CQ-TV
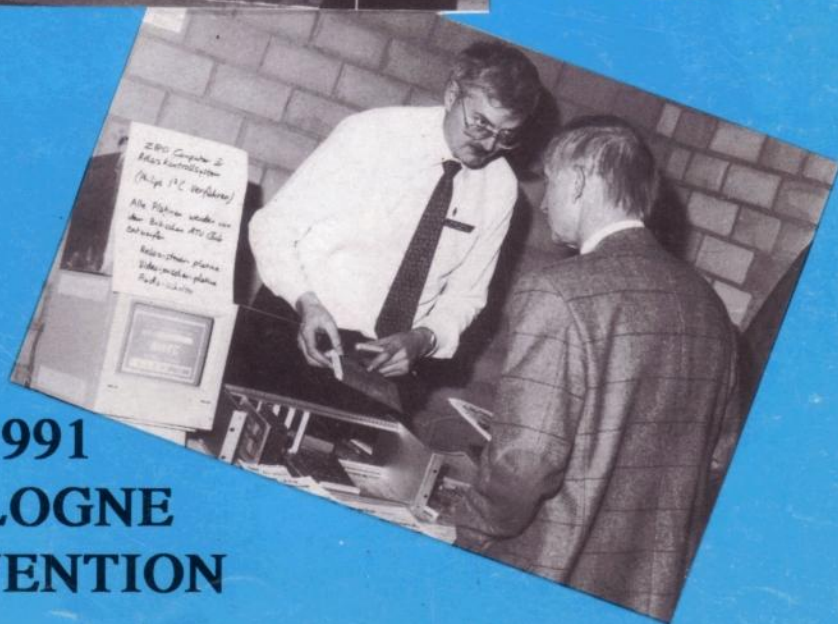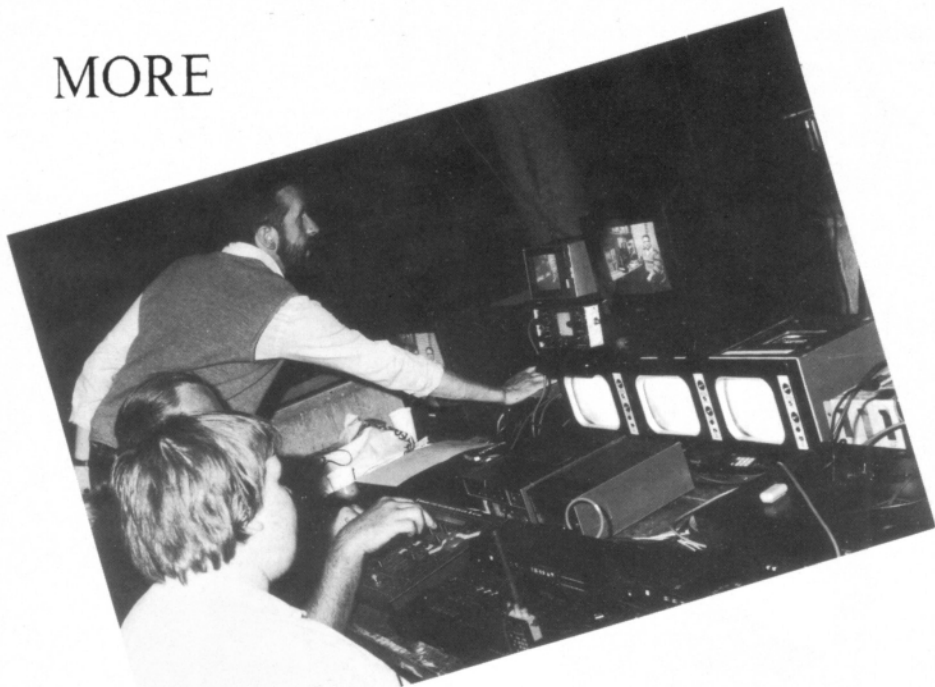
THE BATC VISITS THE AGAF

1991 COLOGNE CONVENTION

BRITISH AMATEUR TELEVISION CLUB

MORE

BATC AT

AGAF

CONVENTION

CONTENTS

WHO TO WRITE TO

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

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

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

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

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

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

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

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

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

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

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

CONTESTS – RICHARD GUTTRIDGE, Ivy House, Rise Road, Skirlaugh, Hull, North Humberside, HU11 5BH. Tel: 0964 562498.

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

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

POSTBAG

A REPEATER IN BIRMINGHAM ?

Club members in Birmingham and the Black Country may be interested to know that a 24cm ATV Repeater is being considered for their area. Correspondence with the RSGB and Graham Shirville was opened during November and the replies I have received so far have been favourable.

TV contacts at the home QTH are usually on 70, but P2 pictures on 24 have been taken from Arthur G5KS in Langley; P5's have been received by Steve G4MVL in Nuneaton, John G1IJT near Coventry and Colin G8YJT at Erdington. Colin had some problems with his new Tx gear last year which stopped him putting any pictures out on 24, but these were resolved just before Christmas. The other Brum ATV'ers in my log are not using 24 at the moment.

There is vast scope for expansion with TV repeaters, for example the Severnside Group have just added a weather satellite system to 'ZZ! But basics must come first so folks, this is just to let you know what may be coming later this year or sometime in 1993 – the ball is at least rolling! I do now need to know if anyone out there is interested either in helping with the project or just wanting further information, so write to me QTHR or give me a call on 021 707 4337, but don't be surprised if my ansafone replies. It's friendly and I do respond to messages!

Graham Hankins G8EMX

SSTV STANDARDS

Dear Mike

I read with interest your article on SSTV standards, or should I say lack of standards!

Like many others I found SSTV on an old Spectrum, then wound up with a Drae, so

that I could send my own pictures, then I got a Robot 450C –not many of them around, but at least I could now send and receive colour. But ... I may have well stayed with the Drae. As time has gone by it would seem that anyone capable of knocking out another system and making a few bob is doing it.

Hard words? ... I don't think so, as although nearly all systems will duplicate a picture for you in Robot mode – note the word duplicate –it obviously gets very boring for others on other modes, so you feel a bit of a 'lemon'. So this leaves you with two options:

1) You don't bother

2) You spend, spend, spend!

I chose the first option and diversified into QRP, RTTY, etc., but a recent contact with GW4WFM on QRP mode resulted in an SSTV contact, so I turned the 450C on. OK, I went over to the main set to do SSTV, but when I had fired up my 450C and the spiders had fled, it made me put pen to paper.

With reference to your article in CQ-TV 156 p28 concerning SSTV standards I wholeheartedly agree with you. SSTV is in decline because of everyone doing it for no-one. Ask yourself, how deep do your pockets go?

A better mode you cannot find – you can see the guy you are going to talk to – all you have to do is figure out what mode he is sending –last I heard it was over 25!!

73 .. P.S.Bruce

CRT INFO PLEASE

Dear Mike

I am after a bit of information regarding some bits I would like to make into a monitor/viewfinder to go with a mono camera I am constructing.

I have a CRT type A11JPF5WW together with its scan coil assembly and base, but I

have no info on pin connections or voltages required. I also have an EHT unit with the following label on it:

4220045010

RU E70954(S)

LCE FB-3

It has eleven pins on its base plus the EHT connector to mate with the aforementioned tube. I think they came from a Boots RV5.

Can anyone help with either circuits or information?

Yours ... Ken Marsh, 26 Waverley Road,

NEWS ROUNDUP

BELATED CONGRATULATIONS

Unfortunately I was not aware until too late, but on behalf of the Committee and the Club, I would like to wish Grant Dixon and his wife a very happy Golden Wedding for September last. It appears that Grant was particularly taken by the Gold cover of CQ-TV 156, which he received shortly after the celebration.

Once again many congratulations ... Mike

HDTV COMING NEARER!

The next generation of television technology is slowly but surely becoming a reality. On August 15th the Japanese launched a new satellite that will allow NHK, Japan's state owned TV network, to broadcast eight hours of high-definition television (HDTV) a day. NHK was rumoured to begin broadcasting on November 25th.

It is believed that this expanded broadcast (from 1 hour) will stir the buying of HDTV sets. Sony is marketing a 36" model and Hitachi, Toshiba, Mitsubishi and JVC have all announced HDTV home units.

METEOR 3.5 WEATHER SAT.

According to an NOAA bulletin a new series 3 Soviet Meteorological satellite (Meteor 3.5) was launched on 15th August 1991 at 12.15pm Moscow time. The spacecraft was launched on an SL-14 Cyclone booster from Plesetsk into a typical 1200km circular orbit, inclined at 82.5 degrees.

The new Meteor spacecraft is not transmitting APT imagery at this time. A single transmission was heard on 137.300MHz, but has not been confirmed. It is not clear whether the spacecraft has been switched off, or whether it has suffered an instrument failure.

MEMBERS SERVICES

Members Services are having a SPECIAL SALE in this issue – see the Market Place pages, and rush your order now to avoid disappointment.

Included in the Members Services lists will be found the items for the I2C project available when the CQ-TV list was prepared. Those who want details, or advance information on future items for the I2C project, should send a suitably stamped and addressed envelope to Members Services. (The components for the I2C CPU PCB are not stocked by Members Services as they are readily available elsewhere.)

BATC Members Services does not hold stocks of BATC publications, and vice versa. Please note that only the items listed in the CURRENT "Services for Members" leaflet are available – a description of most

the various PCBs and components can be found, in the "What's What" supplement sent with CQ TV 149, or available on receipt of an SAE.

The postage rates are for a single item – please estimate the correct sum if ordering more than one item. Overseas members requiring surface mail, or in Europe should double the U.K. rates listed.

Members requiring airmail postage to outside Europe should write to Members Services for a quotation for postal costs. To avoid delay and inconvenience, please be careful to include the correct amount of VAT with your order, currently 17.5% of total goods AND postage, unless an overseas member. Payment should be by cheque or crossed postal order in favour of BATC – do NOT send cash or stamps please.

Members are advised to check the availability of items limited to stock BEFORE placing their order.

VIDICONS

Tubes available include electrostatic focus or deflection, and low light types not previously available to club members. Prices vary depending on the size, type and grade of tube. A tube guide appears in CQ TV 149 and 150. Please contact Members Services for further information. The stripe filter tubes used in domestic type colour cameras are not available through BATC, and normally must be ordered direct from equipment supplier.

C-Mounts are usually made to order, so please send a sketch to show where mounting holes, or other specific details, are required. A price can then be quoted, depending on the work involved.

ANOTHER FIRST FOR GB3ZZ

The Severnside Television Group has scored yet another first with GB3ZZ, the Bristol 13CM FM ATV repeater (in case you didn't know where it is!). GB3ZZ now features a 24 hour weather satellite picture service, which can be accessed by any user by means of the DTMF (dual-tone multiple frequency) system which has been operating with the repeater for some time.

The system currently monitors the European Space Agency Meteosat 4 satellite. The main aerial is a 3M long 40-element JVL quad loop Yagi which feeds via a short length of low-loss a downconverter which outputs on 137MHz into a standard crystal-controlled weather satellite receiver. The output from the receiver is decoded into a picture and stored in a YU3UMV digital framestore which, although only at a resolution of 256 x 256 pixels with 64 grey levels, produces a satisfactory enough picture for retransmission by 'ZZ.

When the repeater is in beacon mode a 40 second slot of weather picture circulates with the testcard and text pages.

Congratulations yet again to all involved with GB3ZZ ... Mike.

THE BATC CONVENTION
SUNDAY MAY 3rd   10 TILL 5

THE AMATEUR TV EVENT OF THE YEAR
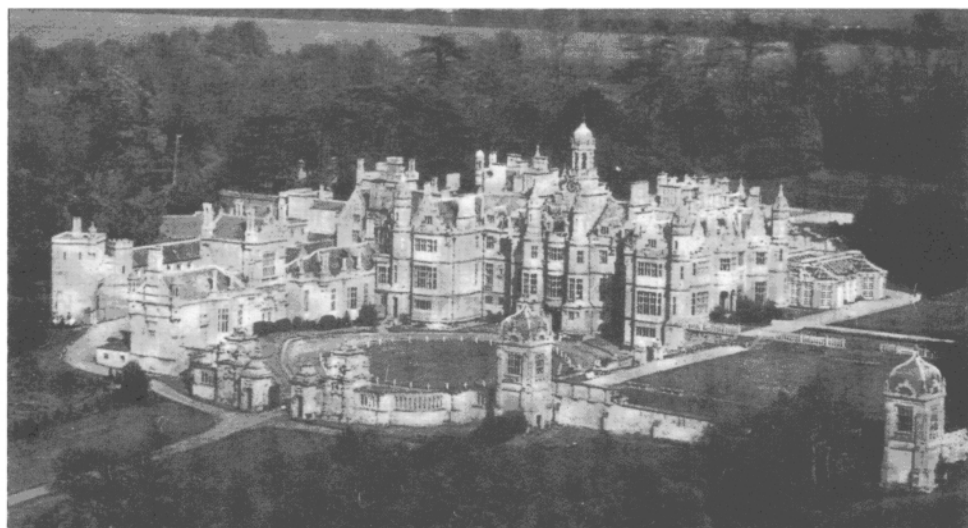
120+ TRADE STALLS, EQUIPMENT DEMONSTRATIONS, TEST EQUIPMENT WORK-
SHOP, BRING & BUY STALL, FLEA MARKET, OUTSIDE BROADCAST VANS, AIR-
BORNE ATV DISPLAY, LICENCED REFRESHMENTS, A LECTURE/VIDEO SHOW, AND,
LAST BUT NOT LEAST, THE BATC CLUB SALES STAND.

ALL IN ALL

THE BIGGEST AND BEST YET

HARLAXTON MANOR, HARLAXTON,

30 MILES NE OF LEICESTER

EDITORIAL

Mike Wooding G6IQM

Well folks, it's that time again. The end of 1991 rapidly approaches as I write this editorial, and quite an interesting year it has been for the Club. We have made appearances at many of the major rallies throughout the year, thanks for which must go to many members of the committee, who willingly give up much of their spare, spare time, to put displays on at the various rallies. Also, a recent delegation was despatched to the AGAF Convention in Cologne, after the Club was invited to attend, as the photographs throughout this issue show. Unfortunately, the invitation was too late in arriving for inclusion in the last issue of the magazine, so we could not readily inform you all. Perhaps next year, if we are invited again, some of you might like to go as well.

With regard to the general management of the Club, we have seen some changes there also. Our stalwart Membership Secretary, Dave Lawton, has now got a new computer system, to enable him to manipulate the Club's membership database more easily, and in less time as well!

Talking of things to do with the membership dept., the recent renewal notice that many of you have received has prompted a few of you to question the method used. Firstly, the mail shot was done in December, rather than as usual in September/October to try and decrease the heavy workload upon Dave Lawton. Secondly, the second-class prepaid envelope included with each renewal notice is an attempt to decrease the work load and the costs. The point being that if we get a better return from this mail shot, then the usual second and often third mail shot we have to send out should be reduced, or perhaps even negated, thus reducing overall postage costs – clever innit?

Finally, whilst talking about the renewal mail shot we have an apology to make – *YES, WE GOT IT WRONG*. We apologise to all members who found it upsetting or insulting to be referred to as Ms. This, I hasten to add was not the fault of the Membership Dept., nor the Editorial Dept., but anyway we are truly sorry – the true culprit shall remain anonymous!

Back to the changes in the club. Here in the editorial department I am eagerly awaiting (!) the arrival of a laser printer. The present printers are NEC P2200 24-pin dot-matrix machines and, whilst they have given good service and produced good results over the past five years, they are now showing signs of wear, and the printed output can certainly be improved upon. So, I anticipate that the next issue will be produced on the new printer, with the expected improved quality. As I produce the master artwork for the Litho system used to produce your magazine, the better I can get it, the better the printers can produce it.

CONVENTION 92

Anyway, enough of all this. You will see from the advertisement on the opposite page, that Convention 92 is to be held at Harlaxton Hall on Sunday May 3rd. All the usual attractions will be there – loads of traders (including me), the Club stand, equipment displays, test-equipment workshop (again courtesy of Steve Mitchell and friends), the flea market and hopefully much more. Once again there will be a limited number of caravan spaces available. **CARAVAN SPACES MUST BE BOOKED THROUGH ME BY APRIL 18th**. The cost will be £7.50 per night and there are only five spaces left as I write this. For further information on the Convention please contact either Paul Marshall or myself at the usual addresses/numbers.

TRADERS PLEASE NOTE: Any traders wishing to book space at the Convention please contact me (Mike Wooding) at the editorial address, or Phone me on 0788 562281 or 0788 890365, or FAX me on 0788 890365. The cost per table is £20 plus VAT. *Don't leave it too late!*

A now resident feature of the BATC Convention is the Saturday night get-together to be held again this year in the lounge bar at Harlaxton Hall. All are welcome to come for a chat and enjoy an informal evening with your family. The children are welcome too. Most of the committee will be there so come and join us.

The Club will also be attending many rallies throughout the country throughout the year. For example we will be at:

☞ The London Amateur Radio Show, Picketts Lock – March 7th and 8th.

☞ The VHF Convention, Sandown – March 14th.

☞ The RSGB National Convention, NEC – May 30th and 31st.

☞ The Lincoln Hamfest, Lincoln – date to be announced.

☞ The Leicester Show – October 30th and 31st.

Plus yours truly will be at many other rallies, so if you see me come and have a chat. I always wear my BATC 'hat' even if not running a BATC stand!

BIENNIAL GENERAL MEETING

Also to be held at this year's convention is the BATC Biennial General Meeting. A list of your committee members who are up for re-election is listed below. Any paid-up member who wishes to propose him or herself, or any other member, for any of the posts listed below, must submit their proposal in writing to the Chairman, Trevor Brown, by March 1st.

Don't forget to attend this important meeting, it is your chance to publicly air your views and opinions on how the club is being managed, and the direction you wish it to take. It is your chance to publicly question the committee if you have any burning questions that need answering. It is also your chance to publicly thank us for the work we do (one can but hope!). The time and the exact location of the meeting in Harlaxton Hall will be published in the next issue of CQ-TV.

Committee Members for re-election: Andrew Emmerson, Philip Harding, Roy Humphries, John Lawrence, Dave Lawton, Ian Pawson and Alan Watson; Gary Shipton is resigning. There is also one vacant seat on the committee as an ordinary member.

CHANGES TO CQ-TV

You will no doubt have noticed by now that I have made one or two subtle changes to the magazine this year, and one not-so-subtle. The main change has been the move to the use of Gloss-Art paper for the cover instead of the previous card format. The main reason for this change is the more professional look given to the magazine, and the ability to reproduce better photographs using this medium. Consequently I have included four more pages of Gloss-Art paper inside this issue as an experiment to enhance some more photographs.

A planned change for 1992 is the occasional use of two-colour printing techniques, but I have yet to get fully to grips with the practicalities involved (and the costs Eh Brian!).

P.S: Owing to the changeover of Contest Manager there is no contest news in this issue, this will be held over to CQ-TV 158.

P.P.S: URGENT, I need a volunteer who can translate French for me. I have a large article totally in French, and my 'la plume de ma tante' just ain't good enough!

OK That's it for 1991, although you won't read this until 5 or 6 weeks into 1992 may I take this opportunity to wish you a belated Happy New Year ... 73 Mike G6IQM

THE 'TELE SNAPPER

John Becker

Here is a project that will provide a lot of interest for PC owners who enjoy programming and messing around with graphics. It captures pictures from TV sets and stores them on disk, so that they can be manipulated and displayed by computer program at a later date.

Using a high speed analogue-to-digital converter (ADC) the unit samples the TV picture signal and stores the data in on-board memory. Once captured, the picture data is transferred to the computer's disc drive under control of a Basic program. It can then be re-imported and manipulated to extract and modify picture details as desired.

IN THE FRAME

The start of a TV picture is signalled by a pulse which is used to trigger and synchronise the unit with the TV. In the UK, the TV video bandwidth is nominally 5.5MHz and the picture is made up of 625 lines, of which only 575 are visible. The complete picture is transmitted in two sections, made up from odd and even numbered lines and interlaced to form the final image. It takes one twenty-fifth of a second to transmit both. The unit has been designed to record just one part, ignoring whether it consists of the odd or even lines.

GW-Basic, the dialect in which the software was written, allows for the plotting of a graphics picture consisting of 199 lines by 319 columns. To simplify the unit's memory and control requirements a recording capacity of 65536 (64K) samples has been allowed for. By setting the sampling rate to 4MHz, each sampled TV line is represented by 256 samples. This allows 256 TV lines to be recorded with a reasonable degree of definition. Since the usable portion of each part of the transmitted picture consists of 287 lines, only 31 lines are lost. Of the 256 lines recorded, any consecutive grouping of 199, or less, can be displayed simultaneously.

The recorded data is a numerical representation, from 0 to 36 (six bits), of the picture signal amplitude sent to the TV's screen. When sent to the computer screen the varying amplitudes can be represented as changes in colour. The number of colours available will depend on the monitor screen and, possibly, the software used. Monochrome monitors can be used with the unit using the recorded data to generate high contrast displays, by showing the image as straight black and white.

The pictures generated may be used as interesting screen displays or written to a printer. Experienced PC users will also be able to incorporate them in a wide variety of graphics applications.

Fig.1 Schematic Diagram

Fig.2 Main Circuit Diagram
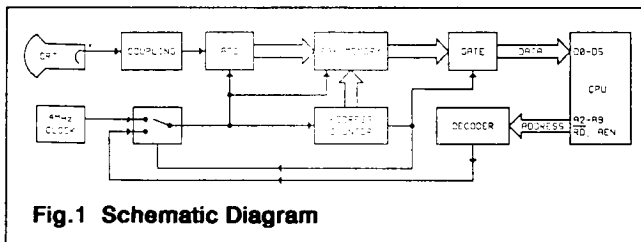
The unit should work with any standard IBM compatible computer and uses the standard interface slots. Unfortunately, it is not practical to use this unit to capture pictures from colour TV's. Whereas a monochrome TV video signal can be tapped at a single point, a colour TV signal is split and sent to several cathodes on the tube.

STASHING THE NUMBERS

Figure 1 and Fig.2 show the block diagram and the main circuit diagram for the project.

In Fig.2 the 4MHz clock generator is formed around IC3e. The clock signal triggers the memory address counters and the digital conversion of the video data.

The video signal is brought into IC7, a 6-bit high speed flash ADC chip. IC7 has two reference inputs, of which one is tied to the +5V line and the other set to around 0.5V by R4. On receipt of a clocking pulse the chip converts analogue signal input levels which lie within the set range into an equivalent digital output on pins B1 to B6. These lines are connected to the data inputs of two 32Kbyte memory chips, IC8 and IC9, and to a tri-state octal gate, IC10.

The overflow (OFL) output of IC7, although connected to the memories and gate, plays no active part in this circuit.

The memory address at which each sample is stored is determined by the twin counters IC5 and IC6. These are connected in series and are clocked at the same rate as the ADC. Between them, IC5 and IC6 provide access to all memory address lines A0 to A14.

The selection of which memory is active is controlled by the Q3 output of IC6. This is the equivalent of address line A15. When low, A15 causes IC8 to become active by taking its chip select (CS) pin low. The CS pin of IC9 is also controlled by A15, via the invertor IC3c. Thus IC9 is only active if A15 is high.

STORING THE IMAGE

To record a picture S1 is closed, allowing the 50Hz filed pulses from the TV to pass through the AND gate IC2b and repeatedly reset the counters IC5 and IC6. Between each reset pulse the counters and the ADC are clocked at the full 4MHz rate and each byte of data is recorded by the selected memory.

When S1 is opened the last recorded picture remains in memory. During the first 32768 counts following the end of the reset pulse IC8 records the ADC data. When A15 goes high IC9 records the next 32768 data samples. On count 65537 the Q4 output of IC6 (A16) goes high and remains so for the next 65535 counter steps.

The A16 line controls the enabling of IC7 and the gated routing of the clock signal source. When high A16 disables IC7, putting its outputs into a high impedance state, so effectively removing them from the memory data lines. The high state of A16 also switches the multiplexing gate IC4 so that the clocking signal from IC3e is no longer routed to the counter chain via IC4 A0/Y0. Instead, the clocking can now come from the computer via IC4 B0/Y0.

IC4 also controls the Write Enable (WE) pins of IC8 and IC9. In record mode IC4 routes the 4MHz clock signal, inverted by IC3b, via A1/Y1 to set the memories into their Write state when the clock phase is low. Only the memory selected by A15 will be affected. When A16 is high, IC4 selects the B1/Y1 path, so setting and holding the WE pins of both memories for the Read Mode.

Once A16 has been set high and the B-path of IC4 is open, the computer can step the counters through all 65536 addresses and read the memory contents at each address.

Consideration was given to using the computer keyboard to trigger the unit's sampling routine. It was decided to use a

separate external switch, since this allows a picture to be snapped from the TV even when in the middle of programming modification lines for other sampled pictures.

COMPUTER CONNECTION

The circuit has been designed to be read from the computer memory map location Hex H0300. Via one of the computer's expansion slots the circuit is directly connected to the address, data and control busses.

Decoding of the address bus is performed by the octal NOR gate IC1 and the triple-input AND gate IC2a. IC1 requires that address lines A2-A7, AEN and the RD lines should all be low. When this condition prevails IC1's output pin-13 goes high. This provides one input for IC2a. When address lines A8 and A9 are also high, IC2a is activated and its output goes high. (Observant readers will spot that in fact IC2 will be triggered when the computer reads from any of the locations H0300 to H0303, since address lines A0 and A1 are not used).

Two functions are controlled by the action of IC2a being triggered. The output from IC2a pin-12 is inverted by IC3a, whose negative-going output triggers the clock input of IC5, stepping the count on by one place. The same logic low condition also activates the output enable (OE) pins of the memories and of the data gate IC10. Consequently, each time the controlling

Fig.3   Schematic of Cathode signal

software calls the read H0300 command, consecutive memory data from the unit will automatically be presented to the computer data lines. When the computer is not reading via H0300 (or H0301 to H0303) the outputs of the memories and IC10 will be in a high impedance state.

PICTURE SOURCE

The TV set for which the unit was designed was a low-cost black and white mains portable with a 12" screen. Mains power is delivered to the set via a built-in isolating transformer. Initial safety checks were carried out to ensure that the plug and leads were correctly wired and that the chassis was grounded. In the absence of a circuit diagram for the set it was decided to tap the video signal from the most obvious point – the cathode of the picture tube. Oscilloscope probings were made to establish which of the CRT socket pins were the cathode and ground connections. At all times proximity to the separate EHT lead to the tube was avoided, since it could be expected to be carrying a potential of several thousand volts. The oscilloscope probes were only connected when the TV set was disconnected from the mains.

The signal feeding to the cathode pin contained the line and frame sync pulses and the video data. The 50Hz frame sync pulse peaked at 120V and the 15.625kHz line sync pulse peaked at 100V, while video data swung between 50 and 70V (see Fig.3). Other readings revealed that the tube heater was powered by 12V DC, that the brightness controlling pin voltage was variable between –25V and +25V DC, and that another pin carried the line sync pulses peaking at 300V DC. All voltages were referenced to chassis ground.

Other connections to the cathode and ground pins were required and the circuit in Fig.4 shows how the signal voltages are attenuated and the sync and video data extracted. The resistor chain R9, R10 and VR3 is connected between the CRT
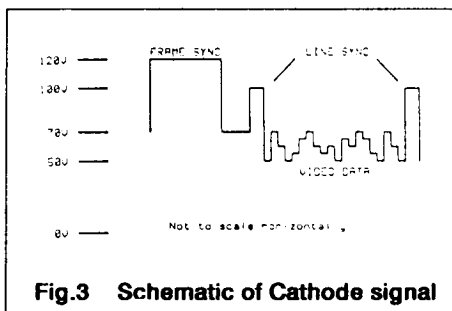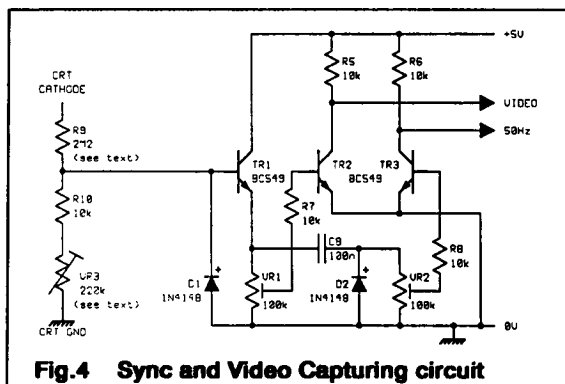
Fig.4   Sync and Video Capturing circuit

cathode and ground. The component values were selected so that the peak maximum voltage of 120V at the cathode could be set by VR3 to less than 5V at the junction of R9 and R10. Constructors should establish by calculation the optimum resistor chains to suit their own TV signal level characteristics.

PRECAUTIONS

In the interests of safety the use of an opto-isolator between the TV and the unit would have been preferable, and for this a circuit is shown in Fig.5. The isolator should have a bandwidth of a least 4MHz, preferably higher, and its LED resistor value
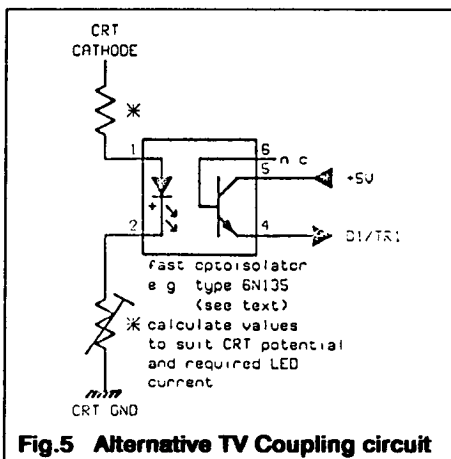

Fig.5   Alternative TV Coupling circuit

must be calculated to suit the device and the cathode voltages.

However, having satisfied myself concerning the safety aspects of my own television set and of the environment within which the unit was to be used, the simpler resistive coupling of Fig.4 did the job. An advantage of using this method is that it imposes less of a load on the TV's cathode drive circuit (an opto-isolator requires around 10mA to drive its internal LED). With the prototype, a dedicated connection between the TV ground and unit was not used, since both were already indirectly grounded via the earthed mains plugs.

It is stressed that readers MUST give full consideration to the safety of the intercoupling and grounding techniques they choose to use, and of the way in which they are implemented. It is also recommended that TV CRT signal levels, polarities and contents should be determined before building the unit.

SORTING THE SIGNALS

In Fig.4 the tapped voltage from R9/R10 is buffered by TR1. VR1 is used to set the signal level fed to TR2, allowing adjustment of the amount of amplification given to the video portion of the signal. In final setting-up, the level is adjusted so that the maximum output signal level is close to +5V, while the line sync pulse portion drives the transistor into saturation. In the software there is a routine which looks out for the saturation (0V) portion of the swing, using it to determine the initial line sync point. The setting of this level is not particularly critical since the software routines can be modified to take care of line sync and amplitude deviations.

The only hardware sync extraction directly required is that of the 50Hz frame pulse. This is derived via the network from C8 to TR3. VR2 adjusts the signal so that the
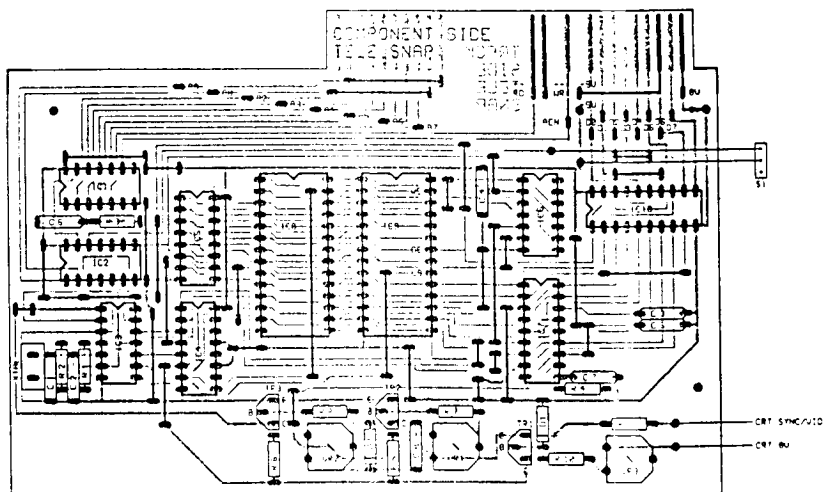
Fig.6 Component Overlay

pulse is cleanly extracted, swinging TR3's output between +5V and 0V. The adjustment of this signal is a little more critical than that of the video, as it controls the resetting of the unit's counters and thus of the primary reference point. Too much amplification could result in video data producing undesirable pulse.

PUTTING IT ALL TOGETHER

Fig.6 and Fig.9 show the printed circuit board track and component layouts. The PCB has been designed to plug straight into the expansion sockets of a PC. It may be treated either as a double or single sided board. If it is built as a double-sided, the interconnections between upper and lower tracks should be made by inserting pins into the interconnecting holes, soldering them on both sides.

If only single sided board making facilities are available, the upper and lower sides may be treated as two separate boards. Each should be plugged into separate PC expansion sockets (these sockets are internally connected on PCs), observing the

correct track polarities. In this instance, only the socket-connecting tracks of the second PCB are used, wiring them to their equivalent points on the main PCB. With the latter board, link wires must be made as shown in the drawing. If preferred, a length of Veroboard could be substituted for the second board since in this role it only serves as a plug.

Additional wiring point have been put onto the PCB allowing it to be connected to the computer via a 20-way cable harness terminated in a separate expansion interface plug. This enables constructors of testing, the wiring harness can be removed and the unit plugged directly into the expansion socket.

PROGRAMMABLE PICTURES

The software was primarily written in GW-Basic, as shown in Fig.7. This dialect offers selection of three graphics colours at one time, plus a background default colour. (Regrettably, I could find no way in which the PC's colour registers could directly be accessed via GW-Basic). However,

```
10 SCREEN 0:COLOR 4,5:SCREEN 1:COLOR 0,1:KEY OFF
20 VIEW (1,1)-(258,198),0,3
30 REM GOTO 150
40 REM TRANSFER FROM MEMORY CARD TO DISC ROUTINE
50 OPEN "STORE8" FOR OUTPUT AS #1
60 FOR F=1 TO 8*256:E=INP(768):NEXT
65 REM 768 IS DECIMAL OF HEX $0300
70 FOR F=1 TO 256:E=INP(768) AND 63:IF E>0 THEN NEXT
80 FOR F=1 TO 199
90 FOR A=1 TO 256:E=INP(768) AND 63
100 PRINT #1,CHRS(E+64)
110 PSET (A,F),E/16
120 NEXT:NEXT:CLOSE #1
130 STOP
140 REM DISC RE-INPUT AND DISPLAY ROUTINE
150 OPEN "STORE8" FOR INPUT AS #1
160 LOCATE 2,2:PRINT "WAIT!"
170 FOR A=1 TO 14*256:INPUT #1,ES:NEXT
180 LOCATE 2,2:PRINT "        "
190 LOCATE 2,34:PRINT "BLU 1"
200 LOCATE 3,34:PRINT "RED 2"
210 LOCATE 4,34:PRINT "WHT 3"
220 FOR F=1 TO 199
230 FOR A=1 TO 256
240 INPUT #1,ES:E=ASC(ES)-64
250 P=INT(E/16)
260 PSET (A,F),P
270 NEXT:NEXT:CLOSE #1
280 STOP
290 REM SCOPE-TYPE DISPLAY ROUTINE
300 OPEN "STORE8" FOR INPUT AS #1
310 FOR G=1 TO 10:F=1:D=0:CLS
320 FOR A=1 TO 8:FOR B=1 TO 256
330 INPUT #1,ES:E=ASC(ES)-64
340 LINE (B,D+C)-(B,D+E),F:C=E
350 NEXT:F=F+1:IF F>3 THEN F=1
360 D=D+20:NEXT:NEXT
```

Fig.6 GW-Basic listing

```
100 CLOSE #3:CLS
110 OPEN #3 INPUT "STORE8"
120 E=5000
130 FOR D=5000 TO 0 STEP -
15
140 C=0:D1=D:A1=A
150 FOR A=1 TO 5120 STEP 20
160 INPUT #3,ES
170 E=ASC(ES)-64
180 P=INT(E/4)
190 IF P=F THEN 220
200 LINE A1;D1,A:D COLOUR F
210 A1=A:D1=D:F=P
220 NEXT A
230 LINE A1;D1,A:D COLOUR F
240 NEXT D
250 CLOSE #3
```

Fig.8 Locomotive Basic Screen Plotter listing

• Re-input for display as oscilloscope type waveforms.

(Experimenters will spot that this project can be used to display waveforms from signal sources other than TV's, so serving as a simple oscilloscope).

Lines 10 and 20 in the listing set the background and text colour parameters, together with the graphics mode and frame area. For sampling the TV via the unit, line 30 remains as a REM statement, bringing in the disc file opening routine at line 50. In this line the file name within quotes should be changed as appropriate.

Line 60 cycles the unit through the first few TV data lines, ignoring them since they do not hold picture data. This loop may be contracted or extended as preferred. Line 70 looks for the zero level line sync data, from which initial screen positioning is determined. This line may also be changed or omitted.

The main sampling routine starts at line 80, in which a loop allowing for 199 TV screen lines to be input is set up. There are, in fact, 256 screen lines held by the unit's memory, all of which could be input, though only the first 198 will be displayed owing to screen limitations.

Line 90 sets the loop length required for

Locomotive Basic 2 allows simultaneous selection of 16 colours. Peversely, though, the version does not allow access to the expansion ports, preventing the use of the Tele Snapper unit. The way round this is to first access the unit via GW-Basic, outputting the sampled data to disc. Locomotive 2 Basic can then be loaded together with the program in Fig.8, and the disc file inputted, allowing full manipulation of the data and colour display formats. Some remarkable display results can be achieved in this roundabout way.

The software listing in Fig.7 has been written as a simple framework, which can be modified and added to as desired. It has three sections:

• Data capture

• Re-input for pictorial display with modification

one line. The figure of 256 is important, since this represents the number of samples taken on each line as set by the unit's 4MHz sampling clock. As only six data lines, D0 to D5, are used, the value input as variable 'E' is ANDed with 63, thus knocking out bits 6 and 7. To reduce its byte size, the result is converted to an ASCII character and sent to disc. The data is also sent to the screen as a pixel of one of four colours, as determined by the result of dividing 'E' by 16 in line 110. At the end of both loops the disc file is closed and the program stops.

By converting the data to ASCII characters, the file size for one complete TV frame of 256 lines is approximately 200Kbytes. Obviously there are several ways in which this quantity can be reduced. For example: the data could be compacted into much longer strings. It would also be possible to increase some bytes by different powers and OR them with other bytes, taking advantage of the full 256 ASCII values. However, such compacting and subsequent decoding would result in speed penalties.

To re-input the data, line 30 should be amended to route the program to line 150. The file name in this line should be changed as required. In this example the first 14 TV lines are input and ignored. From line 220 the main input loops are set up and the disc data is input as 'E$' to be converted back to a numerical held as 'E'. Between this point and the instruction to plot the pixel on the screen, any amount of manipulation can be performed by inserting suitable conditional and corrective lines. The final answer is a colour attribute value, usually between 0 and 3, held as variable 'P' and plotted on screen in line 260.

To make more space for the modifying statements call 'RENUM' to renumber the program lines. Additional program lines may be inserted to write the modified data to another disc file. Selected sections of pictures can be extracted in this way, allowing for picture line length shortening as well, provided that subsequent input routines are amended accordingly. Data may also be stored as graphics symbols, selecting specific areas as detailed in the GW-Basic manual.

To display data as an oscilloscope type waveform, amend line 30 to route the program to section three at line 300. This routine is of particular benefit when first setting up the presets on the printed circuit board. It can also give guidance when writing display modifying instructions.

Fig.8 shows an example of a disc file input and plotting routine as written for Locomotive Basic 2, allowing a choice of 16 colours.
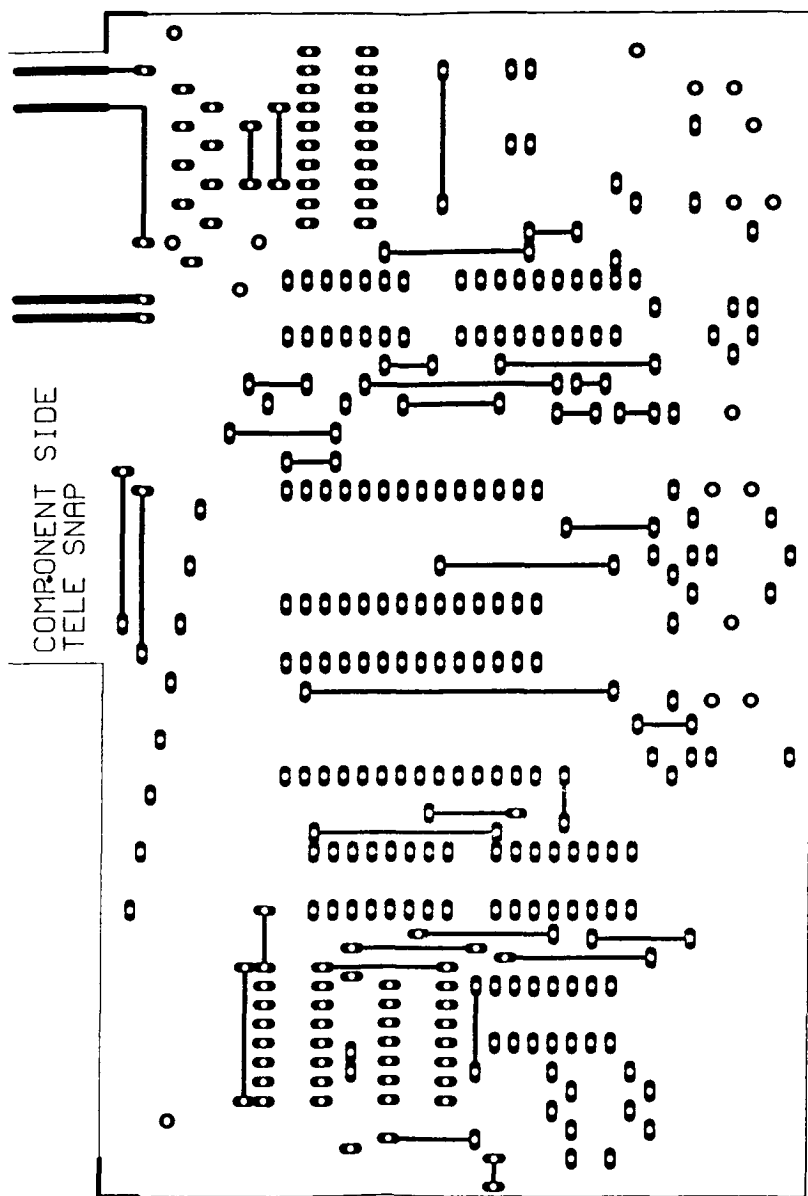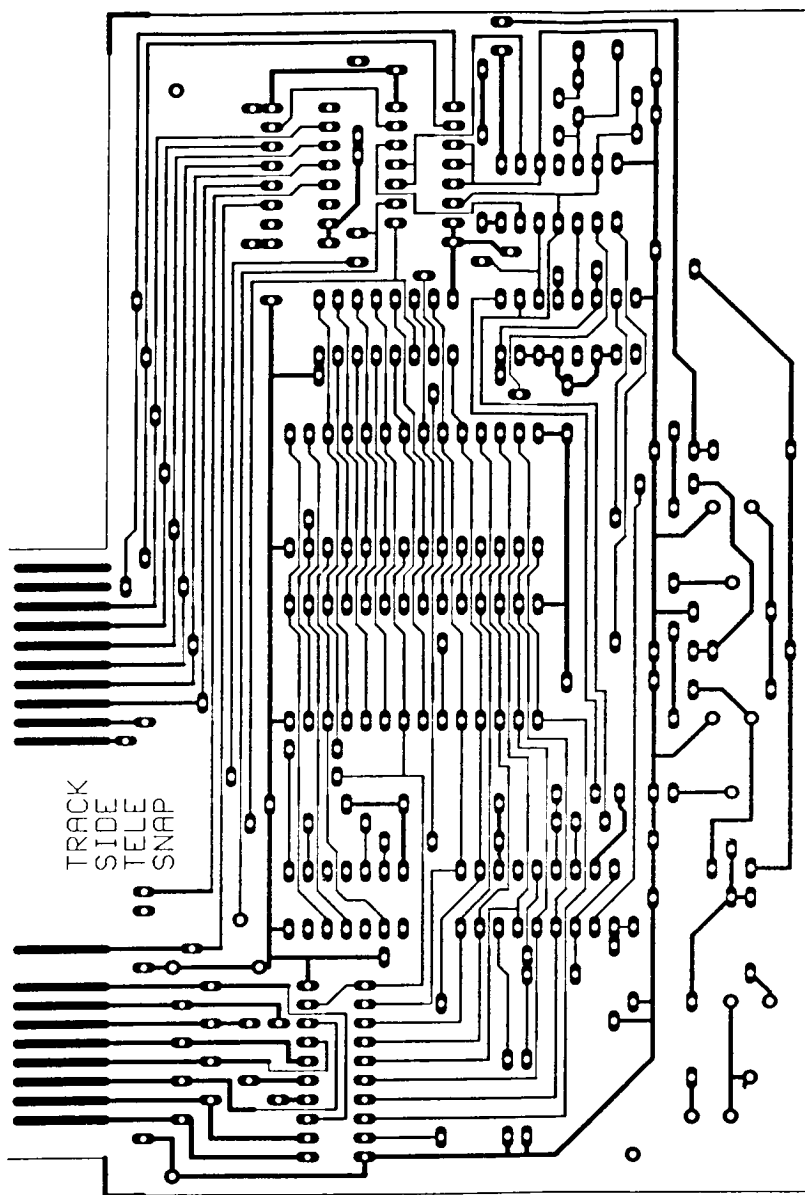
Fig.9a   Component-side PCB Track Layout

Fig.9b   Track-side PCB Track Layout

IMPROVED FADE-TO-BLACK

Mike Hutchings

The potentially useful Fade-to-Black circuit, based on the TEA5114 IC, as shown in Fig.1, page-11 of the ATV Compendium, is marred by a decrease in video black level toward the synchronisation tip level, as the signal is faded.

Thus, picture content in darker areas is totally lost before the fade is complete, and loss of sync may occur due to the additional negative level in the output signal. One way of avoiding these spurious effects is described below.

CIRCUIT DETAILS

The modified circuit shown below maintains a constant black level by varying the degree of attenuation applied. This is achieved by substituting thye fade potentiometer with a dual-gang type (linear), the second track of which provides the variable clamping voltage.

The most negative value of the clamping voltage is set to be equal to the TEA5114 internal clamping voltage by adding a diode voltage drop to the voltage at pin-5 of the TEA5114, the input to the chip.

The maximum value of the voltage is set by the 10k trimmer to give the correct black level at full fade, which will nominally be 0.3V higher. The wiper voltage then clamps the video input via a second external diode.

The reference supply to the clamp voltage divider chain is derived from a low power 5V regulator, to prevent changes due to power supply variations, and obviates the need for a multi-turn trimmer potentiometer.

I have also shown a simple emitter-follower output stage as the TEA5114 is not guaranteed to drive a load less than 300 ohms with a 12V supply.

Video switch input drive limitation, here achieved via a 10k series resistor, reduces the switching delay between the faded signal and the sync/burst portion. This delay can be further decreased to around 0.1uS by omitting the optional LM1881 input filter. This reduction results in a cleaner negative-going sync pulse edge at the video output.

CONSTRUCTION AND PERFORMANCE

The circuit was built on a small single-sided circuit board, initially to facilitate modifications if required. The layout remains non-critical and construction could well be accomplished using strip-board.

N.B: I could supply boards at a small fee to cover costs if anyone is interested.

The dual-gang potentiometer I used came from *Electrovalue* of Egham, Surrey. The trimmer was a miniature half-turn Cermet type.

In practice the technique implemented here holds the black level to within +/-20mV or so over the full range of the fader. I suspect that this remaining variation is largely due to potentiometer track non-linearity.

The circuit will accept a supply voltage in the range 9V to 12V.

Any problems with the original circuit are effectively circumvented by way of these fairly minor changes and a more functional unit is the result.

Fig.1   Improved Fade-To-Black Circuit
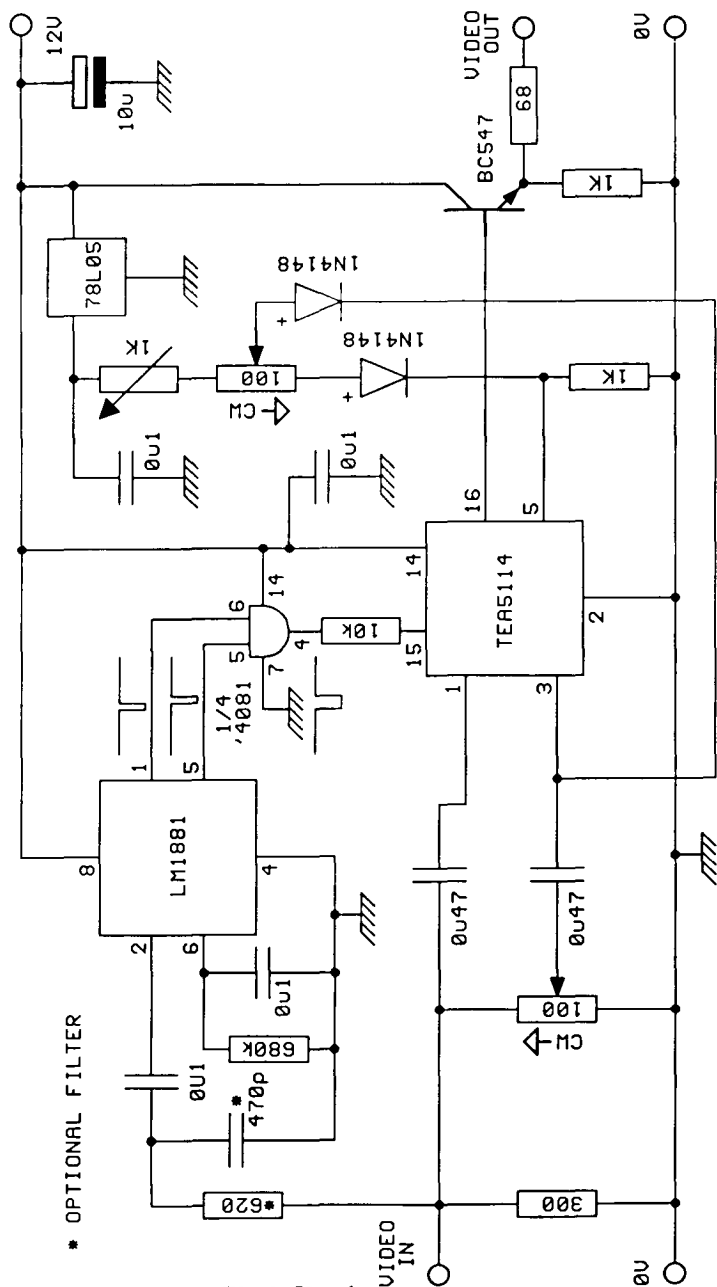
A NOT SO SIMPLE SPECTRUM ANALYSER

Although this article does not constitute what I normally look for in a construction project, that is, as complete a description as possible with as high a degree as possible of component details, due to the interest that I know that this unit of John's has engendered then I agreed to publish the article. Any questions arising from this piece please send to John direct, as I only have this limited amount of information and no personal knowledge of the project ... Mike

John Stockley G8MNY

After showing my home brew analyser at ham rallies, I was often asked for the circuit, well here it is. No details are given for transistors, filters, etc. as most came from the junk box.

The analyser is based on an unknown multiband TV tuner, with lots of bits around it. Frequency range of the tuner was adjusted to coverage 70-150MHz, 170-250MHz and 430-800MHz. The display uses an ordinary DC oscilloscope sweeping at 12-50 Hz.

The signal input is attenuated using small push button switches, small non inductive resistors (theoretical values shown) and short, point-to-point wiring. 20dB was found to be the be the maximum practical switch loss for UHF, fine level adjustment is by use of the tuner AGC.

A frequency marker is provided by a pulsed 10MHz square wave clock IC soldered onto the tuner case, with its output poking into the tuner front end, the harmonics are visible to 800MHz.

The sweep ramp is obtained from an 8V P-P output from the oscilloscope (why

re-invent the wheel?). A sweep signal-to-noise ratio greater than 120dB is required if sweeps of 400MHz down to 50KHz are required, and to give a noise free filter edge resolution of 400Hz. So the sweep gain is controlled by two ganged log pots. A flyback clamped CR filter is included to provide to help achieve this.

Note: the op amps must run on +36V to -5V for the full frequency range of tuner!

Frequency control is by a large multiturn potentiometer geared to a tuning dial, small potentiometers do not give the resolution as each step of wire on the pot can be seen as a jerky movement on the display.

The sweep correction circuit alters the gain of the last op amp, giving two additional gain slopes, at two preset voltages, in an attempt to correct for the cramping of the 'varicap tuner diode' to 'frequency' characteristics. Unfortunately the correction is different per band.

The power supply is straight forward, providing a well regulated +12V @ 300mA, +36V @ 10mA and -5V @ 15mA. Hum is a problem for a steady display when zoomed right in on individual TV line sidebands.

An IF of 21.4 MHz was used, this enabled narrow crystal filters to be used directly. The tuner needed only slight adjustment for best gain with the new frequency.

Parallel buffers were used to drive the filters and filter switching was accomplished using DC, AC and earthing techniques, in an attempt to get enough isolation at 21.4MHz.

The 1Mhz filter is made from six 27MHz transformers retuned with 44pF, the shape and skirt of this filter are easily adjusted, when the analyser is going.

G8MNY SPECTRUM ANALYSER

G8MNY SPECTRUM ANALYSER

G 8 M H z   S P E C T R U M   A N A L Y S E R

L O G   A M P L I F I E R S   + 8 0 D B
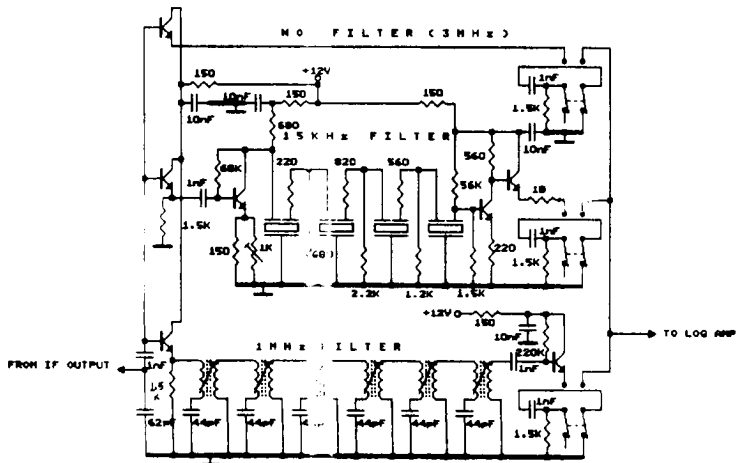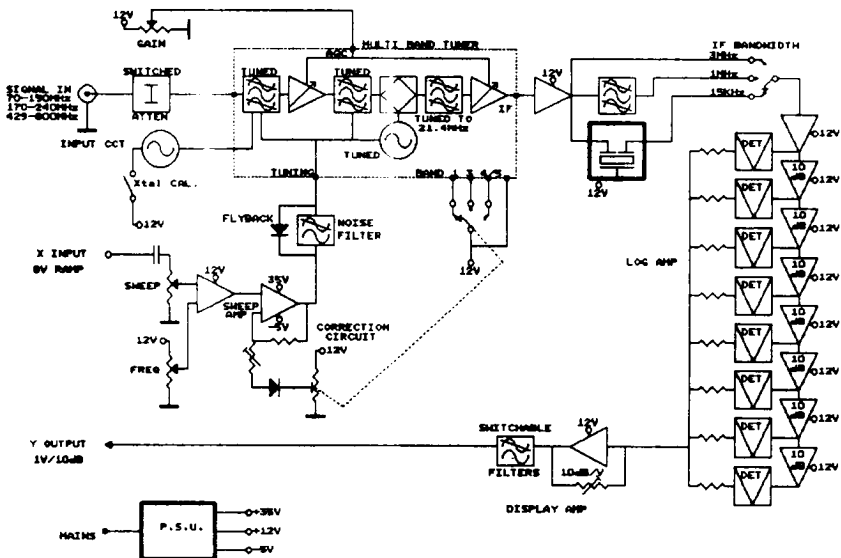
D I S P L A Y   A M P L I F I E R

The 15KHz filter used cheap 30dB skirt crystal filters (Cirkit), so four were used in tandem to give the required performance. Matching was found to have a great effect on the response shape, the different series and shunt resistors shown gave the best smooth rounded shape (not the designed square communications response) for fastest sweep rate without ringing. Extra gain is needed for this filter, so adjustment is needed to equalise this.

The logarithmic amplifier uses the traditional approach (not the one chip AGC), with eight 10dB (3x) gain stages. Each stage has it's own gain control, tuned circuit, detector, limiter, current summing resistor, and most important the decoupling!

Calibration of the logarithmic amplifier was done by first calibrating the AGC rail against external 10dB attenuators. Then switching the AGC while adjusting the gain of each stage to produce the same output (on it's detector) as the previous one. Detector voltages between 0.1V and 0.4V must be used to avoid detector errors & limiting.

The display amplifier converts the detected current into 1V/10dB for all the 8 stages. The display bandwidth can be reduced from that of the detectors and op amp (about 100KHz) to 8KHz and 1KHz. This greatly cleans up noisy displays (ideal for that photo) but it will cause the display to lie about the fine detail if the sweep is to fast.
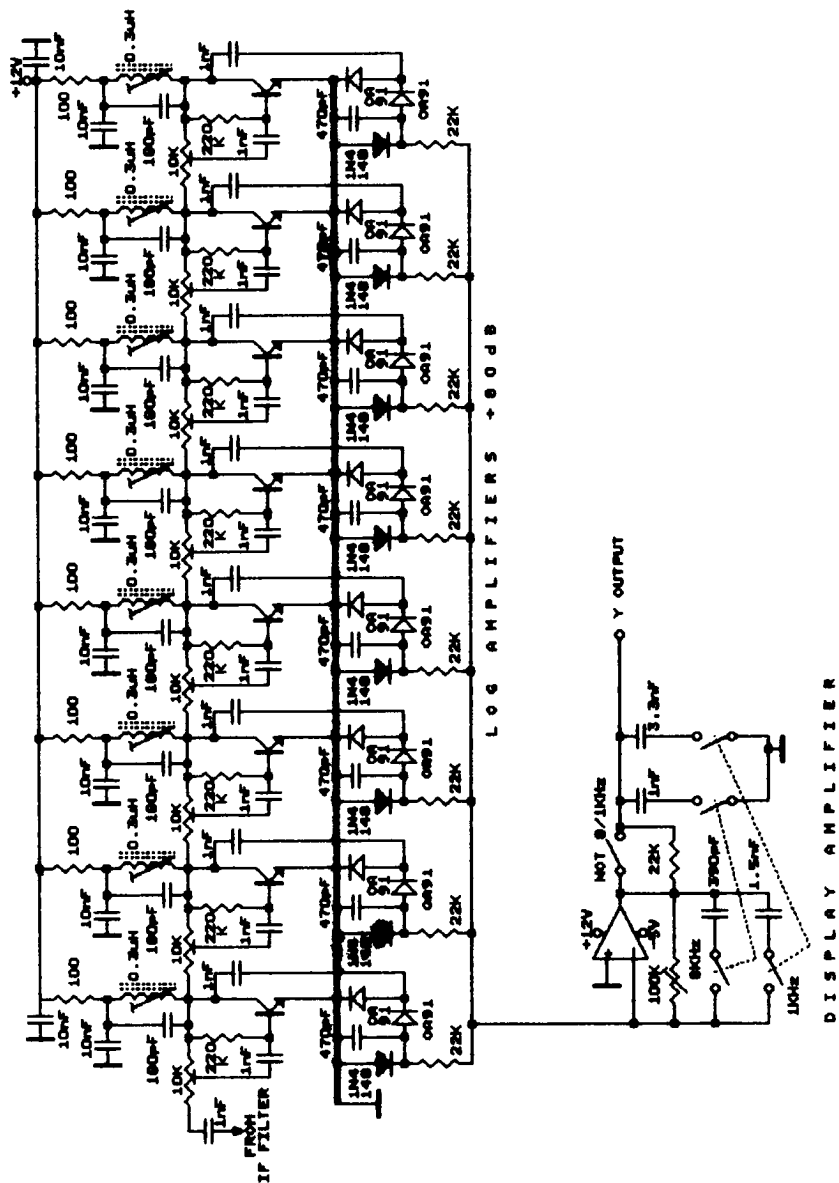
For those of you who have not seen it, the analyser is built in a box 10" x 8" x 2+", and can give a meaningful display (not calibrated in uV) very comparable with £15K worth of kit.

Construction was started with a simple sweep circuit driving a tuner. The log amp was built a stage at a time and checked for function as a simple analyser as I went.

The filters were set up using the display itself. Adding the refinements as I developed the circuit, this project gave me hours (years) of pleasure getting it all going, only to show up your how dirty some of my

TXs really were. They are all cleaned up now and I don't know how I ever tuned up kit without it.

Limitations to the use are mainly due to the tuner and filters limiting:

1) The dynamic range is limited to about 70db with no distortion, usable to 85dB? Which is good compared to up mixing to SHF designs.

2) IF image is at 42.8MHz away and is about 30–40dB depending on the frequency and band.

3) Band flatness is quite bad compared to proper analysers, this is due to the tracking of the tuner tuned circuits and input SWR.

4) VHF harmonic levels cannot be measured (e.g: –60dB) due to band gain changes and for the reasons given in 3 above, but they can be seen and therefore improved upon.

However much can be seen, stereo VHF broadcasts show the 19KHz, 38Khz, and 76KHz RDS information, broadcast TV displays the Nicam sound and 6.55MHz, sound ident information at 18kHz to 25kHz (the reason Nicam had to be used for stereo) on the 6MHz intercarrier sound and the usual colour VSB signal.

Extended frequency down to DC and up to 23CM can be achieved with suitable filters, a 700MHz oscillator and mixer. Not into DC (still class B), I use a BATC design 23CM converter and can see lots of RADAR with it alongside weak ATV repeaters. You can even see how wide FM TV really is (+/–24MHz at –80dB) with only 3MHz P–P deviation.

As you can see elsewhere in this issue John has been busy again providing us with articles. Please follow his example and send your articles etc. to me. They don't have to be technical, just interesting. So come on then – put pen to paper out there! I'm waiting! ... Mike

G8NNY SPECTRUM ANALYSER
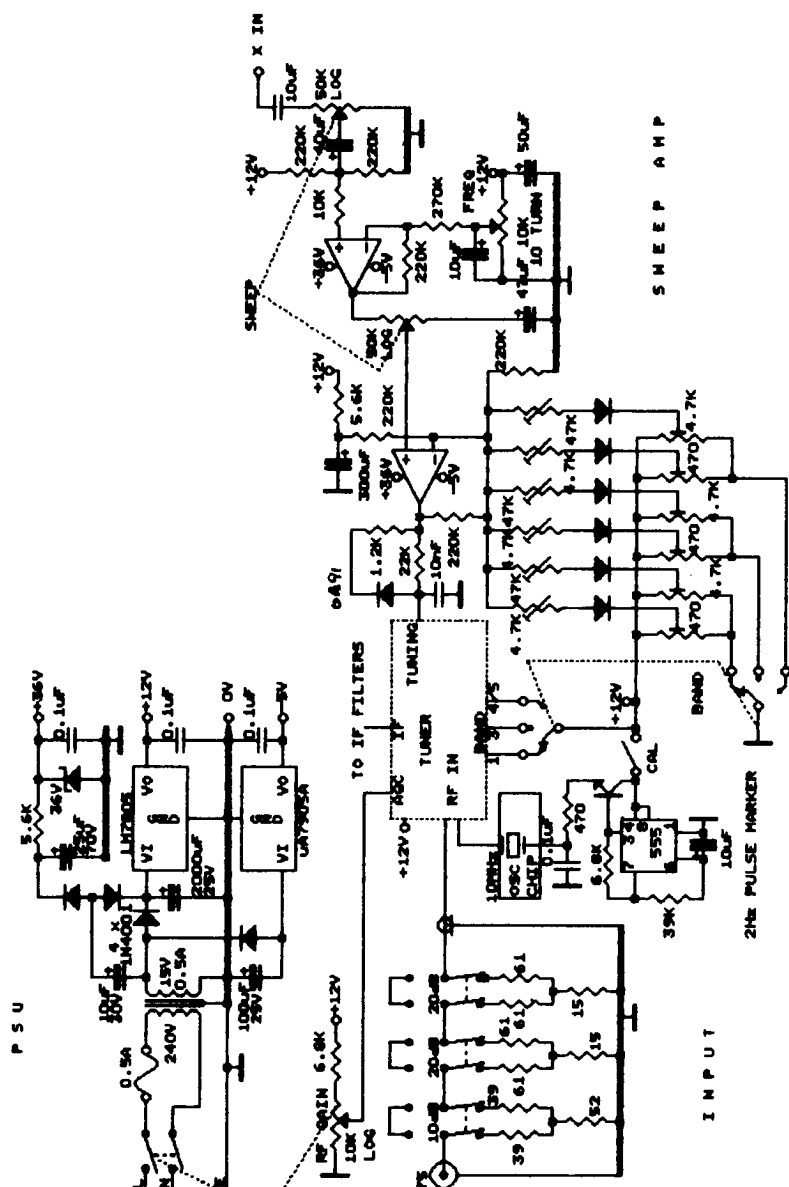
SETTING UP YER DEVE'

Dave Allen G8LHD, Technical Manager Camtech Electronics

A problem for new beginners to the hobby, as well as experienced ATV enthusiasts, is what should a video transmitter deviation be set to? Similarly, if you know the peak system deviation, how do you measure it? Often transmitters are set up and adjusted on air for best picture quality, which is fine for the ATV'er except this often results in over-deviation, which can be a severe nuisance to other users of the band.

To establish the peak system deviation we first need to know the system bandwidth. If we assume that for FM ATV we require a bandwidth of 16 MHz, then for practical purposes:

Bandwidth (BW) = 2 fm(mp + 1)

where: fm = max modulating frequency mp = modulation index

Let's assume for the time being that we wish to transmit a colour picture; then the max modulation frequency (fm) would be the colour burst carrier of 4.43MHz. Thus:

16MHz = 2 x 4.43(mp + 1)

16MHz/(2 x 4.43) = mp + 1

1.805 = mp + 1

Thus:

mp (modulation index) = 0.805

From theory:

mp = fd/fm

where:

fd = peak system deviation
fm = max modulating frequency

Therefore we can calculate the peak system deviation (fd) by re-arranging the above formula to express peak system deviation as a function of modulation index (mp) and the modulating frequency (fm).

fd = 0.805 x 4.43

fd = 3.56 MHz

DEVIATION MEASUREMENT

With narrow band PMR equipment you can easily set a transmitters deviation with a modulation meter. However, this commercial equipment often only measures peak deviation to a maximum of +/- 100kHz. Obviously this equipment is useless for our purposes. What we need is a method that is both accurate and relatively simple.

Well, the procedure is very simple and extremely accurate, although I would be the first to admit that not everybody has a spectrum analyzer in their shack! The procedure makes use of a phenomenon known as first Bessel zero, and for this obviously some explanation is required.

When you frequency modulate a carrier, modulation sidebands occur which can be observed on a spectrum analyzer. Their relative amplitudes, and that of the carrier, can be predicted by knowing the modulation index (mp) and referring to a set of tables known as Bessel functions. As the modulation index is increased, power in the sidebands increases and the carrier power diminishes. There comes a point when all the power of the main carrier is developed in the modulation sideband components. Thus the carrier effectively nulls out.

This phenomenon first occurs at a modulation index (mp) of 2.405

This can be put to practical use. From previous formula, we know that we require a deviation of 3.56 MHz and that

$$mp = fd/fm$$

Thus, the first Bessel zero will occur when the modulation frequency (fm) = fd/2.405

Thus:

$$3.56/2.405 = 1.485MHz$$

We can now modulate our video transmitter with a 1V pk/pk (354mV RMS) sinewave at 1.485 MHz. First, set the deviation pot to minimum, slowly increase the deviation and you will note the modulation sidebands appear. Increasing the deviation further you will observe the amplitudes of the first sidebands peak and then the carrier will start to null. When the carrier is nulled (-40 to -50 dBC in practice) the deviation will be exactly 3.56 MHz.

SOUND SUBCARRIER

If you wish to transmit sound on your vision carrier the general procedure, once you have set the video deviation, is to adjust the level of your sound subcarrier until its modulation side bands are approximately -15 to -20 dBc with respect to the main carrier.

Note: your video input should be disconnected from any video source when setting up your sound sub carrier level

Too high a level of sound sub carrier will result in interference with your video signal, too little will result in very poor audio quality or no audio reception at all.

For further information on Bessel functions refer to the RSGB VHF/UHF Manual 4th Edition ... Mike

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GB3ET REPEATER GROUP

SPECTRUM SOFTWARE

The latest version of the software to menu-drive the 2764/27128 programmer on page-64 of The ATV Compendium is now available. This latest version allows editing in Hex and ASCII display of data ..... £3.50 Update ..... £2.00 (send old cassette).

PRE-PROGRAMMED E-PROMS

For the Caption Generator on page-12 of 'The ATV Compendium'. Up to 14 characters and numbers ... £5.00

For the Teletext Pattern Generator on page-25 of 'The ATV Compendium'. This design allows for your callsign, name and QTH (see page-33 of the Compendium) ... £10.00

ORDERS TO TREVOR BROWN, 14 STAIRFOOT CLOSE, ADEL, LEEDS.

THE I²C ATV STATION

Trevor Brown G8CJS

Including the instalment that accompanied this issue, we have produced six issues of the I²C series of articles. The aim was to make available to club members a modular ATV station. The station was easy to build, because we supported it with a range of very high quality PCBs, using state-of-the-art technology, and custom software in the design.

All the same, the club's 2,500 members have bought fewer than 20 sets of PCBs and software EPROMs.

Why should this be?

True, the technology is microprocessor-based, but every time you operate a piece of electronic equipment these days – from washing machines to motor cars – you are controlling a micro without any knowledge of computers.

The I²C station is the same: you just populate the PCBs with the components, connect the PCBs together as shown, order your custom EPROM, plug it in like any other chip and switch on and use the system. If we did not explain what the project is clearly enough, then I apologise and will put that right now.

THE BATC I²C PROJECT

The system is a set of modular cards that are all Eurocard size and can easily be housed in a standard case. The edge connectors are standard DIN 41612, which is an indirect edge connector; it comes in two parts, one part is soldered to the PCB and the other mounts in a rack, card frame or case. The CPU and VDU are the heart of the system, both cards being necessary to the system. They must be populated and connected together as per the

interconnection diagram on page 8 of the booklet. A parallel ASCII keyboard is also required and can often be found very cheaply at rallies. If you have a PC, computer software is available to enable you to use it in place of the ASCII keyboard, and if necessary we will repeat this for other home computers.

You need to order a custom EPROM and state your callsign, if you have one. This is then fitted like any other chip.

When powered up the two cards produce a feed of TTL RGB and sync that can be displayed on an RGB VDU, or encoded to composite PAL, for displaying on a colour monitor, by the simple addition of a PAL coder such as the Maplin kit. At switch-on, if all is well you will see a menu on the VDU or monitor, even if you do not have a keyboard at this stage.

The menu will invite you to press keys to do such things as display an electronic test card. This test card comes complete with your own callsign, and is part of the EPROM, hence the need to state your callsign when you order the EPROM. You can also type direct to the screen in order to compose colour captions for use over the air.

If the unit is fed with external video, then the RGB signal from the VDU card will be synchronous with that signal for caption superimposition and titling work. If that video source has teletext data in its vertical interval, such as would be the case if it was from a TV tuner or satellite receiver, then by simple key-presses you will be instructed by the menu how to select a page and display it.

All this is available from just the CPU and VDU cards.

If you wish, you can add other modules, the first one we introduced was a vision
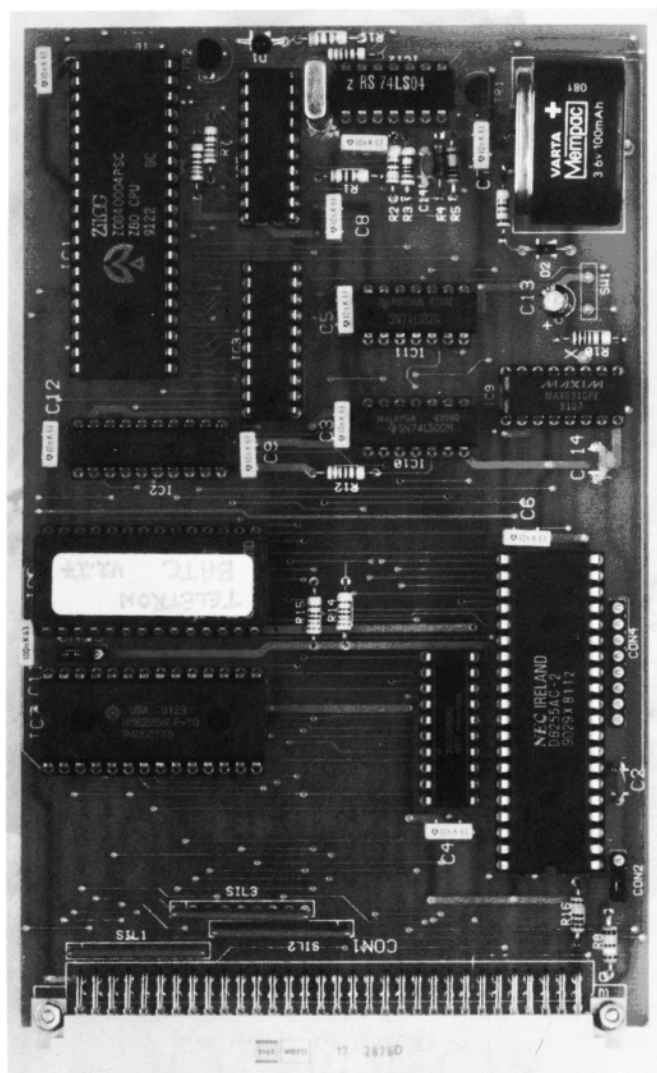
The I²C Project CPU board
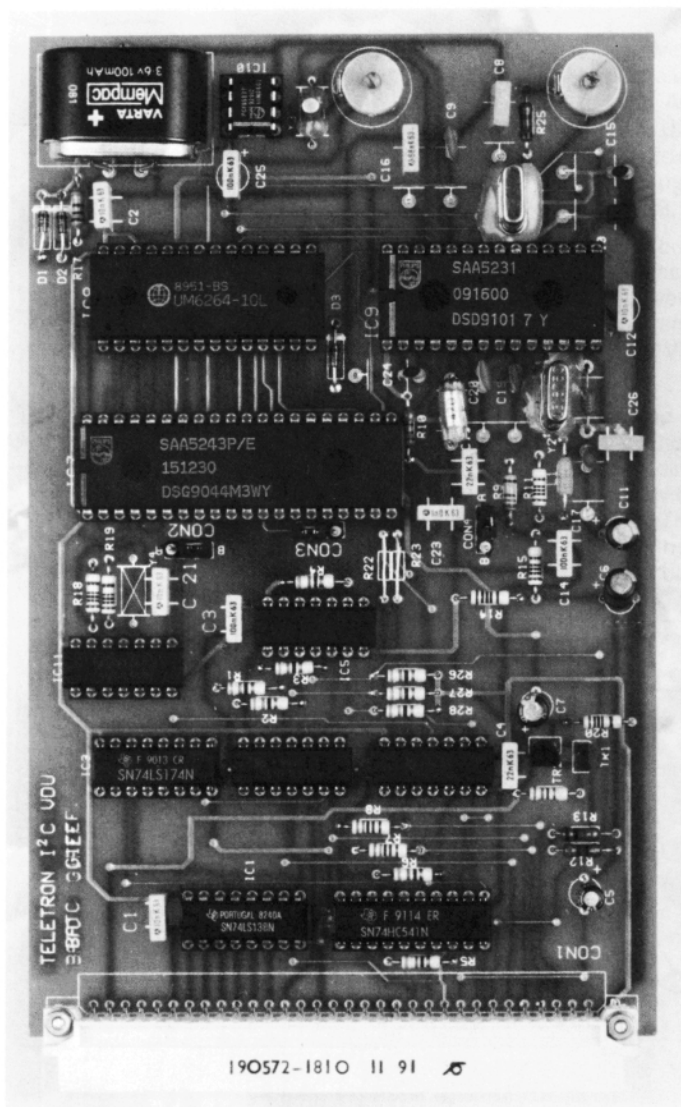
The I²C project VDU board

switcher that could direct any one of eight inputs to one of two outputs. The board was again state-of-the-art and working to broadcast performance specifications.

The menu that controls the vision switcher it is already part of the EPROM and gives you a clear indication on the screen which video source is selected. The names of the video sources displayed on the screen can be changed by the keyboard to make them meaningful, i.e: Camera, Video Recorder, 24CM RX, or whatever you care to plug into the switcher. The switcher is connected to the CPU and VDU module by a simple two-wire interface.

In the next issue we introduced a third module, a relay board that connects to the VDU card again by a two-wire interface. The two-wire interface is called I'C and is where the system gets its name. This module gives you the ability to control up to eight relays, again from the keyboard. The VDU screen indicates which relays are closed and which are open. The menu can be overtyped from the keyboard to indicate the functions of the relays, for example 70 CM TX on, etc.

In part 5 we paused, and explained the system software to you in detail. In this issue we are introducing a terminal unit that enables the system to control a modem. The modem can be plugged into your home telephone and puts you in touch with the club's computer bulletin board system (BBS). Here you can find out what's happening between issues of CQ-TV, leave messages for other I'C builders' place ads in CQ-TV or send copy to CQ-TV, plus much more.

Sorry not to include the modem circuit, but all equipment connected to the UK phone network needs approval, so you will have to buy that bit. The approval is called BABT and only applies to the modem because it connects to the phone, you can connect what you want to the modem.

The BBS is free, you only pay for your phone call in the usual way, and is a place where you can exchange ideas with other members; it is not restricted to the UK. In future instalments we are hoping to introduce an audio switcher to complement the vision switcher and more.

If the complex technology put you off before now, you only have to build it, and that's really not difficult. If it doesn't work first time, either Chris Smith or myself are only too willing to look at problem cards. If the idea of a keyboard-controlled station did not appeal, consider how easy it is to expand a system that does not require drilling panels and fitting switches, lights and meters every time you extend it.

I have tried in the "Beyond TTL" series to lead you into the technology of microprocessors as gently as possible, surely you expect the club's circuit designs to reflect the state-of-the-art.

If we designed a 20-valve SPG that does what the ZNA 134J chip does I would not expect many takers. It is now time for a review of the project: I cannot justify printing and circulating 2,500 bulletins spending the club's human and monetary resources for less than 20 enthusiasts. If you want to get your feet wet on this technology, then now is the time.

In the next issue I will be using the I'C computer as a teaching aid in the "Beyond TTL" series. This may be your last chance to jump on the bandwagon and avoid being left behind. Many very good engineers were left behind, when we moved from valves to semiconductors, again when we moved from semiconductors to logic. Now we must move from logic to microprocessors.

This club has always been at the forefront of technology, so let's not fall behind now.

Trevor Brown G8CJS, Chairman BATC

A 23CM ATV TRANSMITTER

John Cronk GW3MEO

INTRODUCTION

This Transmitter is the practical result of using the recommendations of several authors, plus a few ideas of my own. In particular, I would like to acknowledge John Wood G3YQC who defined the requirements of an amateur FM TV transmitter.

In addition to performance costs were also considered. The three stage RF amplifier will be, for most constructors, the tricky part, and could be replaced with a commercially made block (i.e: M57762 Hybrid Amplifier) but at almost four times the cost. The circuit lends itself to crystal control with the Plessey SP5060 PLL chip, however the stability is quite good without this extra complexity. (See Table 1).

My intention is to give enough detail for the design to be reproduced if required, although I suspect most constructors will produce their own version, which in my book is what amateur radio is all about.

TIME (Min)	FREQUENCY (MHz)	
0.0	1242.11	Cool
0.5	1242.07	
1.0	1242.05	
1.5	1242.05	
2.0	1242.04	
3.0	1242.03	
4.0	1242.02	Warm
5.0	1242.02	
6.0	1242.01	
7.0	1242.00	
8.0	1241.99	
9.0	1241.98	
10.0	1241.98	

Table 1 : Stability

The design is described in two parts, which can be considered separate projects.

More than the usual information is shown on the circuit diagrams to make up for the lack of a detailed components list; most constructors will use their existing stock anyway.

PART-1: THE VIDEO AND SOUND SECTION

DESCRIPTION

The attenuator at the video input is to improve the line termination to frequencies rejected by the low pass filter. This filter cuts off at 5MHz, to limit the bandwidth from some digital video sources (CQ-TV 156).

The DC restorer is essential for the peak white limiter to work. The pre-gain control is set with a 1V peak-to-peak video signal at the input socket to prevent sync crushing. The high frequency peaking components in the emitter of T2 are optional. The peak white limiter is to prevent over deviation. A 6MHz trap removes any noise that may have reformed at this frequency and the FM sound subcarrier is added to the video information before the 75 ohm pre-emphasis network.

The deviation control is panel mounted, this has been found worthwhile whilst operating, as the receiving station invariably asks for the deviation to be adjusted for best results. (See CQ-TV 142, p70 for deviation standards).

It was decided to maintain the video DC component right through to the modulator diode; a final DC restorer circuit is actually located in the transmitter module. A
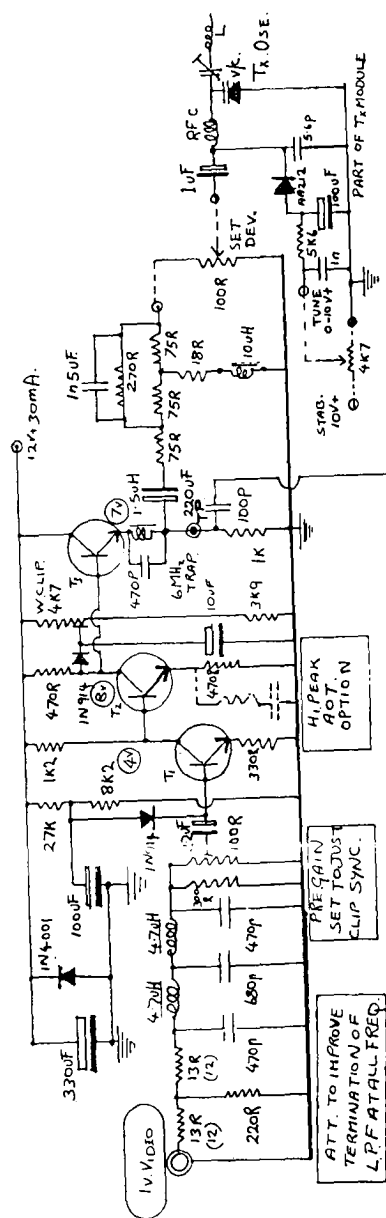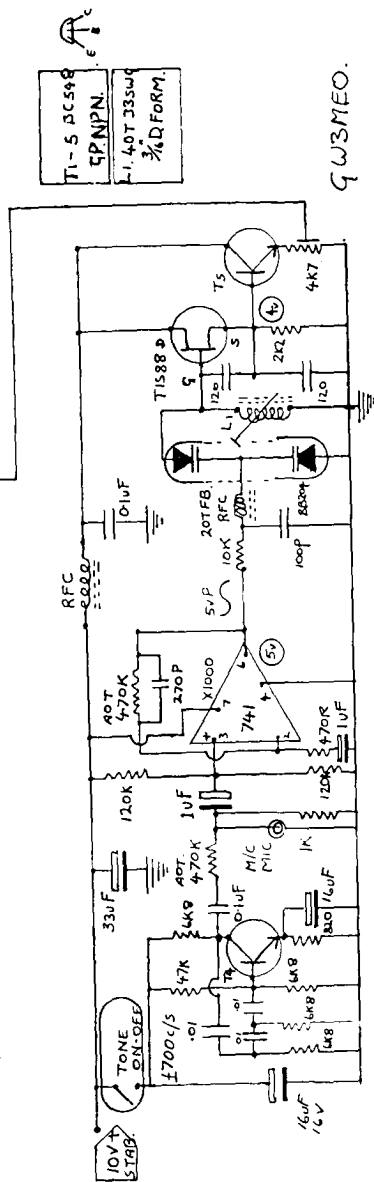
Fig.1: Vision and Sound Circuit Diagram

germanium diode ensures that the video sits on the varicap diode tuning voltage.

The sound circuit starts with an optional tone generator, its output level being preset to give approximately 50% of full deviation by selection of the series resistor (470k shown). Its inclusion is well worth the slight extra effort for the professional effect. It could be switched down by the microphone jack socket.

The op-amp is DC coupled to the varicap diode and is an economical way of achieving amplitude limiting, high gain and a tailored audio response with minimum component count. The 270pF capacitor rolls off the high frequency response and the 1uF sets the low frequency

response. The audio deviation (50kHz) is determined by the oscillator L/C ratio.

Incidently, a PNP transistor (BC558) was substituted for the dual varicap diode with identical results (it even looked the same!). The amplitude of the audio subcarrier should be set to 23% of the peak video at the input of the pre-emphasis network with the control in the emitter of the buffer stage (T5). The component values of the pre-emphasis network shown are slightly non-standard for convenience.

CONSTRUCTION

The sound and vision circuits were built onto a single piece of Veroboard measuring 5" by 1.5", with the tracks running along the length. The component layout follows the circuit diagram, with the 10 and 12 volt lines along the centre of the board and both edges being 0 volt lines. The sound and vision circuits are laid out in parallel, with both inputs at the one end and the outputs at the other.

a 10 volt three terminal regulator (7810), which serves both this board and the transmitter module, is mounted on the inside of the case, but has not been shown in the circuits or on the layout. Also not shown is a three way panel mounted

switch, for selection of the preset frequencies by switching in suitable tuning potentials for the varicap diode in the transmitter.

PART 2: THE RF MODULE

DESCRIPTION

This module is intended to provide the drive for a 10 Watt power block, but is a useful transmitter in its own right, with just over 1 Watt of output.

The layout and style of construction is all important, very low reactance emitter connections are essential , and for this reason an uninterrupted ground plane was chosen.

The oscillator (1240 to 1300MHz) is remarkably stable (see Table-1) when it is considered that there is not much choice of component types possible; ceramic capacitors are not renowned for their stability. For stringent applications such as repeaters, crystal control with the Plessey SP5060 is possible.

Table-2 shows tuning voltage versus frequency for the prototype transmitter.

VOLTS	FREQUENCY (MHz)
1.5	1234
2.0	1240
2.5	1247
3.0	1253
3.5	1259
4.0	1264
5.0	1273
6.0	1280
7.0	1288
8.0	1296
9.0	1304

(2.5MHz = 200mV)

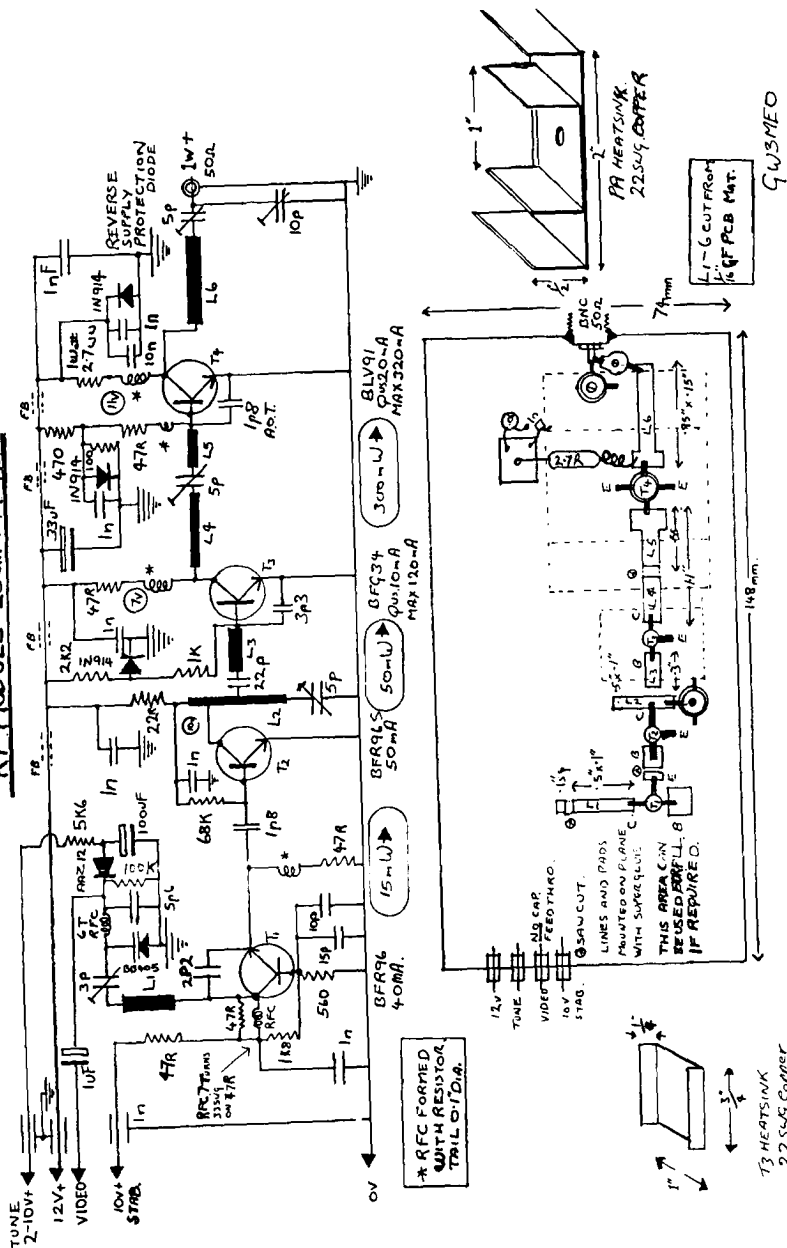**Table 2: Tuning Volts vs Frequency**

Fig.2: RF Module Circuit Diagram

The next stage (T2) is a loosely coupled buffer class-A biased amplifier for maximum gain. The driver stage (T3) utilises a BFG34 transistor configured with class-AB bias . The output stage also operates in a similar configuration. The collector resistors serve the dual purpose of damping the radio frequency chokes and limiting the collector currents.

CONSTRUCTION

The ground plane is a piece of PCB material 74 x 148mm, soldered into a type 7762 tine box close to the bottom, only the top lid is required. This forms a nice solid box for the module.

A BNC socket is soldered through a hole at one end so that the pin is just above the ground plane. The lines are cut from good quality single sided 1/16" thick glass fibre PCB material.

Some small squares of 1/32" thick PCB material are used to make islands to anchor the bias and collector components, positioned as required. These islands also serve as low inductance bypass capacitors themselves, and small 1000pF wire ended ceramic capacitors are connected in parallel.

Due to the use of series tuned matching lines it is not quite so important to restrict the length of the base and collector connections. Transistors T1 and T2 are mounted in contact with the ground plane with very short emitter connections, which also serve to hold the transistors in position. The ground plane acts as a heatsink for these devices. The base and collector leads are bent up to join the lines.

Transistors T3 and T4 sit in holes through the ground plane, which allows the emitter leads to be very short. heatsinks made from 22SWG copper are soldered underneath the ground plane. The transistors should make good thermal contact with the aid of heatsink compound.

SETTING UP

The usual care must be observed when commissioning the unit to prevent the transistors from exceeding their maximum ratings. temporarily increasing the value of the collector resistors in the output stages to 10 ohms gives useful protection.

The quiescent current of T3 and T4 can be checked by stopping the oscillator, the precise current is not critical. All stages are adjusted for maximum RF output.

The most efficient operating condition is with the least forward DC bias and maximum rf drive. It is worthwhile spending time optimising the inter-stage matching components. When correctly matched the output transistor will get only slightly warm at 1 Watt output. Good thermal stability through RF efficiency ensures that the output does not reduce after the first few minutes.

The transmitter must always be operated with a 50 ohm load and there should be no hint of instability.

Both sections, together with a 'Teletext' caption generator, were housed in an 8" wide x 3.5" high x 8.5" deep metal case, which has space available for an additional output amplifier. The transmitter has operated for long periods without problems, from both mains and unregulated battery supplies.

THE CQ-TV BINDER *only* £3.50

BEYOND TTL

Part 2

Trevor Brown G8CJS

In the last issue in part–1 I covered some of the external circuitry to make the Z80 into a roger bleep. I left you with some software in the form of a Hex dump, that could be programmed into EPROM and run. In this instalment I shall be explaining the inside of the Z80 and looking at the software we used to produce the roger bleep, along with one or two other instructions you may find useful. I hope that by the end of this instalment that you will be able to write your own CW programme.

The diagram below in Fig.1 shows the inside of a Z80 in detail. A, B, C, D, E, F, H and L are the registers that we will be controlling to generate the roger bleep. A', B', C', D', E', F', H' and L' are a duplicate set of registers that can be switched in to replace A, B, C, D, E, F, H and L, but at this stage of the tutorial we will be ignoring them.

The registers should be envisaged as 8–bit data latches, that can be loaded with an 8–bit binary number. The binary number will be in Hex for ease of programming, but never lose sight of the fact that we are moving binary around inside the CPU. The registers can be incremented, decremented, rotated, added to, or subtracted from each other, and can have their contents exchanged with each other.

To accommodate 16–bit binary numbers, BC, DE and HL can be paired as shown. IX, IY, SP and PC are 16–bit registers. ALU is the arithmetic part of the chip and is used to add and subtract registers. The A register is the door around the chip and the way by which we will send and receive between the inside and outside world. With the exception of the F register, all other parts of the chip should be ignored at this stage. The F register is the Flag register and indicates mostly the result of arithmetic calculations, by the ALU.

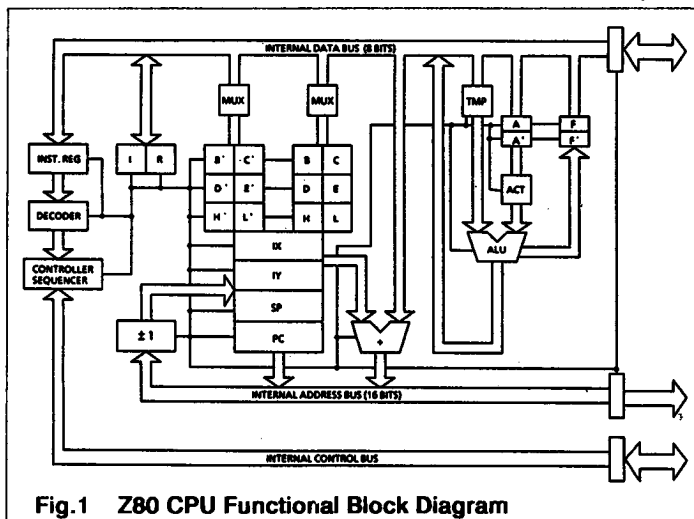The numbers we put into the EPROM are the object code which the Z80 understands. As human beings, the code we will understand is called source code. One can be converted to the other by hand or by computer software. Source code is written by using mnemonics, which is Greek for aid to the memory, the memory referred to is human, not the computer's.

Fig.1   Z80 CPU Functional Block Diagram

Mnemonics being easier to remember than numbers, each mnemonic is equal to one 8-bit binary number and is represented by a pair of Hex digits for ease of use. Some mnemonics refer to the next digit in memory, i.e: 'LD A,N' (load register A with the next number in memory). Some are jumps, i.e: 'JP,NN' (jump to the address given in the next two memory locations, 2 bytes being required for an address). Some are Jump a number of steps from your current position in memory, as given by the next memory location or byte and are JR. Last not least some are two byte instructions and are prefixed by CB or ED, which is like a shift key, it gives it a whole new meaning when you have run out of keys, or in this case single byte instructions

Let's first look at part of last issue's software, the Hex numbers are shown on the left, and on the right I have reproduced the mnemonic by looking it up in the instruction list at the end of this tutorial. After the mnemonic I have placed a semicolon and then an explanation of what is happening. All numbers are in Hex, as is the case through out this series. The comments after the semicolon are not essential, they only help you understand what is happening, rather like a REM statement in basic.

16	LD D,N	;load register D with the next number, i.e: 90
90	3E LD A,N	;load register A with the next number, i.e: 80
80	26 LD H,N	;load register H with the next number, i.e: 02
02	2E LD L,N	;load register L with the next number, i.e: 40
40		
01	LD BC,NN	;load the BC registers with the next pair of
		;numbers, i.e: 00 01 (yes this way round)
01		
00		
ED		;two number instruction when followed by 79 means
79	OUT (C),A	;set the address bus to contents of BC and put the
		;contents of the A register on the data bus and
		;pulse the WR and IORQ pins of the CPU low
2D	DEC L	;reduce the contents of register L by 1
20	JR NZ,DIS	;did reducing the contents of L make it zero? if
		;not jump backwards in the program an amount
		;set by the number, i.e: F8
F8		
3E	LD A,N	;load A with the next number, i.e: 00
00		
25	DEC H	;reduce the contents of H by 1
20	JR NZ,DIS	;jump back unless H is zero
F1		;tells you how far to jump back to
15	DEC D	;reduce D register by 1
20	JR NZ,DIS	;jump back unless D is zero
EA		;tells you how far to jump back
01	LD BC	;load BC with next pair of numbers, i.e: 50 00
00		
50		
0B	DEC BC	;reduce BC by 1
78	LD A,B	;the next two instructions are necessary to test a
B1	OR C	;register pair for zero due to an 8080 bug
20	JR NZ,DIS	;jump back unless the register tested is zero
FB		;tells you how far to jump back to

At this point the Z80 has produced a bleep, and a space, the software is repeated for a dot and a further dash. The number we put in the D register sorts the dots from dashes. The software pauses when it reaches the 76, which is a software halt. Does it seem like the hardest way to make something go bleep you ever saw? Please don't turn to the next article, I will talk you through it. Like driving a car, when you can't do it it seems impossible, when you look back as an experienced driver you wonder what the problem was.

Loading the D, H, A and L registers is straight forward. Remember, we are in binary, so that for 8-bits the maximum is FF, i.e: 11111111. Loading the BC registers as a pair is straight forward, except that it requires the low byte first, so we have put 0100 in the pair not 0001. The next instruction puts the contents of BC on the address bus and the contents of A on the data bus. The BC address is necessary for the I2C computer, where 0001 is port B of the 8255, but in last issues roger bleep hardware any address would do to send the A register to the flip flop in the I/O map. The 80 in the A register equals 1000000 in binary, the logic 1 being on the most significant D7 (flip flop input) and so the 74LS74 is set.

Now we waste some time by removing 1 from the contents of L, and if the register is not empty jump back in the programme and remove another one. Do not worry at this point about setting the number of steps we jump back with a Hex digit, I will cover that later. 40 reductions and jump backs and the L register is zero. We pass to the next instruction, load register A with 00, reduce the contents of H by 1, as it was loaded with 2 this leaves it with 1.

Now, if the H was zero we would pass to the next instruction, as it is not, we jump back and put the contents of A on the data bus and the contents of BC on the address bus, as 00 equals 00000000 we reset the 74LS74, because D7 has a zero on it. Now

we have generated half a cycle of the dash, with the contents of L setting the duration of the cycle. By jumping back as shown, we can repeat the time waste, at the end the H will be reduced to zero and we drop through to the next instruction, which is reduce D by one and jump back and do it all again until D is zero.

This means we generate a tone whose frequency is dependent on the value in the L register and whose duration is the value we loaded into D, i.e: 90. A short pause is achieved by loading the BC register with 5000 and repeatedly subtracting one until the register is empty. The whole thing is repeated for a dot, so D is loaded with 30, and, last but not least, we repeat it with D loaded with 90 again.

At this point we have generated 'Dah Di Dah' and the programme is halted by 76, a software halt. 76 also indicates that it is halted by putting a logic low on pin-18 of the CPU. This will drive a very small LED, but would be best driving the base of a transistor with an LED in the emitter
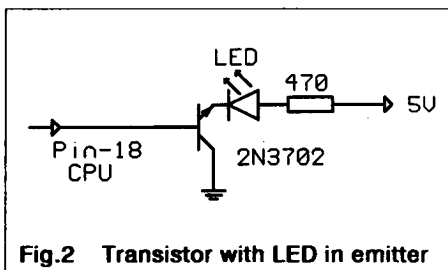
Fig.2   Transistor with LED in emitter

In this way we know the programme reached the Halt in software. This is useful for debugging by moving the halt down the programme and running it in stages. The best way out of Halt is reset and it will all happen again. There are other ways out of Halt that I will go into later in this series, they all involve external hardware, there is no way in software to pass a Halt.

The only trick I did not cover was how to set the number after 20 that says how far back to jump in the programme. JR is jump

a number of bytes and JP is jump to the address given in the next two bytes, i.e: JP means you can jump to any address, but every time you put the routine in a different part of memory you have to change it. JR is jump a number of steps, or better still bytes, either forward or backwards, and so does not need changing when the routine is located at a different memory address. The problem with JR is that its range is limited and it is difficult to calculate, but here goes.

The binary number starts with 1 for backwards and 0 for forwards, the other 7-bits of the binary number are how far to jump starting from the end of the instruction. The instruction is known as a signed binary jump, and as used in the roger bleep software it is a conditional jump, i.e: when something has not been set to zero as indicated by the flag register (JR NZ). The reverse of this is possible, i.e: JR Z; jump when something has been set to zero.

The other abnormality in Z80 code is decrementing a register pair. When the pair reach zero the CPU does not know about it. This is because the flag register does not indicate zero when a register pair is reduced to zero. It is because of a bug in the construction of the 8080 CPU and the Z80 repeated it for compatibility. This is not the case for a single register, so we convert an empty register pair to an empty register A, so that the zero flag is set. We do this by loading one of the registers into the A register, and then we OR it with the other. From TTL we should remember that an OR gate gives a logic 1 output unless both its inputs are logic 0. From this we should see that until both registers are zero there will be an output and the zero flag will not be set. The zero flag is one bit of the F register and indicates that the last sum performed by the ALU resulted in zero.

The final Z80 problem is loading something with the next two memory bytes, i.e: BC in the programme. The two bytes are placed in memory in the order low byte high byte.

The above programme was written so as to encounter all these problems, so they could be explained. The only problem not encountered was JP,NN where you jump to a specific address. As with the load register pair from memory, you enter NN as low byte high byte.

You need to master the above explanation of using software in anger. I hope by making it of use in a project you will be more tolerant of the complex explanation. I hope also that the programme provides example use of Z80 Machine Code instructions. I have included a list at the end of this tutorial so that you can look at them and puzzle on what they do. If you have a problem, then I can only point you at Zacks book, which covers every instruction in detail, with excellent diagrams. I will be delving further into software later in this series, so do not worry about understanding all the instructions yet.

By now you should be able to reprogram the roger bleep in the last issue to generate the CW message of your choice. Before I leave programming I would like to introduce the concept of using a piece of computer software to aid your programming. The software is called an assembler and allows you to type mnemonics in, in the form shown below. It will sort out the low byte high byte problem and will calculate JR steps by letting you put a label where you want to jump to. It will look up the Hex for you and point out if the instruction does not exist. If you have an EPROM programmer connected to the same computer, it will move the Hex data into a file ready for the EPROM programmer, so you need never enter long Hex streams of data from the keyboard. The assembler will allow remarks after each instruction so you can help yourself along.

The examples below show the Spectrum Computer print out of the Hisoft assembler called DEVPAC. The # indicates that the number after it is in hex, otherwise it is treated as decimal. ORG #0000 is the

address that it will be located at in the hardware that the EPROM will be used in. The object code is also generated in the spectrum and this can be at a different location, because the spectrum has EPROM memory at 0000. The code can then be saved to tape ready for the EPROM programmer. Hisoft can be found at The Old School, Greenfield, Bedford, MK45 5DE. Tel: 0525 718181.

The programme is typed in as per Fig.3, using line numbers and then the assembler adds the Hex data as per Fig.4 and the memory addresses. It will also save the data on to microdrive, or tape, where it can be recalled with the ATV Compendium EPROM programmer and ET repeater group software (see add elsewhere in this magazine). Working out Hex from handwritten source code and then entering it into an EPROM programmer is an excellent starting point. The assembler is like a word processor, you just add to or amend text, recall previously written routines from your own library, make changes and edit programmes, and then with a few keystrokes create a hex file. Then blow the EPROM from the file and try it. If you are unhappy with the programme amend the source code, remake the Hex file and blow another EPROM and try again.

Writing machine code that runs first time has been likened to getting a hole in one in golf, so a few tools make the task much more pleasant. Z80 assemblers exist for machines other than the Spectrum as do EPROM programmers. They even exist for the PC, so you need to look around. Having the two on your computer make programming a pleasurable task. Routines that you know work can be saved to disc and included in programmes, rather like standard paragraphs are in word processing.

If you write something and can't get it to run, then let Chris Smith, our software guru, or me have a look at it. You can even mail it to either of us via the new BBS if you have a modem!

5		ORG	#0000	0000		5		ORG	#0000
10		LD	D,#90	0000	1690	10		LD	D,#90
20	LOOP3	LD	A,#80	0002	3E80	20	LOOP3	LD	A,#80
30		LD	H,#02	0004	2602	30		LD	H,#02
40	LOOP2	LD	L,#40	0006	2E40	40	LOOP2	LD	L,#40
50	LOOP1	LD	BC,#0001	0008	010100	50	LOOP1	LD	BC,#0001
60		OUT	(C),A	000B	ED79	60		OUT	(C),A
70		DEC	L	000D	2D	70		DEC	L
80		JR	NZ,LOOP1	000E	20F8	80		JR	NZ,LOOP1
90		LD	A,#00	0010	3E00	90		LD	A,#00
100		DEC	H	0012	25	100		DEC	H
110		JR	NZ,LOOP2	0013	20F1	110		JR	NZ,LOOP2
120		DEC	D	0015	15	120		DEC	D
130		JR	NZ,LOOP3	0016	20EA	130		JR	NZ,LOOP3
140		LD	BC,#5000	0018	010050	140		LD	BC,#5000
150	LOOP4	DEC	BC	001B	0B	150	LOOP4	DEC	BC
160		LD	A,B	001C	78	160		LD	A,B
170		OR	C	001D	B1	170		OR	C
180		JR	NZ,LOOP4	001E	20FB	180		JR	NZ,LOOP4
				Pass 2 errors:	00				
				Table used:	61 from 131				

Fig.3 Typed in program   **Fig.4 Data added by Assembler**

Hex	Z80 Assembler	– after CB	– after ED	Hex	Z80 Assembler	– after CB	– after ED
00	nop	rlc b		3F	ccf	srl a	
01	ld bc,NN	rlc c		40	ld b,b	bit 0,b	in b,(c)
02	ld (bc),a	rlc d		41	ld b,c	bit 0,c	out (c),b
03	inc bc	rlc e		42	ld b,d	bit 0,d	sbc hl,bc
04	inc b	rlc h		43	ld b,e	bit 0,e	ld (NN),bc
05	dec b	rlc l		44	ld b,h	bit 0,h	neg
06	ld b,N	rlc (hl)		45	ld b,l	bit 0,l	retn
07	rlca	rlc a		46	ld b,(hl)	bit 0,(hl)	im 0
08	ex af,af'	rrc b		47	ld b,a	bit 0,a	ld i,a
09	add hl,bc	rrc c		48	ld c,b	bit 1,b	in c,(c)
0A	ld a,(bc)	rrc d		49	ld c,c	bit 1,c	out (c),c
0B	dec bc	rrc e		4A	ld c,d	bit 1,d	adc hl,bc
0C	inc c	rrc h		4B	ld c,e	bit 1,e	ld bc,(NN)
0D	dec c	rrc l		4C	ld c,h	bit 1,h	
0E	ld c,N	rrc (hl)		4D	ld c,l	bit 1,l	reti
0F	rrca	rrc a		4E	ld c,(hl)	bit 1,(hl)	
10	djnz DIS	rl b		4F	ld c,a	bit 1,a	ld r,a
11	ld de,NN	rl c		50	ld d,b	bit 2,b	in d,(c)
12	ld (de),a	rl d		51	ld d,c	bit 2,c	out (c),d
13	inc de	rl e		52	ld d,d	bit 2,d	sbc hl,de
14	inc d	rl h		53	ld d,e	bit 2,e	ld (NN),de
15	dec d	rl l		54	ld d,h	bit 2,h	
16	ld d,N	rl (hl)		55	ld d,l	bit 2,l	
17	rla	rl a		56	ld d,(hl)	bit 2,(hl)	im 1
18	jr DIS	rr b		57	ld d,a	bit 2,a	ld a,i
19	add hl,de	rr c		58	ld e,b	bit 3,b	in e,(c)
1A	ld a,(de)	rr d		59	ld e,c	bit 3,c	out (c),e
1B	dec de	rr e		5A	ld e,d	bit 3,d	adc hl,de
1C	inc e	rr h		5B	ld e,e	bit 3,e	ld de,(NN)
1D	dec e	rr l		5C	ld e,h	bit 3,h	
1E	ld e,N	rr (hl)		5D	ld e,l	bit 3,l	
1F	rra	rr a		5E	ld e,(hl)	bit 3,(hl)	im 2
20	jr nz,DIS	sla b		5F	ld e,a	bit 3,a	ld a,r
21	ld hl,NN	sla c		60	ld h,b	bit 4,b	in h,(c)
22	ld (NN),hl	sla d		61	ld h,c	bit 4,c	out (c),h
23	inc hl	sla e		62	ld h,d	bit 4,d	sbc hl,hl
24	inc h	sla h		63	ld h,e	bit 4,e	ld (NN),hl
25	dec h	sla l		64	ld h,h	bit 4,h	
26	ld h,N	sla (hl)		65	ld h,l	bit 4,l	
27	daa	sla a		66	ld h,(hl)	bit 4,(hl)	
28	jr z,DIS	sra b		67	ld h,a	bit 4,a	rrd
29	add hl,hl	sra c		68	ld l,b	bit 5,b	in l,(c)
2A	ld hl,(NN)	sra d		69	ld l,c	bit 5,c	out (c),l
2B	dec hl	sra e		6A	ld l,d	bit 5,d	adc hl,hl
2C	inc l	sra h		6B	ld l,e	bit 5,e	ld hl,(NN)
2D	dec l	sra l		6C	ld l,h	bit 5,h	
2E	ld l,N	sra (hl)		6D	ld l,l	bit 5,l	
2F	cpl	sra a		6E	ld l,(hl)	bit 5,(hl)	
30	jr nc,DIS			6F	ld l,a	bit 5,a	rld
31	ld sp,NN			70	ld (hl),b	bit 6,b	in f,(c)
32	ld (NN),a			71	ld (hl),c	bit 6,c	
33	inc sp			72	ld (hl),d	bit 6,d	sbc hl,sp
34	inc (hl)			73	ld (hl),e	bit 6,e	ld (NN),sp
35	dec (hl)			74	ld (hl),h	bit 6,h	
36	ld (hl),N			75	ld (hl),l	bit 6,l	
37	scf			76	halt	bit 6,(hl)	
38	jr c,DIS	srl b		77	ld (hl),a	bit 6,a	
39	add hl,sp	srl c		78	ld a,b	bit 7,b	in a,(c)
3A	ld a,(NN)	srl d		79	ld a,c	bit 7,c	out (c),a
3B	dec sp	srl e		7A	ld a,d	bit 7,d	adc hl,sp
3C	inc a	srl h		7B	ld a,e	bit 7,e	ld sp,(NN)
3D	dec a	srl l		7C	ld a,h	bit 7,h	
3E	ld a,N	srl (hl)		7D	ld a,l	bit 7,l	
				7E	ld a,(hl)	bit 7,(hl)	

Fig.5a Z80 Op Codes

Hex	Z80 Assembler	– after CB	– after ED
7F	ld a,a	bit 7,a	
80	add a,b	res 0,b	
81	add a,c	res 0,c	
82	add a,d	res 0,d	
83	add a,e	res 0,e	
84	add a,h	res 0,h	
85	add a,l	res 0,l	
86	add a,(hl)	res 0,(hl)	
87	add a,a	res 0,a	
88	adc a,b	res 1,b	
89	adc a,c	res 1,c	
8A	adc a,d	res 1,d	
8B	adc a,e	res 1,e	
8C	adc a,h	res 1,h	
8D	adc a,l	res 1,l	
8E	adc a,(hl)	res 1,(hl)	
8F	adc a,a	res 1,a	
90	sub b	res 2,b	
91	sub c	res 2,c	
92	sub d	res 2,d	
93	sub e	res 2,e	
94	sub h	res 2,h	
95	sub l	res 2,l	
96	sub (hl)	res 2,(hl)	
97	sub a	res 2,a	
98	sbc a,b	res 3,b	
99	sbc a,c	res 3,c	
9A	sbc a,d	res 3,d	
9B	sbc a,e	res 3,e	
9C	sbc a,h	res 3,h	
9D	sbc a,l	res 3,l	
9E	sbc a,(hl)	res 3,(hl)	
9F	sbc a,a	res 3,a	
A0	and b	res 4,b	ldi
A1	and c	res 4,c	cpi
A2	and d	res 4,d	ini
A3	and e	res 4,e	outi
A4	and h	res 4,h	
A5	and l	res 4,l	
A6	and (hl)	res 4,(hl)	
A7	and a	res 4,a	
A8	xor b	res 5,b	ldd
A9	xor c	res 5,c	cpd
AA	xor d	res 5,d	ind
AB	xor e	res 5,e	outd
AC	xor h	res 5,h	
AD	xor l	res 5,l	
AE	xor (hl)	res 5,(hl)	
AF	xor a	res 5,a	
B0	or b	res 6,b	ldir
B1	or c	res 6,c	cpir
B2	or d	res 6,d	inir
B3	or e	res 6,e	otir
B4	or h	res 6,h	
B5	or l	res 6,l	
B6	or (hl)	res 6,(hl)	
B7	or a	res 6,a	
B8	cp b	res 7,b	lddr
B9	cp c	res 7,c	cpdr
BA	cp d	res 7,d	indr
BB	cp e	res 7,e	otdr
BC	cp h	res 7,h	
BD	cp l	res 7,l	
BE	cp (hl)	res 7,(hl)	
BF	cp a	res 7,a	
C0	ret nz	set 0,b	
C1	pop bc	set 0,c	
C2	jp nz,NN	set 0,d	
C3	jp NN	set 0,e	
C4	call nz,NN	set 0,h	
C5	push bc	set 0,l	
C6	add a,N	set 0,(hl)	
C7	rst 0	set 0,a	
C8	ret z	set 1,b	
C9	ret	set 1,c	
CA	jp z,NN	set 1,d	
CB		set 1,e	
CC	call z,NN	set 1,h	
CD	call NN	set 1,l	
CE	adc a,N	set 1,(hl)	
CF	rst 8	set 1,a	
D0	ret nc	set 2,b	
D1	pop de	set 2,c	
D2	jp nc,NN	set 2,d	
D3	out (N),a	set 2,e	
D4	call nc,NN	set 2,h	
D5	push de	set 2,l	
D6	sub N	set 2,(hl)	
D7	rst 16	set 2,a	
D8	ret c	set 3,b	
D9	exx	set 3,c	
DA	jp c,NN	set 3,d	
DB	in a,(N)	set 3,e	
DC	call c,NN	set 3,h	
DD	prefixes instructions using ix	set 3,l	
DE	sbc a,N	set 3,(hl)	
DF	rst 24	set 3,a	
E0	ret po	set 4,b	
E1	pop hl	set 4,c	
E2	jp po,NN	set 4,d	
E3	ex (sp),hl	set 4,e	
E4	call po,NN	set 4,h	
E5	push hl	set 4,l	
E6	and N	set 4,(hl)	
E7	rst 32	set 4,a	
E8	ret pe	set 5,b	
E9	jp (hl)	set 5,c	
EA	jp pe,NN	set 5,d	
EB	ex de,hl	set 5,e	
EC	call pe,NN	set 5,h	
ED		set 5,l	
EE	xor N	set 5,(hl)	
EF	rst 40	set 5,a	
F0	ret p	set 6,b	
F1	pop af	set 6,c	
F2	jp p,NN	set 6,d	
F3	di	set 6,e	
F4	call p,NN	set 6,h	
F5	push af	set 6,l	
F6	or N	set 6,(hl)	
F7	rst 48	set 6,a	
F8	ret m	set 7,b	
F9	ld sp,hl	set 7,c	
FA	jp m,NN	set 7,d	
FB	ei	set 7,e	
FC	call m,NN	set 7,h	
FD	prefixes instructions using iy	set 7,l	
FE	cp N	set 7,(hl)	
FF	rst 56	set 7,a	

Fig.5b   Z80 Op Codes

ATV COAST-TO-COAST IN OZ COURTESY OF AUSSAT

This article was first published in Break-In, the journal of the Wireless Institute of Australia and I wish to thank the editor for permission to reproduce it here ... Ed.

Wayne Griffin ZL1UJK

While in Sydney recently I had the opportunity to visit Keith VK2ZZO in Gladesville on the North Shore. His QTH also houses the Gladesville Amateur Radio Club's ATV studio. This studio is used to produce and transmit material for the Wireless Institute of Australia (WIA) on the technical and educational aspects of amateur radio, plus material from ATVers and groups. (Committee please note! ... Mike). It also had the distinction recently of broadcasting live to much of Australia by Aussat (Australian Satellite).

The studio is quite impressive to see in action. The Gladesville group broadcast live 1930 to 2300 hours four nights a week; Wednesday, Friday, Saturday and Sunday. The transmissions are on UHF about 579MHz (channel 35), with 30W peak sync going to a colinear on the roof. The program material consists of presenters reading news and pre-prepared material on tape, all about Amateur Radio events and techniques.

The ATV signal can be readily received on the North Shore and the south and western parts of metropolitan Sydney. Being on Ch35, there is also an audience among the general public, who often come across it when tuning their sets for other UHF TV stations. Keith told me that this was how an Aussat executive first heard of them. He contacted them, wanting to know more about the group and what they did.

Aussat were impressed by what they saw and offered the free use of a satellite transponder for three hours to the group to transmit wideband ATV around Australia, i.e: fast scan 625 line PAL colour.

The first transmission was on November 14th 1990. The Aussat earth station is located in Belrose, also on the North Shore. Its uplink frequency is in the Ku band at 14.281GHz to Aussat 2, transponder 5. The downlink on 12.533GHz covers most of Australia, with a spot beam to Western Australia. Linking to Belrose from Gladesville required additional help: the ABC provided microwave equipment via TAFE (technical institutes).

The satellite downlinks in the state capitals were fed into the local ATV repeaters, which made it easy for most ATVers and non ATVers to view the transmission. Transmissions was one way only, the Gladesville being the master control station.

The opening segment of the Aussat transmission featured an interview with Aussat's managing director Graham Gosewinckel being interviewed by presenter Doug Mackie VK2XGX, followed by a typical Gladesville educational presentation and prerecorded tapes from the various ATV groups around the country, made especially for the occasion. They received many reports from amateurs for this transmission; certainly an historic event for all involved.

Speaking to Keith more recently, he advised that Gladesville did another Aussat transmission on February 27th 1991, and are due for a third on July 24th 1991. Another one is planned for around

September 1991. Here follows a report by Keith himself.

ATV REPORT ON AUSSAT ATV TRANSMISSION

Well, how do you write a report when you are only now setting one's feet back on earth?

Aussat - oh yes! what a wondrous night that was. For myself, it started at 0730 hours and as I had planned the day very carefully, nothing could go wrong - or could it? Wednesday was left to finally time the tapes and write up the running sheets, simple. Not so - I forgot to allow for phone calls.

After the first ten I stopped counting. Most were from ABC TC TAFE North Sydney and Aussat Belrose, all concerned with and about the test transmission. By 1500 hours the pressure was on and the running sheets not finished. The ABC link people arrived, Tom King (Media) and then some of the crew arrived, more of me was required to make decisions and the time flew by.

I eventually hid in another room to finish the running sheets before the transmission started, but only two sheets of four were finished by then. Number three was finished after the start of the transmission and number four never happened.

The transmission from our end had no equipment failures as seen on Channel 35+, however, there were problems with the system outside of our station, which appeared to be commercial apparatus elsewhere and after 40 minutes into the transmission all was fixed. There were 130 signal reports by radio and phone and also some letters. These reports were taken in the garage where the food was, and a TV looking at 35+.

If you are sick of everybody talking about Aussat test transmission, remember this - that nowhere in the world has any Amateur Radio club transmitted wide band television through their country's communications satellite.

I wish to thank all the helpers for making this a world first total, beyond belief, success. Thank you all ... Keith VK2ZZO.

NARROW BANDWIDTH TELEVISION ASSOCIATION

The Narrow Bandwidth TeleVision Association, founded in 1975, specialises in the mechanical and low definition aspects of ATV, and offers genuine (moving) TV within a basic bandwidth of 6 - 7 kHz. The techniques, basically an updated form of the Baird system, are a unique mixture of mechanics, electronics and optics. Membership is open World-wide on the basis of a modest yearly subscription (reduced for BATC members), which provides an annual exhibition and quarterly 12-page newsletter, together with other services.

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

IN RETROSPECT

VIDEO FILTER CQ-TV 153 p20, CQ-TV 155 p53

A few words of warning to those thinking of modifying the Video Filter as per the 'In Retrospect' article in CQ-TV 155, sent in by Clive Reynolds G8EQZ.

It just so happened that CQ-TV 155 dropped on the door mat the day that I had pulled my video switcher/filter apart to even up the levels. I had noticed that the filter introduced a small loss despite resistors R5 and R8 being set to give the correct x4 gain to make up for the matching resistor losses in R3 and R7. I had got as far as attempting to increase the gain to slightly more than x4 by juggling with the values of R5 and R8, to make up for the small through loss without success when I read Peter, G1COI's, article.

Thinking it was the answer to my problems I modified my filter as per the instructions and switched on. To use Peter's phrase 'it had tart's filling linearity' (what IS he on about?!). A poke around the post-filter amplifier with the digital multimeter revealed insufficient volts between the collector and emitter of TR3, for it had to work as an amplifier. Then it dawned on me as to why Peter had to modify a previously uncriticised design, and why his mods failed miserably for me.

The post-filter amplifier comprising of TR2 and TR3 in the original design relies on a DC path from the video output of the filter to the 75 ohm termination in the input circuitry of the equipment it is feeding. I suspect that Peter tried to use this circuit with AC coupling, but that would not allow sufficient current to flow in TR3, causing Peter's poor linearity result. However, while Peter's mods allow the use of AC coupling, they do NOT work when the filter's output is DC coupled as designed.

Having gone back to the original DC coupled circuit I then investigated the cause of the slightly low gain and found that it was due to incorrect mid-point biasing of the output pair, resulting from my use of lower values for R5 and R8. The use of lower values does improve the output pair drive capability, but so as not to overrun TR3 too much, I used 150 ohm for R5 and 470 ohm for R8 (to get x4 gain R8 must be 3x R5). With a supply of 12V the potential at the junction of R7/R8 was around 10V when R* was 47k, as recommended. Reducing this to around 6V, by changing R2 to 22k from 33k, cured my problem of slightly low gain.

So, the moral of this story is 'beware of heavy criticism of well tried designs!'.

ATV TALKBACK - 144.750 FM
ATV TALKBACK - 144.270 SSB
SSTV TALKBACK - 144.550 FM

HDTV ? - WHAT'S THAT THEN ?

Trevor Brown G8CJS

It would seem that we have reached a crossroads in Television standards and there is now great debate in how and where to go next. HDTV seems one of the popular phrases to band about, but what is HDTV? is it analog, digital, or how many lines does it have. Is it compatible with previous standards and if so which.

Japan and Europe are planning analogue HDTV, while the USA is still contemplating either a digital or analogue system. The Advanced TV Research Consortium, which includes Holland's Philips and France's Thompson, as well as state-side companies, like Sarnoffs Labs and NBC. The consortium was one of the first to jump on the digital bandwagon, soon to be joined by Zenith and AT&T.

Critics of digital HDTV say that "graceful degradation" is not possible, because every bit of digital information is necessary to reconstruct the picture. This being the case, at the edge of the transmitter coverage area one home would get a perfect picture while the person next door would get no picture at all, with the boundary between the two moving with weather. One of the digital supporters is the FCC, because they believe that HDTV transmitters can operate on much lower power levels, which would mean that HDTV could be placed in parts of the terrestrial spectrum where high power analogue channels could not be for interference reasons. The bottom line of any USA system will be something that can be accommodated on terrestrial transmitters, as direct reception of HDTV from satellite does not feature and is not likely to in the near future.

Across the water, Europe is also reviewing its television standards, with a view to introducing a system with 16:9 aspect ratio

pictures. Europeans are a very different proposition from the states, with satellites already providing quality in the shape of C-MAC, D-MAC, and D2-MAC, with the planned further development of HD-MAC to an aspect ratio of 16:9.

The terrestrial television companies are the ones with a problem. They see 16:9 aspect ratio television on the way, from satellite broadcasters who have the necessary bandwidth, and are worried about the loss of viewers if, and when, 16:9 TV sets hit the market place. There goal is to come up with a system that will deliver this 16:9 aspect ratio picture down a standard terrestrial TV channel, and at the same time be compatible with the existing 4:3 aspect ratio receivers. The answer to this conundrum is PALplus.

PALplus received its first demonstration at the consumer electronics fair in Berlin, and is the result of co-operation between Thompson, Philips, Grundig, and Nokia. Ideal compatibility between a 4:3 system and a 16:9 system would be to transmit a conventional 4:3 picture, and side-panels required by 16:9 viewers only. Much work has been done in this direction, but the problem of visible joins seems at this point in technology to be insurmountable.

The PALplus approach is a move away from 4:3 pictures and separate side panels to a 16:9 picture on a standard 625 raster with the picture filling 432 lines. The 4:3 viewer will then see letter-box pictures.

This may be accepted in Germany where viewers are accustomed to seeing cinema scope films presented in letter box, but would be less popular in the UK, where scope films are zoomed and panned to fill the whole screen. The advantage is to the 16:9 viewer who will also see 432 lines of picture, but this time in a screen filling display.

The possibility of line doubling displays must also exist at the receiver end in a store and repeat system.

The lines top and bottom of the letter box are not wasted in this rather cunning system, but are modulated with a digital signal called helpers, which increases the horizontal resolution on sets with helper decoding to the order of 7.3 MHz. This keeps the horizontal resolution on the wider screen sets to about the same as the narrower 4:3 screens.

The helper signal is kept to a low level of modulation and down near black level in order to minimise any annoyance to 4:3 viewers to whom it is visible.

The system is still experimental, but tapes are now circulating around the UK so that broadcasters are able to subject the signal to the various pieces of television hardware and check for any problems caused by the helpers signal.

The design of PALplus has not been finalised. The hope is that when 16:9 Television receivers start to appear in volume, that they will be multi standard, one of the standards being PALplus.

In this way the screen can be filled from a terrestrial broadcaster, as well as a satellite broadcaster, and thus the viewers equipped with the new 16:9 screen, will not be handed over to the satellite broadcaster to have their screen filled with either MAC or HD-MAC, a system that will not be available to terrestrial broadcasters because of the required bandwidth.

Other work that is going on is on the programme making front, after all, when we get to a way of sending wide screen pictures it would be nice to have some pictures to send. On the film front super 16 seems to be finding popularity with the programme makers.

What is super 16? I hear you say. Well cast your mind back to what 16mm film looks like, remember all the pictures one after the other in a reel. At one side were the

sprocket holes and the other side the sound track.

When programme makers use film, the sound track is often redundant because the information at the side of the picture relates to pictures further down the reel, and so is difficult to edit. The sound is recorded on site on separate audio. The sound stays separate for the post production work, and is only put alongside the pictures at the last stage. If your film is going to a cinema then this last combining stage is essential. When your film is going to a telicine machine then this last stage can be omitted, because any self respecting telicine machine can handle separate sound.

Enter super 16; why not open up the picture by extending the picture into the space reserved for the sound track, and give the picture a wider aspect ratio. Standard film stock can be used (cheaper than 35 mm) a little work on the film camera and a different gate in the telicine machine, plus a little work on the transport, rollers etc, and bingo you are into super 16. Does the system work? Yorkshire Television shot the Darling Buds of May this way, admit you only saw it as zoomed in 4:3 pictures, but when we get around to the inevitable repeats then who knows. Scottish Television are now shooting Taggart on super 16mm, so that's two productions that may repeat in a different shape at some time in the future. Remember Satellites were just a figment of Arthur C. Clark's imagination, when some of the programmes were made that emanate from them now, so plan ahead would seem to be the order of the day for programme makers.

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All Club crystals are HC18/U (wire ended).

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I²C Part-6

SERIAL PORT CARD

INTRODUCTION

Part-6 of the I²C series describes an add-on card for the system that will put two RS232, serial ports at your disposal. How you use them will be up to you, they are configurable either via a menu option or by programming them yourself, via Z80 machine code.

The main idea behind the card was to encourage more people to build the system. Providing an uncommitted serial interface will allow you to connect any equipment that has an RS232 port to the I²C computer.

The most popular piece of hardware that uses a serial port, is a modem. 300–300 Baud modems can be found at very reasonable prices at rallies nowadays and once connected to the system, they can be controlled with the terminal emulator.

This means that you can then call the BATC Bulletin board! Most bulletin boards assume you have 80 columns of text across your screen. Of course this is not the case with the I²C system, it has only 40. But do not despair. The BATC BBS is being modified to accept callers using the I²C system.

To log onto the system in this mode, you have to call the BATC Hotline number (Answering machine on between 1500 – 1900) and leave a message saying you wish to use the BBS in this mode. You should leave your name, callsign (if applicable) and BATC membership number.

An account will then be set up for you (within 24hrs), so when you call back, using the modem, you will be presented with the 40 column system, specifically designed for the I²C computer.

CIRCUIT DESCRIPTION

Figure 1 shows the complete circuit diagram of the board. It is not a very complicated board and could be built on a Eurocard size piece of Veroboard in an evening.

IC1 is a 74LS04 device and two of its inverters are used to form a crystal oscillator, the output is buffered by a third inverter and fed to two pins on IC2.

IC2 is a Z80 CTC (Counter/Timer Circuit) and is used to generate the correct frequency clocks to drive the serial device. IC2 has four internal counters, two are used to provide clocks for the serial interface (T1 & T2).

The other two are uncommitted and may be programmed to do whatever you like. They always count DOWN. So you put a number into them and they will decrement that number until it reaches zero. Once they reach zero, they can INTerrupt the CPU (If programmed to do so). In addition to being able to count the CPU clock, they can be set up to count external events as well.

The two outputs from IC2 drive the clock inputs of IC3. This is a Z80 SIO device (Serial Input/Output). It can be programmed in a whole host of different modes, including :-

Fig.1: The I²C Serial Port

+5U

100n

0U

DATA
BUS

40	D0
1	D1
39	D2
2	D3
38	D4
3	D5
37	D6
4	D7

9 VCC

10	W/RYDA
30	W/RYDB
14	TXCA
13	RXCA
27	RXTXCB
7	IEO
6	IEI
21	RST
8	M1
36	IORQ
32	RD
20	CLK
5	INT
33	C/D
34	B/A
35	CE

Z80
SIO
IC3

TXDA	15
RTSA	17
DTRA	16
RXDA	12
CTSA	18
DCDA	19
SYNCA	11
SYNCB	29
TXDB	26
RTSB	24
DTRB	25
RXDB	28
CTSB	23
DCDB	22

GND 31
0U

IC4 - 1488

12 11   TXD
13
    9   8 RTS
    5 10
    4   6 DTR
    3   1 RXD
6   4   CTS
11 13 DCD

IC6 - 1489

CHANNEL 1

IC5 - 1488

12 11   TXD
13
    9   8 RTS
    5 10
    4   6 DTR
    3   1 RXD
6   4   CTS
11 13 DCD

IC7 - 1489

CHANNEL 2

1488	PIN-1	-12U	1489	PIN-7	GND
	PIN-14	+12U		PIN-14	+12U
	PIN-7	GND			

Asynchronous – 5, 6, 7 or 8 bits/character, Variable stop bits, Several clock rate multipliers, Break generation and detection, Parity, Overrun and Framing error detection.

Synchronous – Bit or Byte orientated messages, 5, 6, 7 or 8 bits/character IBM Bisync, SDLC, HDLC, CCITT-X.25, etc. Automatic CRC generation/checking, Sync character and Zero insertion/deletion, Abort generation/detection and Flag insertion.

The terminal emulator will allow you to use it in Asynchronous mode at either 300, 1200 or 2400 baud. The device itself can go up to 800K bits/second, but the I²C VDU limits the maximum speed at which characters can be transferred from the serial port, onto the screen. The maximum clock rate for the I²C bus is 100Khz.

The serial I/O from IC3 is converted to RS232 levels by IC4&5 for port one and IC5&7 for port two.

The card requires +5volts to power all the TTL devices and +/- 12volts for the RS232 driver chips.

SOFTWARE

The next version of the Firmware, supplied on EPROM is now ready. It is version 2.30 and supports the add on card, by providing a simple terminal emulator.

This is activated ·by selecting option 8 on the main menu. You will be presented with a blank screen, anything you type will be sent to port one on the serial card, anything that is received from port one will be shown on the screen.

The software defaults to 300 baud, 8 bits/character, 1 stop bit and no parity. You can alter these settings by typing CONTROL-A. This will stop data transfer over the serial port and present you with a menu of options.

Select the option you require by pressing the number next to that option. This will then re-program the serial port to your requirements and carry on with the terminal emulation. (There is also an option to quit back to the main menu).

FOOTNOTE

If anyone has any idea's or suggestions as to what we should do next for the IIC project, please let us know. This can be suggestions for extra boards or improvements/extra bits to the software.

We have a couple of projects up our sleeves, but some feedback from yourselves would be useful. Please send any correspondence to:

Chris Smith G1FEF, 107 Hitchin Street, Biggleswade, Bedfordshire, SG18 8BL.

Alternatively, you could always log on to the BATC BBS and leave a message for me there!

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Model	Groups	Gain	F/B ratio	App. length
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DY5	WB	12.0dB	16dB	0.68m
DY10	A,B,CD,WB	13.0dB	16dB	1.40m
DY20	A,B,CD,WB	15.5dB	18dB	2.60m
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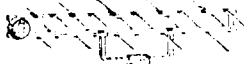
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ATV CONTESTS THE WAY TO DO EM ?

John Stockley G8MNY

TV contests do not have the same pace as phone or CW contests, and can therefore be more enjoyable. Here are some tips from 12 years of contesting.

TALKBACK

During contest 144.750MHz becomes a calling channel, not a talkback channel, so please QSY ASAP. On QSYing both stations should check out the new frequency by asking **"IS THIS FREQUENCY IN USE PLEASE?"**, beforehand, to avoid loosing the contact and causing QRM to others.

FM is the most commonly used mode for talkback but it is often difficult to find a clear channel when on hill tops. Remember the all mode section of the band has many allocated channels:

Beacons, Raynet, Packet, RTTY, etc.

Deep QSB causes difficulty on FM, so why not use SSB, which won't block the ATV half as much, and give yourself a chance of maintaining contact Dx! Also, don't forget to listen around 144.170 SSB, as this frequency is used abroad.

WHERE TO BEAM

With narrow beam aerials aligned on the same mast, the use of headings based on QRA locators is highly desirable, assuming you can calibrate the rotator that well, and you have an RF quiet electronic abacus!

Otherwise beam up on the 2M signal if you are the same polarization. On 70CM best headings are obtained from using a narrow band (SSB) receiver tuned into the carrier, once you can extract the exact frequency from the transmitting station.

For 24CM exchanges send the 70CM pictures first is an obvious rule, but be prepared to deviate the heading slightly, as the paths can bend and reflect differently.

WHAT TO SEND

The contest rules require a different four number code per band to be sent in vision, these numbers must not be sequential or repeating. So sending pictures of that nice tidy shack, is NOT REQUIRED (that's a relief), nor is that colour test card, only the four number code.

However, one should identify the code as being yours, so also include the callsign. The numbers should be designed to fill most of the screen (allowing room for callsign). They need to be thick, this is especially true for all the vertical portions of the digits, as this is the first detail to be lost on poor paths.

BLACK OR WHITE

At first sight you may think that white numbers on a black background would be best, as noisy blacks are less noticeable. However, to see anything, first the TV set has to lock the picture, this means SYNCs must be sent. With white numbers on a black background, the TV has a reduced signal-to-noise ratio of 0.3:noise, assuming no sync clipping. In practice, this could be reduced by 6dB with slight clipping (0.15:noise)!

Now, for black numbers on a white background the sync circuit has it easy, a full swing at sync time 1.0:noise. This is true for both FM and AM TV. With AM TV there is an added bonus, as less mean power is required, sync pulse linearity is

less important, so more drive can be used, giving greater peak power, with the resultant improved S/N ratio at the receiver.

The use of white background upsets some operators who like to see lots of mean power leaving, so to them I say "get a PEP meter".

POWER

The UK licence limits the power to 400 watts peak at the aerial. The aim under contest is to work as many stations as possible, thus the higher the power the better, unless you have neighbours that is. In that case try going /P or get new neighbours (move).

As a point of contrast, even though I used to run medium powers on both bands when active, I must put the view here that contesting is not only about earning lots of points and winning. Contests are about, perhaps more importantly, promoting activity and the use of the ATV sections of the bands. Let us not forget the hundreds of 'local' low-power stations, who derive great pleasure from attempting their low-power contacts at relative DX. Such contacts made possible often only because of the increased activity caused by contests. The syndrome of pointing your beams out of your local group, instead of into it! These low power contacts are often disrupted, or made totally impossible by the high power stations! ... Ed

MODULATION

Information is only carried in the modulation, so full modulation is the key. To get as much modulation of the carrier as possible is not always easy. Unfortunately there is no video equivalent of 'speech processing', only the camera and video gain controls are available. An evenly lit code caption card, or computer video with no video droop, are the best that can be done. On FM TV the amount of deviation used depends on the Rx station's IF bandwidth, so the picture content becomes the only adjustable item.

TX BANDWIDTH AND FREQUENCY

For just code captions, curtailed video bandwidth should be used. This can be as low as 0.5MHz at –3dB and 2MHz at –20dB. A simple 75 ohm repeated pie section filter can provide this.

On 70cm this enables other stations to work alongside you in this restricted band, as well as keeping other 70CM users happy. With such reduced bandwidths every thing looks blurred, but the caption is still just as readable as with the wide band, because fine detail is drowned by the noise on weak pictures anyway. With the narrow bandwidth, the Tx frequency can go much higher in the band, up to say 438Mhz. This can also enable each station to be readily identified with its unique spot operating frequency, and not all on 435.6MHz.

This makes the assumption that most stations can easily change frequency – as most are crystal controlled this could be disputed. I know the answer is change crystals then, but many stations are not equipped for such practices, either technically or practically ... Ed.

On 24CM, the aerials, preamp, Rx and PA are often frequency selective, not to mention the RADAR interference, so a compatible frequency can vary around the country. 1255MHz is favoured, but, as for 70CM, a spread in frequency can help when the band is congested.

RECEIVERS

For 70CM a TV tuned down to the band is best, as down-converters can generate unwanted broadcast images. Reduced IF bandwidth from 5MHz to 0.5MHz with a switched 'Q' multiplier stage after the tuner will give up to 10dB improvement on weak signals. This is a much greater improvement than using a low noise preamp could produce, but you will still need one of those as well. Splitting the preamp output into both the Tx and a

70CM phone Rx, enables monitoring of signals well below P1, this will give you better judgement of the contact chances under QSB conditions. With a good quality weak signal, the TV should be able to lock up before the numbers are identifiable.

On 24CM a narrow IF down to 6MHz will improve low grade pictures, if the Tx deviation is kept low. Adjusting the PLL on weak signals before a contest is a good idea, as it is quite a different setting than that for P5 colour and sound.

Dx contacts can be as much to do with "Aircraft en route" than equipment sensitivity.

RX QRM

At /P sites other strong signals may cause problems, on:

70CM

- Strong PMR on 440MHz band
- Broadcast TV image at +2xIF
- Broadcast TV due to VHF mix
- Syledis wideband location system
- Aircraft altimeters
- 70cm repeaters users
- 70cm satellite user

24CM

- Extremely strong RADAR V not uV
- Broadcast TV on IF
- Broadcast TV's 2nd Harmonic
- CellPhone/VHF PMR mix

Some of these can be cured with inter-digital filters, others can not.

VIEWING

Contest pictures are best viewed on a small screen TV (6") from a long way away (5') in subdued lighting. This is because one's brain can do a lot of 'state-of-the-art' picture processing, and act as a frame store under these conditions.

REPORTS

Only the check sum (the code numbers added together) is permitted to be communicated on the talkback link, the code number itself must not be communicated on pain of disqualification! Don't forget to log the code number seen.

A report of:

P0 means no usable picture was received.

P1 is a picture just interpretable.

P2-P4 increase in viewability, until:

P5 no apparent noise.

Under contest conditions it is often possible to extract part code numbers from fleeting glimpses, where aircraft QSB just lift the signal long enough to get some of the code, several QSB peaks may be required for the whole code. Usually a P1 report is given, though P0+ would really be correct. In addition to the QRA, check sum and report, the exchange needs a contest serial number per band, as with other contests this is a 3 digit number starting from 001.

SCORING

A BATC logsheet should be used, this will give all the right boxes to fill out as you go. Unlike most other radio contests scoring is based on Km of video worked. Normally 1 point per Km per direction. Bands higher than 70cm, 2 or 4 points per Km may be used, so check the contest details in CQ-TV.

BE BRIEF

Please remember also that others want to exchange pictures too, so remember to cut transmissions once the code number has been seen or when the other station in not in a position to Rx.

HI-RES v 1.5 - SSTV SOFTWARE

R.W.J.Humphries B.Sc. G4UKL

HI-RES v 1.5 is copyright protected software for the Robot 1200c and PC computers, it is written in Turbo Pascal version 5 by N9AMR, Tom Jenkins of Indianapolis. SSTVers first saw his programming skills when a modest suite of N9AMR graphic files was included in the SCAN software written by W5ZR. Tom became hooked on SSTV some two and a half years ago and soon began to put his professional skills as a computer programmer to work for the benefit of SSTV. Tom's ambition was to write a completely new programme which would include all that was best from existing software such as SSTV.COM, GEST and SCAN but with new code, layout, original innovations and incorporating suggestions from other SSTVers.

CRITERIA

The criteria for any SSTV programme is two-fold. Firstly, the facilities to be used whilst on-air must be quick and easy to access with maximum menu friendliness, there must be a clear and easy route to the required function with a minimum of command layering, picture retrieval needs to be quick and positive with text and overlay easily inserted. The second criteria is an off-air facility for picture enhancement, composition and manipulation necessary to prepare pictures for transmission and provide an avenue for individual artistic expression. It is generally accepted that the most expert and adroit SSTVers spend considerably more time working on their pictures prior to transmission than they do on the air so a good graphics package is a desirable asset. Having taken over a year in

Photo 1: Graphics and text produced with HI-RES

developing a programme which fits this framework, it is understandable that Tom Jenkins would want to protect his work with international copyright and make a modest charge to provide some recompense for his time, labour and skill. The charge also serves as an acknowledgement of his copyright .Unfortunately, there has been some illicit copying and distribution. SSTV amateurs are asked not to accept copies offered from any source other than Mr.Jenkins and to notify either him or the author of the circumstances. To evaluate and describe all of Hi-RES in detail would take an entire edition of CQ-TV this review will therefore describe only facets which are new, novel or of special interest, and generally appraise the work from a user standpoint.

During the review period the programme was installed on a 386DX computer running at 33Mhz with an IDE hard-drive having an access time of 14m/s, 590k free ram and an Orchid Pro-designer 11s HC Graphics board capable of displaying 32768 colours with a multi-scan monitor. This represents the upper limit of most computer equipment likely to be found in the ham shack and the programme will run quite happily on 286 machines with the usual 255 colour VGA graphic boards.

WHAT DO YOU GET ?

HI-RES costs $75 with any updates charged at $3 to cover postage, the programme arrives on a single unprotected 5.25" disk in a sturdy mailer. There is a printable 48 page manual on the disk and a brief read-me file which warns of the protection devices built into the programme, attempting to copy before installation might cause damage to the disk. Inserting the disk and typing INSTALL begins a train of distinctive actions, firstly an irremovable identification is written to the computer BIOS, files are unpacked into a directory, the installation file is deleted, you are asked to designate which EPROM is currently resident in the 1200C and finally a successful installation message appears on the monitor. The programme will now run BUT only on the computer used for installation, it cannot be re-installed or
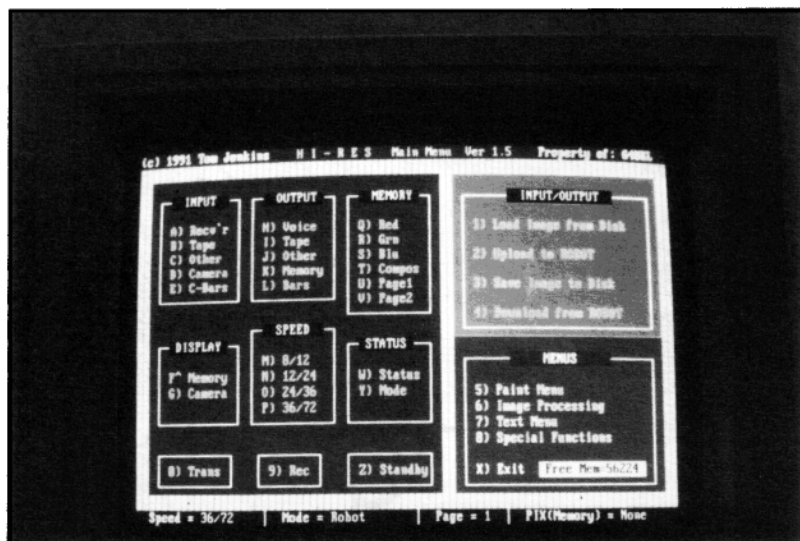
Photo 2: The opening Menu screen

transferred (should the user change computers a new disk will be supplied on production of the computer receipt and $3). Having completed the installation, is now possible to make a back-up copy of the disk for any future refreshing. Typing HR starts the programme and displays the opening screen, although primarily intended for use with a mouse, keyboard operation is always available, an essential option for rodent-less computers.

WHAT DOES IT DO ?

The opening screen, (Photo 2 The Master Menu, opens to display on the left-side all the regular in-built functions of the Robot 1200c, OUTPUT, MEMORY, SPEED and STATUS, and most usefully, all the current settings are displayed at the bottom of the screen. STATUS also accesses the MODE select: ROBOT, AMIGA, WRASSE, M-MODE or SCOTTIE are fully supported in all speeds and variation. The top-right sector of the Menu Screen controls the loading and saving of pictures to disc, down and uploading to the computer memory. whilst

the bottom right sector gives access to four further main screens for the PAINT, TEXT, IMAGE PROCESSING and SPECIAL FUNCTIONS. Also in this sector is a box displaying the amount of free computer memory.

Having reached this stage I first tried saving a picture from the Robot to file. The prompt asked for a directory and picture name adding a suffix unique to HI-RES (.hrz) then whisked the picture away in seconds. When I opened the 'Load Image from Disk' function the significance of this suffix became apparent because remarkably the programme not only loaded images saved in its own .hrz format but offered a selection of external file formats used by other programmes e.g: .GEST, SSTV.COM. and .GIF together with 10 selectable drives A to J (if you should be so lucky) All pictures available for loading were displayed in column form, requiring a single mouse click to display the selected picture on the Robot monitor. It was luxury to be able to load pictures from other programmes without having to thread a path back through DOS. A spin-off was the ability to view the entire
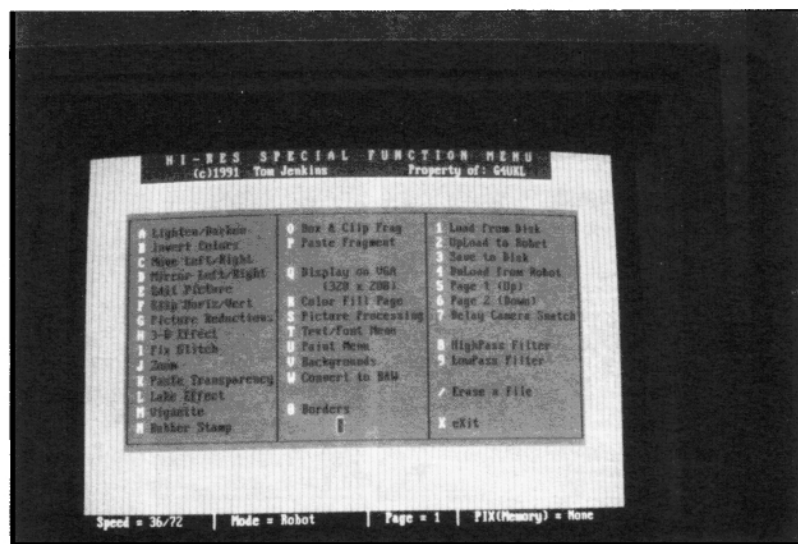
Photo 3: The Special Functions Menu screen; note the Camera Delay switch

Photo 4: Right picture Robot 1200C screen; left picture transferred to computer

contents of the selected drive. Unfortunately, this version of HIRES did not pictures to be saved in these external formats it is a load only process but once loaded to the Robot screen, pictures could be resaved in .hrz format thus making it possible to transfer pictures from other sources with great ease, each picture took up an economical 135K of disk space in C1 format.

Re-loading my saved picture I timed the finished display on the Robot monitor at a very acceptable 7.5 seconds. When loading a picture an option is offered for loading images directly into memory, using this function I was able to have five high resolution pictures available for transmission at any one time. Transferring the computer memory image up to the Robot was completed in an astonishing 3 seconds. The 'download to computer' function turned out to be very important when image processing was to be done, and easy to forget. It was whilst loading a picture into computer memory that I experienced an occasional glitch, the programme continued to flash a message

that the picture was being loaded when in fact it had locked the computer. Reducing the computer speed eliminated the phenomenon.

SPECIAL FUNCTIONS

Opening the Special Functions file (Photo 3) refreshed the screen with a new menu containing layer upon layer of effects, some of which act upon the displayed Robot picture, some modify the screen, others create multi-hued, diffused, plain or patterned backgrounds. (Photo 4).

Many subjects hosted sets of sub-menus offering opportunity for even further variation. Some perform in a single keypress routines which previously took many stages. The '3-D' effect' automatically shifts the red image a user-selected number of pixels left or right giving a 3-D picture either in the depth of the monitor or standing out apparently in thin-air in front of the monitor, the later created an illusion so realistic that a hand can appear to pass between the picture and the screen. 'Fix Glitch' cleverly removed lines of

Photo 5: Original Robot picture

QRM. 'Edit Picture' displays a selected area of the screen magnified to pixel level, where modifications can be made in any colour, including if wanted, a complete re-draw of the area selected. 'Make Transparency' created overlays from pictures snipped round with a 'rubber band', these are saved by the programme in a separate file 'Paste Transparency' which when activated displayed a menu of previously created overlays, these can be pasted anywhere on the Robot picture, in any size or shape.

'Rubber Stamp' picks up a user-sized portion of a picture which can then be stamped anywhere and as many times as wanted. 'Box and Clip' together with 'Paste fragment' snips out a variably sized portion of a picture and saves it to file for instant recall.

A function which is quite unique in this section is the 'Display on VGA'. This will transfer any image held in the computer memory, from initial load or an image downloaded from the 1200C screen to the computer monitor, cleverly and immediately prior to the appearance of the picture a neat little text display shows the calculation

being performed by a look-up table where the total number of tints in the original picture (which may run into thousands) is being reduced to the best palette of 255 colours.

As with all VGA graphics there is an inability to display more than 255 different colours, this limit being imposed by the graphic board, nevertheless the result was very acceptable, (see illustration) where it can be seen that the aspect ratio of the computer monitor picture does not quite match the 1200C 4:3 format. At this stage the picture can be snatched with a suitable TSR programme when the necessary vertical adjustment to correct the format ratio can be carried out followed by saving for future attention or sending to a printer.

A Hewlett Packard colour printer gave bright clean prints closely matching the original picture. I found this to be an outstanding section of Hi-Res which will considerable improve when the new generation of graphic boards using the Sierra-Dac LSI and improved A to D chips become economically available, this system will allow up to 32768 on-screen colours as

against the present 255. (the author is currently assessing an Orchid Pro–designer 11S HC Graphics board with a computer only SSTV colour system for review at a later date).

Continuing in this section, the 'Backgrounds' function opened a yet a further menu giving a wide diversity of background screens temptingly experimental, a great deal of time can be spent here. 'High and Low Pass Filters' either sharpen or diffuse the displayed 1200C picture, this was one facility I didn't think matched the standard of similar functions in other programmes, the high-pass filter was confusing because it had the same effect as low-pass filters in other programmes!.

The low–pass filter considerably reduced image sharpness, and whilst fulfilling its intended function, I cannot appreciate the logic of intentionally reducing the sharpness of an image intended for SSTV transmission when the majority of images inevitably suffer loss of detail during TX, perhaps I missed the artistic connection.

THOUGHTFUL PROGRAMMING

As stated, the opening menu screen contains the facilities for picture loading, saving and transfer to and from the computer memory, these functions are the most commonly used and very agreeably they are repeated on all other menu screens except TEXT, thus alleviating changing screens to access pictures.

Another well conceived application is the inclusion of commands giving direct access to other sections of HI-RES, e.g: the Paint, Text and Picture Graphics each can be accessed from virtually any screen menu without having to return to the main menu each time a new function is required.

TEXT

As supplied, Hi-Res includes but a single font, Souvenir, but all the fonts of the GEST programme were compatible with HIRES it was simply a matter of copying desired fonts across and modifying the suffix from .BIT to .FNT this included fonts made up of icons, symbols, borders and the like giving
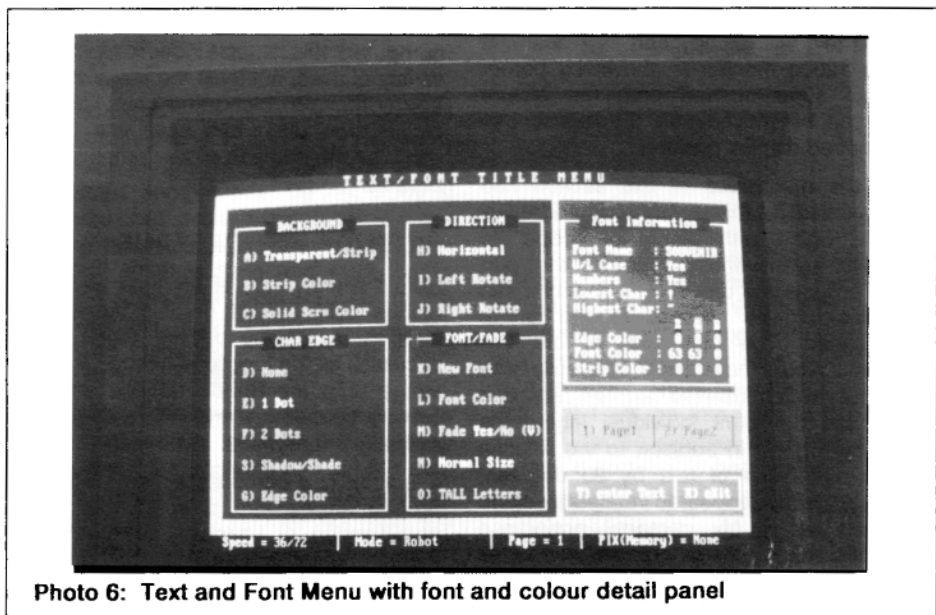
Photo 6: Text and Font Menu with font and colour detail panel

a virtually inexhaustible combination. (Photo 6).

Text colour is selected from either an on–screen menu, blended to taste or lifted from the Robot picture, the real–time colour under selection being displayed in a small box on the Robot screen. Text can be horizontal or vertical, transparent, or on a solid coloured background, with selectable outline thickness, this together with an imaginative selection of drop–shadowing and colour blending, caters for every style and taste. An inset panel displays the vertical and horizontal pixel size of the font currently selected together with a brief indication of the actual contents (very useful because some fonts do not support numerals or lower case), I also appreciated the inclusion of a block which gave the numerical values of the colours selected for the text. The size of the print is largely dependent on the font selected, no vectoring is supported in this version of either text or pictures, but I discovered that a sub–menu 'TALL LETTERS' allowed a selectable increase or decrease in height, experimentation was needed with some fonts, which, when heightened, appeared horizontally striped. The exact space entered text will occupy and its placement on the 1200c monitor is shown by corner brackets superimposed onto the picture these can be moved with the mouse into the required display position.

Once the mechanics of this section had been worked out it was very easy and quick to use, again with plenty of scope for individual inventiveness. From another part of the programme on– screen captions can be twisted, given perspective and further manipulated. The only part of the text section I would have liked differently was the facility which inserted text vertically, and which did not print individual letters the right way up, for in addition to the rotation of the entire line of text by 90 degrees, individual letters appeared rotated to stand on their sides. My personal preference would be to have the letters upright so they read from top to bottom right way up.

PAINT

Most of the facilities found on an colour graphics programme can be encountered here, allowing the creation of computer generated pictures, modification and additions to existing screens, the production of overlays, and as before access is provided for loading and saving and down and up–load to computer memory, a sub–section gives access to ready–made backgrounds, including a sub–sub–section for the creation of screen mosaics based upon a selected picture area and a choice of cleverly faded blended colour masks being vectored they can be sized and orientated anywhere on the Robot display. Borders and frames come ready made, just choose a colour blend. It is worth mentioning here that throughout the programme, whenever a colour choice is necessary, an ingenuous sub–menu is displayed for colour selection this is very comprehensive, beginning with a straight choice of 16 colours (including transparent black or white (for overlays) you are also allowed to mix a palette colour of any hue or tint and if this is not enough, a colour can be picked out from the displayed picture and transferred back to the computer, this latter function has a wide variety of uses, not least the ability to select border tones to blend and compliment the picture, too often one sees fine pictures spoilt by the addition of raw primary colour borders.

PICTURE PROCESSING

Here I spent much of my time amongst a unique collection of graphic manipulation facilities. A closely packed menu screen accesses all the functions needed to get an image onto the Robot monitor from disk, camera or memory and with a direct route to the Text/font menu.

It is virtually a complete scheme within the programme, a very powerful tool for the manipulation of images downloaded into the computer memory. Anticipating a need, there is the thoughtful facility on this screen
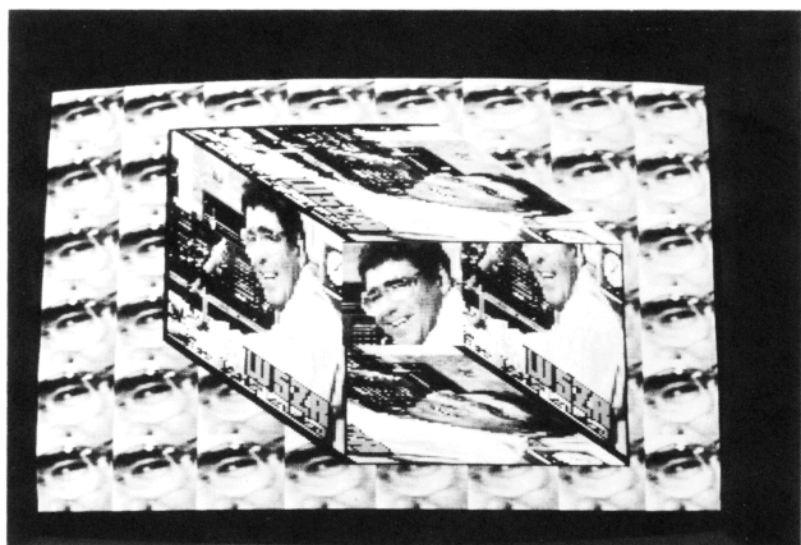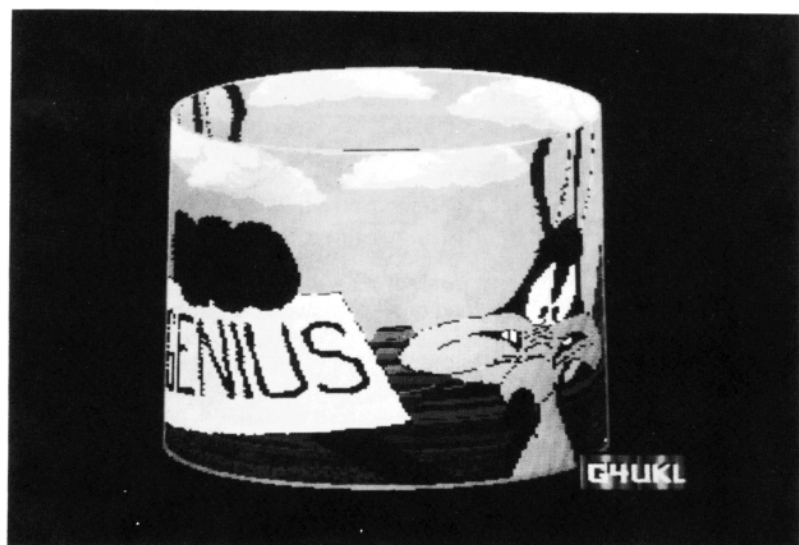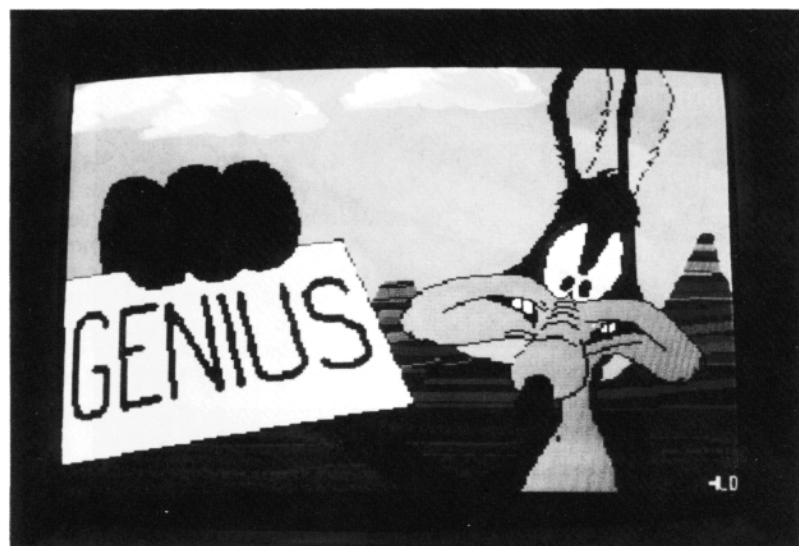
for snatching a picture from whatever source is selected be it camera, VCR or TV.

Without a maths co-processor installed some functions take a considerable time to build-up and complete, e.g: a large globe up to 15 minutes on a 286 computer reflecting the whopping amount of computation which has to take place to wrap a picture into both the interior and exterior of a can of beans or wine-glass and that is what this section is about, not only cylinders, but open boxes, globes, ice-creams, books, flags, cones, etc. It is here that the powerful 386 computers with their fast processing speed are advantageous.

Within this division entire pictures and text can be scrolled into deep perspective and convoluted shapes, I enjoyed turning an off-air portrait of EA5FIN into a tin of 'Potage de FIN, avec herbes' with part of a Heinz plaque scrolled around the bottom for added authenticity. Boxing-in W5ZR was equally fascinating, the illustration shows the same image on each side of the box, but it is just as simple to have a different picture on each side, alas much of the novelty is diminished when the receiving station has a similar facility and knows the tricks.

All these effects are completely new to SSTV providing facilities not previously available for picture manipulation and a desirable addition to the SSTVers picture enhancement armoury.

SUMMARY

This programme is far and way in advance of other contemporary software, it performs routine functions smoothly and efficiently with plenty of scope for the imaginative experimenter and innovator. It is quick and easy to use including everything needed for present-day high-resolution colour SSTV, when considered with reference to the price of $75 with updates for only $3 postage it is very good value indeed.

The manual is clearly written and I had no difficulty in identifying and implementing functions, it definitely needs printing out for leisurely study. Hi-Res is probably most comfortable on computers running up to 25MHz, little was gained at higher speeds. The significant speed increase in processing graphics came when a co-processor was in use. This is a comprehensive package which will manage your 1200C and PC in all present SSTV modes, the ability to access and load pictures from other sources and formats is a major asset. There are facilities I would have liked to have, vectored fonts and pictures, perhaps a CW ident for example, but I am sure that N9AMR is aware of these options for future development. No computerised SSTV station should be without Hi-Res.

FOOTNOTE

Since this review was written version 1.6 has been released. This contains some 25 modifications and additions to the 1.5 version. I have selected the following to be of the greatest interest: There are now 5 major menu screens, the Select Colour Screen has been re-written and enlarged making it possible to create any colour combination for text. A useful Font Editor is now included as a stand alone programme. Spray and Paint Image in Memory, this picks-up an actual part of an image in computer memory to follow the spray or draw on the Robot screen, produces some weird effects. Picture Merge, merges a picture in computer memory with the display on the Robot monitor, for added effect the process can be repeated to emphasis the picture in the computer. Mirror Image, produces a mirrored image from left, right, top, bottom or diagonally from top left to bottom right, only the latter function is new. Move Left/Right, a very useful addition which permits shifting the picture on the Robot monitor to the left or right by a preselected percentage.

ATV - WHITHER HENCE ?

This article was first published in Break-In, the journal of the Wireless Institute of Australia and I wish to thank the editor for permission to reproduce it here.

Although the references to exact frequencies and the band-plan for Australia, and references to the conditions prevalent in Australia and the activities of the regulating authority concerning the ATV fraternity, the general content of the article is highly pertinent to ATV in the UK and Europe ... Ed.

J.F.Ingham VK5KG

ATV is at the cross-roads; 576MHz rescinded, ATV repeaters closed down to make way for broadcast TV transmitters, WARC-92 looming with the threat of much of 420-450MHz, Where is ATV heading?

Firstly, allow me to establish my credentials as an 'ATV Seer'! While many know of my activities as the Wireless Institute of Australia's (WIA) Federal Video-tape Co-ordinator, long before non-broadcast video recorders were developed I started in amateur television. In fact, it was in the early 1960s, some 30 years ago, that my interest in ATV started.

But it wasn't until the early 1970s when I was living in Edmonton, Canada, that I struck up a friendship with a fellow ATVer whose QTH happened to be at the bottom of a very deep river valley. Try as we might we could never exchange pictures from my QTH. One day, the idea of building a small ATV repeater to be sited on the rim of the valley occurred to us. As I thought long and hard about it I realised that the advent of the repeater would have a far greater impact on ATV operation than it has on phone operation.

If you have never attempted point-to-point ATV transmission, it would probably never

have occurred to you just how difficult it is. Because of the very wide bandwidths involved, and the very high frequencies to which ATV is confined (with the attendant high path losses) it is necessary to use very high gain (and very directional) aerials for both transmission and reception.

Under these conditions, unless both aerials are already aligned, it is practically impossible to expect a reply from an ATV 'CQ' call. I realised that an ATV repeater situated high above 'ground clutter' had the potential to revolutionise ATV operation; at last ATVers would know where to point both Tx and RX beams prior to calling CQ!

We never got around to building that first ATV repeater, but I published my ideas in a Canadian Amateur Radio newsletter before returning to Australia later in 1973. I found the Adelaide ATV scene here much as I had left it, with a handful of die-hards struggling to punch their signals through the suburban tree-line.

After I had become established at my new QTH I interested the local ATV group in an experiment to prove the merits of my idea. Using a 576MHz transmitter built by Maitland Lane VK5AO, plus my own receiver and aerials we duly tried and assembled an ATV repeater on a high spot overlooking Adelaide. The rest is history.

While VK5TYV may not have been the first licenced ATV repeater in the world (we were beaten by a group in Washington DC) it was the first to be licenced in Australia. Since then, wherever an ATV repeater with output in the 576MHz band has been licenced, interest in ATV has soared.

Part of the success story of ATV in Australia can be attributed to the fact that the modern domestic television set can tune to 576MHz (channel 35) without modification. Indeed, many present day operators owe

their start in our hobby by their chance stumbling across an ATV repeater output while 'fiddling' with their TV set. The ready availability of domestic TV cameras and recorders has also encouraged more.

So that brings us up to date. But what about the future? Is there really nothing but doom and gloom for the ATV operator? Well, by the turn of the century there probably will be far fewer ATVers able to transmit as we do today, but perhaps all is not lost!

But by then the Television Telephone will be well established in many homes and businesses. The technology already exists. In September 1989 I saw a working demonstration in Melbourne of a digital Television Telephone, whose use is intended on Telecom's new Integrated Services Digital Network (ISDN) and which has a bandwidth not much more than a single telephone conversation does today.

True, its electronics took up the best part of a rack of electronics. But the promise is that by 1994 development of dedicated Large-Scale Integrated Circuits will enable its size to be condensed into that of a shoe box and sell for about the same price of a cellular mobile telephone currently.

A large base of domestic equipment suitable for use on ATV has been catalyst for many operators in the past, and future ATV developments must depend on narrower bandwidths. The modern Television Telephone has a very narrow bandwidth and by the year 2000 there should be quite a few in use in the community. But can it be put to use for ATV purposes?

In the rest of this article I will call on my experience in the field of Digital Compressed Television for Video conferences, to explain something of the techniques Television Telephones use to compress a live wideband video signal down so that it can be connected to Telcom's ISDN. This is equivalent to a

compression bandwidth from some 900 telephone conversations to one or two telephone conversations!

This description is of a notional system: the exact details are still being kept under wraps until officially released.

Firstly, it must be understood that I am talking about live colour TV here, not slow-scan or monochrome television. However, certain compromises in picture quality have been made in line with the anticipation that the picture, when displayed, will usually be quite small and that gross movements of the subjects are not expected.

As an initial step, a major reduction in the required bandwidth is made by halving the spatial and temporal resolution, i.e: by transmitting

• half the number of scanning lines

• half the detail in each line

• half the number of pictures per second

which leads to an eight times reduction in bandwidth. (Down to the equivalent of 125 phone conversations!).

Corrections at the receiving end are of course applied to compensate. These double the number of scanning lines and pictures per second back to the original, but the small size of the receiving screen reduces the need for as much detail.

The transmitting end contains a frame store, which compares each new frame coming from the camera with the previous one; only those parts of the picture which contain actual changes are then transmitted. This again reduced the bandwidth by reducing the amount of information which need transmission.

So as to analyse the screen for movement, the picture is subdivided into some 256 little squares, each being about 16 pixels by 16 lines. If any movement is detected in any square, the whole square is transmitted; conversely, if no movement is

detected, then the receiver simply repeats the information contained within the square, indefinitely.

The information about each pixel is described in terms of the difference between its new value and its previous value. This information is encoded in a digital form in such a manner that the most statistically likely changes are transmitted using the shortest digital 'words'. This further reduces the bandwidth requirements.

If gross picture changes are detected at the transmitter, the system momentarily drops to a lower resolution mode. For instance, if you move out of camera shot and someone else takes your place, the effect is of a 'rough sketch' transmitted forthwith, with the details filled in almost immediately.

In case of interruption of the signal the image on the receiver 'freezes' until the signal is restore. At the start of transmission (and when recovering from transmission path errors which may scramble the picture) a fresh picture is established by slow-scan over several seconds. This uses special information which is continuously being sent as a background task for just such a purpose.

One of the features of the system as described is that it is one-way; that is, it does not require a continuous 'hand-shaking' between transmitter and receiver (in the manner of Packet radio) therefore, the information cane be broadcast (more than one receiver) or recorded for future playback. Any digital sound is incorporated in the signal as well.

How might the compressed television signal be transmitted? In its native form it is a digital signal which would lend itself well (with suitable processing) for transmission and reception over long paths on Amateur Radio. However, it would still be several hundred kiloHertz in bandwidth in that form and careful filtering techniques would be required to avoid interference with other users.

An alternative might be to convert the digital signal back to an analogue from by means of a Digital-to-Analogue Converter. In this form its bandwidth would be no more than 10kHz and so could be FM modulated and even transmitted on 144MHz. Imagine, live colour ATV on 2M!

So there you have it! I hope that this article proves to be as prophetic as the one I wrote back in the early 1970s.

USING THE 48K SPECTRUM AS AN I²C KEYBOARD

Trevor Brown G8CJS

No one wants more than one keyboard in the shack, so if an existing computer can be used instead of a second keyboard for the I²C system, then the savings are two fold in both cost and space. The advantages of this system run even further is that keystrokes can be saved within a

basic programme stored on the Keyboard, or host computer. This is useful if you want to store teletype captions, or are a programmer. The 48K Spectrum can be used in such a way and probably the 128K, +2 and +3 Spectrum models, only they were not available to test the system on.

The Spectrum computer, unfortunately, does not have a user port which would

make life so much simpler, so one had to be constructed. The system chosen was based on the Z80 PIO and interfaces to the edge connector on the rear of the Spectrum. The PIO operates in mode zero where a pulse that can be used for keyboard strobe is generated at BRDY. The pulse does need inverting and that is the function of TR1.

The programme to control the system is written in Sinclair Basic and is shown below. It can easily be changed to implement different control keys, should you not like the ones I have chosen, which are shown opposite.

The hardware should be implemented as per Fig.1 and the Spectrum powered up and the above basic entered and run. The spectrum Keyboard will then control the I²C computer in the normal way.

Control Key	I²C Function Code	Spectrum Code	Spectrum Code
01	Cursor Home	07	Edit
04	Cursor On	203	Then
05	Cursor Off	204	To
08	Cursor Left	08	Cursor Left
09	Cursor Right	09	Cursor Right
10	Cursor Up	10	Cursor Up
11	Cursor Down	11	Cursor Down
12	CLS+Cursor Home	12	Delete
13	Enter	13	Enter


```
1 REM I²C KEYBOARD
2 OUT 127,15
10 PAUSE 0
25 LET a$=INKEY$
30 LET b=CODE a$
35 IF b=7 THEN LET b=01:OUT 63,b:GO TO 10
40 IF b=203 THEN LET b=04:OUT 63,b:GO TO 10
45 IF b=204 THEN LET b=05:OUT 63,b:GO TO 10
50 IF b<8 THEN GO TO 10
55 IF b>13 THEN GO TO 65
60 OUT 63,b 65 IF b<32 THEN GO TO 10
70 IF b>127 THEN GO TO 10 75 OUT 63,b 80 GO TO 10
```

B2 to B9 are connections on the CPU CARD
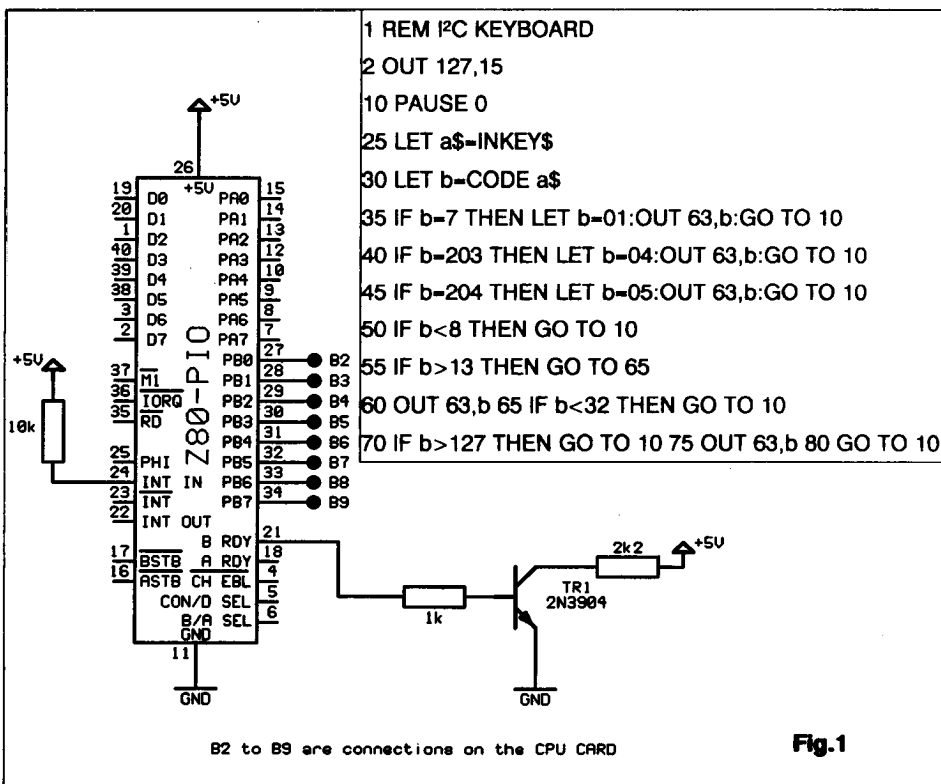
Fig.1

MORE ON PHASING AERIALS

Glen Ross G8MWR

This article is written in answer to the one by Ron Neyens N0CIH on page 25 of CQ-TV 156. Most of the advice he gives is sound, but he is, unfortunately, very wrong in one respect. He advises that you should use odd multiples of quarter-wave coax, so that you see 50 ohms at the connection points.

As most people will remember from the RAE class, the impedance presented on a length of coax repeats at the HALF-wave points, not the quarters. The quarter-wavelength lines actually act as impedance transformers. Due to this fact the impedance seen at the end of the lines specified by Ron will ONLY be correct when the aerial feed point is exactly 50 ohms.

Fine, you say, my aerials are all 50 ohm units. This, in fact, is rarely the case. Most manufacturers specify the aerial impedance as giving an SWR of not more that 1.5:1. Check your J-Beam catalogue! This means that the actual impedance seen by the feeder where it connects to the aerial can be anything from 75 ohms down to 33 ohms.

Let us now assume that both aerial;s to be fed are at the low end of their specification. (this is a reasonable assumption as the mutual coupling due to stacking aerials, other than at very wide spacings, tends to lower the impedance at the feed point, even beyond the maker's quoted specification figures).

If Ron's idea is correct and the impedances repeat at ODD quarter-waves, then two 33 ohm impedances in parallel gives a combined impedance of around 16 ohms at the point where he connects the single feed cable.

This is a feed point SWR of 3.2:1, and I am sure that you would not be happy with that!

What you have actually ended up with is 'worst case' matching, not 'best case'. As the impedances do not repeat at these points you could, in fact, end up with an even worse SWR than the above calculations show.

A BETTER WAY

The main point to bear in mind is that, unless the maker has incorporated a variable matching device in the aerial design, you are stuck with the aerial feed impedance 'as seen'. You cannot end up with a better result than this unless you build an aerial matching unit.

Now mount the two aerials onto the mast at the appropriate stacking distance. This is done so that impedance changes due to mutual coupling can be included in the setting up procedure.

If there is a matching section provided then this can now be adjusted. To do this, set up the stub mast so that the aerial fires up into clear sky. This is essential as otherwise power reflected back into the aerial from nearby walls, etc., will give incorrect settings. Now connect your SWR bridge AT THE AERIAL FEED POINT of one of the aerials and set the matching section to give as near as an SWR of 1:1 as you can get. repeat this for the other aerial.

THE CRAFTY BIT!

To make sure that the two aerials are fed in phase, and that the feed point is brought to 50 ohms, the next step is to connect the aerials to a common feed point using 75 ohm domestic TV feeder (DO NOT USE ordinary 50 ohm feeder at this point). This cable must be cut to odd multiples of

quarter-wavelengths at the operating frequency, and the two lengths must be equal.

After allowing for velocity factor this means that on 70CM using cheap solid-dielectric cable, the unit length is 4.45 inches. If you are using foam or semi-air spaced cable, then the unit length is 5.15 inches.

To work out the unit length for other frequencies use:

length = 2950/(MHz)*vf

where:

'vf' is the velocity factor of the cable; for cheap cable this may be taken as 0.66, and for the pricey stuff use 0.84.

You must make sure that both aerials are connected to the cables in the same phase. Looking from the rear of the aerials, if the right-hand side of the aerial is connected to the inner of the coax, then the right-hand side of the other aerial must also be connected to the inner of the coax, and vice versa.

TRANSFORMING

We saw earlier that odd quarter-waves of coax could be used a matching sections. The required matching-line impedance is worked out using:

Zm = square root(Za * Zf)

where:

'Zm' is the matching-line impedance

'Za' is the aerial impedance

'Zf' is the feed-line impedance.

Substituting our values in the above formula we find that the open ends of our two feed sections show an impedance of 100 ohms. Connecting these in parallel, inner to inner and outer to outer, will give us the usual 50 ohm impedance to connect to the feeder that runs to the shack.

STACKING DISTANCES

The optimum stacking distance between the two aerials depends on several factors. These include the actual gain of the individual aerials and whether you want maximum gain or minimum side lobes. Usually we go for maximum gain.

A good rule-of-thumb is that the two aerials should be stacked a minimum of half the boom length apart. As the gain of the aerial determines to a large extent the length of the boom, this is not such a rough-and-ready method as it may at first appear.

If you want more accurate figures please send me an SAE (QTHR) and include details of your aerial gain and your operating frequency. I will calculate the spacings for you.

THE ATV COMPENDIUM
96 PAGES OF VIDEO, 24CM AND 3CM PROJECTS
ONLY £3.50

CIRCUIT NOTEBOOK No.45

John Lawrence GW3JGA

Some 'mature' members will recall that Circuit Notebook was a regular feature in CQ-TV for some years up to CQ-TV 137, after which yours truly put ATV on the back burner for a while.

A resurgence of interest, plus North Wales activity (GW3MEO, GW8PBX and GW4KAZ), has precipitated a rebuilding programme for 24CM and with it the return of Circuit Notebook.

AN 'S' METER FOR THE WOOD & DOUGLAS VIDIF BOARD

With my revived activity concentrated on 24CM, some means of monitoring received signals strength became essential.

The W&D VIDIF (Video IF and Demodulator board) in my ATV receiver has an automatic gain control pin available on the board. This comes from the AGC output, pin-4, of the TDA3540 chip. Unfortunately this signal has a sudden death characteristic – minimum to maximum for an input signal of only a few dB.

However, a more convenient (but unofficial) signal is available at pin-3 of the TDA 3540, this is the 'tuner AGC takeover' pin. This point is connected to a potential divider network R7, R8 and R9 in the VIDIF circuit, as shown in the diagram.

By using a simple op-amp circuit to amplify the signal at pin-3 and a biasing network to offset the standing voltage present, the output signal can be used to drive a moving coil 'S' meter. The op-amp used is a FET input CA3140, but a 741 is pin-compatible and would probably work just as well.
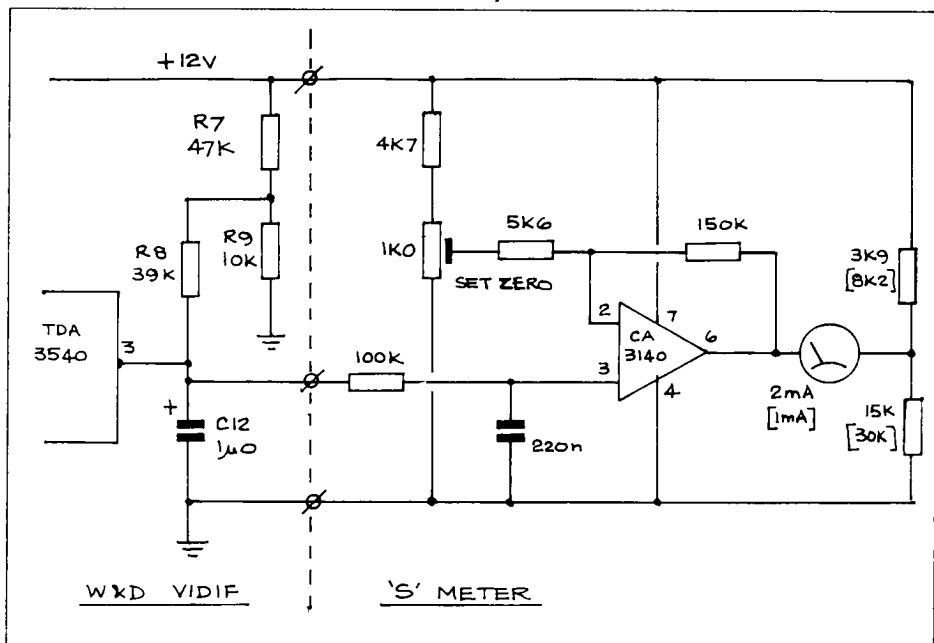
The response is not ideal, but does give a logarithmic (dB) indication over a range of about 35dB, as shown in the graph. The component values in the circuit were chosen to suit a 2mA meter, which happened to be available. For a 1mA meter the values of the 3k9 and 15k resistors in the meter circuit should be increased to 8k2 and 30k respectively. The circuit was built on a small piece of Veroboard and attached to the back of the meter.
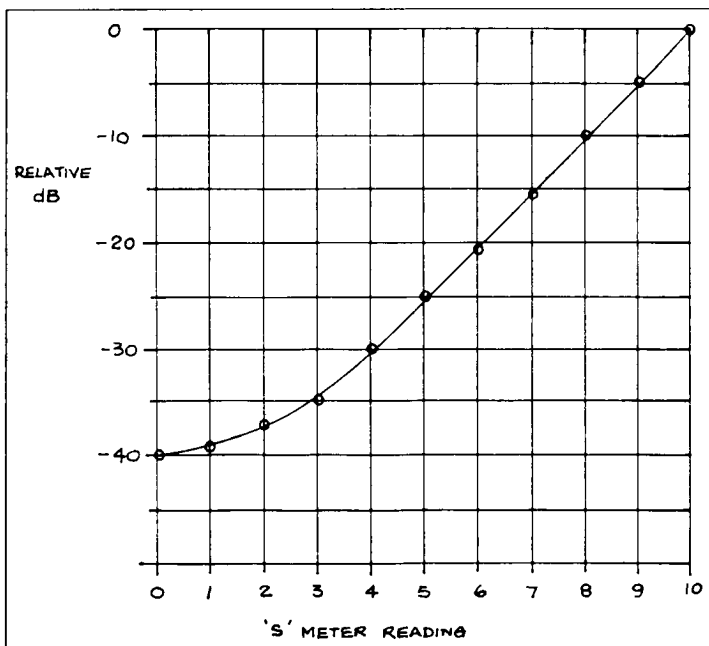
The 'S' meter has proved most useful when evaluating various aerials for gain and directivity.

RELATIVE dB

0   -10   -20   -30   -40

0 1 2 3 4 5 6 7 8 9 10

'S' METER READING

REFERENCES

1) Wood & Douglas VIDIF Circuit Diagram.

2) Data Sheet Mullard/Philips TDA3540.

NEW BATC CONTEST RULES

PREAMBLE

May I introduce myself, my name is Richard Guttridge G4YTV. I have taken over the reigns of BATC Contest Manager from Bob Platts G8OZP, who has had to give up the post because of an extra work load. Thanks Bob for all your hard work keeping the contest scene going.

The idea behind the BATC Contest FSTV rules revision is to attract more entries, whether they are BATC members or not. The established contest groups and fixed station operators will have something new

to fight for. Two trophies for the portable and fixed station winners will be bought, more on this later.

These new rules are not chipped in stone, but they will stand for all contests in 1992 EXCEPT THE INTERNATIONAL. All comments will be most welcome and will be considered after the Autumn Vision Contest. This contest rules revision has been circulated to all the BATC committee members for their comments. A few changes have been made from the feed-back. Hopefully you will not need the services of a lawyer to keep you on the

straight and narrow. Slow Scan Contest Rules stand as is until I get some comments from you.

☞1) **Eligibility** ... Contests are open to all licenced radio amateurs who are equipped to transmit and/or receive pictures by Fast Scan . Non transmitting amateurs and SWL's can also take part with their own section.

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

☞3) **Location** ... Operation must be within the terms of the licence, from either the main station as listed in the current RSGB Call-Book or Portable.

☞4) **Frequencies** ... Within the allocated segments of the 70cm, 24cm, 13CM, 3CM and 1.5CM bands. Operation via repeaters does not constitute a valid contest contact.

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

☞6) **Exchange** ... Call sign and a four-figure code number must be conveyed via video. Confirmation of reception by transmitting back the sum of the code numbers on the talk-back channel.

PLEASE NOTE: all four digits in the contest number should be different and not consecutive. The numbers must be different for each band and each contest. (Any difficulty in this please contact me).

☞7) **Score** ... 1 point per kilometre one way. Multiply by 2 for a 2 way.

PLEASE NOTE: your computer program should give 6371.290982km as the earth's radius and 111.2036km for each degree change in latitude before rounding off.

☞8) **Logs** ... Separate log sheets should be submitted for each band worked. Each sheet should indicate: Band, Date, Time in GMT., Station worked, Report and Serial Numbers exchanged (each contest log for each band should begin at serial number 001). The code number sent by the distant station should also be recorded on the log

(but NOT DICTATED on the talk-back channel only the SUM of the figures in it) and the distant station's Maidenhead locator.

The operator must sign the log. A contest cover sheet should be submitted indicating the following:

Contest title, Call sign used, Location (QTH), Locator (Maidenhead only please), Operator's names and callsigns, Points claimed for each band and total for all bands, numb er of contacts on each band, best DX on each band and the Code number used on each band.

I would also like the following information:

Aerials – type/gain and height AGL, Transmitter and PA used including output device, Receiver and preamps used, Power at the aerial and estimated ERP, Name & Address and phone number for contact. (This information is to give me something to waffle about when you win).

Cover sheet **MUST** be signed. Logs and cover sheets must be received by the contest manager no later than the third Monday after the contest.

LOG ERRORS:- YOU WILL LOSE POINTS if there any **UNMARKED** Dupes, incorrect call signs, incorrect code numbers, incorrect locators, incorrect reports and serial numbers.

☞9) **Awards** ... A certificate will be issued to the winner and runners up (those placed 1st. 2nd. and 3rd.) in each band. A new award will be made on an annual basis. It will be called **THE BATC CONTEST CHAMPIONSHIP**. There will be portable and fixed station sections. Any entry received for a **BATC** and/or the **INTERNATIONAL** contests will automatically enter the Championship.

Scoring for the **BATC** Championship *ONLY* will be as follows for 1992. 70CM points stand as is, 24CM points will be multiplied by 2, all bands above 24CM points will be multiplied by 3. The total of all bands is then added together. This will give a

contest winner and his/her score will be adjusted to 1000 points and all other stations scores will be pro-rata.

This will be carried forward for all the BATC contests in the year including the International, which will be run under it's own IARU rules. Annual Trophies will be presented at the BATC Convention to the leading Portable and Fixed stations. This award will be held for eleven months and must be returned to the contest manager on request. It can not be won outright.

☞10) **Disputes** ... The decision of the Contest Manager and/or The BATC Committee is final.

☞11) **Receive Only Section** ... Send log sheet giving Callsign/BRS No./Name, Band, Date,Time in GMT, Callsign of station seen, Report on signals seen, Code number seen, Maidenhead locator of receiving and DX station if possible. The contest manager will work out your Maidenhead locator if you send him your Ordnance Survey six figure National Grid Reference and the letters for the 100000 metre square in which you live. (U.K. only) The locator of the DX station will if necessary and if possible be abstracted from other logs received. Scoring one point per kilometre.

☞12) **Spirit of The Contest** ... Do *NOT* leave your transmission on 70CM any

longer than necessary, you will be spoiling the chances of other stations – If you are a portable station giving a few points away don't just work your mates in your club, it's fair to let other stations work you! Move off the ATV Calling frequency 144.750 MHz as soon as possible. What about using SSB? A lot of contacts are lost under FM. Let low power stations have a go. Made a few contacts? What a bout sending the log in as a check log? Or even better as an entry! Above all have FUN, it's only a hobby.

☞13) **Access to Logs** ... A new facility. Copies of any log entered for the contest will be available to competitors for the fee of £1.00 for the first band, plus £0.50 for each extra band, payable to BATC

☞14) **Declaration of Interest** ... As some of you will know, Clive G8EQZ and I take part in BATC Contests. So that we are whiter than white our logs will be counter-checked by another committee member.

☞15) **Contact Address** ... For entry forms, log sheets and cover sheets, also any brickbats, bouquets and any other flying missile along with, I hope, the odd useful comment, direct towards:– **RICHARD GUTTRIDGE G4YTV, IVY HOUSE, RISE ROAD, SKIRLAUGH, HULL, NORTH HUMBERSIDE, HU11 5BH, ENGLAND. Tel: 0964 562498.**

Understanding the Technology
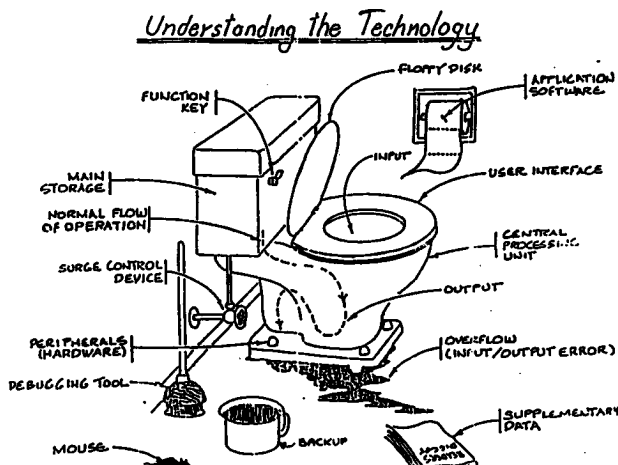
BROADCAST BAND
DX-TV RECEPTION

Garry Smith and Keith Hamer

Long distance reception was remarkably active throughout October and November, no doubt making up for the disastrous summer conditions we all experienced. Sporadic-E activity brought in signals from most of Europe during the period, with sustained openings on many dates. October 1st and November 5th were two excellent days.

It was F2 activity which caused much of the excitement. October 16th was a truly eventful day for reception, with many enthusiasts witnessing the opening – the day being a Saturday. Several lucky DXers located Australian signals on channel-A0, which were visible for well over an hour. At one stage, New Zealand's channel-NZ1 became visible with weak video emerging from the patterning around 45MHz.

By 0950UTC the A0 and NZ1 signals had disappeared; strong E2 video was now present. Just before 1000 a large '3' caption appeared, indicating that Thailand was coming through! A Sporadic-E opening then commenced, swamping the

F2 reception on channels-E2 and R1. During the afternoon F2 activity occurred again with extremely strong Arabic signals on channel-E2.

Iran has been a good performer this season, with lengthy reception of the FuBK test card, usually from 1230UTC onwards, according to reports. October 26th was particularly good and at times the letters 'IRIB' could easily be made out. Peter Chalkley has identified Iranian signals on two offset frequencies so it seems likely there are at least two E2 transmitters operating.

Countries identified during the period include New Zealand, Australia, China, Thailand, Malaysia, USSR, Dubai, Iran and Zimbabwe. There are no reports of Iraq, Kenya, Equatorial Guinea or Ghana yet!

The following logs are edited highlights of those which appear in TeleRadio News (issues 55 and 56). Many thanks to the following enthusiasts who have supplied reception reports: Simon Hamer, Stephen Michie, Bob Brooks, Peter Chalkley, Garry Smith, Kevin Bolger and David Glenday.

SEPTEMBER LOG

02.09.91: Sporadic-E activity between 1130 and 2030UTC with signals from Italy, Germany, Spain, France, Austria, Poland, the USSR, Switzerland and Hungary. High M.U.F.'s. at times, e.g: the USSR R3 and Albania IC (82.25MHz).

04.09.91: More Sporadic-E reception with signals from Spain, France, Italy and Portugal. The latter pictures carried the identification 'C1' in the top left.

13.09.91: Good Sporadic-E opening to Norway with test cards from Steigen, Melhus, Gamlem, Bagn and Hemnes noted on channels-E2 and E3. the USSR and Sweden also identified.

17.09.91: Tropospheric lift with reception from Eire, France and Benelux (VHF and UHF). In addition, Norway, Denmark and Sweden were identified in Band III.

OCTOBER LOG

01.10.91: Excellent Sporadic-E reception throughout the UK from 0725 until early evening with signals from many direction. Countries identified included the USSR, Norway, Czechoslovakia, Belgium, Switzerland, Italy, France, Spain, Sweden, Denmark, Finland and Iceland.

12.10.91: One of the first F2 openings with Dubai identified on channel-E2 at 1100 from their sample pages of teletext.

13.10.91: F2 signals noted from farther afield – this time Thailand at 0935. Weak unidentified signals were present from the south at 1410.

16.10.91: F2 reception from Zimbabwe noted at 1035.

18.10.91: An excellent F2 opening with first reports of Australia, New Zealand, Thailand and Malaysia. Dubai and Iran were also identified. A mystery signal in the form of a 525-line picture was resolved on channel-R1 at 0900. Some country is using a non-standard system; we suspect that it is Korea.

19.10.91: An eye-opener of a day with strong F2 signals until mid-afternoon witnessed by several enthusiasts. The collective log is as follows:

0814	A0 Star Television (Australia), film with subtitles via F2
0828	E2 Malaysia via F2
0830	E2 Unid F2 pictures with zero offset
0834	A0 Star Television (Australia) with F2 until approximately 1000
	R1 the USSR with UEIT test pattern via F2
0900	R1 very strong smeary pictures (USSR/China)
0905	E2 Unid pictures – 10kHz offset
0935	NZ1 New Zealand – weak video. Carrier audible until 1000
1000	E2 Thailand '3' logo and programmes
	R1 USSR programmes via SpE!
1230	E2 TVE-1 programmes via SpE
1345	E2 Iran(?) EBU bar via F2
1350	E2 Unid Arabic programme with lots of text – strong signal
1455	E2 TVE-1 cartoon via SpE
1510	IA RAI UNO – signals better from south-west!
1520	E3 TVE-1 programmes via SpE

21.10.91: Australia noted again but at a lower strength, accompanied by Thailand or Malaysia on channel-E2. Sporadic-E from Norway and Italy also reported.

24.10.91: A tropospheric lift lift produced watchable pictures in Band III and at UHF from Norway, Sweden, Denmark and various parts of Germany.

25.10.91: A tropospheric highlight for one enthusiast – Finnish signals from YLE-1 and 2 on channels-E7 and E9.

NOVEMBER LOG

05.11.91: Sporadic-E reception throughout the day produced Romania, Italy, Spain, France and Yugoslavia during the morning. At 2145 the German news programme 'Tagesschau' was received on channels-E2, E3 and E4.

08.11.91: Intense auroral activity produced lots of reception throughout Band I. At one stage USA/Canadian 525-line signals were discovered on channels-A2 and A3.

13.11.91: F2 signals from Australia, New Zealand, Malaysia, Thailand, China, Iran, Dubai and the USSR. The mystery 525-line transmission was seen again.

14.11.91: reception similar to the 13th.

15.11.91: Iranian signals received via F2 at 1335.

21.11.91: Another tropospheric goody – Spanish signals on E9.

EURO NEWS

OIRT TO GO: L'Organisation Internationale de Radiodiffusion et Television is to be disbanded by 1993. Its European members are to join the European Broadcasting Union (EBU), thus forming a single European broadcast union. The OIRT was originally formed in 1946 by Eastern Bloc countries to swap radio programmes and technical know-how. It was expanded in 1959 to include TV.

SWEDEN: The country's first terrestrial commercial TV channel has been given the go-ahead by the ruling Social Democratic Party. The channel will be in direct competition with the two existing state-owned channels, which have undergone radical changes since the introduction of satellite TV three years ago.

NORWAY: CNN, The Discovery Channel and Super Channel could all be banned from cable networks in Norway unless advertisements for alcohol are stopped. One suggested solution is to encourage the cable operators to substitute the offending adverts with something more acceptable.

NETHERLANDS: Encrypted test transmissions have been noted via the Goes Ned-1 transmitter on channel-E29.

CZECHOSLOVAKIA: Following the launch of a pirate TV station serving southern Prague, private TV in Czechoslovakia looks like being a certainty. It is still unclear how many frequencies will eventually become available for new services. Those formerly employed by the army are 'now technically available' and large cities, such as Prague and Bratislava, could, in theory, be allocated up to fifteen channels.

The future of the state-owned third network OK3 is also uncertain. Launched in 1990 and used exclusively to relay foreign satellite material it may be privatised.

ROMANIA: The number of German and Hungarian language transmissions have been reduced and confined to the second network. Unfortunately, TVR-2 can only be seen within a 160km radius of Bucharest and this has upset Hungarian-speaking viewers in Transylvania, because it cannot be received there.

HUNGARY: The MTV-2 channel-R32 transmitter at Pecs is airing the local TV programme 'VTV' (Varosi Televizio) between 1400 and 1500UTC on weekdays. The test pattern consists of colour bars without identification. NAP-TV, the Breakfast TV programme, has been transferred from MTV-1 to MTV-2.
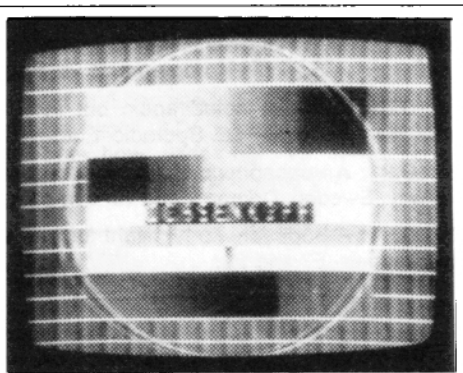
Sporadic-E reception from the Bayerisher Rundfunk region of Germany. The transmitter is located at Ochenkopf and the channel used is E4.
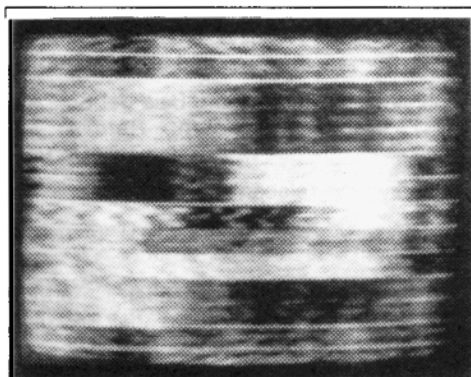
The Iranian FuBK test card received via F2 propogation in early 1991. The image is relatively clear considering the propogation mode.

CROATIA: By mid-October at least six out of the seventeen transmitters were put out of action by the Federal army, including one at Sljeme just outside the city of Zagreb. Fortunately, reserve transmitters were put into service, albeit on different channels. All HTV networks are carrying a common programme, with relays of Eutelsat F5 from 1800 to 0000 local time. The mystery E3 signal seen from the west was eventually traced to a military transmitter near Karlovac. The transmitter is no longer operational.

MALTA: The new Malta Broadcasting Act will allow up to ten new VHF radio channels and a new TV cable system.

GIBRALTER: The GBC are now relaying BBC World TV programmes, but not locally produced ones. Broadcasts are encrypted, but the shortage of decoders is a problem at the moment!

GERMANY: There is a report that CT-1 programmes are aired from the Berlin outlet on channel-22. This implies that the old SFB-1 outlet no longer transmits German TV programmes!

FINLAND: Since early October the YLE-TV1 service is now on air twenty four hours a day, in order to provide a continuous

Teletext information service. Over 700 pages of YLE Teksti-TV will be available. The FuBK test card will be shown outside normal programme hours.

The following YLE TV3 stations are now showing their own local FuBK test patterns: Tampere, Lahti, Turku, Jyvaskyla and Lapua. The identification is 'YLE' followed by the transmitter name.

TV-3 Pyhavuori commenced transmissions on channel-E12 on 01.08.91 with 20kW ERP. It is the first transmitter in Finland to make use of this channel. The station shows the test card of Lapua.

Since the end of 1991 NICAM stereo has been available from the following transmitters: Ahtari, Haapavesi, Oulu and Tervola.

EIRE: Plans for a third network could be scrapped due to the present economic recession. Meanwhile, RTE-1 has had its logo redesigned. The new animated logo is designed to reflect the conservative, classical air of the station.

LUXEMBOURG: The government is to remove the monopoly that CLT has enjoyed over the years and the result is that four regional, forty local and a new TV network will be established.
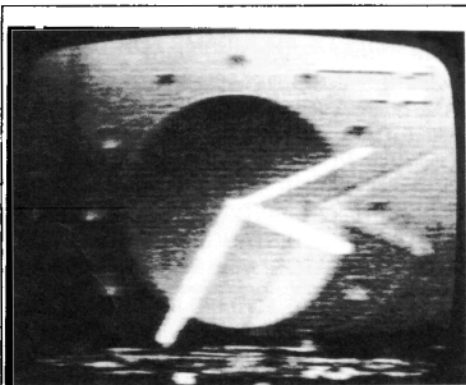
The Icelandic clock complete with arctic ghosts. Received via Sporadic-E during the summer of 1991 on channel-E4.

POLAND: The mast that collapsed during renovation work, and was thought to be the Lodz mast, turned out to be the long-wave transmitting mast.

ICELAND: The RUV Teletext service (Textavarp) is now on air. As expected, there are problems with the Icelandic alphabet – some decoders need modification to display the correct characters. Philips are to produce a decoder which will cater for the Icelandic characters. The Icelandic Language Board has already complained to RUV because viewers see incorrect characters on their screens and this could encourage them to adopt the new spellings!

ITALY: A selection of private TV stations currently known to be operating in Band I and II are as follows:

Channel-E2: Antenna Blu TV, Tele Alta Italia 90, Tele Ercolano and tele Ficaea

Channel-IA: Audiovision, Baia del Sole TV, D.J. Radio Television, Rete-4 TV, Telesettelaghi S.R.1., TVA and Tele Uno.

Channel-IB: Telebari and Telelibera

Channel-C: Rete 7 Piemont (Torino) and Telelibera

The inclusion of a channel-IC private transmitter in Torino implies that RAI UNO no longer use this channel.

Euro News information kindly supplied by: Gosta van der Linden and the BDXC, Netherlands; Sandor Rottenbacher, Hungary; Garry Smith, UK; Roger Bunney, UK; Dalibor Frkovic, Croatia; Simon Hamer, UK; Pertii Salonen, Finland.

SATELLITE TV NEWS

Trevor Brown G8CJS

MAC DIRECTIVE

Changes to the MAC draft announced by Filippo Maria Pandolfi include: withdrawl of the mandatory inclusion of D2-Mac receivers in all new sets; giving the directive a six year rather than a ten year life; and giving an acceptance that if research into digital television progresses the Commission would review the terms of the directive. All new services would have to broadcast in D2-MAC, but could continue to to broadcast in there existing standard, be it PAL or SECAM. Existing satellite services would not have to simulcast until 1996.

CANAL PLUS OPTS FOR SECAM

Without consultation with France Telecom, Canal Plus has opted for SECAM 4:3 transmissions for its "bouquet" of channels on Telecom II. This must be a major undermining of French public policy towards the MAC issue.

PORN CHANNEL

Britain's first soft porn subscription channel "After 12" has been granted a licence by the ITC. Its backers say that the estimated 500,000 pirate decoders in the UK for the scrambled Astra channel "Film NET", which transmits hardcore porn on two nights a week, prove the market. It wont be all Porn but a mix of adult comedy, and sports, but there are plans for a version of Tutti Frutti, the German strip quiz show. It will launch on a Eutelsat II, transponder on 20 December.

COMEDY CHANNEL

Comedy Channel finally settled on Astra 1B transponder 26 and commenced transmission on October 1st. Many of the SMATV distributors are unhappy about the transponder choice as reception of this transponder involves LNB changes at large number of installations.

FILMNET SOLD

Esselte has finally managed to sell Filmnet to a consortium led by a Swiss holding company, Comparable Financiere Richemont. The purchase price was $140 million.

SPECTRE

No, nothing to do with James Bond, but an acronym for Special Purpose Extra Channels for Terrestrial Radio-communications Enhancements. A TV system being worked on by National Transcommunications, the newly privatised transmission arm of the old IBA. The system is aimed at UHF terrestrial broadcasting rather than satellite broadcasting. The system involves use of the "taboo" channels, these are channels that are unused at a given location because of potential interference problems. Spectre will use power levels well below conventional analogue transmitter levels, up to a thousandth less. It is not clear at this point if Spectre is to provide HDTV or extra channel capacity. National Transcommunications are saying it could be used to double the number of terrestrial TV channels.

EUROCRYPT

National Transcommunications and France Telecomm have signed a memorandum of understanding for the development and promotion of Eurocrypt. The agreement also includes exchange of technical information in other MAC related areas.

ROUND THE SATELLITES

ASTRA 1a and 1b (19.2 degrees east)

Eurosport has now left transponder 22(11.53800 GHz V) and is now on

transponder 4 (11.25850 GHz V), with French language commercials being noted on a 7.56 GHz sub-carrier. Eclipse FM went off the air on Nov 1st, previous to this, the station was transmitting on a 7.56MHz subcarrier on transponder 20 (11.50850 GHz V). SWF3 (Sudwestfunk), the German radio service is now broadcasting in stereo on transponder 2 (11.42900 GHz V) using subcarriers of 7.74 MHz and 7.92 MHz. Transponder 23 (11.55275 GHz H) was noted active with a clear PAL test caption from Aagesta Earth Station on Friday 29th Nov.

EUTELSAT II F1 (13 deg EAST)

Clear PAL testcards are currently being broadcast by British Telecom on transponders 33 (11.596 GHz H) and 38 (11.617 GHz V). Transponder 47 (12.625 GHz V) is currently carrying the French Language, health channel "Canal Sante" in clear SECAM with audio at 5.80 MHz. Transponder 46 (12.584 GHz V) was carrying a live clear feed of the Paris Tennis open on Sunday Nov 3rd with English commentary on 5.80 MHz.

EUTELSAT II F2 (10 deg EAST)

Middle East Broadcasting Centre was using the upper half of transponder 27 (11.158 GHz V) each evening during the Middle East Peace Conference for coverage of the

conference in Madrid. The feed was in clear PAL with Arabic sound at 6.6MHz.

EUTELSAT I F4 (7deg EAST)

The Spanish television network Antena Tres is on the lower half of transponder 1 (10.974 GHz) and Cannal+(Espana) is on the lower half of transponder 11 (10.974 GHz). Both are scrambled, but Antena Tres carries three clear mono radio services at 7.02 MHz 7.20 MHz and 7.38 MHz.

TELECOM 1A (8 deg west)

Antenne 2 was broadcasting its coverage of the Paris Tennis Open in HD2 MAC. Antenne 2 broadcasts on DBS channel 17 (12.03436 RHCP).

OLYMPUS 1 (18.8 deg WEST)

RAISET continues as the only regular service on this satellite, but CBC (Canadian Broadcasting Corporation) has been seen broadcasting on on 12.529 GHz V in clear NTSC.

By the time you read this Telecom II should have been launched on the night of 16th\17th of December atop Ariane V48 which will also be carrying Inmarsat II F3.

Satellite TV News is looking for an Editor, if you can help then please contact Trevor Brown (see committee address page).

HOW TO USE THE BATC BBS

Chris Smith G1FEF

The BBS has been up and running for four months now, the response has been quite good, there are now around sixty regular callers. We are still a bit short on ATV software, so if anyone has any public domain or shareware software for ATV please log on and upload it. Or to save on phone bills, send me a disc with the software on. (If you ask me nicely, I'll even

send it back with different software on!)

I'm sure there are more of you out there with modems, but perhaps you are not sure what to do to gain access.

With that in mind, read on...

First of all, the speed at which your modem communicates is important. The BBS will accept incoming calls from modems at 300/300, 1200/1200 and 2400/2400 Baud.

(It does NOT support 1200/75 – Prestel mode). Or in another language V21, V22 and V22bis. If your modem supports one or more of these speeds, then you are on your way.

Secondly, you need a computer/terminal to plug your modem into. This should support 80 column text for best results. The BBS can send ANSI codes to display graphics and colours, if your terminal has this feature, even better – If not, don't worry, you will just have to run in monochrome mode.

The most popular terminal is a 'PC' computer running some terminal emulator software. If you have a PC (XT/AT/386/etc.) but don't have such a software package – see note 1 at the end of this article.

Now you have a modem plugged into the phone line and a terminal of some sort hooked into the modem, simply call up the BBS. If all is well you will see a short message inviting you to enter your **FIRST** and **LAST** name. *(Please,* only **ONE** first name and **ONE** last name!) Assuming you haven't called before, you will be asked a few questions, if you're not sure about any of them it's probably best to answer NO to turn that particular option OFF. (You can always enable it again later on). You will also be asked to enter a password, please write it down somewhere safe – You will need it the next time you log on.

After you have got through the questions, you will be shown a short list of your current status (e.g: Connect speed, etc.) Press ENTER and the system will ask you if you wish to check for mail. On your first call answer NO. Once you start using the system, this will allow you to quickly check if anyone has left you a message (You also get the option to read any waiting mail – There and then).

The next bit is called the **NEWS BOARD** – This is usually 3 or 4 pages of information about the BBS. (For those Power Users out there, if you press 'S' while the text is appearing on your screen, it will abort and go straight to the main menu).

Once you've read the news, you will be shown the main menu. The BBS is set up like a building. You go in the front door where Harry asks you your name and password. Next you are in the LOBBY or reception area. Here you will meet Sharon the receptionist and she will ask you to select one of several options...

You have another chance to check your mailbox for new mail here, as well as being able to check for new files since your last call (or from a specific date). You can also 'Alter your system settings' – this allows you to turn on all those features you weren't sure about when you first logged on! You can also leave the TV club from here as well, although you won't want to until you've explored a bit!

The most important bit in the **LOBBY** is the registration form, if you choose NOT to fill it in, you won't be able to do very much, except wander around and have a look. Once you've filled it in, the system automatically increases your security and allows you to download files send and receive messages, etc. Once you've filled it in – it will disappear from the menu – so if you made a mistake, you will have to go to the **LOUNGE** to alter it...

This is where the **LIFT** comes in. Enter the lift from the lobby and you'll meet the Lift boy, who politely asks which floor you would like. The system 'knows' your security level and so some of the 'Floors' are out of bounds, so if you ask to go to the Penthouse – nothing will happen (That's where I live!). Access to the BATC floor is restricted until I have confirmed your membership number (around 24 hours later).

The different 'floors' all give you access to different parts of the BBS

The **BASEMENT** is where all the on-line games are.

The **GROUND** floor takes you back to the **LOBBY**.

The **LOUNGE** is for general info (also where you can alter your registration form).

The **COMMON ROOM** is where you can read/send LOCAL messages (i.e: Messages for other people on this BBS only).

The **POST OFFICE** is where you go to send/receive messages to people on other BBS's these messages are called NETMAIL. This BBS is linked to thousands of other BBS all over the world via amateur e-mail networks called FIDONET and FREENET – You may communicate privately with other people here, provided you know their 'address'. (See note 2 at the end of this article).

The **CONFERENCE** room is where you go to participate in what's called ECHOMAIL conferences – This is where people discuss a particular topic openly. It is not restricted to this BBS and is linked to the worldwide e-mail networks. (Unlike NETMAIL messages, these areas are PUBLIC and can be read by anyone else).

The **LIBRARY** is where all the files are kept. This room allows you to download software from the BBS (And upload some as well!). There are several different 'areas' Select 'Area change' to see the full list of available areas or topics. (Most are for the PC, but we do have an area for the AMIGA and will support other areas if requested to do so by YOU).

The **BATC** room – This is for YOU! It is really a combination of the COMMON room and the LIBRARY, but the areas are fixed on BATC. In other words downloading a file from this room is exactly the same as going into the library, selecting the BATC area and downloading the same file there. The same goes for messages. There is also an option to upload files for inclusion in CQ-TV. Articles, adverts, etc.

The **DIRECTORS** lounge and The **PENTHOUSE** are restricted access and allow me to log in to the BBS when I'm away from home and do the housekeeping (tidy up messages, move files about, etc.).

Armed with the above information you should be able to have a good look around

the system and get a 'feel' for how it works. Don't worry, you can't hurt it – no matter what you do, it will not get damaged in any way!

By default the system works on a 'Hot-Keyed' system, this means that if you know where you want to go, you don't have to wait for the current menu to finish appearing. A valid keypress will abort the current menu and go straight into the option you selected. You have the option of disabling this if you wish, once disabled, you have to press the key for the option then ENTER to activate it.

NB: All system settings such as this, can be altered from the LOBBY, by selecting 'ALTER SYSTEM SETTINGS' on the menu there.

Once you've found your way around, you will probably want to start sending and receiving messages. When you send a message, the system prompts you for several inputs:-

TO: This is who you want to send it to (Full name or Callsign). If you send a message to 'ALL' that means everyone can read it.

SUBJECT: This is a short (one line) 'title' for the message.

You will then be asked if you wish to upload a prepared message, Answer YES if you prepared a message before you called and you will then be able to send it. Answer NO otherwise, and you will be able to type in your message.

There are two editors in use on the BBS at present, the one you get to use will depend on how you answered some of the questions when you first logged on. The simplest is the line editor, this allows you to type in a message, one line at a time. When you have finished press ENTER on a blank line and a short menu will appear. If you have finished select 'S' to Save the message. Some of the other options are 'C' to continue with the message, 'Q' to Quit (does NOT save the message), 'L' to list what you've typed so far, etc.

If you opted for the 'Full screen editor' when you first logged on, or selected it from the 'SYSTEM SETTINGS' option in the LOBBY, you will see an all together different screen. It is exactly what it say's – a FULL SCREEN EDITOR, you just type away. You can use the cursor keys to move around the screen, delete text, insert/delete lines, quote text if you're replying to someone else's message, etc. There is help available if you want to know all the commands available. The main key you need is the ESCAPE key. Press it and a one line menu will appear at the bottom of your screen, giving such options as 'Save' 'Quit' 'Help' etc.

When you have finished and you have SAVED your message, you will be asked if you wish to send any files with this message. This option is so you can (for example) send someone a file (program, etc.) and have a message associated with it, e.g: the message could say something like 'Hi Fred, here's that new software I promised you' and then Fred would be able to read the message and download the file.

NB: If you send a file like this – attached to a message, then that file does NOT appear anywhere else, so in effect it is a method for transferring a private file to another person.

If you post a message in a local area, you will in some cases be asked if you wish to use your 'CALLSIGN/HANDLE'. This allows you to send messages using your callsign. If you don't have a callsign, you may use a 'handle' or nickname. To check that the system has your callsign correct, you can list callers by name or by callsign in the LOUNGE. If you list by callsign and your name appears, then you should leave me a message, so I can alter it.

To read a message it's even easier (honest!). At first it seems a rather daunting task to read a message as the system asks lots of questions, but once you get the hang of it, it's really all quite logical...

When you ask to read a message, you are presented with a short menu of options:–

[F]orward – This allows you to read messages in ascending order. You can enter the starting number, or just press ENTER to read everything from start to finish.

[R]everse – Same as Forward, but backwards! [I]ndividual – Read a single message by entering its number.

[M]arked – Read message(s) previously marked during a message 'scan'

[N]ew msgs – Read all new messages, since your last call.

[S]elected – Allows you to specify which messages you want to read by searching on either the 'TO:', 'FROM:' or 'SUBJECT:' fields.

[Q]uit – Back to the previous menu.

[H]elp – If you get stuck, it's always there! (Amazing how many people spend 10mins trying to figure out the system, without once selecting this option!).

Remember, you will only be able to read messages that are either addressed to you, or are NOT private. The system may report 20 messages in the current area, but you only get to read 10 of them, because the rest are private messages between other users of the system.

A final point, there is on every menu a line across the bottom which enables you to 'teleport' directly to the lobby or exit, or page the boss. Use them! You don't have to go out of the BATC room into the lift, then into the LOBBY, then to the exit door! If you've finished and want to leave use the 'teleport' option. Also I am usually around in the evening and at weekends, please feel free to page me and have an online chat if you get stuck. If I'm not around, or you're a bit keyboard shy, then leave me a message when you log off. I read them all and usually reply to them all, it doesn't matter what your message is – A cry for help, A thank-you for providing the service (Ones I like the best!), Or even a note saying how much you hated it! If you don't like some

feature or you have found a bug (and they do exist!) please let me know – so I can put it right.

NOTE 1 – Software

If any one has an IBM PC/XT/AT/386 or clone then I can supply you with a suitable software package that provides a terminal emulator. The software is called TELIX and is one of the best packages around for the PC, It is also 'SHAREWARE' which means I can legally distribute it to you and if you decide to use it, you should register it with the author. Either send me £2–50 stating the disc size you want (5.25" or 3.5") or send a disc in a suitable mailer with return postage enclosed.

NOTE 2 – 'Address'

When you send a NETMAIL message from the POST OFFICE to a user on another BBS. The system will ask you for his address. This is not his street address! It is a sequence of numbers that identifies the BBS that you want the message sent to. For example the TV Club has two address's one for FIDONET – 2:258/62 and one for FREENET – 42:100/115

If you are not sure of the address, but know the name of the BBS, use the 'BROWSE NODELIST' option to list all the BBS's available. The first number in the address corresponds to a ZONE (1 for America, 2 for Europe, etc.) The second number is the NETWORK (258 for our area), the last number is the BBS's number in that zone and network (62 in our case). The above examples were for FIDONET, For FREENET, the ZONE is 42, the NETWORK is 100 and the BBS's number is 115.

PLEASE NOTE: **FROM MARCH 1st THE BATC BBS TELEPHONE NUMBER WILL CHANGE TO 0767 317521**

TV ON THE AIR

Andy Emmerson G8PTH

REGIONAL ROUND-UP

Dusan Pecek (pronounced Dushan Pechek) comes from Slovenia (one of the former constituents of Yugoslavia) and is at Coventry Polytechnic. His project there involves geographic surveillance using a radio-controlled model aircraft and an on-board TV camera and transmitter (1.3GHz). He is contemplating 10GHz operation and would be pleased to hear from anyone who has experience of this kind of remote surveillance. Write to him at the Computer Science Department, Coventry Polytechnic, Priory Street, Coventry, CV1 5FB and tell us what you're doing as well!

Harry G3MFW writes that he built a flying-spot scanner for TV back in 1947; it used a 931A photomultiplier and had to be used in a dark room. Nowadays he is playing again with video, this time with a Pye Super Lynx camera (a fine beast!) and a Mitsubishi HS-B20 video recorder. With a baby grandchild growing up fast, he intends to upgrade to a colour camera.

NEWS FROM MANCHESTER

Andy G1HBE writes: "Enjoyed your article in November's Short wave Magazine and I thought I would let you know what we're up to on 10GHZ here in Manchester. Myself, G2JT, G1HWJ and G3WFK have regular 'phone hook-ups on or around 10.435GHz WB FM.

"As far as TV is concerned, we have exchanged good quality pictures from various sites over distances up to about 12km. We have not tried to improve on this so far.

Our equipment is semi-homebrew: X-band doppler units on transmit (Wessex type gives better results than Solfan for TV) and

satellite LNB with homebrew IF system on receive. Apart from a small change to the post-mixer filtering, the LNB is unmodified with the local oscillator left well alone on 10.000GHz. This brings the IF of 480MHz (we use 10.480GHz for TV) nicely within the range of a normal TV tuner. This is followed by 39MHz IF amplification and PLL demodulation, giving excellent results. On strong signals, slope detection on a normal TV gives reasonable results.

I would like to hear from anybody in the north Manchester area who is interested in 10GHz, phone or TV. My address is 43 Cheetham Hill Road, Dukinfield, Cheshire." Sounds good to me, Andy – let's hope you get lots more contacts.

ZL SPECIAL

Mike Sheffield ZL1ABS took time out while holidaying in Wellington to send a card with details of the ATV scene there. The picture – of Maori rock carvings – was captioned in English and Japanese so one must assume that Wellington is on the Japanese tourist trail now. One thing the Japs probably wouldn't see is the ATV repeater on Mount Belmont, 70cm in (443.25MHz) and channel 39 out (615.25MHz), all AM of course. What a marvellous "shop window" for amateur television, having an amateur allocation in the middle of the UHF broadcast band! Most of the other repeaters, Mike says, are 2 metre and 70cm voice ones; he can work the 23cm voice repeater but there's next to nobody on it. Mike adds that Doug Ingham (past BATC member) is now president of the WA VHF Group; the WA could be Western Australia or it could be WN for Wellington.

In another letter he writes: "My efforts towards a 'Summer of 23cm FM-TV' are proceeding. I have tested a PA unit using an M57762 module. With 1.4 watts drive

(from my FM voice rig) the output is at least 16 watts (the 400-1000MHz slug probably reads low at 1280MHz). However, my present FM-TV set-up only puts out 0.4W so I need to work on that to match up the drive levels. I have had a very helpful letter from Bob Platts about 23cm hybrid power module PAs.

Trevor Brown is pleased with the teletext EPROMs I sent him – says the lessons he gave me last year in Leeds have worked well in taking the concept further than he has had the time to do himself. I like to hear about ATV from Europe and the USA. Some info from DL would be welcome.

I tested the 23cm amplifier with the 0.4W drive last night and have about 15 watts out! The heatsink did warm up a lot in the 5 minute run test, so I will have to look at the provision of a fan for long overs. The first long-distance trial will be in the December 7 & 8 VHF/UHF field day contest. Ralph ZL1TBG is going to be over 100km from our site near Morganni Bluff (north of Dargaville on the west coast of North Island). We have had excellent contacts on 23cm FM voice in the past, so I hope the FM-TV will make it also. 70cm AM-TV has been done over the path before, too.

Wayne Griffin ZL1UJK is back from a two-week holiday trip to Brisbane and Sydney. He was interviewed on VK4RTV Brisbane about ATV in New Zealand. A VHS tape has been made of this."

ENTENTE CORDIALE

We amateurs don't need a Single European Market in 1992; we have always practised full international cooperation. France, being our nearest neighbour country, has always been a natural centre of interest but news of ATV operations there was been lacking recently.

A letter from Marc F3YX puts this right. At last, he says, Radio-REF (the French RadCom) has published the synthesised 24cm transmitter which he demonstrated at the Crick ATV convention five years ago. It

uses surface-mounting components and I can supply a copy of the 16-page description (in French) at cost. He is currently in process of writing an article on a synthesised ATV converter for the 70cm band. This uses an oscillator which is programmable between 380 and 490MHz to chose the sideband it is desired to receive; it also has an important system of filtering on the output since QRM is getting worse and worse on 70cm. (10-page article in French available).

Marc says in France they have abandoned the IARU bandplan for 70cm which they find excellent only for 1950s conditions. 70cm is the only band which will give you 50 or 60km contacts on ATV on any day without special propagation. "We have decided that ATV on this band should have priority over packet, and in case of mutual coexistence problems a VHF commission should take the decisions to assign packet link frequencies to resolve the awkward cases (use spare FM repeater channels and shift full-duplex to 23/24cm)." In the meantime, however, it seems that certain packet radio operators are going around saying that ATV will soon be banned on 70cm, which does not help promote harmony. Marc thinks the eventual solution may have to be some kind of time-sharing. There is no reason, he feels, why inter-BBS data transfers could not be carried out in the night while people are asleep; this would avoid the interference to ATV operators and cause no real problems to packeteers.

"ATV contact frequencies will definitely remain 144.170 plus or minus 20kHz for SSB (DX and faraway stations) and we have assigned 144.425 to 144.475 for local ATV QSOs in FM. As you know, 144.750 is an FM repeater input frequency and anyway that's only one frequency, which is entirely inadequate in major centres like Paris where there are at times four different ATV QSOs in progress at the same time."

Incidentally, Marc runs an ATV and amateur radio topics bulletin board with two metres

inputs on 144.650 and 144.675MHz. Unfortunately there's no telephone hook-up to the board and in fact he says that is strictly forbidden in France. You can, however, send messages to him with S F3YX @ FF6PTT.

EMERALD ISLE

Dave Hooper in Dublin writes: "My TV activity has slowed down while I practise for my morse test in order to gain an El licence. I haven't been active on the air for more than 30 years so I can be forgiven for being rusty. I heard an El slow-scan TV station on two metres and I'm joining the Irish Radio Transmitters Society and so will be able to find out who's who in amateur television here. A month ago I joined the South Dublin Radio Club here in Templeogue, and I'm finding how the amateur radio scene has changed. I feel like Rip van Winkle, there is so much new technology. Anyway, morse is the first step." Good luck with the test, Dave!

APOLOGY

Yes, I have lost my notebook, which means the info given to me by Gervais Mouquet F1BPO is lost in limbo. Perhaps it will turn up again before I write the next column. As I recall he told me about France's latest ATV repeater, to be located at Amiens (I think). The input was going to be on 1255MHz FM and the output on 438.5MHz AM, positive modulation in both cases. But there was more, and it's so infuriating when you know you had it all written down!

And that's it once more. Try and make a new year's resolution to send in a report of what's going on in your neck of the woods. Then we can all keep up with what's happening in amateur radio's most highly developed mode!

Write to: Andy Emmerson, 71 Falcutt Way, Northampton, NN2 8PH.

3CM ATV - THE OPTIONS

As related by Bob Platts G8OZP to Andy Emmerson G8PTH.

We have had several articles in CQ-TV on individual techniques and projects for ATV on 10GHz. An introductory round-up was lacking and this is why we persuaded seasoned 10GHz operator Bob Platts G8OZP to set out the various options as he saw them. Now read on ...

Bob estimates there are around a dozen active ATVers using 10GHz (or 3cm) equipment, with a lot of interest being shown by others. Equipment performance surprises most people: a reasonably simple transmitter/receiver combination into a medium sized dish (30" diameter) should give contacts of up to 50km over a line of sight path. A good system will work even better, say up to 100km with the same size of dish. Then again, a souped-up state-of-the-art system will achieve even more.

With all this we are assuming a low-power transmitter using a doppler radar module. With higher transmitter power or more antenna gain you could start to operate non line-of-sight paths, relying on scatter, though phasing could do funny things to your picture, due to multipath effects. Even the most basic system should achieve 4 to 5km contacts on a line-of-sight path.

DOWN TO BASICS

So what is this typical basic system? The transmitter can be a surplus Solfan or AEI

Gunn diode oscillator, the sort you can now buy at rallies for as little as £5. Alternatively you could build one yourself following the instructions in the RSGB VHF/UHF manual or the Microwave Society's publication. Either way you should be able to produce 8 to 12mW at 10.250GHz (the TV simplex frequency). Surplus Gunn diodes are often available from Birketts of Lincoln.

The Gunn oscillator needs a stable 6 to 9 volt supply with the video signal superimposed on it (about 100mV peak-to-peak for the Solfan). An excellent modulator circuit is described in the BATC's "ATV Compendium" and a printed circuit board is available from BATC Members' Services. Modulators designed for use in voice Gunn diode transmitters are not really suitable, suffering from lack of bandwidth and pre-emphasis.

On the receive side you can start off by using Gunn oscillators feeding an inline mixer. This is the same as used on 10GHz FM voice rigs and several designs are available (RSGB handbook again or Microwave Society). You can use an IF of around 39MHz and follow this with 40 to 60dB of IF amplification (which must be wideband). This is then fed into the BATC's design of FM demodulator (again, a PCB is available). This produces video ready for connecting to a normal video monitor.

More advanced receivers use double conversion with a tunable first IF in Band IV/V and a TV tuner. Again the second IF is at 39MHz, feeding a BATC demodulator. The first mixer and local oscillators use dielectric resonant oscillators (DROs) for stability and low noise, feeding a balanced or very low noise mixer diode. You also need an input filter to reduce image noise. A modified Ku-band LNB could also be used (see state-of-the art system below).

AN ADVANCED SYSTEM

Let's turn now to a state-of-the-art system, bearing in mind of course that the state-of-the-art is changing constantly! The basic systems already described can be a lot of fun and provide an excellent grounding in

the band and the ATV mode. But for the real addict, devices are now available to allow the design and construction of high-performance designs.

The transmitter starts off with a 94MHz crystal oscillator multiplied by bipolar devices to around 2GHz, then quadrupled by as GaAsFET amplifier to 9GHz. This is mixed in a GaAsFET mixer with a phase-locked source of 1.250GHz modulated with video. The resulting 10.250Hz is filtered and amplified by GaAsFETs to the required output level (half-watt devices are readily available on the amateur market in USA).

Our receiver employs a Ku-band satellite LNB modified for use on 10.250GHz input and 1.2GHz output. A normal satellite TV receiver can then be used, alternatively the 1.2GHz IF can be amplified by GaAsFETs and passed through a bandpass filter into a GaAsFET mixer together with a 730MHz crystal-controlled source. The resulting 470MHz second IF is delivered via bandpass filters and four MMIC amplifiers to a 470MHz PLL demodulator.

REPEATERS

The new 3cm repeater GB3XT for the Burton-on-Trent area is intended to use the system just described, under the control of a microcontroller designed by Trevor G8CJS. The input to GB3XT will be 10,250GHz, the output on 10.150. The receive antenna will be a 20dB gain colinear and the transmit aerial a sectional horn. Initially the signal will be beamed north and with no input signal the unit will revert to beacon mode, providing an accurate signal for test purposes.

At the moment a lot of Ku-band equipment is appearing on the surplus market as home satellite systems become more sophisticated. Obviously the dishes have a use, either with a centre feed (penny or scalar) or with an offset feed (like the Amstrad) with a suitable horn. A 1 metre dish can achieve 36dB gain, enabling a half-watt transmitter to achieve an effective radiated power (ERP) of 2kW! Even a

10mW source becomes a very respectable 40 watts.

Some of the surplus LNBs can be converted (look for names like the Skyscan model L1 and the Echostar LNB1905), though the Amstrad ones are definitely unsuitable. Satellite receivers can often be used if the bandwidth is reduced and the video output provided with extra gain. With all this Bob predicts a good future for ATV on 3cm!

SIGNOFF

Remember, if there are any topics you would like covered in this column, please write in and tell us. A stamp won't cost you much and your letters are most welcome!

MEMBERSHIP

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

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

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

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

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Severnside Television Group

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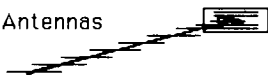
Our ever popular 24cm 18 element wideband Yagi is a must for all ATV stations. Specially designed to cover the whole band for repeater working. Look at some of the features....

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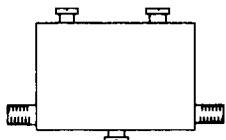
Precision made 3-pole and 5-pole interdigital filters for 23/24cm. Low insertion loss of 0.5db and 1db respectively. Wide passband of 60MHz, and -30db/-60db stopband at 70MHz offset. To order, state lower frequency of pass-band, and either BNC or N type connectors.

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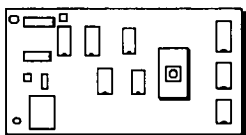
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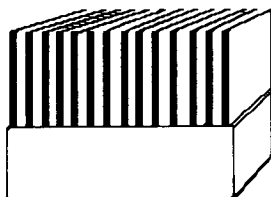
A 20 Watt PA using the SC1040 module is now available to accompany the AZTEX TX

Price £150.00 + £5.00 p&p

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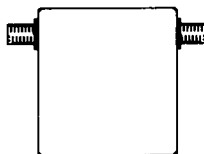
This GaAsFET pre-amp offers a gain of 17db with a noise figure of only 1db. Designed to go between the RX antenna and your receiver The gain is flat across the 23/24cm band but has an 8db roll-off at around 700MHz to help reduce broadcast TVI. A highly stable deign based on the ATF10135 GaAsFET utilises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

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AZTEX Electronics

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OBSOLETE TAPE! People requiring cassette tapes for Technicolor 1/4" and Philips 1500, 1700 and V2000 VCRs should contact Stephen Albrow, Globe Video Services, 192 Castelnau, London, SW13 9DH.

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"405 ALIVE" MAGAZINE, now in its fourth successful year, covering 405–line technology and programming from the 30s to the 80s. Subscribers find it irresistible! Four 64–page issues for £12 or have a sample copy for £3.00 post paid. Andy Emmerson G8PTH, 71 Falcutt Way, Northampton, NN2 8PH.

JVC COLOUR CAMERAS: type GXN–70E Nuvicon tube, auto focus, auto iris, caption insert, complete with PSU, leads and handbook, in mint condition ... £275. Type GXS–9E Saticon tube, complete with PSU, leads and handbook, in mint condition ... £225. HITACHI UNITRON MSX Midi Studio System complete, two cameras, console, etc., unused ... £1000 ono. JVC 4000 series colour camera ... £70 ono. Barry Senior G8YGT, 1 Bedale Close, Coalville, Leics. Tel: 0530 832088.

SONY VO2630 RECORDER ... £50.00. Sony RM420 Remote control as new ... £10.00. Zoom Lens, 10:1, servo amps, controls etc. for TV88 mount Image Orthicon format (35mm) circa 1965, in two wooden travelling cases, in good condition ... £75.00. Aircraft inverter made by Ferranti, solid state 28V DC to 115V AC 400Hz. modern unit with control unit with meter ... £20.00. TeleMation caption generator, 4 keyboards, dual outputs with P/v and Tx, 2 disk drives, computer unit, Big! needs some TLC POA. Second Telemation caption generator. This one is small (ish) and self–contained desk top unit circa 1979 .... offers. Mitsubishi 14" High res colour RGB monitor 32Khz line scan ... £45.00. Time code generator type 304 and reader type 104 By "Rapco" smart units, LED and Liquid crystal displays of Hours, Minutes and seconds, Working order ... £65.00. Illuminated Push button switches, approx 20*30mm. top, in new condition, 2 lamp sockets for dual colour ... 12 for £10.00. Selection of other illuminated push buttons some with hold–down solenoids some numbers 1–12 for mixers etc. new/used price Negotiable. Marconi Mk4 picture and waveform monitor, complete, handbook, valve, 405/525/625 capable, will need small amount rewiring, collectors item ... £40.00. Matthey MLW618B video filter 3dB point 6.63Mhz. BNC in/out orange die-cast box as new ... £10.00. LabGear 7056 TV Tuner and Teletext adaptor, with remote control handset, video, sound & RF outputs Teak? case, working but slight sound fault ... £45.00. Rank bush Murphy Monitors 9" solid state 405/625 autoswitch, handbook, Mains/Batt., early 60's fair condition but not working, collectors item BATC ... £25.00. Bell & Howell "Filmsound" 16mm film projectors with optical sound, BATC ... £60.00. BBC waveform monitors MN6/501, valve, clean condition made to fit alongside picture monitor BATC ... £25 each or 2 for £40.00. Image Orthicon tube P811G unboxed condition unknown, BATC ... £10.00. Studio Varotal Zoom Lens f4.5 10:1 (I think) 35mm. format clean condition, BATC ... £30.00. Contact B. Summers G8GQS QTHR 081 998 4739 evenings!

ILLUMINATED DIASCOPE FOR I.O. CAMERA, new condition, with power supply for lamp. Slides onto lens, takes two 2" x 2" slides ... £50 or swap. Two PYE LYNX CAMERAS, clean but untested ... £20 each or £30 the pair. Postage at cost. Andy Emmerson G8PTH, 71 Falcutt Way, Northampton, NN2 8PH. Tel: 0604 844130.

U-MATIC EDIT SUITE, 2 x Sony VO-2850P complete with Sony RM 400CE edit controller, controller cables and minutes counter giving full MM:SS read-out ... £500 ono. PORTABLE U-MATIC RECORDER, Sony VO--3800P complete with AC-3000P AC adaptor/charger ... £200 ono. U-MATIC CASSETTES, 60, 10 and 10 minutes ... £1 each. Paul Phippin G6FRA, 69 Chesterton Avenue, Harpenden, Herts., AL5 5SU. Tel/Fax: 0582 768298.

A56-120X COLOUR CRT, never used, rejuvenate that old TV! - yours for a pint, before I junk it. I can deliver between London and Peterborough. Also TELONIC UHF SWEEP GENERATOR, covers bands 4 & 5, and sweep should cover 70CM, large with manual ... Any cheap offers? Peter Carliell. Tel: 081 337 9688.

MICROWAVE MODULES MTV 435 70CM TV transmitter (both channels crystalled) 20W PEP ... £95. WOOD & DOUGLAS TVUP-2 70CM receive downconverter module ... £28. Brand new unboxed VGA MONOCHROME MONITOR ... £50. Panasonic KXP 1180 dot-matrix PRINTER ... £85. Citizen 1.44Mb 3.5" DISK DRIVE ... £30. Icom 575H (100W) 28/50MHz TRANSCEIVER in mint condition ... £750 ono. Kantronics KPC4 dual-port TNC (latest firmware available) ... £160 ono. Paul Chamberlain G4XHF (QTHR). Tel: 0293 515201 anytime.

JVC SYNC COUPLER GN-C80E ... £60. JVC COLOUR VIDEO CAMERA G71 with C-mount lens ... £175. JVC 12V POWER SUPPLY CV-AC224 ... £40. JVC portable VHS RECORDER, c/w tuner, timer/AC adaptor HR2650 ... £295. JVC 10M 10/12-pin camera EXTENSION CABLE ... £35. JVC U-matic 4400 PORTABLE VCR, c/w AC adaptor/charger VGC ... £395. JVC 12V POWER SUPPLY ACC322E (boxed and unused) ... £55. Panasonic CHARACTER GENERATOR WV-KB12E (boxed and unused) ... £99. Panasonic VISION EFFECTS MIXER MX10, VGC ... £750. Panasonic 9" B&W MONITOR with underscan ... £98. Sony broadcast interview MICROPHONE F115E (boxed and unused) ... £75. Sony EDIT INTERFACE UNIT (U-matic/low-high/Betacam) VGC ... 675. Sony U-matic portable TAPES KCS20BRK (boxed and new) ... from £5.85. Sony U-matic PLAYER VO2030, mint condition ... £195. Sony type-5 U-matic RACK MOUNT KIT ... £28. Sony camera TRIPOD PLATE, suit 3000/325 cameras VCT-12 ... £65. Vivanco 8-in/2-out mic/line AUDIO MIXER (boxed and new) ... £25. Static audio REVERBERATION UNIT ... £95. Nobo FLIP CHART/white board and carry case ... £80. 5-way VIDEO DISTRIBUTION AMPLIFIER ... £70. C-mount TV ZOOM LENS 1:1.8/12.5-7.5 with macro ... £45. Philips high resolution 14" colour monitor 9CM053 ... £225. Philips green screen PC MONITOR BM7713 ... £95. Sony 3-tube 700 line resolution VIDEO CAMERA with 5x Cannon lens plus carry case, only 175 hours use ... offers. Sony INTERACTIVE RESPONDER COMPUTER unit with programmer, printer, workstation keypad; full kit to make and use interactive video using U-matic VCRs (as new) ... offers. Bob Walters. Tel: 0273 558320.

EXCHANGE & WANTED

WANTED: any information, handbook, circuit diagrams, etc,. for the FORTOP 435 ATV TX. I can photocopy and return any material quickly. Please help me get QRV on 70CM here in Scotland. J.Sinclair GM4YAA, 3 Ben More Drive, Paisley, PA2 7NU.

WANTED: Pye Westminster AM PMR manual, RX info would do. Ray Hill G0IMV. Tel: 0989 62906.

WANTED: OLD CAMERA TUBES, (and similar imaging devices) of various type and age, and related data etc, for historic (!) collection. Particularly welcome would be an Orthicon, EMI 9831 Vidicons, an Ebitron, an Image Isocon or a 1.5" Vidicon. Tubes that are not operable, are suitable, so if you replace tubes in cameras, don't throw the old ones away, but please contact: Peter Delaney G8KZG, 6 East View Close, Wargrave, Berks. Tel 0734 403121.

WANTED: Has anybody got a copy of Volume-2 of the EMI 2001 Instruction Manual that they would be prepared to pass on, swap or sell? I am also after a working SPG, either a Thorn W964/X or a Pye System 70. Tim Highmoor. Tel: 081 995 9185.

WANTED: To borrow a copy of 'What Satellite Television' September 1990 featuring the article on 'Dishes Inside'. W.Edwards, 5 Countisbury Close, Bognor Regis, West Sussex, PO21 3QW.

WANTED: Thorn TX10 chassis colour TV audio/video in/out kit, type TA124 or TA134. Service manual for Grundig Video 2x4 Super VCR (mechanical section only). Audio/Sync head for Philips N1501 VCR, also test tapes, jigs and tools for N1500/N1700 series. N1512 VCR complete or just the AV in/out panel. Murphy V789 or V783 mono TV (circa 1962). Ferguson model 22B5 monitor style TX10 CTV. GEC Technical Bulletins, Murphy Service News, BRC Bulletins, etc. 1960's 'Trader@ sheets, service manuals up to circa 1965ish. Dave Hazell. Tel: 0993 771373.

WANTED: Letters from J.L.Baird and Telivisor information. Motorola P210 VHF high walkie-talkie or other Motorola walkie-talkie/accessories. P.Bedford, 5 Woodstock Road, Bedford Park, London, W4 1DS. Tel: 081 747 0069. Fax: 081 995 0137.

WANTED: TO BORROW: can anyone lend me a Lektrokit catalogue (any period) and/or mid-1970s Radiospares and Home Radio catalogues? I'll pay postage both ways and return these rapidly. Thanks. TO BUY: Basic Television part 2 (Technical Press). Also, before you turf out any 405 line equipment (small monitors, cameras, etc.) give me a call first! Thanks! Andy Emmerson, 71 Falcutt Way, Northampton, NN2 8PH. Tel: 0604 844130).

WANTED: Two METAL reels for 1/4" tape. Must be 10 inches in diameter and have standard British hub. Also wanted: 5" diameter loudspeaker with 8 ohm coil and WITHOUT fixing lugs, lo-fi will do. Doug Pitt. Tel: 0602 282896.

WANTED: Outside broadcast tripod and pan/tilt head suitable for 3-tube colour camera ... W.H.Y. Steve Cowie. Tel: 0452 302842.

WANTED: Circuit diagrams and manuals for JVC S100E colour camera and for Link Electronics 526 PAL coder. Original or photocopies, I can photocopy if necessary. Chassis TRAK slides for mounting Tektronix 526 Vectorscope in 19" rack. Patrick White G6CJB. Tel: 081 847 3995 (daytime and answerphone), 0628 21718 (evenings).

WANTED: Circuit diagram, manual, or any information for the following: Telequipment Oscilloscopes D52/D1011; Hitachi CCTV camera HV-620K; National Panasonic CCTV camera WV-51E. Michael J.McElligot EI6EY, Skelenoun, Listowel, Co.Kerry, Eire.

CQ-TV Index

Introduction

The following pages list the major articles that have appeared in CQ-TV from issue 153 through to issue 156.. This is the usual update supplement that we publish between the 2 yearly complete index.

This index is in two sections. The first lists articles by categories and the second lists articles alphabetically by issue.

The index contains some abbreviations, and these are explained below.

The stock of some back issues of CQ-TV is small and variable, so please check in the current issue CQ-TV of for their availability. When stocks of a particular issue fall below 10, it is removed from the list published in CQ-TV, thus there may be odd back issues still available.

Please check with the Publications department on the availability of any back issue of CQ-TV that you may require. All enquiries should include a stamped, self addressed envelope.

Abbreviations used.

PAGE - is the CQ-TV page number, and PHOTO is the number of photo copy sheets required for that article. The cost is on a sliding scale dependant on the number of copies ordered. Please see the current issue of CQ-TV for the current prices.

Articles marked [*xxx] indicate that a correction or update to that article has been published in the "In Retrospect" column in issue number xxx.

Section 1 - By Category

Vision - Switchers/Mixers

Vision - Test/Pattern generators

Vision - Cameras

Vision - Processing

Vision - Other

Receiving - 70cm

Transmitting - 70cm

Receiving - 1.3GHz and Above

Transmitting - 1.3GHz and Above

Microwaves

Aerials

Repeaters

Slow Scan and NBTV

Miscellaneous

Test equipment

Reviews

Satellite

Computing

General News

End of section one.

Section 2 - By Issue

The following section lists articles in issue order. Within each issue, articles are listed alphabetically. The code letters correspond to the categories in the first section of this index. A list of these is given at the end of this section.

Some titles appear in more than one category in the first section, and these duplicates are also shown in this section.

153

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End of section two.

Category Codes

A .... Vision - Switchers/Mixers
B .... Vision - Test/Pattern generators
C .... Vision - Character generators
D .... Spare
E .... Vision - Cameras
F .... Vision - Processing
G .... Vision - Other
H .... Synchronisataion
I .... Power supplies
J .... Receiving - 70cm
K .... Transmitting - 70cm
L .... Receiving - 1.3GHz and Above
M .... Transmitting - 1.3GHz and Above
N .... Microwaves
O .... Aerials
P .... Spare
Q .... Spare
R .... Repeaters
S .... Slow Scan and NBTV
T .... Miscellaneous
U .... Test equipment
V .... Reviews
W .... Satellite
X .... Computing
Y .... General News
Z .... Spare

About this Index

The data for the index is held in a database. A program in Clipper has been written to maintain this database. One option of the program is to write the data to a disk file that can be read directly into Microsoft Word for Windows for typesetting. The output from Microsoft Word for Windows is then printed on a NEC S90P postscript laser printer at A4 size. This is then photo reduced by the printer to give the final A5 size index supplement.

Compiled by BATC Publications, 14, Lilac Avenue, Leicester, LE5 1FN, England.

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