CQ TV

No 110　　　**June '80**

A Vision Mixer

SSTV and the Microprocessor

WHO TO WRITE TO

Subscriptions and changes of address to the treasurer.

Membership enquiries to the Membership Secretary.

Advertisements and articles for CQ-TV to the Editor.

Orders for books and magazines to BATC Publications.

Orders for equipment and components to Club Sales.

CONTENTS

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Malcolm Sparrow G3KQJ.

OUTLOOK

From the Chairman

On behalf of all Club members, I would like to express our gratitude to Andy Hughes, our former Hon. Editor, and to Alan Pratt, our former Hon. Treasurer. The two posts are both vital ones, and Andy and Alan have each contributed an enormous amount of time and effort to the BATC over many years.

Andy has edited more copies of CQ-TV than any other editor, and I think I am correct in saying that Alan has been our longest serving treasurer. They have been most efficient and enthusiastic in their duties.

Under Andy's editorship, CQ-TV has been issued regularly four times a year, and has covered a wide spread of topics to suit all amateur television interests. With Alan as treasurer, Club finances have been carefully administered, and financial statements presented in a most understandable manner at committee meetings and at General Meetings.

While saying thank you to Andy Hughes and to Alan Pratt for past services, I would like to take this opportunity of welcoming our new Hon. Editor, Lewis Elmer, and our new Hon Treasurer, Arthur Rix.

DON REID

From Club Sales

We have been advised by E.M.I. that production of their 2/3" vidicons is somewhat spasmodic, being dependant upon commercial orders being sufficient to justify a production run. As a result the supply of "amateur grade" tubes is insufficient to meet our needs. No furthur orders for 2/3" tubes will be accepted until the position eases itself and we are advised that a better supply is available. Our other supplier, E.E.V., is unable to help us with this size of tube.

However, I have negotiated with a firm who can supply NEW Hitachi 2/3" vidicons, either electrostatic or magnetic focus, at a special price to members of £19 including VAT and postage. I have also found a source of supply of 8" diagonal rectangular cathode ray tubes with P7 phosphor for SSTV. These are new but out of date and are offered to members at £25 plus VAT. Please write for details if you are interested and then deal direct with the firm concerned. Do not send cheques for these to BATC.

C. GRANT DIXON

From G8ADE

Shortly after being somewhat involved in CAT-70 I got married and because of the demands of home, family and business, I have been almost totally inactive for the last nine years. Attempts to make a come-back have been frustrated not only by the deterioration of old equipment, but also by the way the whole activity has changed. Instead of **AM** we have FM or SSB. Instead of crystal control and continuous tuning we have channelisation and synthesizers. Instead of 405 positive modulation and AM sound we have 625 negative modulation, FM sound and colour. The result was that despite a whole building full of carefully preserved equipment I was completely unable to communicate with anyone!

About two years ago, when things started to become a little easier, I had to decide whether to give up for ever and scrap the lot, or to try and re-educate myself in modern technology before it was too late. I decided on the latter.

To date I have completely re-engineered my aerial system, putting in a new low noise mast head pre-amplifier, in turn protected by a low loss band pass filter to remove intermodulation products caused by the local BBC and IBA high power transmitters. I am currently working on the receivers to add demodulators for SSB and FM. When this is complete I will convert the sound TX to multi-channel operation and FM, so sometime during the latter part of this year I should be able to come on the band again and at least communicate and of course receive TV.

The question is what to do about TV transmission? The SPG, cameras and modulator can all quite easily be changed to 625 line negative modulation but with the advent of repeater input channels up to 435MHz and satellites up to 438MHz is it still wise or even possible to transmit ATV 625 line fast scan TV on 70cm?

If we only had to bother about repeater input channels up to 435MHz then a somewhat band limited VSB filtered 625 monochrome signal could still be fitted in especially if a steep sided band pass filter, say 4MHz wide, were to be used on the output of the TX. The use of the band up to 438MHz for satellites however seems to spell the end of ATV unless one moves up to 1296MHz and accepts a very limited range. Does the Club have a point of view? What would you advise? I obviously don't want to spend a lot of effort on equipment that may never be used again.

IAN WATERS G8ADE (ex G6KKD/T)

3

Switzerland

LADISLAV VIG writes from Switzerland giving news of his activities. He is a very keen SSTV enthusiast and has been experimenting with K6AEP's circuit, described in "Ham Radio" July 79, for storing an SSTV picture in a computer memory and then displaying it on a fast scan monitor using DMA (direct memory access) with a 6845 CRT controller chip. This chip is programmable for the display parameters and he has modified K6AEP's original program to give 15625Hz line frequency but the frame frequency is about 53Hz and this gives some "picture swinging" due to stray AC fields. He has also tried to use DMA 'write' for the puppose of 'frame grab' but is having difficulty locking the picture to the display. He is also interested in Don Millers MSTV experiments.

Ladislav Vig, Alfred Schindler Str. 3, 6030 EBIKON, Switzerland.

Another Monoculus

Brian Summers sends us this photograph of his Outside Broadcast van. He hopes to take it to some rallies this summer and to the B.A.T.C. convention later. It will be fitted with two IO cameras, caption scanner, video tape recorder, off air receiver and transmitter, mixer and all Mod. Cons. More information to follow in a few months time when it is completed.

Meanwhile: He can't think of a name for it, so get your thinking caps on and send Brian your suggestions (address inside front cover). He will offer a free years membership of B.A.T.C. and the winner will be announced at the convention.

Correction

Some errors have crept into my article on a Colour Processing Amplifier in CQ-TV 109, they are as follows:-

On page 25, the outputs of the LINE BLKG monostable are dwawn reversed - Q (pin 6) and $\overline{Q}$ (pin 1) should be swapped over. Similarly, the output of the FIELD BLKG monostable should be taken from pin 1 ($\overline{Q}$) and not pin 6 (Q). Lastly, the resistor 'holding up' the unused input on the sync-sep inverting 7400 gate should be shown as '2k2' although it is not very critical, of course.

JOHN GOODE

in brief

RADIO 210 at Reading will be presenting a programme entitled "Amateur Radio" on 17th July, they hope to have something on Amateur Television as well as interviews with local amateurs etc.

RICHARD THURLOW G3WW sends brief details of G3NOX's two way colour SSTV transatlantic transmission using three Robot 400's. He also tells us of an SSTV contest run by GARTG, part 1 was on 5th April and part 2 will be on 11th October; further details from him at: 2 Church Street, Wimblington, March, Cambs.

BACK ISSUES of CQ-TV available from IAN PAWSON are: 68, 77, 82, 88 to 97, and 99 onwards. Those in short supply are: 87, 97, 104 to 106. They are priced at 50p each, except pre-No. 93 issues which are 25p. Postage is extra.

MIKE CRAMPTON is preparing a new information sheet to give to new members. If you have achieved any firsts, or if you know of anyone who has, please write to him. His address is: 16 Percival Road, Rugby, Warwickshire, CV22 5JS.

FINAL NOTICE from the treasurer - if you have not renewed your subscription, this is your last CQ-TV.

CONVENTION

LEICESTER

5 OCTOBER '80

This year's convention is to be held at the Post House Hotel,
Braunston Lane East, Leicester. A large car park is available
and also preferential rates for members wishing to stay overnight

DETAILS IN NEXT ISSUE

CONTEST NEWS

I have three sets of results - firstly in chronological order I have now received the amalgamated scores for the Sept. 79 International Contest.

INTERNATIONAL AMATEUR TELEVISION CONTEST 1979 COMBINED RESULT

1.	F3YX	11806	19.	F1ADJ	2266	37.	PA0JTA	1098	55.	PE0KGF	232
2.	F8MM	8452	20.	PA0GBE	2160	38.	F3HD	852	56.	G8CTU/A	227
3.	F6BEZ	6724	21.	G4ARD/P	1864	39.	F6FGE	901	57.	DL9UC	214
4.	F6CHU	6365	22.	F2RP	1834	40.	PE1CME	793	58.	F1DFJ	191
5.	F1ECJ	5140	23.	HB9ARI	1812	41.	DJ6PI	664	59.	PA0TVJ	174
6.	PA2AAD	4162	24.	G8DTQ	1772	42.	DB1MJ	596	60.	G8PTH	162
7.	PA0AWI	4142	25.	PE1AME	1766	43.	DK8TE	594	61.	PA0DXY	148
8.	ON6OO	3814	26.	F1EDM	1722	44.	G8LWX	590	62.	DF7YU	140
9.	ON7WR	3744	27.	DC6CZ	1668	45.	G4AKG	534	63.	DL5NQ	126
10.	ON5VG	3382	28.	ON6AR	1650	46.	G8EIM	502	64.	DB5WZ	112
11.	PA0ERW	3152	29.	F1EJK	1613	47.	DJ8EW	492	65.	DF2SS	60
12.	PE1CHY	3115	30.	ON6SY	1599	48.	ON1CC	472	66.	DK6GI	52
13.	DK8CD	3050	31.	F1CRG	1470	49.	G8DLX	434	67.	DF8UG	52
14.	DF9KK	3036	32.	G8MNY/P	1385	50.	DF2JQ	432	68.	DK7SN	30
15.	DC3KT	2926	33.	G4CRJ	1337	51.	DC4CK	422	69.	DJ6TE	30
16.	F1ETG	2847	34.	F3LP	1327	52.	DJ9PE	396			
17.	ON6BM	2470	35.	F9UP	1239	53.	DC1MP	324			
18.	PD0AQO	2316	36.	ON6UA	1238	54.	F1ETD	291			

As you will see the scores have been amended slightly as some countries discounted one way contacts. However, this has not affected the relative positions. This years contest will allow half points for one way contacts.

It certainly seems as if there is a tremendous amount of television activity in France - perhaps some enterprising UK group should go on a portable expedition there for the next contest?

BATC SLOW SCAN CONTEST NOVEMBER 1979

			QRA				
1.	G3WW	240 points	AM31E	11 2metre QSO's	5 80metre QSO's
2.	G4BWU	200 points	ZL09D	9 2metre QSO'S	5 80metre QSO's
3.	G3HSK	135 points	ZL60G	6 2metre QSO's	3 80metre QSO's
4.	G8CGK	100 points	YL07C	5 2metre QSO's	
5.	G8PLP	80 points	ZM41A	4 2metre QSO's	

So, congratulations to Richard Thurlow G3WW on winning the contest, tinged only with regret at the poor entry. Ideas for making this contest more attractive would be welcomed by your scribe. G3WW suggests using the RSGB Radial Ring system of scoring for 2 metres - what do the others think?

Again NO activity in the North - they must be very shy up there ....

BATC ACTIVITY WEEK FEBRUARY 1980

		points	QSO's	QRA	power	ant.	RX	
1.	G8DTQ	3039	38	ZL60E	100	2x21E	TP491	
2.	G4CRJ	2337	30	ZL38B	120	88M	BFR34A	
3.	G8MFG	1986	21	ZL45C	10	88M	-	
4.	G8MNY	1840	29	ZL60A	100	20E	BFR34A	
5.	G8EGG	1688	20	ZL77H	6	18E	Rigonda	
6.	G4DYP	1580	19	ZM21G	10	46M	-	
7.	G3FNQ	1284	6	YN36H	150	48M	TP491	(10GHz - 10mW 20dB horn 30'AGL)
8.	G8DIR	1056	16	YM27S	15	23E	BFR91	
9.	G8MEO	203	6	ZM70S	100	48M	TP491	
10.	G8GHH	150	3	AL57B	150	88M	TP491	
11.	G8GLQ	40	8	YL48H	150	48M	TP390	
12.	G3PTD	0	0	YN49G	20	46M	AF239	

This was the first activity week that has been organised for some years so your organiser is pleased to report that 12 entries were received and that a quick check reveals that there were over 50 stations active during the contest.

G8DTQ in Caterham led the field by quite a margin and a certificate will be going to him shortly.

The top 5 stations were all located in "ZL" square but G3PTD in Manchester sent in a log (for all seven nights) just to prove he was on! and will receive a special prize.

G3FQN in Southport must be mentioned as he is the first station ever to send in an entry for a 10GHz TV contact. On three nights he put a signal across to G3NKL over a (not quite optical) 37km path. Signals varied from grade 3 to grade 1. G3NKL was also using just a 20dB Horn. So especial congratulations to them both for a notable first.

Everyone (well almost) enjoyed the event. "difficult to find a clear channel on 2" - G8DTQ. "I decided to do my bit!" - G3PTD. "Looking forward to the next one" - G4CRJ. "Got stuck in the mud operating /P on the first night, pulled a muscle extricating the vehicle so had to operate the rest of the contest from the bedroom" - G8MNY. "Very good fun - can it be one night a week for seven weeks next time ?" - G8EGG. (Perhaps we can discuss this at the convention ? - G3VZV). "Hope to be active on 23cms soon" - G8DIR.

THE FUTURE

The International Contest is scheduled for Sept 13/14 and the rules will be published in the next issue.

Finally just to alert you that we have decided to have an activity day on July 20th to coincide with the RSGB 10GHz contest on that day. No rules as such but please send details of your 10GHz activity/gear/successes/failures to me by 1st August please.

GRAHAM SHIRVILLE G3VZV

RALPH ROYLE

It is with regret that we have to record the death of Ralph Royle G2WJ, who died on 26 November 1979, at the age of 74. He had suffered a serious illness some three years earlier which had left him partly disabled, although still able to maintain an interest in amateur activities.

If not actually a founder member of the Club, Ralph had certainly been involved in amateur television from the very beginning. His interest in radio, however, went bach much further to when he was first licensed whilst still at school at Mill Hill during 1922. In those early days he took part in pioneering long distance short wave tests with the USA and New Zealand, for which he was granted a special licence permitting him to use up to 1kW.

After the war his interest turned to VHF and UHF, and in 1950 he co-operated with the GPO in special tests which were to prove that amateur TV could be transmitted in the 70cm band without interference to other users, notably the radio altimeters which then operated on that frequency. These successful tests led to the issue of the UK amateur TV licence.

From then on the station at Gt. Canfield became a team effort with Ralph pioneering UHF RF techniques, while his eldest son, Jeremy, later to be licensed himself as G3NOX, built the cameras and baseband equipment. Before long a regular two way TV sked had been established with Len Dent G3GDR near Watford, using Jeremy's Photicon (Image Iconoscope) camera feeding Ralph's transmitter, which consisted of a CV53 disc seal triode tripler, driving another similar valve as a TV modulated PA.

The later 1950's saw Ralph, together with other members of the Club, transporting vast quantities of heavy and awkward equipment to demonstrate ATV in sundry places. These included the RSGB exhibition at the Royal Hotel, Woburn Place; the radio show at Earl's Court; and the Dagenham Town Show. In those days both amateurs and the public still had the ability to wonder at such things.

Ralph's station was involved, in 1953, in what was probably the first ATV colour transmission, when Grant Dixon's CPS field sequential colour equipment was brought up from Herefordshire to feed pictures into G2WJ/T, for transmission to Mike Barlow G3CVO/T, then resident near Chelmsford. The writer remembers well that there was only one spinning disc colour monitor which, after the camera had been set up, was rushed 15 miles to the receiving end to view the result.

Ralph was always keen to help younger people startin in radio and TV. During the 1950's he helped the writer, amongst others, to obtain his licence. The first entry in my log book, in 1955, is a QSO with him.

During the 1960's, ATV activity blossomed greatly in East Anglia, and G2WJ/T formed a link in a reversible ATV chain which ran from G3GDR via G2WJ and G3NOX, by now resident at his own QTH near Duddenhoe End, Essex, to terminate at the writer's station then in Ely. At the repeater stations, broadband vision signals were both received and transmitted within the 70cm band. Part of this link was featured, in 1970, when pictures from G2WJ/T were relayed via G3NOX/T to the Club's CAT 70 convention at Cambridge.

Much more could be written of a man who was not only a highly qualified amateur engineer but also a good friend and kind host to the large numbers of amateurs who often visited Gt. Canfield. The Club extends its sincere sympathy to Mrs. Royle, Jeremy and the family.

IAN WATERS G8ADE

TV ON THE AIR
by John Wood G3YQC

Further to my brief report in the last issue on Videtec Electronics of Strathclyde, I have been in contact with the company who have informed me that because of a lack of orders they have withdrawn all their ATV modules as from the first of January 1980. They say they had an excellent response to their single very small advertisement in "Radio Communication" which proves that the customer potential is there. What, I wonder, did they expect? In my own case I saw their ad., promptly sent for the literature which took about three weeks to come, with a promise of further details later; no further details were forthcomming, no further ad's were seen and nowhere was a phone number given, also directory enquiries did not have them listed. Now I was ready to order a 10 Watt linear amplifier but considering these points I was no about to send my money until I could be sure the firm still existed and that the goods would be forthcoming. No, I'm afraid this is another typical case of a firm trying to make a quick killing with the minimum of effort or market research. Small wonder they consider the amateur market as not being worth while if they are not willing to "sell" their products to the customer. It is not the lack of a good market, it is the lack of a good sales department that made this venture fail. From the letter received from Videotec Electronics it seems they design and manufacture television systems for professional and semi-professional purposes, and yes they do have a telephone number. It is stated that there is a possibility of reintroducing a limited range of modules sometime in the future, but when, they were not able to say. Let's hope that next time they give it a fair chance.

From time to time I run across TVers who are interested in receiving foreign commercial TV stations. I wonder if there is sufficient interest to be able to devote part of this column to this subject. I have been active in DX-TV for some years and can receive bands 1, 3 and UHF. I try to keep abreast of DX-TV matters and propagation conditions, which are particularly interesting at present because of the sun spot cycle. Pictures are being regularly received from Australia, North America, Africa and Asia, apart from the usual European signals. Also, there are TV satellites up already with more to come in the near future, this will provide much work for the enthusiast. If you would like to see this subject cover ed please write and let me know.

THAT OPENING

On the 28th and 29th of November conditions really opened up on the VHF and UHF bands, and although the conditions in general seemed to affect only the southern half of the country there was a very high level of ATV activity. The 144.75MH calling channel was very busy indeed with ATV talkback. On the 28th, stations from the west midlands and Wales were working into Belgium. G4DYP (near Cannock) had a particularly good time chasing the DX as did many other stations from the midlands. G3WTY had a two way vision contact with PA0HLA and PA0AWI, strength 5 and 3 respectively. G3WTY uses a "MM" transverter with the CJS modulator from CQ-TV 104. GW8GKF managed a two way contact with ON5FF with streng 4 reports exchanged, this is certainly a very long haul contact indeed. In fact, when Ray mentioned his TV activities to his employer, Cleartone Telecommunications Ltd., the company very generously agreed to sponsor Ray's TV and promptly provided a pair of brand new 4CX250R's complete with UHF bases, now that's what I call an employer.

Anywhay, back to the opening. G8ADE (Cambridge) resolved test cards from G3VZV, ON4PO, G4IMO, PA0ERW, G8BWC, PA3AKL, and PE1AYR all between 19-22 hrs on the 29th. I logged very many continental commercial TV stations throughout the entire UHF TV spectrum, these included pictures from France, Belgium, Holland, Germany and Switzerland some of the signals were strong enough to lock in the colour (at least those with PAL systems). Amateur TV pictures encountered by myself included F1EIF, ON1AGO, ON7PO, ON5FF, and ON5LT, all of which were received at very good strengh here, also copied were G4DYP, G4IMO and G8EQZ.

I must say this is the first time I have heard the calling channel sounding more like 20 metres during a contest, and with so many stations on, a considerable spreading to either side was necessary. By the way, whatever happened to SSB? Everone seems to be using FM these days. This certainly must have been the most intense opening for a considerable time so I would like to hear of your experiencies and see any photo's which may have been taken.

Another opening occurred around the middle of January (which unfortunately I missed because my receiver had packe up). G8DLX in Rugby saw pictures from several ON' stations so conditions must have been good. I would like to hear abou this one as well.

G3PTU (Huddersfield) copied good pictures from DC6CF, PE1AYR and DF7KX on the 29th November. David says that the DC6CF and PE1AYR were both very strong indeed, confirmation is being sought from the DC6 who, David thinks, may have copied his pictures.

G8GUN from Birmingham is now active with PAL colour equipment and G3UKV from Wellington in Shropshire is active with low power. A two way contact with G5KS (Warley) was made in early January with good pictures being exchanged. On the 21st January G8GUN using a new solid state transmitter had an excellent two way contact in colour from the QTH of the Midlands Video Group to G5KS. The pictures were reported as being first class.

That's about it again, please keep the letters coming and address them to:-
TV on the Air, 54 Elkington Road, Yelvertoft, Northampton NN6 7LU.   Tel: 0788-823250

BOOK REVIEW

FERNSEHEMPFANG ALS HOBBY by Hans-Dieter Ernst. Telekosmos Verlag, Stuttgart. (1979). No price marked.

The title translates as "TV reception as a hobby" and that's a fair description of what this 160 page paperback is all about. In many ways it covers the same ground as Roger Bunney's book on TV-DX but this book goes into details about multi-standard receivers, amateur and industrial TV, lightning protection, video recording, etc. in addition to the "usual" stuff about propagation and aerials. There are plenty of tables of data on standards and channels. The book is comprehensive though not over technical and has 24 well reproduced pictures of testcards. Three ATV stations are represented, PA7TEJ, ON6KF and who else but G8ACN!

The book is a good introduction for the newcomer but it doesn't contain many real surprises. If you don't read German it would hardly be worth obtaining for the pictures alone. All the same, the chapter on ATV is well informed and I was most interested to read that the band from 440 to 451MHz in West Germany is used for mobile TV, such as traffic observation from helicopters.

ANDREW EMMERSON G8PTH

VOLTAGE MULTIPLIERS

Full Wave Doubler

Half Wave Tripler

Basic ½ Wave Multiplier
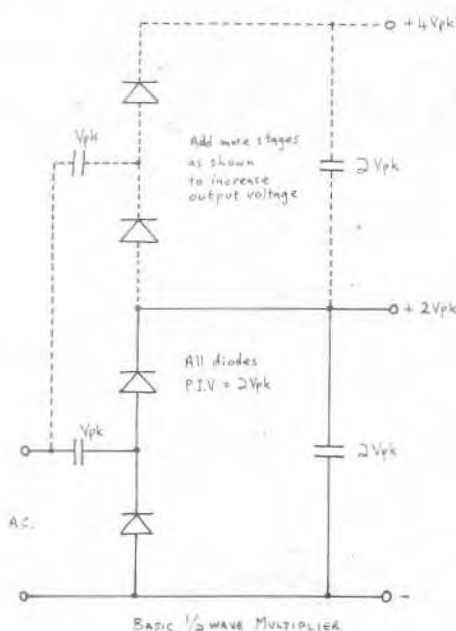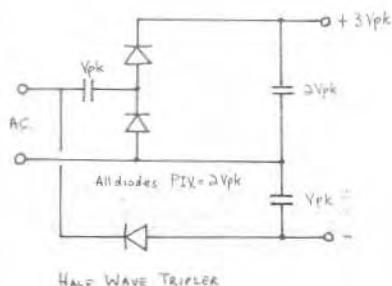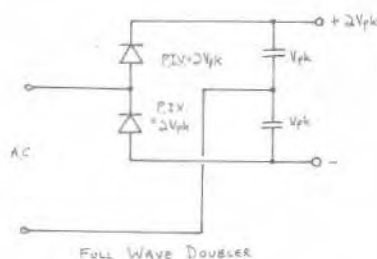
A VISION MIXER
by David Wilson

This article describes the vision mixer which I built recently, and it may provide "food for thought" for anyone who may be thinking of making something similar. There is no claim that all of the circuits are original; in fact, a few of the circuits have been published in CQ-TV before, and these have been modified to suit the present application. The values of certain components used in the prototype have been chosen by successive approximation (i.e. trial and error) and may need to be changed to suit alternative transistors, or different input levels, etc..

The video is first applied to a blanking circuit and a 6dB amplifier to drive a monitor. The blanked video is applied to the two banks of electronic vision switches, using the circuit published in CQ-TV 104 by Jeffrey Borin, but with different logic. This uses 2½ IC's for 6 inputs (or in this case 5 inputs plus black level) and would require only another 74LS05 to expand this to 10 inputs.

The field drive is inverted and used to gate the clock oscillator driving the CD4017. The clock enable input of the CD4017 is held high by the 100k resistance until a source selection button is pressed. Because the video source has not yet been selected, the output of the emitter follower will be low and therefore the clock enable input will be pulled low. The CD4017 will then count the clock pulses, during field drive, and each of the outputs will in turn go to logic 1. When the selected output goes high, the clock is inhibited, and the logic 1 on the output drives the video switch via the emitter follower and the 74LS05. The black level switching stage was added to keep the output d.c. level constant, otherwise the output would fall to earth when black level was selected. The 74LS05 is used to stop the input of the inverters feeding a voltage back past the emitter followers to the lamp drivers; the 7405 could probably be used instead, with lower values of resistance in the emitter follower divider chain.

I used BSX20 transistors to perform the video switching, as Jeffrey Borin suggested, but even with these transistors the unit is not fast enough for wiping, however, since it has nearly ½ms of field drive in which to switch then is seems likely that the cheaper 2N3704 or BC108 would work just as well.

The source selection buttons are arranged so that the lamps are illuminated at roughly half brightness when the source is selected but the bank fader is fully faded down. The button is fully illuminated when the source is faded up, and at the same time the camera tally output is at 12 volts.

The illuminated pushbuttons are Miyama type MS078 and are obtainable from: Field Tech, 2 Maintenance Area, London Airport, Houndslow. They are available with white, red, blue, yellow or green buttons, although I favour using white buttons and placing cinemoid filters behind the button to change its colour when illuminated. When I bought the buttons many years ago they were supplied with 12 volt 150 mA lamps but they can easily be changed for a different voltage or current L.E.S lamp. These are the cheapest illuminated push buttons I know of; the current price (December 1979) is just 30 pence plus V.A.T. but unfortunately the supplier has a minimum order charge of £10 plus V.A.T.

The tally circuit associated with the separate wiper on my system is fed to a relay, so that the relay contacts can handle the current of more than one camera tally light when two sources are fed through the wiper.

Each pulse input is fed to a multi-output pulse D.A. before feeding the camera and mixer circuits. Also on the same P.C.B. are three emitter followers to give three video outputs.
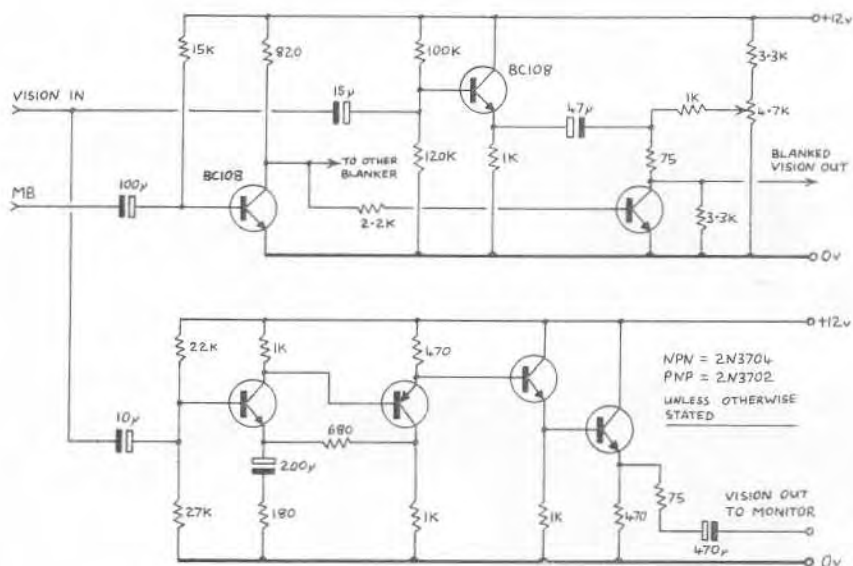
Two 7812 +12 volt regulators are used. One is for the electronics and the other feeds the indicator lamps. A 7905 -5 volt regulator is used for the pulse D.A.'s. The two transistor microphone pre-amp feeds the talkback line, and the headphones are supplied from the MC3360P ¼Watt amplifier. The fader unit uses the video attenuator circuit by Dave Lawton in CQ-TV 82. I used the MC3340P which is the identical circuit of the MFC6040 but is in an 8 pin D.I.L. package.

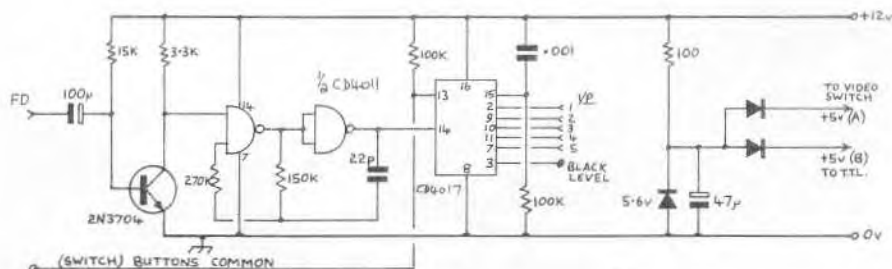The pin connections of the MC3340P are as follows:
Pin 1   Input
     2   Control voltage
     3   Earth
     4   Not connected
     5   Not connected
     6   Roll off (not used)
     7   Output
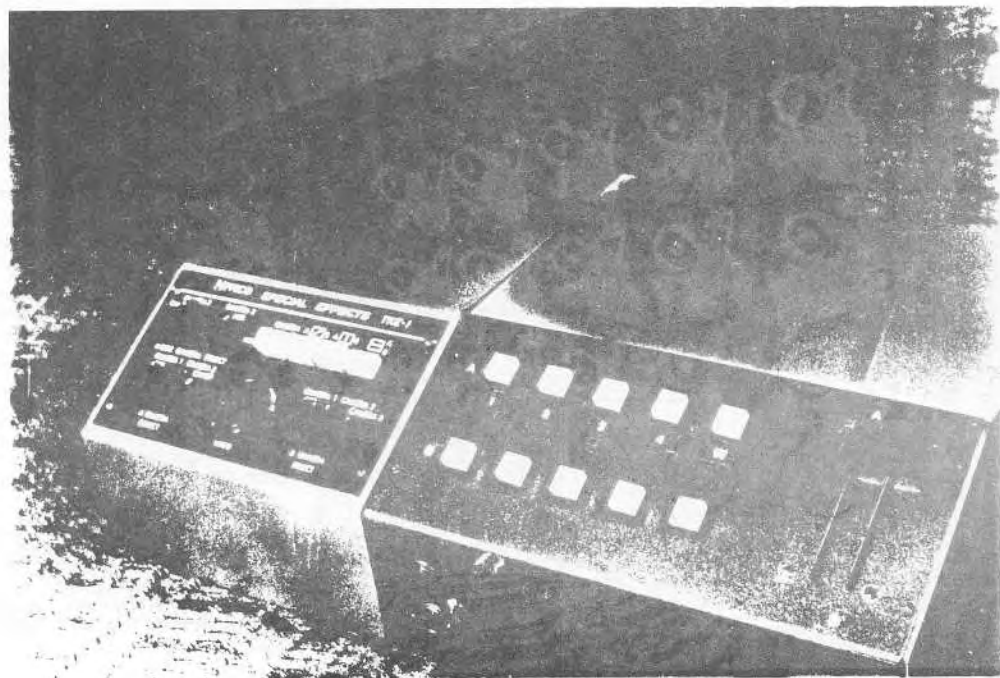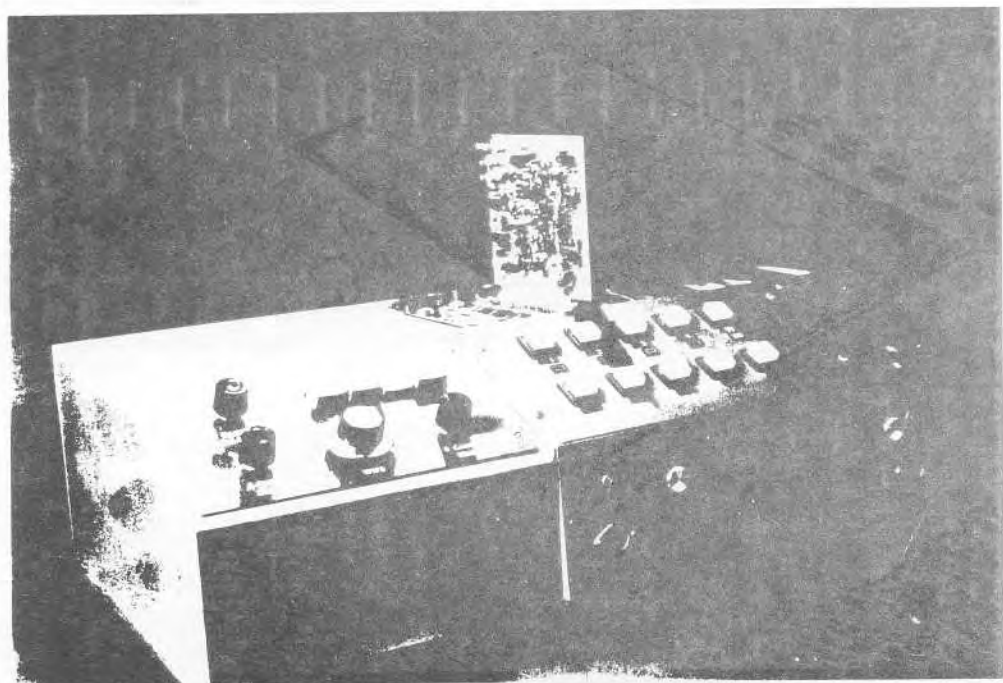   8   Positive supply (Vcc)

The 0 to 12 volt D.C. from the fader is fed to the lamp driver board so that the tally lamps operate when the fader is operated, and the same control voltage is supplied via the level shifter to the video attenuator I.C.. The direct input to the base of the input transistor is available to apply inputs to produce soft edged wipes if this is required at a later date. The resistances marked * and the zener diode may need to have their values changed to suit the particular MC3340P's that are used, to provide a smooth cross fade.
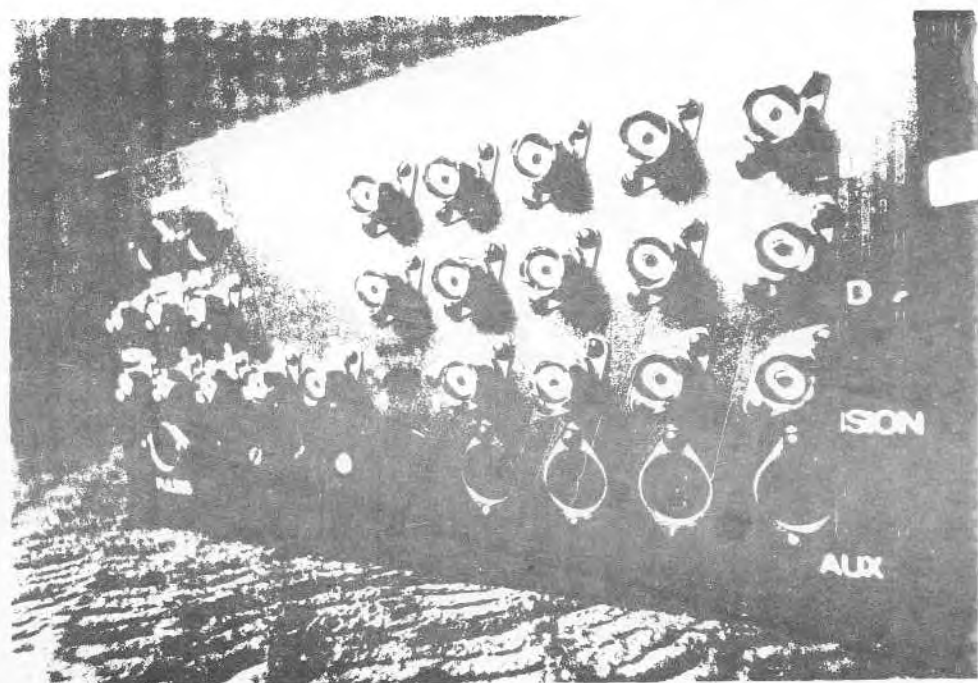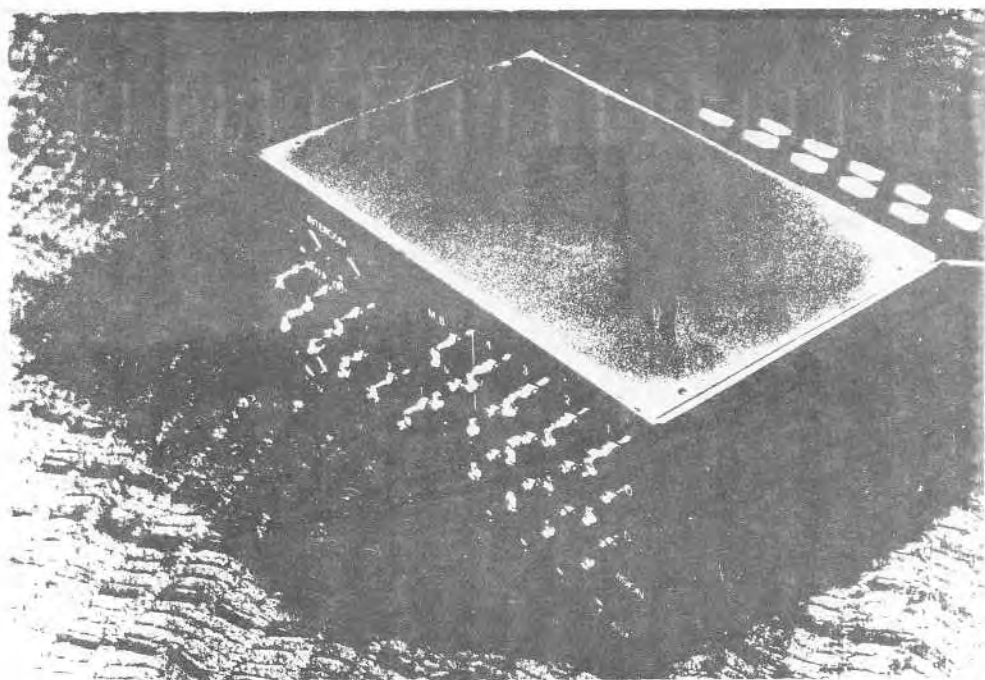
The processing amplifier is a slightly modified version of John Lawrence's design which was published in the BATC book "Amateur Television" on page 53. This circuit is run off +9v and +3v instead of the -6v and -9v of the original circuit, but since the inputs and outputs are all A.C. coupled this does not seem to make any difference to the operation.

The intercom uses a common talk/listen line with separate headphone and microphone amplifiers at each unit. The headphones used in the system are either Japanese headsets with boom microphone or A.K.G. K108 headsets. The Japanese headsets are available from: Audio Electronics, 301 Edgeware Road, London W2, and A.K.G. Acoustics are at: 191 The Vale, London, W3 7QS. The camera is fed with a 4 way screened lead which supplies intercom signal, +12 volts, tally light and a spare.

BLANKER AND MONITOR D.A.

PROCESSING AMPLIFIER

2 CHANNELS

NPN = BC184
PNP = BC214
UNLESS OTHERWISE STATED

14

5 VISION SWITCHES

VISION IN

BC107

TO OUTPUTS OF CD4017

TO SWITCH + LAMP DRIVERS

+5v (B)

74LS05

1·5k

1K

18K

100y

4·7K

100

+5v (A)

BSX20

2·2k

100

1K

100

1K

100

+12v

TO FADERS

0v

VISION BUS

VISION SWITCH

TO BLACK LEVEL O/P OF CD4017

BC107

+5v (A)

18K

74LS05

1·5k

1K

TO BUTTON

2·2k

100

2·2k

+12v

0v

NPN = 2N3704

PNP = 2N3702

UNLESS OTHERWISE STATED

MS
LO
MB
FD

22y

2·7k

100K

27K

2·7k

680

100

2N3704

2N3053

40362

4 x 75A

TO PROC' AMP'

2000yF

0v

−5v

PULSE AND VISION D.A.

FROM PROC' AMP'

1K

2N3704

470y

470

75

+12v

TO OTHER O/Ps

0v

ONE EMITTER FOLLOWER FOR EACH OUTPUT.

+12v

4·7K

3·9v
1·5W

TO PANEL
LAMP DRIVERS

330   330

TO CAMERA
LAMP DRIVERS

0-12v
1·5k
TO FADER
CONTROL VOLTS

0v

NPN = 2N706   PNP = BFR81

CAMERA
LAMP BUS

+12v

PANEL
LAMP BUS

6·7k   4·7k

330   330

TO CAMERA
LAMPS

TO PANEL
LAMPS

6·8K
TO SWITCH +
EMMITER FOLLOWER
ON VISION SWITCH
CIRCUIT

6·8K

0v

AUX¹ BOARD

560

LED DROPPER
RESISTOR

470µF

MONITOR VIDEO
OUTPUT CAPACITOR

+12v0
TO RESERVOIR
CAPACITOR

2 x 12v SUPPLIES   2N697

+9·4v

7812

220

0·1   0·22   22µ   22µ   10v

12v AC

1N4001 OR BRIDGE

-5v0
TO RESERVOIR
CAPACITOR

7905

PSU

9v AC

0·1   0·22

1N4001

16

INTERCOM SYSTEM

INTERCOM

SSTV AND THE MICROPROCESSOR

BY GRANT DIXON

Surprising though it may seem, SSTV has been with us now for 20 years. During this time it has evolved from Cop Macdonald's student project to an accepted means of communication in the amateur radio world. Some of us have found it an absorbing hobby with plenty of scope for experimentation and development and we have held our end up despite the occasional jibe from the "fast scan" merchants.

Now that we have the increasing growth of the home computer hobby, it is perhaps the time to ask ourselves what can be done with a computer to aid amateur radio and amateur television (both slow and fast). Several articles have already appeared in the press with programs for sending morse, for calculating great circle distances, for controlling the beam heading of an antenna and for generating alpha-numerics on an SSTV screen. I would like to confine myself to the SSTV applications of a computer and at the end of this article I have listed a number of useful references.

Basically we may regard the computer as a general purpose electronic kit which may be used to process or generate signals in accordance with a program written by the experimenter. Such programs are written either in a language such as BASIC or in an assembler language which is specific to the microprocessor chip being used in the computer. The execution of an assembler language program is much faster than a BASIC program and is recommended to all who are processing audio or SSTV signals as it allows several operations to be performed by the computer between successive 'bits' of the SSTV signal.

What operations can we do? Well, for a start, let us generate SSTV sync pulses by writing a program which first of all outputs a '1', calls for a delay and then outputs a '0'; after a given delay this can be repeated. If the two delays are 5ms and 55ms then we have produced line sync pulses. Now these pulses can be counted in one of the microprocessors registers and after 127 pulses a single pulse of 30ms can be generated. We have now got mixed syncs. We can now take our line period and divide it into a suitable number - say 8 - and during these 8 segments we can arrange for the computer to output 000, 001, 010, etc... 110, 111 and these will give us digital values of eight steps of grey. To convert this into an SSTV signal we have to mix the sync and grey level value to give a combined video signal and feed it to a VCO which has been suitably adjusted to give the correct SSTV frequencies.

The program which generates the sync and video signals is referred to as the "software" and the microprocessor, VCO and its interfacing circuitry is the "hardware" needed. In general there is always a trade off between software and hardware. In the example given above we could ask the computer to send a string of '0's and '1's during the sync period which would constitute the 1200Hz signal; during the first steps of the grey scale the computer would generate 1500Hz, etc etc up to the last step when it would be sending 2300Hz. This would avoid a lot of extra construction but entail a lot of extra programming. Personally, I like constructing PCB's so I prefer to feed a VCO with computer generated video.


FIG 1

18
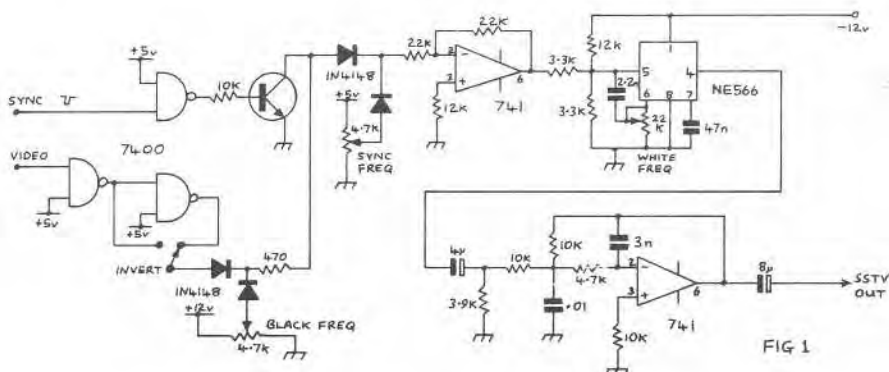
For a lot of SSTV work (drawings, text etc) it is only necessary to have a representation of black and white and if the computer can be induced to switch between black and white at the appropriate times then anything can be drawn on the screen. This is the principle behind K6AEP's article in the June 1977 issue of "73 magazine" and fig.1 shows the circuit which is used to generate SSTV from the computer video. K6AEP's program was written for the 6800 microprocessor and has been re-written and modified for the 8080 microprocessor by G3OQD. I have taken G3OQD's program and modified it to suit my TRITON computer, adding a bit to it so that now it will display on the VDU 5 pages of text, each page having 7 lines of 10 letters. Any page can be updated and then an SSTV program can be compiled of say 5 frames of page 3, 2 frames of page 1, 4 frames of page 2, etc. etc. The original program had 5 lines of 6 letters per page, which gives a much better text when one is engaged in DX QSO's on the HF bands. For closed circuit or local working where noise is not a problem the extra length of line is a considerable advantage.
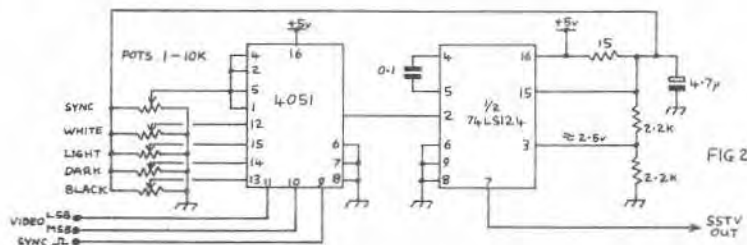
FIG 2

Barry Sanderson, writing in "QST", confines himself to a 4 level grey scale, which he calls black, dark, light and white, and fig.2 shows his circuit for feeding the VCO which in this case is a 74LS124. The 4051 is a 1 of 8 channel selector; two of the three inputs are used to select the 4 lower channels whilst the third input selects all the upper channels in parallel. If one wanted to use 4 bits for video to give a full 16 steps of grey then it might be possible to feed the sync directly to the 74LS124 via a diode and suitable current adjusting resistor. I have not tried these circuits but merely offer them as ideas to experiment with.

In fig.3 there is the circuit which I use in conjunction with my pattern generator described in CQ-TV 85 & 86. A, B, C and D are the inverted inputs; A being the least significant bit and D the most significant. If it is desired to feed non-inverted video, substitute a 7407 and feed the sync inputs with negative pulses. Note that the output stage is a low pass filter and this is essential if one is feeding the SSTV to a transmitter; square waves contain lots of harmonics and your SSTV transmission will spread all over the band unless the audio is limited by a low pass filter.

Now what about actual pictures? I have a home built DL2RZ scan converter to produce SSTV from a fast scan camera and I have built the circuit of fig.4 to interface the 4 bit video of the scan converter with my computer. At the time of writing I have not done any picture processing but the circuit does the job of switching the scan converter video off and switching the alternative input on. I have made an input and an output port for the computer and I envisage feeding the line and frame sync pulses to the computer for timing purposes, also the 4 bit video is fed to the computer. As each picture bit is received it is processed in whatever way is desired and the computer feeds back a 4 bit video signal and a switching signal which inserts "computer video" into the outgoing SSTV. Possible uses for this scheme are:-

1) enhancing contrast.
2) gamma correction.
3) insertion of titles.
4) insertion of picture stored in computer.

The last use brings us to the question of storing video signals. As it is common practice to express SSTV pictures in terms of a 16 level grey scale this leads to a 4 bit word being used for each picture element. Now most microcomputers work in 8 bit words, each word being called a "byte". Hence it would seem reasonable to use one byte to store two picture elements and thus halve the data processing rate. There are $128 \times 128 = 16384$ picture elements in a single SSTV frame, if we halve this number we find that we need 8K bytes to store each SSTV picture. (N.B. 1K=1024). If we elect to put up with a picture whose definition is half the usual value both horizontally and vertically then we can store this poorer quality picture in 2K of memory, or in 8K we could store 4 such pictures. These could then be called from the computer memory in any order we like and assembled to give an SSTV picture which has a different scene in each quadrant. K6AEP has given some interesting demonstrations of this technique.

And now for the crunch! Can we extract the picture, which has been stored in computer memory, at a rate which is fast enough to produce a fast scan display? The answer is yes, provided that we do not expect the computer to do the job as most microprocessors are rather too slow for this job. By using DMA (direct memory access) and a rather special CRT controller chip, K6AEP has succeded in getting a fast scan display. I think I have gathered from his article that the display is not entirely compatible with fast scan TV but it is possible to view it on a normal TV monitor by adjustment of the line and frame hold controls.

Well, there are a few ideas for you. If you are experimenting in this field I would like to hear from you.

FIG 3

A 14 pin DIL plug is wired to plug into the 7405 socket on the DL2RZ board. This also carries the +5v supply for this interface board.

FIG 4
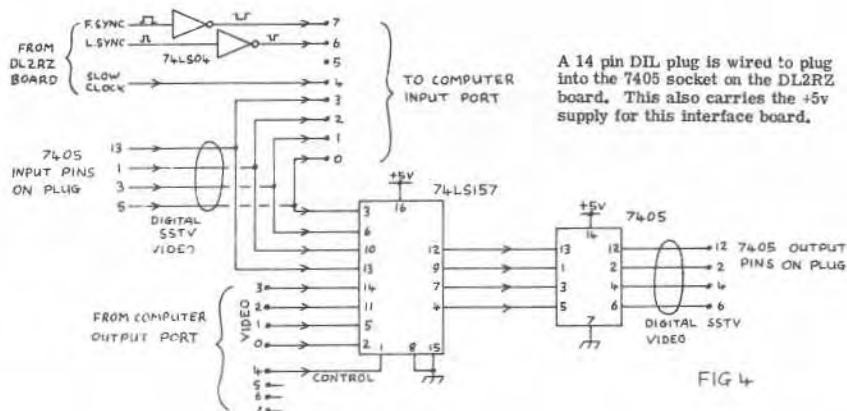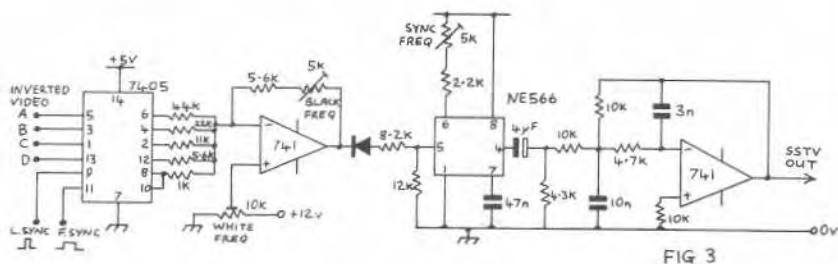
SSTV References.

SSTV pictures from your microcomputer,   B. Sanderson,   "QST" Oct '78
SSTV meets the SWTP 6800,   Clayton Abrams K6AEP,   "73 magazine" June '77
Title your Pix with a Micro,   Clayton Abrams K6AEP,   "73 magazine" Oct '77
SSTV meets SWTPC Parts 1 & 2,   Clayton Abrams K6AEP,   "73 magazine" Nov & Dec '78
Build this SSTV pattern generator,   Al Gerbens K7SBK,   "QST"
Display SSTV pictures on a fast scan TV,   Clayton Abrams K6AEP,   "Ham Radio" July '79
The microprocessor and Slow Scan Television,   Paul Jessop G8KGV,   "QST" Jan '80

Others

Aim your antenna with a micro,   Dennis Bodson W4PWF & Bob Fenichel WA2TMT,   "73 magazine"
DX delight,   Jan Heise WA4VDQ & Ed Mehnert N3NN,   "73 magazine"

N.B. This list is not exhaustive. I would be glad to hear of other references.
                                                               C.G.D.

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STATIONERY

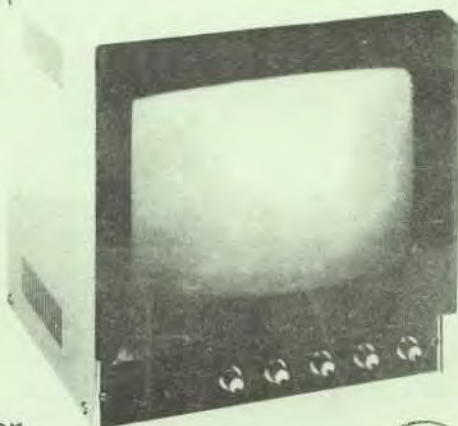| BATC headed notepaper & envelopes (50)	£1.75	£1
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