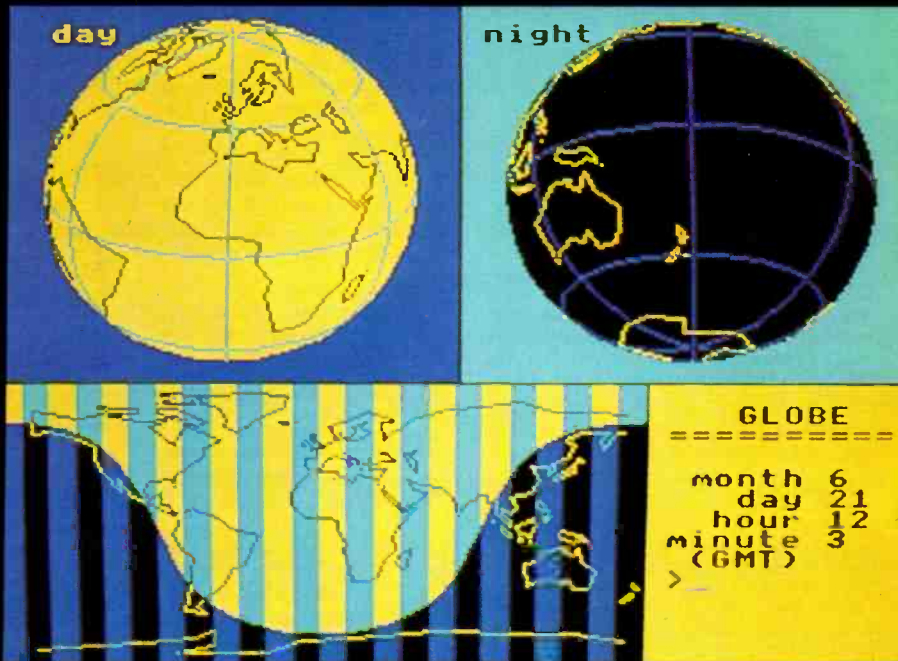


RADIO

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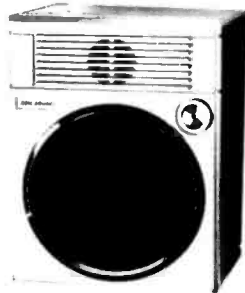
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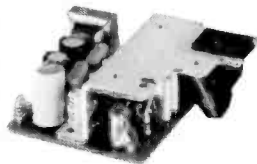


The new SS-2 Heil Sound System contains two five watt amplifiers, a 3.5" woofer with a half pound magnet a 1.5" tweeter with a 12 dB per octave passive crossover network. The tweeter is crossed over at 1500 hz, right where the response of the human ear starts to fall off and the huge woofer fills out the mid-range and low frequency response. No single cheap speaker can begin to give you this type of response.



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When most receivers are running at a comfortable listening level, their little one half watt amplifiers are being pushed into extreme distortion levels. The extended response, the added efficiency and additional output power of the SS2 will lower your noise floor, reduce noise and allow you to copy signals that formerly were impossible to hear.



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The SS-2 measures 3 3/4" x 5" x 3 3/4". It weighs 2 lbs. and is housed in a high impact silver beige case. Power requirements are 12-13.8 volts D.C. at 400 M.A. A red L.E.D. is mounted on the front panel for power up indication. All input/output connections to the amplifier is made through a 5 pin DIN plug.

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£65.00

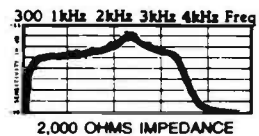
THE MICROPHONE HEIL HM-5

Radio amateurs have historically used microphones designed for something else: industrial paging, public address, tape recording, etc. "Matching" microphones for new equipment usually means it's the same colour as the radio! None of these microphones has the correct response we so desperately need for maximum speech articulation. The engineers at Heil, Ltd., went far beyond traditional mic design. They spent thousands of hours analyzing complex SSB voice patterns... allowing them to determine precisely what was really necessary for your communications microphones. The results are enhanced intelligibility, maximum articulation and clean, natural audio for the signal that will always be "on top".

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VOLUME THREE NO.9 SEPTEMBER 1985

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LETTERS

THE TRUTH WILL OUT . . .

Sir, After reading Mr R T Freeman's letter in your July issue, ('Telling the truth?') I feel the need to air a few points. Firstly after having taken HRT since its first issue, I congratulate you on what is in my mind *the* best amateur radio publication on the market. It covers a wide range of topics and being an avid homebrewer. I enjoy the articles on constructing our own equipment, which is what ham radio is all about. Does Mr Freeman think that the constructional articles are to add and I quote — "another piece of useless kit" to our shacks? I certainly think with what he wrote, Mr Freeman wouldn't know one end of a soldering iron from the other!

If he had tried 'homebrew' he might have experienced the pleasure it brings many of the licensed amateurs on the air today, both A and B class. As for an article which is "padded crap" I certainly feel that is all he is talking!

Regarding sticking to ham radio subjects, isn't this what Ham Radio Today has been offering since it hit the stands, a lightly balanced, good humoured approach to the subject — I think so.

Now to a different subject. I would like to know how many readers of this publication actually feel that Messrs WPO and JST are only using HRT to fill their own pockets? For many years the monthlies have striven to get projects on the scale of Micron and Omega running and failed dismally. Now finally this dynamic duo have come up with the answers and HRT have had the sense to publish them. Just look at the popularity of the DSB80, 1000s of them sold and up on air *and* used regularly . . .

Simon Lewis, G4PLM

. . . admittedly we do not all run 400W but, my friend, we are still getting results.

Please do not run down the home built kits until you have given one a good try out. The DSB2 has given this operator lots of pleasure to build and operate. Indeed the amateur stations in Moscow, Sicily, and 14 other countries commented on its fine performance using 2W DSB into a 20m sloping dipole at 20' above the ground during February. You really don't realise what you are missing. It does make a satisfy-

ing change from my 100W transceiver.

Also do not slag a magazine that is trying, and succeeding, to supply a service to learners as well as experienced operators like yourself. The answer is in your own hands. Do write us an interesting article and let us learn from your obvious world wide operating experiences.

Finally a wee, friendly tip from North of the Border reference 400W QRP, the secret old man is in two places; the operating technique and the aerial system — not in how much noise you make with your linear amplifier. To HRT, keep up the good work.

Ted, GM4LKJ

Sir, Re G4SDJ's unconstructive letter (July 85 issue). Racism of any kind cannot be tolerated in any so called democratic society, and exposing its use even on CB radio must be of interest. Especially as many CB'rs move over into the ranks of the radio amateur and could bring that single-mindedness with them; I can find no fault in such a letter. As for the letter page containing only two letters, as expressed by RTG Freeman . . . if they are interesting, so be it.

The important part of the magazine is not the letter page surely! but more the contents: which I consider to be quite catholic in subject matter.

There is one part of his letter that I am in some agreement with, and that is his comments regarding the promotional aspect of the articles by G4JST and G3WPO. I say this because of price! If I can explain, I have been a constructor for many years, in my beginnings when I could not afford to buy a new product. I would always seek out a kit; kits in those days were very much cheaper than that of buying the finished product. Today, it would seem, it would be cheaper buying the finished product as the price of the so called kit is so expensive.

It is all very well for G3WPO and company to use HRT as a means of advertising their wares; that is their privilege. But let us not forget the young people who are coming into amateur radio, many of whom are unemployed and do not have the resources to buy a 2.30 or what ever the case may be.

Buying a kit to build, as they should be encouraged to do as a means of learning, should be their best prospect. If the price is too high, then it is catch 22!

The Micron, dutifully featured in HRT, costs £241.00 as a kit!! A youngster, if he has that amount of money to spend, can buy a hand-held near enough around the same price.

It is worth remembering that all readers of HRT do not live in the prosperous south east.

J M Stevenson, G8ZRY

Sir, With regard to the letter "Telling the truth" from R T G Freeman, G4SDG, well, what a miserable self opinionated prat he is; disregarding all other objections he aired I for one look forward to the outputs of G4JST/G3WPO. I have built the OMEGA, albeit final layout and cabinet design of my own choosing, and whilst I was engaged in the construction, I have never had more pleasure out of the hobby of radio and resolving all the problems that are to be encountered when tackling a project of this size.

All I can say is if G4SDG gets no satisfaction from learning — perhaps he knows it all — then he is not a radio amateur. I for one hope that I never have the misfortune to encounter him on 80 metres or any other band for that matter.

W K Judge, GW4KEV

Well, Mr Freeman, you certainly stirred up a hornet's nest. Amateur radio is a broad church and HRT tries to reflect all the different 'faiths' in the spectrum of articles that we run.

With reference to G8ZRY's criticism, let me say the following. In order that a large number of people are able to build a kit, the kit supplier must be able to find a reliable source(s) of components. With the contraction of the part of the industry supplying components to enthusiasts, due to computers taking newcomers away from electronics and radio, reliable supplies of components have become not only expensive to buy, but time consuming and difficult to find.

This is unfortunately reflected in the price of kits, something which is of great concern to Tony Bailey. From a

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MICK

commercial point of view if he could make his kits cheaper, Tony is well aware he could sell more and get better returns... Regarding the lining of pockets, Tony still has his old KW2000A and house in Hassocks, won't get rich on kits and certainly won't get rich on what we can afford to pay him. Now, why does he do it?...

Finally, the simpler projects we do, many of which can be built from bits picked up at rallies and junk sales, are intended to help the less well off — see the 'High Gain 2m Omni' in this issue.

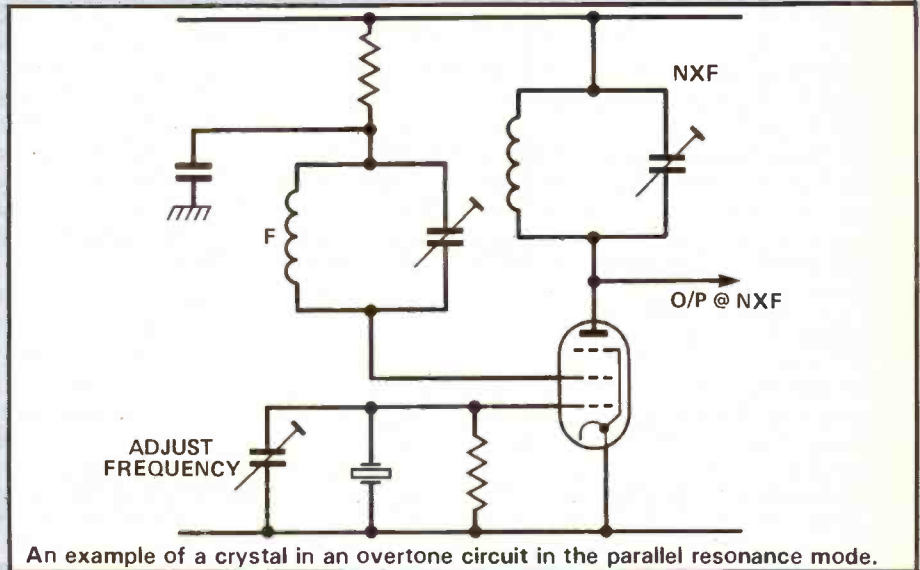
SAVE OUR SQUADRON

Sir, I am attached to my local Air Training Corps as a Civilian Instructor in Newark. A great deal of my time is spent looking after radio equipment or in training boys aged between 14-18 years old how to operate radio equipment. Your magazine is therefore one which is often read in our workshop.

I wonder if you could help us through your magazine. At present, training boys in sending and receiving morse and in radio procedures is not a problem. However, our Squadron funds, like most Youth Organisations, remain exceedingly small and radio equipment either expensive or very difficult to obtain.

I have contacted the Radio Society of Great Britain's local clubs in Mansfield and Newark two months ago and although sounding very hopeful at first, they have been unable to help.

While any money remains a problem, I desperately need two HF transmitters capable of operating between 3.200MHz and 3.800MHz and further up the band from 5.200 to 7.500MHz. (The frequencies we use are spot frequencies and thus equipment is crystal controlled). Our power requirement is anything from 20 watts to 100 watts output with the facility to offer CW (A1), AM, and SSB in transmit mode. Sets do not have to be in working condition as long as parts are still available we could repair them ourselves. Our new training year starts in September and we desperately need



An example of a crystal in an overtone circuit in the parallel resonance mode.

this equipment — can you help us.

J Gellatly

If you have any equipment that may be of use to the Newark ATC, Mr Gellatly can be contacted on Mansfield 870558.

OFF FREQUENCY

Sir, In his 'Practicalities' (July issue) G3YWX resurrected an old chestnut I imagined to be long dead and buried. His valve oscillator (Fig. 3) produced the wrong frequency only because it is the wrong circuit.

All crystals have two closely-spaced but distinct resonances: the lowest of these is a series-resonance mode in which the crystal presents a low impedance; at the higher frequency the crystal exhibits parallel resonance and presents a high impedance.

The valve oscillator circuit given is in fact a crystal version of the Clapp (or Gouriet) oscillator, which uses a series-resonant tuned circuit between grid and ground. The coupling capacitors between grid-cathode and cathode-ground are effectively in series with the crystal and tap the valve into the oscillatory circuit; thus their values should be as

great as possible to prevent over-driving the crystal. Unless the crystal used by G3YWX was designed for series-mode operation it must produce a frequency lower than expected; if the coupling capacitors are too small in value the crystal will possibly behave erratically.

It is G3YWX's contention that the crystal in his transistor circuit (Fig. 4) is operating in series with the feedback path. Absolutely correct but, again, it must be a crystal designed for the desired frequency *in the series mode*.

To use a crystal in an overtone circuit in the parallel-resonance mode, the attached circuit is probably the most useful. Cathode, grid and screen are used as a TATG oscillator with the screen circuit tuned to the fundamental frequency of the crystal. The mode circuit is tuned to the desired harmonic; the oscillator is very effectively buffered against any load imposed on the output because of the frequency difference. The frequency can be adjusted slightly by the small trimmer connected across the crystal.

K H Green, G1NAK

Please address correspondence to:
Ham Radio Today,
1, Golden Square,
LONDON W1R 3AB.

The Multimate Keyer RFI Suppression

Preventing RF Interference

The prototype has been tested in the presence of medium RF fields and has shown no signs of suffering in any way from this. Since digital circuitry is prone to interference from RF however, it seemed worthwhile giving some hints if anyone was unfortunate enough to experience problems of this kind. Such problems could be due, perhaps, to the use of high power and/or a poor SWR generating a very high field strength in the proximity of the keyer. Generally, problems of this type will manifest themselves in the keyer working perfectly when not connected to a transmitter, but failing to work or 'crashing' as soon as it is used to key a rig.

A major contributor to RF tolerance is screening. The recommended case is of a sheet metal construction and therefore offers a reasonable degree of shielding. The substitution of a plastic case would clearly *not* provide this protection. The screening

provided by the metal case is not perfect, however, due to the large cutout made for the keyboard. A possible solution to anyone experiencing problems would be to provide extra shielding for the processor board in the form of an additional earthed metal enclosure, making connections to this through feed-through capacitors. As this involves a reasonable amount of extra work, it should clearly be considered as a final resort.

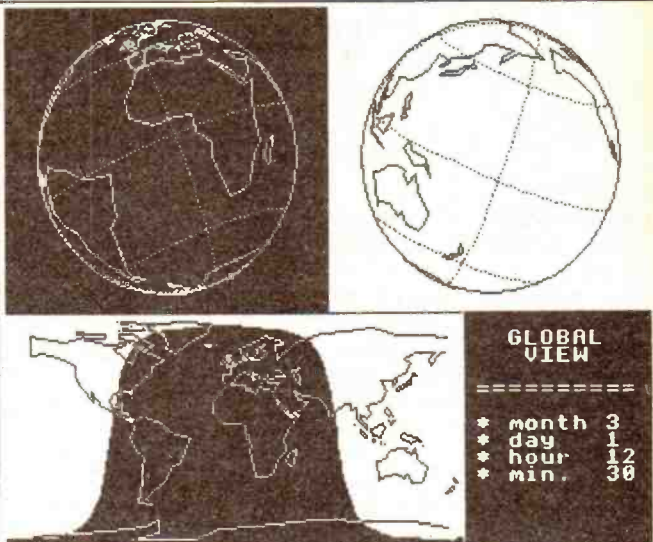
Clearly it is not possible to provide any screening for the keyboard and, accordingly, the only solution if it is suspected that there are problems in this area is to increase the number of suppression capacitors across the power rails, perhaps also attaching a small capacitor from strobe to ground. It will almost certainly be found that the processor board has sufficient decoupling capacitors. The one other area to be aware of is that 'aerials', in the form of unscreened cable should be used for the leads to the squeeze key and transmitter and, if problems still persist, for some of the internal wiring.

Buy the amazing program in COMPUTA DX!

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Ham Radio Today, in conjunction with A & B Computing Magazine, are pleased to announce that the 'Global View' program, as featured in this month's 'Computa DX' article and originally described in A & B Computing June '85 issue, is available on both tape and disc. You also get a companion program, 'Down to Earth', as featured in July '85 issue of A & B Computing.

A cassette version costs £4 and the disc, in Acorn DFS single density format, 40 or 80 track as requested, a modest £6. All orders should be addressed to 'Global View Offer', A & B Computing Editorial, No.1 Golden Square, LONDON W1R 3AB. Orders will be fulfilled within 28 days of receipt. Cheques should be made payable to Argus Specialist Publications. Good DXing!



GLOBAL VIEW

- * month 3
- * day 1
- * hour 12
- * min. 30

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RADIO TODAY

The WINNER of our competition for an SMC Oscar 2 10m FM transceiver was Mr John Edward of Summerston, Glasgow whose choice was A. G. H. L. N. P:

Congratulations!

Sad Departure, But Happy Return

Steve Ireland, G3ZZD, has departed as editor of Ham Radio Today, and will be taking on a new role on a weekly newspaper. We wish him well in his new job. However, Julie hasn't got rid of Steve completely, as he will continue to act as our Consultant Editor, so his knowledge and expertise will not be lost to us or to the hobby.

We hope you will give a warm welcome to the new editor – who is, in fact, the old editor – Dave Bradshaw, G1HRT. We also hope that you will continue to support the magazine as we continue our editorial policy of bringing you the best articles we can.



Anyone Wanting To Work 6m?

Geoffrey Pattie, Minister of State for Industry and Information Technology, made the following announcement in Parliament "I am conscious that the interim Merriman Report recommended that the Radio Amateur Service should be given an allocation in the band and I am therefore proposing to fulfill that recommendation by allocating the band 50.0 to 50.5MHz to radio amateurs."

Low Electronics have just announced the arrival of two new transceivers which cover this newly allocated band. The TR9300 covers the US radio amateurs allocation of 50-54MHz and is in the same mould as the well known TR9000 and its 2m sister the TR9130. This 6m version gives 10 watts output on FM, both sidebands and CW, and about 3 watts on AM. The TR9300 incorporates two VFOs, six memory channels, a green LED frequency display and memory scan facility.



The TR9300



The TS670

The TS670 is the new quad band transceiver which covers 6m as well as 10, 15 and 40m. It can also come with an optional receiver board that will enable general coverage of 500kHz to 30MHz. The TS670 gives 10 watts on SSB, CW and FM and 4W on AM and comes with two VFOs, 80 memory channels – each of which can hold operating

mode, memory scan and keyboard frequency entry – and has an optional mounting bracket for mobile use.

The TS670 quad-band transceiver costs £751.57 inc VAT and the TR9300 will set you back £569.97 inc VAT. Contact Low Electronics on Chesterfield (0629) 2817 for further details.

STOP PRESS!

At the Ham Radio Convention in Friedrichshafen in Austria, an official of the West German Post Office said that agreement had been reached by 14 CEPT countries on a common licence.

Nigel Roberts, G4IJF, in Austria

So You Want to Study For The RAE?

Dacorum College, Marlowes, Hemel Hempstead are running an RAE course which starts on Wednesday 25th September between 6.30 and 9.00. Enrolment is on the 9th, and further details are obtainable from the college on (0442) 63771.

Princes Risborough Adult Education Centre in Merton Road, Princes Risborough are running an RAE course with tutors Stan, G4HQC, and Ron, G3NCL, starting on the 26th. They also intend running a Morse course. The fee will be approximately £22. The Arnold and Carlton College of Further Education are running a series of RAE, electronics and Morse classes. There will be two

Poetry Corner

TIPTOE THROUGH THE ETHER

"Wouldn't it be fun to talk together?"
My husband said to me;
"All we need to communicate
Is some gear and the RAE."

Now I'm all for wedded togetherness
(I'm very fond of that),
And you don't get kids by transceiving
And it doesn't make you fat.

So RSGB we contacted
And we duly paid our sub,
And we got to know some members
Of our local radio club.

They said, "Sign up at the College
And buy yourselves The Book,"
But when we got it home to read
We scarcely dared to look.

It's twenty-seven years ago
Since I ever read such things,
And the thought of swotting or
cramming Sheer blind panic brings.

"Well, I'll have a go," I said to him,
"And I'll really try my best,
But it even that isn't good enough,
I'm afraid you can stuff the rest."

So from August through to May I toiled
Till the final testing came;
My pencil rattled in my hand,
I could scarcely write my name!

"Watts over amps is volts," (oh dear,
Is that what teacher said?)
"A long wire's only half a wave,"
"Two's colour code is red."

"Conventional current flows from plus.
If dummy load rings true,
Impedance matching's done the trick

And signal flows right through."

"You can't transmit aboard this bus";
"Add 'W' in Wales";
"Indelible entries in your log";
"Unplug your set in gales".

"A moving magnet in this coil
Induces in this field"...
...That's my lot! My time is up!
My radio fate is sealed!

"Wasn't it hard?" "I'll never pass!"
"Could you do it?" "No, of course
This means another try at Christmas,
Before we start our morse!"

I wish we knew, (I really do!)
So till August wish us well;
Then, if we tiptoe on the ether,
Please cheer and QSL.

Valerie Berry

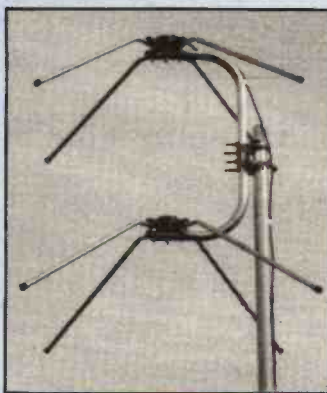
Antennas for Satellite Reception

Thinking about receiving satellite signals? If you don't want to build your own antenna — as suggested by Arthur Gee, G3UK, in his satellite articles (June and July '85 HRT) — there are antennas capable of receiving satellite (both amateur and weather) signals. Halbar manufacture the I.T aerial, which comes in two versions: the I.T/u which is designed to receive left hand circular polarised signals from UOSAT, and the

I.T/m for right hand circular polarised signals from TIROS/NOAA weather satellite. The aerial comes with four reflector arms which are positioned under the driven elements and increase the upward directivity and, apparently, the gain.

The I.T antenna, supplied with mast clamp, costs £19.50 plus £2.50 p and p. When ordering your antenna, please state which version you require. Further details can be obtained (with an SAE please) to Halbar, Unit 1 Bury

Walk, Bedford MK41 ODU or phone (0234) 44720.



short courses beginning 19th September and 6th February '86, and a long RAE course starting 18th between 6.30 and 9.00. Enrolment is at the college on 9, 10, and 11th Sept 2-8pm.

Hilderstone RS have organised an RAE course to start on 4 Oct at the Adult Education Centre, Hilderstone House, St Peters in Broadstairs. The tutor is Dr Ken Smith, G3IX, who aims to use demonstrations, theory and practical projects. Further details from the Hilderstone Centre or GOBEX on Ash 812 723.

Cheshunt DARC will be running an RAE course at the East Herts College, Turnford. Although the starting date is not fixed, it will probably be on Mondays between 7 and 9pm. Jim,

G3OJI, is the man to contact on Ware 4316 or the college on Hoddesdon 466451 asking for Mr France or Mr Norman. Basingstoke ARC are assuming no prior knowledge for their RAE course due to start in September. Contact Dave Burleigh, G4WIZ, on Tadley 5185 for further details.

Derby College of Further Education is offering two courses for radio amateurs this year. In addition to the usual RAE based course which runs for 30 weeks (one session of 2 hours a week) they are also running an advanced radio amateurs course for the same time which will go beyond the exam and into technology, and much more. It will also include a large proportion of practical experience. Enrolment is on

the 9 and 10th September. Further details from F Whitehead, G4MLL, at the college in Wilmorton, Derby DE2 8UG.

And finally for this month, North Trafford College in Talbot Road, Stretford, Manchester are running RAE courses on Monday or Thursday evenings and Wednesday afternoons with Morse classes on Tuesday evenings and Wednesday mornings. Enrol on 9, 10, or 11th September. Mr Beaumont, G3NGD, is the lecturer again. The college can provide further information on 872 3731.

HRT will be pleased to accept details from colleges and adult education centres of RAE courses for publication in the next issue of the magazine.

Testing, Testing

Maplin Electronics have introduced a new range of test equipment designed to be cost effective, fast and accurate. There are at present 5 meters in the 'Precision Gold' range with prices from £6.95 to £42.50.

The cheapest is the pocket multimeter which is apparently a rugged, portable, easy to operate, general purpose meter. At £14.95 comes the M-102BZ which has 23 measuring ranges. Slightly more expensive at £19.95, the M-2020S can also check diodes and transistors and the latter's type and operational integrity. Finally, there are two 'professional' meters — the electronic M-5050 and the digital 5010. Further details can be gleaned from Maplin on Southend (0702) 552911.

● Salisbury RES are holding a 2m contest on 18th August running from 0900 to 1500 GMT. Contestants must operate on frequencies below 144.295 using CW and SSB only and be below the maximum power limit of 250W ERP. The usual contest exchange of call sign, serial number and county is required and the scoring is 1 point per contact, 10 points each for a new county, new country and contacting G3FKF/P. A specially endorsed Salisbury certificate will be awarded to the top 3 contestants.

Repeater News

GB3GN, the Grampian Repeater Group's VHF repeater at Durris, has been modified to reduce the length of 'overs' during the rush hour periods. Between 7.30 and 9.00am and 4.30 and 6pm, talk through has been limited to 90 seconds followed by 10s of beeps and closedown. However, at all other times, 5½ minutes of talk-through time is allowed before time-

out is indicated. The delay from the drop of carrier to the invitation Morse 'K' has been extended to permit greater ease of break-in for anyone wanting to join the net.

The Grampian Repeater Group have also received site clearance for the proposed North Grampian repeater, GB3NG. This repeater will probably have a lower power output as it is intended as a fill-in repeater between the existing GB3GN and GB3SS.

And in the South; the East London Repeater Group have been given site clearance for the relocation of GB3EL on channel R0 and are now waiting for the RMG's assessment. The Sussex Repeater Group have found a new site for GB3SR on channel R7 which they hope will give better coverage than the Datsun House site in Worthing. The new site will be on Truleigh Hill on the South Downs.

● The current vogue for transceivers with voice synthesis capability is a mere sign of today's technology. A more useful device using voice synthesis has been recently introduced by British Telecom for helping speech impaired people to communicate. At the touch of a button, 'Claudius Converse' (Claudius stands for Calling Line Announcements Using Digitally Integrated Voice Synthesis) enables the user to select words and phrases which are transmitted by the equipment's built-in voice.

Round Britain in 52 ½ Hours

Five radio amateurs recently visited the most southerly, northerly, easterly and westerly parts of mainland Britain in the cause of charity in one weekend; and they were transmitting all the way!

All five participants were members of Goole Radio and Electronics Society, and the money raised — in excess of £750 by the time this is published — will go to two charities: the NSPCC, just celebrating its centenary year, and the 'Stop the Rot' appeal of Goole Parish Church.

The main backers of the event were Renault UK, who lent the group a car for the trip, and didn't flinch at the thought of various rigs and antennas being installed. Additional support came from North Sea Ferries, Standard Telephones and Cables plc, the Croda Chemical Group and a local jeweller, Keith Anderson, who supplied prizes for a guess-the-mileage competition. Sadly, a complete lack of interest was shown by the amateur radio traders contacted by the Goole RES.

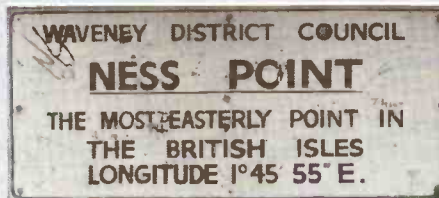
It had been hoped that the special event callsign GB8RBT/M would be granted but the DTI wouldn't wear the use of a special event callsign for mobile operation. To quote: "... if we were to permit your society to use a special event callsign /M, the RSGB could expect to receive many more similar requests of varying significance, which they would have to consider equally." However, they did wish every success in its venture. In the end, the Goole RES callsign, G8HSG, was used /M.

Departure Day

At 5.10pm BST on Friday 3rd May, four members of the team left Goole Parish Church en route for Dunnet Head, the northernmost point. As luck would have it, their very first contact was Alan, G6ZOI, a fellow Goole Society member. Even though operations were limited to 2m, it was well before the Scottish border, that the first Scottish amateur — and the only contact on SSB — was made with Mike, GM6WX/P.

By midnight, Inverness and 36 QSOs had been reached; by 0350 BST on the Saturday morning, Dunnet Head

The first Renaultators' Steve Anderson, Dennis Lockwood, Geoff Cowling, Ray Thomson and Richard Sugden.



'fell', with proof of the achievement being supplied by a friendly lighthouse-keeper. Perhaps it was not surprising that there was very little activity on 2m at this time of morning in Caithness, various repeaters being fired up in the hope of a contact or two, but all to no avail.

It was to take longer than expected to reach Ardnamurchan Point, the most westerly goal, and at one stage it looked as if it might not be reached at all — the petrol gauge registered empty for almost 60 miles on the return to Inverness! Long winding roads and the occasional QSO (even a /MM) did little to buoy up spirits, despite impressive scenery.

None the less, the Ardnamurchan Point lighthouse was reached shortly before noon on Saturday. Ten hours afterwards, at a rendez-vous on the M6 in Lancashire, Richard G8IOH was replaced by Dennis, G6REL with Chris, G3VBI, acted as taxi driver for him.

Steady progress was made throughout the rest of the journey, the self-styled 'Renaultiators' capturing Lizard Point at 0550 Sunday morning. The most easterly point, Lowestoft Ness, was reached, via London, at 4pm Sunday. A total of 43 stations had been worked between Cornwall and Suffolk, including a couple of GB2RS newsreaders who'd given welcome publicity.

2274 Miles Later...

Goole was reached approximately 52½ hours and 2,274 miles after departure; the team had maintained an average speed of 43mph, including stops for food and petrol, and a QSO rate of just three an hour. A total of 58.4 gallons of petrol had been consumed on the trip, and the cost of just under £120 was borne by the participants.

Was it worth the time and effort? Well, a total of 150 contacts were made and, within two days of their return, Goole RES was bombarded with requests for special QSL cards from licensed operators and short-wave listeners, and many donations were gratefully received.

As we've already said, £750 will be raised by the time this appears, and there's no reason to suppose that another, perhaps more challenging, expedition next year wouldn't be every bit as successful. And if your society is planning anything similar, give us here at Ham Radio Today a call, and we'll let others know about it.

Requests for further cards should be sent to: Round Britain Trip, Goole, Yorkshire, accompanied by an SAE (and a donation, if you feel so inclined).



Francis Woolley, G3LWI, has retired as secretary of the RAIBC after more than twenty years at the post. At a recent RAIBC picnic at Romsey, Francis was presented with a gift of luggage by vice-chairman Digs' Acheson, G3WJT.

Mrs Cathy Clark, G1GQJ, takes over as secretary and editor of the newsletter and husband Brian, G1ECE has become treasurer.

Ultimate Decoder?

The Pocomtor AFR 8000 is the follow on model from the popular AFR 2000 and 2010. Like the AFR 2010, it decodes CW and RTTY in Baudot, ASCII, ARQ, FEC and AMTOR. However, unlike its predecessors, it is a stand alone unit, requiring only connection to the audio output of your receiver. It

displays the decoded text on two lines of LEDs which can each display 40 characters. The AFR 8000 can also be linked up to a printer to provide hard copy.

The AFR 8000 costs £684.57 inc VAT and further details of it and the AFR2000 and 2010 can be obtained from Dewsbury Electronics, 176 Lower High Street, Stourbridge (phone Stourbridge 3900630).

Band 2 Changes

The IBA have announced a series of frequency changes for Independent Local Radio (ILR) stations. The stations affected include Invicta Sound which will have both its transmitters' frequencies moved. Saxon Radio, based in Bury St. Edmunds, will have its frequency changed only slightly. The frequencies of Essex Radio's transmitters will move up. Radio Mercury's Reigate transmitter will be moved to 102.7MHz, a frequency presently occupied by BBC Radio Sussex! The frequency of Pennine Radio will be moved from 103.4 to 102.5MHz and Piccadilly Radio in Manchester will be moving from 97MHz to 103MHz.

The IBA aims with these moves to provide room for a new national commercial VHF network. The BBC is also undertaking some frequency changes to facilitate a planned Radio 1 VHF network.

Another aspect of these moves is the advent of community radio. Peter Marcham, reporting in the *Radio Society of Harrow's QZZ newsletter* (June/July '85), states that the two versions of community radio under consideration are 1) a station with "very local coverage for a specific geographical community providing programme material of a general local interest" and 2) stations that cover "a greater area and provide a service to ethnic minorities". Finally, Peter reports that the "Community Radio Licence will permit 10W maximum ERP in frequency range 105-107.9MHz".

The near future will, it appears, see some major changes in Band 2...

Very Special Events...

On 3rd August GB2PYF will be operational from the Penny-Fal Hospital fete on HF and VHF. Abergavenny and Nevill Hall ARC are organising and will be manning the station throughout the day.

GB2TC will be on 3.5 and 144MHz on 17th and 18th. The station is celebrating Henry Tudor's visit to the town, 500 years ago! A special QSL card will be sent to all contacts.

Several special event stations are planning to be on the air over the August Bank Holiday. These include:

GB2TVF which is marking the Towersey Village Festival between 23rd and 26th. Operating from Towersey in Oxfordshire, they will be on HF and 2m and a QSL card will be available to contacts.

GB8SDX and GB6SDX will be operating from 24th for a week. The organisers, radio amateurs from City and Brunel Universities, are intending working from two sites in square IO97 otherwise known as Peterhead in Scotland. They will be using SSB, ATV, RTTY and packet radio on VHF and UHF.

GB2BTF will be on the air from Bassetlaw showground on Sunday 25th and Monday. The station is being organised and run by Worksop ARS and

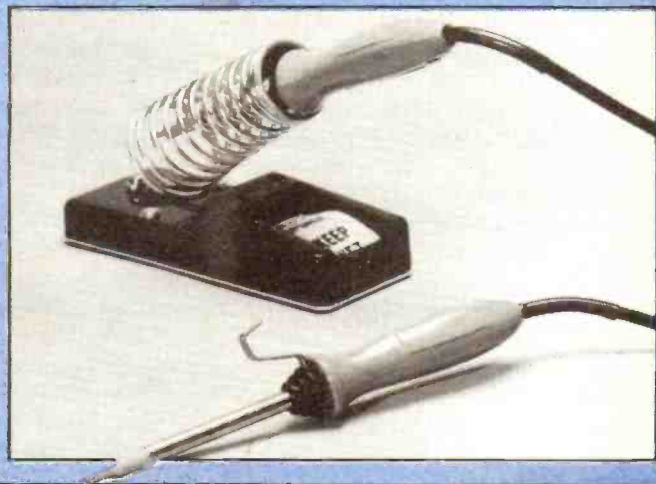
further details will be available from the club.

Finally, Frensham Heights RC have informed us of an interesting incident that may lead to greater things... The club organised a special event station for 25th May to celebrate the 60th anniversary of Frensham Heights School and to raise money, by means of sponsorship, for famine relief in Sudan.

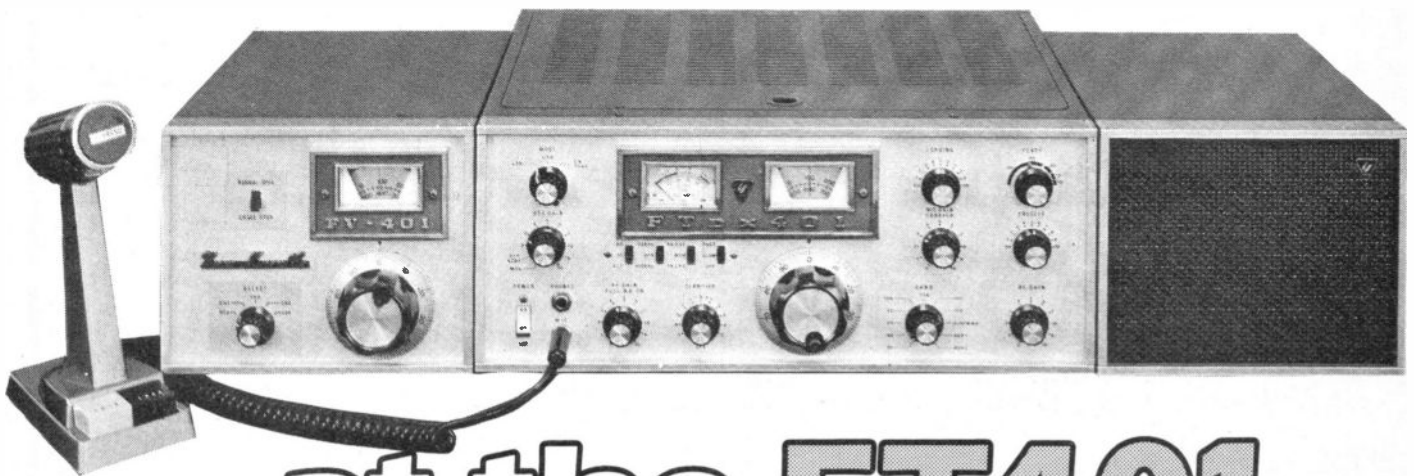
Conditions were not very good and nearly all the contacts made were in Europe. But just as the operators were beginning to wind down, they heard English speaking ST5ALR calling them. ST5ALR was based in El Obeid, central Sudan and the operator turned out to be a field worker with one of the aid organisations. The operator, Al, agreed to send information about the group and their activities and they arranged further contacts.

The club is clearly delighted with this direct contact with the area they were hoping to help and would like to hear from others who are or would like to be involved in an amateur radio famine relief project. Contact Dick Jones, G1JCD, at Frensham Heights School, Rowledge, Surrey GU104EA.

The Oryx Super 30 is a low cost, 17W soldering iron. It is aimed to be general purpose, being reasonably lightweight and able to work off a variety of voltages. Manufacturers Greenwood Electronics claim that it is thermally balanced by a 'unique' current phase angle controller which apparently prolongs the element's life. The soldering iron costs £6.50 excl of VAT plus £1 p&p and is available from Greenwood Electronics Ltd, Portman Road, Reading, Berks RG3 1NE (phone 0734 595844).



A Fresh Look



at the FT401

“80-10 metres; up to 560W PEP input; built in PSU; CW filter and noise blanker; FETs in the VFO for superior stability and valves in the receive chain for reduced cross modulation. Completely self contained — only needs a microphone, antenna and loudspeaker to go on

5520 — 6020 kHz being used on later ones. The easiest way to spot the difference is to check the frequency of the 80m oscillator crystal. This is 9.22 MHz on earlier units and 9.520MHz on the others. A less obvious difference is that a ‘suck out’ crystal is incor-

When correctly tuned into a dummy load a ‘mint’ FT401 will give up to 300W RMS output on the lower frequencies and a little less on 10m. Very few 10-15 year old FT401s will be in such good condition; and so around 200W is perfectly ok if the rig is running at full HT voltage, or about 150W if this has been reduced to prolong valve life, as will be explained later. When tuning up, it is very easy to damage the power amplifier valves. Let the prospective seller do the tuning until you have had time to read and fully understand the tuning instructions.

Where you are unable to test it on the air, a good idea of the general condition of the rig can be obtained by visual inspection. Remove the top and bottom covers and look for signs of modifications, or ‘botched up’ repair work. Examine in particular the range switch, as damaged contacts on this will be very difficult and expensive to correct. Beware of FT401s that are covered in yellow nicotine deposits, as 15 years inhaling cigarette fumes does nothing for the health of a rig. In several cases of late this has been a contributory factor in rigs being written off as “beyond economical repair.”

Back in the early seventies, three of the four most popular Japanese transceivers were made by Yaesu — the FT101, FT200 and FT401. In previous issues, Harry Leeming, G3LLL, has given servicing advice and modifications for the former two. This month, Harry looks at the FT401 and variants, including FTDX400, FTDX500 and FTDX560.

the air with around 300W PEP output power.” No, sorry you cannot rush out and buy one: it is not the latest thing from Yaesu, but the FT401 — production of which was discontinued over 10 years ago!

Fig. 1 shows the block diagram of the Yaesu FT401B transceiver which was the last of a series that included the Yaesu FTDX400, FTDX560 plus Sommerkamp equivalents such as the FTDX500. All these models are basically similar, differing only as to whether AM, a fan, a CW filter, or a noise blanker — as opposed to a noise limiter — is fitted. Very early models of the series have slightly different internal frequencies, 5220 kHz — 5720 kHz being used in the band pass circuit of the variable IF on early models, and

porated in the band pass tuned circuits of later models, giving a cleaner transmit signal.

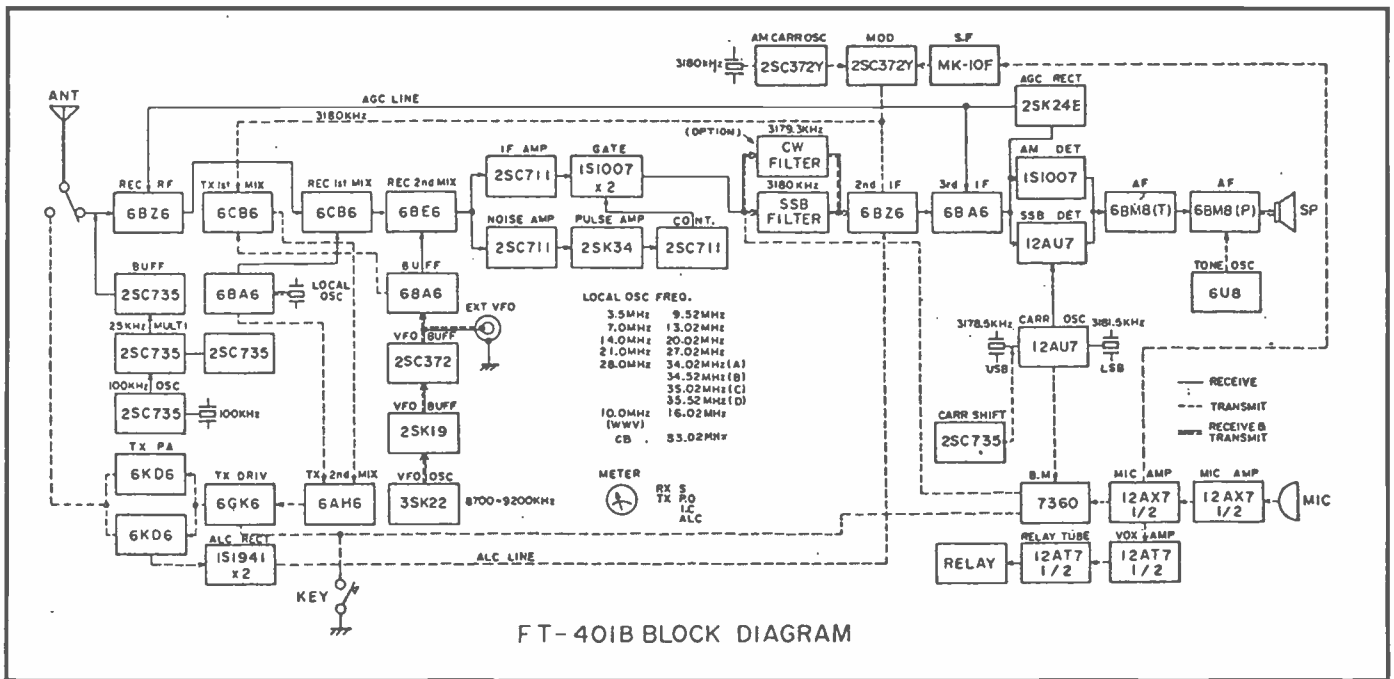
Buying Second-hand

As rigs in this series can be up to 15 years old, their condition varies enormously. Rigs given to the writer for part exchange or repair in recent years have varied from ‘mint’ to ‘your dust bin not mine, please’. Not a great deal of technical expertise is needed to assess the general condition of most samples and an ‘on the air’ trial is highly recommended before parting with your hard earned cash.

The receiver should be lively on all the bands that are ‘open’, and the back ground noise should peak as the pre-selector is tuned in.

Servicing Your FT401

The PA Stage This uses a pair of rather ‘over run’ 6KD6 line output valves which are a common



FT-401B BLOCK DIAGRAM

source of trouble. 6KD6's do not usually die, they are murdered (!) by operator error or excessive time spent in the 'tuning up' process. I have seen many 6KD6 valves which have got so hot mainly due to the latter, that the glass has melted. The instructions in Yaesu's manual do not give a wide enough safety margin, and when selling the FT401s new, we provided the following notes which saved a lot of trouble and expense.

1. Do not connect the FT401 to the AC main supply or switch on without ensuring that the controls are in the following positions: 'mode' set to LSB or USB and not CW tune or AM; 'VOX Gain' should be near minimum but not in MOX position; 'Mic Gain Carrier' should be set at minimum.

2. When tuning up, use in addition to the manual's pre-tuning and final tuning instructions, the following is helpful: use the PTT mic switch to enable tuning to be accomplished quickly — do not switch to transmit using the MOX switch. Keep the meter switch in the IC position and ensure that the meter reading never exceeds 0.2A when pre-tuning, as per the manual's instructions, or when adjusting the ATU for minimum SWR. When everything has been pre-tuned at low power and a low SWR has been achieved, complete the final tuning at full power in the shortest possible time, keeping the meter switch in the IC position. On no account must the IC reading exceed 0.5A for more

than a 2 second burst followed by a 4 second rest.

Apart from PA valve faults caused by user error, these valves can be blown by a failure of the negative bias supply. It should read about -50 volts at the grid of the PA valves with no drive but in transmit mode; and around -90V when receiving. Check this before fitting replacement valves! The most likely cause of reduced or positive bias is leakage in the coupling capacitor from the anode of the driver valve, which can be checked. When replacing the 6KD6 PA valves, try to get a pair of Japanese manufacture, or you may have neutralization problems.

Low output power coupled with excessive IC, and the inability to tune the plate and load controls is usually caused by a defective choke in the anode supply to the PA valves. Similar results occur, however, if there are shorted turns on the tank coil (such as a blob of solder!) or the output coupling capacitor from the anode of the PA goes open circuit. If very little current can be read in the IC position and the valves are ok, check the screen voltages — the 100 ohm parasitic stopper resistors often fuse under faulty conditions.

The Driver Stage. This uses a 6GK6 with a fixed neutralization capacitor of a few picafarads between its input and output. Most FT401s were issued and the driver stage neutralized for use with

General Electric 6GK6. What ever valve was fitted by Yaesu originally it is essential that the same make is used if replacement becomes necessary, otherwise the driver stage neutralization will be incorrect. This results in the pre-selector peaking at different points on Tx and Rx, with either a tendency to low drive or even driver stage oscillation. If you cannot get the correct driver valve, remove C81 and fit a 10pF trimmer in its place. Adjust this until the driver grid circuit peaks at the same point on Tx and Rx along with stable operation of the stage.

Shortage Of Drive. As with the FT101 and FT200, an 'untraceable' cause of very little drive can be shorted turns on L6 in the driver stage neutralizing circuit. Replace with an 100-1000uH choke to check, then obtain and fit the correct item.

With a rig that is in good condition, you will find that there is excessive drive on 80 and 40 metres, but that this falls off, so that on the highest frequency bands there is only just about enough. As the set ages and drive falls, power falls off appreciably on 10 and 15 metres, long before the lower frequencies are affected. This effect can create some confusion because it is often due to a component which is common to all bands, but which is incapable of delivering the extra drive needed on 10 & 15 metres. Valves can only be properly tried by

substitution — the most likely culprits for low drive are the 7360 and the 6GK6.

Microphone Gain/Carrier Control. In all but the FT401B and the last few FT401s, this control functions in the CW and tune position by unbalancing the 7360 balanced modulator valve. There should be very little drive with the CW carrier control at minimum, if there is appreciable drive then the carrier balance is out. To adjust, slightly off tune the pre-selector so that the IC current can not exceed 0.2A with full drive, and then set the carrier control at minimum. Locate the carrier balance control (indicated on the last page of the user manual and on the PCB) and carefully adjust for minimum output. Re-peak the pre-selector and check that there is very little output with the carrier control at zero. If this setting drifts excessively, try cleaning the pre-set control, and if this fails fit a new 7360 valve.

Receiver Dead? A common cause of this trouble is a leaky trimmer capacitor TC 205. This runs from the grid of the second Rx IF amplifier to the grid of the transmit first mixer — a leak here causes the Tx cut off bias to kill the receiver. Adjusting and cleaning the trimmer usually results in a temporary cure, the final cure being to fit a new trimmer which is then peaked for a maximum drive on CW transmit.

If the receiver sensitivity falls off as the rig heats up, this is almost always caused by an AGC controlled valve flowing grid current. Replacing the 6BA6 IF amplifier valve with a 6BA6W is the customary solution to this problem. The 'ruggedised' version of the 6BA6 stabilises also the 'S' meter zero setting.

The Power Supply. Despite developing quite a lot of power in quite a small space, very little power supply trouble occurs, and burnt out mains transformers are normally unknown as long as the correct 5A fuse (10A for 110V) is used. As in most modern power supplies, the most common fault is rectifier failure, and these can be replaced with BY 127 type general replacements. If an HT rectifier fails, it is better to replace all eight in the circuit, rather than have the

job bounce back next week. The AC supply for the high tension is taken from a 600V tap on the mains transformer to give the quoted 560W PEP input. Practice shows that if this is removed and reconnected to the 460V position, input power is reduced to around 400 watts. This extends the PA valve life and allows a larger margin for error when tuning. This will result in negligible reduction of signal strength and we always sold FT401s re-wired this way, unless otherwise requested by the purchaser.

Alignment

Due to heat, age and nicotine, the FT401's alignment can drift considerably — resulting in a 'deaf' receiver and poor transmit drive with little or no ALC action. Alignment details are given in the manual and the notes below are not complete without reference to them.

Aerial RF and Driver Coils.

Aligning these is complicated by the fact that the driver cores (the ones nearest to the PA valves) have usually seized up solid. *Do not force them*, there is an easier way! Set the rig to the centre of each band and tune in to a callibration point. Switch to Tx and tune up for maximum power, reducing the drive to give about 0.1A IC. Trim RF core (if sealed with wax, warm with a soldering iron — don't force it!) for maximum drive whilst trying the pre-selector slightly either side of the peak. Adjust the combination of the pre-selector and RF core until maximum output power is attained — *backing off the drive control as necessary to avoid damaging the valves*. Switch back to receive and, without touching the pre-selector control, adjust the relevant aerial core (the one nearest the front of the set) for maximum receive sensitivity. Following the above course of action should result in perfect alignment without the danger of breaking an almost irreplaceable core.

The 5.5-6 MHz IF Band Pass Filter. After trying everything else, if your rig is still short of drive, the fault is probably a drift in alignment of this band pass filter. Remove the sticky tape from the top of the screening can and note three holes.

Use a small screw driver with an insulated shaft (there is 150V on the trimmers, so be careful!) and note that there are two trimmers in shallow holes and one in a deep hole. Set the rig at 14.05MHz and peak the pre-selector with the rig in the Tx mode, setting the carrier control to give an IC of about 0.1A. Adjust one of the trimmers in the shallow holes for maximum IC backing off the carrier control if necessary to keep the PA current below 0.15A. Next, tune up at 14.45MHz and repeat the procedure with the trimmer in the other shallow hole. Then, peak the trimmer in the deep hole with the rig set at about 14.25MHz.

Carefully repeat the above three actions a few times, until it is possible to get a fairly even amount of drive right across the band. If you can only get adequate drive at one end of each band and adjustments to the band pass filter will not improve things, check the alignment of T207, which is the VFO's band pass filter. Measure the VFO's injection voltage on pin 1 of V201 with a diode probe volt meter — it will vary as you tune across the band with the drive set at minimum. Peak the two cores in T207 to give a good response over the VFO's 500kHz tuning range.

Mic Gain. The FT401 does not have a great deal of mic gain to spare. With the correct microphone, the control is likely to be well up on 80 and 40m and almost flat out on 10 and 15m (except that is for that breed of 'hams' who instinctively shout as soon as their eyes light on a microphone!). Not having much gain to spare means that it is essential to use the correct microphone. This should be a high output dynamic type with an impedance of 50 kohm; a high output crystal or ceramic microphone will just about work, but a standard low impedance microphone made for a modern ham or CB rig will just not do.

The New Bands and 160m

As all late FT401s use the same crystal frequencies as the FT101E, it should be possible to fit three extra bands using the WWV, Auxiliary 1 and Auxiliary 2 posi-

tions. 10-10.5 MHz is already fitted for receive only on the WWV range and so the only extras needed are a driver coil, a few capacitors and a 'tap' on the PA coil. The writer has *not* tried this, however, so please do not ask for advice.

Some FT401s have been adapted to 160m as years ago, my company did market an FT401 160m kit. The parts are no longer available, but if you want to wind your own coils, I can photocopy the wiring diagram and instructions upon receipt of a stamped addressed envelope and 30p in stamps. I must, however, emphasise that we do not have any parts or coil winding details, so that these instructions are supplied on a strictly "sort it out for yourself" basis.

Spare Parts

Even Yaesu do not hold spare parts for ever, and some bits and pieces are difficult to get hold of. Substitution is the answer here and often parts from later rigs will do. TV line output stage disc ceramic capacitors work well in the PA



One advantage of older rigs, such as the FTDX401, is the well spaced and large controls. Here is a tuning control you can really get your hands around...

stage, and most items are exchangeable, even if it means drilling a few holes — fortunately there is plenty of room. If you are really stuck and the official importers (AE UK at Birmingham and SMC at Totton, Southampton) cannot help, it is worth writing direct to Yaesu in Japan and ordering direct. You will have to pay in Yen but your bank

can arrange this at the usual handling charge!

A *good* FT401 is a super rig which will still hold its own against most other rigs. However, some are really past it, so do check carefully before parting with your money. Repairs are one thing but the new lamps for old department is now out of business.

**CALL THE REST, then . . .
CALL THE BEST . . .**

RECEIVERS: FACTORY FRESH STOCK JUST IN!

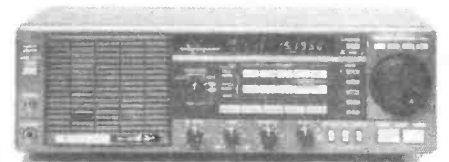
Western your **"SINGLE SOURCE"**
for
KENWOOD & YAESU



R-600



R-1000



R-2000

DESCRIPTIONS:-

R-600

The R-600 is a high performance general coverage communications receiver covering 150 kHz for 30 MHz in 30 bands. Use of PLL synthesized circuitry provides highly accurate frequency control with maximum ease of operation. Use of the latest technology assures the ultimate in short wave listening enjoyment on all covered frequencies, whether using AM, SSB, or CW modes of operation. The compact size of the R-600 allows the user the maximum flexibility in placement of the radio, and the front mounted speaker permits the radio to be located between shelves without degradation of audio quality.

R-1000

The R-1000 is a high class general coverage receiver covering 30 bands from 200 kHz - 30 MHz with a PLL synthesizer that incorporates a variety of KENWOOD's sophisticated electronic technology acquired over many years. Both a digital display readout (1 kHz step) and analog dial are provided for more convenient operation. The R-1000 also boasts a quartz digital clock with timer, three IF filters, RF ATT and TONE control, etc, to enhance receiving conditions for each mode. Due consideration has been given to innovative design and compactness, making the R-1000 indispensable for Amateur radio operators, professionals, BCL's and SWL's, etc.

R-2000

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High Gain 'Omni' Antenna for 2m

The antenna consists of two $\frac{5}{8}$ wave elements joined together by an eighth wave phasing section, as in a conventional collinear antenna. Performance is equal to that of a commercial 'Ringo Ranger' and the

Cover the matching section over its entire $10 \frac{1}{4}$ " length with a couple of layers of PVC tape.

Take the bottom element of $\frac{5}{8}$ " aluminium tube, $55 \frac{1}{2}$ " long and slide a plastic funnel, of the

Vertical 'omni' antennas giving a reasonable amount of gain can be expensive. Why not try this straight-forward design giving 6dBi which can be built with a few hand tools? Design by Jim Pestell, G3BPB.

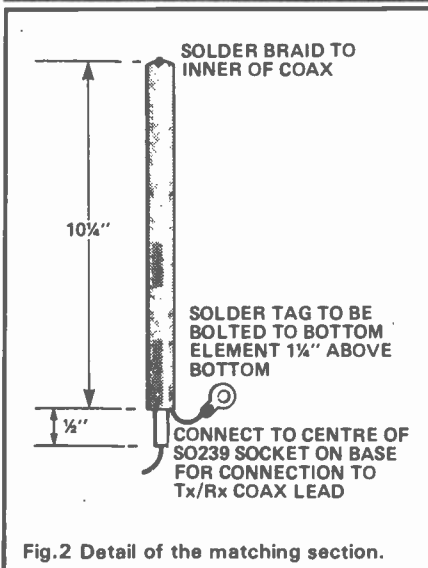


Fig. 2 Detail of the matching section.

antenna will give about 6dB gain over a $\frac{1}{4}$ wave vertical antenna. It needs only a simple ground plane, consisting of four 19" rods, and makes a very superior radiator for vertical 145MHz FM working.

Construction

The general construction of the antenna is shown in Fig. 1. The first thing to do is to make up the coaxial matching section necessary at the base of the antenna, as shown in Fig. 2. Strip off the insulation from a 1" length of U43 or U76 coaxial cable and prune to length as per Fig. 2. At the end indicated in the drawing, solder the coax braid to the inner. Be careful not to keep your soldering iron too long on this joint as too much heat will tend to melt the coax inner.

type obtainable at hardware stores for filling cans etc, over the bottom element and the matching section as in Fig. 1. Once in position the funnel, which will act as a rain cover, is taped in position and weather proofed with two coats of clear varnish. Before fixing this, the bottom 1" of the element should be tightly fitted in a dome type conduit cover, once again, obtainable at a good hardware store.

The bottom element and conduit cover is then mounted in the centre of a 6" square of $\frac{1}{2}$ " thick paxolin or perspex, which has been first drilled to take an SO239 socket. The position of the socket is not particularly critical, but this should be mounted just *outside* the radius of the conduit cover — see Fig. 3. As the diameters of different makes of conduit cover will vary slightly, this distance is difficult to fix. The inner of the phasing stub should then be connected to the

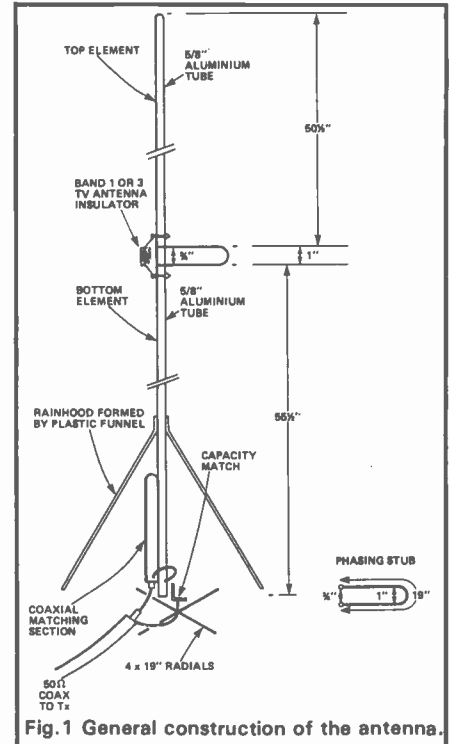


Fig. 1 General construction of the antenna.

centre pin of the SO239 and the outer attached to the bottom element close to where this enters the conduit cover with a solder tag and a suitable nut and bolt.

The top element of $50 \frac{1}{2}$ " can now be cut and joined to the bottom section by an old Band 1 TV Yagi, dipole or crossed dipole centre piece. There should be a $\frac{3}{4}$ " spacing between the top and bottom element inside the TV antenna centre piece.

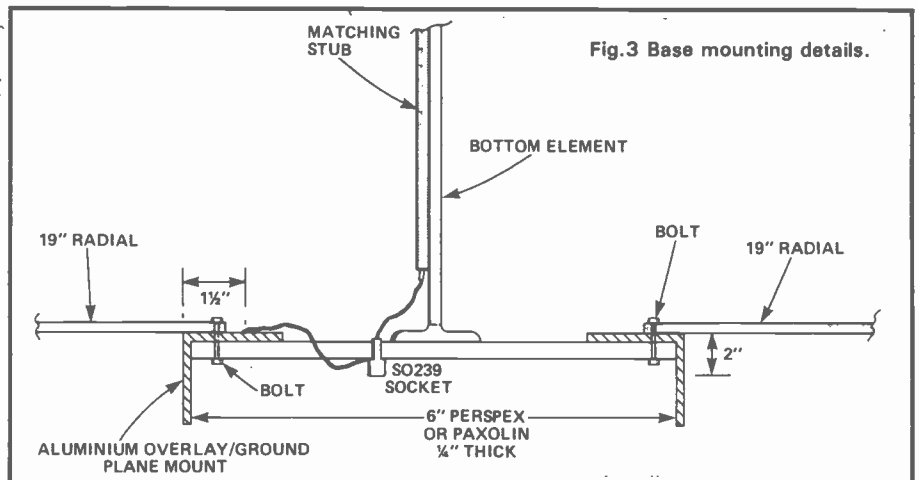


Fig. 3 Base mounting details.

The next thing to be fitted to the antenna is the phasing stub. This can be fabricated out of 10, 12 or 14swg varnished or enamelled wire, the heavier gauge the better. The phasing stub should be attached inside the TV centre piece, one side being attached to the top element of the antenna, the other to the bottom (the centre piece may need to be drilled to achieve this).

When all nuts, screws and bolts have been tightened, give them two coats of varnish. The antenna should now be fitted to the base mounting plate, a 6" square of at least 14swg aluminium sheet, with a two inch border bent down at 90 degrees all around, so that we have a 6" square which fits neatly over the perspex base (see Fig.3). Prior to bending down the border, a 3" square hole must be cut in the centre of the aluminium square to clear the conduit dome cover. The four radials, consisting of four 19" lengths of 3/8" aluminium tube, are mounted in each corner of the baseplate diagonally, so that the antenna end of the radials extends to the inner

Fig.4 Top view of base mounting.

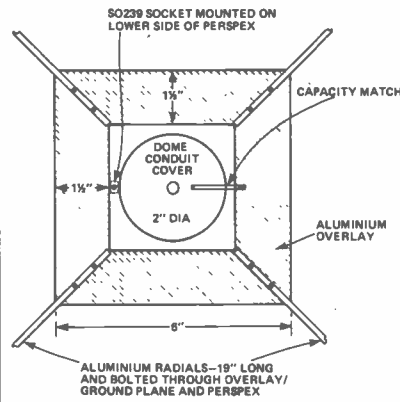
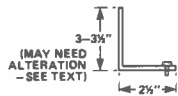


Fig.5 The capacity matching section.



boundary of the base plate (see Fig.4).

The outer of the SO239 socket mounted on the paxolin/perspex is now connected to the aluminium overlay/radials by means of a short length of 14swg wire. A capacity matching section is now constructed from a piece of 14swg

aluminium, 1/2" wide and bent into an L shape (see Fig.5). This is bolted to the aluminium overlay so that the 3 1/2" vertical part of the L is approx 1/4" from the antenna.

The matching is achieved through varying the capacity between the ground plane and the radiator. This is practically done by varying the distance between the matching section and the antenna until the lowest SWR is achieved at 145.5MHz, with your 2m Tx supplying power via 75 ohm coax plugged into the SO239 with the appropriate plug. If varying the distance between the radiator and the matching section fails to achieve an SWR of at least the matching section it should be shortened a few mm at a time until the desired effect is achieved. The matching procedure is best carried out with the antenna 7-10' off the ground.

Actual mounting of the antenna is left up to the requirements of the individual reader. In the author's case, two 5/16" holes were drilled in the aluminium overlay border and the antenna bolted to his mast.

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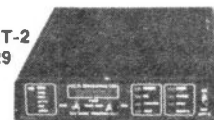
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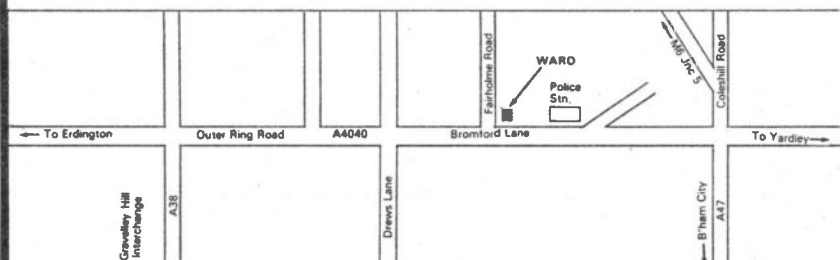


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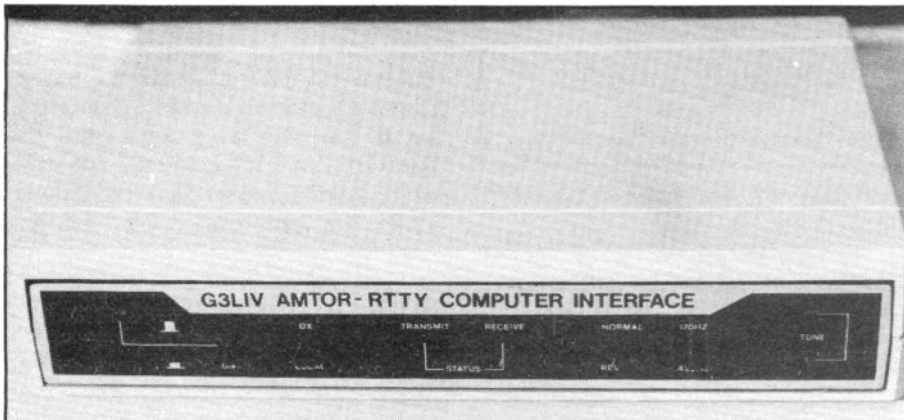
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AMTOR with the BBC 'B' and G3WHO E-PROM



Following on from my article in which I reviewed the new AMT-2 all mode Terminal Unit from ICS Electronics, here is a solution for those of you who do not have lots of the 'ready' to purchase such an item of equipment but have access to a BBC 'B' microcomputer.

beginning! Peter, G3WHO, and Johnny Melvin, G3LIV, (of the SSTV and RTTY interfaces for the BBC 'B'), have got together and Johnny has produced suitable units to suit Peter's new program and the BBC 'B'. The program, incidentally, is on EPROM and is plugged into

adjust the delay to suit your particular transceiver for DX/local working. The latest version of the EPROM includes a display of the actual delay time in milliseconds at the top right of the monitor screen, so that there should be no trouble to arrange for your unit to give the *best* possible results for local working and for DX. In addition, by pressing 'Control L', one can toggle (switch) between the existing short delay that has been set up, and the maximum of 50 milliseconds for local working.

The 'Amtor Controller' needs a Terminal Unit between it and the transceiver, and it is designed, primarily, to work with the G3LIV dedicated BBC 'B' Terminal Unit, although it can be used with his Mk2 and Mk3 PCBs.

The second unit supplied for review was in fact the G3LIV dedicated TU. This is the same physical size as the Amtor Controller and can sit either on top or below the Controller. A 20 way ribbon cable connects to the BBC 'B' User Port, using an IDC female connector, with the other end parallel looped to both the Amtor Controller and the dedicated RTTY interface via IDC female connectors.

The Amtor Controller has a 2.5mm socket at the back, for the PTT connection from the rig. The RTTY interface has a 3.5mm socket at the back to take the audio in from the receiver and the tones out to the microphone circuitry of the rig.

A potentiometer is located at the back right of the PCB for the adjustment of the level of the audio tones feeding the microphone input. The instructions, quite rightly, emphasise the need for care to be taken not to overload the PA stage

Recently, we looked at the latest AMTOR unit from ICS. Now, Ken Michaelson, G3RDG, investigates a budget software based approach to the mode using a BBC 'B' computer. Read on...

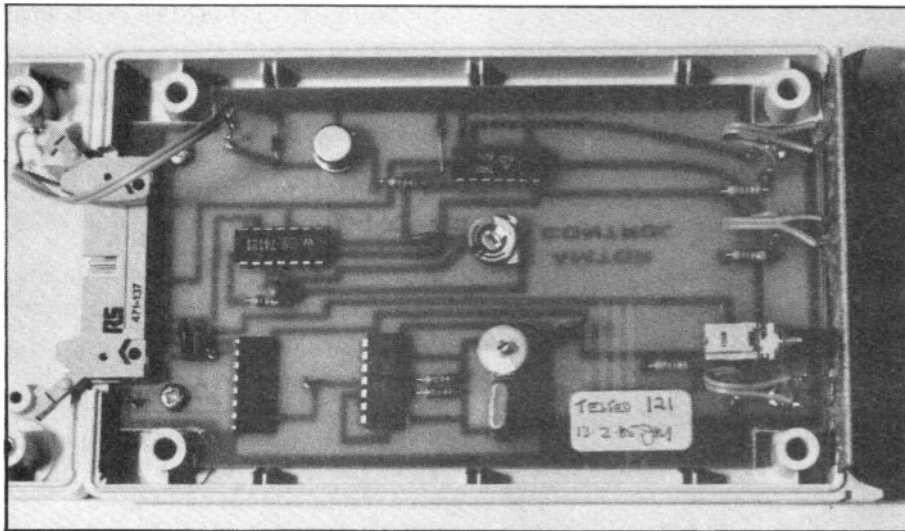
Peter Harris, G3WHO, is the man who wrote that excellent RTTY program for the BBC 'B' which I discussed in a previous article in this magazine (HRT February 1984). He has now written a program for AMTOR (almost) 'stand alone'. This means that using the BBC 'B' and either the dedicated RTTY Terminal Unit interface for the BBC 'B' or the G3LIV Mk 2 or Mk 3 RTTY Terminal Units, we can receive or transmit AMTOR, either in the 'ARQ' or 'FEC' mode. There is also a 'Listen' facility. In addition, by loading in the G3WHO RTTY program, one also has the RTTY send/receive facility.

But I had better start at the

the computer in a spare position.

The result is a unit measuring 1 3/8" high x 3 1/2" wide x 6" deep, called the 'Amtor Controller'. Unfortunately, the BBC 'B' internal clock is not accurate enough on its own for AMTOR. Experience has shown that software programs for other computers can run into problems with loss of phase during QSOs, which is very frustrating for both ends. So, in fact, the controller is essentially an accurate 1kHz timing reference, and interfaces with the Beeb via the User Port.

Also provided on board is a solid state PTT switch and PTT delay circuitry. This allows you to



Inside the G3LIV 'AMTOR Controller'

of the transmitter/transceiver.

Operating The System

Since this is, primarily, a review of units to enable the keyboard enthusiast to operate using AMTOR with as reasonable an outlay of hard cash as possible, I will start with comments on the operation of the unit and the program. First of all, the program. I find it excellent, and as a confirmed AMTOR addict, could not fault it in any manner. The extra facilities offered in the program make it, in my view, superior to any of its competitors. It is very similar to the G3WHO RTTY program in that it runs on 80 columns. (For the benefit of those of you who are not familiar with 'Computerese', columns means number of characters per line, and it took me some time when I started, to understand this!!). When the EPROM is plugged in and the computer switched on, the program is called by typing '*AMTOR', whereupon you are asked to insert the time in hours and minutes. Having done that and pressed 'Return', the Menu appears. All this is in colour, if you are using a colour monitor of course, and looks very pleasing indeed. There are seven choices in the Menu as follows: 1). **Mailbox**, 2). **Edit messages**, (which means that you are able to insert up to six 254 character messages which can be recalled at will by pressing Function keys 1 to 6), 3). **Save messages**, (to disc or tape), 4). **Load messages**, (previously written and saved), 5). **Alter callsign**, (the EPROM comes with your own

callsign and Selcall in it), 6). **Alter Selcall**, (same remarks apply), 7). **View text**, (this will allow you to view all the text previously received and still in the buffer. You are able to save it, print it or clear the buffer).

The next thing is to get the display prepared for receiving/transmitting, and this is done by pressing 'Escape'. It is a split screen display, with the top half of the screen showing the received text and the lower half the text about to be transmitted. That is to say that you can type your text before actually transmitting it, in fact, even while you are copying the other station's transmission! The very top line of the screen shows the status information, and this is displayed in a very fine clear manner. There are six pieces of information which are available. They are: the mode of reception/transmission (ARQ or FEC); the state of the unit, (Standby, Phase, Traffic, Idle, Error or RQ); Receive/Transmit /Listen, the word 'Printer', if the printer is switched on; (Shift/F6), the current time (input at the commencement of operating) and, on the latest EPROM, the delay in milliseconds on the PTT line, (mentioned previously).

The actual wording of the status line is not the same for both ARQ and FEC. In ARQ, the second column shows as above, but in FEC it will only show 'Idle', 'Traffic' or 'Error'. An interesting piece of information is shown in the second column when actually calling a specific Selcall, where the word 'Call' appears followed by the

Selcall you are calling. Finally, to my mind the *most* useful display of the lot, and one which made the tuning in of stations so simple that the veriest newcomer could do it. This is achieved by a two dot display in the top righthand of the screen. It shows, in fact, that the program has locked with the other station, and although I have been operating AMTOR for perhaps three years now, I found it a very great aid. It is interesting to note that Peter Harris, G3WHO, modestly dismisses this excellent facility in one short sentence!

But to continue... When transmitting, all transmitted text, both in ARQ and FEC is 'echoed' back to the top screen when sent. In addition, all received and echoed text is put into memory for later QSO review, and, (a great help for log keeping), all transmissions initiated by you are time-stamped. Further, all the text in the QSO review buffer can be printed or saved to disc/tape as you wish. (See my remarks on the Menu above).

At the end of an AMTOR QSO by sending '* ' the program closes the transmission and automatically sends your callsign in morse. A further interesting key is ' ' which, when pressed, sends the current time.

So far I have not given any details about Option No.1 on the Menu. The Mailbox facility in this program is a simple one. The unit will respond to your Selcall when sent and take messages for you, either on the printer or in the buffer, (which can be saved to disc or tape). It will then sign off with the time. If you have answered 'Yes' to the CW ident prompt, then a CW ident will be sent, and the system will return to standby and reset ready for the next call. I should draw your attention at this point to the fact that doubts have been expressed as to the legality or otherwise of unattended AMTOR operation within the terms of the Amateur licence.

Final Thoughts

I shall not describe the actual methods of achieving ARQ and FEC contacts, because I have discussed this before, but suffice it to say that this program makes the whole thing simple and easy. In the latest version of the EPROM there is yet

another operator's aid. The keys 'Control+A' are disabled except when on Standby. This is because it is easy to press 'Control A' instead of 'A' by accident when typing, which causes the QSO to be lost. I know, I've done it a number of times!

Peter Harris's manual explains everything very clearly, and using the units I had a number of enjoyable contacts. As I mentioned above, the Amtor Controller, (which is the Clock/PTT interface), required an RTTY interface to act as a MODEM, and is then able to transmit and receive RTTY without any alterations to the units. Simply load the G3WHO RTTY program from either disc or tape, or for that matter call up the program from the available EPROM by typing '*RTTY', and you are away in the RTTY mode!

As to which units are selected, if you already have the RTTY interface or the Mk2 or Mk3 board from G3LIV, then, obviously, the 'Amtor Controller' is the only thing required apart from the EPROM. If you are starting from scratch, then



If you already own a G3LIV RTTY interface for the BBC 'B', you only need to purchase the 'AMTOR Controller' unit and the E-PROM (see above). For those starting off, a combined unit is available (see picture on 1st page of article).

the complete AMTOR-RTTY interface is the thing.

Having used the equipment for some three weeks, more or less

continuously, I have nothing but praise for them. The finish of the items and the ease of operation, due to Peter Harris's two programs, makes the units, in my view, *the* equipment for AMTOR and RTTY. Leaving aside the matter of price, this setup would still be my choice, but when one considers that it *is* also considerably cheaper than its rivals, there seems to be no argument.

Amtor Controller (board alone £28, boxed £43); EPROM (£27); RTTY computer interface (boxed £77) and G3LIV Amtor/RTTY interface (complete unit £112.50). The double ended cable supplied is an extra £10.

All these prices include VAT and postage. Thanks are due to Peter Harris, G3WHO, of 10 Appleby Close, Great Alne, Alcester, Warwickshire B49 6HJ for the loan of the EPROM and from whom this can be purchased, and to Johnny Melvin, G3LIV, of 2 Salters Court, Gosforth, Newcastle, Tyne and Wear for the loan of the three units.

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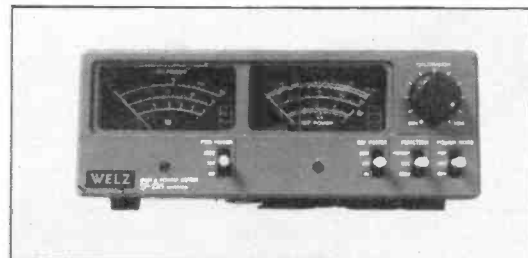
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OPINION

The RSGB – an Open Society?

The following article was written by Geoff Smith, G4AJJ, who until recently was an Ordinary member of the RSGB Council. He resigned from that Council over fundamental disagreements on how the Society should be managed. In a letter from

tion, but have little means of establishing whether that Council is fulfilling that responsibility efficiently or not.

RSGB membership has grown considerably over the years as has the hobby itself and until fairly

in technology, some of their books are somewhat out of date. The most popular RSGB publication is of course the 'Callbook', the latest edition of which came out in April.

The growth of the publications side of RSGB highlights the fundamental change that has taken place within the Society itself – developing from a dedicated group of experimenters to a National Society with 10s of thousands of members. The Council tries to meet the varied demands of those members on the one hand, whilst now being required to run the Society as an efficient and profitable business on the other.

Are you a member of the Radio Society of Great Britain? How much do you know about how the Society works? Geoff Smith, G4AJJ, recently resigned from the RSGB Council. . .

the current President of the RSGB, Mrs Joan Heathershaw, G4CHH, accepting his resignation, these differences of principle and therefore policy were acknowledged, with a further acknowledgement of Mr Smith's sincerity with regard to the well being of Amateur Radio.

A member of RSGB since 1959, Geoffrey Smith was first licensed as G8ABL and has held several DX calls. He has been Secretary of the Bahrain and Hong Kong National Societies, built and installed IBP Beacon A9XC and the 2m repeater, VS6KP. Active on most bands, he is the GB2RS main newsreader for the Scarborough area.

Married with 2 young children, his XYL Anne is also licensed as G4LSS and is a member of the YLRL.

Some readers of *Ham Radio Today* will not be members of the RSGB, but most who are will know that the Society represents all UK radio amateurs. Equally, most RSGB members will have detected from reports in the Society's journal 'Radio Communication' that all is not well at 'Potters Bar', but probably have no real idea as to what is going on behind the scenes. They will know that the task of managing the RSGB is vested in the elected Council of this 60 year old institu-



tion, but have little means of establishing whether that Council is fulfilling that responsibility efficiently or not.

RSGB membership has grown considerably over the years as has the hobby itself and until fairly

in technology, some of their books are somewhat out of date. The most popular RSGB publication is of course the 'Callbook', the latest edition of which came out in April.

Personal Service?

Several obvious conflicts were bound to arise and did – the conflict between personal service to the members and the real cost of providing that service was one. The demands placed on the Membership Service Dept., pro-rata per member, increased dramatically over the last decade, reflecting the large number of newcomers to the hobby and, indeed, the falling average age of those new amateurs. This demand was met by computerisation of transactions handled by HQ and there are hundreds of enquiries each working day. The original computer has since been replaced for such tasks – the current 'box of tricks' is fairly advanced. Provided one doesn't mind receiving standard letters in reply to 'standard' enquiries, all is well but large computers have to be paid for.

Another conflict was between the workload at HQ and the facilities available (notably space). This was resolved by selling off the old HQ building in central London and moving to spacious premises at Potters Bar; although some of us

would have preferred a new premises in the Midlands, the move was a good one in terms of finances since a handsome profit was made.

In spite of the computers and the new premises, the conflict between workload and available staff effort/expertise was still present; finances have prevented this being solved by recruitment of additional staff and so the Society's Committee system was strengthened with Chairmen being appointed by, and reporting directly to, Council.

The Committee System

As with much of Society affairs committee members give their time freely, although they can claim travel & meal expenses; committee members are chosen by the Chairmen and not necessarily even have to be RSGB members. They are chosen for what they can offer to the committee; there is no requirement for each committee to have a member of Council as a member of it, although this is encouraged for obvious reasons. The 'senior' Committees such as Finance and Staff, Membership and Representation, Licensing and Advisory, are however dominated by Council Members. Whereas some committees have no Council members and some Council members do not serve on any committee, there are Council members who serve on as many as 8 committees.

From the foregoing, the reader might be forgiven for thinking all was pretty rosy, as a result of what amounts to considerable reorganisation of the RSGB in recent years, but this is in fact not the case. While all this was going on within RSGB, the world outside was changing fast! CB was legalised, PCs became common place in many homes, the RAE was rationalised and the ravages of unemployment took their toll. The repeater network, together with easy-to-use rigs for VHF and UHF, resulted in more UK amateurs talking to each other than ever before and activities such as the exchange of software (non-copyrighted versions of course!) become common place. They were talking to each other but unfortunately the RSGB wasn't doing much talking with them at all; RSGB was talking to

the DTI, the IARU etc but *not* to the grass roots membership.

In an attempt to run the Society efficiently, a gap with the membership developed. The only flow of information was one way — via Radio Communication and to a lesser extent via GB2RS. Newsletters to affiliated clubs were out of date and in any event incomplete, in that whereas news items were (and are) reported, no indication of current 'thinking' or details of 'what was being looked at' were given. A veil of semi-secrecy prevails as regards 'in-house' events of Council and the Committees — this semi-secrecy remains as policy from the President down.

The RSGB's elected Regional Representatives together with Area Reps. had the impossible task of trying to bridge the gap, but sheer workload coupled with lack of detailed up-to-date information prevented miracles being performed.

The Results

Some of the more important problems which have occurred as a result of the foregoing are as follows:

- 1) A decline in RSGB membership in real terms — as a percentage of licensed amateurs it is currently just over 50% and if present trends continue unchecked will fall well below that psychologically important figure by the end of this decade.
- 2) RSGB has started to run up an annual deficit on current account, reflecting a slow down of growth in membership income. Panic measures have been recently instigated to counter this problem including the reduction of ORMs (Ordinary Regional Meetings) to only one a year but these measures are short term expedients which hedge the real issues.
- 3) There has been a general decline in operating standards on most bands — mainly due to inexperience; this could have been a trend the other way if tackled earlier by the RSGB.
- 4) RSGB Council has allowed itself to delegate much more of its elected responsibilities either to HQ (via the General Manager) or to the various Committees than is desirable. From the point of view of HQ, this puts a considerable burden

on the General Manager and his staff. From the point of view of committees, there have been several results; firstly the additional workload has meant many items take months before they are concluded and last minute panics often result in committees by-passing Council (to whom they would normally submit a recommendation) and taking action directly. Secondly, the whole process becomes further bogged down if more than one committee is involved, particularly if those committees cannot agree over an issue. A classic example of this is the issue of Novice licences where disagreements at all levels has resulted in recent proposals for an 'intermediate' licence which will be seen by many as an unfortunate and indeed unnecessary compromise.

5) Over recent years, successive Presidents & Councils of RSGB have become what can only be described as paranoid about confidentiality. Some items of RSGB affairs are indeed confidential in that they are commercially sensitive under the terms of the UK Company Law; staff salaries and details of publication costs and margins are clear examples. However, most items discussed at Council or Committee levels *do not* come in this category and should be available to the membership. Council dictates though that *all* is confidential and Council members are expected to abide by this dictate. *To those on Council who believe in an 'Open' Society, who believe the membership should know what is going on and that they should be consulted, such secrecy is totally alien and unacceptable.*

There are other problems arising from the aforesaid, but in the interest of brevity it is not necessary to delve further — the reader should by now have the gist of the basic problems at RSGB.

Heated Affairs

It is therefore not surprising that over the last year or so in particular, that Council Meetings have been heated affairs. They tend to be dominated by a well informed nucleus of long serving individuals, some of whom, as I have said, also serve on up to 8 committees! It does not follow necessarily that



The RSGB on show at the NEC, Birmingham.

quantity of involvement means quality of work.

Last year's AGM and associated EGM was also a heated affair; the chair refused to accept moves for a vote of no-confidence in Council on the grounds of tedious points of order. Prior to the AGM, many months before, attempts were made to ascertain how such motions should be included or could be included on the Agenda. No one ever found out! — draw your own conclusions from that as you will. At the AGM, though, the 'old guard' were clut-

ching hundreds of hastily gathered proxy votes to ensure the outcome of those motions that *were* on the agenda.

Some Ideas

So where should we go from here? What is the best way forward? What form does RSGB have to look like in order to best be able to tackle the future? By now the reader will probably have some of his or her own ideas but the following are offered as food for thought:

1) Conduct an 'Open' Society and eliminate the autocracy by in-

roducing a more up to date system of representation.

2) Ensure that Council does not delegate more of its elected responsibility than is prudent — for the average member, the best way to achieve this is via the ballot box at Council election time by choosing the members who will most likely be in sympathy with them.

3) All aspects of RSGB finances, both income and expenditure, should be reviewed with a view to more efficient management of resources.

4) The rule book is hopelessly out of date and is currently being revised. It is up to the membership to ensure that they are consulted over this very important aspect and to ensure that Council does not just pay lip service to such consultation.

At the end of the day, the future well being of amateur radio in this country is very much dependent on the well-being of the RSGB and the time has come for the membership to insist that RSGB operates as *they* wish it to — not necessarily as a minority think it ought to be.

Addendum

The T2FD Resurrected (p31 June '85)

The balun - designed by G6XN - suggested by John Heys should be made with a ferrite rod of diameter $\frac{3}{8}$ - $\frac{1}{2}$ inch. The wires should both be 10 inches long and must be either new or undamaged as cracks in the enamel may cause short circuits. The diagram Fig. 3 may appear misleading; the number of turns depends on the rod used and the spacing between the turns is not critical as long as the correct length of wires is used.

Receiving Weather Satellites (p12 August '85)

Due to lack of space, we missed off the list of recently published articles which is reproduced below.

Weather pictures on the Beeb; Terry Weatherley; Radio and Electronics World, April '85
Receiving Weather Satellites on the BBC 'B'; Michael Furninger; Acorn User, August '84. Contains information on how to obtain software and complete instructions necessary to build hardware.

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See review of the MICRON in the latest issue of SPRAT

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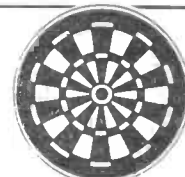
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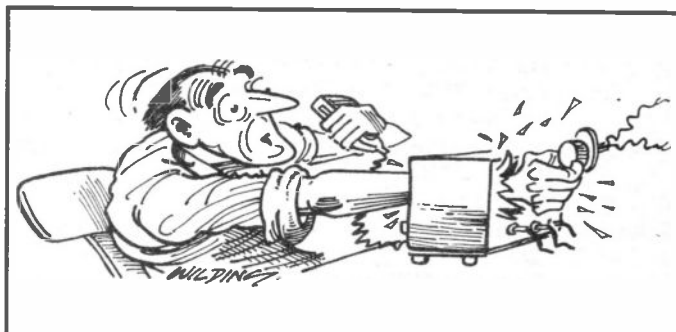
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RADIO Tomorrow

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- | | |
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| <p>1 Aug N Wakefield RC: on the air night.
Preston ARS: informal meeting.
Maidenhead DARC: evening out.
Meirion ARS: natter night at Dolserau Hall Hotel, Dolgellau.
Abergavenny and Nevill Hall ARC: meets every Thursday at the Pen-y-Fal Hospital, above male ward 2 at 7.30pm.</p> <p>2 Aug Coventry ARS: 2m DF contest.
Maltby ARS: three in a row mini lectures.
Clifton ARS: meeting at New Cross.
Dunstable Downs RC: <i>Radio Controlled Models</i>.
Radio Society of Harrow: activity night.</p> <p>3 Aug GB2PYF organised by Abergavenny and Nevill Hall ARC on HF and VHF from the Pen-y-Fal Hospital fete.</p> <p>5 Aug Horndean DARC: <i>Salvage of the SS Great Britain part 2 by G4BEQ</i>.
Basingstoke ARC: natter night.
Worcester DARC: <i>Contesting by G4ERP</i>.
Todmorden DARS: chat night.</p> <p>6 Aug E Lancashire ARC: visit to British Nuclear Fuels at Salwick.
Bury RS: informal.
Fylde ARS: visit to Lytham CAA radar station.
Kidderminster DARS: meeting.
Chichester DARC: club meeting.
Wolverhampton ARS: visit to Police Motorway Control Centre.
Dartford Heath DFC: pre hunt meeting at the Horse and Groom.
Reading DARC: discussion of contest arrangements.
Worksop ARS: fox hunt.</p> <p>7 Aug Three Counties ARC: film night.
Wirral ARS: meeting.
Denby Dale DARS: noggin n' natter.
Brighton DARS: meeting.
Cheshunt DARC: junk sale.
Fareham DARC: portable operation.
Havering DARC: informal at the Fairkytes Arts Centre. Billet Lane, Hornchurch in Essex between 8 and 10pm.
Telford DARS: natter night.
Wirral DARC: D+W at the Harp Ness.</p> <p>8 Aug N Wakefield RC: natter night.</p> <p>9 Aug Bromsgrove DARC: <i>The History of the Avoncraft Museum</i>.
Coventry ARS: treasure hunt.
Maltby ARS: junk sale.
Clifton ARS: meeting.</p> | <p>11 Aug W Kent ARS: DF hunt.
Radio Society of Harrow: activity night.
Dartford Heath DFC: DF hunt.
Wirral DARC: 5th DF hunt.
RAIBC and Flight Refuelling ARS organise Hamfest '85. Details from Elaine Howard on 0202 671191.</p> <p>13 Aug Westmorland RS: meeting.
Newbury DARS: informal at the Spotted Dog.
Wolverhampton ARS: club project discussion.
Reading DARC: canal boat trip.
Bury RS: annual fox hunt, 7.30pm in the Mosses Centre, car park.</p> <p>14 Aug Exmouth ARC: meets at the Scout Hut, Marpool Hill, Exmouth, visitors welcome.
Denby Dale DARS: chairman's evening.
Farnborough DRS: field day post mortem.
Cheshunt DARC: natter night.
Fareham DARC: portable operation.
Havering DARC: <i>Directional Couplers by G8ZKZ</i>.
Telford DARS: RTTY night.
Wirral DARC: mobile treasure hunt.
N Wakefield RC: lecture/visit.
Preston ARS: final preparations for the rally.
Chichester DARC: club meeting.</p> <p>15 Aug Maltby ARS: <i>Getting on 2m SSB Cheap by G1CAQ</i>.
Clifton ARS: meeting.
Dunstable Downs RC: DF hunt 160 and 2m.
Coventry ARS: VHF portable expedition.
Radio Society of Harrow: activity night.</p> <p>16 Aug 17-18 Aug Special event station GB2TC run by Tamworth ARC to celebrate the 500th anniversary of Henry Tudor's visit to Tamworth prior to the Battle of Bosworth. Operations on 3.5MHz and 144MHz from 10-8 on Sat and 10-5 on Sun from Tamworth Castle. QSL card available.
Wolverhampton ARS: 144MHz DF hunt.
1296/2320MHz RSGB contest 0700-1300 gm.
Red Rose Rally at Haydock Park Racecourse, Newton le Willows. J23 off M6. Talk-in on S22. Details from G6TYB.</p> <p>18 Aug Todmorden DARS: talk by leading antenna manufacturer.</p> <p>19 Aug Kidderminster DARS: meeting.
Midland ARS: <i>Amateur TV by G8GWN</i>.
Wolverhampton ARS: <i>Fire Prevention and Fire Fighting by WM Fire Service</i>.
Reading DARC: <i>Raynet by G4KWT</i>.
Fylde ARS: top band fox hunt.
Maidenhead DARC: video show.</p> |
|--|--|

- Worksop ARS: junk sale.
Bury RS: informal.
- 21 Aug** Three Counties ARC: *2m DX by G3VXM*.
Wirral ARS: meeting.
Denby Dale DARS: noggin n' natter.
Brighton DARS: meeting.
Cheshunt DARC: 2m portable operation on Baas Hill Common.
Fareham DARC: portable operation.
Havering DARC: informal.
Worcester DARC: informal.
Telford DARS: ATV on the air.
Wirral DARC: D + W at the Saughall Massie Hotel.
- 22 Aug** Greater Peterborough ARC: informal social.
- 23-26 Aug** GB2TVF (Towersey Village Festival) from Towersey in Oxfordshire on HF and 2m. QSL card available.
- 23 Aug** Bromsgrove DARC: construction meeting.
Maltby ARS: Spitewinter.
Clifton ARS: meeting.
W Kent ARS: DF hunt.
Coventry ARS: night on the air.
Radio Society of Harrow: activity night.
- 24-31 Aug** GB8SDX and GB6SDX will be operational on 2m and 70cm from IO97 locator square, a DXpedition organised by City and Brunel Universities radio amateurs. Modes SSB, ATV, RTTY and packet radio will be used and QSL card available.
- 25 Aug** 18th Preston Rally at Lancaster University, Talk-in 2m. Entry fee 50p and doors open 11am. BARTG rally, Sandown Park, Esher, Surrey.
- 25-26 Aug** Worksop ARS operating GB2BTF at the Bassetlaw showground.
- 27 Aug** Chester DRS: pre SSB HF field day contest meeting.
E Lancashire ARC: informal.
Wolverhampton ARS: night on the air and discussion.
Bury RS: informal.
- 28 Aug** Exmouth ARC: meeting.
Denby Dale DARS: rally wind down meeting.
Cheshunt DARC: natter night.
Fareham DARC: portable operation.
Havering DARC: talk by G8IXC.
Telford DARS: mini fox hunt and summer barbeque.
Wirral DARC: surplus equipment sale.
N Wakefield RC: monthly meeting.
Preston ARS: audio visual evening by G3UEC.
- 29 Aug** Clifton ARS: meeting.
Coventry ARS: visit.
Radio Society of Harrow: activity night.
- 30 Aug** Horndean DARC: junk sale
Basingstoke ARC: *Direction Finding by G6AGE*.
Alyn and Deeside ARS: contest arrangements.
Worcester DARC: club publicity evening.
Todmorden DARS: talk by Harry Leeming, G3LLL.
Wolverhampton ARS: visit to Police Radio Control Centre at Bourneville.
- 2 Sept** E Lancashire ARC: surplus equipment sale.
Reading DARC: *Packet Radio talk and demonstration by G6CAA*.
Worksop ARS: evening visit to Scunthorpe club.
Wolverhampton ARS: meeting.
Bury RS: informal.
- 3 Sept** Three Counties ARC: *Computer Decoded Morse by G6VMA*.
Wirral ARS: quiz.
Brighton DARS: meeting.
- Cheshunt DARC: club project with G4ZCX.
Fareham DARC: natter night on the air.
Havering DARC: informal.
Telford DARS: rally group final meeting.
Wirral DARC: inter club quiz vs Wirral ARS.
- 5 Sept** N Wakefield RC: AGM
Meirion ARS: video or film.
Abergavenny and Nevill Hall ARC: meets every Thursday at the Pen-y-Fal Hospital (above male ward 2).
- 6 Sept** W Kent ARS: open meeting.
Clifton ARS: club meeting.
Coventry ARS: night on the air/project launch.
Radio Society of Harrow: construction contest.
- 7-8 Sept** RSGB Trophy contest 144MHz.
- 8 Sept** Galashiels DARS: open day with trade stands, raffles and bring and buy. The venue is the Focus Centre, Livingstone Place, Galashiels and doors open at 11am. Further details are available from GM3DAR.
- 9 Sept** Alyn and Deeside ARS: D + W.
- 10 Sept** Chester DRS: *Lowe Electronics display their latest!*
Newbury DARS: junk sale.
Dartford Heath DFC: pre hunt meeting.
Wolverhampton ARS: club project discussion.
Bury RS: main meeting.
- 11 Sept** Exmouth ARC: meeting.
Cheshunt DARC: natter nite.
Fareham DARC: *70cm 1kW linear amplifier with G6XHR*.
Havering DARC: DF hunt.
Telford DARS: natter nite.
- 12 Sept** N Wakefield RC: junk sale.
Preston ARS: *Atomic Structure by G4DBU*.
Bromsgrove DARC: surplus equipment sale.
Clifton ARS: club meeting.
- 13 Sept** Dunstable Downs RC: *Airport '85 - A Pilots View by G4ZJF*.
Coventry ARS: Ill fated mini lectures?
Radio Society of Harrow: activity night on 10m.
- 15 Sept** Peterborough Mobile rally, Wirrina Sports Stadium, Bishops Road, Peterborough. 10.30-5.
Dartford Heath DFC: DF hunt.
Wolverhampton ARS: 144MHz DF hunt.
- 16 Sept** Alyn and Deeside ARS: *Computers in Data Comms - A Professional View by Roy Honeyman*.
Todmorden DARS: informal chat night.
- 17 Sept** Chester DRS: inter club quiz with Ellesmere Port ARS at Chester.
Midland ARS: home brew contest.
Reading DARC: *An exhibition of equipment and kits by Wood and Douglas*.
Worksop ARS: *Lightening Protection*.
Bury RS: informal.
- 18 Sept** Three Counties ARC: *S W France by G6SNS*.
Wirral ARS: *Smith Charts Simplified by G3EGX*.
Brighton DARS: meeting.



- Cheshunt DARC: video 'Amateur Radio's Newest Frontier' plus an introduction to amateur radio for new members.
 Fareham DARC: natter nite on the air.
 Havering DARC: informal.
 Telford DARS: *What We Did On Our Holidays G3UKV and Co. in GM land.*
- 20 Sept W Kent ARS: meeting.
 Clifton ARS: club meeting.
 Coventry ARS: night on the air.
 Radio Society of Harrow: *Community Radio.*
- 21 Sept **The 2nd National Amateur Radio Car Boot sale at the Shuttleworth Collection, Old Warden Aerodrome, Biggleswade, Beds. Talk-in on GB4SC.**
- 22 Sept **Harlow Mobile Rally at the Sportscentre, Harlow starting at 10.30. Ample parking, refreshments and licensed bar, plus book stall, bring and buy etc.**
 Talk-in on S22.
- 23 Sept Alyn and Deeside ARS: D + W.
- 24 Sept Chester DRS: meeting.
 E Lancashire ARC: informal.
 Wolverhampton ARS: night on the air.
 Bury RS: informal.
- 25 Sept Exmouth ARC: meeting.
 Cheshunt DARC: natter nite.

- Fareham DARC: *2m Rhombic Aerials by G6MVL.*
 Havering DARC: surplus equipment and junk sale.
 Telford DARS: Doctors Surgery — failed projects welcome!
- 26 Sept Preston ARS: Test your rig night. G3SYA officiating.
 Greater Peterborough ARC: ring Secretary.
- 27 Sept Bromsgrove DARC: construction meeting.
 Clifton ARS: club meeting.
 Coventry ARS: project construction.
 Radio Society of Harrow: activity night on 15m.
- 30 Sept Alyn and Deeside ARS: *Raynet talk and demonstration by G8RXB.*
 Worcester DARC: AGM.
- 1 Oct E Lancashire ARC: *The Welshpool and Llanfair Light Railway.*
 Reading DARC: *Improving Your DX on 2m by G8VR.*
 Worksop ARS: Space Shuttle video.
 Wolverhampton ARS: AGM.
 Bury RS: informal.

Will club secretaries please note that the deadline for the November segment of Radio Tomorrow (covering radio activities from 1st October to 1st December) is 19th August.

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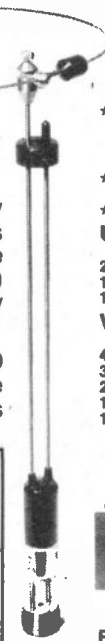
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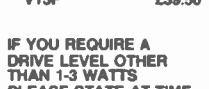
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DX!

Most of us have a general conception of the ionosphere as being a sort of 'mirror' which hovers conveniently above the earth in order to facilitate radio communication. But often once the trauma of the RAE has faded into the past, so the mechanisms of propagation fade, too. This is a great shame because not only can this knowledge be interesting in itself, but can also frequently give you that essential DX edge over the less knowledgeable high-power merchants who inhabit the HF bands.

separate the two, the Sun generates such phenomenal quantities of emissions that the outermost regions of the earth's atmosphere are in a continual state of change. So as to give an idea of the truly enormous amount of energy

addition, there is the so-called 'solar wind' which consists of electrically charged sub-atomic particles, such as electrons and protons. Whereas the electromagnetic components derived from the Sun travel at the speed of light (yet even so take 8 minutes to get here), the solar wind is quite slow by comparison, travelling at a 'mere' 400 km/s (900,000 mph) by the time it reaches the outer limits of the Earth's ionosphere.

The secret of DX working is knowing when the desired countries are likely to come through and on what band. To do this, a solid grasp of the mechanics of propagation is essential. Dave Bobbett, G4IRQ, demystifies propagation and shows how to use a BBC or Electron computer to enhance your understanding of this and get the edge on DX.

I suspect that the two areas of amateur radio which most appear to take on an almost mystical quality are those of aerial design and propagation theory, so for the benefit of those who want to blow the cobwebs off their radio theory, and of course those who are new to the field I will briefly look at propagation fundamentals. It is important to get to grips with these basic principles as they underpin a rather novel aspect of propagation which can be of considerable practical use which we will be looking at later in this article and which a micro' computer can be used to predict.

The ionosphere can be seen as being rather like a section through an onion, consisting of a number of different layers of ionised gases which lie one above the other at various heights above the earth's surface. There are four layers which are specifically of interest to us, starting with the lowest which is the 'D' layer at a height of about 75 kms, the 'E' layer at 125 kms, the 'F1' layer at 175 kms and finally the 'F2' layer at 275 kms. Because these layers are made up of ionised gases they are not stationary, their exact heights vary somewhat and they appear and disappear, depending upon certain external factors.

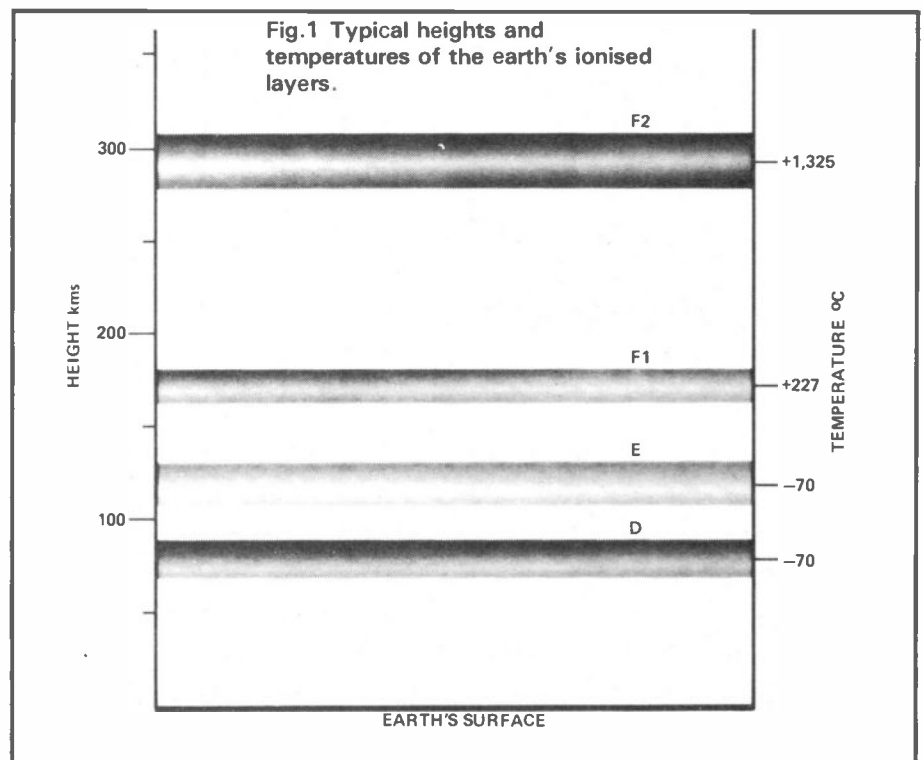
All of these factors are dictated by the Sun and the position of the Earth relative to it. Even over the massive distance of 150 million kms which

involved, the estimated power output of the Sun is 3.7×10^{20} megawatts, which is 370 million, million, million, million watts! — now that's what I call QRO!

These emissions are not just in the form of visible light, but include ultraviolet and X-ray radiation too. In

The final ingredient in the 'ionosphere soup' are the extreme temperatures involved which range from -75°C in the layers nearer the Earth's surface up to as much as $+1,325^{\circ}\text{C}$ in the outer reaches (see Fig. 1). Given these rigorous conditions of temperature and radiation bombardment it is hardly surprising that the gas molecules in these regions become affected and form into clouds and layers of ionised gas. This takes place mainly as a consequence of the action of X-ray and ultraviolet radiation on individual gas molecules — with the slower moving charged particles of the solar wind acting in opposition to this ion-forming effect.

It is fortunate not only for radio purposes that this process takes place as these layers act as a kind of 'buffer' between the harsh environment of



outer space and the susceptible life forms on the planet's surface. For even with more than 200 miles of 'insulation' between us and the outer edge of Earth's protective envelope, diseases such as skin cancer tend to be more prevalent when the Sun is passing through an especially active phase and as a consequence is radiating more strongly than is usual.

Pause For Reflection

We have seen the importance of the Sun's various emissions in creating ionised reflective layers in the ionosphere, but as yet we have not considered the significantly different ionospheric conditions which are found at various times. How is it that band conditions change from one time to another? To answer this I will consider the changes in three stages; firstly, short-term day/night differences; then medium-term seasonal factors; and, finally, longer-term solar activity fluctuations, that is to say what we term 'the Sunspot Cycle'.

I have so far outlined how the layers of ionised gases we term the ionosphere are created as a consequence of being exposed to the sun. The planet's surface is of course in daylight during this period, and, because the ionised layers are at a considerably greater height than the weather-creating layer, they are unaf-

ected by cloud and other meteorological factors. When the planet turns on its axis so that the same area is in night, it is no longer exposed to the source of ionising radiation and so the layers start to become de-ionised.

The rate at which this occurs depends upon how dense the ionosphere is at a particular level; for example, the lowest (therefore densest) 'D' layer will de-ionise quickly because the ions are relatively densely packed. The chances of ions thus re-combining into uncharged molecules by collision with others are consequently much greater.

Further out into the ionosphere, where the ions are much more thinly spread, the process of re-combination is much slower — and in fact is so slow that the 'F₁' and 'F₂' layers never entirely disappear but instead merge into a single 'F' layer during darkness, which is located at an intermediate height between the normal daytime 'F' layers. When the planet rotates around into daylight again the process of ionisation begins once more and the 'F₁' and 'F₂' layers are re-formed.

Whilst the 'F₁' and 'F₂' layers react to the reducing level of ionising radiation by combining with each other, the 'D' layer cannot be sustained in the absence of sunlight. Once night falls, the 'D' layer's ions thus recombine rapidly with each other and the layer

ceases to exist until the next phase of daylight returns. Users of the 1.8 and 3.5MHz will be well aware of the way in which these bands start to 'open' after dark. This is due to the fact that the 'D' layer totally absorbs frequencies much below 5MHz. Thus signals never reach the reflective 'F' layers during the day to allow long distance communication to take place.

Once the 'D' layer disintegrates in the absence of sunlight, these frequencies are allowed to pass through and greater distances may be covered — the same phenomenon explains why the range of medium wave broadcast transmissions is so much greater at night.

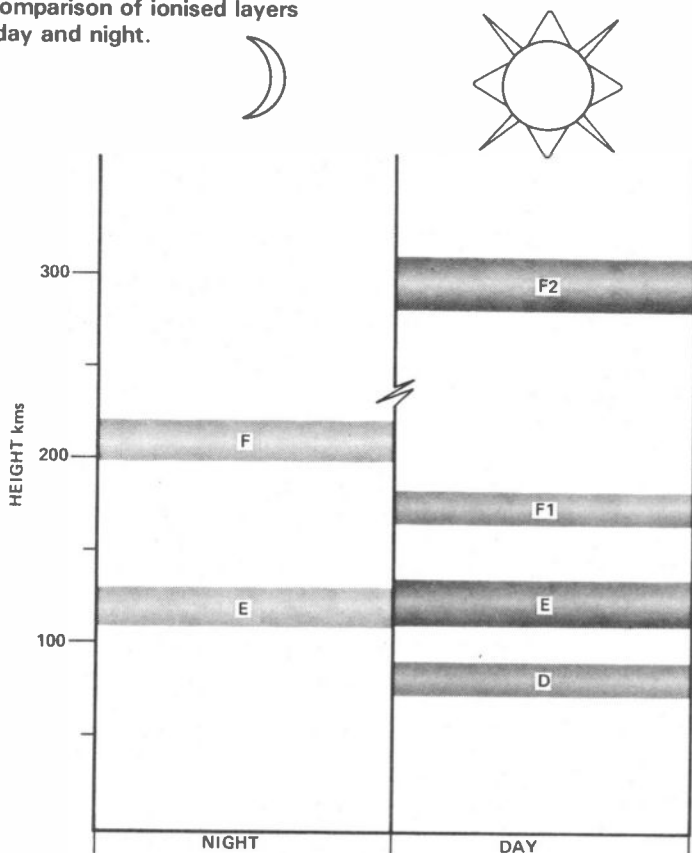
The Four Seasons

Propagation conditions change not only from day to night but also with the passing of the seasons. Whilst the Earth's orbit around the Sun is very slightly elliptical, the varying distance between the two is not (as some people think) the reason behind seasonal fluctuations. As we shall see, there is another explanation for this so for the purpose of this discussion we can safely consider the Earth's orbit to be circular. Fig. 3(a) shows what the situation would be if the axes of the Earth and the Sun were parallel to each other.

Here we can easily see that because the amount of energy falling on any given point during the daylight hours would always be the same, the varying climatic conditions which characterise the observed seasons simply would not exist. There must therefore be another explanation — in fact the Earth's axis is tilted obliquely by 23.5 degrees, resulting in what can be best described as an extremely slow 'wobble' as the planet orbits around the Sun. On the longest summer day in the Northern hemisphere (June 21st) the tilt is *towards* the Sun (Fig. 3b) and on the shortest day of winter (December 21st) it is tilted *away* (Fig. 3c), If you are living in the Southern hemisphere, the reverse is true — which explains not only why the seasons are reversed between the two hemispheres but also why Australians can have Christmas dinner on the beach when we are up to our armpits in snow!

In addition to the longer hours of sunlight in the summer (and shorter hours in the winter) the energy from the Sun strikes the planet's surface far less obliquely, thus the intensity of radiation falling per unit area in the summer is significantly greater than is the case in the winter. That which is true for the planet's surface is also true for the ionosphere. Hence, the *tilt towards the Sun in the summer* results in higher intensities of radiation impinging upon the ionosphere, which gives rise to *increased levels of ionisation*.

Fig.2 Comparison of ionised layers during day and night.



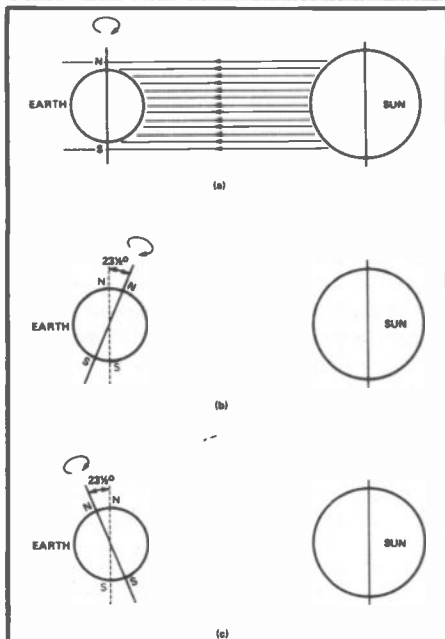


Fig.3 (a) If the earth had its axis of rotation 'straight up', then different points would have the same illumination throughout the year, with no winter or summer. (b) shows the actual tilt towards the sun at summer solstice (in the northern hemisphere) on June 22nd, and (c) shows the actual tilt away from the sun at winter solstice, December 22nd.

As the 'F' layers become more intensely ionised, so they become more effective reflectors. One consequence of this is that signals of higher frequencies are reflected in summer than in the winter — that's why the Maximum Usable Frequency (MUF) figures issued by research stations take an upward lurch in the summer months. Unfortunately it isn't all good news because the higher levels of ionisation in the summer equally apply to the RF absorbing 'D' layer, thus making low frequency daytime communication even more difficult. As well as this, summer meteorological conditions are such that atmospheric conditions tend to create high static levels — the dreaded QRN!

Before leaving the topic of seasonal propagation fluctuations, it is worth mentioning that whilst the June 21st *Summer Solstice* represents the longest day and December 21st is the *Winter Solstice*, ie the shortest day, there are intermediate ratios of day to night between these dates. Two such points are the *Vernal Equinox* on March 21st and the *Autumnal Equinox* on September 23rd. On both of these dates there are exactly 12 hours of light and 12 hours of darkness. We will be looking at this in the context of specialist propagation prediction techniques later in the article.

The third and final component in the equation concerning propagation, in addition to day/night and seasonal changes, is that which is concerned

with the behaviour of the Sun itself. This body is staggeringly large, being 1.5 million km in diameter (compared with the Earth's 13,000 km diameter) and it may surprise you to learn that it actually rotates, just like any other celestial body, with an equatorial rotational period of about 27 days.

Solar Activity

Of the events which affect radio propagation, the solar flares and other similar sudden eruptions of the solar surface are the most problematic — it is impossible to predict their occurrence and the particle emissions derived from them can seriously impair radio communications by disrupting the ionospheric layers above the Earth.

SIDs (Severe Ionospheric Disturbances) are one of the consequences of such activity and can result in an almost total loss of propagation lasting minutes or hours. The more gradual fluctuations in solar emissions can be predicted to a greater degree of accuracy however and because the rotational period of the

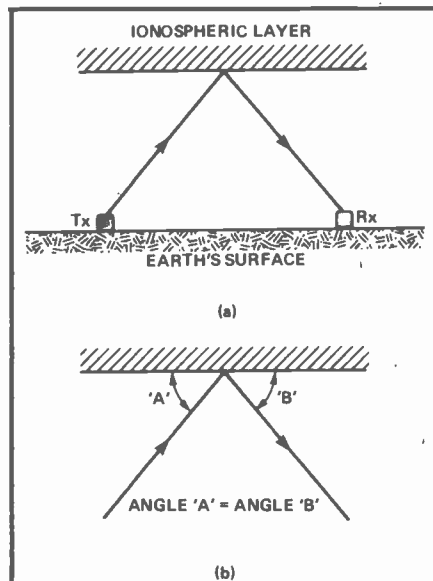


Fig.4 (a) Ionospheric reflection, and in detail in (b): angle of incidence 'A' equals angle of reflection 'B'.

Sun is known to within reasonable limits, suddenly appearing features such as 'sun-spots' can be usually expected to re-appear on the next rotation, so conditions for 27 days hence may be predicted. The 'life' of such phenomena may be as much as four or five solar rotations (ie up to 135 days). The 27 day cycle is especially easy to confirm during periods of relatively low solar activity.

Apart from these short-lived but occasionally spectacular features, there is a longer term cycle of activity which characterises the Sun's behaviour. Generally it is regarded as being the case that the Sun's activity follows an

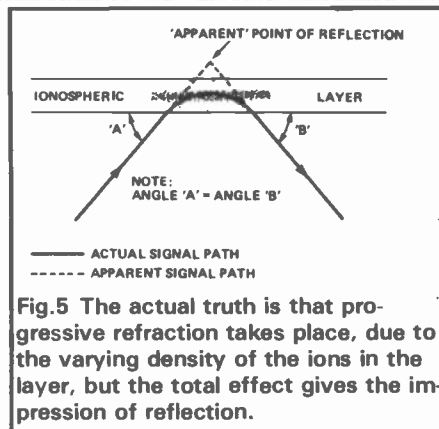


Fig.5 The actual truth is that progressive refraction takes place, due to the varying density of the ions in the layer, but the total effect gives the impression of reflection.

11 year cycle from peak, down to sunspot minimum and back up to a peak again, with the radio propagation conditions changing accordingly. During the maximum activity periods, the changes in propagation are very similar to (but greater than) those experienced between winter and summer in that the Maximum Usable Frequency is typically much higher, and stays that way. As a consequence, 28MHz band is open all day, with 21 and 14MHz being usable all round the clock. On the other hand, LF bands on 1.8 and 3.5MHz suffer from the same problem of 'D' layer absorption as they do in summer months and the overall level of QRN is increased too.

The notion of an 11 year cycle in solar activity should not be taken as being an absolute truth however, as anomalous factors can create periods of intense activity during what should be a sunspot minimum period and vice versa. Indeed, some solar observers prefer to consider the cycle as having a duration of 22 years, as the magnetic polarity of the sun-spots in a given solar hemisphere alternate between being North-seeking at the first maximum and then South-seeking at the next maximum 11 years later. It is only in the subsequent maximum that North-seeking spots appear once again — hence the claim to a 22 year cycle. Either way it is much better to see the sunspot cycle as more of a general trend rather than a hard and fast prediction — for one thing you'll be less disappointed that way!

So far, we have looked at the three time-dependent processes which are incorporated into the equation which ultimately dictates the sort of propaga-

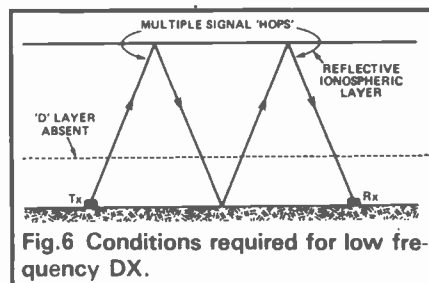


Fig.6 Conditions required for low frequency DX.

tion conditions available to us. The least predictable of these relates to the complex and, as yet, not fully understood mechanisms of the Sun's internal nuclear chemistry and the seemingly random nature of solar events make this path a rather fruitless one to follow. On the other hand whilst we may not be able to get to grips with much of the gross data concerning the Sun, we do know considerably more about the inter-relationships between the short-term levels of solar activity and propagation, plus the behaviour of the ionospheric layers themselves.

All Done With Mirrors

Just as many RAE texts appear to leave out specific details of *how* the Sun works and *why* ionised layers form and disintegrate in the upper reaches of the Earth's ionosphere, there is also a tendency for the ionospheric layers to be represented as a series of simple 'radio mirrors' from which signals are reflected to distant points. Of course this level of detail is quite acceptable for the purposes of the RAE but there is a bit more to it than that, the essential point being that the mechanism involved is not *reflection* but *refraction*, a fact which we can turn to our advantage as we will see shortly. Fig. 4 (a) shows the more commonly encountered model of ionospheric 'reflection', with the detail in Fig. 4 (b) illustrating how, just like any well-behaved light beam, the signal's angle of incidence A is equal to the angle of reflection B.

In practice, the 'reflective' layer can be as much as 40 or 50 kms thick with the most densely ionised area being at its centre and becoming progressively less intensely ionised towards the upper and lower edges. A radio signal is bent (ie refracted) when it passes through areas of differing levels

of ionisation and because the level of ionisation is at its greatest in the centre of an ionospheric layer, it is also here that the greatest 'signal bending' ability exists. Consequently in its path through the layer the radio signal will be refracted only slightly in the outer (weak) regions, with the amount of bending increasing progressively as the (strong) central zone is approached. Fig. 5 illustrates this process and shows how the impression of being a simple reflection is created, with the angle of incidence A still being the same as the angle of 'reflection' B.

Grey Line Propagation

We saw earlier that whilst working long distances on the higher HF bands, such as 14MHz and above, during daylight was very much dependent upon the season and the current state of the solar cycle, the problem with DX working on the lower bands was that the *lower* the frequency one wanted to use, so the greater the signal absorbing powers of the 'D' layer became.

There is a way around this problem to some extent and one particularly useful too is the Global View program which was published in the June and July '85 editions of 'A & B Computing'. Written by JG van Dijk, the program is intended to run on either the BBC Micro or an Acorn Electron. In addition to being able to draw separate day and night views of Earth with the correct perspective (see photos) the program also provides a cylindrical map showing the areas of light and dark. If you take a look at one of these cylindrical projections, you will realise that it is not only a map of day and night but also of 'D' layer activity — *the 'D' layer is only present during the day so the light areas are also 'D' layer areas, whereas the*

dark (night) regions are devoid of 'D' layer activity.

To briefly recap, what we need for LF DX work is for the 'D' layer to be absent at both the sending and receiving station's locations and also at any points in between them where the signal strikes the Earth's surface as part of a multiple hop sequence (see Fig. 6). In addition to this, a reflective and preferably high-altitude layer is required in order to provide the long-range hops which are needed to cover the distance.

A few very long hops are much preferable to many shorter ones, the losses incurred at each deflection are thus reduced and the probability of the signal encountering an area of poorly reflective ionosphere are also lessened, whilst the total distance travelled by the signal is shortened. The problem which we come up against at this point is that whilst the 'D' layer disappears at night, both the height and strength of the reflective layers also reduce and if the DX is located in a country which has been in darkness for many hours, the reflective layers will be both weaker and lower, thus reducing the chances of a contact.

However, dawn and dusk are rather special times in an ionospheric context and Fig. 7 shows the situation as dawn is just breaking over the station of a bleary eyed LF DX hound. Because the outer reaches of the ionosphere are at a considerably higher altitude than the planet's surface, the sunlight reaches these areas first and as a consequence all the daytime layer formations start to take shape *before* the surface directly below is fully in daylight.

Similarly, because the night-time 'F' layer is at a considerably greater height than the 'D' layer it will re-form into the two distinct 'F' layers *before* the 'D' layer becomes fully established — the result is that for a few minutes

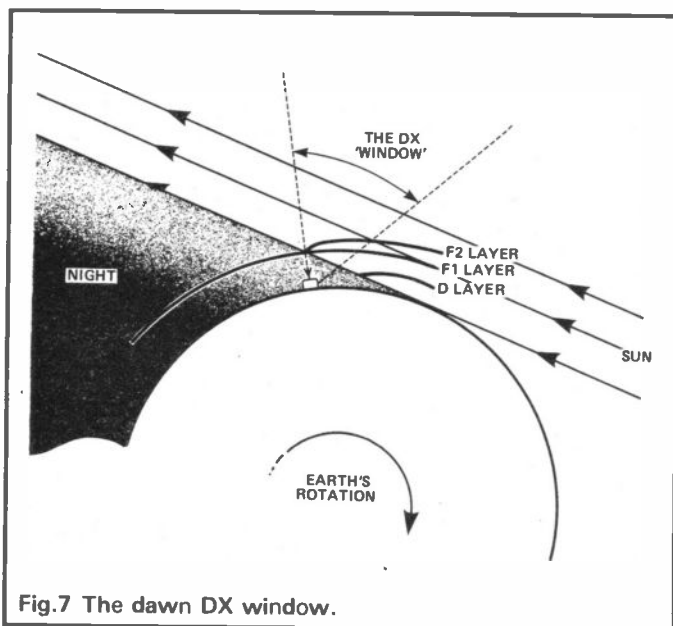


Fig.7 The dawn DX window.

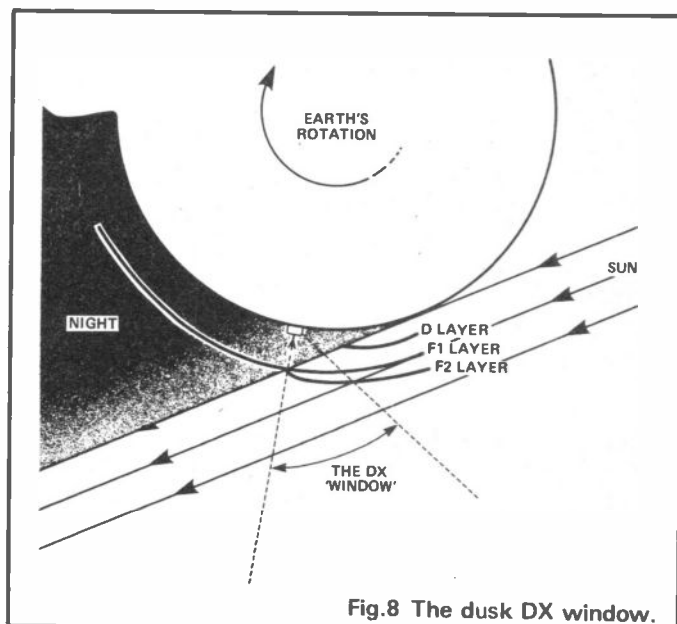
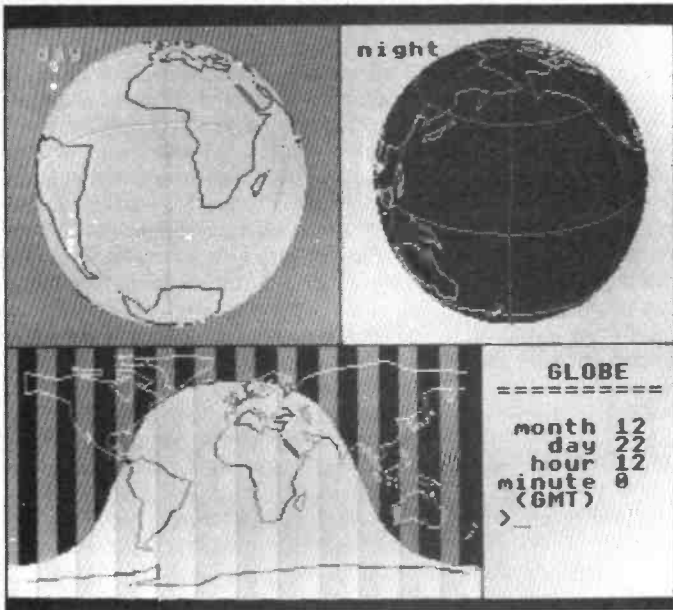
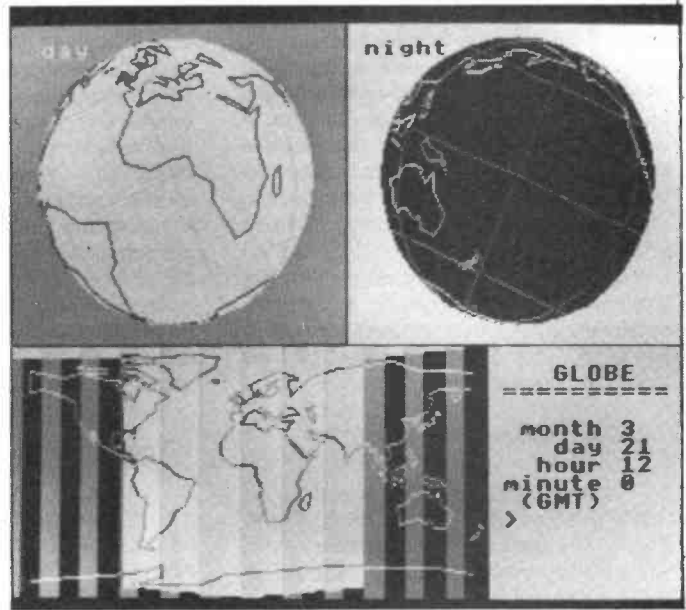


Fig.8 The dusk DX window.



Winter solstice, Dec 22nd. (The bands shown are actually coloured and represent the time zones.)



Spring Equinox, March 21st.

around dawn there is a 'window' when ionospheric conditions are just as we want them. A similar situation occurs at dusk (see Fig. 8). Being at a lower altitude, the 'D' layer moves into darkness first and disappears before the higher 'F' layers pass out of sunlight and begin to change, hence there is a 'window' here too. This process goes on at any point on the 'terminator' (the dividing line between day and night) and offers the best chances of LF communication when both stations are located on this line. Looking again at the screen photos, the dividing line between light and dark can be visualised as being a narrow 'ribbon' of highly

unusual ionospheric conditions which offer exceptionally good LF DX possibilities. Presumably the term *Grey Line* propagation, which is most often used to refer to this phenomenon, was derived from the intermediate nature of the light/dark conditions found there.

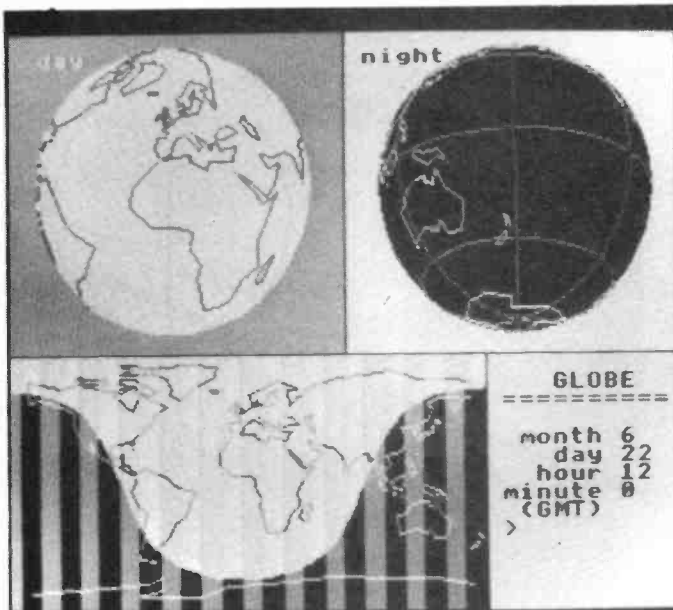
Using The Program

There would appear to be at least three different versions of the 'Global View' program, one which appeared in the June '85 edition of *A & B Computing* and two different versions which

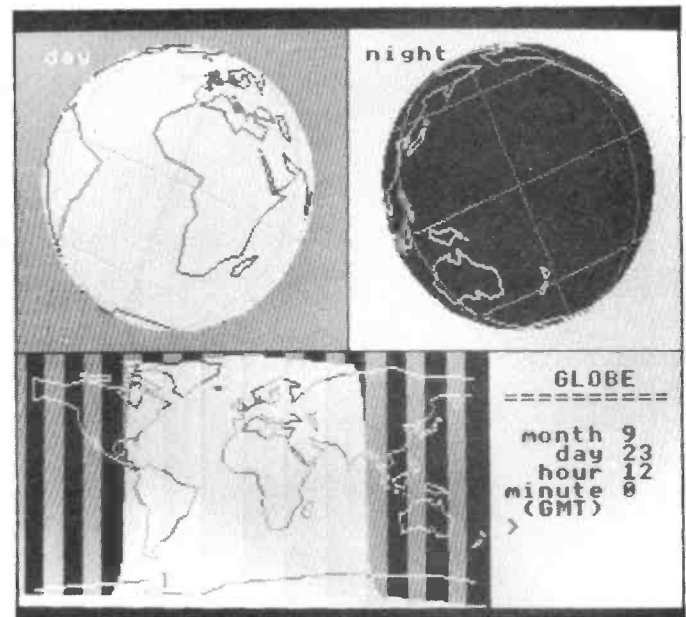
were supplied on tape or disk. There are some cosmetic differences between them but for practical purposes, they do exactly the same thing in terms of being able to produce maps of the lit and unlit areas of the Earth. To use the program it is simply RUN in the normal way and the information concerning the month, day, hour and minute is typed in when the computer requests it.

You will probably recall that mention was made earlier of the fact that the ratio of daylight to night hours varies over the year and how, at each of the spring and autumn equinox points (March 21st and September 23rd respectively), there are exactly 12

Summer solstice, June 22nd.



Autumn Equinox, Sept 23rd.



hours of light and 12 hours of darkness. We can see this graphically illustrated in the computer predictions for these two dates and at the same time appreciate why it is that only predominantly North South paths are available at these times as the shape of the terminator takes on a distinctly square-wave appearance.

At other times of the year, such as winter solstice on the 22nd of December and summer solstice on June 22nd, the distribution of light and dark takes on a very much more sinusoidal shape — making the possibility of Southern hemisphere contacts that much greater. The only notable difference between these two dates is that the Arctic regions are unlit in the winter and lit in the summer. Incidentally, if you look at the screen photo for dawn on December 22nd you can see why Grey Line predictions are so useful — it *should* be possible to have an LF DX contact with New Zealand at this time!

In between the major 'signposts' of solstice and equinox, the distribution of light on the earth's surface follows a gradually shifting intermediate pattern as it changes from the sine shape of solstice through to the square wave of equinox. As a result it is possible to contact a variety of DX rarities over the year due to the multiplicity of different path shapes.

The simplest way of predicting what you will be likely to hear is to obtain your local sunrise and sunset times from a diary or similar source (bearing in mind that the program works in GMT!) and enter these figures into the computer. Once the Grey Line starts to get close to an area which you're interested in, it can be worth spending a bit of time 'doodling' to see if you can get an exact crossing a few days hence — after that it's simply a question of biding your time and hoping that next door's coffee grinder won't start up at the crucial moment!

Needless to say, other factors will affect the success or failure of LF Grey Line DX, short paths generally being more likely to succeed than long ones of course and this particular form of propagation 'cheating' is no less susceptible to ionospheric anomalies than any other. All the things which they tell you to do in the aerial handbooks should be followed if possible, with DX'y, low angle radiation aerials giving the greatest edge. If you don't happen to be the proud owner of several thousand rolling acres, don't despair as a certain amount of cunning can help out too.

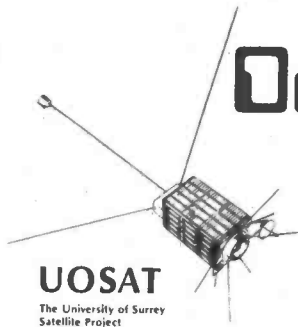
Check to ensure that you are putting out as much signal as possible in the appropriate direction. It may be that the orientation of your aerial can be

modified to help things along. If sought after countries are accessible over paths which do *not* cross densely populated areas, such as Europe or North America, then give these a try as the chances of being heard are considerably increased if you're not having to struggle against several hundred other Grey Line fanatics.

Finally, double check sunrise/sunset times, Grey Line openings only last for a few minutes and there's nothing more frustrating than getting on air only to be told that the DX has been and gone!

Hacking Global View

If your interests veer towards butchering programs, the original can be made more directly applicable to the radio field by deleting the sections responsible for the time consuming (but nevertheless very clever) projections of the globe and making the screen size of the cylindrical map rather larger than in the original. A tremendous amount of work must have gone into calculating the DATA lines at the end of the program, which contain the co-ordinates used to draw in the various continent shapes, so this section of the program alone would be an invaluable foundation for anyone wishing to put together a slightly more radio-orientated version.



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Practicalities

With all the new equipment being advertised in the magazines and also hearing what equipment is being used by other people on the air, one could be forgiven for thinking that a very large bank balance is essential to start up an amateur radio station. Indeed this is one way, and the commercial equipment available offers good value for money and high performance. There is still a great deal of enjoyment and economic saving to be gained from constructing some of your own equipment, especially if you are interested in QRP where the equipment is often

This month, Ian Poole, G3YWX, offers some advice on identifying valve types, powering semiconductor 'add-ons' to valve equipment and designing your own attenuators.

reasonably simple. Also, kits are often available in conjunction with some of the constructional articles published in radio magazines.

Another cheap and satisfying solution worth bearing in mind is to update an old receiver or transceiver to suit the modern day requirements. Many of the older valve receivers often give a very good account of themselves and are available at prices which represent excellent value for money. Obviously, one has to make a careful choice of receiver and consider both the original specification and the overall condition. However, once bought, they are ideal for modifying, not only for the fact that one is more willing to dive into them with a soldering iron than, say, a new Trio or Yaesu, but being valve designs they have more space in them than their modern counterparts for adding extras such as an audio 'notch' filter or a VHF converter.

Valve Identification

Now that semiconductors have taken over from valves in virtually all applications, it is becoming increasingly difficult to obtain data on valves, in spite of the fact that they are still used in many older pieces of equipment. For example, I still use a valve transmitter and a valve receiver, both of which perform as well as many of the new designs around today, and although they do not have all the 'frills', do offer better value for money.

It is often very useful to have an idea of the function of a valve without having to search for data on it. It is usually possible to gain quite a lot of information about a valve from its type number, and there are two main systems of numbering which are used, giving a greater or lesser amount of data dependent upon the particular system.

The first system, which incidentally originated in

Table 1. European Valve Numbering System

1st Letter	
A	4V heater
D	0.5 to 1.5V heater
G	5.0V heater
K	2.0V heater
U	100mA heater
C	200mA heater
E	6.3V heater
H	150mA heater
P	300mA heater
Subsequent Letters	
A	Single Diode
C	Triode
E	Tetrode
H	Hexode or Heptode
L	Output Pentode
N	Thyratron
T	Misc.
Y	Half Wave Rectifier
B	Double Diode
D	Output Triode
F	Pentode
K	Heptode or Octode
M	Electron Beam Indicator
Q	Nonode
X	Full Wave Gas Filled Rectifier
Z	Full Wave Rectifier
Number	
20 - 29	B8G (Loctal)
30 - 39	Octal
40 - 49	B8A
50 - 59	Misc.
60 - 69	Subminiature
80 - 89	B9A
90 - 99	B7A

If the number is over 100 subtract from number to obtain base type.

the States, applies to valve numbers such as 6CH6, 12AT7 etc. In this case the first number refers to the heater voltage and the remaining letters and numbers to the type serial number. Thus 6CH6 has 6.3 volt heaters and a 12AT7 operates from a 12.6V heater supply. In fact in the case of the 12AT7 and several other valves (12AX7, 12AU7 etc) the heater is centre tapped, so that it can operate from either 6.3 or 12.6V by placing the two halves of the heater in parallel or series.

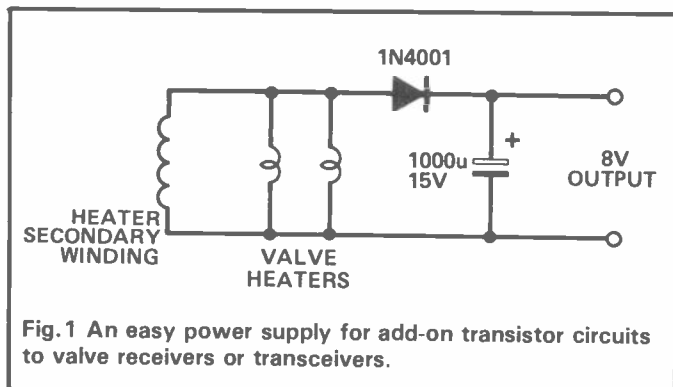
The second system, employed by European manufacturers, applies to valves like ECC83, EABC80 etc. Using this system, it is possible to tell what elements the valve actually contains. Referring to the table nearby, it can be seen that the first letter gives information about the heaters, then any further letters describe the various elements within the valve. The number then indicates the base type and particular valve type serial number. Taking as an example an ECC83, this has 6.3 volt heaters (E), it contains a double triode (CC), its base is B9A (8) and its type serial number is 3. Similarly a PL80 has 300mA heaters, contains an output pentode and has a B9A base. For further details, see Table 1.

These two systems cover the majority of valves in amateur service.

Powering Semiconductor Circuitry from Valve 'Heaters'

Unfortunately, one of the drawbacks of adding extra valve circuits to many of these older transmitters and receivers is that this inevitably requires a certain amount of metalwork. This is something which I have never been particularly fond of trying to avoid if at all possible. Accordingly, it is often more convenient to hybridise the equipment and use semiconductor circuits — which usually generate less metalwork! In addition to this, there are several other advantages; for example it is possible to build a more compact circuit and the available space can be utilised more neatly; also semiconductors are more easily available and it is often possible to construct a more sophisticated design than would be possible using valves.

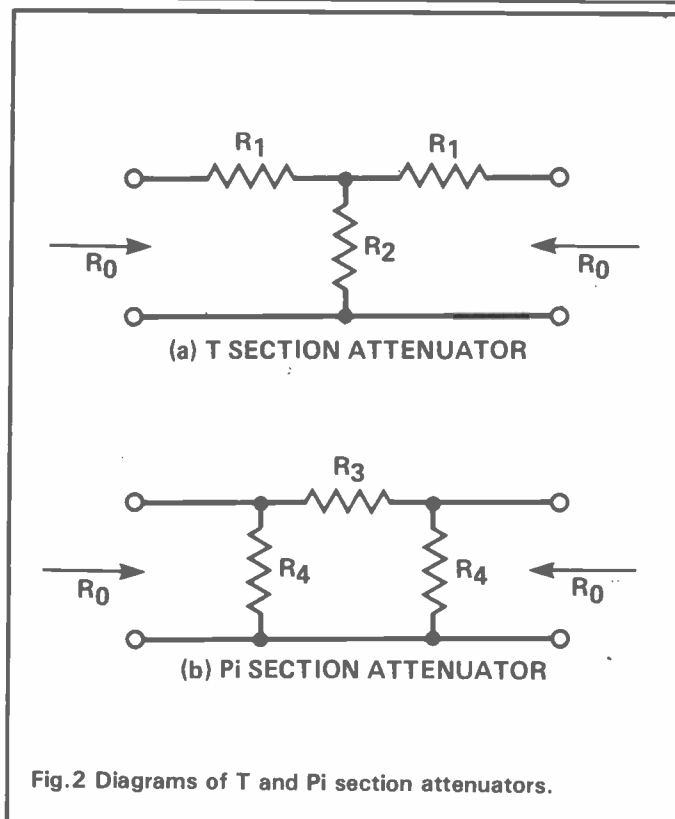
If semiconductors are used, a separate voltage supply will be needed. This can often be derived from the heater supply to the valves, using the circuit shown in Fig. 1. Using this arrangement, an output of about 8V should be obtained. As one side of the heater supply is normally earthed, this forces the use of half wave rectification. This means that if any appreciable current is drawn, the ripple of the supply will rise. However, for applications when only a small amount of current is drawn, this is a very convenient way of producing a supply without the need for any extra transformers to be added.



Designing Attenuators

With the ever increasing crowding on the bands these days and the number of very strong signals that are around — forty metres for example still has a large number of broadcasting stations using it — there is often a requirement for some form of attenuator at the receiver front end to cut down overloading and the consequent cross modulations. There are also several other uses for a fixed and defined attenuator within the amateur station (see 'The Case For... 'F' Units' in Feb '85 HRT — Ed).

The easiest way of making an attenuator is to place some form of potentiometric divider into the system and hope for the best. However, it is far better to take your time and fit an attenuator which is properly matched over a wide bandwidth. At this point, one may think back to physics lessons at school and try to remember Kirchoffs' Law — and then how to apply them!



Fortunately, some time ago I came across a useful set of formulae which makes the matter of designing attenuators far simpler.

Basically there are two configurations for an attenuator: Pi section or T section, and each has its own set of formulae.

Taking the T section first:

$$R_1 = R_0 \frac{(n-1)}{(n+1)}$$

$$R_2 = R_0 \frac{2n}{(n^2-1)}$$

and for Pi section:

$$R_3 = R_0 \frac{(n^2-1)}{2n}$$

$$R_4 = R_0 \frac{(n+1)}{(n-1)}$$

In both cases $n = \text{voltage in/voltage out}$ and $R_0 = \text{line impedance}$.

Using these formulae it becomes a very simple matter to decide upon the values for the attenuator. Normally these calculated values will obey Murphy's Law and fall exactly between two preferred values of resistor (ie midway between, say, 39K and 47K). However if the nearest E24 (range) value is used in each case, a satisfactory result should be obtained.

From a practical point of view, if an attenuator is required to give over about 20dB loss then it is advisable to build this in two sections (ie 20dB attenuator = 2x10dB sections) screening one from the other if RF is involved so that stray pickup is avoided. Apart from avoiding stray coupling, some varieties of carbon type resistors become inductive at high operating frequencies and should not be used as this will alter the performance of the attenuator. For most HF applications, the metal oxide TR4 series of resistors should prove reasonably adequate.

Beam Splitter for an

ed and measured with ease.



Oscilloscope

One of the most essential pieces of test gear for any radio shack is an oscilloscope. The cheapest and most plentiful variant is the single beam oscilloscope, but occasionally two waveforms will be required to be displayed simultaneously. Monitor input and output of a variety of devices on a single beam 'scope with this design by Ted Nield, GW3ARP.

The unit described in this article will enable a single-beam oscilloscope to function as one with a dual-beam facility, whereby two separate waveforms may be displayed together.

Undoubtly the most useful function arising from this is the ability to establish a time-relationship between two dissimilar but related waveforms, as for example, those existing at two points in a time-base or pulse generator circuit. The dual-beam facility is a valuable aid to the proper understanding of such devices as multivibrators — monostable, bistable or astable — showing what happens simultaneously at various points in the circuitry. Another and more pertinent use for the radio amateur is of the 'before and after'

kind, when one examines the waveforms on either side of a 'reactive' element, such as a filter circuit. Phase shifts may be observ-

The Unit

A general view of the device is given in the photograph. It is self-contained with an internal PSU for mains operation. Each signal input feeds a separate amplifier, with its gain variable from unity to 100X (40dB). Care has been taken to ensure a flat and wide response which is level from a few cycles to over 1MHz. A useful gain is available up to 4MHz. The length of the level response is, of course, dependent upon the setting of the gain control.

The input will accept up to 4V RMS with an impedance loading of about 1 Mohm. The output is of low impedance and may be fed directly into the attenuator of the oscilloscope. Included is a 'separation' control which varies the distance between the two traces and will make coincide, overlap or completely change places on the screen. Another control may be adjusted to eliminate the occasional 'stroboscope' effect inherent in the system, whilst a fifth control, when used with the 'Z-axis' input of the oscilloscope, enables the relative brightness of the two traces to be equalized.

If photography is to be used, this is a very useful feature, especially when a complicated trace and a simple one have to be photographed together, since normally this would result in the unequal exposure of the two traces. Finally, there is a sync. signal out-

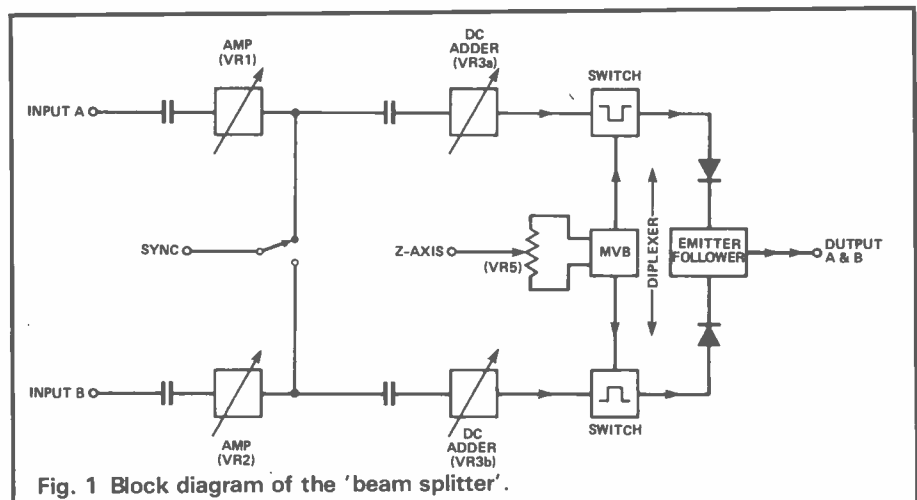
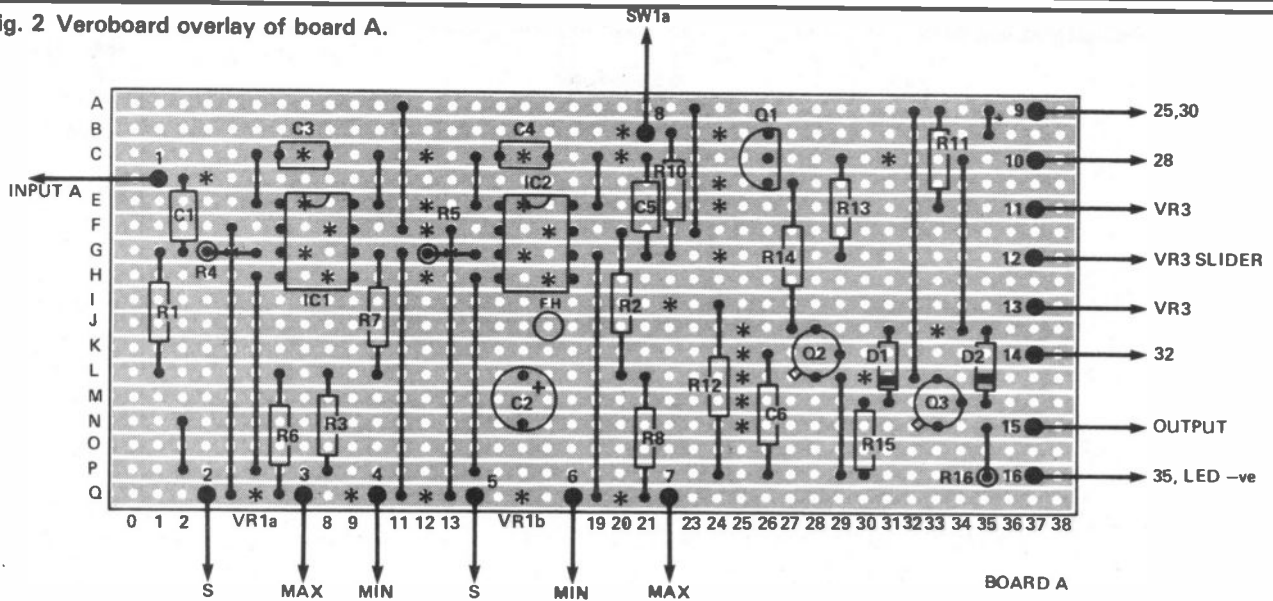


Fig. 1 Block diagram of the 'beam splitter'.

Fig. 2 Veroboard overlay of board A.



- = TERMINAL POINT
- = VERTICAL COMPONENT
- * = BREAK IN TRACK
- FH = FIXING HOLE
- = WIRE LINK

put from each channel, which may be selected at will.

Circuit Operation

Reference to the block diagram shows each input to the unit followed by a signal amplifier. These are identical, each consisting of two wide-band, high-performance CA3130E Bi-MOS operational amplifiers in cascade (IC1, IC2 and IC3, IC4) used in the non-inverting mode. Each has its maximum gain limited to 10X (20dB) in order to preserve a wide bandwidth: the pair giving a gain of 100X (40dB) at the input of the following stage — and N-channel FET (2N3819). This is coupled as a source-follower of unity gain, the only function of which is to enable a variable DC component to be introduced and thus vary the relative positions of the two scans using VR3, the separation control.

The following stage uses a BFY51 as a switching transistor (Q2, Q5) which shunts the signal to ground when its base is driven by the positive-going phase of the switching waveform, a square-wave generated by a CD4001

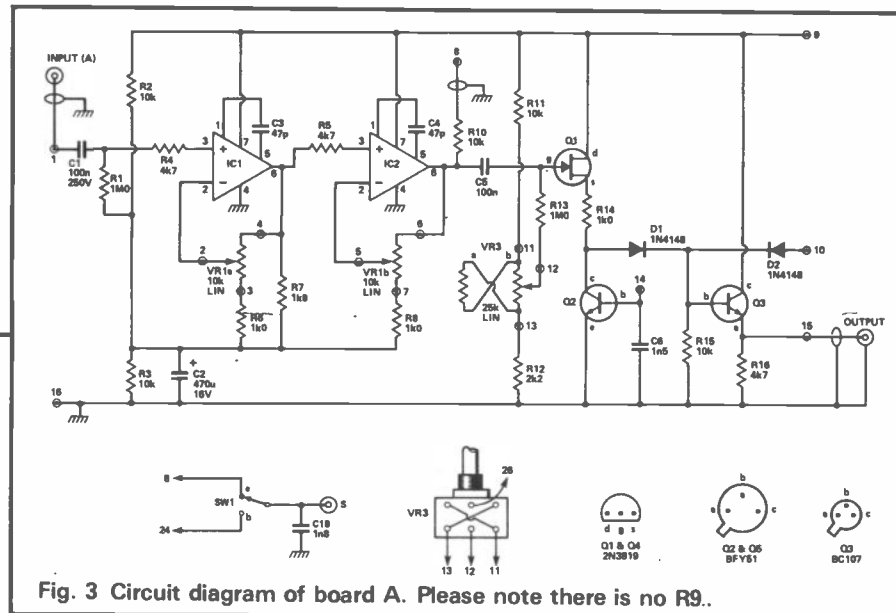


Fig. 3 Circuit diagram of board A. Please note there is no R9.

astable multivibrator (IC5).

The two channels, A and B, are switched alternately and their conducting phases pass on the signal to the input of the final BC107 emitter-follower output-stage (Q3). Diodes D1 and D2 isolate the signal from the switching stages when the latter are in a conducting state. Thus Q1, 2, 3 and 4, together with the diodes D1 and D2 act as a diplexer, similar to that in an FM decoder, sampling alternate left and right channels.

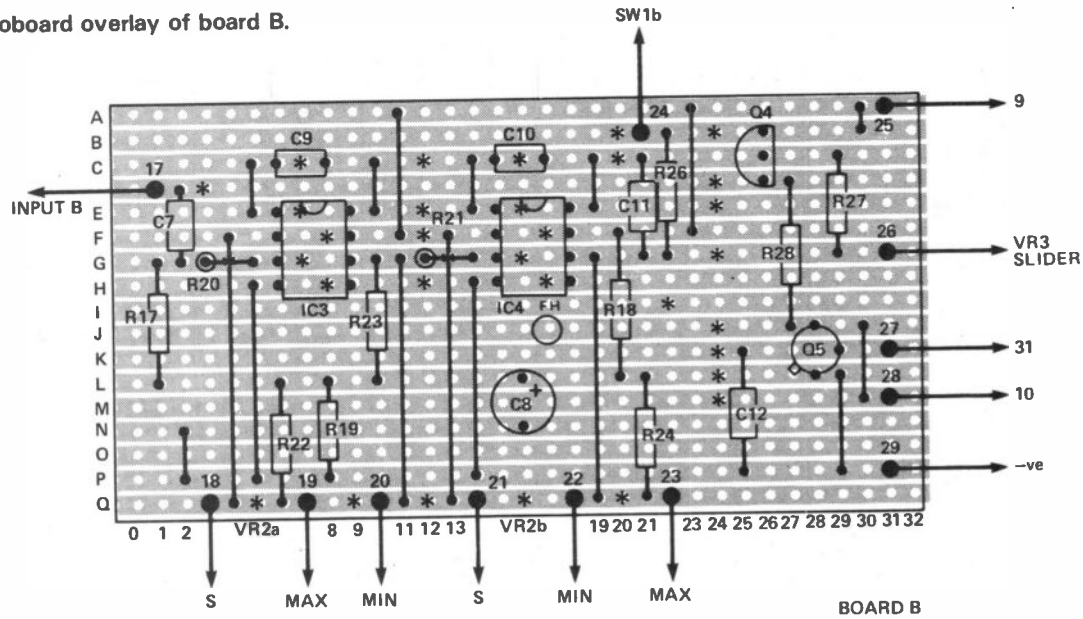
The output of Q3 therefore consists of a complex waveform made up of alternating samples of each input, plus two variable DC components which determine the relative trace-positions on the oscilloscope screen. The multivibrator frequency is made variable, and ranges from around

600Hz to 16kHz. This enables certain switching frequencies to be avoided should they happen to fall into harmonic relationship with the displayed signals, causing patterning.

SW1 selects sync from the appropriate channel, the oscilloscope sync-selector being set to 'external'. Normally, it is immaterial whether sync is taken from channel A or B, except when traces of differing frequencies are displayed. The Z-axis input uses the full anti-phase output of the multivibrator (approx. 12V peak to peak) and VR5 applies this differentially to reduce brilliance on one or other trace.

The PSU delivers 15V stabilised at approximately 70mA, about 30mA of which is being supplied to the LED. At this loading, the ripple

Fig. 5 Veroboard overlay of board B.



content was measured at 1.7mV RMS. The diode D3 is included as a protective device for the logic chip IC5. Some oscilloscopes give a large negative voltage-surge at the Z-axis socket when switched on and the author lost several chips before the truth dawned on him!

Construction

The circuit is built on four sections of veroboard, the component layouts of which are shown. The power transformer is attached to the wooden base of the case, with its PCB fixed to it. The remaining three boards are fixed to the underside of the control panel which is removable for servicing, being connected by two pairs of flexible leads (one to the mains switch and the other pair to the PSU output).

The terminal points consist of 1/4" lengths of 18 swg copper wire pushed through the holes of the stripboard and soldered. The control-panel layout may be seen from the photograph shown nearby. The second photograph shows the positioning of the circuit boards etc. A metal case is not required, the prototype being made of hard-board sprayed with grey cellulose primer from an aerosol and the lettering was done with 'Letraset'.

A small screen of tinfoil may be seen behind the input A socket. This is soldered to the earth tags of the socket and shields against pick-up of switching waveforms

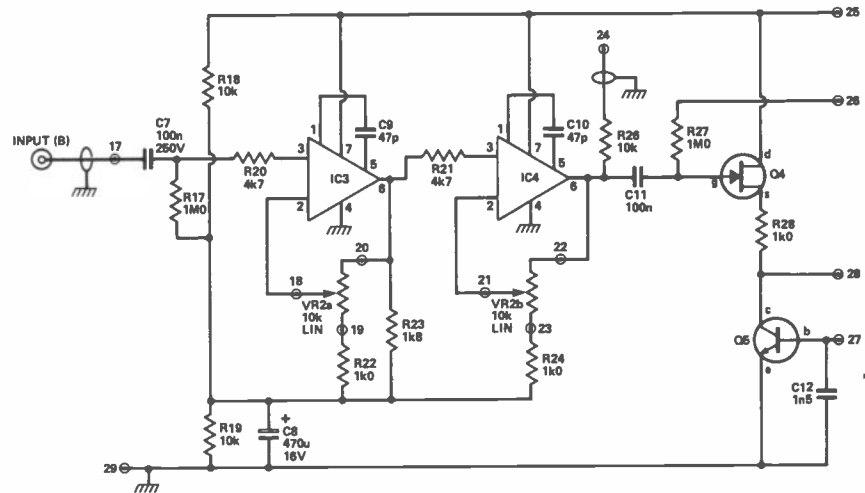


Fig. 4 Circuit diagram of board B. Please note there is no R25.

generated by the adjacent components on board A. Screened leads should be used for the signal inputs and output, and also for the sync. output leads.

The boards A and B are mounted on wooden blocks using the mounting holes shown. Board C may also be mounted in this way, though the prototype shows a dif-

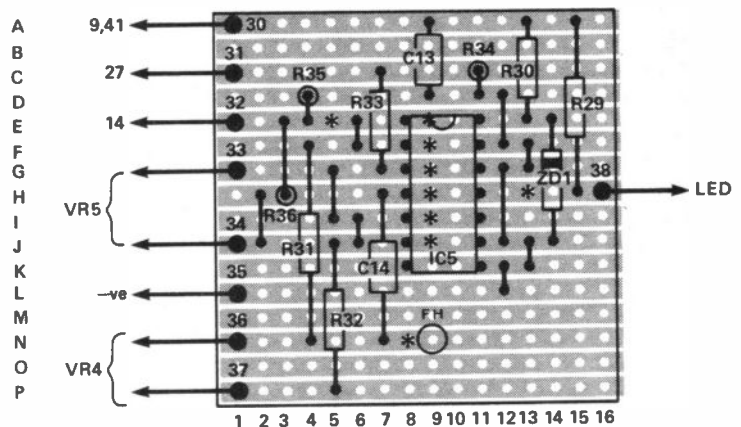
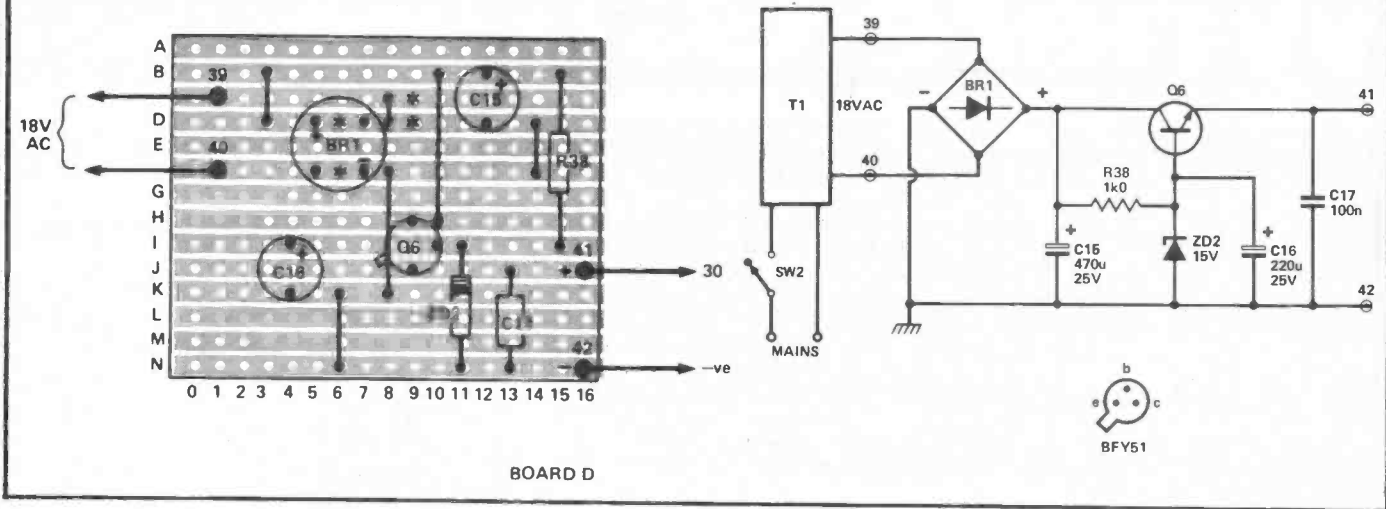


Fig. 6 Veroboard overlay and circuit diagram of board C.

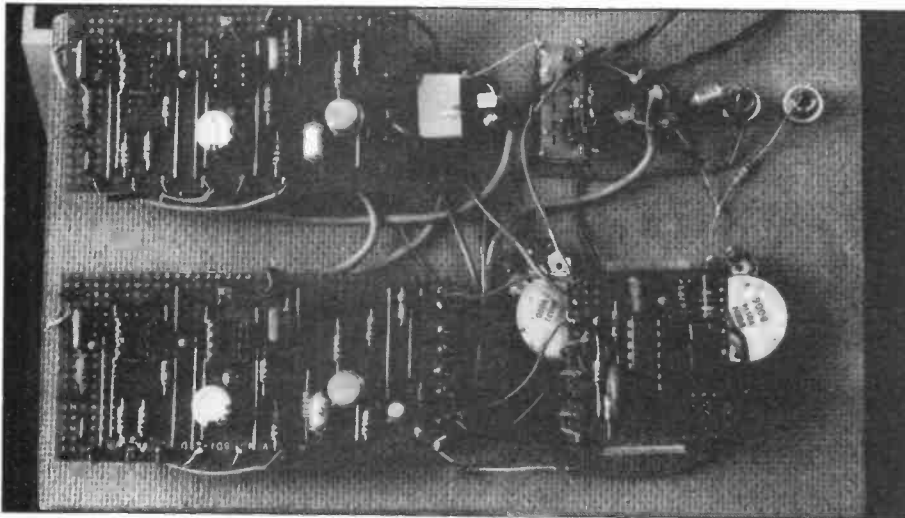
BOARD C

Fig. 7 Circuit diagram and Veroboard overlay for Board D.



ferent method. It was considered neater to fix the switches and sockets into position using 'Araldite', thereby avoiding unsightly screws. The overall dimensions of the unit are:
length — 215mm
depth — 120mm

rear height — 120mm
front height — 60mm
panel — 208 × 128mm
The pot VR4 should be connected so that maximum frequency occurs in the anticlockwise position, as this gives a more linear control of frequency.



COMPONENTS LISTING

Resistors

R1,13,17,27,31	1M
R2,3,10,11,15,18,19,26,37	10k
R4,5,16,20,21	4k7
R6,8,14,22,24,28,38	1k
R7,23	1k8
R12	2k2
R29	390R (0.5W)
R30	470R
R32	39k
R33,36	12k
R34,35	1k5

All resistors 0.33W carbon film unless otherwise stated. Note that there is no R9 or 25.

Potentiometer

VR1,2	10k lin. dual gang
VR3	2k lin. dual gang
VR4	2M log.
VR5	10k lin.

Capacitors

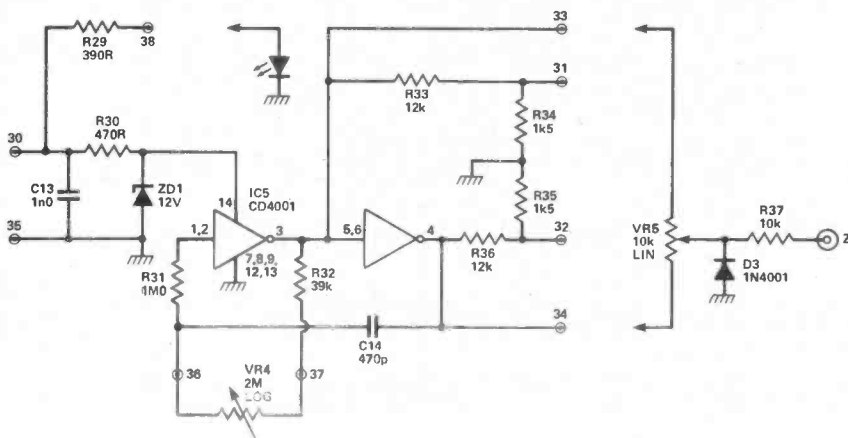
C1,7	100n 250V polyester
C2,8	470u 16V electro. radial
C3,4,9,10	47p ceramic
C5,11,17	100n 150V polyester
C6,12	1n5 ceramic
C13	1n ceramic
C14	470p ceramic
C15	470u 25V electro. radial
C16	220u 25V electro. radial

Semiconductors

IC1,2,3,4	CA3130E
IC5	CD4001
Q1,4	2N3819
Q2,5,6	BFY51
Q3	BC107
D1,2	1N4148
D3	1N4001
ZD1	BZY88 400mW 12V
ZD2	BZY88 400mW 15V
BR1	W005 type

Miscellaneous

3 TV type coaxial mounting sockets; 2 Wander types sockets; SPDT switch; SPST switch; 5 knobs; 8-pin DIL sockets; 14-pin DIL holder; 1 rectangular 2.5×5mm and veroboard.



Where On Earth?

There are quite a number of places on the official DXCC countries' list which are so obscure that, outside of amateur radio, nobody has heard of them. Some are relics of the past which just refuse to die.

The Order today is a world-wide Roman Catholic charity, devoted to hospital and other community work, with approximately 10,000 clergy and lay members. Its headquarters, located atop the

Turks in 1523 after a long siege. It then retreated to Malta where it was to stay for 250 years until being evicted in 1798 by Napoleon.

The Maltese period was the Order's most prosperous time. The SMOM fleets controlled much of the Mediterranean, briefly acquired the town of Tripoli in North Africa and the Caribbean islands of St Croix, St Barthelemy and St Martin, and undertook the construction of many beautiful public buildings on Malta itself.

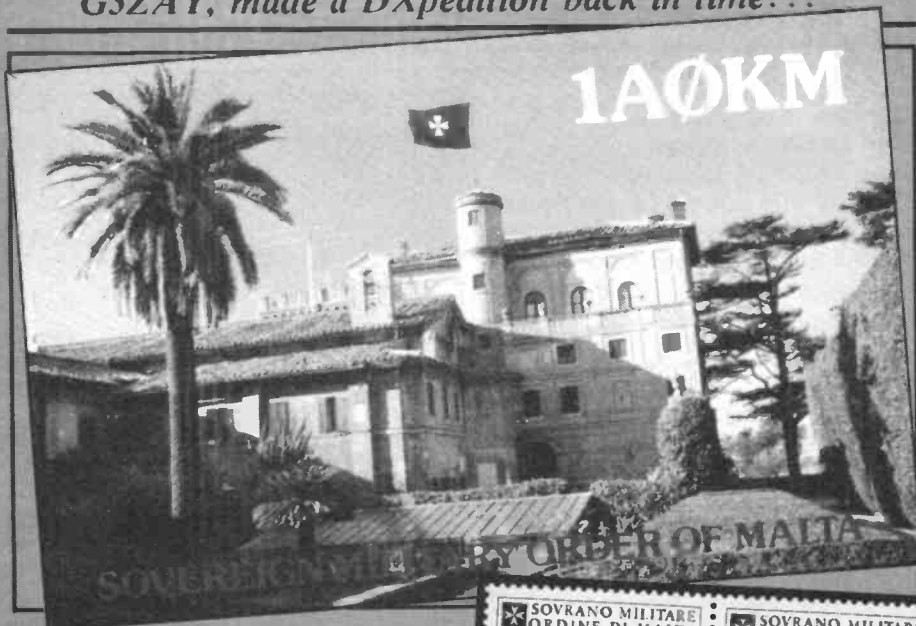
After Napoleon's defeat, Britain refused to return Malta to the Order and its territory has been restricted to a handful of buildings and embassies ever since.

SMOM and the DX Operator

The appearance of the Order on the DXCC list was due to the efforts of Rome DXer, IOMGM, Mario Gallavotti. Mario submitted detailed documentation to the ARRL in support of his contention that the SMOM was a bona-fide sovereign country which should be included on the DXCC list, even though its territory only amounted to a few square yards of suburban Rome. The ARRL was sceptical at first, but, after making investigations of its own, added the Order to the DXCC list in January '82, backdated to the first operation in December '80.

There are no amateurs in the small 'native' SMOM population living in the HQ building on the Aventine hill, so all the 1AOKM (KM = Knights of Malta) operations have been by visitors; mostly Italians from the Rome area. Weekends have been the usual time for the station to be put on the air, from a temporary shack in the ante-room of the administration wing, where the operators are surrounded by reminders of the once glorious past. Portraits of previous Grand Masters look down from the walls and beautifully detailed models of the sailing ships with which the Order once patrolled the Mediterranean stand around the

Some of the more obscure DXCC countries have strange and lurid histories. Martin Atherton, G3ZAY, made a DXpedition back in time...



Others are so small and isolated that the world has just forgotten about them.

The Sovereign Military Order of Malta (1A0)

What is the connection between the Crusades and the DXCC countries' list? This question might floor most contestants in the BBC 'Brain of Britain' competition but would be an easy one for any active DX operator. The answer is the Sovereign Military Order of Malta, or SMOM for short, which is recognised as a sovereign power by 41 countries around the world, as a DXCC country by the American Radio Relay League and counts separately for most other awards and contests. Although virtually landless, the SMOM issues stamps and passports and accredits ambassadors. The Grand Master of SMOM ranks as a cardinal in the Catholic church.



Aventine hill in Rome at one corner of the Piazza dei Cavalieri di Malta, is now almost the only territory it possesses, but in earlier centuries things were very different.

The Order was founded in Jerusalem at the end of the 11th century as a hospital, initially for pilgrims to the Holy Land, but later catering for knights injured in the Crusades. It gradually grew both in numbers and in wealth and, though continuing its hospital work, slowly changed into a military body dedicated to fighting the advance of Islam. During the 14th and 15th centuries, the Order was based on Rhodes but was forced out by the



A DXpedition to SMOM HQ on the Aventine Hill. From left to right — IOMGM, IOJX, IOIJ and IOMXM.

operating desk.

One of the Order's rules is that only those of noble birth can sit on its governing council and in consequence most of the HQ residents are Italian noblemen. Visiting DXpeditioners always take care to dress formally so as not to cause offence and usually wear grey suits — even when erecting antennas on the roof!

The Rome DXers have declared that they intend to keep 1AOKM high on the list of wanted countries and consequently are active from there no more than once or twice a year. This policy is probably a case of making a virtue out of a necessity, since although relationships with the authorities are good, there might be some ill feeling if visits were too frequent.

Mount Athos (SV/A)

If you hear a Greek station signing /A, don't assume he's working from his alternative premises. He's not. SV.../A calls (as well as SY prefixes) are used from the independent country of Mount Athos, which counts separately from Greece for DXCC and most other amateur radio awards and contests. There are some strange little places on the DXCC countries list and Mount Athos is without a doubt one of the strangest. An independent republic, under the protection of Greece, it consists of a single mountainous peninsula 30 miles long and 6 miles wide, jutting southwards into the Aegean. The

highest point, Mt Athos itself, is some 6670 feet above sea level.

So far, so ordinary, but the quite extraordinary feature of this place are that all the 1000 or so inhabitants are *men*, and almost all are monks living in the 20 monasteries dotted around the coast. Women have been completely banned from the country for the last thousand years, and even female animals were prohibited until recently(!).

The first hermits settled on the mountain in 850 AD and by about the year 1400, 19 out of 20 monasteries had been established. The religious nature of the place gave rise to its Greek name Ayion Oros — Holy Mountain. For the last thousand years, the population has been sustained by a continual inflow of monks and money from the rest of Europe — principally from the Greek and Russian Orthodox Churches. The government consists of the 20 man Council of Abbots (one from each monastery) which meets three or four times a year in Karyes, the only village on the peninsula.

Male visitors are permitted to enter the country if they can obtain one of the 10 visas issued per day, but no-one can stay for more than 4 days without special permission. There are no roads across the border and visitors arrive by sea on the regular ferry from Ouranopolis. Free accommodation is available in the monasteries where guests are expected to join in the monastic life and attend church services — in-

cluding the ones in the middle of the night. Woe betide anyone who arrives during Lent! The monks take it very seriously indeed and food is rarely on the menu!

According to 'Holiday Which', intending British visitors should first obtain a letter of recommendation from the British Consul in Thessaloniki or Athens, which can then be exchanged for an entry visa at the Ministry of Northern Greece in Thessaloniki. 'Genuine' reasons for wanting to visit are required, plain tourism isn't good enough. As there are no licensed amateurs among the monks, all radio operations from the country have been visiting DXpeditioners who have to obtain not only a Greek licence, but also an operating permit from the Council of Abbots. The last operation acceptable to the ARRL was by W6LAS/SV/A in April 1983. DJ5CQ/SV/A was active last year but could not produce the right paperwork and so his QSLs do not count for DXCC. The last major DXpedition was back in April 1980 so the place is long overdue for a proper 'airing'.

The most recent information to come from the country is supplied by the well known DXer Eric Sjolund, SMOAGD, who visited the place in April 1984. Eric arrived just before Easter and, just in case he was lucky enough to find the Council of Abbots in session, carried his complete HF station (plus generator, since only one monastery has mains electricity) with him. In the event, there were only 4 Abbots in Karyes, not enough for a quorum, so he had to forget about operating and concentrate on sight-seeing. He and another SV DXer spent their 4 days hiking from monastery to monastery, talking to the monks about amateur radio. One Abbot invited them to come back to set up a station once they'd got permission from the Council, but Eric is still waiting for that to come through.

Finding a suitable operating spot on Mount Athos is extremely difficult because most of the monasteries are perched on precipitous mountainsides, completely blocking propagation for at least 180 degrees around the horizon. The mountaintops offer the best prospects but there are few roads, so all the gear would have to be transported by mule.

Mt Athos poses a challenge of a different sort to the well known husband and wife DXing team of Lloyd and Iris Colvin, W6KG and W6QL. They have stated that they intend to operate from every reasonably accessible DXCC country and have already ticked about half of the total off their list. Lloyd could make it to Mt Athos, but Iris...?

STOP PRESS

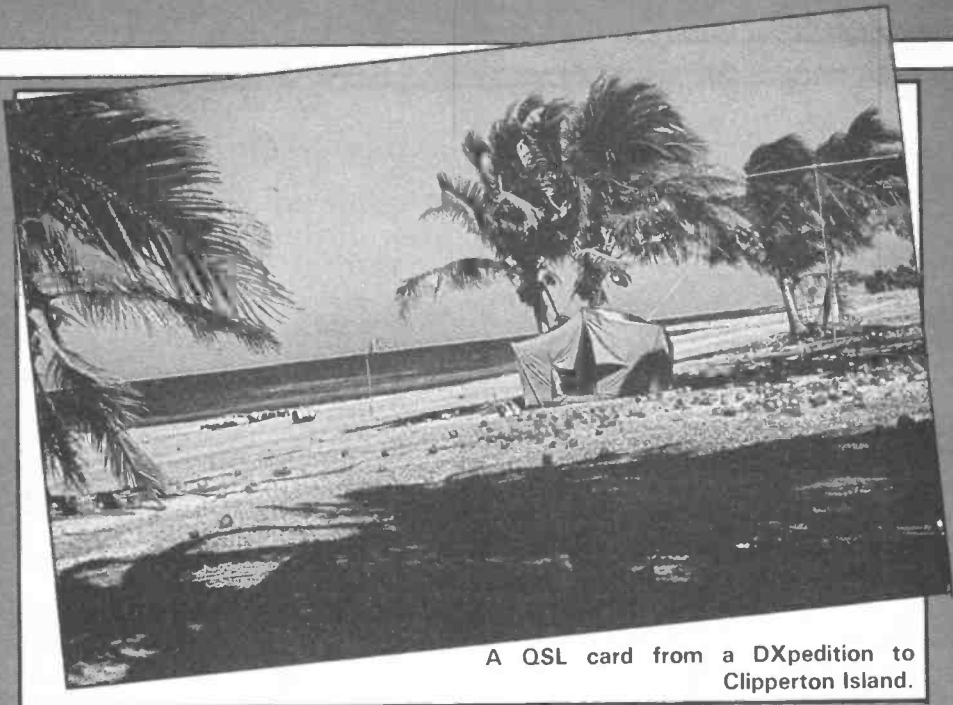
We have just heard that the ruling Council of Abbots on Mount Athos have decided to ban all further amateur radio expeditions.

Clipperton Island (F00)

Out in the Pacific, some 700 miles west off Mexico lies lonely, uninhabited, Clipperton Island; a low lying ring of sand enclosing a stagnant salt water lagoon. Although it now belongs to France and is administered from Paris, it is named after an English pirate — John Clipperton — who used it as his base during the early years of the eighteenth century.

France formally annexed the island in 1855, but Mexico disputed the claim and was the first country to occupy the place. The dispute was eventually arbitrated in 1930 by King Victor Emmanuel of Italy who came down in favour of France.

The years 1914 to 1917 marked a particularly gruesome period of Clipperton's history, when it became a forgotten colony. At the end of 1913 about 100 people, Mexican soldiers, guano workers, women and children, were living on the island and receiving regular supplies from Mexico. When war broke out, a bureaucrat somewhere in the Mexican government forgot about the colony and no further supplies were sent. During the next three years, most of the people died from starvation or tropical diseases, several of the men were drowned trying to row out to a ship they saw (or thought they saw) in the distance, and after a horrific night of violence, in which the lighthouse keeper murdered the surviving men and was in turn murdered by one of the women, only three women and eight children were left alive. The very next day, a US naval vessel called at the island and picked up the sur-



A QSL card from a DXpedition to Clipperton Island.

vivors.

The period 1939-45 again saw it occupied, this time by Japanese agents monitoring radio and shipping traffic in the surrounding sea lanes.

Amateur radio activity has been very infrequent. 1978 saw a major Franco-American DXpedition which made some 30,000 QSOs, and, by the time this appears in print, the April '85 DXpedition sponsored by the Northern California DX Foundation should long have been history. W9KNI's book, 'The Complete DXer' refers to yet another Clipperton DXpedition which reportedly ran into problems with a typhoon, had most of its equipment wrecked, and left the island after making only 50 QSOs (including one with W9KNI).

If you missed the expedition this April you'll probably have to wait quite a time to get a QSL from this island of ghosts.

Pitcairn Island (VR6)

Another island with a violent past is Pitcairn in the South Pacific. Although world famous for providing a hiding place for the 'Bounty' mutineers, its subsequent history is almost unknown.

Let's pick up the story in February 1808 when Mayhew Folger, an American sealing captain, put into Pitcairn for fresh water supplies. Expecting to find the place uninhabited, as it had been when discovered in 1767, he was surprised to see a canoe being launched through the surf towards

him. He was even more surprised when the young brown skinned occupants clambered onto his deck, greeted him in English and said they were subjects of King George!

Folger asked them a few questions and soon established that they were the children of the Bounty mutineers who had disappeared back in 1789 after the, even then, famous mutiny. The lads took him ashore where he met the only surviving mutineer, John Adams, who had a dreadful tale to tell. It seemed that the mutineers and their Tahitian wives had not found happiness on Pitcairn. Endless drunken quarrels over land and women had resulted in the deaths of all the men except Adams, who emerged from the violence as a born again Christian, dedicated to bringing up the children in a civilised God-fearing community.

Ever since that first conversion, the Pitcairners have been a devoutly religious community and today firmly embrace the beliefs of the Seventh Day Adventist Church. Folger's report of the surviving mutineer eventually reached the British Admiralty, but the thirst for vengeance had weakened with the years and when a British ship eventually called at Pitcairn, Adams was left to live in peace on the island. Most of today's islanders are descended from the children he raised.

The history of Pitcairn in the nineteenth century is littered with colourful characters. One particularly worthy of note is Joshua Hill, a madman who arrived on the

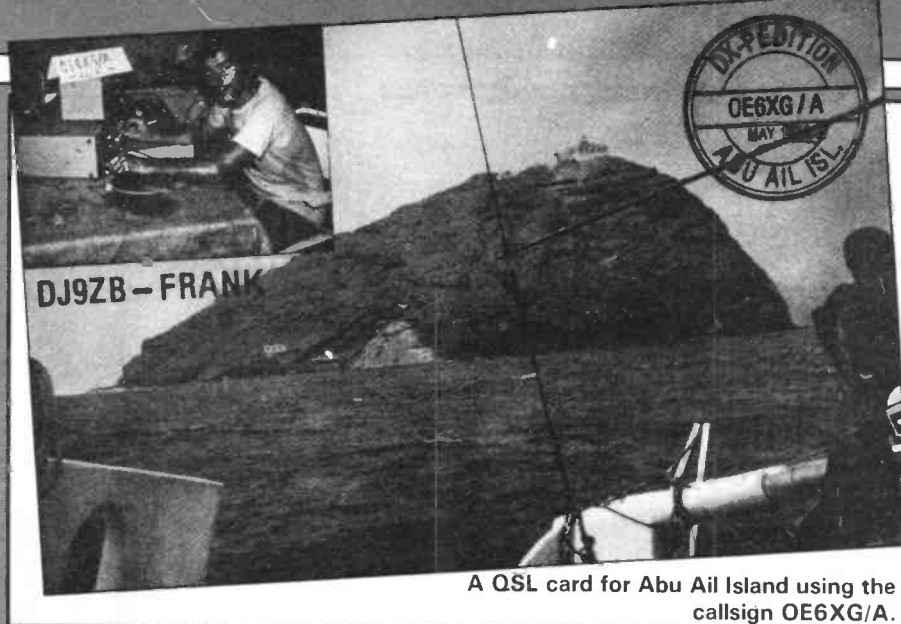
island in 1832. He set himself up as governor and claimed to be a personal friend of most of the Kings and Queens of Europe. He came unstuck in 1838, when a visiting Royal Navy ship turned out to be captained by an aristocrat who was supposed to be one of his greatest friends, but who, it soon transpired, had never heard of him. Rather bad luck really when you think about the chances of that happening!

The modern Pitcairn population numbers about 60, and there are at least two active amateurs on the island — Tom Christian, VR6TC (a native Pitcairner), and Kari Young, VR6KY (a Norwegian girl who fell in love with an islander while on shore leave from her job as radio operator on a merchant ship). Tom can be found around 14145 on most Sunday mornings (0730-0800z) working his friends in Europe.

The future for the Pitcairn islanders is bleak. The population is steadily declining as young people leave for the bright lights of New Zealand, and the number of passing ships is fewer every year. There are intervals of three or four months during which there is no way to get people or goods on or off the island. Once the population gets below the 50 level, the community will probably cease to be viable and the residents will have to emigrate en masse to a new home. The DX-ing moral is to work this one while you can.

Abu Ail & Jabal al Tair

This DXCC 'country' in the Red Sea is almost impossible to find on any but the very best charts. It qualified for the list at a time when the rules were rather less strict than they are today. It consists of two small, rocky, islands about a hundred miles apart. Abu Ail is 300 feet high and Jabal al Tair 780 feet. Both have lighthouses on their summits. Although the islands are claimed by virtually all the surrounding countries, they are not administered at present by any of them. The lighthouses are run by an offshoot of the British Department of Trade and Industry (because a fairly old treaty on Red Sea navigation assigned this task to Britain) and are manned by staff recruited from the Middle East.



A QSL card for Abu Ail Island using the callsign OE6XG/A.

The first amateur radio operation was by ET3ZU/A in 1971, and the most recent was by Lloyd and Iris Colvin, W6KG and W6QL, operating as G5ACI/AA in 1982.

Suitland Island (KH7S)

You won't find this island in any atlas or even on the DXCC list. It doesn't even exist but there has been activity from it! A few years ago the editors of DX information sheets around the world received a package of material about an American Island in the Pacific, 600 miles north of Hawaii, which had just been decommissioned as a chemical weapons dump. Suitland Island, as it was called, had apparently been deleted from American maps for security reasons but was now to be declassified. To celebrate its re-appearance there was to be a DX-pedition signing KJ6DO/KH7S the following weekend, and, in view of its distance from Hawaii, there was a strong possibility that it would count as a new DXCC country. The package even included a detailed government map of the island.

Most of the American bulletins, in their haste for a 'scoop' printed the story straight away, but this author (then co-editor of RSGB's 'DX News Sheet') smelt a rat and headed for the chart room at Cambridge University's official library. Not even the most detailed maps they had showed any sort of island in the appropriate part of the Pacific, so a hoax was hesitantly suggested.

At the appointed hour, however, KJ6DO/KH7S duly ap-

peared on the bands and soon developed an enormous pile-up. It began to look as though the doubters were wrong, until stations in California realised that they were having to beam north to work a station that should have been due west. KH7S was clearly somewhere along the north west coast of the USA and several thousand miles from where it was claiming to be. After several hours of mayhem, it went QRT and about a month later QSL cards with a skull and crossbones on the front began to appear through the bureaus. Why Suitland Island? Well Suitland in Maryland is the home of the US Navy's map-making dept.

The Washington authorities and the gullible DX editors were not amused.

Final Transmission

Hopefully the foregoing has shown that DXing can be a fascinating hobby, even if you are not bothered about collecting QSL cards or awards. The next time you work someone in what seems to you an unusual spot, ask about the local history and what it's like to live in the country. The amateur at the other end will probably be delighted to have the chance of a 'real' QSO and say something other than "59 QRZ?"

A word of warning though. Don't try this with a DXpedition or someone who is clearly intent on DXpedition style operating. An operator who has spent upwards of £1000 to make QSOs from a rare spot will not want to give you a lecture about the place — or at least, not until he returns home.

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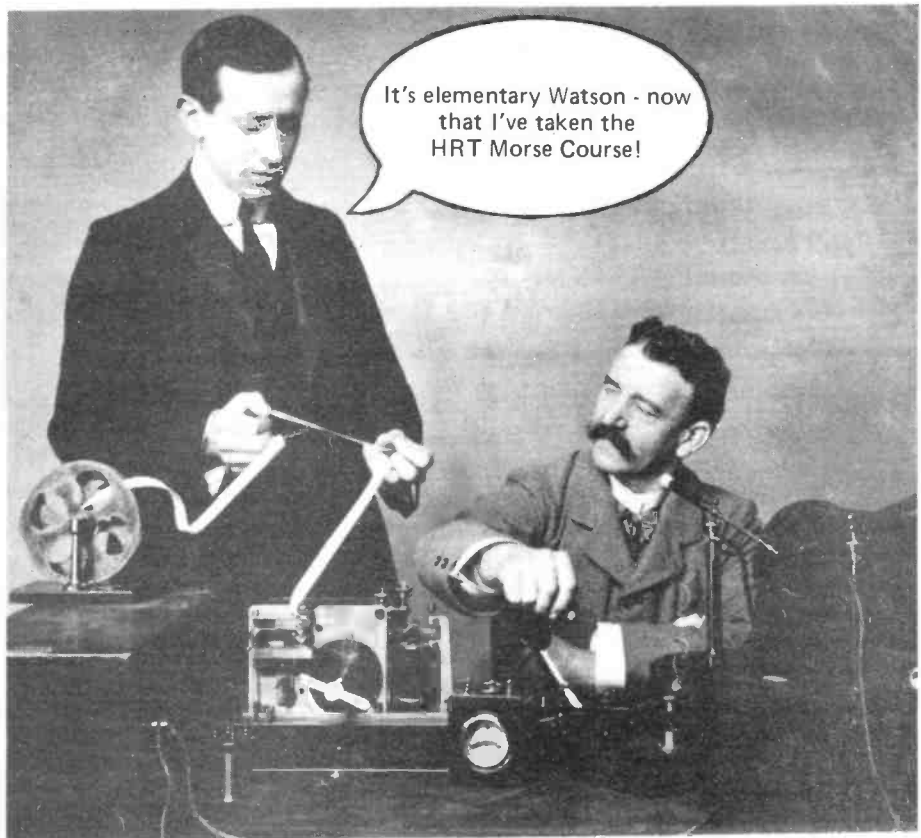
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Simple 'In-circuit' Tester

Traditionally, fault finding on a de-energised printed circuit board has required the desoldering of all but one of the connections to the component you desire to test and then making one or more resistance

measurements on the component. This process is not only time consuming, but also requires the application of a hot soldering iron to the board which can cause lifting of the PCB tracks and, perhaps, the destruction of heat sensitive components such as transistors or ICs, before, or even after, testing.

As the component packing density of modern equipment increases, so does the danger of inadvertent damage to adjacent components which fault finding in the above fashion. Furthermore, an ohmmeter cannot detect a short circuit inductor or an open circuit capacitor and some will generate sufficient voltage, even on their lowest range, to de-stroy some semiconductor junctions. This problem has troubled the author for a considerable period until quite recently, when, whilst clearing out a pile of old papers in the loft, he came across an old RCA Information letter dated some ten years ago. This described a simple yet versatile test device which, it was claimed, would meet this long felt need.

Want to test components — from coils to transistors — 'in circuit' on a PCB? All you need is an oscilloscope and this neat device unearthed by Brian Kendal, G3GDU.

In the best traditions of amateur radio, the clearing of the loft was forgotten, the soldering iron was switched on and a 'bread-board' version of the tester constructed within a few minutes. This was connected to the shack oscilloscope and, by the end of an hour spent checking a number of old PCBs acquired from club junk sales, he was fully convinced that

the tester was capable of the claimed performance. The unit described is, when used in conjunction with any oscilloscope, capable of testing components for short or open

If the transformer chosen develops more than 6 volts RMS, then the 560 ohm resistor should be replaced by one of higher value.

No specific constructional details have been given for two reasons: firstly, the circuit is so simple that none are really necessary and, secondly, a separate transformer may not even be needed if a floating (ie the negative or positive of this are not

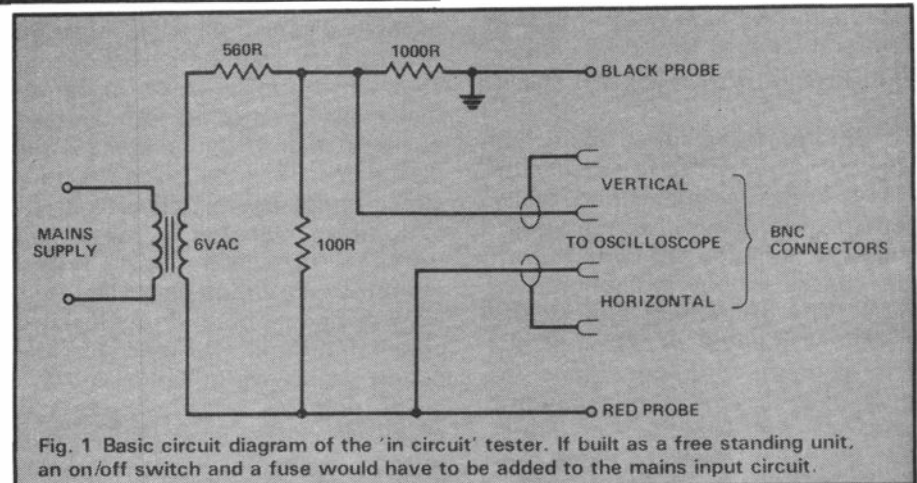


Fig. 1 Basic circuit diagram of the 'in circuit' tester. If built as a free standing unit, an on/off switch and a fuse would have to be added to the mains input circuit.

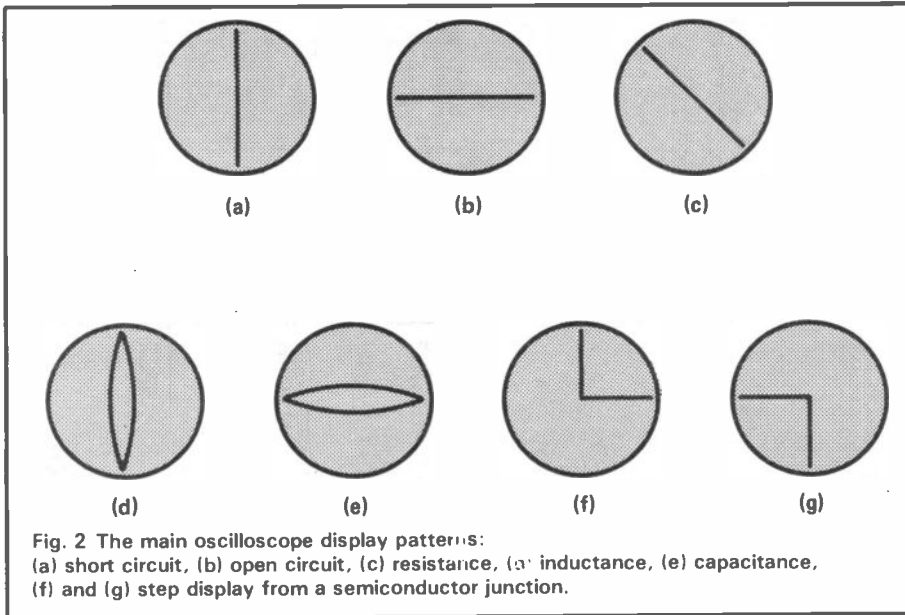
connected to earth or chassis) low voltage supply is available on the bench. As can be seen, the power requirement is minimal and if the smallest possible mains transformer is used, the unit should easily fit inside one of the readily available small diecast boxes. In such circumstances, an on/off switch and a fuse should be added to the mains input circuit. Alternatively, once that a breadboard prototype has proved the concept, the constructor may decide, as has the author, to incorporate the device within the oscilloscope.

Construction

A glance at the circuit diagram in Fig. 1 reveals that the construction could not possibly be more simple and, since none of the components are critical, they may be replaced by whatever is immediately available. The main requirement is that approximately 1V should appear across the 100 ohm resistor.

Operation

With the tester connected to a suitable oscilloscope, short circuit the red and black test leads and with the time base switched off, adjust the vertical gain on the oscilloscope until the trace is



almost full screen height. Separate the leads, and adjust the horizontal gain until the horizontal trace is almost the full width of the screen. The tester is now ready for operation.

Before using the tester in anger, it is good idea to practice on a few known working and faulty components, singly and in combination, until you are familiar with the oscilloscope indications in Fig. 2. The instrument can clearly identify a number of different circuit elements and conditions including: resistance, semiconductor junctions and capacitive or inductive reactance. Each of these produces its own distinctive pattern, but a little experience is necessary when interpreting combinations of these, such as may be found when 'in circuit' testing on a faulty PCB.

When testing transistors, check from base to emitter and base to collector separately, because a collector to emitter test,

being through two back-to-back PN junctions, will not produce a useable display. A single junction will produce a distinctive 90 degree step waveform, whilst a more obtuse angle (greater than 90 degrees but less than 180) indicates a DC path across the junction. If the transistor is not connected into a circuit, this indicates a less than perfect junction, but when mounted on a circuit board (ie in circuit) this could be due to a resistor connected in parallel with it in the circuit, as shown in Fig. 3.

If one leg of the waveform takes the form of a loop, this is due to the presence of capacitive or inductive elements in the circuit, see Fig. 4. For example, if a diode and a capacitor in parallel are under test as in Fig. 5, the oscilloscope will display both a 90 degree step waveform and a Lissajous loop, indicating that no separate DC path was present. If however, the circuit under test was a transformer win-

dng in the base-emitter circuit of a transistor, the display would show a similar pattern but with a step angle of more than 90 degrees, thus indicating the presence of a DC path in addition to the inductive reactance and the junction step.

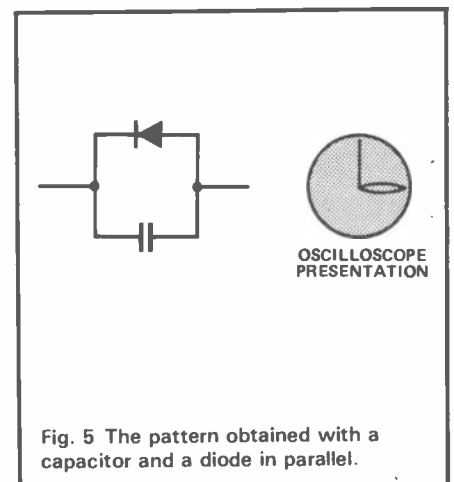
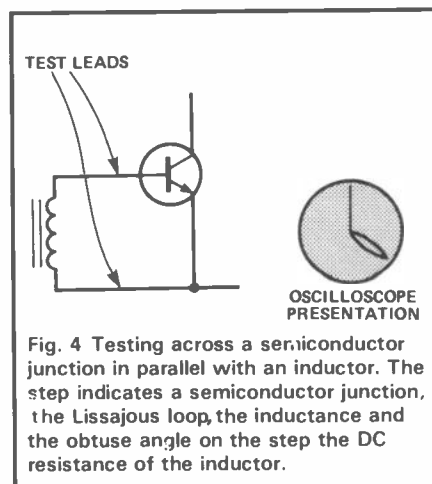
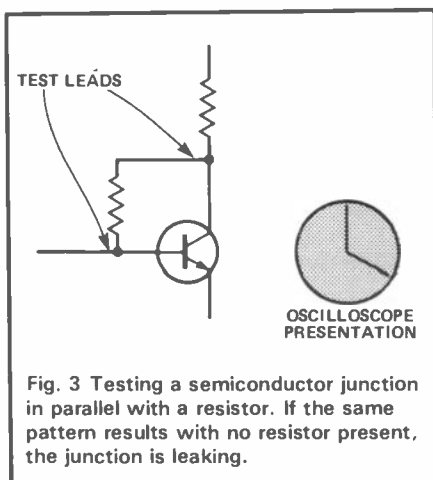
Two other useful checks can be performed with this tester:

(1) When confronted with an unmarked transistor, a common enough occurrence in the average shack, place the red test lead on the base connection and the black lead on the emitter or collector. A step pattern opening downwards will indicate that the device is NPN, whilst a pattern opening upwards indicates PNP. This method can also be used to determine diode polarity.

(2) An out-of-circuit potentiometer can be checked for 'noisy' operation. Connect the test probes between the potentiometer slider and one end connection and rotate the spindle through its range. A quiet device will cause a diagonal line to be displayed, the angle changing as the position of the arm is varied. Should any noise be present, this will show as intermittent spurious responses as - jaggedness - on the display.

Safeguard Components

The design of the tester limits the current applied to the device under test to about 1 mA RMS. This is perfectly safe for the majority of semiconductors, however, this could cause damage to some small signal diodes or transistors. If such devices are to be tested, they can be simply safeguarded by placing an additional 10k ohm resistor in series with the red lead of the tester.



Looking at BBC 'Outside Broadcasts'

Television OBs, as you can imagine, are a little more complex than radio. Whereas with radio it is only sound quality one is after, with TV it has to look good as well! Because of the complexity of TV, a vast amount of electronics is used, which is beyond people like me (I can understand how a microphone picks up a voice, is mixed and then transmitted, but the workings of a vision mixer... well need I say more). Bearing this point in mind, my findings in this article generally relate to communications and how the vehicle functions as a control unit.

In part two, Mick Rump, G8CYE, takes a look at television and the 'Lime Grove Topical Production Unit'.

One day, whilst trudging through the bustling streets of Brighton, I happened to notice a large van in what I thought was the BBC grey livery parked outside Prince Regent's Royal Pavilion (any visitor who has been to Brighton will recognise this as the Palace with the 'onions' on top). On pursuing my noseyness, I discovered the van was a unit called the 'Lime Grove Topical Production Unit' or TS1 to its friends. Unfortunately, my visit was too late to bear any fruit as the crew were heading for the gate back to Lime Grove. However, fate being what it is, TS1 made another visit to Brighton for the TUC Conference. Armed with pen and notebook and also finding two very helpful and cooperative engineers, I discovered the following...

TS1 is designed as a one-camera mobile vehicle and carries all the equipment required for a broadcast, unlike most other control units who need support vehicles to bring the equipment to the site. Its main role is used in and around London for fast news

coverage, although running true to the BBC motto it was used as the TUC Conference for 'Breakfast Time' and 'Newsnight', for which special interviews were made in a rented room in the adjacent Metropole Hotel.

The camera is fed into TS1, produced, directed and then beamed out on SHF through two phased helix yagi's at the top of the mast (the latter being affectionately known to the engineers as poles). There are five receiving aerials around London for the signal, which is passed along an SHF chain of repeaters, finally being fed into

Television Centre.

The Mercedes van used is literally crammed with electronics. The main production area is situated between the cab and the rear axle, the rest of the vehicle being used for storage of equipment. This includes camera and audio cables, power cable, cameras, camera stands, a spare microwave dish along with short stands that can be used instead of the 'poles' and a great quantity of plugs, sockets, leads etc essential to any kind of broadcast.

The termination panel of the TS1, carrying power camera and audio inputs to the vehicle.



The 'Topical Production Unit' or TS1.

The production area consists of audio and vision mixers, with appropriate monitors. Also included are equipment racks, containing jack fields (networks of jack plugs and sockets for equipment connection purposes), line amplifiers, audio and video processing equipment, mains power circuit breakers (in case of overloads) and monitoring equipment.

Of special interest is the communications facilities carried on TS1 and they are somewhat comprehensive; no less than seven transceivers are used, working on different frequencies. These systems are as follows:

a) **Low band VHF.** This is used for outside broadcast communications. Let's say for example we have a relay vehicle on a nearby hilltop, this link is used between the relay vehicle and the OB site. The aerial is a $\frac{1}{2}$ wave mounted on the roof.

b) **Low band VHF.** As you can imagine, an awful lot of cables have to be laid for an OB and this work is carried out by 'riggers' who communicate between themselves or TS1 using hand held sets. These are stored in TS1, ready for use at any time. Again the vehicle aerial is a roof mounted $\frac{1}{2}$ wave.

c) **High band VHF.** This is the main

engineering link used by engineers for reporting technical difficulties or talking about technical adjustments, before, during or after a broadcast. The aerial is the ubiquitous $\frac{1}{2}$ wave roof mounted.

d) **High band VHF.** Being essentially a news vehicle, fast communication with the newsroom or nearby engineering base is essential, so a conventional radio telephone is also fitted. By dialing any number on the telephone keypad, it is fed directly into the British Telecom network for direct phone contact. A half wave aerial completes the system.

e) **High band VHF.** This is the main news communication link in and around London, so all news vehicles can keep in contact. A $\frac{1}{2}$ wave aerial roof mounted is again used.

f) **UHF.** This is used for contact to the camera man. The camera cable includes an intercom pair so the camera man can plug a pair of headphones into the camera; however, in some circumstances this may not be practical, so wireless communication is used. The camera man has only a receiver



The main production area of the TS1 is situated in the central part of the van. The rear space is used for storage of ancillary equipment, such as cameras, power and audio cables.

with an ear piece or headphones, the reason for this being quite logical. The production staff in the vehicles pass on a command to the camera operator, which they obey, and the staff can see the results on the camera monitor screen back in TS1, so he has no need to be able to talk back. The second reason and probably the most important, is that the physical position the camera operator is in is often very close to the microphones for the sound recording — if the operator did speak, it would come out on-air! The aerial used is a $\frac{1}{8}$ wave, either mounted on the roof of the vehicle or on top of the sixty foot vehicle mast for better coverage.

g) **SHF.** All the pictures and sound that have been processed in TS1 have now to reach the main London studio. This is done via microwave link, the dish antenna which is usually located on the vehicle mast. This transmission, in the case of a broadcast from Brighton, of the five receiving (microwave link) aerials, as mentioned earlier.

As may be seen from this brief insight, TS1 is a *very* comprehensive outside broadcast vehicle. Other TV OB vehicles have broadly similar contents but are designed for specialist purposes. Finally, as the TS1, it must be the most valuable Mercedes lorry on the road, anywhere!

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Free Readers' ADS!

WANTED

WANTED memory expansion and super expander cartridge for Commodore VIC20 computer. Also wanted microwave hardware for 10GHz, such as circulator, small dish and feed, wavemeter. WHY? Dave Price G4BIX Betchworth (Surrey) 2894 after 6pm.

WANTED Marconi Atlanta PSU or details of construction also manual. Frost, 36 York Gardens, Braintree, Essex CM7 6NF 0376 40317.

MICROWAVE MODULES MMT432/28 transverter in good condition. Also Yaesu FT225RD memory unit. Graeme G6CSY Orpington (0689) 29230 evenings.

WANTED TRIO R-599D amateur radio receiver with instruction manual must be in good condition, no modifications please state price, please ring 051-931-1001 anytime.

OSCILLOSCOPE WANTED 20 60 MHz dual trace & operating manual. Phone 01-482 1635.

WANTED digital frequency meter 200 MHz or higher minimum 10Hz resolution preferably mains powered. Also cassette with SSTV signals off air. Write Daly, 2 Stoney Lane, Newbury, Berks. All letters answered.

TEN-TEC CORSAIR wanted. Tel Tom, 0252 519834.

WANTED Yaesu YK-901 keyboard. Also Panasonic DR-49 digital coverage receiver. A Yaesu TD-148 desk mike. Phone Colchester 394336 Essex.

WANTED: looking for RE604 and RE614 tubes. Any quantity. Price offer to ON4ABT Postbus 135 LIER 2500 BELGIUM.

SUPER SKYRIDER wiring diagram or any other information pertaining to the SX28 model required. Contact Mr Baird, 65 Waterpump Court, Thorplands, Northampton 48850.

WANTED to replace stolen item RTTY Morse converter Codemaster or Tono 550. Phone 051 526 4832.

WANTED VLF receiver and pre-world war 2 radio handbooks. For sale Codar PR4D preselector £8. Marris, 35 Kingswood House, Farnham Road, Slough, Berks, SL2 1DA.

WANTED UFO DIGISCAN or similar. Must be cheap and working. Phone 01-961-4659.

WANTED any info, circuit diagram, on a SBE54CB. Will pay any expenses. Tel Paul Young 01-961-4659.

WANTED Sinclair ZX81 computer condition not important, but must be working. Will pay upto £10. Potters Bar 42065 evenings.

FREE of charge selection of past magazines, mainly 'Radio Communication'. Wanted miniature plug in Xtals between 12.53 MHz and 12.68MHz. Also 14.21 to 14.49 McCarthy, Ipswich 215047.

WANTED valves T160L-572B 12BY7A FT101ZD also any ATU. Tel Hounslow 01-560 7150.

WANTED air band receiver 108-138MHz selectivity and sensitivity important. Would consider home built providing conditions satisfied, also would consider loan of plans and instructions for self build. AE Jones, 46 Kingsdown Road, Northfield, Birmingham B31 1AH 021 475 1313.

WANTED Vibroflex bug icy original jewelled movement model. John Short, 26 Howard Crescent, Seer Green, Beaconsfield, Bucks HP9 2XP. Telephone 04946 5097 evenings.

WANTED handbook for HRO 500, buy or borrow for copying. Please state price or expense incurred. GM3DOD QTHR or phone Greenock (0475) 23742.

WANTED HS-DX TV converter model D100 new/unused or in excellent condition - with instructions please. Details to: DJ Oliver, 100 May Lane, Kings Heath, Birmingham B14 4AG.

WANTED DX-TV converter model D100. Operating instruction booklet leaflet.

Details please to: Mr DJ Oliver, 100 May Lane, Kings Heath, Birmingham B14 4AG.

WANTED Yaesu FT757GX transceiver, must be in good condition. Cash waiting. Phone Denis, Portsmouth 828872.

WANTED handbook or circuit diagrams of telequipment 'S61' scope, on loan or purchase. Ring Mr King on Peterborough (0733) 261681.

WANTED VFO for trio 2200GX or 7200G or 7200 GII. Believe serial of VFO is VFO 30G but will consider any suitable VFO. Will consider transceiver and VFO if necessary. Also wanted VFO for Trio 7010 SSB CW. Tel Allan 0782 612868.

GENERAL COVERAGE receiver urgently required, Yaesu FR range or Trio R1000. Carriage paid if too far to collect. D Howes, 149 Warren Wood Road, Rochester. 0634 404096.

WANTED two wide spaced variable capacitors 200 to 350 pF for ATU. J Van Walwyk, 11 Valette Court, 74 St James Lane, London N10 3RA.

WANTED any details for Hallicrafters SX 42 receiver photocopying and postage paid or manuals bought. Tony Dean, 3 St Johns Cottages, Charlton, Musgrove, Br Wincanton, Somerset.

WANTED Yaesu FT1018 FT101E or similar model. Will pay up to £300, if in good condition. Tel Stroud 04536 2385 Glos. 6.30pm onwards, Tues/Fri.

HAVE VRL Comms Rx 0-30 SER 496. Need circuit info PSU etc or would swap for 148 GTLDX ST9FDX S'star 360 for 10m conversion. Also want scrap CB's for shack spares (not trade). Also want 2mtr-10mtr transverter. Contact Eric after 6pm N'ton 37266 G1KRL.

WANTED can anyone help with information on Trio TX-88D or SM-5D or SP-5D transmitter. Any literature, instruction manual etc. Will pay postage and any costs involv-

ed. Contact by phone or letter Mr M Hudson, Flat 5, 6 Augusta Gardens, Folkestone. Phone 0303 42099.

WANTED circuit diagram and service manual for Sugiyama F850 HF/VHF transceiver. This rig has HF 50MHz and 2mtrs your price for same or photocopy Zycomm Electronics marketed this rig but they cannot help me. Phone Dublin 01 377139.

WANTED Marconi morse key model 365 unmodified, in first class condition. Write William J Ford, VE3KHB RR6, Smiths Falls, Ontario K7A4S7 Canada.

WANTED to borrow handbook for Wayne Kerr component bridge B521 for photocopying. All expenses paid plus useful present. Also wanted disc-seal triode TD03-10 (CV273) G3AAG. Hants 0730 892143. "Upper Durford", Durford Wood, Petersfield GU31 5AN. Help would be much appreciated.

WANTED Nato 2000 in good condition, Belcom 26-29MHz FT707 in good condition, phone 0283 221870.

WANTED Pye PFI's Tx and Rx xtalled for RB14, SU20, RB10. Good price paid for sets in vgc. Tel Leigh 675445 QTHR or write to S Balon 18 Knowsley Street, Leigh, Lancs WN74ER.

WANTED PSU for radio No 19 mark III also aerial for same, tuner etc. Price and carriage to Owen Corrigan, 24 Sheares Park, Glasheen Road, Cork, Eire. Thanks.

WANTED Yaesu YK901 keyboard. Yaesu YD-148 desk microphone. Phone Colchester 394336 Essex.

WANTED YC7B digital frequency display unit for Yaesu FT-7B. Tel 01 393 9115 evenings, 08926 4489 daytime. Ask for Pete Jenkins. **WANTED** FM board for FT101ZD, good condition, fair price paid. Jim, 23 Brookvale Grove, Olton, Solihull West Midlands. Phone 021 706 3570.

WANTED any information especially circuit diag for Hallicrafters S27 VHF Rx

27.8-143 MHz. Barry Stone G6SRE Ashford 25991.

WANTED two or three element HF beam 10, 15, 20 metres Tribander. Phone 08926 62540.

WANTED for AR88D full manual, original or photocopy, tel 0742 557686.

WANTED 3 or 4 bedroomed QTH within 20 miles radius of Bracknell. House, bungalow or WHY up to £45,000. Apply D A Jenkins ZB2HR, Meteorological Office, RAF Gibraltar, BFPO 52.

FRV7700 VHF converter for 2 metre and air band to fit FRG7700. Garry P Grigg (G1GPG) 061 428 6491 evenings

WANTED copies of tests about ICR70 ICR71 AOR2001 FRG 9600 FRG 8800. Contact D. Kemp, 40 Rue Des Seringas, 50200 Coutances, France.

WANTED Codar AT5 Tx 2m rig, also wanted FDK700EX or similar. G4RIP Mr Creasey, Rose Cottage, Six House Bank, West Pinchbeck, Spalding, Lincs PE11 3QG.

WANTED a 1362A type signal meter for my Marconi Atalanta receiver. Any reasonable price considered and all letters answered. This unit might not be common so any details appreciated. Jonathan Baker, 67 East Sussex Street, Selsey, West Sussex PO20 0BT.

WANTED Vintage radio books, magazines "Wireless at Sea" Hancock 19235 "Admiralty Handbook of W/T" HM50 1938 or similar. Condition unimportant, Crabtree 406A Linthorpe Road, Middlesborough, Cleveland 0642 828522.

WANTED power supply KW2000/B any condition if transformer ok or transformer only giving 800V 200V -60W and 12V. Rogers G3AIU 0793 (Swindon) 814280.

EXCHANGE

EXCHANGE my Bronica ECTL camera 75mm lens 2X converter 50mm lens spare back Pentaprism filters flash S/H value £600 for best HF transceiver offered. Dolphin, 3 Buckmore Avenue, Petersfield, Hants GU32 3EF.

WANTED FRG7700 or Trio R600 or Trio R1000 or any good communication receiver in exchange for 64K Amstrad CPC464 colour computer & software & books only six

months old. Write to Mr Durham, Dunedin, The Green, Hatfield Peveral, Chelmsford, Essex CM31 2JQ.

HAM INTERNATIONAL Jumbo Mk2 base station 26. to 28.495. Speedy CTE. international linear amplifier maines good condition swap for FT101 HF FT200 HF. Please write to Tom PO Box 16, Livingston EH54-8RB.

EXCHANGE Pentax M.E. Super Plus 28mm 40-80mm 75-150mm lens also flash and autowinder. All in mint condition. For SX200N AR2001 or similar. Cash either way. Phone 0970 4271 after 6pm.

EXCHANGE Magenta open top sports car for VHF/UHF transceiver and ATU etc or other radio equipments suitable for 2m operations preferably dual band. Anderson 037 387 483 Faulkland (Somerset) evenings.

EXCHANGE Super 8 sound home movie projector, films, screen, ex speakers, all in good condition. When new cost approx £700. For a good Trio or Yaesu home base transceiver must be working. Phone Norman, Leeds 530182.

EXCHANGE Super 8 sound home movie: projector, films, screen, ex speakers, all in good condition. When new cost approx £700. For a good Trio or Yaesu home base transceiver must be working. Phone Norman, Leeds 530182.

EXCHANGE Amstrad CPC464 colour computer. Colour monitor, assorted software, books, four months old for ham international Jumbo 2 base station for conversion or 2m multimode. Contact Keven Storey, 7 Dulnan Close, Tilehurst, Reading, Berks RG3 4YN.

TRANSMITTER type 9231 ex govt. 200-400 MHz good condition, weight approx 200 lbs. Offers or exchange R1155 or HF receiver or 70MHz plus 144MHz receiver. Tel 0380 830428 (Brattan, Wilts).

MM4001KB RTTY xceiver offered in exchange for 70cm xceiver and ZM converter. H/B 4CX250 linear £40, buyer collect. GW3COI Abersoch 2675.

EXCHANGE my Icom IC22 xtald for R0 to S22. For TR 2300 with case, NiCads and charger. Bob, Canvey Island, Essex. 0268 697906.

SWAP Acorn Electron (BBC Basic) cassette deck, soft-

ware, books, mags, cash adjustment if needed, for 2m/70cm FM or SSB rig or sell £110 ono. Write K. Argyle, 3 Gregory Close, Barlestone, Nuneaton, Warks CV13 0EP. All letters answered.

FOR SALE

REALISTIC DX300 digital readout communication receiver, 10kHz to 30MHz, vgc £120. ARAC102 receiver 10m and 2m AM-FM-SSB, 12 V good working order, £45. Ken Greenough, 2 Bexley Close, Glossop, Derbyshire, SK13 9BG. Phone 04574 5468.

KW EZZE match ATU £35. Lar HF Omnimatch ATU all bands inc WARC £60. SEM Ezitune Antenna Tuning Bridge £25. ½ size G5RV complete £7.50. Mains PSU 12V 5M regulated, metered £15. All brand new. Phone Basingstoke 465126.

RTTY SCARAB terminal unit MPTU1 factory built, complete with leads and manual plus matching interface and RTTY program for 48K Spectrum with manual. Price £85. New 6146 valves £85. A/B £7 each. Tel 021 373 8806.

KYOKUTO 105SXRII 10watt 144-149 FM vgc £99. Ferguson Videostar VHS video vgc £169, 70CM multibeam £10. 22" colour television £29. 200 Valves, some new! Offers? Phone Dave Hoddesdon, 440587 after 6pm.

REALISTIC PRO-30 programmable scanning receiver covers aircraft, ham, public services, etc 68MHz-174MHz and 380MH-512MHz, memory backup, priority scan etc. Still under guarantee, boxed as new. Offers in region of £190. Phone Weybridge (0932) 40966

SEXY legs and pics now I have your attention, who wants a Ham multimode 2, five bands SSB FM and AM. Incredible condition must be seen. Also preamp Bremi BRG27 new. £135 for both, separate? Phone Michael Radlett 4172.

FOR SALE Microdot2 CW RTTY terminal unit, complete with built in monitor, 18 months old, cost £540 bargain £300. Buyer to collect. Ring 0642 211685. G4OOK QTHR.

YAESU 101ZDMKIII 9 band transceiver fitted FM board fan, mint condition £450. Trio 2400 with speaker mike, base charger, boxed £135, Ed-

dystone 770R £75, Wanted Trio 930S Tentec Corsair, Swan Astro 103BX Shure 444T. Ring Bill G4EMG 01-534 3460 evenings. 01-553 7308 days.

YAESU FT290R multimode complete with 25W micromodule linear & pre-amp ½ mobile whip, Gutter mount, carrying case, power supply, 9-element beam. Tel 0282 37768.

TRIO TS780 dual bander multimode base station, 2/70 digital, as new with SP70 mint, £750. Tempo 2 kilowatt 2002 144MHz linear £750. Icom IC701 HF digital, 100W, transceiver with matching PSU, remote keyboard mike, boxes, etc. £495 or WHY? Phone 01-998 4936.

FOR SALE fifteen metre, three element beam antenna. Good condition £35 ono. Tel G4OFR. Plymouth 880784.

FT901D HF TCVR vgc, USB, LSBAM, FM, FSK. Spare PA and driver valves. Service manual. YD148 desk mic £480. Weltz AC38M ATU £55. Gould PSU 13.8V 3.5A Overvolt and current protection £15. 2 meter HB9CV antenna as new £5. Ring (0462) 35248. G4OXD.

FOR SALE Datong D70 Morse totor £35. Phone Keith Dartford (0322) 70073.

ICF-7600 Sony synthesized receiver, computerised sell £110. Telephone Don 832777 (Bridge of ALLAN).

SUPER STAR 360 with extra frequency, as new, built in power reducer + power switch, plus power mike and many meters. All A1 + 200W, boots and flat beam with rotor £225 ono. Will split. Ring Canvey Island 0268 684113.

HYGAIN TH6DDX six element HF beam complete with BN86 Balun £75. Ring Dursley 811454 after 6pm.

FT230R 2m FM mobile £180. Practical Wireless, Practical Television, Radio Constructor, 1950-1980 offers? or SAE with your individual requirements. G2DYM 40m-10m trap dipole £40. G4MYA QTHR. Tel 0744 22647.

STRUMECH Versatower 30 feet base mount type £325. TA32 JNR tribander £80. AR40 rotator £80, all good condition, buyer collects G4KIZ QTHR Tel 0472 823825.

FOR SALE Collins KWM-2 80-10 HF transceiver separate PSU £450, manual. Seeking smaller HF Rx/Tx in exchange (FT101, TS530S, Ocom R71, etc) WHY? Gee Goodrich G4NLA Home 0273 723934, work 0273 693555 extn8587. **KW2000E** pristine condition, with spare valves, PSY and handbook, absolute bargain at £240. Trio R1000 HF receiver £175 boxed. LAR VHF Omnimatch, as new £20. All buyer collects.

WANTED 144 MHz valve linear. Contact Mike G3TSL (0772) Preston Lancs 635560.

FOR SALE realistic DX100L Rx from 0.15 MHz to 30 MHz, 12V DC or 240V AC vgc £65 ovno. Or swap for s/h solid state RX. Phone Stonehenge 630652.

RTTY MM4000 with keyboard and monitor £150. G4DQS QTHR Brighton 37992.

PYE CAMBRIDGEAM10B, 6-channel, mid-band £2. Microphone, control box and cables £1. Loudspeaker £1. Creed 656M auto-tx £3. Creed 7TR punch £3. New boxed valves EF91 EF92 ECC81 6BG6 5U4G 5Z4G £1 each. 6BR7 £2. 5B254M £10 pair. Hitchin 811591 after 6pm.

KW 202 receiver, excellent condition £120 ono. Microwave modules 2m converter £10. Ring Colne 866038.

ICOM ICB 1050 10M FM rig, 29.3MHz to 29.7MHz, 5KWz steps, plus 25W PA plus mobile antenna plus slide mount £45. Tel 0783 815331 after 7pm.

SPECTRUM 48K prof keyboard data recorder console complete issues of 'Input' £220 or swap FT290 or 2M multimode 0476 70887 evenings.

FOR SALE Eurosonic GT858 FM 27MHz for sale, also Amstrad mobile antennae transceiver only six months old. In excellent condition so will sell for £20. Antennae £5. Contact between 6pm and 7pm. Phone (Plymouth) 54807 (Bernie).

USA WW2 equipment. Bendix etc, cheap. EMI radio amateur exam course old buy very good with morse records £25. Safety in the shack, Crabtree earth leakage breaker, unused £25. Old wireless words etc, cheap to clear Phone Neath (0639) 820356.

YAESU FT101E mint £360. FV101B £60. Trio 7800 2M mobile 25W £170. Belcom L5102L 26-30MHz £160. Belcom L520XE with many accessories £120. FC902 10-160 antenna tuner £85. HS2000 rotator £30. MMD050500 + probe £75. IC4E many accessories £200. 12V PSU 3-amp £5. HF5 + radials £55. G3ZHI 0709 814911.

MM 28 MHz linear amp 100W £80. J beam 5 element £8. Icom 1050 £15. Breml 30W £12. 12V PSU 3A £5. CB £10. G3ZHI Tel 0709 814911, PCB 18MHz to 1.6MK2 £8 not working.

YAESU FRG7700 GCR £200. Phone Corby 65618.

FOR SALE Zetagi G1 BV131 linear 100W AM/FM 200W SSB. Converted 10 metre and 15 metre amateur bands. vgc £80 or nearest offer. Contact Congleton 275158 after 5.30pm and ask for Paul.

ICOM 701 accessory. Computerised remote control unit ICRM3 plus marker extension terminal ICEX2 £75. Postage extra. Ring 0202 579115.

SONY portable communications receiver ICF2001 £85. Three legal FM CB's £25, and £35 each. Daiwa search nine two metre receiver ten channel £50. Yaesu portable two metres £80. Mike De-Wynter (01-946 2967) 2 Woodside, Wimbledon London SW19 7AR ask for Jane.

FOR SALE G3ZVC SSB boards complete with SE1 1246AX Filter £40. Heathkit IB1100 DFM not working £15. Phone 0437 2015.

WANTED Racal RA117 or RA17 also Racal RA17 type filmst.P dial unit. Phone 0437 2015.

SOMMERKAMP (YAESU) FT202R 2m handheld FM transceiver, 6-channel capability, 3 supplied, 3 optional. S meter and battery condition indicator. Flexible helical whip antenna, perfect working and as new condition, with case. £38 including postage, packing and batteries. Mr Labantz, 62 Fern St, Ramsbottom, Lancashire. BLO 0BA.

TRIO TS700 2M all mode Tx/Rx and 2m co-linear and SWR meter £285 the lot. Buyer collects. Tel 0246 36496.

MAST 40 FT lattice telescopic heavy duty, wall mount com-

plete with 20ft extension pole, vgc £175 ono. Telephone Rotherham (0709) 67471.

MICROWAVE MODULES 432MHz 50 watt linear, 10 watts input 50 watts output £90 ono. Phone Andrew Milborne St. Andrew 301.

TRIO TR8400 70cms FM, mobile mount PS10 PSU, Speaker, all boxed, mobile whip antenna. the lot £200 ono. Phone Fleetwood 77636, day or night.

KENWOOD TS930S fitted auto ATU, superb performance, condition as new, only reason for sale. Delivery of 940S imminent. £900 no offers. G4ODG QTHR, tel 0778 422795.

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HF LINEAR 800W single band 14MHz, home brewed but very well made and all self contained. £50 ono Barry, Kingswinford 271076 or Stourbridge 372926 daytime.

FOR SALE Trio RS2000 + VHF VC10 converter, 10 memory AM/FM/USB/LSB full coverage £400 ono. Brilliant with ATU for HF SW bands. Belcom LS102L 26MHz to 30MHz all mode 10 watt £150 no offers 10FM JWR 40CH £25 ono, 4 watt. Call 53 Maple Road, Penge SE20. All vgc.

COLLINS 75-4A receiver vgc of the best amateur Rxs made. Inc manual £275 ono. Sheffield 0742-24671, daytime, evening 746464.

MODEL 444 ITT teleprinter with manual, free but must collect. Shropshire 095245 3166 (Telford).

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ICOM IC2E handheld, charger, speaker, mike, manual and original packaging £140. 8" disc drive, as new, circuit

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YAESU FRG-7 communications receiver with manual, mint condition, no modifications, original packing, can be seen in London or Essex. £125. Maldon (0621) 892755.

PYE MOBILE repeater system fully working and xtalled. Work 70cm to 2 metres and back again. Space too small to fully describe. £2,000 or complete with 'Y' reg Cortina Ghia 'S' £6,000. Write to Hamilton, 25 Thornham Close, Armthorpe, Doncaster, South Yorkshire DN3 3BL.

SALE LESON hand held CH219 power mike £10 p paid. Saturn antenna 500 watts capability £10, + £3 postage. Cheiza horn speaker 4ohm 5W £10 p.paid. Multi-tester AC/DC 1000V model TK-20A £10 p.paid. Sky searcher 3 element beam for 28MHz £27 p&p extra. M.Marsden 205 Moss Lane, Burscough, Lancs L40 4AS.

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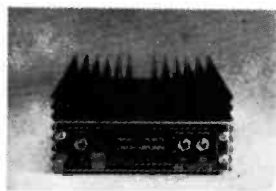
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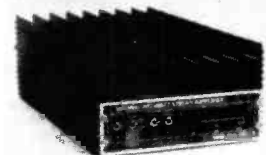
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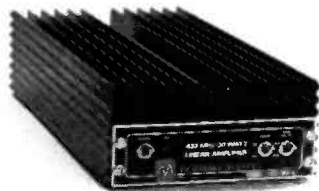


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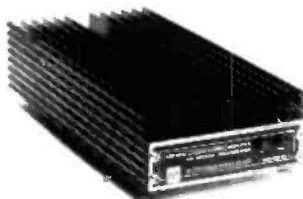


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