictures.

The circuit in Fig.1 shows an amplifier based around a 3SK51 MOSFET transistor. The original circuit used a 40673 but this is becoming difficult to obtain now. A gain control is included, although this can be replaced by a 50k resistor if it isn't required. A simple band-pass filter is included in the output to minimise unwanted signals reaching the following stages. The power requirements of the amplifier are 12 to 15 volts at 4 to 5mA, and, fortunately this voltage is usually available inside most TV receivers, so it can be powered direct from the set.

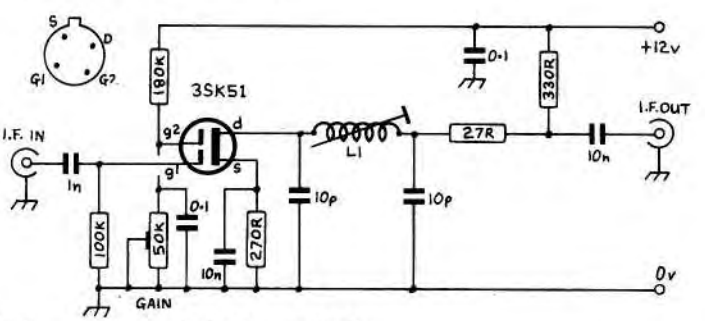

Fig.1 I.F. Pre-amplifier

The unit can be constructed on Vero-board as the layout is not critical The variable gain control may be fitted onto the front panel of the TV set, along with a switch to bypass the amplifier thus restoring the set to normal working. The coil L1 is constructed from 13 turns of 38swg enamelled copper wire wound onto a 4mm former with tuning slug. The amplifier should be housed in a metal box to screen it from the large fields generated by the scan circuits of the TV. The only setting-up required is to tune L1 for maximum signal strength with minimum noise whilst receiving a picture.

FILTER

Another very useful addition to this IF system is to include a narrow-band filter in the line before the pre-amplifier. This type of receive system is used by many of our more infamous portable stations to great effect, as you may have heard on the air. The on-screen effect of working 'narrow-band' is an apparent considerable increase in received signal strength. However, the filter described here is a passive device so no amplification (in fact a loss occurs) of the signal is achieved. What actually takes place is a further improvement in the S/N ratio of the IF stages resulting in less noise and more picture on the screen.

The filter shown in Fig.2, designed by John Wood G3YQC, reduces the bandwidth of the receiver from 7.5MHz to something of the order of 2.5MHz at the 3dB points. The filter is a combination unit with a high-pass section followed by a low-pass one. The values given for the capacitors are not preferred ones so they may have to be made up using series/parallel combinations. The coils are all constructed on 5mm formers with tuning slugs using 30swg enamelled copper wire. The turns required to give the inductance values quoted are given below:

L1, L3 & L5 ..... 4 turns
L2 ..... 6 turns
L4 & L6 ..... 7 turns

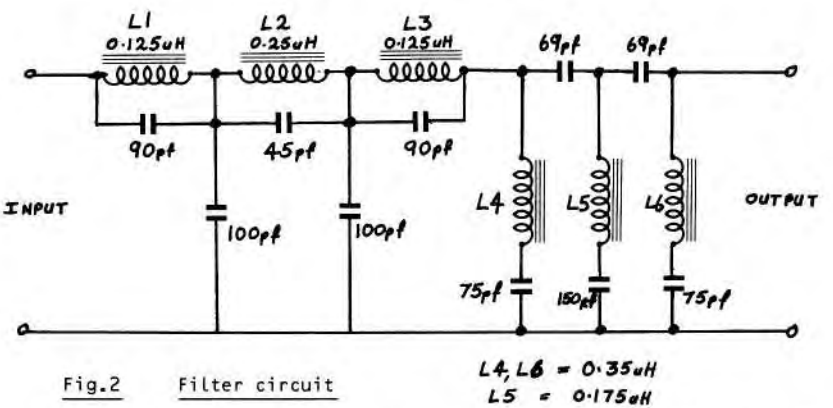

Fig.2 Filter circuit

Setting-up of the filter is not really practical without the aid of either a network analyser, or sweep equipment. Final adjustments on-air are possible, but only to accurately match the filter to the centre frequency of the TV IF.

If the TV set is to be used for normal broadcast reception, or if regular reception of high strength pictures is the norm, then provision should be made to switch the amplifier and filter out of circuit. This will enable the received pictures to be viewed at full bandwidth and normal definition.

Ref: 'Television' magazine April 1976, MOSFET I.F. Preamplifier by Graham Harrison.

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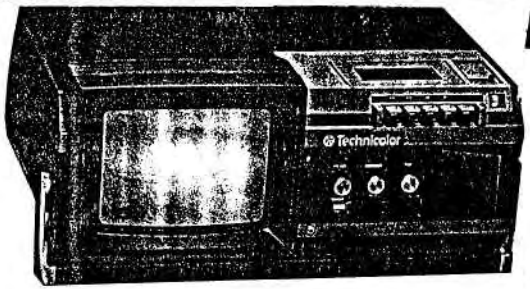

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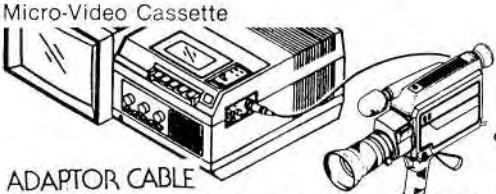

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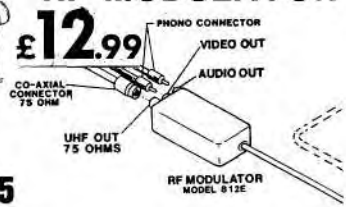

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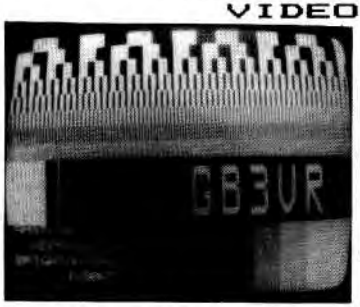

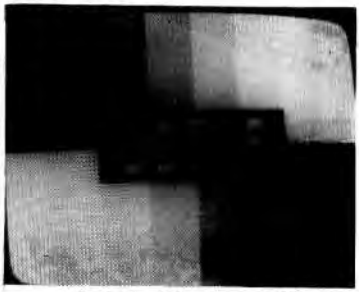

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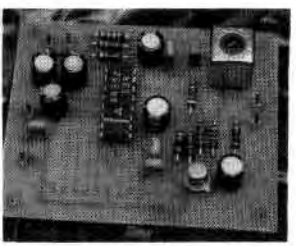

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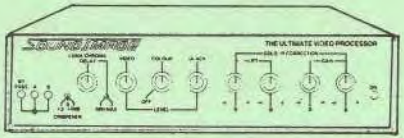

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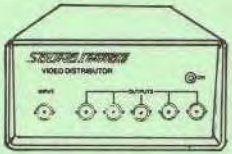

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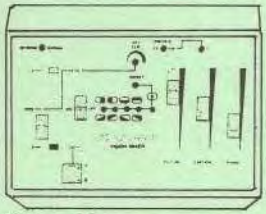

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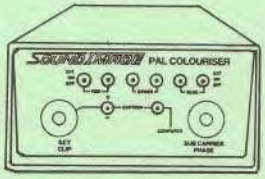

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