C Q — T V

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The British Amateur Television Club.

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COVER PHOTO
G3WW received at Pebble Mill during a BBC programme.
See article on page 14 for the full story.

THE CQ-TV AWARD

To mark the one hundredth issue of CQ TV BATC has introduced an operating award scheme whose aim is to encourage activity in amateur television by providing an incentive in the form of a certificate.

This award is available to both transmitting and receiving amateurs and SWLs in any part of the world whether they are members of the British Amateur Televisio Club or not.

The award is for contacts made using fast scan high definition television systems only.

Consideration has been given to the advantages achieved by stations in high activity areas or with exceptional geographical locations, therefore qualification for the award is on a points basis as detailed below:

TRANSMITTING AWARD

For pictures transmitted which have been successfully identified by another station claim 2 points per kilometer; if the contact becomes a successfull 2 way exchange of pictures then 10 bonus points may be claimed by each station regardless of distance.

Carefull logging of transmissions is esential.

RECEIVING AWARD

For any picture positively identified claim 2 points per kilometer.

POINTS

Points are claimed as above; however if the contact is on 23 cm or above, the points should be doubled.

The award is divided into three grades for the Bronze - 1000 points, for the Silver - 5000 points and for the Gold - 10,000 points.

CONTACTS

A station may be worked once only per day for the purpose of this award.

It is quite possible for the award to be gained by working the same station many times, but the aim is to promote activity of any sort.

Points may only be claimed for contacts made from the 1st November 1977.

THE CERTIFICATE

Upon qualification for the Bronze award a certificate will be issued together with the Bronze seal; the certificate may be upgraded later with Silver and Gold seals.

No charge will be made for the award, but please send return postage with each application.

APPLICATIONS

Applications should include log details consisting of call-sign, date of QSO, band, location of the station worked and points claimed. Contacts made from other thsn the home station should be clearly marked.

QSL cards are not required, but the application should be checked and signed by one other licenced amateur.

Applications should be made to the award manager John L. Wood G3YQC, 54 Elkington Road, Yelvertoft, Northampton. NN6 7LU

POSTBAG

J Lambert F2XO from Boulogne-sur-Mer writes to tell of the activity of F6BQH and himself. Both have "Rigonda" receivers for positive or negative modulation with 19 element aerials, 'BQH at Calais and 'XO at Boulogne. F6BQH's studio has two 625 line cameras (one home built), a caption scanner and a window generator together with a home built SSTV camera and monitor. The Tx is a 438.5 MHz 4 watt transistorised design, with a 45 watt amplifier under construction. F2XO has three 625 line cameras, two home built 1" vidicons and one commercial §" vidicon, a SPG,

and pattern generator, feeding two monitors. The Tx is a 20 watt design by F3YX. Other stations in the area able to receive atv are F1APQ, F6ASP and F6AZW. These stations keep a watch on 144.950 FM whilst in the shack, and contact can be made with them this way.

Jim G3LAI has sent in some details of how he acquires off-air photos of his SSTV contacts. At first he used a VENUS monitor which has a hood as an optional extra. A Polaroid camera with portrait lens attachment was used set to TIME. An exposure of one whole frame was found to give satisfactory results with Type 27 Polaroid film. Present gear is a ROBOT 400 scan convertor feeding a SONY monitor, which produces a 6" x 6" picture on the screen. As this is now a fast scan picture, the same camera is set to AUTO and placed about 10 to 12 inches away from the screen. Printed here are two of his photos, one by each method. The first, of Bert G2BAR on 2m was taken off the slow scan monitor; the second, of Paolo I5PCU on 20m was a fast scan conversion.

Colin Guy G4DDI of Boston in Lincolnshire writes that following a very interesting demonstration of amateur tv by Joe Rose and Brian Summers, at the Spalding and District ARS Northern meeting last year, a number of Lincolnshire amateurs have become interested in fast scan. The culmination of this to date is that on the 10th of October last G4DDI with the assistance of G8LAW and three SWLs from Boston set up a portable station in the Lincolnshire Wolds. One way video contact was made with G3VPR in Spalding, the details being:

Distance: 30 miles
Transmitting site: Highfields Farm, Old Bolingbroke
QRA: AN61G (NGR 356657)
Height: 300 ft asl
Aerial: 8 over 8 at 30 ft agl
Tx: Homebrew QQV03-20A final
Modulator: valve, screen, as ATV Handbook p 10.
Camera: Grundig FA41, vidicon, transistor.
RF Output power: 10 w (for c.30 w i/p)

The picture received in Spalding, with a 46 element multibeam at 50 ft feeding a modified ELC1043/005 was such that print over about §" on a 19" tube was quite readable, and people could be easily recognised. A contact with G4EGC in Sheffield on 2 m produced a report that 'the sync pulses were detectable but couldn't be locked' - about 60 miles. It is hoped that more activity from Lincolnshire will be stirred up by this, and next time the group operate from Highfields they will try to give more publicity and use more power with a better aerial, Talkback was on 144.25 SSB and 145.8 FM, the group also operate on 433.2 FM. They also found the mistake on p 10 of the Handbook! It's pos., not neg!

tv on the air by John Wood G3YQC

Two active continental stations worth looking out for are F6BQH and F2XO. F6BQH can receive positive or negative modulation with his Rigonda receiver, a BFR91 in the tuner and the transmitter delivers 4 watts at 438.5 MHz; a 45 watt solid state linear amplifier is under construction. Positive modulation is preferred but negative is possible. The serial is a 19 element array. Two vidicon cameras are available together with a caption generator. F6BQH lives in Calais but often operates from a portable site overlooking the channel.

F2XO's receiver is also a Rigonda with a modified tv tuner, the Tx is built to the F3YX design, it is solid state and runs 20 watts on 438.5 MHz. F2XO's home station is at Boulogne sur Mer and directly overlooks the Channel. Other active stations in the area are F1APQ, F6ASP and F6AZW. It is worth noting that a number of these stations momitor 144.95 MHz FM when they are in the shack.

The Australian Journal "Amateur Radio" has recently started a regular column called "ATV News", written by VK3ZVJ and VK3BFG and similar in content to "TV on the Air" giving information on activity in various areas and detailing the equipment being used. A familiar chord is struck at the end of the August 1977 column which reads "to round off this months news I am putting out another appeal for news from all atv groups... ..." It seems they have the same problems as me!

Back at home activity continues to increase in the Birminmham area, G8GUN is now on the air with a new momochrome Tx; he can receive both black and white and colour.

G4ALT in Kidderminster is at present receiving atv pictures and by now should have his transmitter in operation.

G4DYP has been taking noise free pictures from G5KS over a path of 25 Km.

G4DHO in Newcastle under Lyme has been taking pictures from G5KS (Warley) at strength four and a half - and this was using a tuner with no pre-amp! Apparently there is a small group of tv'ers in Newcastle under Lyme, and they would doubtless be pleased to make other contacts

That's it folks, except to wish everybody a happy and successful 1978, and to hope that New Year's Resolution includes one to write to "TV on the Air" regularly.

TV on the Air is at 54 Elkington Road
Yelvertoft
Northampton
NN6 7LU
Telephone Crick 823250

CONTEST NEWS.

by Peter Johnson G8EIM

THIS YEARS CONTESTS

UK ATV ACTIVITY WEEK	7 - 14 January 1978
INTERNATIONAL ATV CONTEST	9 - 10 September 1978
SSTV ACTIVITY WEEKEND	7 - 8 October 1978
ALBATROSS SSTV CONTEST	

This year there is to be a change in the basic rules for atv contests, and full details will be published as soon as the committee have discussed it all. As 3 cm tv is now on the scene, we think it is time to award extra points to anyone participating on frequencies above 70. Perhaps 20 points per Km would be a good start for 3 cm, with points getting progressively less as frequency gets lower. Please send in YOUR ideas on the subject to the Contest Organiser. Also, if you use 3 cm for contests, why not send details of your rig for publication in CQ-TV?

Congratulations to F3YX on winning the 1977 International ATV Contest. Many thanks to all participants - you are beginning to make the Contest Organiser happy! But even though the response was good, we need more logs - many stations just did not bother to send in logs. Please, no matter how small your score may be, send in a log-sheet; stand up and be counted! We need to prove the use of the amateur bands, and contests are one way of showing that we do use the frequencies allocated to us. Next year December 1st will be the last date for entries to the IATV Contest.

The winner of the Jubilee Contest was G3VZV, and if he will send a 8" x 4" stamped addressed envelope to the Contest Organiser, he will receive the first prize - a complete set of pcbs for the BATC DVM as designed for the Harrow Radio Club, and now to be described in CQ-TV.

RESULTS

1977 International Contest

1	F3YX	17	G8DDC/P	33	F1DAO	8	ONL3708
2	F5BH	18	ON6UG/T	34	F6BUF	9	ONL3727
3	F6DGS	19	ON6BM/T	35	F6KFG	10	ONL3547
4	F1FY	20	ON6KF/T	36	F6ADQ	11	ON1RG
5	F1FZ	21	G8GLQ/P	37	F1DFL	12	ON4VD
6	F1BJB	22	G8GON/P	Section B		13	ON1LJ
7	F6BYO	23	ON5QJ/T	1	F1BPG/P	14	ON6CY
8	F8MM	24	F6ASU	2	F3PJ/P	15	ON6GM
9	F6AQM	25	G4CRJ	Section C		16	ON6ZP
10	F3LP	26	F5VA	1	F1ADJ/P	17	ON6DR
11	F6CZG	27	G8EIM	2	ON6SY		
12	ON7WR/T	28	ON6FB	3	ON600		
13	ON1OH/T	29	F9ZS	4	ON6BS		
14	ON6LE/T	30	GW8GKF	5	ON1CC		
15	F5VL	31	ON5VGT	6	ON1JF		
16	F6BXK	32	ON4UB/T	7	ON4CT		

1296 MHz A5 2 way

2 F3YX - F5BH 18km

3 F5BH - F8MM 10km

1 F8MM - F3YX 32 km

10 GHz A5 2 way

1 F6ADQ - F3PJ/P 2km

2 way best DX

F1FY - F6CPR 530km

F3YX - F1TE 460km

F5BH - F1TE 480km

F1BPG - F1BJO 415km

ON6UG/T($\frac{1}{2}$watt) - F1BJB 126km

1 way best DX

F1FY - ON1OH/T 500km

F1FY - ON7WR/T 500km

British best DX

G8DDC/P - F1BJB 290km

G8GON/P - GJ8AAZ 200km

G8GLQ/P - G8DDC 112km

G4CRJ - G8DTQ 43km

G8EIM - G8DTQ 42km

1977 Jubilee Contest

1 G3VZV 687 points
2 G8BLZ 273 points
3 G4CRG 254 points

1977 Albatross SSTV Contest

1 N5EA
2 W9NTP
3 WA2ZFT
4 YU2PKW
5 G8PY
6 ISORUH
7 SP3PJ
8 W6WDL
9 HA6VV
10 I4LRH
11 ISOPM
12 HA1ZH
13 G3TKR
14 IOVMV
15 PAoDXY
16 G4CVZ
17 CT1BY
18 W9HR
19 HA5KBM
20 XE1SA
21 DJ6KA
22 JA2CGC

SWL

1 I4YMO
2 LZ10-90
3 CT4BY
4 DJ8BT
5 BRS34898
6 JA9CWJ

Remember printed contest log sheets are available from the Contest Organiser on receipt of an sae.

A REPORT FROM S.O.T.A.R.S.

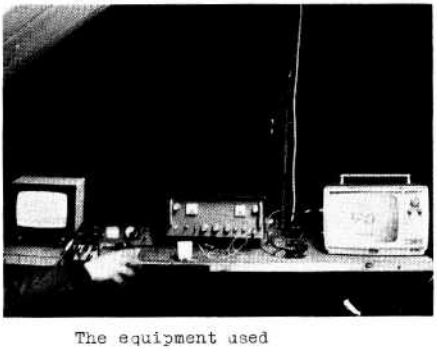
In view of the sites available to us, the group decided to go portable for the 1977 Jubilee Contest. We located a site at Moreton Low 10Km NE of Leak in Staffordshire; in retrospect a debateable idea due to the level of activity. The weather we know and expect on this site.

On the Saturday the equipment was put on site and fixed up. No 1 Tx kept blowing up due to overvoltage from the generator; this being attended to, we installed No 2 and were ready for the Contest.

Of the few contacts made, the best was G8DIR.G3GBU Shrewsbury to Moreton Low. This was a grade 5 vision 2 way, the sound being 144.23 SSB both ways.

Transparency by G8GFQ used for transmissions.

Our Tx equipment was as follows:
Home built 3/20 Tx by Ron Perry G6OAC/T
2C3GA Linear by Tony Hill G8GFQ
Camera supply (Xtal controlled invertor) and camera by Albert Allen G4DHO
MM ATV Convertor into KB VC11 & Conrac 9" monitor from Allan Bucknall G8BLZ
and a not inconsiderable amount of help from G8KUZ and others. We would also like to thank those amateurs who went to great efforts to take pictures from us, even if we did not succeed.



The equipment used

Some of the group at Moreton

On Sunday morning the generator packed in, and despite all our efforts, we failed to get it going again; later we found the ignition coil had broken down. Members of a local Society brought up another generator later in the morning, for which we thank them very much - but that one unfortunately also stopped, and so did we!

Was it really all worth the effort? We just don't know - but when is the next one?!

A SLOW SCAN PROJECT

Don Miller W9NTP recently wrote to Richard Thurlow G3WW asking if he knew of a UK slow scan amateur who could help with a major project he has going at the moment. Richard has passed the letter on to us, and to explain what it is all about, this is what Don says in his letter;

Dear OM,

I have been wanting to write to you about a big SSTV project I have going. I am working on a special circuit that when used in conjunction with a Robot 400 will permit the transmission of moving pictures in a bandwidth of about 35 kHz. This system is about 128 x 128 x 4 and transmits fields at a rate of 3.75 field per second. I plan on getting a special authorisation from the FCC to permit the testing of this system on the 10 metre band, at the high end. I hope for band openings so that we will be the first people to transmit a moving tv picture across the Atlantic without the aid of a satelite. What I need is a British ham to work with me. It will require several pieces of equipment, either purchased or home-made. The first is a AM tv modulator for a 10 m Tx. This should be easy since most of the SSB rigs can be grid modulated to do this. (By the way, I am planning to send vestigial sideband. The top 30 kHz will be upper sideband and the bottom 5 kHz will be lower sideband). The audio will be sent as FM on the carrier as narrow band. The receiver is the bigger of the communication problems. It must have a bandwidth of 35 kHz and be linear.

The tv gear will be a heavily modified Robot 400 circuit with an extra memory. This memory board I have designed now, and I am using it in the colour modification of the Robot 400.

What I would like for you to do is to set up a correspondance with a live-wire British ham who has a Robot 400 who can work with me. It is necessary that he should be able to work 10 m. In fact, he should try to get permission for the transmission part of the test from the British end from the Home Office.

73s Don Millar W9NTP, Waldron, Indiana 46182, U.S.A.

G3WW replied to this letter on the 13th December, saying that he knew of no SSTV enthusiasts prepared to take part in this project, but would pass the letter on to CQ-TV in the hope that publicati n in the magazine would encourage someone to volunteer. He also suggested that perhaps the Amateur Radio Club of a University or big electronics company would be the best choice for assistance; who wants to have a go?

There are several Robot 400s in use in Britain at the present, so someone should see in this plea for help a golden opportunity to put his SSTV experience and equipment to good use - and perhaps make history!

W9NTP can be contacted via the American Radio Relay League Inc (of wich he is a director) at Newington
Connecticut
U.S.A. 06111

PROJECT 100

PART 2

by Eric Putt and Tom Mitchell G3LMX

A PAL COLOUR PATTERN GENERATOR and SYNC PULSE GENERATOR

This article concentrates on the building and testing of the sync pulse generator, which represents about two evenings work. The colour pattern generator pcb should be available during February, to join the already available spg board; as the final pcb had not been tested before this issue went to press at Christmas, the details of the pattern generator have been held over until the next issue. However, if you wish to start collecting bits and pieces for it, you will require a crystal of four times CSC, ie 17.734474 MHz 32pf parallel resonant. This will have to be made to order. You will also require the following TTL ICs:

1 each 7413, 7450, 74151, 7473, 7493.
2 each 7492, 7402, 7420.
3 each 7474.

If you would like to know when the pattern generator pcb is available, send a stamped addressed envelope to Tom Mitchell G3LMX
30 Old Farm Close
Hounslow, Middx. TW4 7AB

In part one, an unfortunate error slipped in on page 13, line 13. The name Hitachi should be deleted and Mitsubishi inserted instead. Hitachi were of course the first Japanese firm to obtain a licence to manufacture PAL decoders.

And now the notes on the spg.

CRYSTAL OSCILLATOR

This uses a 5 MHz crystal in the series mode. Any 5 MHz crystal should oscillate, but not all parallel mode crystals will pull in to exactly the right frequency in this circuit. However they will do well enough for testing, and for general use if the genlock facility is not used. If you have to purchase a crystal, specify for SERIES resonance.

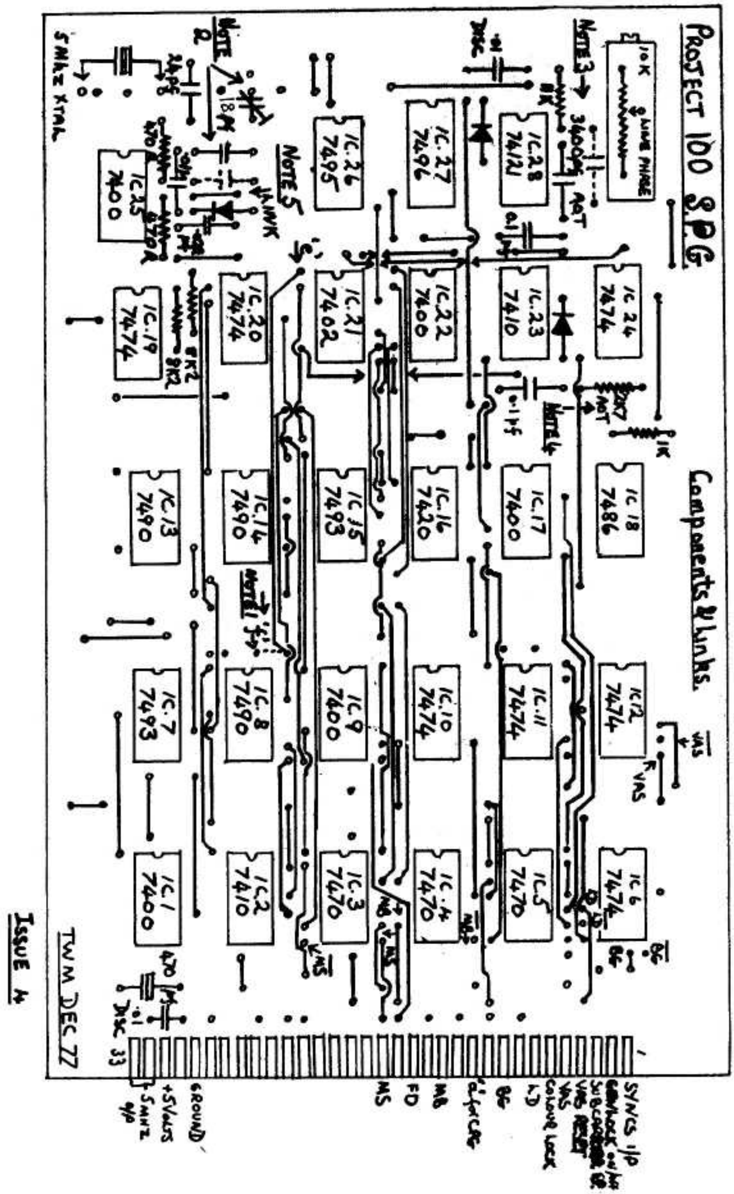
COMPONENTS

These are as per the components list, published in CQ-TV. However two small errors crept in to this list; IC9 appeared twice and IC8 was omitted.

IC8 7490
IC9 7400
Diodes 1N914 or 1N4148, NOT 1N1418.

GENERAL

The components and links diagram gives all the information required to put the spg together, and provided care is taken with the links, it should work first time. As only one link has to be changed to convert from the non-genlock to the genlock version, (see note 1) you may care to build and test the basic spg first. In this case the genlock ICs may be omitted. These are Nos 20, 21, 22, 23, 26, 27 & 28. IC24, which is part of the colour locking system may also be omitted until it is required.


PROJECT 100 S.P.G.
Components & Links.
TWM DEC 77
ISSUE A
5 MHz XTAL
SYNCS I/P
COLOUR LOCK
GROUND
+5Volts
5 MHz o/p

LINKS

These have been drawn to emphasize those holes they have to pass on the way. They must of course be insulated; my preference is for fairly thin self fluxing enamel covered wire. The results will look neater if the vertical links are left until last.

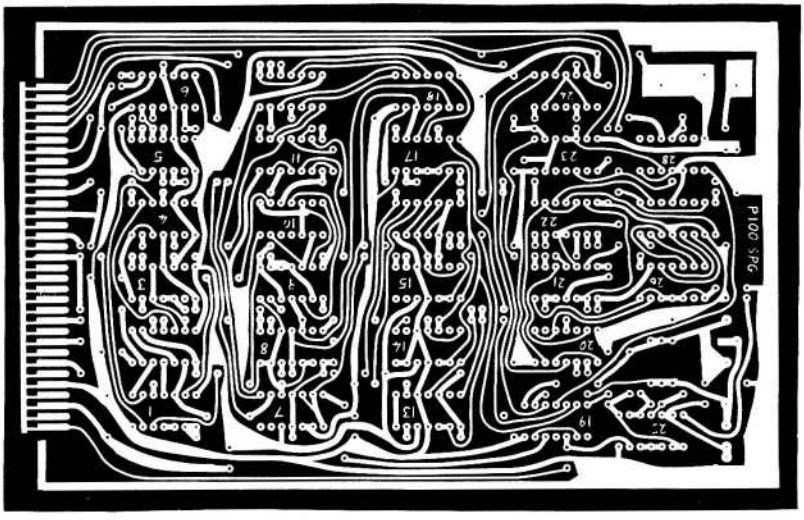
TESTING AND SETTING UP

a) connect a 5 volt power supply giving a minimum of 500 mA, and providing the crystal circuit oscillates, all outputs should be available.

b) Use either a frequency counter, or a comparison method with broadcast syncs, to check that the oscillator can be trimmed both sides of 5 MHz; if not, try adjusting the trimming components or obtain a series mode crystal.

c) set the oscillator to 5 MHz and check out genlock as under.

Although designed for a TTL input, the genlock will usually respond to a feed of mixed syncs of 2 volts or more (ie unterminated) fed into pin 1 via a capacitor, with resistor to ground. For initial tests set the line phase pot to mid-position (see note 3) and if it does not pull into line and field lock consult note 4; then start looking for a wiring fault or a duff IC! In use, the genlock mode can be inhibited until required by earthing pin 2.



NOTES

1) The dotted lines show alternative link if genlock ICs are not required.

2) The board is drilled for two fixed capacitors and a number of common trimmers for adjusting the crystal oscillator to 5 MHz. A reasonable starting point is about 20pf fixed and a variable of 20 - 30pf max. However, if you have a larger trimmer to hand, include some fixed or the oscillator may stop at low settings of your variable.

3) Line phase range. The AOT capacitor of about 3600pf sets the range of the line phase control from just over ½ line to just under one line. As the board is drilled for two capacitors in parallel, small adjustments can be made. A 3300pf is probably too small and 3600 a little too

large; hence the recommendation to set the line phase pot at mid range when first testing. If the range is greater than $\pm \frac{1}{2}$ line, the field locking circuit may be confused.
TO ADJUST ON TEST set the line phase resistor to minimum, and increase the value of the capacitor until the output from the monostable is just over $\frac{1}{2}$ line(on prototypes about 3400pf, but this depends on the type of multi-turn pot used). Check the maximum is just under 1 line, if not, change the 11 K resistor.
4) Broad pulse detector. This depends on the time constant of the 2.7 K resistor and the 0.1 uF capacitor; unfortunately, while the values shown should be satisfactory, a 0.1 uF capacitor is likely to have a tolerance of $\pm$ 20%. So if the field locking circuit fails to work, check the resistor value as follows; replace the 2.7 K resistor by a 5 K pot set to maximum and reduce the resistance until the pulse detector just stops giving an output. Measure the resistance of the pot and replace it by the next highest preferred value. The broad pulse detector should now function on the first broad pulse, or on a simple field pulse whose duration is longer than a broad pulse. (Note however that simple pulse sources will also have to be within the fairly limited range of the line locking circuit).
5) Although this link is not necessary, and is not shown on the circuit in CQ-TV 100, it enables a capacitor to be fitted in series with the line oscillator control diode, to limit the range of correction.
6) The 5 MHz output from the oscillator is now on both pins 32 & 33. This enables a standard 32 way .1" edge connector to be used in place of the original 33 way ISEP.
7) The diagram also shows points from which inverted outputs may be linked if required.

A PAUSE FOR THOUGHT

By D.J. Stanton G8HNN

(This article represents solely the views of the author).

Let me begin the article by asking a simple question. "What does a Radio Amateur need most?". A transmitter? No. A receiver? No. An aerial? No. The thing a Radio Amateur needs most, as most of you will have already guessed is FREQUENCIES. Without frequencies there would be no Amateur Radio, and no Radio Amateurs.

It was with this in mind that the author (while at his place of work, HI) a short while ago, began to put together some facts and figures on the valve of our 145 and 432 MHz bands to other interests i.e. private mobile radio (PMR), Police etc. The figures now presented can be taken as the minimum or lowest cost probable, in actual fact, the real figures could be 2 or 3 times higher.

Let us assume that a firm has a need for 1 mobile installation and of course, 1 base installation, the minimum one can have (we assume this includes aerials etc). They decide to rent the equipment and are quoted £20 a month for the mobile and £30 a month for the base. This then is £50 a month and £600 per year. We can now take this £600 as being the value of one simplex channel per year.

There are 160 channels in 144-146 MHz, assuming 12.5 KHz spacing as current commercial practice. This gives a value to 2 meters of 160 x £600 = £960. And this is with minimum figures.

Putting these figures into 432 MHz we come up with the following, 432-440 MHz gives 320, 12.5 KHz channels, giving a value of 320 x £600 = £1,920. There is also the fact that these channels, because of the nature of propagation at VHF and more so that at UHF, can be used up to 4 times around the country. Miltiply £960 and £1,920 by 4 and you get £3,840 and £7,936 resectively. NOW YOU CAN SEE WHY PEOPLE COVET OUR BANDS. And don't forget that it won't just apply to VHF, the HF bands can mean much more money to commercial interests.

I will let you ponder on the implications of these figures and relate them to WARC 1980 and just say, next time you go on the air remember these figures before you press the mike switch. The authop will!

AN FM SOUND OR VISION CIRCUIT

By Cyril Chivers

This novel piece of equipment was developed to record tv programmes from the loudspeaker of a receiver by "transmitting" them a short distance to an FM radio. No carrier noise, or line or frame timebase noise is received.

The range is 20 yards with no serial. It can also be used for copying tapes, with practically no degradation - in fact many tapes are greatly improved.

Keep the micorphone insert close to the loudspeaker and keep the volume low. The results are amazing! A small aerial would increase the range to 200 yards. The device is tuned to the frequency required by adjusting the length of the tuned circuit from 1½ ins, to 4 ins. - it depends on the capacity of the condenser microphone. If tne capacity of the microphone exceeds 30pf, put a 30pf variable capacitor in series and adjust the frequency with it.

The old Grundig microphone is just the job; no 90 volt supply is necessary any more. But if you want to use the system for pictures, a fast photo diode should be used instead of the mic. Use an FM tv receiver in just the same way as described above for sound.

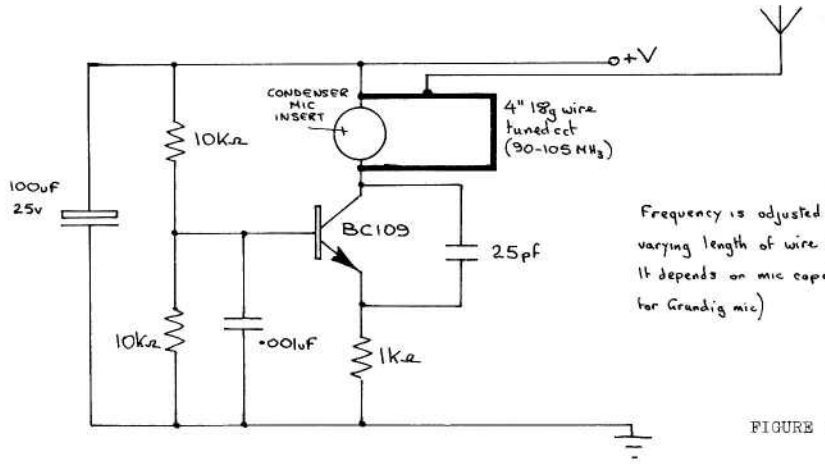


FIGURE 1

If you don't think it will work, have a go. If it's not better than anything you've ever seen before, just let me know. It is simple, and it is cheap.

FEEDBACK (Mainly +ve)

by Tom Mitchell G3LMX
30 Old Farm Close
Hounslow
Middx. TW4 7AB

C Q - T V is mainly a magazine for feedback of information from members to members. If you have any information, or modifications to anything already published in C Q - T V, please pass it on to the rest of us.

I would like to start a file of pcb layouts for the use of B.A.T.C. members. If you have produced a layout for anything published in the magazine, please let me have a copy. It may then be possible to have a number made, for sale to members at cost.

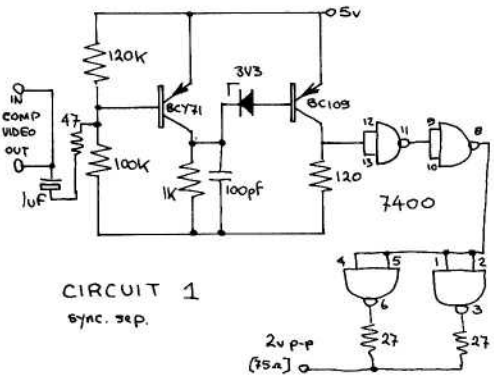
To show some useful "feedback" here is a letter I received from Ian G8IQU who has not only built the Project 100 spg, but has produced two very useful add-on units for it.

Dear Tom,

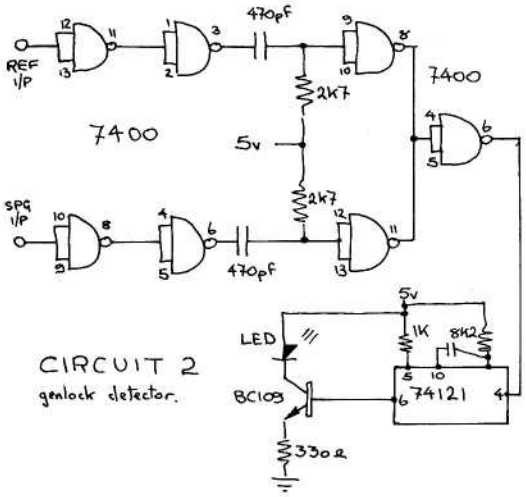
Before building the Project 100 spg, I looked for the cheapest ICs, particularly the 7474s. These I found at 28p each from HB Electronics in Kettering. I ordered all the ICs from them. I installed all the ICs and links for the basic spg in an afternoon. On switchon, everything worked OK. A frequency counter across the osc. read 4999999 and was soon tweaked to 5MHz.

The next afternoon the genlock ICs were fitted; of course it did not work due to a missing strap. This took the rest of the day to find going round in circles. I understand the operation of the circuit much better now! Inserting the missing strap restored all the field pulses but genlock still did not work; this was due to one gate of IC23 having a permement '1' on its input. A day of delay while I got a new one. Another afternoon to set up the genlock circuit IC28 had to have a 12K in series as I could not get an 11K locally, so I started with 3ooopf. I ended up with 4oopf across it. The 5MHz osc. used a 2-50pf trimmer with a fixed 30pf across it. For genlock I had to reduce it to 22pf.

I enclose details of two circuits I have found useful for use with the spg; the first is a simple sync separator which provides mixed syncs for the genlock input from a comp. video input (loop thru') and works from a 5 v supply. It is based on a circuit in CQ-TV 77 by Arthur Critchley.



CIRCUIT 1
sync. sep.

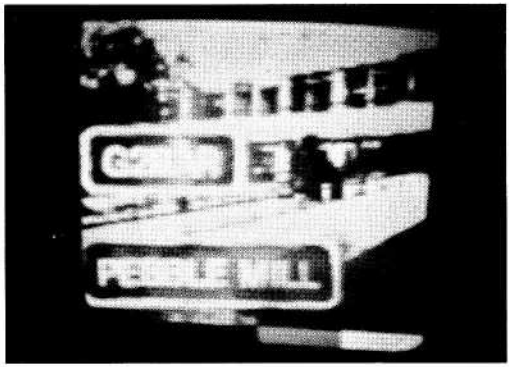


CIRCUIT 2
genlock detector.

The second is a genlock detector and gives a visible indication of genlock. It works as follows; mixed syncs from the genlock input and the spg output are fed separately through two NAND gates to a negative edge detector. This causes a short '0' to be applied to the input of a NAND gate which in turn produces a '1' at its output, this is applied to another NAND gate together wit a pulse from another negative edge detector. When both pulses arrive together, ie when the spg is genlocked, a '0' is produced at its output. This pulse is too short to use directly to light a LED and so it is fed into a 74121 monostable. This increases the pulse to 60 uS which is just less than the 64 uS line rate. The 'Q' output feeds a BC109 buffer with a LED in its collector. The eye is unable to detect the short time the LED is off and it appears continupusly lit. This gives a visible indication of genlock, very accurately; it can be used to adjust the line phase pot instead of a double beam scope.

Ian Pawson G8IQU
Leicester.

COVER PHOTO



BBC Television's "Pebble Mill at One" programme recently ran an item on slow scan tv featuring Bert G2BAR and his equipment.

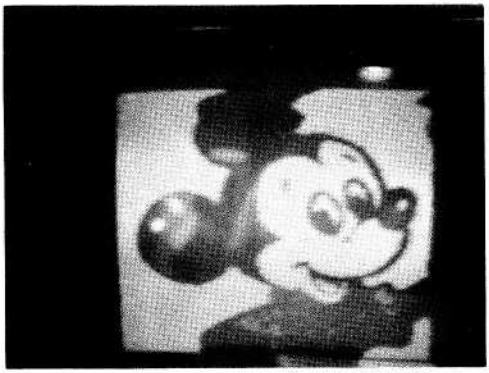
The item was first originated by a request to Grant Dixon G8AEC by the BBC who discussed the matter with Malcolm Sparrow G3KQJ, after which Grant decided to ask Bert Uppingham of Bristol, as he is a regular DX operator who has sstv equipment plus a Robot 400 scan convertor which will work in both directions.

In the programme we were given a brief description of what we were looking at and then a live call followed by a reply from a /MM station at Port Said in the Eastern Mediteranean. This was said to be live - bit in practice the BBC ran a recording at this point! After this

Bert called up G3WW and Richard gave his name callsign and location in speech, followed by his report and some capyions, including the one of his grand-daughter shown here.

The W4CVS picture was also shown, reputedly as part of the Port Said station reply, but as his callsign was W7FV/MM it was obviously just added for effect. W7FV/MM was located on the SS "Arizona" roll-on-roll-off cargo vessel 470 miles west of the Suez canal at the time of the broadcast.

The point was also made that the pictures can be recorded on an ordinary domestic cassette recorder, so perhaps a lot more people will soon become active in the, to them, new hobby of sstv.



1HZ - 450MHZ DIGITAL FREQUENCY METER WITH SIX DIGIT DISPLAY.

PART 1

by Peter Johnson
G8EIM

INTRODUCTION

The DFM described is the product of eight months solid hard spare time work. It started as a group interest project at the Harrow Radio Society and so far has produced 20 kits, all of which have worked satisfactorily; some others are still underway at the time of writing.

The first unit to be completed was for the Club, to be used as a working example, and the unit exceeded all expectations.

The basic requirement was a 1 Hz to 50 MHz device with a reasonable sensitivity. Flexibility of the design allows the use of different frequency crystals to be used in the timebase. As the pcb for the timebase uses links from each stage of division, it may be programmed to suit the crystal. From a 1 MHz oscillator, division provides 1 Hz, with the option of 0.1 Hz and 0.01 Hz timebases.

Four pcb's make the basic DFM, these are as follows;

pcb 1 & 2 MO & Divider (= timebase)
pcb 3 Decade counter and display driver, with or without store/latch.
pcb 4 Logic control with store control or without store/latch.

pcb 7 Input amplifier
pcb 8 (Actually Veroboard) Display six digit DL707 LED common anode displays.
pcb 9 An additional board in the form of a "take it or leave it" rf stage with a 10:1 divider from 450 MHz to 50 MHz.

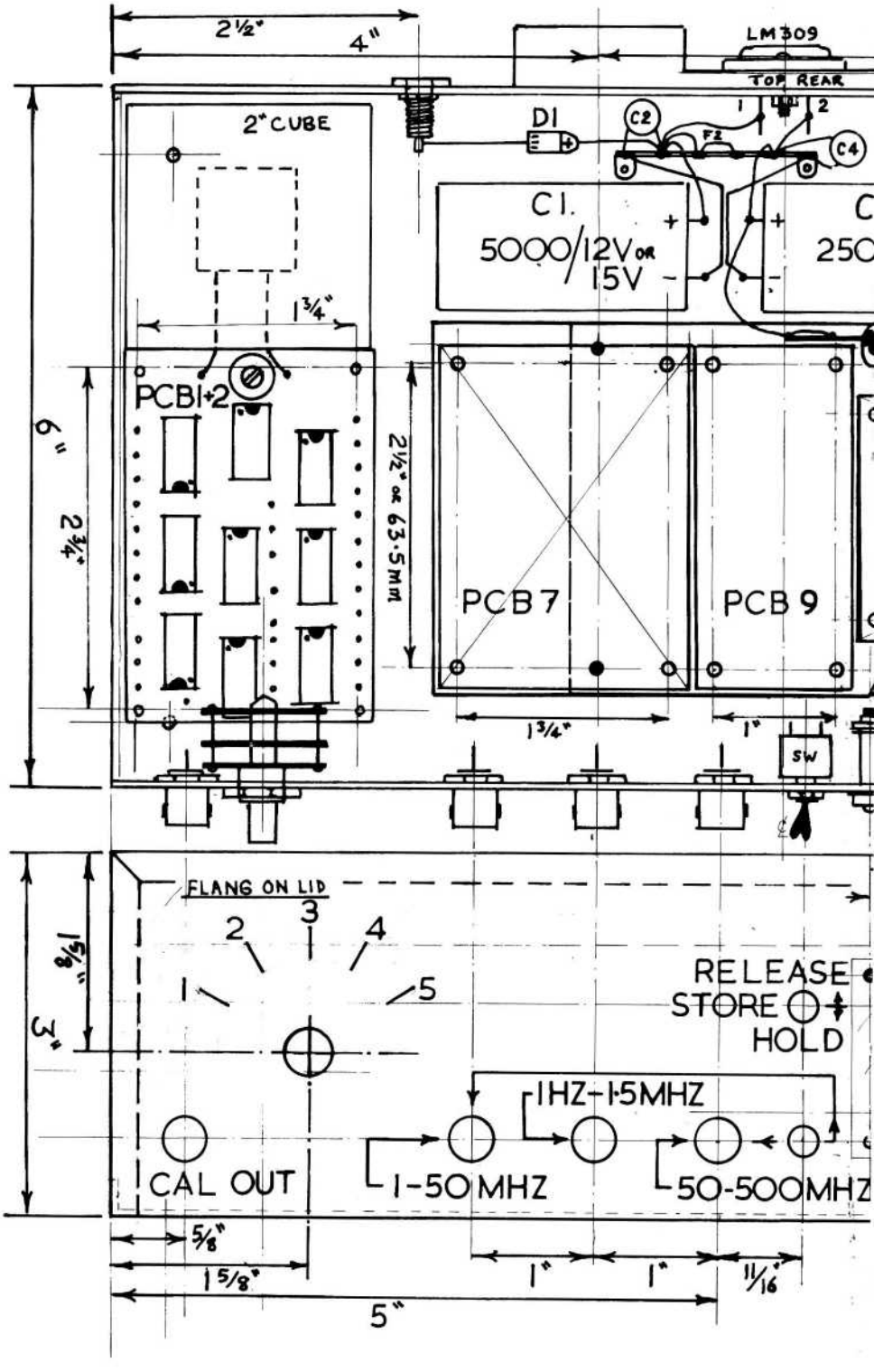
Other additional circuits may be added at a later stage - refinements such as an overflow indicator external off-air reference to lock the crystal to Droitwich, buffer stage on the cal. output with electronic switching etc etc.

A frozen display is available on either version, but without a store/latch. It does not update the reading continuously, only every 1 Hz on the lowest timebase range. The flicker rate without storage is not unpleasant.

A standard, and cheaper than most, cabinet is available for this project. It can be had off-the-shelf in most electronic stores.

All components are currently available - only branded devices should be used unless you have a means of testing them before use. Duff components can cause any well designed project to go bad! The cost of the complete DFM with the 450 MHz pre-scaler is approximately £54 - and that includes the paint for the front panel. The pre-scaler amounts to about £12 so if you do not want to have it, the cost drops to £42. This is cheap when you compare the price and performance of other kits.

I strongly recommend the TEXAS ICs for this project, especially the high speed Schotky 74...AN series. The 74196AN must definitely be a Texas component, as no other branded IC has produced comparable results.


2½"
4"
LM309
TOP REAR
2" CUBE
D1
C2
F2
C4
1
2
C1.
5000/12V OR
15V
+
-
1¾"
PCB1+2
6"
2¾"
2½" or 63.5mm
PCB 7
PCB 9
1¾"
1"
SW
FLANG ON LID
2
3
4
1
5
8/5"
3"
RELEASE
STORE
HOLD
1HZ-1.5MHZ
CAL OUT
1-50 MHZ
50-500MHZ
⅝"
1⅝"
5"
1"
1"
11/16"

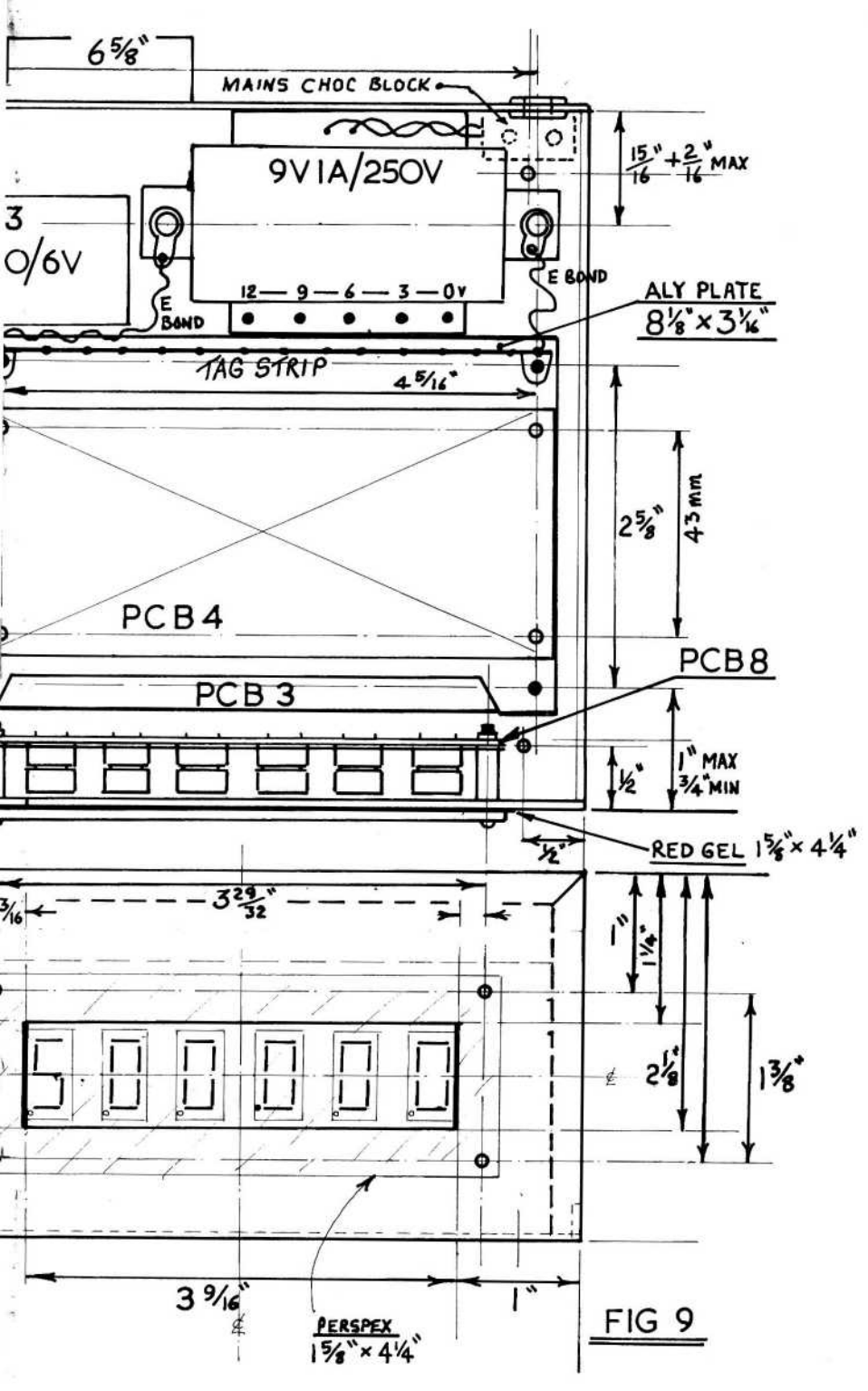

6 5/8"
MAINS CHOC BLOCK
9V 1A/250V
15/16" + 2/16" MAX
3
O/6V
E BOND
12 — 9 — 6 — 3 — 0V
E BOND
ALY PLATE
8 1/8" × 3 1/16"
TAG STRIP
4 5/16"
2 5/8"
43 mm
PCB 4
PCB 8
PCB 3
1" MAX
3/4" MIN
1/2"
1/2"
RED GEL 1 5/8" × 4 1/4"
3/16
3 29/32"
1"
1 1/4"
2 1/8"
1 3/8"
3 9/16"
1"
PERSPEX
1 5/8" × 4 1/4"

FIG 9

GUIDE SPECIFICATION

The figures below cannot be guaranteed, due to the wide range, and variation in source of supply, of components.

Frequency Range	A	1 - 50 MHz ±50 Hz dependant on source of ICs used.
	B	30 - 450 MHz ±100 Hz dependant on source of ICs used.
	C	1 Hz - 1.5 MHz
Range	A	1 - 80 MHz
(Actual measured)	B	30 - 460 MHz
	C	0.1 Hz - 2.5 MHz
Sensitivity	A	200 mV @ 1 MHz (50 mV @ 80 MHz)
	B	100 mV - 400 mV without pre-amp.
	C	200 mV - 400 mV
Timebase Position	1a	0.01 Hz (Optional)
	1b	0.1 Hz
	2	1.0 Hz
	3	10.0 Hz
	4	100.0 Hz
	5	1000.0 Hz (Optional)
Cal. Output		1 MHz
		500 kHz
		100 kHz Intermodulated, resolves well above 500 MHz
		50 kHz
		10 kHz
Xtal fitted	1 MHz 0.005% Tol ±10 Hz in free air @ 25°C.	
Option	10 MHz 0.001% "	

Xtal fitted into Jabalite 2" Cube

Average error @ 100 MHz = ±200 Hz

Max. error @ 100 MHz = ±1000 Hz at extreme temperatures ± 25°C

P.S.U. 5 V 1.2 A regulated
4.7 - 5.1 V 200 mA Z REG
External car battery 13.8 V max 1.25 A average (a filter is required if engine runs)
AC Mains 250 V @ 27 w approx.

NOTE 8 dividers are required with a 10 MHz crystal, 6 with a 1 MHz crystal. The pcb has space for eight 7490s.

ORDER OF CONSTRUCTION

1	chassis	
2	PSU	check
3	pcb 1 & 2	check
4	pcb 8	check
5	pcb 3	check
6	pcb 4	
7	pcb 7	
8	check MO for zero on ref freq.	
9	tidy up	
10	COMPLETE.	

NOTE

Good insulation and earthing of the soldering iron common to the chassis being worked on must be observed. If a potential difference exists damage will occur to all ICs etc. One unit was completely ruined by this mistake.

LIST OF DRAWINGS

Note that not all these are reproduced in this issue.

FIG 1	pcb 1 & 2	MO & Divider Timebase Circuit
FIG 2	pcb 3 & 8	Divider & Display
FIG 3	pcb 4	Control logic
FIG 4	pcb 7	Input amplifier
FIG 5	pcb 1 & 2	Layout of components
FIG 6	pcb 3	
FIG 7	pcb 4	
FIG 8	pcb 7	
FIG 9	Metalwork and pcb positions etc. P.S.U. etc.	
FIG 10	Interconnection and P.S.U. circuit.	
FIG 11	Pre-scaler 500 MHz ÷ 10	
FIG 12	Display Veroboard pcb 8 and P.S.U. tag strip layout.	

PROGRAMME OF CONSTRUCTION

FIGURE 9; Chassis.

Mark out the metalwork as per the drawing, drill holes, cut out voids, de burr edges, finish all holes, rub down surfaces to be painted with fine grade emery cloth. Clean off with a solvent suitable for the spray paint, or paint, to be used. Spray the chassis lightly, leaving plenty of time between each application, until about six coats have been applied. Spray with transfer fixing varnish and leave for two or three days for a completely dry, hard finish. While waiting for the chassis to harden, collect all the components ready for the assembly process.

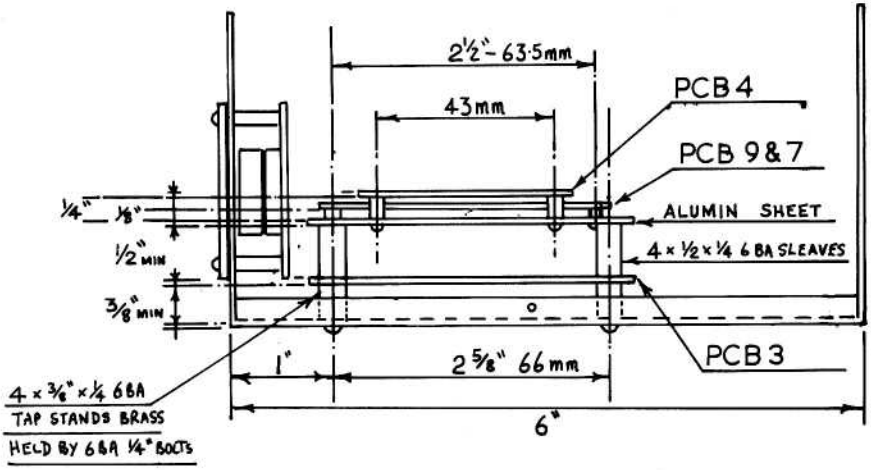


FIG 9 SIDE VIEW

When the paint is hard, fix transfer lettering or Letraset in the appropriate places, spray varnish to fix the letters to seal against being rubbed off. The regulated P.S.U. components should now be fitted to the chassis; transformer, mains cable, regulator, electrolytics, tag strips, switches, rectifiers, and capacitors. Wire up and check that all the P.S.U. components have been fitted and wired. Check before switching on that the 9 volt tap is correct and that pins 1 & 2 of the LM309 are correct - this last is a common error. Switch on - off load voltage should read 5, with 9 - 12 on the unregulated side. Solder a 10 ohm high wattage resistor between the +5 V rail and earth.

Briefly switch on and check that the 5 V is still present. Now use a scope to check that there is less than 5 mV of ripple on the rail. Do not forget to include F1 and F2, with 1A fuse wire links. Remove the 10 ohm resistor, and the power supply is now ready for checking each pcb as it is made.

COMPONENTS LIST

HARDWARE & P.S.U.

Quantity	Type		Designation
1	WB4	'Norman' readymade cabinet	
1	LM309K	Regulator 5 V 1 A	PSU
1	0 - 3 - 6 - 9 - 12 v 1A 250 v transformer from Smith's Edgeware Rd		PSU
4	1N4001	Rectifiers	
1	2A	For external 12 V supply polarity protection	D1
1	5000 nF 15 V		
1	2500 nF 6 V		
2	0.22 nF 50 V		
2	0.05 nF 100 V		
2	10 - 12 mm dia. ferrite rings. Wind as many turns as possible of 20 - 22 swg wire		CH1 & 2
1	4.7 V 1.5 w	Zener	Z1
1	27 ohm 1.2 w resistor		
1	10 way tag strip		
1	6 way tag strip		
1	4 pole 5 way Yaxley switch (4 pole 4 way will do)		S1-4
6	6BA earth tags		
1	metre of 8 way multicolour flat cable		
1	packet vero-pins for pcbs (100 of 0.1")		
1	can of spray paint of desired colour		
1	can of spray lacquer to fix transfers		
1	sheet of Letraset or letters to choice		
1	pointer knob		
4	BNC sockets (or Belling Lee, which are much cheaper!)		
4	rubber feet (or toothpaste tops)		
1	rubber grommet for mains cable		
1	3 way terminal block for mains cable termination		
1	13 A plug top (fit 2A fuse)		
2	metres 3 way 2A mains cable		
2	sockets (red & black) for external 12 V supply connection		
1	heatsink for LM309K. Approx. 2" x 3" wide x $\frac{1}{4}$" thick. Allow for flange of cover at rear, $\frac{1}{4}$" overlap.		
1	2" cube made from expanded polystyrene, Jabolite, ceiling tile etc.		
2	4BA earth tags		
1	single pole ON/OFF switch for freeze/release display.		
1	switch, mains, SPSW, mounted on rear of cabinet if required. None was fitted to the prototype.		

ACKNOWLEDGEMENTS & REFERENCES

1 VHF Communications Vol 5 Ed 2 0 - 100 MHz pre-amp designed by DL8TM. Permission to reproduce a modified version has been obtained from DL3WR of VHF Communications.

2 Mr J. Bryant of Plessey Semiconductors for supplying the ICs used in developing the pre-scaler.

3 All the members of the Harrow Radio Society who contributed feedback of information after construction of this design, and especially G8IWY who designed the logic circuits.

IN THE NEXT ISSUE: CIRCUITS & PCBs FOR THE REST OF THE UNIT.

CMOS

A.CRITCHLEY Dip El; C Eng; MIERE.

PART 2

Interfacing and using Transmission Gates.

Why CMOS ?

So far we have seen that CMOS has some advantages over TTL and also some disadvantages. What others has it?

Unfortunately there are two types of CMOS which differ mainly in the way in which they are connected to the package pins. These are the 4000 series and the 74C series (which are pinned as for TTL). The other differences are as follows:

Advantages of 74C over 4000

1. 50% faster,
2. 50% more output current,
3. Can be driven by TTL over the MIL temperature range without pull-up resistors. (+5V supply)
4. Engineer familiarity with pins and functions.
5. Consistent device characteristics.

Advantages of 4000 over 74C

1. More logical pinning of packages - supplies at ends for all devices; symmetrically pinned,
2. NOR/NAND gates pinned identically,
3. Wider range of AND,NAND,OR & NOR gates.
4. Multiplexers are reversible,
5. Standard positive clocking,
6. Positive-logic orientated,
7. Many more suppliers,
8. Wider range of functions including some unique to CMOS.

These differences mainly revolve around basic gates, simple circuits and usability. 4000 is more flexible with a wider range and the manufacturers of 74C who also make 4000 actually sell more 4000 types.

The advantage of 74C interfacing with TTL is minimal as circuits are usually all TTL or all CMOS so why mix them up?

CMOS has some other advantages over TTL too. It not only requires far less power but can also work with a much wider and less critical range of supply voltages. Most will work with 3 to 15 volts and some with up to 18V. Not only that but the voltage does not need to be regulated and that saves money too. It also saves money by needing less thick wiring and less cooling.

Although CMOS is a bit slower than TTL it is still amply fast enough for most TV applications and its cost is the same or less than TTL.

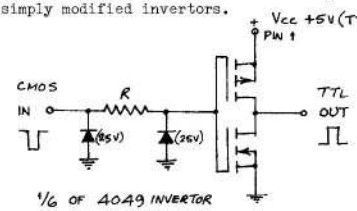
It does not need the same amount of decoupling on printed circuit boards as it is less susceptible to noise and also generates less to start with. The noise performance is, however, somewhat offset by the fact that higher impedances are present because of the protection arrangements so that noise is more easily picked up.

It does have some disadvantages of course. Unused inputs must be tied down to an appropriate voltage rail. It does not have the same ability to drive other circuitry as the output current is of the order of 1 mA only. This means that the interfacing system is usually more complex.

Handling is one of the main problems but can be overcome with care.

Interfacing -driving TTL

Now for some practical arrangements. The 4000 range includes some Hex. Buffers specially designed to drive TTL from CMOS voltage levels - which are always higher. They are simply modified invertors.



1/6 OF 4049 INVERTOR

The 4049 has the TTL supply voltage as the invertor supply and the input protection diodes removed from the positive rail. Thus any input signals can exceed the +5-volt rail and go up to the CMOS signal rail of up to 15 volts. The 4050 has a further invertor stage to make it into a non-invertor.

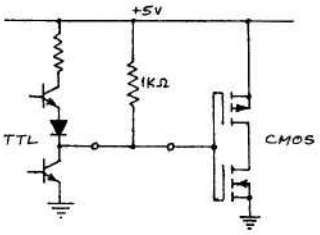
Since the protection is missing against the positive input voltages these devices should be handled with great care!

The 4049 and 4050 respectively replace the 4009 and the 4010 which were conventionally protected and needed the CMOS supply rail as well as the TTL one. In their cases the output rail must never exceed the CMOS rail. They are now obsolete.

The 4049 and 4050 are the only CMOS IC's not to have the supply rail on the last pin of the package.

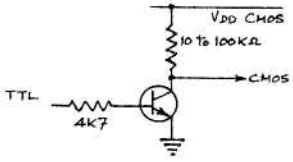
Interfacing - driven by TTL

If the TTL and the CMOS are on the same supply of 5 volts the only problem is that the TTL output does not rise all the way to the rail.



To ensure this a pull-up resistor is fitted. This reverse-biases the TTL output diode which no longer holds the output voltage to about 4 volts and so it rises to the rail voltage. The value of R should be between 330Ω and 15kΩ, 1kΩ is usual.

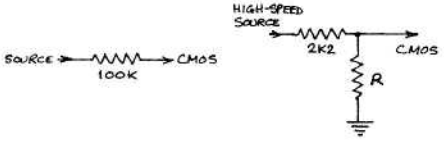
If the CMOS and TTL voltage rails are different then a transistor interface is required.



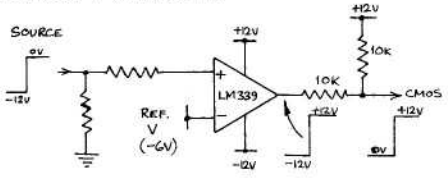
This is very simple but a pull-up collector resistor is necessary to ensure that the CMOS input does not float when the transistor is turned off.

Interfacing from other sources

If the source voltage equals or exceeds the CMOS rail voltage, then a simple resistive input is all that is required (to limit any current). If the speed has to be great then this resistor must be low in value in order to reduce the effects of stray capacity. In order to keep the current down another resistor then has to be added to attenuate the voltage.



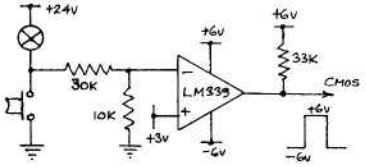
If the source voltage does not reach either of the rail voltages then some form of level-shifter is necessary. A suitable one makes use of a comparator type LM339 or LM3302. The source voltage shown here varies from −12 volts to earth so that the comparator requires a reference voltage somewhere in between, say −6 volts. The comparator is run on −12 volts so as to be safely driven. Its positive supply is +12 volts as for the logic. The output swing is therefore ±12 volts. This is too much for CMOS so an attenuator of 2:1 to +12 volts changes the CMOS feed to a swing of 0 to +12 volts.



The precise arrangement differs with the input range but it is worth noting that the comparator has an open-collector output so that its resistor may be taken to almost any convenient voltage.

Interfacing from 0 & +24V to ±6V

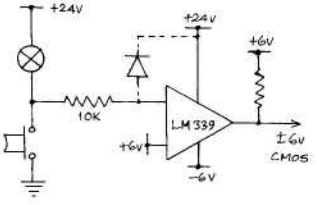
This is a fairly common TV requirement with a 24-volt push-button control system and CMOS which is centered about 0V.



The input voltage is attenuated to keep the swing between the rails so that the comparator is not damaged.

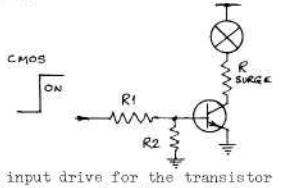
An alternative which saves resistors is to power the comparator from the lamp supply. Then the input cannot exceed the rail.

Another alternative is to fit a diode from the input to the supply rail to prevent the input from going beyond it. This could be useful as the lamp will get an 'off' current by being strung between the two supplies and the value of the input resistor will determine the 'off' brightness of the lamp. This finds an application in dark control rooms.



Driving lamps

This is a little tricky because CMOS can only provide about a milliamp of current so that a driver transistor is necessary. A typical transistor has a Beta of say 50 which means that the lamp current must not exceed 50 mA. A surge-limiting resistor should be included.

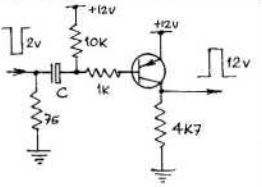


The input drive for the transistor takes the form of an attenuator rather than a single resistor because when the lamp is off it is possible for the transistor to have base leakage current which might cause thermal runaway - i.e. the lamp would be on all the time. An

input resistor of 10kΩ or so would not prevent this but the much lower resistance of the attenuation resistor would.

Driving CMOS from Standard Pulses

The standard pulses are only 2 volts (or 4V) in amplitude which is insufficient to make CMOS work. An interface in the form of a transistor amplifier is necessary and this is a.c. coupled as shown.



Values of C (Minimum)	
H.DR.	2.2 nF
V.DR.	220 nF
BL.	1 µF
SY.	100 nF
B.G.	1.8 nF
P.I.	47 nF

Larger values than these are recommended to be on the safe side.

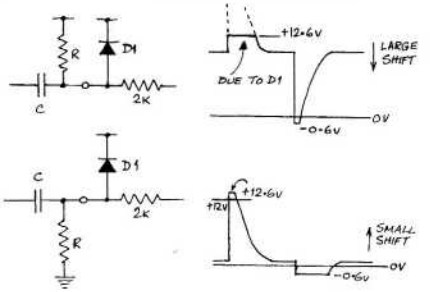
Differentiation

TTL differentiators are safe only when the resistor is returned to earth potential because of the problem of reverse-biasing the input transistor junctions.

CMOS differentiators have a different problem. The protection diode to the positive rail rectifies a differentiated pulse to cause a negative shift of the signal at the gate. The amount of shift depends on the source impedance. Thus returning the resistor to the positive rail is not recommended.

Unfortunately, the same problem is present if the resistor is returned to earth except that there is a further 2kΩ resistance added to the source resistance. This is somewhat better.

In practise, though, either type works satisfactorily because the CMOS does not change state until the signal gets almost half-way between rail voltages. The d.c. portion of the shifted signal therefore has quite a way to go before a differentiator does not work.

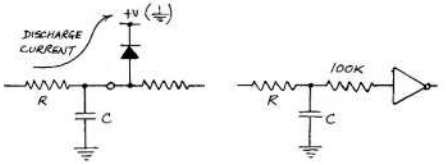


The protection diodes can handle a 50mA peak signal so a differentiator presents no problem if the source is another CMOS gate as the 500Ω limits the current to about 24mA. Any other source should be treated with care and the resistor only returned to earth. This then responds only to positive-going edges of the input signal.

Integration

When integration is performed with TTL there is a danger of oscillations during the slowly changing waveform. This does not happen with CMOS but the lower gain of the device prevents the output of a single invertor from having a sharp transition. This can lead to a power loss in the invertor and perhaps its destruction. Long time-constants should thus be avoided or else fed into a schmitt-trigger device such as a 4093.

There is another problem with integrators too. If the supply to the CMOS is turned off it is possible for the integrator to hold a voltage higher than the voltage rail of the device. The capacitor then discharges via the protection diodes and it is quite possible to cause damage in this way.



All integrators should therefore include a series resistor in the gate feed to limit the current in this event. 1kΩ is the minimum for high speed and 100kΩ is normal.

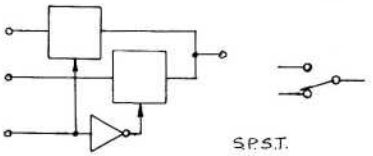
Integrators frequently form the basis of a delay system and since the gate resistance is so high the integration resistance may also be made high which makes the value of the capacitor that much smaller. This saves both money and space and is also safer as the discharge current is less. In fact the safety resistor can often be omitted.

Using Transmission Gates

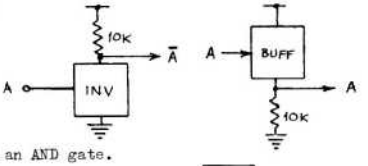
This is a very flexible device and comes in several variations. The most common version is the 4016 which contains four transmission gates in one 14-pin package. Each has an 'on' resistance of about 300Ω. The 4066 is identical but has a lower resistance of some 80Ω

The transmission gate can handle any kind of signal that stays within its voltage rails - including analogue signals - up to some 10 MHz, but crosstalk at high frequencies is a problem that prevents its use as a video selector. It is reasonable for amateur use.

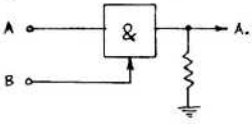
Basically the gate is a simple on-off switch (SPST) but can be arranged to form other switch types.



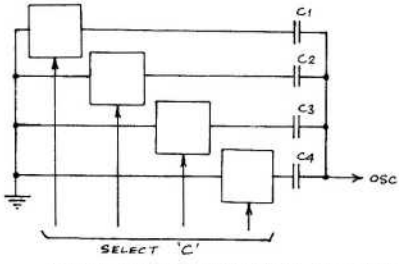
It can also be used as an invertor or a buffer.



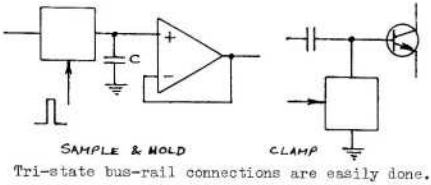
or as an AND gate.



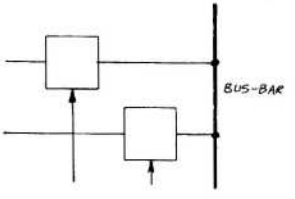
A good use is in selecting capacitors or resistors in a network to digitally control an oscillator.



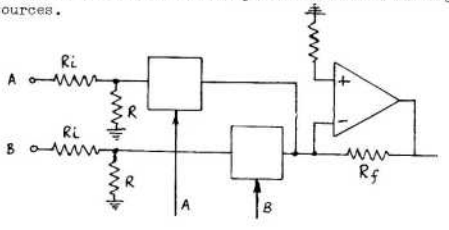
Sample-and-hold applications are common or it may be used as a clamp - particularly the 4066.



Tri-state bus-rail connections are easily done.



One very good use is as a selection system into a virtual-earth mixer. Here the transmission gates are placed at the virtual-earth point and not at the signal sources.



There are two reasons for this. Firstly, since the 'on' resistance of the gate is low compared with the source resistance R_i, the voltage drop across the gate is low and it therefore stays in its most linear (central) region. Secondly, the source voltage may exceed the rail voltages of the gate so that some input resistance would be necessary. Therefore all of the resistance is put in the input.

This is fine when the gate is 'on' but when it is 'off' and the signal exceeds the rails some attenuation must be provided (remember the protection diodes of a transmission gate can be turned 'on' by signals). If a resistor R is fitted as shown, then during the 'off' state it attenuates the signal to a safe level but during the 'on' state is connected between earth and the virtual earth. These have the same potential and so no current flows, i.e. it is effectively not there.

Transmission gates form the basis of some multiplexers. These are simply multi-way switches having several inputs and one output, but here lies the beauty of CMOS - they can be used in reverse with one input and several outputs!

There are several arrangements available.

4051 is a single 8-way switch with a 3-bit control input.

4052 is a dual 4-way switch with a 2-bit control input.

4053 is a triple 2-way switch with 3 separate controls.

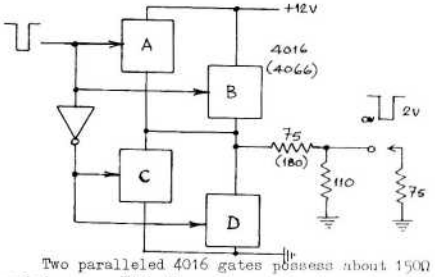
4067 is a single 16-way switch with a 4-bit control.

4097 is a dual 8-way switch with 3-bit control inputs. The two sections switch together, i.e. two-pole.

The 4051/2/3 have a useful feature in that a third voltage rail input makes them able to level-shift their outputs; that is the signal input range can be different from their control signal input levels. The total swing must not exceed 15 volts though.

Driving 75Ω

Transmission gates can be used to drive pulses into 75Ω lines but the practise is not really to be recommended as it overloads the devices.



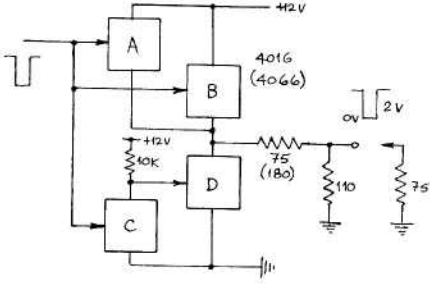
Two paralleled 4016 gates possess about 150Ω resistance. With the arrangement shown above this results in 2 volts across the 75Ω load. The source resistance is 74Ω. Dissipation in the package (in gates A and B only) is about 300 mW which is excessive as the packages are rated only at 200 mW.

Use of a 4066 will reduce this to some 80 mW since it has a lower 'on' resistance. The 75Ω series resistor then becomes 180Ω

The mark-space ratio of the pulse will reduce the

dissipation slighty as the pulse itself turns off gates A and B. Gates C and D do not dissipate any power as they merely connect the load to earth during the pulse. They are there only to preserve the output impedance.

If one of these gates was used as the invertor, then the simpler arrangement would work almost as well. The only problem is that the source impedance during pulses would be increased to 85Ω - no great problem for amateur use.



Acknowledgement

The author wishes to thank Richmond Hill Laboratories Ltd., of Scarborough, Ontario, Canada, for permission to publish this article.

Letters to the Editor

Dear Sir,

The article on Modulation in "A Guide to Amateur Television" contains an error, I think on page 10. The circuit of G6AHR/Ts design is given, and referred to as having an inverted output. Not so surely? Two inverting stages and a cathode follower produce a non-inverted output. G6KOK/Ts sync white stretcher on page 12, if added to the modulator, would then solve two problems I think.

I like the idea of ATV repeaters in the Band 4 to 5 range (John Ingham's letter in V Q - T V no. 100). If we are already campaining for one here, how can I help? If not, how do we start?
B.J. Dandy G8MGH
Kidderminster, Worcestershire.

Dear Sir,

Us antipodeans noted with much pleasure your mention of the Melbourne ATV activity in your journal and also the Amateur Radio Page of Wireless World. To follow up the input of Peter Cossins VK3BFG, I thought that I would let you have an outline of the recent dramatic use in activity in Melbourne.

Approximately two years ago ATV was in a parlous state in our fair city. Only 4 operators and very infrequent at that. Getting somewhat "crapped off" at the lack of playmates I instigated an ATV popularization campaign. The first move was to hold a somewhat tatty demonstration of transmitted ATV from one room to another in the Melbourne WIA VHF group's meeting. I was surprised at the attendance (over 100) the best ever for such a VHF group session. From this humble beginning I have presided over a quite surprising increase in activity until at present we have some 70 practitioners, half of whom can or have transmitted pictures.

The campaign started with demonstrating the simplicity of an ATV receive set up (a simple converter ahead of the standard telly). From this I started regular ATV transmissions for test purposes. The WIA regular news source for amateurs (10.30 AM East each Sunday morning). Then at my request inserted an ATV news segment that was shortly afterwards accompanied by a colour (PAL) picture from my home in Pascoe Vale. This is still going.

A variety of gear is used and one of our locals VK3ZBJ (Les Jenkins) has for the first time offered a manufactured ATV converter for our net frequency 426.250. Others use gear varying from surplus UHF base stations to the VHF Comm. DJ4 system. Some have gone quite their own way with home designed transistor exciters. I have an old base station driving a commercial amplifier into an 88E J Beam.

Several stations transmit colour, mainly from VTRs and waveform generators. As far as I know

I am the only VK3 with a colour camera.

I have enclosed a map of Melbourne showing the location of the approximately 70 ATVers commonly active.

At the moment our frequencies are 426.250 MHz, 444.250 MHz, 580 MHz (channel 34 UHF) 1296 MHz and shortly 10 GHz.

We are currently building a repeater for ATV up 444.250 MHz and down 580 MHz.
Harrison VK3AHJ
Melbourne, Australia.

Dear Sir,

Congratulations to C Q - T V on its 100th issue. This is a landmark for B.A.T.C. which caters for a minority interest and therefore faces problems which followers of more popular activities never encounter. The LDTVA, which appeals to an even smaller clientele, appreciates these difficulties very fully, as you can imagine. The appearance of the 100th issue of C Q - T V represents the end of a long chapter of hard work and perseverance by B.A.T.C.'s more literary bretheren and deserves a timely pat on the back.

Best wishes to C Q - T V for the next hundred issues.

Doug Pitt (Chairman LDTVA)
Wollaton, Nottingham.

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ELECTROSTATIC CRTs for SSTV.
P7 phosphors - types 4GP7 and 4EP7
ONLY ONE OF EACH TYPE AVAILABLE.
ANY OFFERS?
Also a three inch oscilloscope tube with X-deflection plates brought out to side caps; might do for rf envelope monitoring. Offers?
Write to B.A.T.C. Club Sales
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Herefordshire

Malcolm Sparrow noticed an advert in a recent Wireless World which looked promising, and he has just received some data from the advertiser which is very interesting. The firm is Telecraft of 53 Warwick Rd. New Barnet, Herts and they sell, among other things, tv game ICs and kits. Prices are reasonable, but the really good bit is the "colour encoder & modulator" at £6.60. Is this the cheap way to amateur colour? Malcolm has not yet received his - if anyone else uses oné, let us all know (thru' CQ-TV) how you get on!

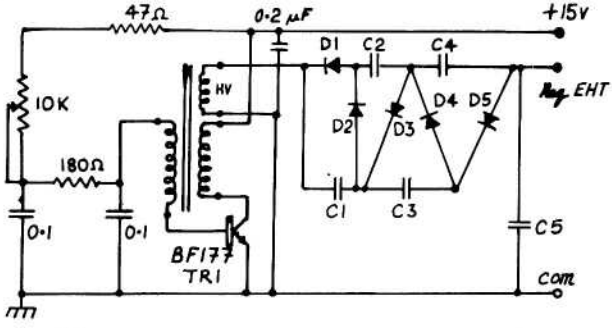
NOTICE

From time to time BATC exhibits at various shows around the country, and requires volunteers to man the stands. A small number of members have been involved in this work up to now, but a better display could be organised if more people were available. If you could help - just an afternoon here, a couple of hours there - the Club would be very grateful. Volunteers should write to Mike Crampton at 16 Percival Road, Rugby, Warwickshire, indicating how far from home they are prepared to travel. It is hoped this way to build up a pool of people all over the country, so that BATC will be able to man a stand at as many exhibitions, rallys, etc as possible.

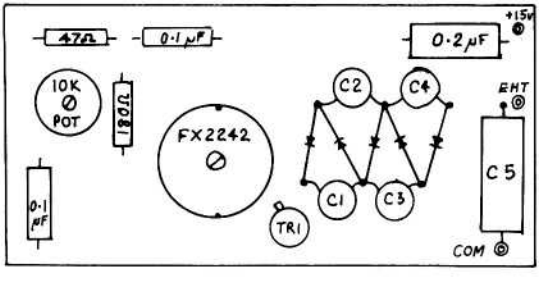
A TRANSISTORISED E H T UNIT

By J. Brown G3LPB

Whilst building a mini monitor using a small CRT, it was decided to build an external power unit. This would eliminate the 'hum' and wavy line which exists with some inbuilt powered monitors. This includes the EHT supplies. EHT is a bit of a problem, even when fed using Coax. So thought had to devise a small EHT generator. The only hope was a ferrite core numbered FX2242. This came from somewhere in the past, and the writer never believes in throwing things away.



Above is a neg out EHT, For Pos EHT reverse all diodes in Ladder network



Layout not to scale.

No data was available as this was presumably an outdated core, so a few test windings were done. The outcome given here makes a very fine little EHT gen. and is small enough to build into the cabinet making EHT available at a low power consumption. The final voltage required was 1 to 1.5 Kv. This is quite easily obtained and drives the electrostostic CRT with esse. The EHT out is dependant on the setting of the 10K resistor. This can be tweaked for the required EHT out in sympathy with the frequency of the generator. It could probably be encapsulated with Araldite or some other agent.

Made up on a piece of fibreglass board with the copper etched away, using Veropins (with shoulders) to support the components. The core was held on the board using nylon screw and nut. Long tests have been carried out with no failures (so far!)

Some frequencies make the core 'sing'. This can be minimised by tightening the nylon screw or even turning the cores laterally.

Winding Data

BASE winding 20 turns 36 SWG Collector winding 35 turns 36 SWG EHT winding 700 turns 36 SWG

Each winding seperately insulated from each other. The EHT winding had extra insulation.

Remembering, if it reguses to oscillate at the start you have two things to look at. 1, the windings need reversal, so reverse the collector winding connections only. 2, the 10K pot may need a tweak. In the original the pot was about half-way, and it went off O.K. This can be adjusted after the unit works.

RESULTS

EHT available 1.9K max. volts freq. about 15K mark.

COMPONENTS

1-47 ohm ½ watt resistor
1-180 ohm ½ watt resistor
1 10K preset pot (Plessey type) held on board with 6BA nut.
Transistor BF177 or near equivalent.
1..1uf 25v disc
1 .1uf 12 volt disc (base cct)

D1 to D5 IN4007 or BY 126

C1 to 4 800 pf 1000v disc
C5 2000 pf 5Kv
all the Bs and Cs can be reclaimed from scrap EHT triplers from TV.

FX CORE

Base winding 20 turns 34 SWG

Collector windings 35 turns 36 SWG
Hi volt winding 700 turns or as many as one can get on 36 SWG
Each winding insulated from each other and the EHT overwind very well insulated, preferably with thin PVC tape.
Experiments now being held on other available cores and this will come to light in the near future.

A SLOW SCAN CQ GENERATOR

PART 2

by G. L. Sharpley G3LEE

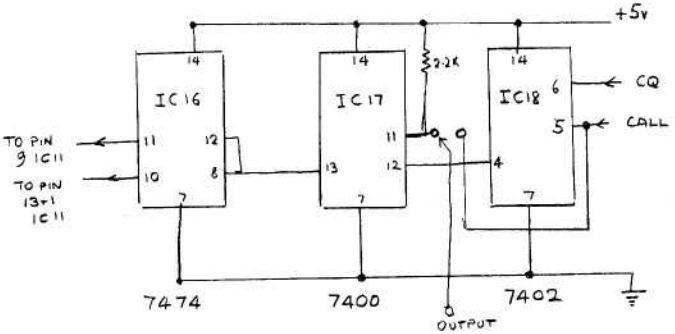
Woe is me! Please ignore the circuits printed with Part 1 of this article, in the last issue of CQ-TV. Here are the correct circuits. I have already been given a detention and 1000 lines by Grant G8CGK, who has kindly checked over these circuits - and approves!

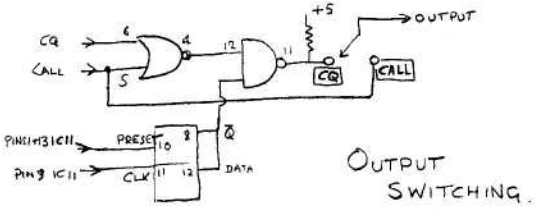
Most of the errors were due to my tracing the circuit off my own pcb and getting some of the pin numbers wrong whilst turning the board over. The main circuit needs no explanation, and completely replaces that on page 28 of CQ-TV 100. Also, the circuit printed below is an improved version of "circuit 3" from page 29.

There is a small error on "circuit 2" on page 29. Note that A, B, C & D are parelled and that E and F are separate inputs; the input to IC15 pin 19 should be F, whereas the circuit in CQ-TV 100 incorrectly shows it as E. The picture of the matrix on page 30 does not make this clear, so you are forgiven if you did not get that one!

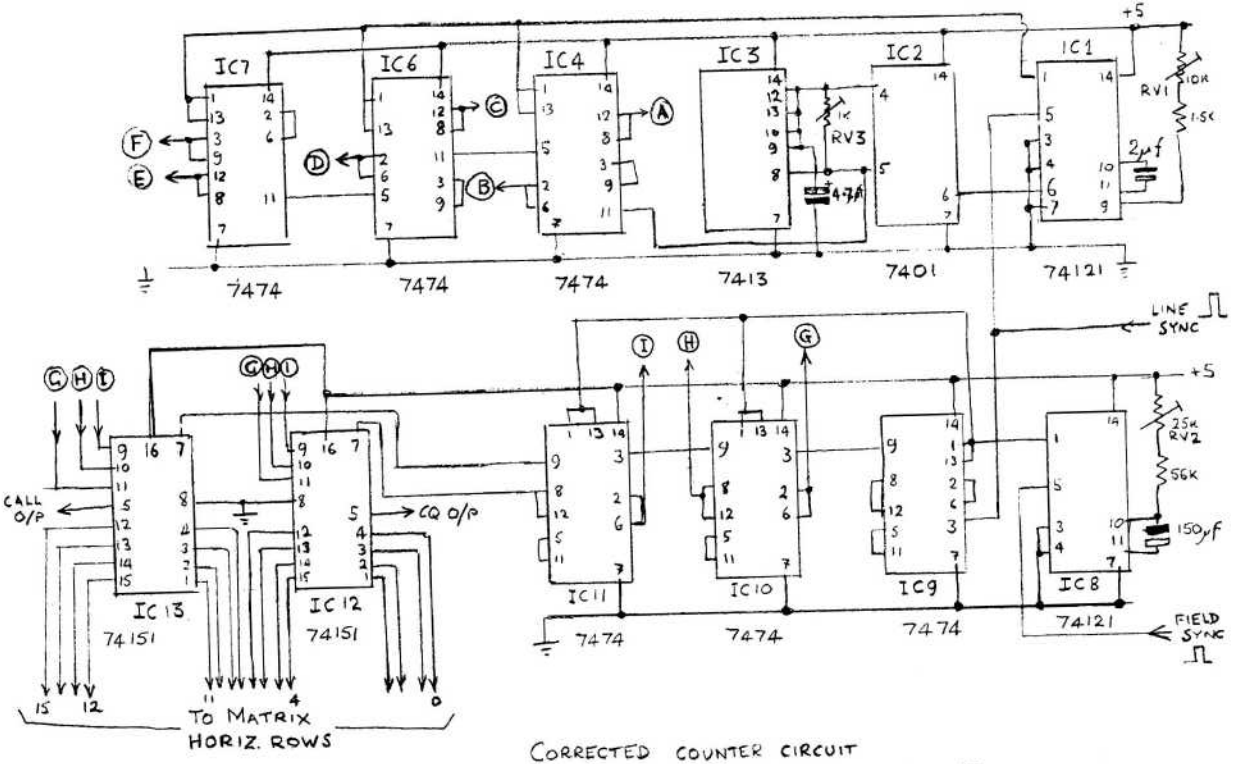
The small error on "diagram 1" is obvious - the right hand IC should have been labelled IC15. Hope you got that one! Not so obvious is that E is not fed to this IC, its place should be taken by F.

EDITOR'S NOTE. Gordon should not be allowed to take all the blame, at least two of the above mistakes (and maybe more) were due to Editorial incompetence. Due to overwork!





OUTPUT SWITCHING.



CORRECTED COUNTER CIRCUIT OF CQ GENERATOR 10-11-77

We reprint here, by courtesy of EMI Electronics Ltd., the data sheet on the EMI Vidicon yoke, as sold by B.A.T.C. Equipment Sales. EMI reserve the right to modify the design and specification without notice.

EMI

DEFLECTION COIL

TYPE KV12S

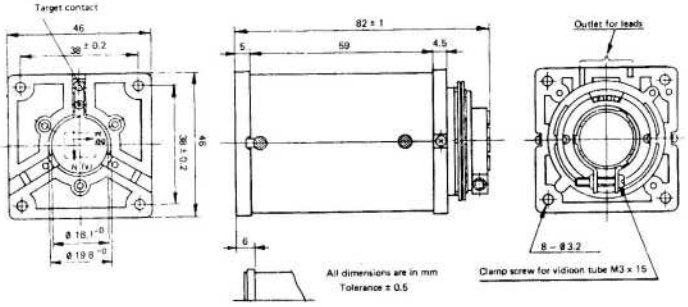
COMPLETE DEFLECTION, FOCUS AND ALIGNMENT ASSEMBLY TYPE KV12S FOR 18 mm ($^2/_3$ in) VIDICON CAMERA TUBES

Conventional wirewound line and field scanning coils are mounted on a central former which is rotationally adjustable within a screened wirewound focus coil. The assembly is completed by two magnetic alignment rings, a vidicon tube target contact and a rear tube clamping band.

The internal diameter of the coil former is such that the vidicon tube must be inserted from the front end.

The assembly is intended for use with vidicon tubes requiring both magnetic deflection and focus.

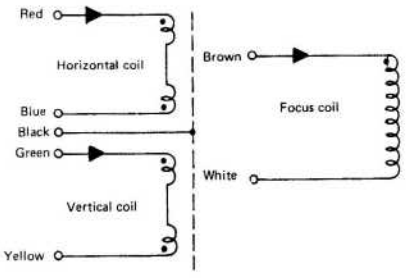
DIMENSIONAL OUTLINE DRAWING

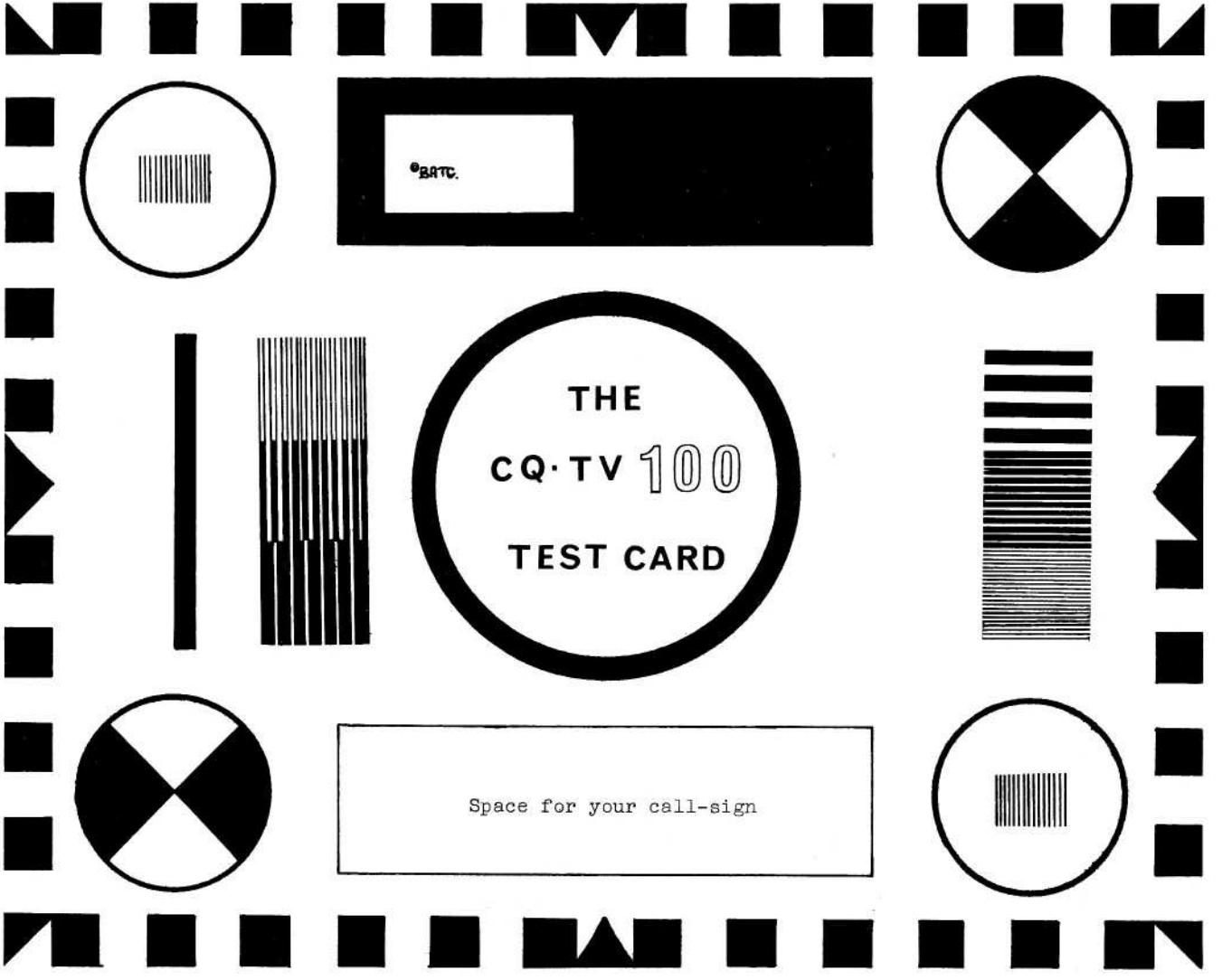


CHARACTERISTICS

MECHANICAL	(Outline drawing overleaf)	
	Weight	290 g
	Overall length (nominal)	82 mm
	Overall height/width (nominal)	46 mm
	Internal diameter (nominal)	18 mm
	Lead length (nominal)	190 mm
ELECTRICAL		
Line coil	Inductance	0.88 mH ± 10%
	Resistance	2.9 Ω ± 10%
Field coil	Inductance	32 mH ± 10%
	Resistance	146 Ω ± 10%
Focus coil	Resistance	55 Ω ± 10%
	Flux density (at 120 mA)	0.005 T ± 10%
Alignment magnets	Flux density (maximum)	0.0004 T
GEOMETRIC DISTORTION	Pincushion, barrel and keystone distortion are within 2%.	
ORTHOGONALITY	Orthogonality of deflection fields is better than 2°	
OPERATING TEMPERATURE	-10°C to +60°C.	

CIRCUIT DIAGRAM

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B.A.T.C. Equipment Registry exists to help members of the Club who have equipment for disposal or who wish to purchase some specific item. Send a list of your "wants" and "disposals" to the address inside the front cover of this issue and during the six months for which your application is valid, the Registry will attempt to put you in touch with someone who will buy your surplus or sell you your needs. A s.a.e. would be appreciated when using this service.

B.A.T.C. possesses a Marconi Sideband Analyser which was donated to the Club some years ago. If anyone wishes to use this equipment, could they contact Ian Waters at 39 Stow Road, Stow-cum-quy Cambridge. They will need to provide their own transport.

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Yoke for 1" vidicon foe Philips colour camera type EL8500 (part no 4822 168 00693) The yokes are made by Fernseh! Your price paid. Desperate! Pye Mk 7 Image Orthicon, or similar, camera head ONLY required, any condition considered.
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IVC vdeo recorder VCR101 (5 MHz b'width) with 5 1hr 1" tape carts. type 3M 461, + whole service data. Swop for FT101 or similar.
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FOR SALE
2" quadruplex VTR Ampex 1002
Would like £350. Upright deck with 2 19" racks.

Included are one spare set of heads, air compressor, Tektronix 525 wfm mon, 3Ms drop-out compensator & all manuals. Also some 2" tapes.
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91 Dyne Road
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FOR SALE
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2 prototype "Project 100" SPGs. Both tested and working, with data.
1) Early version, SPG with NO genlock. TTL osc. &divider for use with 10, 5, 2.5 MHz Xtal (10 MHz fitted) £12.50
2) Final pre-production prototype. TTL osc.layout and a few links different from final version
with 5 MHz Xtal £20
less " £17.50
Tom Mitchell
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HOUNSLOW
Middx.

FOR SALE
70cm 'off-air' Rx. Also covers UHF b'cast band. Complete with audio amp, l/s, 70cm pre-amp,gives 1 V output £25
Electronic callsign generator (as described in CQ-TV 74) £8
Test signal generator. Gives grille, PLUGE, step-wedge, sawtooth variable lift £8
Separate 405 & 625 SPGs in the same box. Full colour pulses from the 625 one £12
Each of the above units is housed in 3½"high 19" rack units, complete with power supply.
Ikegami vidicon camera with tube £25
Cintel 28841 17" monitor, 405/525/625 £25
Pye PAL decoder units £5
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Dave Lawton G8ANO
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SSTV chart for checking the resolution of your system; graded bars down each side with picture in the middle. Bars indicate 60, 80 and 100 picture elements per line. Send 40p (post paid)
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FOR SALE
Alength of armoured multicored cable, about 60', intended for remote operation of a Pye Lynx camera. It has two coaxial cores, three bunches of seven cores, one bunch each of five & four cores all colour coded, surrounded by steel & copper stranded wire as screen & armouring. It is c 1" dia. & can be buried. I would consider any offer buyer collects.
C.G.Richardson
11a Roseberry Ave
Hatfield
Doncaster
South Yoyks DN7 6JW

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Articles should be on amateur tv or related subjects and it is our proud boast that we print everything we receive! *
Manuscript may be handwritten, although typescript is preferred. Photographs must be semi matt of EN Print or post-card size, and will only be returned if a specific request is made. Drawings should be clear enough for our draughtsmen to read them!
Send your material to
The Editor CQ-TV
17 Woodside Avenue
Weston Green
Esher
Surrey
KT10 8JQ

* Well, except for those 17 SPG articles we received one month, one or two of those were left out, and also... ... Oh, OK, we just print some of what we get!

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			PRICE	POST & PACKING
Camera tubes	EEV Leddicon		£82	nil
	1" 9777 E.M.I. Ebitron		£28.00	nil
	⅔" 9831 E.M.I.	Amateur grade	£11.00	nil
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PUBLICATIONS

This is a separate department of the Club, do not send orders for publications to Club Sales, send orders to B.A.T.C. Publications
64 Showell Lane
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Slow Scan Television by B.J.Arnold G3RHI published by B.A.T.C. 2nd edition 35p + 8p p&p

A Guide to Amateur Television published by B.A.T.C. price (post paid) £1.50 to members and £2.00 to non members. Overseas postage rates on request.

Slow Scan Television Handbook sold out

CQ-TV BACK ISSUES. The following issues are at present in stock: Nos. 67, 68, 69, 73, 76, 77, 78, 79, 80, 82, 83, 86, 87, 88, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99 & 100. The stocks of some are very low and will soon run out. They are: Nos. 67, 69, 73, 78, 79, 80 and 98. Back issues cost 50p each for Nos. 93 onwards and 25p prior to 93. Return postage allowance would be appreciated. Any article which has appeared in the journal can be supplied in photo-copy form at 5p per sheet. Payment for this service should be in postage stamps. A list of all the main articles which have appeared in CQ-TV giving details of how many sheets are needed to reproduce it is available for 40p (preferably in UK postage stamps) plus a large (9" x 4") s.a.e.

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