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CB

AN ARGUS SPECIALIST PUBLICATION

CITIZENS' BAND

FOR BRITAIN'S 250,000 CB USERS

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Home constructor
special

**BREAKERS
IN THE SKY**
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THUNDERPOLES ARE GO!

The Ever Popular Mk II (Base Loaded)

Base loaded ribbed coil design on a single radiating element 1.5m long. Doubly encapsulated windings for maximum performance and all weather protection.

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Base for 1 1/4" diameter. Pole mounting.

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Centre loaded helically wound coil with low radiation angle shrink wrapped for all weather protection and that amazing extra performance you would expect from the world famous Thunderpole range.

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Power handling 500w wide frequency band covering 120 channels, low S.W.R.

Suitable for all models — AM, FM, SSB.

Base for 1 1/4" diameter Pole mounting.

New Thunderflash Mobile (Centre Loaded)

Centre loaded helically wound solid copper winding on fibre glass shrink wrapped for maximum protection — strength.

The whip is 17.7 p.h. stainless steel and all fittings are chrome brass with stainless steel screws.

Slim elegant coil. Overall length of the Thunderflash 1.65 long.

Fully compatible for use on 27FM and new CEPT frequencies.

To obtain maximum performance insist on: THUNDERPOLE HATCHBACK/BOOT MOUNT

No drilling or soldering necessary. Standard 1/4" UNF. Thread mounting adjustable angle with positive non-slip action.

THUNDERPOLE STRIKES AGAIN! Citizens Band magazine on the fantastic Thunderpole range.

Thunderpole II

The Thunderpole was the best all round base station antenna tested.

A well constructed easily assembled and erected excellent performance legal antenna with the added bonus that it is pre-tuned.

Thunderpole III

On test the Thunderpole Mk III performed very well and contact was maintained even when the mobile test vehicle encountered a strong signal on the next channel in our notorious blackspot. In conclusion we consider the Thunderpole III to be a strong well constructed, top performance antenna.

Thunderflash Mobile

Firstly it is a very slim and neat looking aerial. The whip is 17.7 p.h. Swedish stainless steel and the centre loaded copper coil is wound on fibre glass for added strength and rigidity.

The screws themselves are stainless steel and all fittings are chromed brass. A very elegant antenna indeed. Reported TX was excellent.

It is strong and very well constructed and excellent value for money at around £16.00.

THUNDERPOLE ANTENNA U.K. LTD.

A subsidiary of Freeman & Pardoe Ltd.,
Tything Road,

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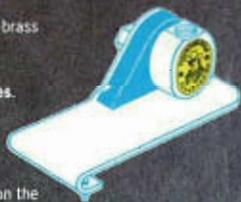
Ask for Thunderpole at your local stockist

The Thunderpole design and name

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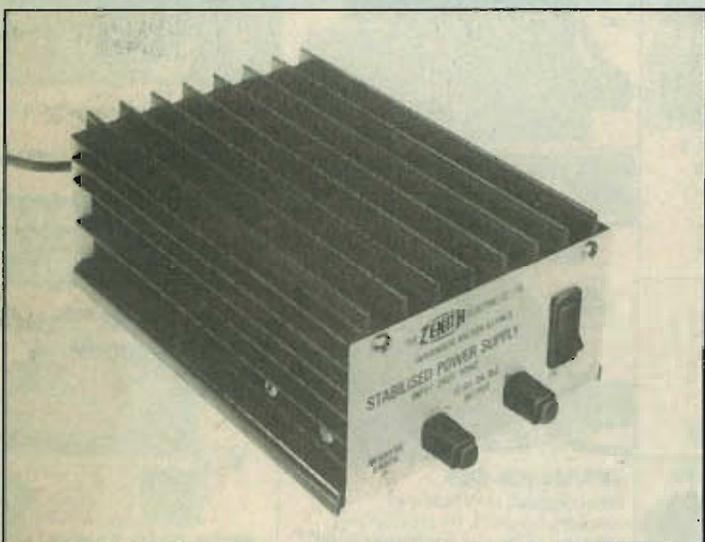
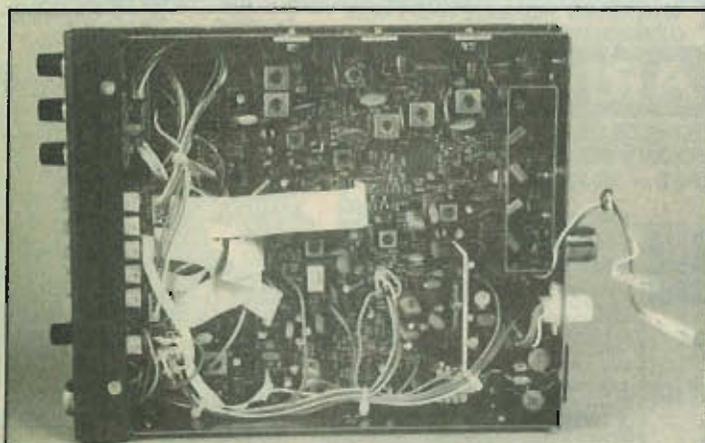
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CB

CITIZENS' BAND

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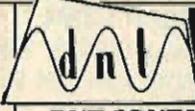
ALL MAIL ORDER ITEMS ARE CHECKED & TESTED BEFORE DESPATCH WHEREVER POSSIBLE AND FULLY GUARANTEED.

WE'VE DECLARED WAR! ON PRICES

A RECENT MASSIVE BULK PURCHASING BY OUR BUYERS ENABLES US TO OFFER THE FOLLOWING RADIOS AT GREATLY REDUCED PRICES — WE DON'T BELIEVE YOU CAN BUY AT BETTER PRICES — PRICES GOOD WHILST STOCKS LAST — SO HURRY! We will endeavour to maintain supplies into the New Year.

uniden

DOWN IN PRICE!



DOWN IN PRICE



UNIDEN 200
Uniden 200 — features HI-Low Power, Volume, Squelch, Mike Gain, RF Gain, HI-Low Tone Switch, Bright/Dim Switch, 'S' Meter, PA Facility, Extension Speaker Socket.

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UNIDEN 300 Base Station — features HI-Low Power, Volume, Squelch, Mike Gain, RF Gain, HI-Low Tone Switch, 'S' Meter, PA Facility, Extension Speaker Socket, 240 volts with 13.8 volt facility also.

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UNIDEN 400 DOWN IN PRICE!



UNIDEN 400
Features RF plus Mike gain, volume, squelch, PA, bass/treble control, LED dimmer and SIFR or modulation meter.

£85.00 + £2.00 p&p

NEW Uniden

UNIT JUST TYPE APPROVED FOR CEPT FREQUENCY Insufficient time to allow illustration and details before going to press but please ring for information — and lowest price in the U.K.!

£110 + £2.00 p&p

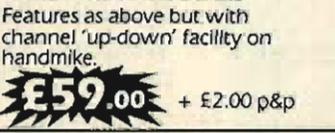
DNT CONTACT — BASIC MODEL



Features Volume, Squelch, Ch. 9 switch, Channel Free indicator, LED chain meter and 'up-down' push button channel change.

£49.00 + £2.00 p&p

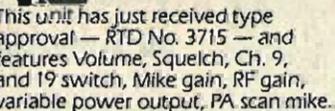
DNT CONTACT — SCAN MIKE MODEL



Features as above but with channel 'up-down' facility on hand mike.

£59.00 + £2.00 p&p

DNT SCANNER 40



This unit! has just received type approval — RTD No. 3715 — and features Volume, Squelch, Ch. 9, and 19 switch, Mike gain, RF gain, variable power output, PA scan mike.

£110 + £2.00 p&p

DNT 4000 FM HANDHELD



Features telescopic antenna, tone call key, LED display, RX/TX indicator, Ch-9 switch, charger socket, 'S' meter, volume and squelch.

£59.00 + £2.00 p&p

NEW DNT TRANSIT 40

A slim new look DNT radio for the old U.K. frequency. Features include Volume, Squelch, LED chain meter, Ch. 9 facility, 'up-down' scan channel selector, plus channel change facility mike.

£62.00 + £2.00 p&p



JESAN

DOWN IN PRICE!



JESAN KR-303
This compact unit features Volume, Squelch, PA facility and NEW High Power switching. Tidy little unit ideal where space is limited.

£49.00 + £2.00 p&p

JESAN CB 950 HANDHELD



Nice quality handheld with all facilities and similar in design to the Moonraker Master For 27/81 frequencies

£59.00

This unit has an LED readout, low/high power switch, DC and charger socket, telescopic antenna and carrying case. Takes 10x HP7 batteries or Nicads (not supplied).



JESAN 2 CH WALKIE-TALKIES
JUST £32.00 PER PAIR + £1.50 P&P.

1/4 watt output with Ch.14/30 switch plus Volume, telescopic antenna (range up to 1/2 mile).

MIDLAND INTERNATIONAL



MIDLAND 77-805 MOBILE/PORTABLE

This excellent combination unit can be used purely as a mobile with its own bracket and power lead or coupled up with the supplied battery case and telescopic antenna it becomes a versatile handheld powered by Nicads or batteries (not supplied). Price also includes a high quality speaker mike.

£79.00
THE MOST VERSATILE CB AVAILABLE + £2.00 p&p

IMPORTANT

Radios with this symbol beside them are on the old U.K. frequency. Radios with this symbol beside them are on the New Cept [European] frequency. PLEASE CHECK YOU ARE ORDERING YOUR RADIO FOR THE CORRECT REQUIRED FREQUENCY.

maxcom

MAXCOM 30E

The old favourite is back and so are some of the old prices! This unit features volume, squelch, mike and RF gain, low/high power.

DOWN IN PRICE

£79.00 + £2.00 p&p

SUPERTUNED!

We have a limited stock of SUPERTUNED Maxcom 30E available, these have been fitted with an extra active filter for clear 'bleed-over' free reception and also auto squelch to eliminate static and FM white noise interference.

£125.00 + £2.00 p&p

In addition to the radios listed we have many other brand names in stock at prices we don't want to publicise! Before you buy a new radio anywhere just check our prices — anyone who matches these discount levels just doesn't want to make money!

NOW — SOME OTHER REASONS YOU SHOULD COME TO US FOR YOUR NEW RADIO

FULL PRE-SALE RADIO CHECK

1. Each new unit is individually checked and tested before despatch. Once your radio is checked to our engineers satisfaction we ensure it has the full legal output and deviation setting (many new radios don't) and it is then date stamped so that your guarantee requirements are fully covered.

SPECIAL EXTENDED WARRANTY

2. For a small additional charge we can extend your radio guarantee for a further 12 months. Your new radio purchased from us can now be warranted for a full 2 year trouble free period. No other major CB retailer offers this special facility. Details of our guarantee will be enclosed with every new radio purchased and of course the price you pay including a 2 year warranty will still be less than most shops charge for a unit with a standard 12 month one.

PART EXCHANGE FACILITY

3. We will give a minimum part exchange allowance of £10 for any working legal (27/81) or PR 27 GB unit. In many instances this allowance will be greater. We can usually give a telephone estimate if required on a PX value.

CREDIT CARDS AND CARRIER DELIVERY

4. To make your purchase fast and efficient we take Access, Visa and Amex for both phone and mail order sales. Your new radio will normally be on its way within 24 hours of receipt of order and we even have a carrier service, just £6.00 for any parcel, within the U.K. mainland, which will ensure swift delivery (within 2 days for most regions). Just the job for those urgent requirements.

SHIPMENT JUST IN — ASTATIC, A.S. ANTLER VALOUR, K40 — LOTS OF NEW LINES — CALL IN AND SEE.

HOME BASE ANTENNA PRICE BLITZ

We've reduced our prices considerably on some top selling base aerials. Again we will try to maintain supplies into the New Year.

- THUNDERPOLE 3 (LEGAL) **£18.00** + £1.50 p&p.
- LEMM MINI GP (LEGAL) **£16.50** + £1.50 p&p.
- TAGRA BT — 104 SIGMA 4 **£72.00** + £3.00 p&p.
- VIKING 777/ANTRON 99 **£55.00** + £2.00 p&p.
- SIRIO 2012 **£70.00** + £3.00 p&p.
- SIRIO TORNADO **£36.00** + £2.00 p&p.
- SHAKESPEARE SUPER BIG STICK **£75.00** + £3.00 p&p.

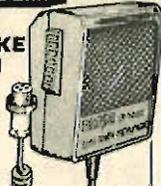
To comply with recent legislation we wish to point out unless a base antenna is marked legal in our advertisement it should only be used for the 10 meter amateur band frequency (28.00-29.70 MHz).

DOWN IN PRICE!

ALTAI DM-315E

ECHO/POWER MIKE

Supplied ready-wired for your radio (quote model please). Takes 9v battery (not included).



£15.50 + £1.00 p&p

SPECIAL PURCHASE

MINI HEADPHONES 'WALKMAN' TYPE



£1.50 + 50p P&P.

DOWN IN PRICE!

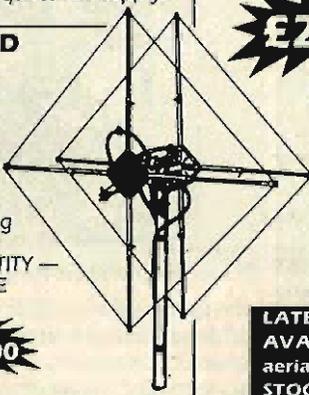
FC 250 FREQUENCY COUNTER



£45.00 Covers up to 250 MHz requires 12v supply. + £1.00 p&p

PDL 2 QUAD

Original Avanti stock purchased by us recently in the USA (repackaged by Antenna specialists) gives a shattering db gain. LIMITED QUANTITY — PLEASE RESERVE BY PHONE.



£149.00 + £3.00 p&p

WE ALSO HAVE A SMALL QUANTITY OF THE ORIGINAL AVANTI MOONRAKER 4 BASE ANTENNAS AVAILABLE — PHONE FOR DETAILS AND PRICES.

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Xmas is upon us again! Join in the festivities whilst you're mobile. Our 12v Tree Lights up and fixes on your car window interior with a strong suction cup.

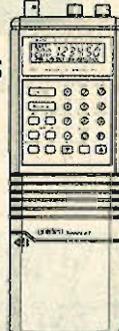
£3.50 inc. p&p

MERRY XMAS TO ALL OUR CUSTOMERS!

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With 200 memory channels, scan, priority search and many more up to the minute features from the No. 1 scanner manufacturers.



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UNIDEN BC 100XL NOW BACK IN STOCK

£175.00 + £2.00 p&p

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and covers 40-999 MHz GET THE MOST OUT OF YOUR SCANNERS & RECEIVERS!

LATE NEWS We have some stock of the original AVANTI ASTRO SCAN and other top USA Receiver aerials just arriving — PHONE FOR DETAILS — STOCKS ARE LIMITED

TWO TOP ANTENNAS RECENTLY IMPORTED FROM THE USA

VAN ORDT **POWER-STIK**

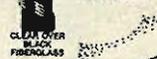
QUAD WOUND 4 x 7/8 WAVE!

The ultimate helical antenna! The POW-R-STIK is 4 x 7/8 wave windings of high quality copper, rate to 1500 watts. Covers over 2MHz with SWR 1:1 to 1:1.5. Adjustable SWR tip and made from the finest materials. Copper coloured over black fibreglass. Try this one on your base station ground plane list or go mobile using a strong stud fitting.

54" POW-R-STIK **£23.00**

66" POW-R-STIK **£26.50**

QUAD WOUND 3/8" 24 UNF THREAD FITS MOST POPULAR MOUNTS



HUSTLER SCB

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- Available in black

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UPDATE



Editorial

Obviously, the first thing to do at this time of year is to wish you all a happy and prosperous New Year – although, at the time of writing this, I'm still saving up for Christmas!

I hope you didn't get too excited over our cover pic this month. We tried for a lady, lads, but no-one seemed to be forthcoming. Instead, enter Jeff, one of our more hirsute designers, who stepped in at the last minute to bare his chest – and it's all in the best possible taste.

Cameron Beval

New Cirkít Catalogue

Just published, the 1988/89 Winter edition Cirkít Constructors' catalogue is crammed with 184 pages of

Seriously, though, on the same subject, we're sure you will find the tie-microphone a handy project. We've tried it and it works rather well, plus it leaves your hands free for driving and, hopefully, keeps PC Plod off your back.

Now, in the next few issues, you should be seeing some – wait for it – new CB equipment. We have been out and about on the scrounge for new gear and are happy to report that it looks like a lot of new radios, antennas and accessories are on their way onto the market.

There also seems to be a lot of interest in the CEPT frequencies and this has got to be a good thing, the way things are going. Why not drop us a line and let us know how you feel? Is it really the way forward for citizens' band radio?

Oh, one last thing. The Department of Trade and Industry have just invited us to a meeting in three weeks, along with a selection of user groups. Naturally, we shall report on the outcome in due course.

essential reading for the electronics constructor including a wealth of new products.

Featured for the first time in



the publication's 3,000 + product lines are several new scanning receivers, offering an extended frequency range and an increased number of channels. Also new are a useful 2m transceiver of ergonomic all-British design, and an eight-channel logic probe, a 2.4GHz frequency counter and the latest Loadstar RF and AF signal generator with LED frequency readout.

Among the many additions to Cirkít's components range are enlarged selections of capacitors, connectors, knobs, semiconductor switches and tools.

Once again the catalogue carries value-for-money discount vouchers for use with prepaid orders and by

popular demand there is another competition offering rich rewards for the sharpest-eyed readers. First prize is a Loadstar RF signal generator, second and third prizes an Easiwire prototyping kit, fourth and fifth prizes are useful miniature analogue multimeters.

Another special attraction in this season's catalogue, to make those cold winter nights pass more quickly is a construction project challenging readers of all ages and vocations to build their own programmable frequency generator.

For further information contact: Cirkít Distribution Ltd, Park Lane, Broxbourne, Hertfordshire, EN10 7NQ. Tel: (0992) 444111.

DXers' Units

The DX Association of Great Britain kindly contacted us recently with the aim of letting readers know of their organisation. Shortwave listeners and enthusiasts will be interested to know that, although the Association is mainly broadcast bands-orientated, it is always open to other aspects of shortwave radio.

The Association was formed in the mid-Seventies as the KES DX Society, becoming known as the DX Association of Great Britain in

early 1980.

The DX AGB Newsletter, which is published eleven times a year, contains comprehensive frequency information, broadcast schedules, programme news, technical articles, news about the Handicapped Aid Programme and the European DX Council.

Feature articles on important radio subjects are published, and each month a major DX logging section is included, compiled by Ronnie Easey, from members' reports.

Members also receive the schedules of a number of radio stations and international broadcasters in the 'DX News,' a column prepared by Edwin Southwell.

Members are actively encouraged to contribute to the Newsletter, no matter how small their contributions may be.

One further benefit enjoyed by its members is that, after the first full year's membership, Senior Citizens qualify for a reduction in their annual subscription.

For further details, please apply to E. A. Rickett Esq., Flat 13, 63 Eaton Avenue, Hampstead, London, NE3 3ET.

New from Nevada

It's good news time, folks. Nevada Communications of Portsmouth recently announced that the Team TRX404 (CEPT) radio - featured in *Citizens' Band* August 1988 issue - has now received type-approval. To complement this set, Team have now released the following models:

Model MAXI 90 UK

This new 3-channel handheld delivers a full 4 watts of output. The 3 channels may easily be re-programmed internally to any one of the existing 40 UK channels. This handheld will sell at £39.95

Model TRX 404 UK

This model is identical to the CEPT radio except that it covers the old UK frequencies. It will be selling at £69.96.

Seaside Fun

Stanmer Park, Brighton, on Sunday the 28th August was the venue and date of the 1988 annual CB4 The Blind Eyeball. The Park is situated on the A27 (Lewes Road) with acres of open space, a fine old house, museum and gardens - open to everyone. Over the years, CB4 The Blind has helped many people to enjoy CB and the whole organisation is dedicated to their charity work. So it comes as no surprise that this event is well attended by breakers from near and far. These include breakers from as far away as Dorset, Gloucestershire, Warwickshire and Essex.

Apart from the odd spot of rain, those who attended found plenty to do and by around 11 am the car parks were beginning to overflow and this kept the marshals from Monitoring Service of Great Britain very busy throughout the day. There was a number of charity stalls including one from the British Lions Club and the hosts. A mini-fair kept the very small children happy, whilst the adults wandered around the CB stalls inspecting a wide variety of goods. Many old faces attended including: Disco One, Spitfire, Diode, Little Gnome, Grey Lady, White Knight, Angel One, Coral, Concho, Mad Colonel, One and Only, White Dove, Mona Lisa, Harmonica and many, many more. It was nice to meet a new young lady breaker called Hot Lips (Enma) from Caterham. She had only been on channel for around three weeks and has been taken under the guiding wing of Disco One.

A team called "Battle Of

The Warriors" entertained the crowds with their skills on fighting with axes, swords and other assorted weapons. For anyone who has ever wondered if these fights are staged or not, I can assure you that, although some moves are rehearsed, they never know who will be left standing at the end, and I was shown a number of scars, cuts and lumps.

Around mid-morning, the roadshow arrived from Southern Sound Radio and, along with Postman Pat and his Cat, gave away lots of tee-shirts and other assorted goodies. They played plenty of records, some of which were dedications from those present.

Dave (*Meter Man*), the Chairman of the organisation CB4 The Blind, remarked on how much enjoyment his members get from holding the event and praised all those who helped them put it together. He also thanked Medico 9 for their work in providing first aid cover and MSGB for their help. He went on to explain that the CB4 The Blind organisation relies a lot on people giving up their time and on financial support. This event not only helps them to add to the funds but is, in many ways, their way of saying 'thank-you.'

After talking to various other members of the organisation, it is clear that they have a lot more work to do in helping blind breakers and they would very much like to hear from anyone who would be interested in giving a small amount of time to assist throughout the year. For more information they can be contacted via: PO Box 2, Brighton, Sussex BN1 8ES.

us a copy of their brand new catalogue. Unfortunately, certain items included now violate the law, as the catalogue was compiled and printed before the company was aware of the introduction of the infamous Statutory Instrument 1988 No 1215 - which we now all know about, don't we!

To their credit, JD Custom have taken the time to include a 'stop press' disclaimer in the catalogue.

The catalogue covers conversions, modules, repairs, accessories, microphone connections - even sections on how to SWR your antenna and a CB frequency chart. All in all, a very handy guide at just £1.25.



J.D. Custom Electronics

EXPORT

CATALOGUE

1st Edition 1989

CUSTOM MODIFICATIONS

▽

CB EQUIPMENT

▽

DIY MODULES

▽

CONVERSIONS

▽

REPAIRS

INCLUDING -

- Revolutionary new Frequency Controller
- New Cutting 55B Adapter
- How to S.W.R. your Radio
- Microphone Wiring Frequency Chart

The Professional Technical Service for CB

JD Custom 1989 Catalogue

Those nice people down at JD Custom Electronics (18 Deans Way, Edgware, Middlesex: 01-906 1225) sent

Automatic Test for RF

Schlumberger Technologies has released a new member of its 700 Series ATE range to meet the test requirements of RE and microwave communications equipment manufacturers. The ATE provides an integrated test environment capable of performing single-stage board-level testing for new generations of communications equipment utilising extensive digital control circuitry. This one-stop test facility offers major throughput and reduced-inventory advantages over the rack-and-stack test systems commonly used today.

All Series 700 RF test systems are designed around Schlumberger's core 700 Series ATE architecture, equipped with a number of new specialist high-frequency features. These include a modular coaxial 8 x 64-channel signal-switching matrix achieving better than 55dB isolation at up to 300MHz, a test-head with integral coaxial field offering excellent VSWR characteristics at frequencies as high 1GHz, and a wide range of high-level driver routines for connection of specialist IEEE-488 instrumentation. The available instrument library numbers well over 100 and includes RF signal-generators, power meters and spectrum analysers.

The new range of Series 700 RF test systems provide the test capability for a growing sector of the communications manufacturing industry: the new generations of equipment utilising extensive digital circuitry for pulse-code transmission or functions such as security coding or frequency agility. Schlumberger's high-performance ATE architecture meets this test requirement efficiently by offering a combinational in-circuit and functional test environment for both the

Model SR316D Selective Calling Unit

This unit has just been released and is designed to simply plug into either the Team TRX 404 (CEPT) or the Team TRX 404UK CB radios. When connected to the radios it allows selective call of up to 16 separate sets. The unit will sell at £59.95.

More news from Nevada - Zetagi have introduced a new style for their 1989 series of products. This new high performance series is reportedly on a par with the quality we expect from Japanese manufacturers.

First in the line is the model HP202 SWR/Watt Meter, priced at £39.50. The unit



uses a twin scale meter for instantaneous forward and reflected power measurements. The 10-watt

scale enables clear and precise measurements to be made of a legal UK CB radio and antenna.

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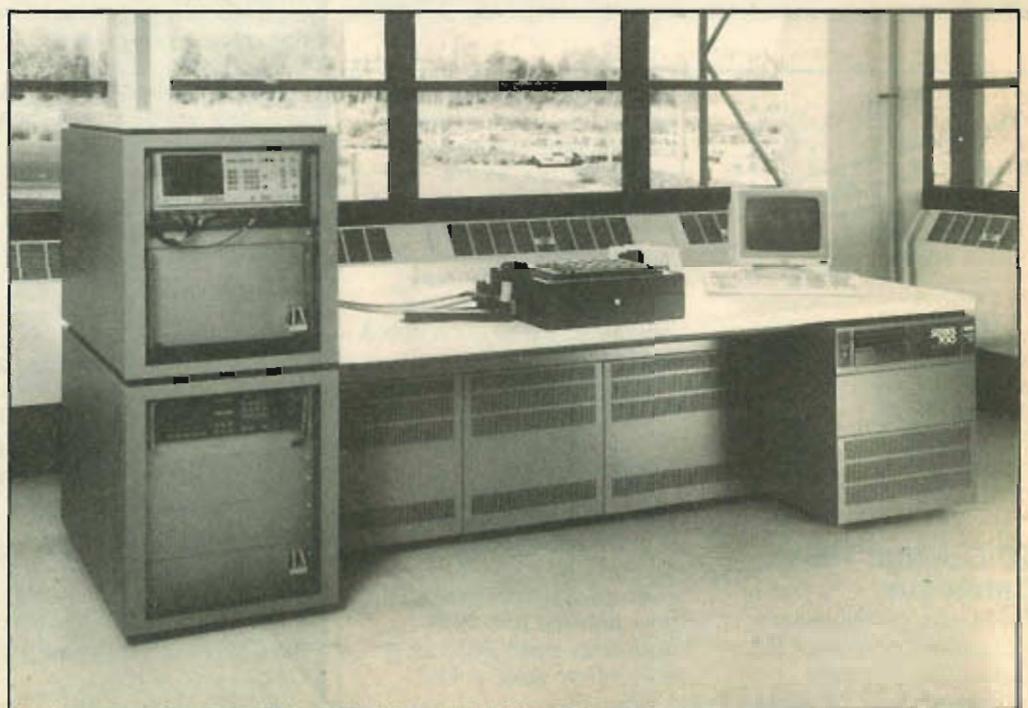
Such facilities can deal highly effectively with the test problems posed by many of

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For further details contact: Steve Muddiman, Marketing Communications Co-ordinator Schlumberger Technologies Automatic Test Equipment Division, Ferndown Industrial Estate, Wimborne, Dorset, BH21 7PP, UK. Tel: (0202) 893535.



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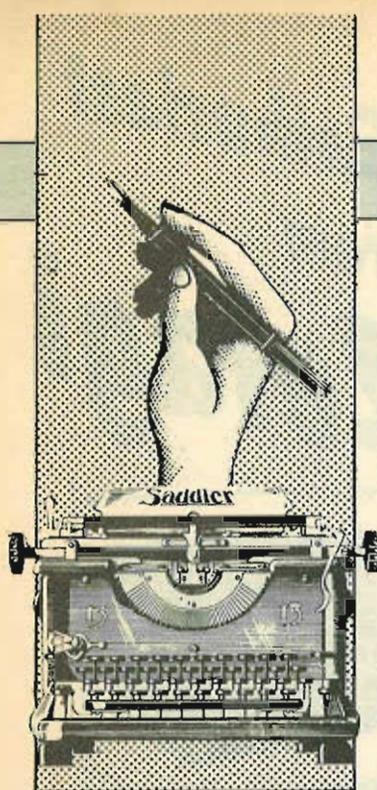
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Shocking Cures

Might I make a couple of further suggestions as to why Mikeman of Norwich (Questions and Answers – November) gets shocks from the metal case of his mike.

You mention that he should check his PSU but you do not tell him the most important checkpoint. The case of the PSU *must* be earthed to the mains earth. Many early commercially-produced PSU's had only twin (live and neutral) cable to the mains, a fact which many people found to be distinctly painful and although Mikeman's PSU is a home-brew and built to a high standard, it is possible that he has a leakage on the high tension side of the transformer. A good earth connection would re-route this to ground, but it is important to use a solder-tag *bolted* not pop-riveted, to the metal case!

Secondly, during this past summer (so-called) there have been many days when there has been a substantial build-up of static on my antenna, and, since the shortest distance route in a non-earthed rig is often via the user, it is an excellent idea to fit a PL259-type lightning arrestor onto the SO238 socket of the Thunderpole. The device then discharges static build-up via a length of 30A cable soldered to the large tag and terminated by a length of copper pipe driven into the ground. The large radial array of Thunderpole can then discharge its static continuously to the ground and not to the rig and operator. You don't have to have a lightning strike in order to get a build-up!

However, as a final word, there are some people who seem to suffer much discomfort from the static build up via artificial fibres/friction etc while to others there is no noticeable shock. A colleague of mine, working in a



laboratory, suffered intensely from static build-up on a rubber apron while insulated from the floor by rubber boots. As soon as her eye touched the metal eyepiece of a microscope, or her hands touched a water tap, there was a distinct 'snap' as the unseen electricity went to

ground. (Plus an involuntary yelp!) Dressed exactly the same, I never suffered the discomfort.

Hope that the above may be of some help to others.

**Sentinel,
Huntingdon.**

SHOCK CURES

Thank you, CB

I am writing to you so you can pass on my thanks to the people in your sales office. You see I have been unable to get November's issue of CB. The newsagent I have my order at has been told my his supplier that it is not out yet. I knew this was a 'porky pie' because a breaker friend of mine has a copy but WHS would not have this. So I rang your

office on Friday 4/11/88 at about 2.00pm and spoke to a charming young lady and told her of my plight and sure enough, through the letter box this morning (Saturday 5 Nov), a copy of CB dropped in. So all that remains is for me to say thank you and keep up the good work.

**Fisherman,
London N1.**

Wise Up Smart Alec

In reply to the comments made in the 'Smart Alec' article (Cit' Band Oct 88), perhaps we should set the record straight once and for all. The DTI have on at least three occasions stated at various meetings that they would be prepared to discuss the future of a Single Side Band mode of CB within the UK for the future. But any such system would have to be one that is both 'worthy' and 'viable.'

We have no doubt that any such system would take a lot of consideration on both sides - from the DTI's requirements and that of the users. It would be stupid from our point of view to push for any such system that would not offer more in terms of protection than those presently 'legally' used in the UK. So MSGB and SACBC have spent about a year asking breakers for their thoughts and ideas on what they consider to be the main priorities of such a system. These points have been analysed and a proposal document has been presented to the DTI for inclusion and discussion within the 1990 Spectrum Review. We have consulted with the DTI at every stage throughout the year's duration, and they have been very helpful. But this still does not mean that we will get legal SSB.

What it *does* however put forward is the fact that many CBers feel that they should enjoy the use of SSB under a legal system - but the right system, if we are to make it work. As far as we are aware we (MSGB & SACBC) are the first to put forward such a request in a published form since the beginning of legal CB within the UK.

MSGB have always made our fellow User Group Representatives aware of our intention to put together such a document and, further to this, it was clearly stated at the last DTI User Group Meeting. Those present showed support including the DTI officers who agreed that it was something to be considered. So, please tell us *who* you spoke to so that we can check your information out. As you have said, you like to keep your ear pretty close to the ground - so be careful that someone doesn't come along and stick their foot in it for you.

The User Group Representative organisations have for some time been very supportive towards each other and this has proved to be of great benefit to CB in general. One of the many things that we will all continue to fight together for is the continuation of the 934 MHz CB band. It is very easy for us who meet the DTI to understand the workings of the government department but, it is not so easy to undo the misguidings that you seem intent on spreading (or is that that you don't listen?).

You have made a further statement that "there is not an ounce of truth in the rumour that the DTI wants to remove the top 40 channels within the next two years, or even in the foreseeable future. At the last DTI User Group Meeting, we were told by the DTI after a question had been put to them that they had no plans to withdraw the top 40 channels. However, they were concerned at the present fall in licence figures and that, after 1992, if the other members of the EEC came up with a viable and financially worthwhile system, the Government may be forced to bow to pressure.

It is clear from your article that you are happy to bury your head in the sand,

and take anything that comes along. Thank God that many CBers and those who represent them don't share your view. After all, if it wasn't for those many who fought so hard to get 'legal' CB into the UK, we would all be like you - a passive objector.

Oh yes, I know a man whose secretary is related to a bloke who cleans the loos in Waterloo Bridge House and he has told that man's sister that you are none other than ! Is that the truth or another rumour?

Ian Oliver,
National Publicity and Public
Relations Officer,
MSGB.

ABCB Open Forum

ABCB's annual "Open Forum" was held again in the debating chamber of the Nottinghamshire County Council on October 29th.

The Chairman of the County Council, Councillor Arthur Palmer, welcomed the visitors to Nottingham. His speech was followed by the Chairman of ABCB who criticised the DTI for their failure to rid CB of its unwanted users who are the cause of the reduction in the number of licences taken out. Foul language, abuse, keying out etc drive the decent people away and, while the CB fraternity supply the DTI with twice the licence fee money that Ham radio produces, we get a very inferior service.

ABCB analysis of channel usage showed very few people on CEPT (less than 20%) which gave a very good argument for the retention of the 27/81 channels. The DTI speaker was Mr John Brigstock who gave an excellent contribution talking about the sort of

things that CB folk want to talk about. He explained why the changes in the licence were made, he talked about 934, music playing and the review in 1990.

The second guest speaker was Mr Paul Green of National One. He talked about the new system of fixed and mobile radio communications, using a network of transmitters. After the coffee break, a very lively open forum was held, where everyone had the opportunity to ask questions. Mr. Brigstock answered all that were put to him and agreed to take a very serious complaint of roving gangs of CB users at night in Nottingham back to London.

The Secretary of ABCB wound up with a plea for a change of priorities from the DTI. A cleaner CB would bring in more revenue from extra licences, and offenders against CB should have their names published.

The Leftman,
Chairman (ABCB),
Nottingham.





Mike Mystery

Mike Mystery

Q I'm thinking about buying a new power mike for my mobile rig — there seems to be plenty to choose from at the moment but which one? Can you also tell me why some of these mikes — even ordinary ones — have batteries inside them? The one I'm using at the moment hasn't got one, why is that?

Michael Keeley,
Oxford.

A The painful but honest answer is to say that you really don't need a power mike, Mike. If you did, it would have been fitted by the manufacturer.

Virtually anything you fit, no matter what it says on the box, will in one way or another degrade your signal. However, some are less annoying than others, and the special effects mikes (echoes etc) used in moderation — well away from us — can be fun. The Sadelta range may be a good place to start. In answer to your second question the mike supplied with your rig is almost certainly a piezo-electric device. A thin slice of quartz crystal is attached to a diaphragm, which resonates in sympathy with your voice — the vibrations are turned into an electrical current, which is amplified etc etc. Most add-on mikes use electret capsules — these minute microphones produce only tiny signal currents, which have to be amplified before they're strong enough to be fed

into a typical rig. The amplifier is normally built into the capsule, hence the need for a battery power supply. Electret mikes do have better acoustic properties than crystal mikes but the limiting factor, as far as sound quality goes, is the design of the rig, and the bandwidth of the transmission channel. You could connect your rig to the best microphone in the world, and it wouldn't make any difference; sorry.

Clammy Cable?

Q Can you help? I've literally run out of ideas. I'm at my wits end, I've tried everything (*Get on with It - Ed*). Over the past three months I've watched the power output needle on my old Cybernet 2000 slowly creep down the dial. When I first noticed the drop in power I had the rig checked out by the local 'doctor' — he pronounced it fit as a fiddle. I've changed the antenna, and the connectors but it's still falling. Help me before I go off the scale altogether?

M. T. Hickley,
Marlborough.

A Let's look at the problem logically. You've had the rig checked out, you've changed the antenna and you've replaced the connectors and we can safely presume that your car battery is OK — what does that leave? The cable. I've encountered the fault you describe only once before, and changing the cable cured that. The ends of the cable looked fine, and it read OK on the meter but it turned out that moisture was seeping in through a





tiny split in the outer sheath. It was slowly creeping along inside between the braiding and the inner conductor, slowly altering the characteristics of the coax as it went. If it's not that, then we suggest that you engage the services of a good exorcist...

Jaws the Job

Q About three weeks ago I picked up a neat little CB rig at a local Boot Sale. It only cost a fiver, and the guy who sold it to me swore blind that it worked OK. Needless to say when I got it home I found that it was completely dead. After trying all the obvious things I opened up the case. When I looked inside it was obvious that someone had been there before me as the main microchip had been unsoldered and removed. I've checked around the rest of the board and it all

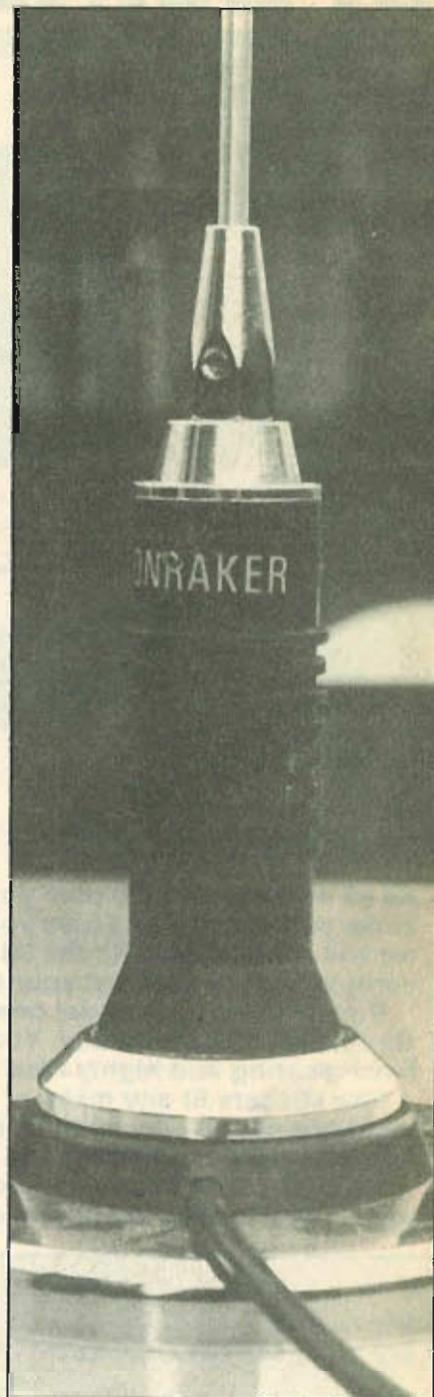
seems okay so it might be worth repairing. Can you tell me what the chip should be — the local expert reckons he can get one if I can find out what it should be. The only identification mark is the name, Jaws MkII.

Pete Samuels,
Brighton.

A That's a real blast from the past — as you say they're really neat little rigs and perhaps something of a collector's item these days. It was an old AM rig, almost certainly illegally imported in the early 1980s. The chip you're referring to is almost certainly IC202, which is an LC7120 (9F4) manufactured by Motorola. Hope that helps.

Lightning Answer

Q Can you settle an argument? What would happen if my CB antenna was struck by lightning, whilst I was driving along — would I and my passengers be electrocuted and would it damage the rig? Is there anything I can do to prevent this happening?
F. Forrester,
London N10



A I wouldn't lose too much sleep over this one. If you are ever struck by lightning whilst out driving (and it's so unlikely as to be almost impossible) the charge would be grounded, through the metalwork, and through the film of rainwater. Any electronic equipment in the path of a mega-volt discharge like that probably won't survive. So no, you probably won't be fried — probably... If it ever happens, then let us know how you get on!



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First of all, allow me to wish each and every one of my loyal readers a very happy and prosperous Christmas and New Year. I hope that Santa has bought you all exactly what you were hoping for, and that none of you have a nasty hangover.

For my 'good deed of the month' I'm going to share a tip with you. If you do go over the top with the Christmas spirit, waking up with a hangover - then, take the usual aspirin or paracetamol, but, also dissolve a couple of spoonfuls of powdered glucose (available from any chemist or good supermarket) in some water or preferably milk. Stir it well and knock it back. I suggested this several years ago to my younger brother after noticing that the after-effects of heavy drinking (ie, headache, sickness etc) were almost identical to the after effects of my sugar diabetes, when I had forgotten to eat and my blood sugar had dropped. Sure enough, my brother was laughing and joking again within the hour. The reality is that alcohol uses up the calories within your body, so artificially dropping your blood sugar. If you can't get hold of glucose, then loads of sugar dissolved in warm milk or water will have the same effect, but will take a little longer! My brother swears by it now, even to the extent of drinking milk and glucose before he goes out.

With this being the January issue, and the New Year Honours List becoming public, I have decided to publish my own New Year Honours. Looking back over the past year's events, these are my honours for the New Year.

My Trucker of the Year Award goes to a man that I have never met, or even spoken to, but I have it on good authority that a nicer person you couldn't wish to meet. He's good fun, going over the top sometimes, he's a very good mate, even to the point of getting home late and losing pay just to stop and repair a mate's truck when no-one else would stop and help. Yes Sambo, you have become my Trucker of the Year.

The MACHO Award took some thinking about (MACHO meaning Most 'Andsome Cute Hunk Out!). But eventually it had to go to one of the, if not the best-looking truckers on the road. Someone who's kind, cheeky, fun, interesting... you name it, he is it (well almost) and, before you all say it - No it's not the man I'm madly in love with - this is awarded to Bill! (Buffalo Bill) who comes up north an drives for Leyland Daf Trucks.

The PUFF trucker of the year (Proven Under Furtive Feet) goes divided between Rough Tough Cowboy from Birmingham and my mate and informer Peter (Honky Tonk). For providing fun and amusement over the airwaves without bad language and abuse. These lads will always manage to cheer you up if you're feeling down. By the way Stuart,



Truck Stop

Brandybird brings in the New Year with her own Honours List

by now, you've probably had your operation and are off the road. We're all thinking about you... get well soon.

The BEAST Trucker Award goes, without hesitation to Butch Cassidy (Alan), again from Birmingham. BEAST standing for Boastful, Exaggerating And Sandra Teasing. Alan is a rotter, always calling me nasty names and taking the mickey, I always swore I'd get my own back. Who'd believe that so much abuse could come from a person who's taken so many radio operator's exams?

I'd also like to make a Lady Breakers Award going to Miss Ellie, for simply being herself. A lady (a real lady) with a heart of gold, who would do anything to help anyone without expecting, or even hoping for anything, in return. If you haven't already guessed, I consider

myself extremely lucky to have Ellie as probably my best friend. Thanks for everything Ellie.

My Wally Trucker's award must go to the tanker driver who delivered to my works recently, in Coventry, phoned his boss and found out he had to drive up to Manchester at 4.45pm on a Friday. He was pleased to hear that he was only a mile from Junction 3 M6, but not so pleased to hear about the roadworks around the Birmingham area. I suggested that he could get on the A5 and rejoin the M6 at junction 12, therefore missing the disaster known as Birmingham, but would obviously get caught up in the rush hour traffic, whichever way he went. His final decision was to join at gate 3, go south to gate 2, take the M69 to Leicester, join the M1 North and then travel back across country again to get to Manchester. I didn't find out his handle, though he did have a CB in the truck. If he did go that way, it must have taken him hours!

Last but certainly not least, I've received another letter from my Spanish correspondent, Jorge, thanking me for the mention last month. He has received several letters from English people, wishing to correspond with him and wanted to thank me. My pleasure, Jorge, glad to have been of help.

Jorge has asked me to give him a bit more publicity. Apparently in Valencia, there are four groups organising fundraising for their children's hospital, where they help orphans and, from as little as eight years of age, drug addicts. If you would like to help and help your own collection of QSLs then here's what to do. Send a £5 note (he must think we're all made of cash over here!) between two of your QSL's (no coins or cheques for some reason). State clearly your name and address, close and seal the envelope with tape and send it to Jorge G. (SSG 45, CH Funds), Apartado Correos 2194, 46080 Valencial, Spain, and you should receive a big package containing information in both English and Spanish about the hospital and the fundraising, free membership to the four groups concerned, 20 QSLs of each group, one volume of the Spanish magazine called Breiko, and a special collection of five different stamps commemorating the 1992 Olympics in Barcelona.

If you can't spare that sort of money then perhaps if you've been on holiday in Spain this year you've got some Spanish money lying around, send that. The price for Spanish participants is 1000 pesetas, but I'm sure they would be grateful for anything that you'd care to send.

Well that's about it for another month. Stay lucky lads and lasses, take care, have a fantastic year and, as always, stay safe.

Brandybird

COMMUNICATION THE

QSL WAY

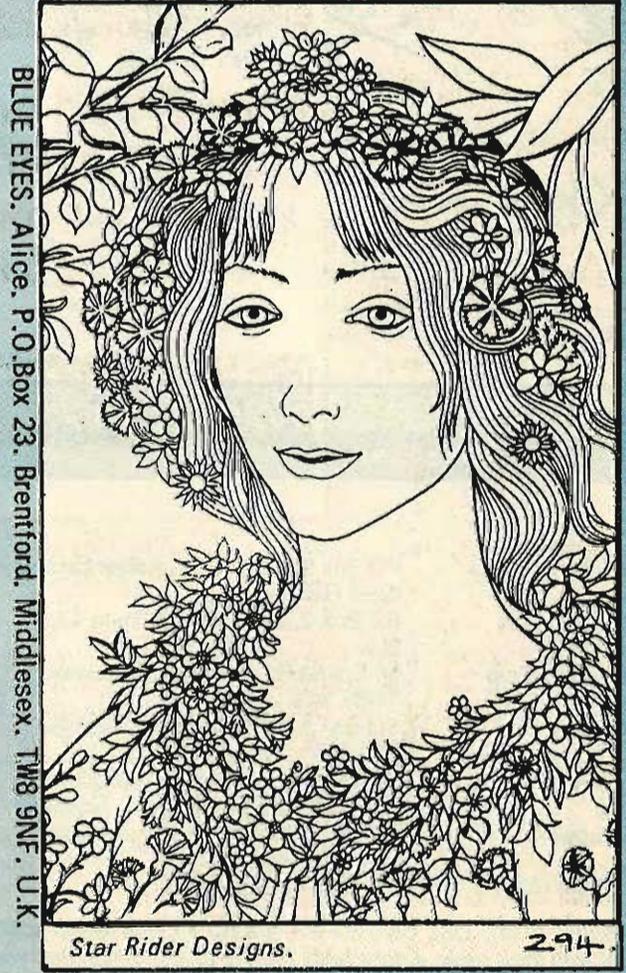


More names and addresses from QSLers all over the world, courtesy of David Shepherdson

Well, once again it's the start of another New Year, so I guess it's time for me to remember to wish all readers a Very Happy Christmas! As this is the January issue, perhaps a few hints on how to get your name mentioned may not go amiss. Also a few hints on contacting QSL clubs could be useful, especially to new QSLers.

Well, first of all, be prepared to be patient. I write several months in advance of your actual reading these pages and have quite a pile of letters to be included at any time. To have a chance of seeing your name in print you'll have to drop me a line and ask for a mention. The way *not* to do this is to send a scrap of paper torn out of a spiral pad, or similar, and nothing else! Send me your QSL card(s) or a package such as you would normally send out. Please do make sure that they are your own *personal* QSL cards, and not someone else's with your name written on the back, this is not fair QSLing! This sort of request is far more likely to succeed than a single piece of paper! If you wish a reply or just wish me to confirm safe receipt, then please do remember to include a SASE (Self Addressed Stamped Envelope), or if writing from outside the UK, two IRC's (International Reply Coupons).

For a club after a mention, the same applies to you but please remember to include some up-to-date application forms so I know what you offer and for how much. If you are new to QSLing and wish to join some of the clubs mentioned in these pages, then drop the club a line and ask for details on how to join. Please mention that you saw their



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name in the magazine and remember to include a suitable SASE for their reply.

When writing to a club outside the UK, or indeed, if writing to a UK club from outside the UK, include a couple of IRCs instead of a SASE, though if you were to include an envelope clearly showing your name and address, this would be a great help. The IRCs are available from your local Post Office. These currently cost 60p each, *but* they can only be exchanged for stamps equal in value to the minimum postage needed to post a letter back to the UK, surface!

Once you have picked a club that you wish to join, and either have sent for and received an application form, or have come across one in a QSL package, read the form carefully. There are sometimes special conditions given in the form on how to join. Most clubs will not accept non-personal QSL cards so please make sure that you join clubs and swap with your own personal QSL cards, not a club card instead of your own card! A club QSL card is there to help extend your own QSL package, not to replace your own personal card(s).

There are three main types of QSL card referred to in QSLing as a hobby. First there are club cards, usually what are classed as "blanks." These are sold by the club and usually have a space for you to write on your name, handle and club unit number. If you have a number of these, and your handwriting is as bad as mine, I do recommend the use of pre-printed sticky labels for adding your address etc to these cards. Next are personalised club cards. Again, these are sold by the club but they can be supplied in small quantities with your details printed on the card, often by the club or one of the people who offer such a service at moderate cost.

The second type of personalised club cards are supplied in larger quantities, often 1,000 at a time, with your name, handle, address and club unit number put on when the cards were themselves printed. Finally there are the personal QSL cards. These are the ones that you have had made, at your expense for your own use when swapping and collecting. These are the cards which are special to you, and you alone. It is these cards that you should use to join QSL clubs with, and to QSL to people with along with any club blanks or personalised cards you have. I hope that this has been of some help to you, especially to anyone who is new to QSLing.

A couple of clubs that I know of offer an extension to the personalised club cards in that the clubs have commissioned a printer to print "four-part" cards with a design, each part of which is swapped, and what is known as "controlled" by a member of the club. One club which offers this is the Crook DX Club of Co Durham. The theme of their "Series" pictures is Science Fiction and they are usually two colours of ink.

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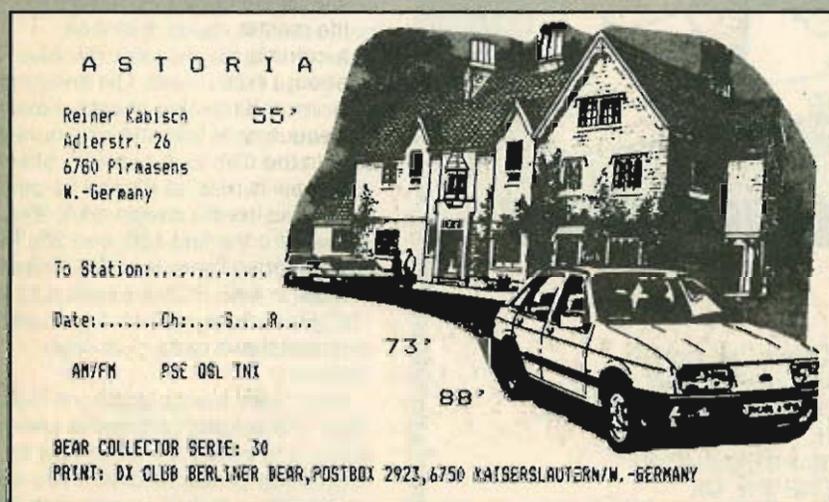
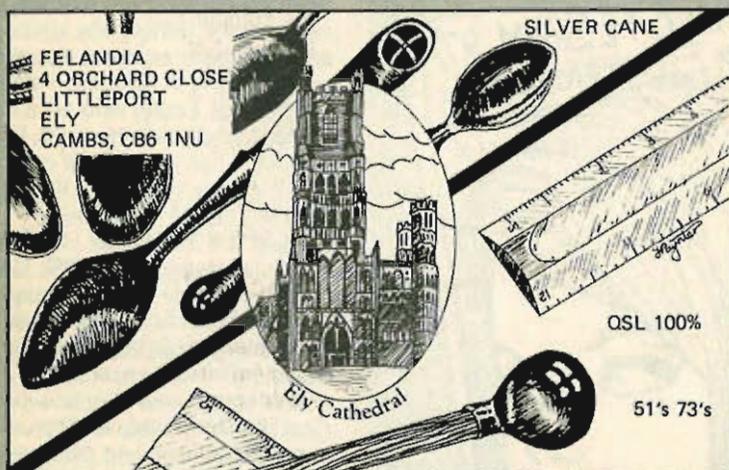
QSL Club Addresses:

Berliner Bear/ Super Stinky	PO Box 2923, D-6750 Kaiserslautern, West Germany.
Crook DX Club	PO Box 2, Crook, Co Durham, DL15 8LX.
Firebirds QSL Club	54 Boyne Rd, Hastings, E. Sussex, TN35 5NZ.
Kilo Mike DX	PO Box 1, Kirby Muxloe, Leicester, LE9 9DP.
Outer Hebrides DX-QSL	PO Box 11, Stornoway, Isle of Lewis, PA87 2NY, Outer Hebrides, Scotland.
Sea Smugglers	PO Box 139, Bexhill on Sea, East Sussex, TN40 2AF.
Tango Papa (83)	PO Box 13, Southport, Lancs.

When writing to any QSL Club or Firm, always include return postage to assist with their reply, it does help. Please also mention that you saw their name in the CB Mag, thanks.

QSL Service Addresses:

Charle Cards	26 Edward St, Hartshorne, Burton-on-Trent, Staffs, DE11 7HG.
Currie Cards	89 Derwent St, Blackhill, Consett, Co Durham.
Ensign Cards	58b Market St, Ashby-de-la-Zouch, Leics.
POMA (Ray-UK Rep)	PO Box 106, Canterbury, Kent, CT1 3YN.
Raymac Display	No. 2 Showfield Ind. Units, Pasture Lane Ind. Est., Morton, North Yorks. (Send £2 for Sample pack & £4 credit towards order).
Sharp Graphics	PO Box 3, Grangemouth, FK3 9BD. (0324-473432).
Scottish CB Newsheet	C/o 'Arnail', Patison, Neilston, Glasgow, G78 3AT. One year's subscription £2.70.



Another club offers its members cards in a "Warrior" series, and has recently added a "Camelot" theme to its cards.

Although the hobby of QSLing is

usually conducted solely through the post, there are many "Eyeballs" held through the year all over the UK and Europe. If anyone is organising such an

event this year, please do let me know some details as soon as possible, then follow them up with fuller details as soon as they became available. The earlier you let me know about any event, the sooner I can include the details, even if it's just date, venue and a contact address. These Eyeballs are a great place to get to meet people who you have only contacted previously through the post by swopping QSLs. Many of them are absolute musts for card collectors.

Those held in Dover, Hastings and Wolverhampton are mainly for POMA card collectors, though anyone who swops is usually made welcome. The Stanley, Kirby Muxloe and more northern ones often cater for collectors of Currie Cards and so on.

Some that are planned for 1989 that I know of include the Stanley "Big Meeting" planned for April, not quite sure of the date as yet for this one. Then there is the Tango Papa Southport Charity Eyeball held on May 20th. I have details already of the 2nd Sea Smugglers Annual Meeting on June 10th and 11th, the Sheffield Charity Eyeball and Gala on June 18th and the Kilo Mike Eyeball on June 25th. I hope to be attending at least three Eyeballs again this year so keep an eye out, you may just spot me at one of them - if you want to of course!

A couple of months back I managed to put both feet firmly in it and said that Mark (*Earlybird*) of the Firebirds QSL Club had control of all the clubs previously run by Ian (*Conman*) i.e. Yankee Truckers, Rebel Truckers and Freightliners. Mark was very quick to write to remind me that he actually has control of the Freightliner and Yankee Truckers' Currie Cards, the Clubs having been closed. As for the Rebel Truckers, this club is currently "Up for Control." Sorry Mark, I'm sure it'll happen again sooner or later!

Further afield, there has been a couple of clubs that people have been trying to get in touch with for some time now. The first is Jorgen Hansen of the Toucan International of Venezuela, but as no-one seems to get any contact with the club, we have to assume that it has closed, probably due to continuing ill-health of the President. The other club that people have been trying to contact is the Berliner Bear/Super Stinky duo run by Knut Mittlstedt in Germany. Well, I can now pass on the news that Knut has been in hospital for much of 1988 but is recovering and has been responding to the many letters which have piled up over the months. Best wishes to Knut from everyone here.

I've also just received a letter this morning from the rather ill-fated Invitations Exchange Centre of Germany to the effect that the Club has apparently had to close.

A request in now from Tony



**MARATHON
MAN TWO**
SIERRA LIMA
GROUP PRESIDENT
PO BOX 55, ALDERSHOT
HANTS., GU11 7YX
ENGLAND, U.K.



QSLer Addresses:

Tony (<i>Gunfighter</i>)	1 Carneton Close, Crantock, Nr Newquay, Cornwall, TR8 5RY, UK.
Eden (<i>Silver Cane</i>)	4 Orchard Close, Littleport, Ely, Cambs, CB6 1NU, UK.
Alice (<i>Blue Eyes</i>)	WM 97, PO Box 23, Brentford, Middlesex, TW8 9NF, UK.
Gary (<i>Black Eagle</i>)	WDX149, PO Box 29, Derry, Northern Ireland.
Nick (<i>Woody</i>)	PO Box 55, Aldershot, Hants, GU11 7YX, UK.
Tom (<i>Marathon Man Two</i>)	PO Box 55, Aldershot, Hants, GU11 7YX, UK.

(*Gunfighter*) Beamond of Cornwall who asks me to pass on his new address as since moving, he's not been getting much mail! A package of cards in from Eden (*Silver Cane*) of Ely; not just QSL cards, but view cards, eyeball cards and even a playing card. For collectors, Eden also has a set of Currie Cards, as does Tony (*Gunfighter*).

Another person who collects these, among many others, is Alice (*Blue Eyes*) of Brentford. She has several cards by different printers including Currie, Star Rider and Heidi and also collects POMA and BandM cards. She has also asked me if I could shed any light on whether or not the South Wales Warrior Group (Caerphilly) is still active as she has written several times without any response, not even her letters returned. Any info on this club, or from this club would be appreciated. Also, she is trying to get in touch with "Libra" of Wednesfield for his or her Star Rider cards, again without any success. Again any help there would be appreciated.

From Derry in Northern Ireland hails Gary (*Black Eagle*) who asks for a mention and sends his card. From Aldershot hail a couple of card collectors, namely Nick (*Woody*) and Tom (*Marathon Man Two*).

I said last month that I had heard that the Outer Hebrides DX-QSL Club had been taken over by Jan (*Superman*) and I would no doubt hear pretty quickly if I was wrong about this. Well, I've since heard that I was correct and I now have details on the new club and its package. Cost of membership is £2 plus a reasonable-sized and stamped SASE along with five personal QSL cards. For this you get your OH Unit Number, ID card, certificate, welcome letter, president's and vice-president's personal QSL cards, with free membership for your XYL/M. Also exchange club invites, OH invites to pass on, stickers, log sheets, viewcard of Lewis, tourist info and a mixture of 26 club cards! The club can also offer club cards, by Curries, at £3 and £4 per 100 depending on the design, plus 30p postage for the first 100, and 20p for further 100's. There is also a limited number of club POMA cards at £7 per 100 (plus postage). Also a club stamp, club patch and extra club seals (stickers).

Well, that's it once again, no more room. I'm actually getting the pile of letters and packages down now to reasonable proportions so if you want a mention for yourself or your club, please drop me a line, with return postage if you wish a reply and I'll see what I can do. Any info on forthcoming events is of course most welcome, but please give me plenty of notice, not a couple of weeks! All letters etc should be sent to 3 Tarn Villas, Cowpasture Road, Ilkley, West Yorkshire, LS29 8RH and not via the mag.

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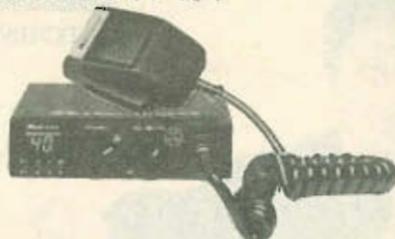
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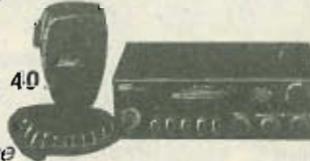
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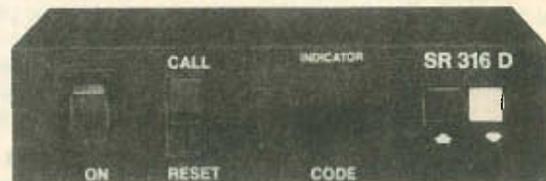
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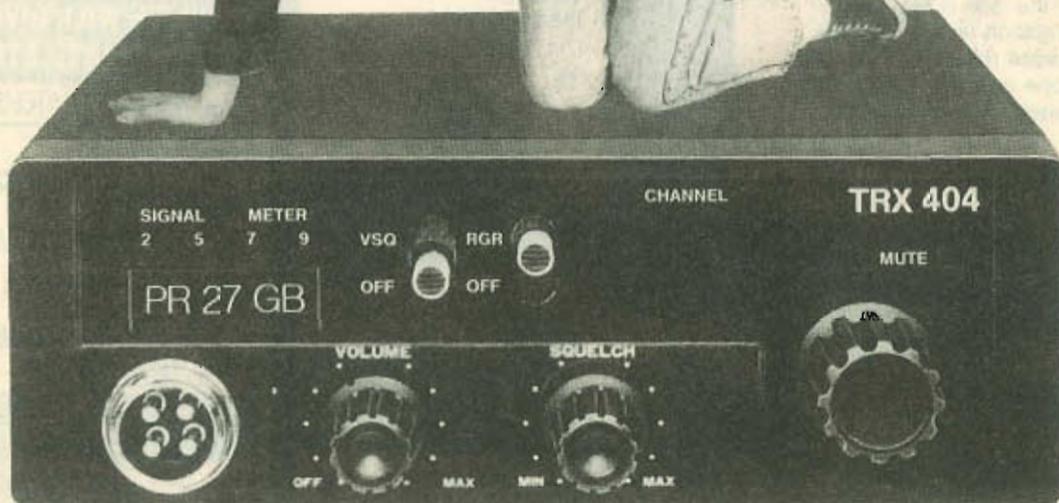


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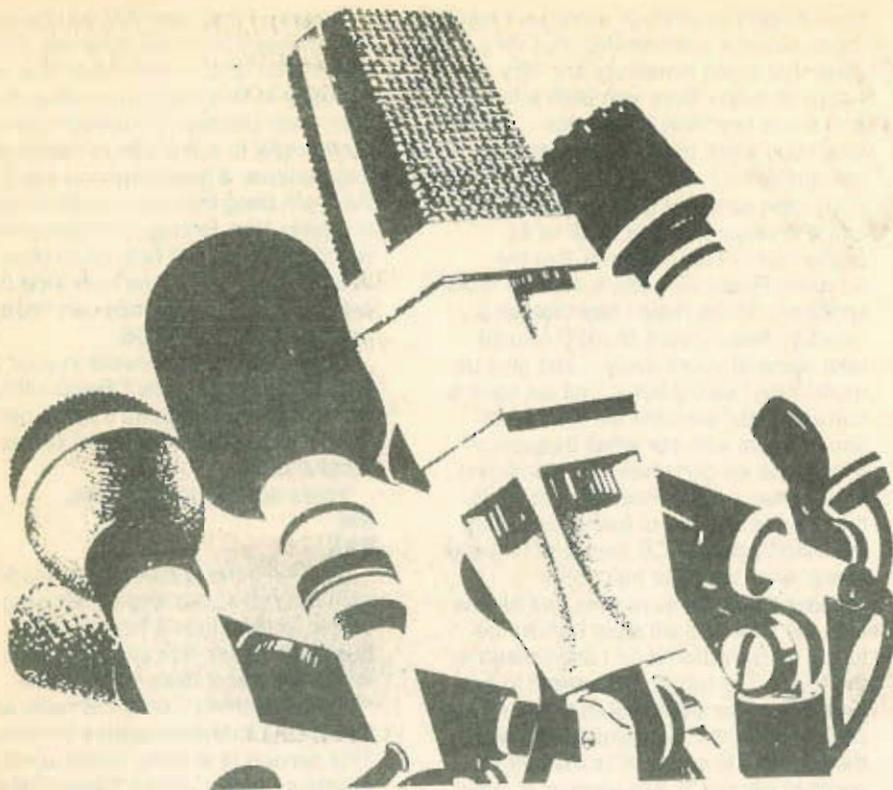


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OVER THE AIR

My thanks to J R Smith (Midlands area rep for the PRCGB 934 Mhz call sign GB 581). He has sent me some very interesting information

about the things that have been going on with the 934 user groups and the DTI and a few other bits. His letter to me makes it clear that he questions the amount of "consultation" that takes place between the DTI and the PRCGB. And, further to that, if the DTI ever takes any notice of *what* they had to say regarding 934 and SRR.

This makes me wonder just how much influence the manufacturers and businesses have or are going to have in the 1990 Review and the possible future of CB in the UK. So are we going to be sold down the river in the years to come? J R Smith, in his letter to me, perhaps sums up the thoughts of many CBers around the UK: "We have been conned and will continue to be conned." So is this the thoughts of the masses?

I was very interested to hear from a friend of mine who has informed me that the DTI plan to carry out 'some kind of CB monitoring' to determine the usage of CB throughout the UK. I would be very interested to know how they plan to do this when they can't even stop or curb those who (a) fail to buy a licence and (b) swear and play music. They can't work out totals from the licences sold because, as we all know, *one* licence covers the three systems. So, do they plan to cover certain parts of the country and then multiply their findings? In which case how do they plan to allow for the lows and peaks of usage during the day and night times? Please

remember that they are always moaning about the lack of finances so what about the payments for overtime? I get this picture of a load of DTI/RIS officers jumping out of vans and cars, and chasing around the streets logging signals on a calculator. Or do they have some kind of 'master plan'?

I get very worried when I hear CBers being referred to as 'hobbyists' or 'hobby users' even to the extent of CB radio being thought of by some as a 'hobby market'. I am trying to think of another form of 'enjoyment' that lends itself to so many different interpretations and uses so that we can at least form or attach ourselves to the same classification (outside of all forms of radio communications) - and I can't think of one! There are many ways in which different people use CB and it has no 'specific' classification. The DTI even say that it is designed for business use so are these businesses 'hobby users'? Take things such as stamp collecting, hang-gliding, swimming, bowling and all the rest. They all have one thing in common, and that is that each one has *one* specific function, but we don't. Try and make a list under a main 'hobby' title and then list the different ways that CB is used. We are *specialist users* with *specialist needs*. All the time that we allow the DTI and others to call us 'hobbyist users' etc, we will always be looked on as a joke.

I can only apologise to anyone waiting to read a report (with pictures) on the Poppy Run 88. The report and film were sent in prior to the Post Office strike. Although this is now over, they seem to have been lost in the post. I will do my best to write another report these and try to obtain some pictures. Whilst on the subject of apologising, September's issue (Over The Air) carried a picture of a young lady who, it was claimed, was "Maggie." This was incorrect and the picture was, in fact, that of Cinderella (Linda). This slight cock-up was down to someone somewhere between the Editor and the printers. Sorry to both ladies and, yes, the stockings were returned at Southernness in October.

Many CBers have asked me why they can never receive a reply to letters or telephone enquiries to the RSGB. I must be honest and say that I have also tried and failed, so to try and obtain an answer from the organisation and in respect of the things that people have said to me I am penning the following "open letter." Perhaps this will spur the RSGB into life and help to allay some CBers' thoughts. Perhaps some of their own members may like to respond although the main aim is to get some kind of answer direct from the RSGB.

Dear RSGB,

First of all I would like to make it clear that it would have been nice to have been less formal in my address but, I don't know who the hell to address this

letter to – because we can never get an answer to anything. So, as this is now the beginning of 1989, I would like to take this opportunity to wish you all at Lambda House a very Happy New Year, and I hope that this year may see a turn in the attitude which you seem to take towards CB and its 200,000 or so users.

I am very aware that we do share some things in common and that perhaps we also share a number of users who both frequent CB Radio and Amateur Radio. However, this seems to be where our two worlds part and you adopt your 'holier-than-thou' attitude. Now, you may like to correct me if I am wrong but we CBers seem to get this impression that *you* consider us to be 'lower than low' or even 'idiots.' I am sure that this can't be true – can it? Don't you think that it is about time that the RSGB got together with some of our main CB representative groups or even took a keen interest in what is going on. After all, it could help both you and Amateur Radio users alike! Don't you think that we could both learn from each other? Remember that, at some future stage, you may need a few extra friends or a helping hand or two.

I don't think that many CBers would, or could, say that they are more knowledgeable than the average Amateur, but then not all CBers want to become Amateurs. Yet, you would have to admit that your numbers have grown over the past few years because of CB. And even if you don't care to admit it, we

have helped possibly to swell your own organisation's membership. It is very clear that some Amateurs are very happy to help CBers with both advice and some practical knowledge – so why won't you listen to us or even answer our questions?

My own personal feelings don't really count in respect of this letter or its contents, but I tend to think that the Amateur Radio user has *too much radio spectrum*. In the main I feel that, on a 'head-to-head' count, the DTI should take some of yours away – and give us more! Yes, I would admit that we have a certain 'wally' element but then so do you. At least with our small frequency allowance we don't have to pass a test to become a wally. Perhaps if the DTI had had some kind of forethought with the introduction of CB then we '11 meter users' wouldn't have half of the problems that we have now. But all this is in the past and we must look to the future for salvation (and I don't mean to the EEC). The future does seem to be less than clear (well it does in my crystal ball) and many CBers are asking why the RSGB and some of its members seem to decry CB and align us to Atilla the Hun! Why is it that much of what we read in your specialist publications always seems to relate anything that is wrong in your world to CB and more so the users? I often wonder who you blamed before CB was brought into the UK. Perhaps it was Bill and Ben or Desert Island Discs.

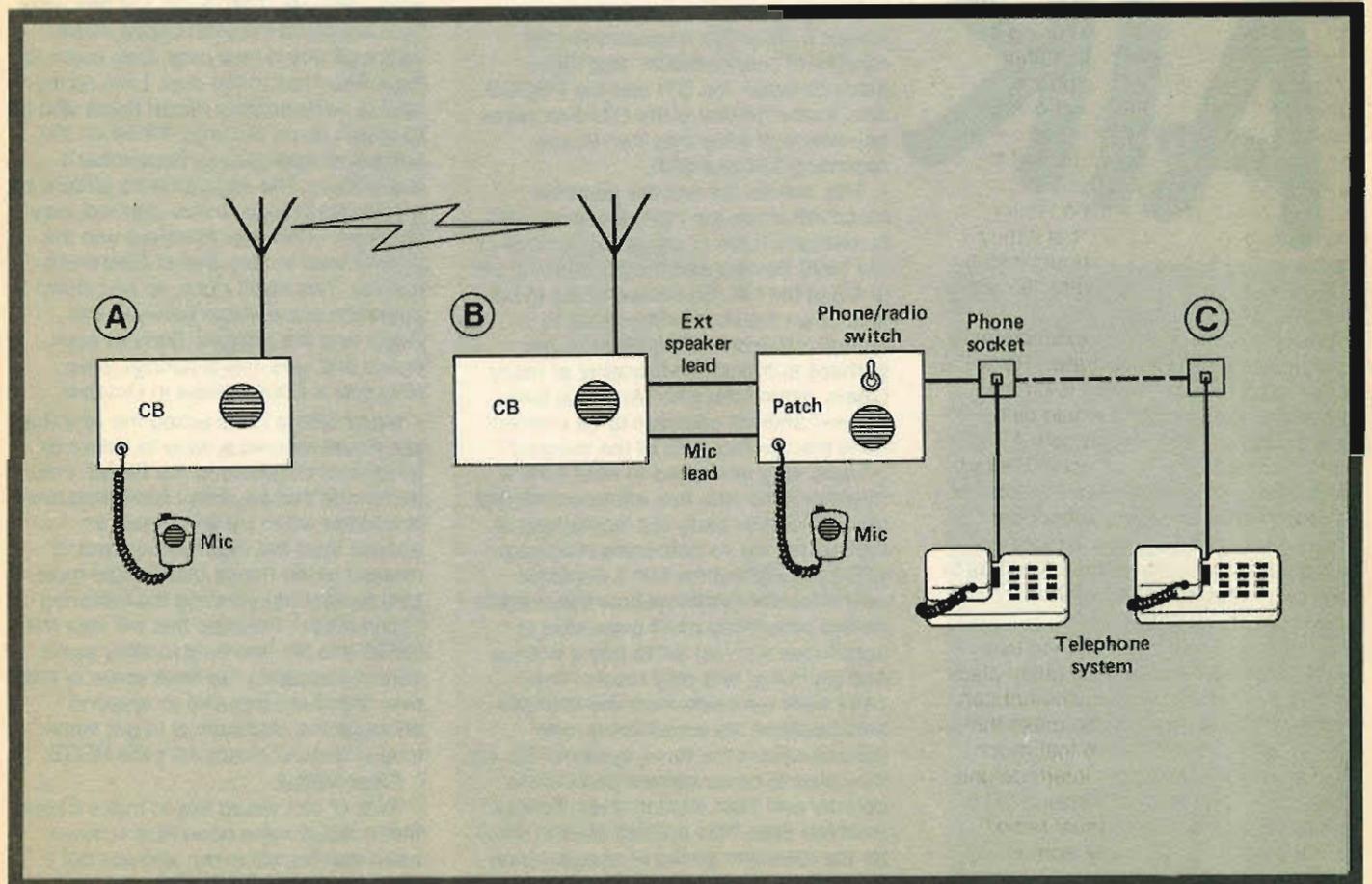
Anyway, I feel sure that you have by now grasped the main meaning of this 'open letter' and I would hope that you will reply in kind (with something more than open promises). Perhaps you may like to reply to a few CBers' letters or even answer a few telephone calls! But the main thing that you should be doing is talking. Yes, talking, and then perhaps we can all plan and help each other before it is too late. And I will stop being asked by CBers why they can never get answers from the RSGB.

I very much look forward to your reply (as I am sure do many CBers) although I won't hold my breath as it could be 1992 (and Europe's open borders) before I receive one . . .

Yours across the airwaves,

**SM
XXX**

Changing the subject, Mike Wade, an amateur radio user and the training officer for Hastings & Rother (East Sussex) Raynet, has sent me some information and ideas for possible "Phone Patching" using CB radio as the interface with the telephone network. This service is already widely used by Amateurs in the United States, Canada and Australia and played a major part in establishing links during the Mexico City earthquake whilst all other forms of communications were lost. He feels that this could be of benefit to many CBers and a very good link for those who either monitor emergencies or assist specialist groups. He states that "the thing about





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patching for monitor use is that all phone calls are charged at private rate and not at cellphone rate! So using a patch on a well located base station means one can give mobile phone coverage to any mobile you choose - very useful for public service radio work and monitor groups." It seems that the PMR people are angry at the DTI for refusing to allow them such a facility and it has been suggested that if they want such a service they should install a cellphone system in each vehicle - as well as their PMR rigs.

Mike gives the following example of how the system could operate: "Radio user A calls up user B, who is on the telephone and asks if he would call phone subscriber C so that both A & C can talk directly together, using B's radio and a phone patch interface. It also has to be explained to phone subscriber C that he/she is talking over a radio as well as a phone link and therefore has to say 'over' after each part of the conversation."

Since this system has been in use, slight changes have already taken place and more sophisticated equipment can now be obtained, which can make the phone patch operators' job that much simpler. The phone patch interface units can now be bought with installed VOX as opposed to the old manual radio/phone switch. And already, some monitoring groups are using such

completed systems linked to telephone answer machines. This enables the calls to be registered and logged.

It is even suggested that in a 'life or death' situation this form of link-up could help to save lives. It could well help, for instance, with RTA's and medical assistance, combating crime, helping people being directed to a given location, community work and much more besides!

Mike sums up this idea by saying: "This phone patch facility is available to the public in many countries except in Europe where communications monopolies have resisted good communication facilities for their citizens. Even with deregulation and privatisation the facility is still not available mainly because the public is not aware of it and has not demanded it, and because some authorities attempt to make phone-patching illegal without asking their citizens if they want it. This means that the authorities are denying their citizens freedom of communications as required by the Declaration of Human Rights and Fundamental Freedoms legally required to be adhered to by countries of the European Community, Council of Europe and the United Nations." Furthermore "the argument that phone companies might lose revenue is not acceptable as this would mean it would also have to be illegal for car owners to

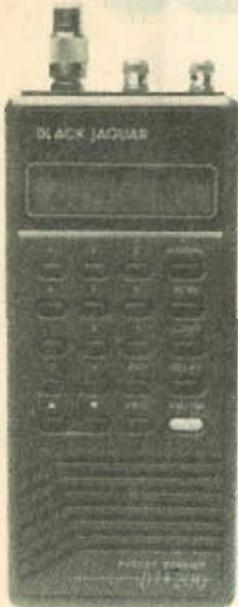
give lifts to people, since that could be argued as taking revenue from bus, train and taxi companies. The fact is that phone companies get extra calls made over their systems because phone patching/radio links allows more people to have access to them."

It is clear that Mike feels very strongly about this system and that CB can make a large contribution to its future. So much so that he has asked Natcolibar to put forward a proposal to the ECBF and that other national CB bodies, monitoring groups, clubs and CBers should lobby MPs and MEPs for support. I am sure that Natcolibar will want to keep everyone informed of how things are progressing in the future and they would be very happy to hear from anyone who would like to add their support to this proposal or, if anyone would like more details from Mike, they will pass all correspondence on to him. Contact Natcolibar at: 38 Amroth Walk, St Dials, Cwmbarn, Gwent NP44 4NQ.

This month's finishing item is someone's definition of STRESS: "That confusion created when one's mind overrides the body's basic desire to choke the living daylights out of some muppet who desperately needs it!"

Please don't forget to send in any information or thoughts that you might like to share with your fellow CBers. Send them to: Sheperd Man, PO Box 429, London, SW19 2UU.

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TIE BREAKER

David Cox clambers out of his laboratory and offers this DIY project for hands-free operation

One of the problems that has always been foremost in the minds of mobile radio enthusiasts is the worry of holding and using a CB microphone whilst driving. At the best of times it can be a downright nuisance; very much a case of "Hang on a moment breaker, I need to change gear!" Of course it could also be listed as being dangerous as the driver's hand is taken away from the steering wheel.

The DIY project described in this article is an attempt to provide a low-cost remedy to this problem. The features that are included to bring about a solution are threefold. Firstly, a microphone that clips to the shirt is enlisted so that the hand of the operator need not be taken away from the steering wheel. This, however, engages a new problem in that the microphone still needs to be switched in order to transmit. For this reason, a small switch is placed away from the microphone and attached to (say) the steering wheel. Also, rather than holding the switch down whilst talking, the switch operates on a "push-push" basis. In this way, the switch is pushed once when the operator wishes to transmit and

pushed once more when the transmission is complete. This frees the operator's hands for more important duties. The final major feature of the unit is the auto-level circuit. This makes sure that a good level of sound is always achieved even if the microphone is not always placed in the same position. Included in the auto-level circuit is a filter which helps to reduce unwanted road and vehicle noises. Also, a flashing TX light can be added.

The basic workings of the tie clip microphone adapter are outlined in the block diagram Fig 1. Immediately visible is the fact that the system is made up of two almost independent sub-circuits. One circuit is associated with the sound control and the other circuit provides the switching from RX to TX.

Of the two sub-circuits, the sound circuit is the simpler and so we will have a look at this first. A more detailed description of the circuit will be supplied later.

At first it was thought that the sound board would have to contain a pre-amplifier to boost the microphone's signal to a usable level. However, the microphone has a small amplifier built in and this has proved to be perfectly satisfactory. The signal from the

microphone is therefore coupled via a simple and passive low filter into the Automatic Level Circuit. The ALC detects the average level of the signal so that it can decide whether the signal requires an increase or reduction in overall level. The output from the ALC is fed to a preset control and this sets the correct sound level to be sent to the rig. This preset will need to be adjusted to suit the rig you use but will not need to be altered again. The last stage in the sound circuit is a switch which cuts off the microphone sound when the rig is receiving. The switch is controlled by the second of the two smaller circuits.

The second circuit is included to modify the action of the push-to-talk switch. The action that is needed to a locking switch whereby the first push turns on the unit and another push turns it off. Further to this, the switch must actually contain two switches in one; one switch to tell the rig to transmit and the other to switch on and off the sound. Switches conforming to these specifications are readily available, but they're all just a bit too bulky for our needs. Therefore, the second circuit has been designed to modify the action of a small "keyboard" type switch and make it suitable for the requirements above. The circuit itself contains a logical section (more later) which drives a small relay. The same output also drives two small TX indicators.

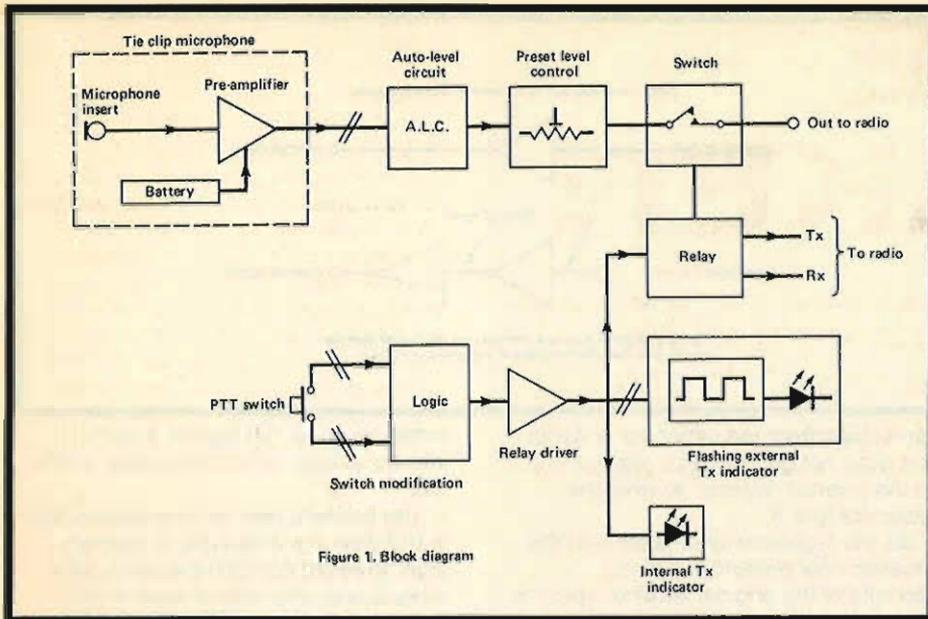
The Circuit

As above, it is easier to explain the two smaller circuits separately as they have very little to do with each other. However, before those explanations, a quick word about the power supply is in order. As we know, all CB radios are designed to work with supplies of between 12 and 14 volts DC. Obviously, a circuit such as the one described here must work with similar supplies so that it will be compatible. Unfortunately though, the ALC part of the system requires a supply of less than 9 volts DC. For this reason, there are 5 extra components in the circuit to provide this supply correction. R1 and ZD1 are the main parts for this purpose (refer to fig 2). R1 drops the voltage down and the zener diode is used to secure the supply (to the rest of the unit) at about 5 volts. The capacitors C1, C6 and C8 are used to keep the supply "clean" and reliable.

Of the sound circuit, the Automatic Level adjustment forms the main part. The output from the microphone's internal pre-amplifier is fed to this stage via the capacitor C3. This component is implemented firstly to block the DC bias voltage set up by the ALC, and secondly to provide a small amount of low frequency filtering. This action reduces background noise.

IC1 is the main component which provides the automatic level adjustment. It is a Voice Operated Gain Adjusting





Device, or VOGAD for short. It was used in the voice compressor project as described in the September '88 issue. Here though, it does not compress the sound even though the VOGAD arrangement is the same for both projects. The difference lies in the components marked R2 and C2. These are the components which the VOGAD uses to find the average level of the signal it is processing. Compared to their values in this project, the equivalents to R2 and C2 in the compressor are much smaller. This means that the VOGAD in that circuit will react quickly enough the change the levels of individual vowels in the speech

In this project, the VOGAD responds much more slowly and so changes the level over a period of sentences. The rest of the VOGAD circuit is straightforward. C3 provides an extra section of low frequency filtering and C5 provides basic high frequency filtering. C4 connects two internal sections within the VOGAD chip and takes care of an unused input to IC1. Pin 8 is the output of the ALC and is taken through the DC blocking capacitor to the preset level control.

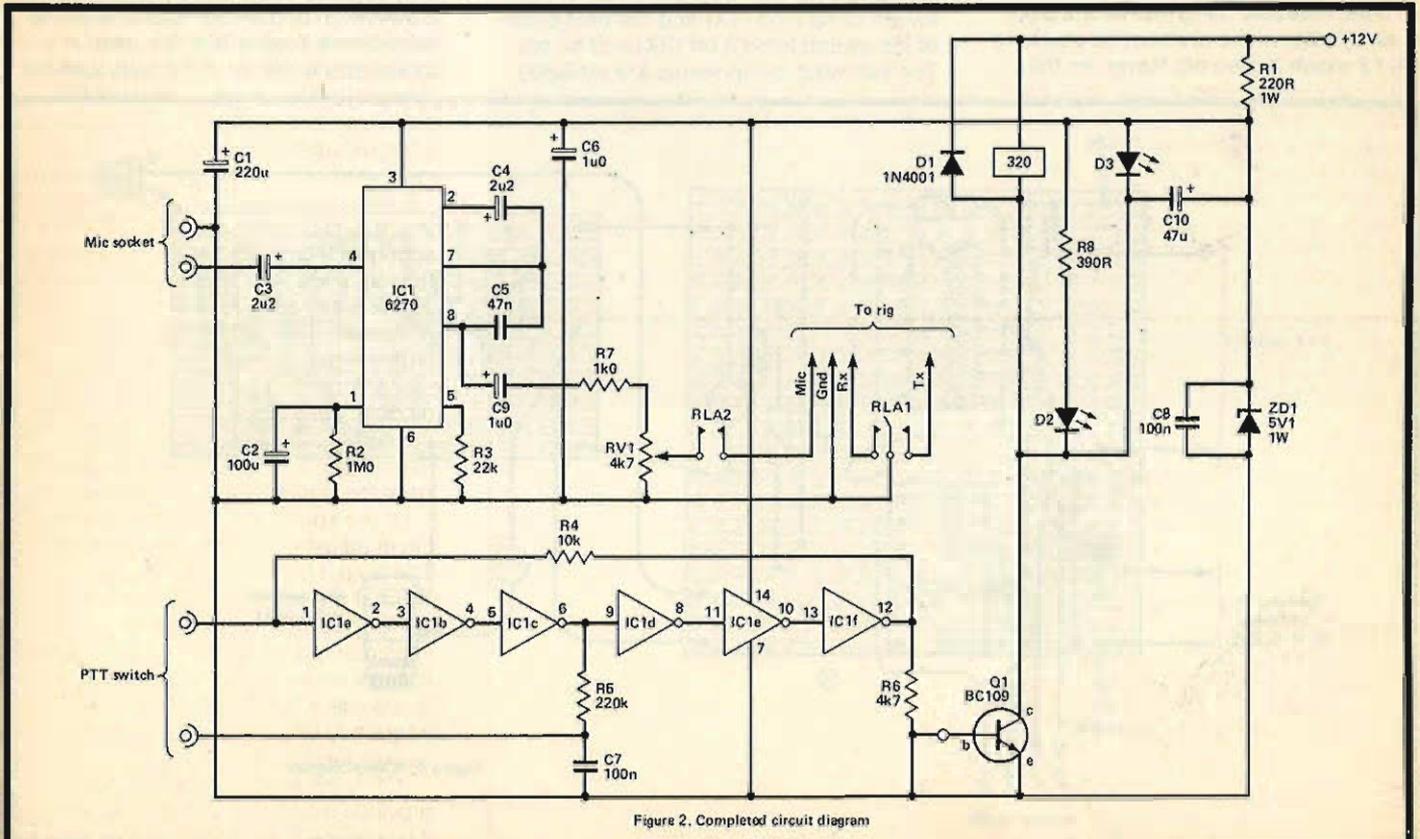
VR1 is the control proper, but R7 is used to protect IC1 from the low impedances that will be encountered when it is connected to a CB. The sound

is finally sent through the relay switch and to the radio set.

In the second circuit, a slightly different area of electronics is incorporated. Logical electronics deals only in "ons" and "offs", rather than dealing with different voltages. A signal is either on or it is off and no state in between is accepted. It is not practical to go into an in-depth look at logical electronics here because it simply would take up too much space! However, all that needs to be known for this project is the on/off fact stated above. There are numerous devices available that deal in logical formats. Indeed, that's all a computer deals in. In any event, though, we will only be looking at one device and that is the logical inverter which is used in the switching section of this project.

The effect of the logical inverter is almost certainly the simplest effect of any logical device. The inverter has one input and one output. If the input is on then the output will be off and vice-versa. Incidentally, if a device's output is said to be off (or logic 0) then the output will be near to 0 volts. If the output is said to be on (or logic 1) then the output will show a voltage of greater than about 2½ volts and in some cases up to the supply voltage.

In this circuit, IC2 is the inverter or, to be more specific, it is actually six inverters in one package. With chips such as this one, it is necessary to connect all inputs to something and therefore, even though we only want two inverters for this project, the other 4 inverters need to be taken into account.



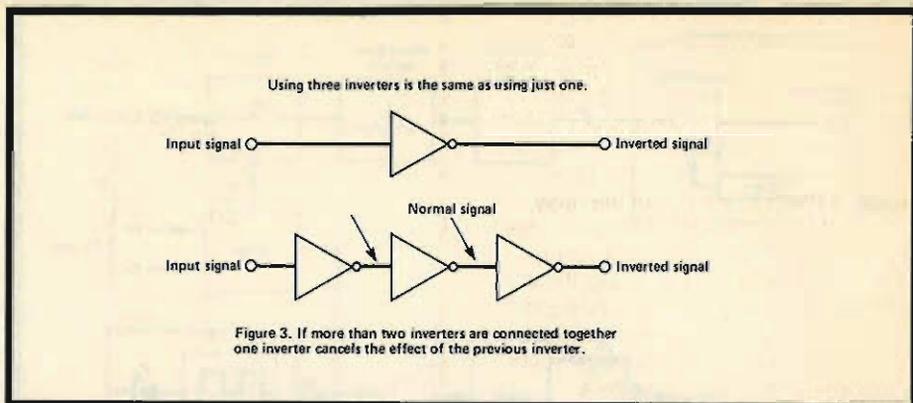
One solution is to use two sets of three inverters. This way, we still end up with an inverted signal and also makes use of the spare units. Looking at Fig 3, it can be seen that as the first inverter inverts the signal, the second inverts it back again and the third reverses it once again. The effect is as if only one inverter was used.

As stated earlier, the effect of this part of the circuit is to add a locking facility to the microphone switch. This is accomplished by the components IC2 (parts a to f) along with R4, R5, C7 and the remotely controlled switch.

To begin with, let us assume that the input to the first inverter (pin 1) is at its off state. Also, assume that the switch is open and the capacitor has no charge. In this situation, as pin 1 is "off" then, through the inverting process, pin 6 must be on. Following along, after the second set of inverters, pin 12 must be off. As can be seen from the diagram, pin 12 is effectively coupled to pin 1 via R4. As pin 12 is off, and we originally started with pin 1 also being off, then the circuit is stable or locked.

Once the TX switch S1 is pushed then the stable situation is broken. Although we originally assumed that the capacitor (C7) had no charge, now it will have a charge. See that C7 is connected via R5 to a point in between the two inverters (pins 6 & 9). As the input to pin 1 was off, then the output from pin 6 must be on. Therefore, the capacitor charges through R5.

The effect of this is that when the switch is pushed, the charge from C7 will be able to flow to pin 1 of the inverter. The only thing that keeps pin 1 in its off state is the connection via R4 to pin 12 which is also off. However, the



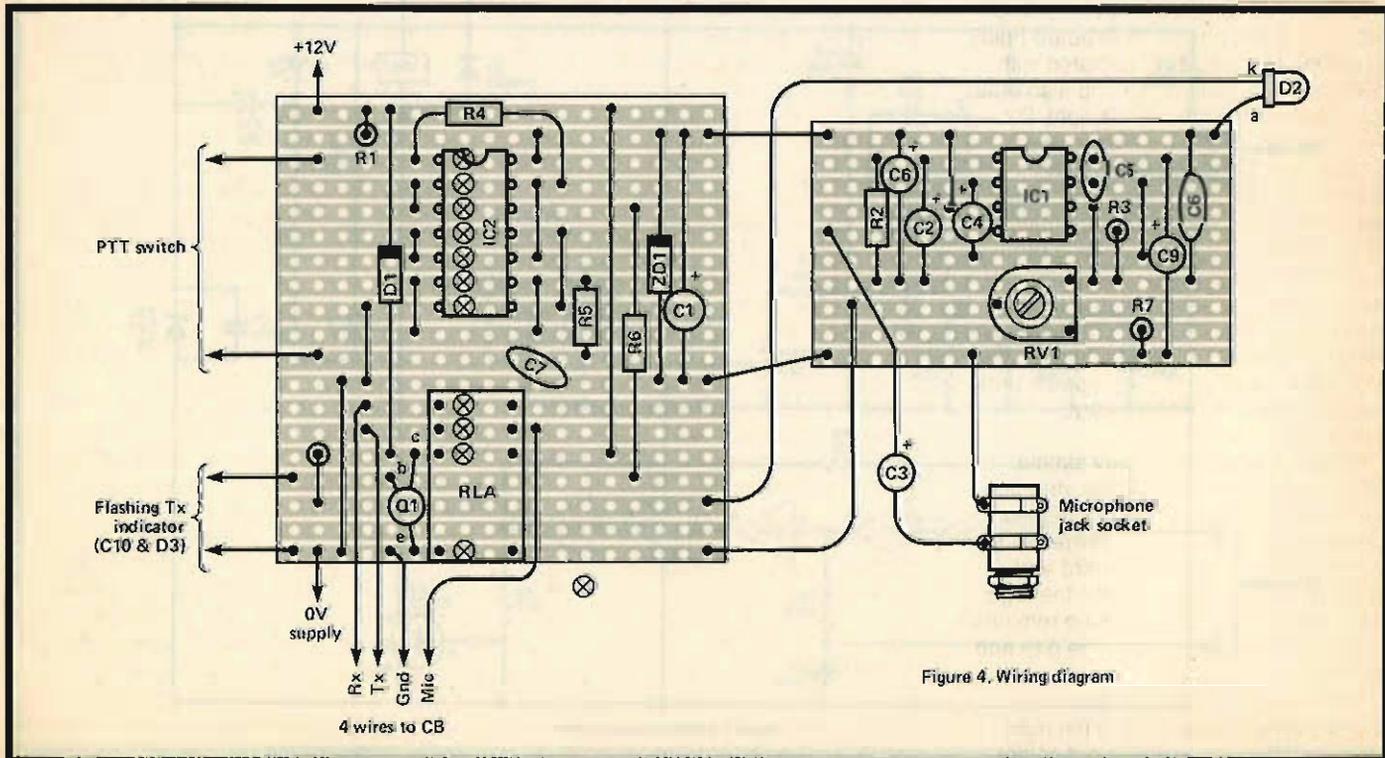
connection from the capacitor is direct and does not go through a resistor and so the inverter "listens" to what the capacitor tells it.

So, pin 1 goes to its on state and the situation now present is a direct opposite of the original situation (pin 1 is on, pin 6 is off and pin 12 is on). Releasing the switch has no effect since pin 1 is held on by the connection to pin 12. As pin 6 is now off, the capacitor discharges and so if the switch is pushed again, the circuit will change back to the original state. The values for R4, R5 and C7 are critical as, if they are not correct, the circuit might tend to rapidly switch on and off, leaving the final state uncertain.

Even though all this happens within the IC2 part of the circuit, it is only pin 12 of IC2 that has any consequence on the rest of the circuit. By following through the workings of the logic section, it can be seen that upon each push of the TX switch, pin 12 reverses its state. That is to say, one push of the switch turns it on (TX) and the next push of the switch turns it off (RX) and so on. The following components are included

simply to adapt this logical switching into something more meaningful for the CB.

The problem with these logical chips is that they are incapable of driving high-powered components such as a relay. It is a relay that is used in this design to switch the CB between RX and TX. The answer lies in using a transistor as a current amplifier. TR1 is a BC109 and has a current gain (Hfe) of about 500 times. Resistor R6 sets the current from IC2 to TR1. As the "on" output of IC2 reaches about 5 volts, the current flowing to the base of TR1 will be a little over 1mA. This is the case since R6 sets the current that will flow and so 5 (volts) divided by 4700 ohms equals roughly 1(mA). The transistor multiplies this current by 500 and so anything up to 500mA will be allowed to flow between the collector and the emitter of TR1. This should accommodate all but the most power-thirsty of relays. The relay contacts are used to switch between TX and RX and to switch on and off the sound from the microphone. Notice that the relay is connected to the 12 volt supply and not



to the 5 volt line. Relays do take a fair amount of current and so it is more efficient to connect it to the 12 volt supply rather than straining the low power 5 volt supply.

Relays are electro-magnetic devices and thus work in two ways. Firstly, if a supply is given to the coil of the relay, the armature in the relay will move. This of course is what we need. However, since the armature has a spring, if the supply to the coil is removed, then the armature will spring back and produce the coil an electric current. As the relay in this circuit is being driven by a sensitive transistor, the last thing needed is a great big reverse current shooting through everything. A simple solution is to place a diode in reverse parallel to the relay coil, which will take the reverse current away from the transistor.

The transistor does not only drive the relay. It also drives the indicators which show when the unit is transmitting. D2 is a straightforward red light emitting diode and comes on as a TX light. It is useful when setting up the unit. R8 restricts the current to D2 in the usual fashion. D3 on the other hand is an unusual LED in that it has a built-in flasher circuit. It is intended to be mounted on the top of the dashboard where the driver can see it out of the corner of the eye. This LED does not require a series resistor as it has current limiting built in. It does, though, require the additional capacitor (C10) to remove the pulsing notes that can be induced into the microphone signal.

Construction

Following the policy of seeing this project as two smaller circuits, it was decided to assign a separate board to each of the two halves. One board holds all of the components associated with the automatic level circuit and also acts as a base for the internal TX light, D2. The other board sorts out the power supply and contains the logic circuit and the relay. Having two boards not only makes the construction of the project much simpler, but it also helps a great deal when testing and fault-finding. It is easier if one board is constructed and tested before the other, rather than making them both at the same time. It is best not to hook up the two boards until each has past the testing stage individually.

Board construction is very simple. Begin by breaking the copper strip that lies between the two columns of pins connected to IC1 and IC2 (there will be four breaks on the sound board and seven breaks under the IC on the logic board). Make sure there are no remains of copper that might bridge the gap and thus short out the pins.

Solder into place the IC sockets making sure that they are in the right place (refer to figure 4). Do not solder

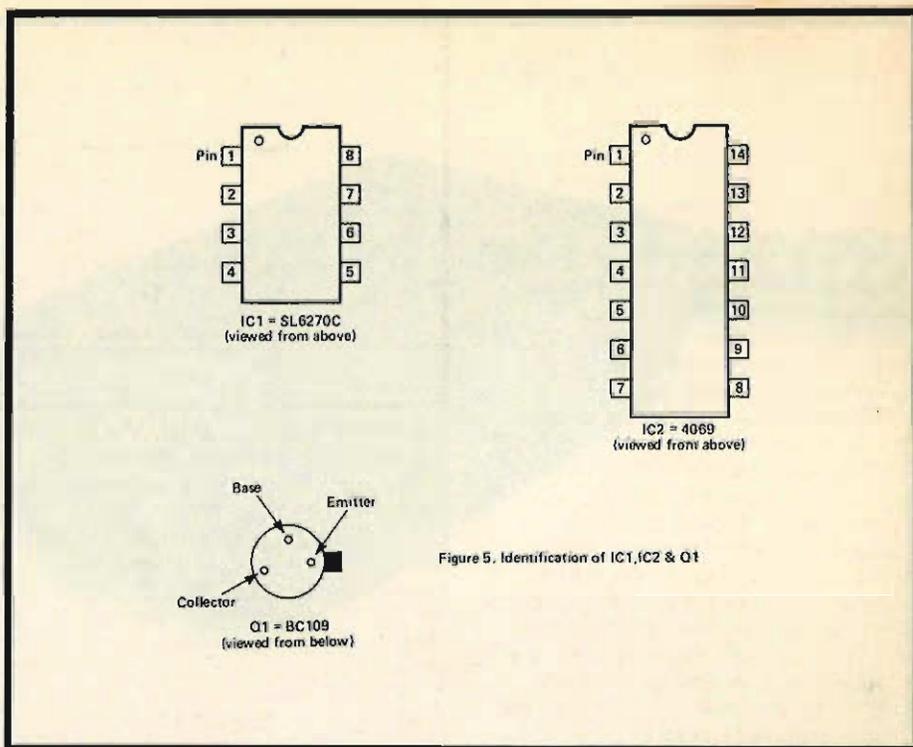


Figure 5. Identification of IC1, IC2 & Q1

directly to the IC; this should be inserted last of all. Before inserting the relay, break the copper strips between the two columns of its pins; there will be three breaks in all. As usual, it is a good idea to start by inserting the components of lowest profile (after the IC sockets). Be sure that you don't miss any of the wire links especially those next to IC2. Some of the capacitors need to be inserted a particular way round. Check that the "+" signs on the diagram (fig 4) match the "+" on the capacitor (or oppose the "-", whichever is the case).

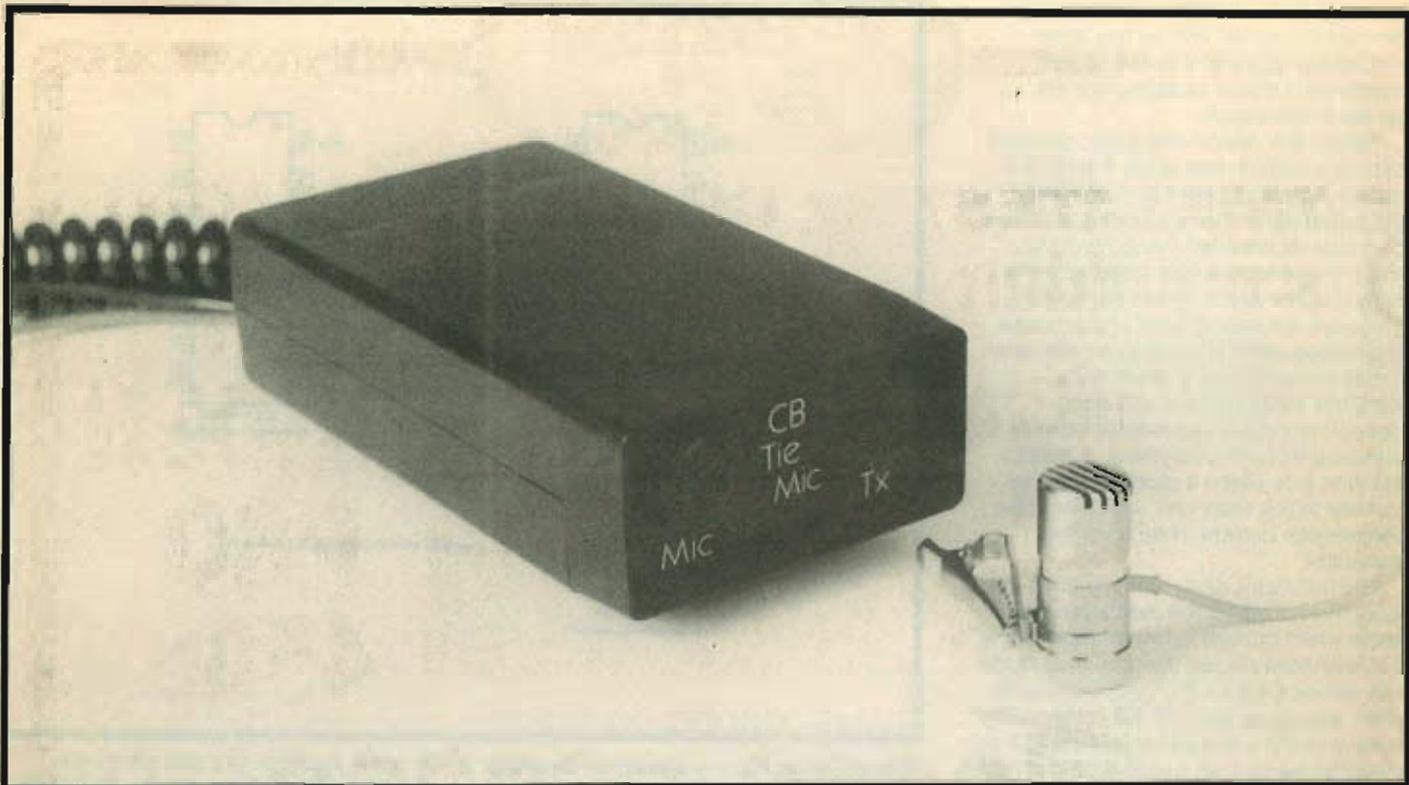
The diodes and the LEDs also need to be connected in one way. The cathode of the diodes (D1 and ZD1) will be shown by a stripe whereas a flat on the side of the package will denote the cathode on the LED. The capacitor C11 is connected immediately across flashing LED D3 and not in the main box. The switch and the flashing LED are connected via a length of about 2 metres of wire each terminated in a jack plug (2.5mm and 3.5mm jacks respectively). A small "potting box" of an inch in each dimension was used to house D3 and C11. When inserting the transistor, use the minimum of heat and be sure that it is in the right way round. The chips will only work if inserted correctly. Further to this, both IC1 and IC2 can be damaged by static that builds up in the body. To avoid damage, try not to touch the pins much or better still, handle the chips only with a "chip holder". Figure 5 details IC1, IC2 and the transistor.

Testing

Before hooking the boards together, follow the checks listed below. Begin with the sound board. On no account

link the sound board straight to the nearest CB powerpack - you'll blow the board sky high! Instead, use a supply of between 5 and 9 volts DC. A 9 volt PP3 battery is perfect. If you have a multimeter, check the current being drawn from the battery. It should be only a few milliamps. If not, switch off and check. Unless you have a small amplifier of some sort, you can't really make a full check of this board. It doesn't matter too much as you'll soon find out whether it is working or not. You could, of course, link it to the PA facility on the rig if it has one, but it isn't worth going to too much trouble at this stage.

The logic board is easier to check. Hook it up to a powerpack and again (if you have a meter), check the current being drawn. It should be next to nothing. After a short while, you may find that R1 gets a little warm. This is to be expected. Try connecting the switch to the board and pressing it. The relay should click and D2 light. If not don't panic. If when you activate the switch, your fingers are touching both contacts on the switch, this may cause the logic not to function. Check that all of the wire links around IC2 are correct before checking the other components. Try taking a 4.7K resistor and shorting it between the base of the transistor and pin 14 of IC2. If the relay still does not click, then the fault lies with either TR2 or RLA. Check their positions. Try connecting a meter between pins 14 and 7 of IC2. It should show a difference of 5 volts. If the meter is connected between pins 12 and 7, then the meter reading should change after each push of the button. If not, and all the components are in the right place, you may have damaged IC2 when inserting it.



Finishing

Once the board appear to be working, they can be linked together as shown in fig 4. The cables which carry the microphone signal should be screened and kept as short as possible. Use a four-way screened cable to connect between the main box and the rig. The prototype was housed in a box supplied by Maplin which is normally used as a box for a remote control. Any box can be used but it ought to be as small as possible so that it can sit under the dashboard. The only components visible from the front are the 1/4in jack socket and the TX LED. Exit holes for the cables need to be drilled in the back as well as holes for the smaller jack sockets. When wiring is finished, the board can be screwed into place or held with sticky pads etc. The front can be marked with transfers and sprayed with a protective varnish.

Installation

The easiest way of mounting the main box is to use either a pair of brackets or some double-sided adhesive pads. As long as the vehicle is negative earth, the negative supply wire to the box can be secured to the chassis. The positive wire can share the wire that goes to the CB radio. The tie clip should be fused although it does not need a fuse of its own. It could share the fuse to the CB or any other device (as long as the fuse is no bigger in rating than 5A). Once the main box is sited, the extension indicator (D3/C11) can be placed.

The switch is next and this could be held by a sticky pad onto the steering wheel. If the unit is required to work on a

24 volt system, then simply change the value of R1 to 1 470 ohm 1 watt resistor.

Microphone

The microphone used for the prototype was purchased from Maplin. It is a tiny electret condenser microphone with a built-in mercury battery (supplied) and is terminated in a standard 1/4in jack plug via about 10 feet of cable. Maplin do three tie microphones and this was the cheapest of the three. Its quality is

exceptional and even at £10, it's good value.

The only slight drawback is that it is omni-directional, meaning that it will pick up sounds from all directions. The top of the range mic is uni-directional and so will pick up less background noise, but it does cost twice as much.

As with all battery operated units, the battery should be removed from the mic if it is not expected to be used for some time.

Parts List

Resistors

R1 220 ohm 1 Watt
 R2 1M ohm
 R3 22K ohm
 R4 10K ohm
 R5 220K ohm
 R6 4K7 ohm
 R7 1K ohm
 R8 390 ohm
 (all 1/2 watt or higher, unless otherwise stated).
 VR1 4K7 horizontal preset pot.

Semiconductors

IC1 SL6270c VOGAD
 IC2 CMOS 4069
 ZD1 5.1 Volt 1 watt zener diode ✓

Miscellaneous

8 pin and 14 pin IC sockets, small box, copper strip board, mic plug + four-core cable, 1/4in mono jack socket, tie clip mic (Maplin LB69A), small box for D3, small keyboard switch, interconnecting wire, sticky pads, relay (Maplin YX95D), solder, hardware, etc.

Capacitors

C1 220uF elect
 C2 100uF elect
 C3 2.2uF elect
 C4 2.2uF elect
 C5 47nF poly
 C6 1uF elect
 C7 100nF poly
 C8 100nF poly
 C9 1uF elect
 C10 47uF elect

- D1 1N4001 diode
 • D2 5mm Red LED
 • D3 5mm green flashing LED. (eg Maplin QY97F)

Aviation Airwaves

Brian Kendal takes a look at a form of 'CB in the air'

With only a limited number of channels available, the present-day breaker must feel somewhat jealous of the aviation industry which has been allocated wide bands of frequencies across the whole spectrum, ranging from the very low frequencies to microwaves.

This feeling must be heightened if, when tuning across many of these wavebands on a scanning receiver, just carrier waves or perhaps no signals at all are heard, giving rise to the impression that, despite the allocation, they are rarely, if ever, used.

Nothing could be further from the truth, for with the exception of the 5 GHz band, which is just coming into use for the new Microwave Landing System, almost all bands are used to capacity.

As an example of this, if an airport almost anywhere in Europe wishes to install a new Non Directional Beacon on the low frequency band, it is probable that it will have to wait several years before a frequency becomes available

for use.

For what purpose then is this plethora of frequencies used? In answering this question, perhaps the best place to start is at the very lowest end of the frequency spectrum where the long range navigational aids are located.

Very Low Frequencies

The very low frequencies used in aviation are dedicated to hyperbolic navigational aids. The basic principle of hyperbolic navigational aids is quite simple and can best be described by considering two radio stations, each of which transmits a short pulse of signal at exactly the same instant.

As radio waves travel at a finite speed, a receiver positioned between the stations will hear the nearer station first and the more distant station a short time later, the time interval depending on the relative ranges of the transmitting stations.

If a line were drawn on a map indicating all points where a constant time difference were received, this would form an hyperbola about the nearer station.

If the exercise were then repeated using another pair of transmitting stations, another line could be drawn and at the two points where the two lines crossed would indicate two possible positions for the receiver. If necessary, this ambiguity could be resolved by a third line from two further stations.

In practice, only four stations are necessary, comparisons being made between a "Master" station and each of three "Slaves".

Omega

The first navigational aid we shall consider is the Omega system which operates on frequencies between 10 and 14 kilohertz.

At these wavelengths, radio transmissions have an extremely long range and, therefore, only eight stations are required to achieve worldwide coverage.

In the Omega system, no particular station acts as "Master" but each station sends four bursts of signal, the first on 10.2kHz, the second on 13.6kHz, the third on 11.33kHz and the fourth on 11.05kHz. The length of each burst varies between 0.9 and 1.2 seconds, dependant on the station transmitting and the frequency being radiated. All transmissions are maintained within a common time frame by caesium frequency standards maintained at each station.

By comparing the relative time of arrival of the signals from each station, the computer associated with the user's receiver performs the necessary comparisons, calculating the user position and displaying the result as latitude and longitude.

This navigational aid is also used by mariners and, as signals of this frequency penetrate water to a considerable depth, submarines.

Decca Navigator

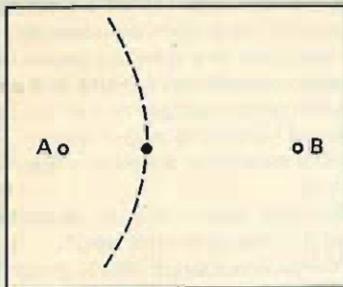
The second navigational aid on these wavelengths is the Decca Navigator system which was developed in the late WWII period.

The Decca system comprises a number of chains, each comprising four stations: a "Master" and three "slaves". The frequencies of the stations in a chain are synchronised to bear a specific relationship to each other. Thus the master station transmits at six times a common comparison frequency (of about 14kHz) while the slaves radiate at 5 times; 8 times and 9 times that frequency.

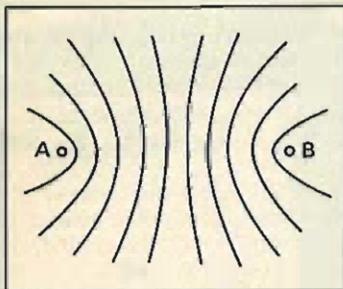
In the users' equipment, each of the signals is received simultaneously and each is frequency multiplied to the lowest common multiple, thus enabling a comparison of signal phase between the master and each of the slaves.

From these and a knowledge of the characteristics of the particular chain,

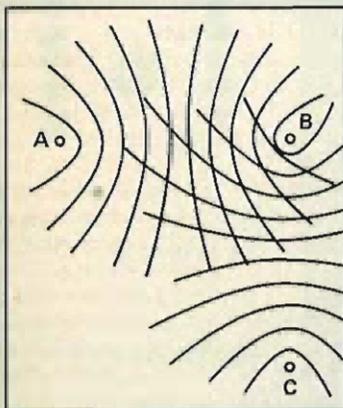




(a)



(b)

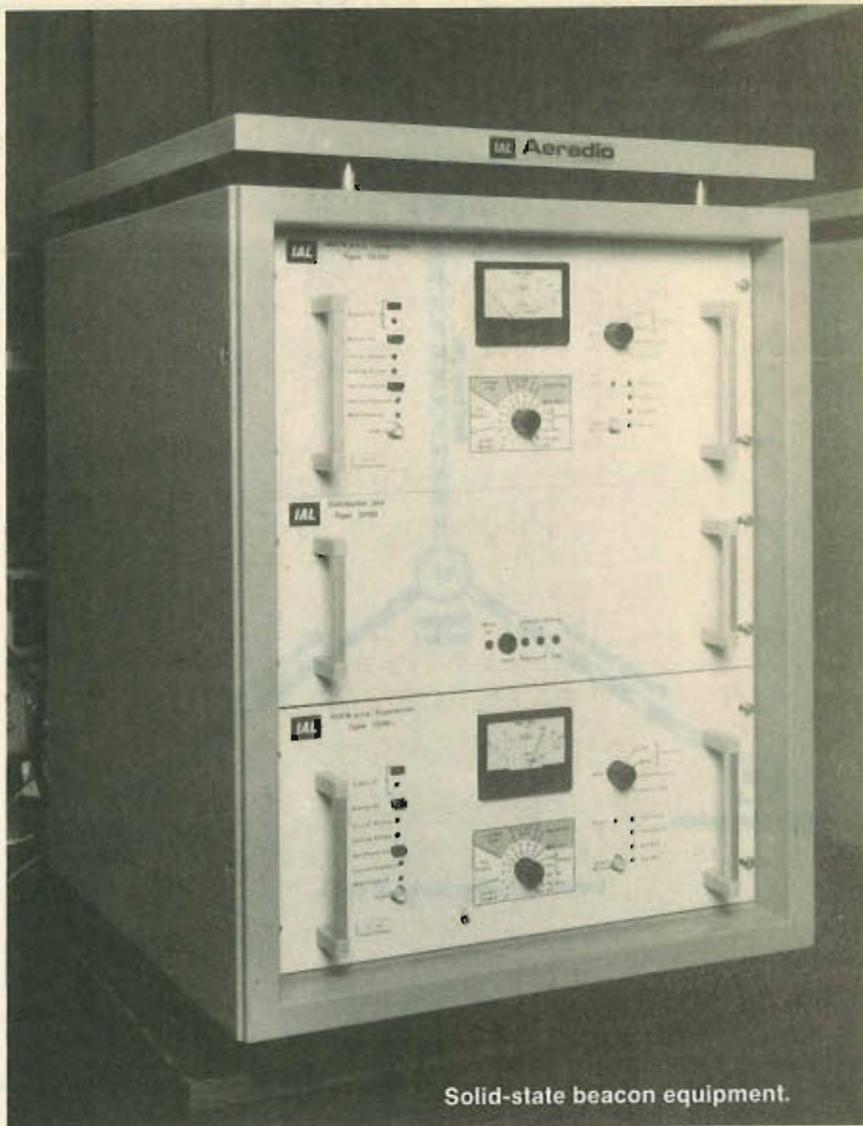


(c)

A. If stations A and B radiate simultaneously, a receiver nearer A will receive that station first and a line (dotted) can be drawn joining all points where the same time interval will be measured.

B. Similarly, a family of lines can be drawn for different times of arrival of the two signals.

C. If third station transmits, another family of lines can be drawn. By measuring the time difference for each pair of stations (ie A-B, B-C) the intersection of the two lines indicates the position of the receiver.



Solid-state beacon equipment.

the position of the user can be determined.

In the past, this task had to be performed manually, but modern technology permits a direct readout of latitude and longitude.

The range of each Decca chain is in the order of 250 to 300 miles.

Loran

The third aid operating on these frequencies is Loran C. In this aid, both master and slave stations operate on a common frequency of 100kHz. Under such circumstances, it would not be practical for all stations to transmit simultaneously so the Master station initiates the sequence by radiating a series of pulses, followed at brief intervals by each of the slaves in turn.

All necessary time comparisons are made within the receiving equipment and the user position is displayed directly in latitude and longitude. Although operating in the same waveband as Decca Navigator, the use of pulse techniques enables Loran to be usable up to ranges in the order of 1000 miles.

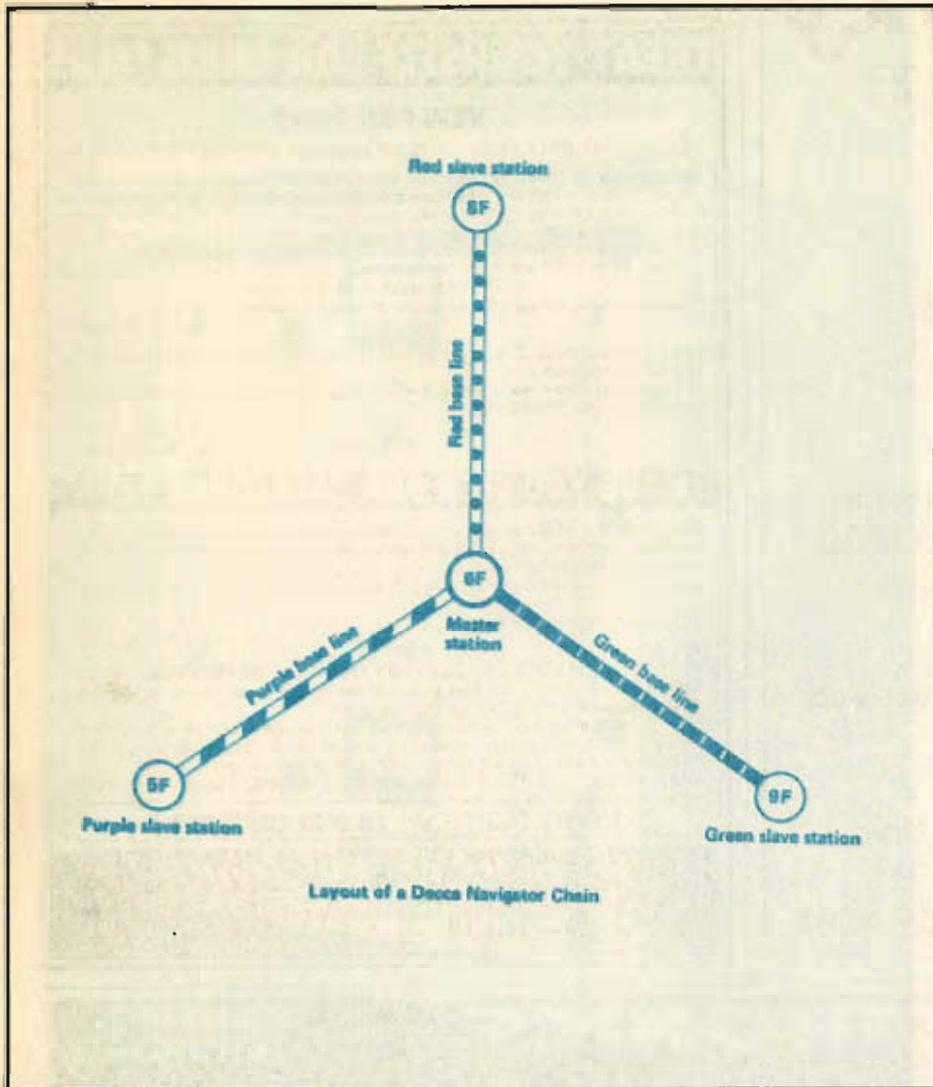
Non-Directional Beacons

The lowest frequency navigational aids which are likely to be heard by the average listener are the non-directional beacons which operate between 300 and 400kHz on the long waveband.

These are simple transmitters which radiate a carrier wave modulated by the facility callsign in morse code several times a minute. This usually comprises two or three letters which often bear some relationship to the location of the facility. For example, the Luton Airport beacon has the callsign LUT and the one at Cardiff is CDF.

In Europe, NDBs are normally used as airport locator beacons and as such only need a range of a few tens of miles, but in the third world they are frequently used to delineate airways and due to the long range necessary and high noise levels in the tropics, powers of several kilowatts may be used.

To receive NDBs, a direction finding receiver is used which enables the aircraft to "home" on the facility from where either guidance may be transferred to another aid, such as Instrument Landing System for a



landing, or another en-route aid for continuing the journey.

High Frequency Communications

Although it is preferable to use VHF for ground to air communications whenever possible, nevertheless, in some areas, such as across oceans, this is impossible and High Frequency communications have to be used.

For this purpose, frequencies are allocated around 3.0; 5.0; 8.8; 11.3; 13.3 and 18MHz, all using upper sideband SSB. Most transmitting stations have frequencies in a number of different bands available and the operational frequency is selected taking account of the conditions prevailing at the time.

When many aircraft are using the same channel, atmospheric noise and transmissions to and from other aircraft can be a considerable distraction to the flight crew. To obviate this, a system known as SELCAL is used. In this, each aircraft is allocated a sequence of tones known as the Selcal code. These are then transmitted before any communication directed to the aircraft. The SELCAL equipment mutes the aircraft receiver until the allocated tone

sequence is received. By this means, the flight crew are alerted to any transmissions directed to them but are not distracted by extraneous noise.

Also within these wavebands are a number of aeronautical meteorological (VOLMET) broadcasts which give up to the minute weather reports for a number of airports over a wide area. Of these, the most easily heard in the United Kingdom are Shannon Volmet transmitting on 3413; 5640; 8957 and 13264kHz, and the RAF Volmet on 4722kHz.

Over a period of days, the voices of several different operators may be recognised on the Shannon transmissions, but, in contrast, on the RAF transmissions (and also the UK Volmet on VHF) it is always the same voice which is heard.

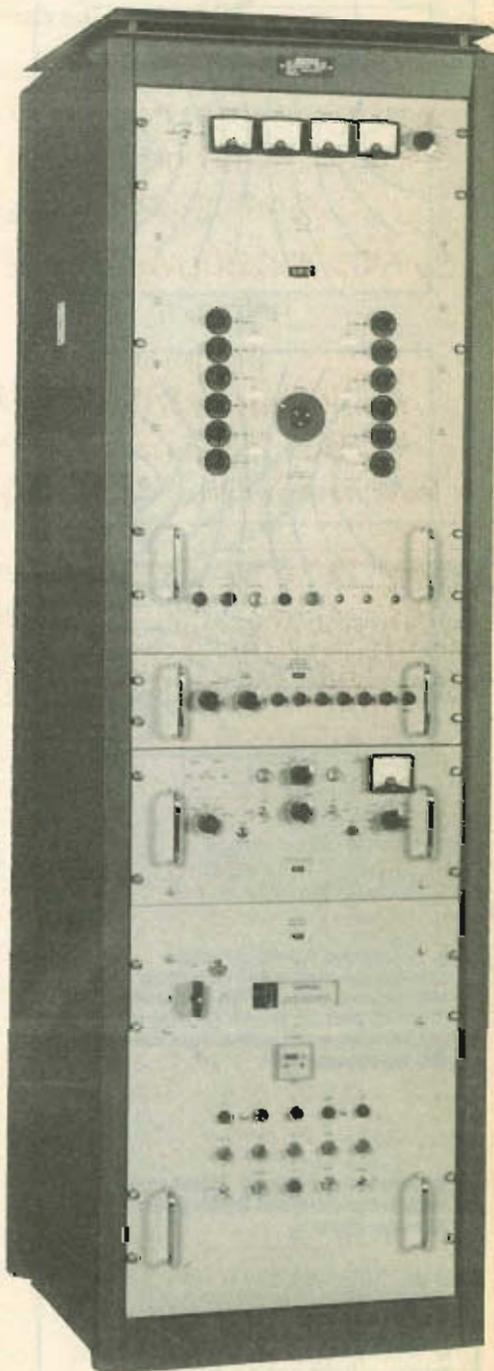
This is the voice of Major John West who recorded all the words required several years ago. These were digitally recorded and are held on floppy disk at each transmitting station.

All meteorological reports are circulated in a special meteorological code by teleprinter. At the transmitting station, the incoming signal is fed to a computer which decodes the signal and then extracts and sequences the

required words from the floppy disk. These are then held in the computer memory. At the appropriate time, the words are extracted from the memory and used to modulate the transmitter.

So fast does this system operate that it is quite common for the first part of the meteorological message to be broadcast before the end of the incoming teleprinter signal has been received.

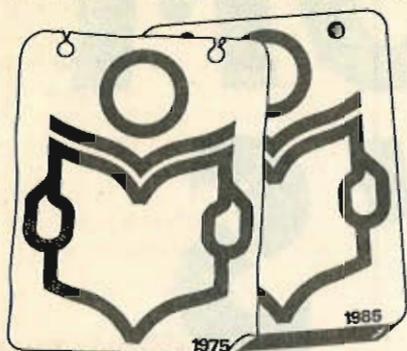
In the next issue, I shall be describing the uses of the VHF; UHF and microwave wavebands in civil aviation.



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TRANSISTORS	90244C	35	MRF237	3.36	2SC1306	1.21	2SK33	40	LA4460	1.47	NE567	52	FCC CONVERSION BOARDS	
AC128	29	BD245C	84	MRF238	13.84	2SC1312	09	2SK192	25	LA4461	1.47	NE565	1.37	FOR CB's on the old UK spec using the LC7137 synthesiser we can supply a conversion board to allow operation on both the sets of 40 channels. Technical help is available.
AC178	30	BD246C	78	MRF460	13.50	2SC1318	10	3N201	1.11	LA4500	1.65	NE566	1.23	
AC187/B	22	BD317	1.78	MRF460A	13.60	2SC1359	13	3K400	1.27	LB1405	2.24	PL02	6.70	
AD149	75	BD318	1.78	MRF454	22.94	2SC1384	23	3K448	2.71	SO42	2.50	RC4568	5.10	
AD161	40	BD507	65	MRF455	19.80	2SC1398	60	3K808	4.5	TA7061	78	TA7217	1.19	
AD162	40	BD508	87	TIP20C	26	2SC1413	3.50	3SK97	1.66	TA7120	58	TA7222	1.24	
AF124	42	BD529	54	TIP30C	29	2SC1674	15	40673	1.30	TA7130	46	TA7227	2.07	
AF127	33	BD530	49	TIP31C	28	2SC1675	13			TA7137	61	TA7240/1	1.98	
AF239	32	BD201	48	TIP32C	33	2SC1678	1.07	IC'S		TA7204	1.38	TA7270/1	1.86	
BC107	11	BD902	40	TIP33C	87	2SC1815	10	AN240		TA7205	96	TA7274	1.90	
BC108	07	BF115	36	TIP34C	67	2SC1909	91	AN6551	1.13	TA7208	1.40	TA7280	2.31	
BC109	13	BF173	26	TIP41C	27	2SC1923	13	AN7131	1.37	LC7120	2.75	TA7310	0.91	
BC114	09	BF180	12	TIP42C	27	2SC1942	1.98	AN7140	1.18	LC7130	3.26	TA7502	0.97	
BC141	26	BF184	32	TIP47	52	2SC1945	3.63	AN7178	2.47	LC7131	2.88	T8A810T	4.9	
BC142	19	BF185	24	TIP120	38	2SC1946	12.62	BA402	59	LC7132	2.89	TC9105	4.31	
BC147	11	BF194	11	2N3085	28	2SC1947	3.78	BA521	1.35	LC7137	3.15	TC9109	5.48	
BC170	11	BF195	06	2N3084	46	2SC1957	1.35	BA859	0.92	LM301	35	TD1010	1.10	
BC182/L	06	BF196	09	2N3055	42	2SC1969	1.58	CA3086	91	LM311N	50	TD1011	1.37	
BC183/L	07	BF197	15	2N3771	1.16	2SC1970	1.48	CA3089	2.45	LM317T	78	TD1020	1.99	
BC184/L	10	BF198	06	2N3772	1.31	2SC1971	2.82	CA3240	1.39	LM324	41	TD1510	3.18	
BC212/L	07	BF199	09	2N3773	1.40	2SC1972	8.25	HA1319	2.16	LM329	46	TD1512	2.12	
BC213/L	10	BF200	21	2N3849	3.6	2SC1973	5.6	HA1322	1.82	LM380N	1.32	TD1515	3.71	
BC214/L	08	BF244	38	2N3856	1.10	2SC2002	25	HA1338	2.31	LM383	3.50	TD1503	1.06	
BC238	06	BF245	09	2SA473	46	2SC2028	1.35	HA1339A	1.83	LM394	1.27	TD2002	63	
BC306	06	BF255	05	2SA504	10	2SC2029	1.12	HA1342A	3.80	LM386	1.15	TD2003	79	
BC327	06	BF256	31	2SA608	11	2SC2078	55	HA1366W/WR	1.72	LM387	2.10	TD2054	1.68	
BC328	11	BF259	25	2SA673	13	2SC2086	49	HA1368	2.64	LM3900N	7.8	TD2005	1.49	
BC348	05	BF324	22	2SA678	38	2SC2092	1.32	HA1368/R	1.63	M51102	1.85	TD2006	79	
BC349	05	BF327	28	2SA683	20	2SC2097	21.09	HA1374	2.11	M51513	1.85	TD2007	1.01	
BC350	05	BF422	13	2SA684	38	2SC2099	19.25	HA1377	1.73	M51514	1.12	TD2013	1.06	
BC355	27	BF425	23	2SA689	56	2SC2196	63	HA1386	2.77	M51516	2.22	TD2611A	86	
BC358	06	BF468	18	2SA733	13	2SC2236	26	HA1389	1.99	M51518	2.22	UC1028	98	
BC363	11	BF479	45	2SA966	28	2SC2290	23.61	HA1392	1.90	M51517	2.22	UC1032	73	
BC364	14	BF490A	60	2SA999	10	2SC2312	2.85	HA1394	2.72	M8372	1.26	UC1181/2	2.05	
BD124P	50	BF550	25	2SA1012	67	2SC2314	30	HA1397	2.55	M8374	2.05	UC1185	1.75	
BD131	38	BF551	34	2SA1013	08	2SC2320	10	HA1398	2.57	M83731	2.16	UC1186	71	
BD132	38	BF590	29	2SB825	25	2SC2395	16.20	HA1801	1.60	M83756	1.83	UC1230	1.49	
BD135	21	BF591	54	2SC390	69	2SC2339	10.79	LA1201	73	M86719	4.12	UC375	75	
BD136	23	BF592	69	2SC496	40	2SC2020	12.80	LA1233	1.27	MC1310	65	UP258	1.65	
BD137	23	BU205	74	2SC436	10	2SD234	46	LA4032	1.99	MC1350	1.41	UPD2816	5.34	
BD138	28	BU208A	89	2SC710	10	2SD235	68	LA4102	84	MC1723	30			
BD139	21	BU208B	103	2SC711	09	2SD235	68	LA4112	94	MC357	1.54	V REGS		
BD140	25	BU226A	99	2SC730	3.67	2SD313	41	LA4140	58	MC359	2.54	7805	27	
BD201	33	BU406	63	2SC828	10	2SD325	36	LA4201	1.15	MC13002	3.05	7808	34	
BD235	26	BU408B	1.29	2SC903	27	2SD330	46	LA4220	1.41	MC145106P	4.19	7812	27	
BD237	27	BU426A	89	2SC930	17	2SD360	4.26	LA4250	2.23	MM55108	3.00	7815	35	
BD238	31	BU508A	90	2SC945	08	2SD471	26	LA4400	2.59	NE545	2.38	7805	49	
BD241	34	BU508B	1.11	2SC1060	89	2SD937	79	LA4420	1.32	NE555	1.6	7808	49	
BD242	33	BU526	1.11	2SC1061	57	2SD980	36	LA4422	1.02	NE556	5.6	7812	49	
BD243C	34	BU536	1.40	2SC1095	71	2SK30	37	LA4445	1.35	NE565	1.01	7815	49	



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CUSTOM PCB'S

Printed circuit boards are a boon to the constructor. David Cox reveals a few secrets

Printed circuit boards offer a number of advantages to the constructor over the conventional stripboard. Projects designed to be built on PCBs are far easier to construct as there are much fewer wire links to be made upon the board. Many components can only be mounted on PCB's as their pin pitches are not compatible with the standard 0.1in stripboard matrix. Since a PCB only has holes drilled in it where components are laid, there is a much reduced risk of incorrect placement of components. The following article has been written so that would-be constructors can gain the advantages of PCB design.

Getting Started

The aspects that put many constructors off using PCB's is that they are more expensive and time-consuming to produce. It is true to say that many very simple circuits would not warrant the use of a PCB. However, for the more complex circuits, PCBs become increasingly attractive.

Producing a PCB is quite a simple ideal. Firstly, a "copper-clad" board is purchased and these are available in two main types and many sizes. Fibreglass boards are a little nicer to work with but are more expensive than the standard SRBP (powder) boards. Expect to pay about £1.00 for an 8in x 4in SRBP board and about £1.60 for a similar fibreglass board. As suggested by their name, these boards are covered completely on one or both sides by a thin layer of copper. Using one of two techniques detailed below, the copper is covered where the tracks must lie (ie where the electricity must flow). Next,

the board is dropped into a container of acid and, over a period of time, the uncovered copper is "etched" away. When all of the uncovered copper has been removed, the board is removed and cleaned to reveal the copper areas that were covered. Once drilled, the PCB is complete.

As mentioned above, there are two major ways of producing the markings for the PCB. One way is more suited to the home constructor whereas the other way is more suitable for people wishing to make small quantities of the same board layout. Both methods rely on similar principals, but their differences are detailed below.

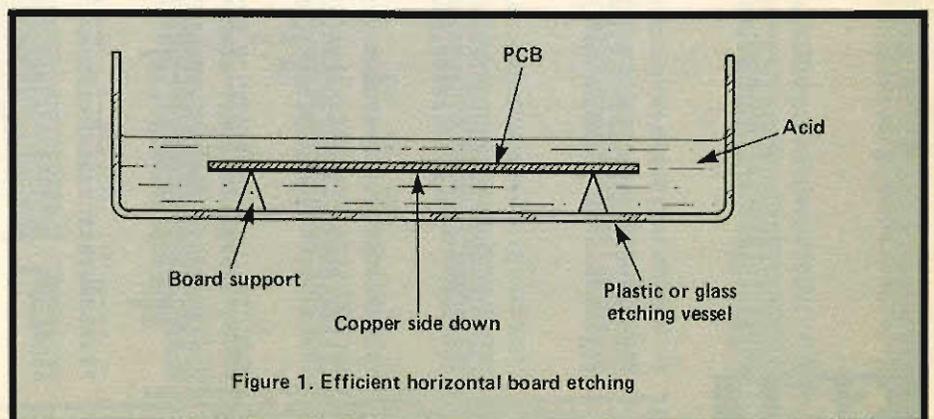
Method 1

The first method of marking the copper is to apply acid-resistant ink and transfers to the surface. Special pens can be bought which contain acid resistant ink but these are not usually as good as dry rub-down transfers. The transfers are more accurate than the pens and are a must when laying the pads for an IC. It is a good idea to buy a

comprehensive set of transfers as these will cater for 90% of your requirements. However, it is also wise to have a pen at the ready as sometimes the transfers crack as they are placed on the board. Any such gap would prevent electricity from flowing and so a pen is useful for filling in these cracks. Transfers are available as lines of many widths, ready aligned pads for DIL ICs and all sorts of commonly used layouts.

Before laying down the tracks, the copper surface of the board must be polished until it shines. When copper is left uncovered, it reacts with the oxygen in the air which produces a thin layer of oxide over the copper. The effect of this is that the transfers do not stick properly and, during etching, the acid is hindered when trying to reach the copper. This induces longer etching times. A quick polish with wire wool or a purpose-designed "polishing block" will remove all oxide and grease with minimal effort.

The tracks can then be laid as required. Use a HB or H-graded pencil to rub the transfers from their carrier. If mistakes are made at this stage



transfers can be removed by placing a piece of sticky tape over them and pulling it away. The ink can be removed with the polishing block. Once the track laying is complete, a thorough check must be made as mistakes are difficult to correct post etching. Placing a piece of tracing paper over the board and rubbing it with the butt end of the pencil will increase the bond between the transfers and the copper. The board is now ready for etching.

Method 2

As with method 1, the objective is once more to make an acid-resistant covering over the copper. However, with this method, some photographic techniques are involved. Instead of making the layout actually on the copper, the layout for this method is produced on a piece of acetate (or any other transparent material). Transfers and ink are still used but as they don't come into contact with the acid, they do not have to be acid-resistant. They do though, have to be opaque.

For this way of PCB production, modified copper-clad boards are used. The special boards have an ultraviolet, light-sensitive coating over the copper. To produce a board, the protective paper on the UV-sensitive board is removed and the pre-prepared artwork is placed over the board. The combination is then placed in a light box which contains ultraviolet, light-emitting tubes. After a short time, the board and artwork are removed and separated. The PCB is then placed in a developing solution (Caustic soda). This has the effect of removing all of the exposed UV-sensitive coating. What remains on the board is an acid-resistant print which is an exact replica of the original artwork. The board is then etched as above before being ready for use.

Which Method?

Using the second method is more expensive since a light box would have to be bought. These range from a unit that costs about £50 and takes 10 minutes to mark the board, to a unit that might take about 30 seconds and costs over £230! The main advantage of this method is that it uses separate artwork and so the artwork can be used again to make an exact copy of the first board. As the etch-resist pattern is laid directly on the board with the first method, the pattern would have to be redrawn for any extra boards.

Another advantage is that if a mistake is made on the PCB, only part of the original artwork needs to be altered as opposed to redrawing the whole board. For constructors of magazine articles, a professional photographer should be able to produce ready-to-use artwork directly from a PCB pattern printed on a magazine page.

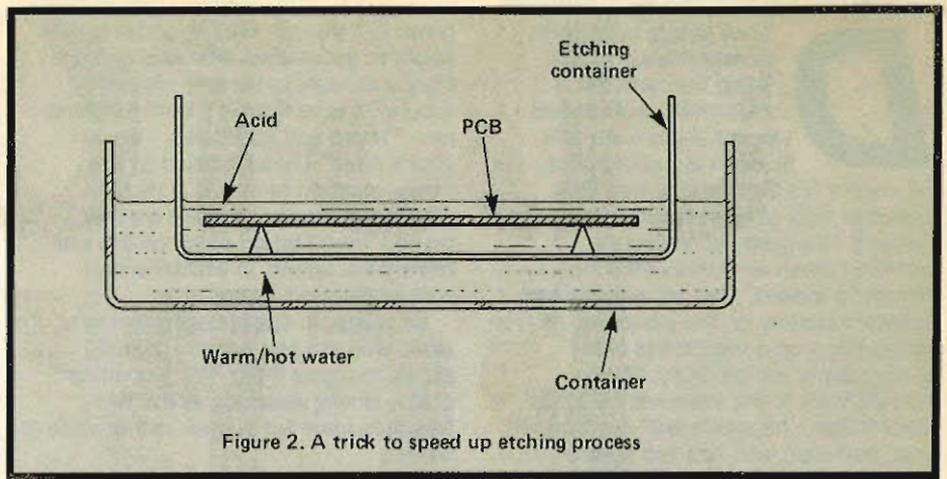


Figure 2. A trick to speed up etching process

Acids

The acid that is used to etch PCBs is called ferric chloride and is available from many component suppliers. The acid comes in one of two forms; either as crystals to be dissolved in water, or as a ready-mixed solution. This acid is strong and so great care should be taken when using it. Wear an apron and plastic gloves. If the solution does get on your hands, wash it off as soon as possible. If it gets into your eyes, wash with plenty of water and go straight to your nearest casualty unit. As long as common sense is exercised, there is no reason to fear the chemical.

If you are required to dilute the solution, always add the acid to water and *not* the other way around. Store the acid in a plastic or glass container with a plastic top (the acid will burn its way through a metal top!). It should go without saying that the bottle should be clearly marked "DANGER - ACID."

Etching

In order to etch a board, a suitable sized plastic or glass etching vessel must be found. As long as the acid comes into contact with the copper, the board will etch. However, with a little consideration, the time that it takes a board to etch can be reduced by half.

The container in which the board is etched has a lot to do with the efficiency of the etching process. If a tray-like container is used and the board is placed lying down, copper side up and submerged in the acid, then it will take a long time to etch. This is because, as particles of copper are etched away, they fall back onto the board, thus preventing fresh acid from reaching the copper surface.

A much better way is outlined in figure 1 where the board is placed upside down in the tray. Now as the copper is etched, the removed particles will drop to the bottom of the container. Note that acid will not be able to get at the copper surface where it is touched by the supports, so these will have to be moved

from time to time. The best way of etching a board is to use a tall container which allows the board to stand up on end. This way, the copper surface can be seen and the time when the etching is complete can be identified. If only the first etching situation is acceptable, then etching times can be increased by rocking the acid.

Another way of increasing etching times is to warm the acid. It would be very dangerous to directly heat the acid. Therefore, figure 2 shows a preferable approach whereby the container of acid floats in a container of hot water.

Etching is complete when all of the visible copper is removed. The time it takes for a board to etch is variable, but it should be between 20 minutes and 1 hour. It is not necessary to dispose of the acid after the etching of one board as the acid can be used many times over. The board should, of course, be cleaned before use. All of the transfers and ink must be removed and they will reveal shiny copper tracks underneath them.

Inspection and Drilling

It is important to check the board for any hairline cracks that might have been produced in the etching process. A magnifying glass makes this task a lot easier. If any cracks are found, running the soldering iron over them will bridge the gap with solder.

Drilling is the fun part! Three sizes of drill bit are used for common components. 1mm ($1/25$ in) drill bits are used for most component wires, 1.2mm ($1/21$ in) for preset leads and off board wires and 0.8mm ($1/31$ in) for IC leads. Needless to say, a small drill is needed to accurately use these drill sizes. Don't put these bits into your Black and Decker - it won't leave them in one piece! Special electric PCB drills can be bought for less than £20 or miniature hand-drills for about £5.

Once drilling is complete, the PCB is ready for use. Make sure that the board has little dust on it as dust will make soldering more difficult.

Danny strode confidently across the workshop, hung his overcoat in the closet, and headed for the kitchen utensils to make a cup of coffee.

He always felt that nobody was their best until after at least five coffees in the morning. He quietly surveyed the sparkling clean workshop, thinking how different it looked. After all, with his new assistant starting on the job today, he had to tidy it up a little; it had been getting rather messy lately. Danny thought back to the interview he'd had with Ritchie – he was a well-dressed, neat, polite lad who had just finished high school. He'd shown Danny that although he may not know everything there was to know about radio and electronics, he had experience with radio equipment, rather than just theory, and he certainly had a desire to learn more. Yes, he'd make a fine assistant.

Danny's thoughts were interrupted by the sound of the workshop door opening. It was Ritchie.

"Hi!" he said, as he energetically burst through the door.

"Well, hi to you too Ritchie," replied Danny with a smile. "All set for making all those radios work?" Danny looked across in the direction of the 'For Repair' rack.

"You bet! Thanks again for giving me the job Danny, I really appreciate the chance."

"You're welcome. After all, we can't have someone who understands radios wasting their time working in some fast-food place can we?" Ritchie grinned; he had spent five weeks in the summer at Joe's Joint, the local teenage heaven, serving hamburgers and drinks all day. "Want a cup?" asked Danny, holding up a coffee jar.

"Please. Just so long as it's better than Joe's!"

"Ouch," grinned back Danny. If it isn't I'll give up trying to make it!" So saying, he poured the drinks and they both walked across to the bench and pulled up a couple of swivel chairs. Danny showed Ritchie the service dockets they used, and how they should be filled in. He'd already shown him around most of

the workshop that weekend when he'd given him the job. Ritchie certainly was eager to get started, that was for sure, Danny thought to himself. He turned around to face Ritchie's bench behind him. "There you go Ritchie – it's all your's now!" The pair stood by the newly-cleaned bench. In a mock ceremony, Danny unveiled a small printed circuit board stuck on the wall behind the bench, in which he had etched Ritchie's name.

So started a successful morning's work, with the pair happily opening radios to repair them. The workshop chaos slowly returned, as the two benches returned to their former state of clutter.

A long period of silence was broken by Ritchie as he carried a battered rig to his bench from the rack.

"Hey, Danny!"

"Uh," came a preoccupied voice from across the room.

"Someone's gone and joined an extension to the power cord on this radio and got the red and black crossed!" Danny released the test probe he was holding with a satisfied feeling, as he had just located the fault that had been eluding him for the last half hour.

"Oh, that's nothing new," he replied.

"If had a penny for every time someone does something silly like that, I'd be extremely rich. Come to think of it, I do get paid every time someone brings in a set like that! It seems as if some people really like to make things difficult for themselves. Are those joints soldered or just twisted together?" Ritchie carefully unpeeled the tape around the join and the extension fell to the floor. "Thought so. I bet you a dollar that the fault with that set is that the owner forgot the wires were the wrong way round and connected it up backwards. What value fuse is in-line?" There was a moment's pause as Ritchie opened the fuse holder.

"Would you believe 10 amps?" he replied.

"I would indeed. I'd check the protection diode across the input; it's probably shorted."

"How the heck do you know that? I haven't even got the cover off the set and you're telling me what's wrong with

it!"

"I've just seen it so many times," replied Danny, grinning. "The diode is supposed to blow a two or three amp fuse if the owner carelessly connects the power the wrong way round. The diodes used by the manufacturer are often rated at only *one* amp, so they're not exactly working well within their limits. With a 10 amp fuse in-line, it's a pretty safe bet that the diode will short out completely before the fuse blows. If the owner is lucky, that's all that happens."

"You mean it can do more?"

"Well, yes. If the diode burns-out open instead of shorted then reverse polarity power gets through to the rest of the set."

"Why don't they make them with higher rated diodes then?"

"Good question Ritchie. You've been using electronics purely as a hobby, just like me. To us it makes very little difference in cost to use a three or five-amp diode instead of a one-amp type. We're using maybe two or three at a time. These guys buy diodes by the thousand. If they spend a penny more on each diode, it works out as ten dollars per thousand. That's ten thousand dollars per million diodes!" Ritchie sat pondering over this piece of information.

"I'd never quite thought of it like that before," he said eventually.

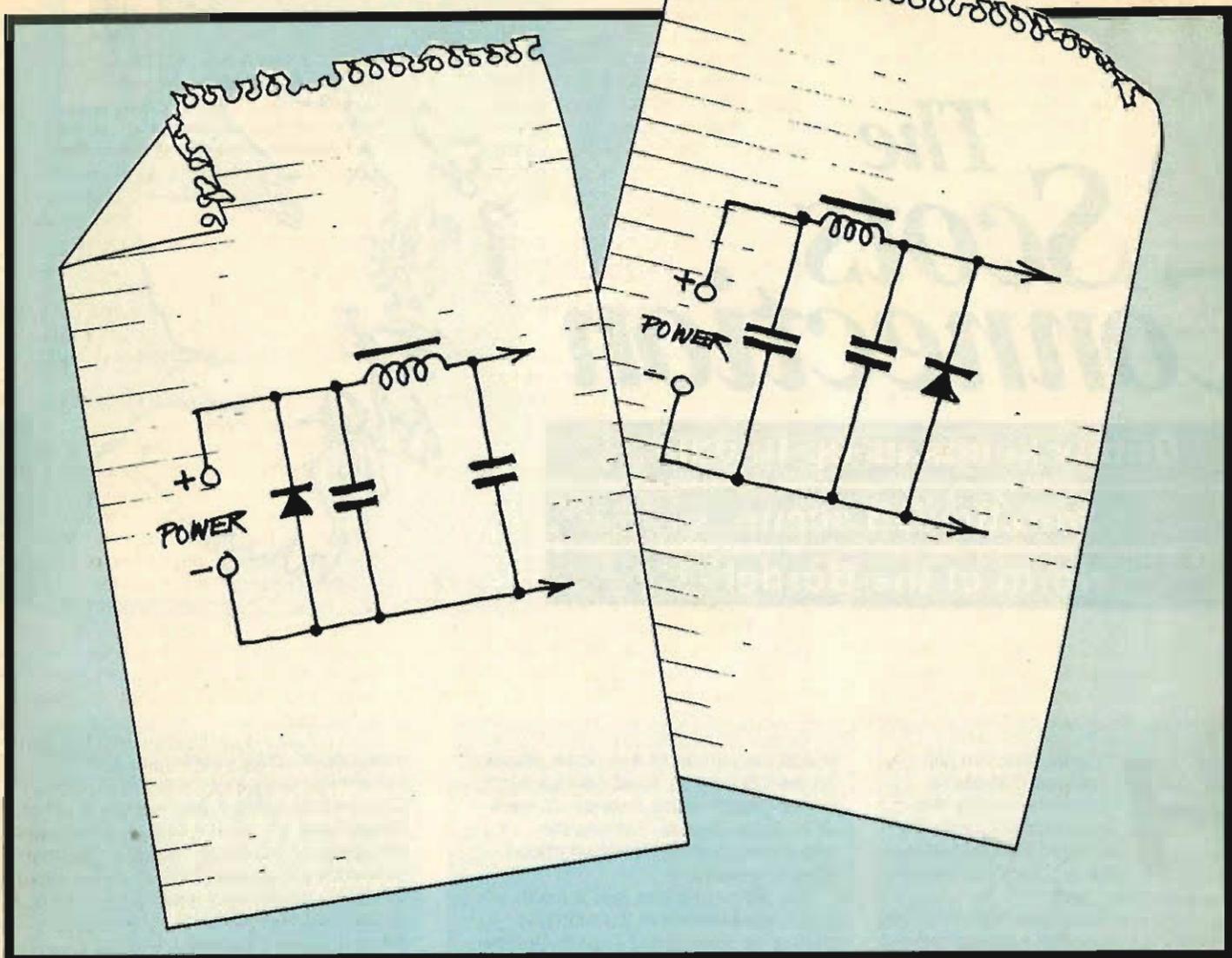
"Don't forget too, that the protection diode does absolutely nothing most of the time. It's only useful when the owner makes a silly wiring mistake. Like that set you have there. As far as the maker is concerned, that diode adds nothing to the radio for the majority of people. If you replace the diode, put in a three-amp type. Someone who wires up extensions like that should find that extra couple of cents now makes a big saving on repair bills in the future!"

Ritchie sat himself at his bench, and Danny returned to the radio open in front of him. Both worked at their respective tasks for a few minutes, the silence only being broken by the odd clatter of a soldering-iron, or voices from the transceiver Danny had left to run on a "soak test" earlier.

"Done!" proclaimed Ritchie, as the

This month we start taking a peek at what goes on inside a CB workshop on the test bench. Join us as we see Danny, the main technician affiliated to the store in town, getting ready for work on a Monday morning

CB BENCH



radio on his bench burst into life.

"Good," replied Danny. "One dollar I think?"

"Huh?"

"The bet? I was only joking!"

"Oh, right. Hey Danny, earlier you mentioned that sometimes the radio needs more than just a new diode. How come?"

"Well, we said that if the diode goes open circuit, then reverse polarity will reach the other components in the set, but sometimes when the diode shorts out it can damage other parts too."

"Such as?"

"Such as the input filter components."

Danny beckoned his assistant toward him. Ritchie, eager to pick up some more information about radios, hastily swung his chair round to Danny's bench. Danny had ripped a sheet of paper from his notepad and made a quick drawing (fig 1). "This is a standard sort of circuit you'll find on the input of many rigs, okay?"

"Yep. The choke and capacitors are to remove RF interference from the supply, yes?"

"Correct," stated Danny. "Now what happens when the power is connected the wrong way round?"

"The diode puts a direct short across the input and blows the fuse." He paused a second. "If one's fitted, that is!"

"You're catching on quick! Now, let's take another circuit." Danny turned the page over and quickly sketched another schematic (fig 2). "What happens now?"

"Well," replied Ritchie thoughtfully, examining the drawing. "The short-circuit will flow through the choke. So if there is no protection by a fuse the current should be enough to damage the choke."

"That's it!" said Danny, happy that his new assistant was picking things up so quickly. "Normally of course, the fuse would blow before anything too drastic happens. Even without a fuse many power supplies will limit the current to a value that is safe as far as the choke is concerned. With a high-current power supply, or a car battery there could be enough current flowing to burn out that choke. Another point to watch is where the diode is actually fitted. Sometimes it's soldered straight across the back of the power connector. If it's on the PC board, you may find that the copper tracks have overheated and burned-out!"

"That bad?"

"That bad. There's one guy comes here with a camper. He wired his Uniden the wrong way round about a year ago: burnt out the diode and the PC foil. I fixed it for him and he comes back occasionally for more work on his rig. You can still smell the burnt circuitry when you lift the bottom off the set!"

"Phew! I bet he hasn't done it since!"

"I gave him the standard talk about feeding radios through fuses. And I fitted a 3-amp protection diode in case.

Incidentally, I put the new diode on the back of the power connector instead of on the board. You can't always do it that way, but if it's at all possible, it's not a bad idea." Danny turned to the rack on a shelf over his bench, and presented his assistant with a 1N5400 diode. In doing so he noticed the clock was creeping towards twelve thirty. "You'd better fit this after lunch. Fancy going to Joe's for old time's sake? I'm buying."

"Hey, thanks, Danny. You know what?"

"What?"

"I think I'm going to like working here!"

So saying, the pair headed for the door discussing how Joe's hamburgers could use protection diodes!

The Scots Connection

Bunny keeps us up to date

with the CB scene

North of the Border



Hi everyone, I've just realised that you're probably reading this round about Christmas so may I start by wishing you 'A Happy Christmas and a guid New Year.'

I've just received a lima lima from CB for the Blind (Scotland), advising me of a change in a committee. Bookwork is now Chairman and Brian Dick Jnr is secretary. The club would like to say 'Thanks' to all who donated CB equipment during the recent TV appeal, but would like to remind CBers that legal equipment is needed all the year round, not just on special occasions. The equipment must be working or in a repairable state. Want to get in touch? Drop a line to: PO Box 8, Falkirk, Lanarkshire.

Regarding Neighbourhood Watch, Methuslah from Kilmarnock, Ayrshire, had a meeting with representatives from the Kilmarnock & Loudon District Council, with a view to having a responsible person monitoring channel 09 on CB radio, in connection with the Neighbourhood Watch Scheme. A suitable location has been viewed by both parties and a final decision will be given at the next council meeting. Permission has already been granted to set up a network, which will allow senior citizens to use CB radio equipment under one licence. The main stipulation

is that the person whose name appears on the CB licence, must contact each senior citizen on the network, at least once a day, thereby fulfilling the requirements of the Neighbourhood Watch Scheme.

The Solway Pirates held a most successful Eyeball at Southernness during the weekend of 7th-9th October '88. It was well attended with all the hired caravans and chalets being booked up well in advance. Representatives from NATCOLCIBAR attended as did countless members from clubs, both north and south of the border. The trade was not forgotten, as there were 12 trade stands represented. Everyone seemed to have a good fling and promised to return next year. Please book now, for '89. A SAE to the secretary, PO Box 15, Kirkcudbright, DG6 4DH, Scotland, should bring a reply. Just to keep you from wondering, here are some of the prizewinners from the weekend: Whisky Lass from the Girvan Breakers. Can any CBER beat her record? She was awarded the title of Glamorous Gran in April '88, and was chosen (by an Englishman) as Eyeball Queen in October '88. Two titles within six months! DX Competition Scottish members; Apache - most common copies; Sunray - most copies north of Glasgow and south of Carlisle; Super Six - furthestmost copy to Namibia in in SW Africa. Cumbrian members; Oracle -

most copies, most overseas copies and furthestmost copy to Vancouver in Haiti. Club awards of Merit were given to Seagull and KK while a special award was given to Warhorse for being an outstanding treasurer from '85-'88. Special trophies were awarded to Shutterbug, Rambler and Quickfire, members of the Sunrisers Club in Somerset. The trophies from Tartan Lad and Tartan Lass were given in appreciation of services rendered during their week-long modulation held near the Solway Firth. Many superb copies and many friends. Roll on next year, till we copy you again.

Got your booking in for Auchenlarie '89? Better get a move on. It will be held again at the Holiday Park (remember a torch and warm winter woolies!) around the last weekend in April. Caravans for hire, or bring your own tourer. SAE to Cree Valley Breakers, PO Box 1, Wigtown, DG8 9HA, Scotland.

A final word from Esk Valley CB Club in Bonnyrigg: "We handed over £271 from our sponsored modulation, walk and swim, to the Highbank Old People's Home. They also sent a donation of £12 from a CB meeting to the Telethon Appeal. Well done.

Please keep sending in those letters, 'cos without them, I cannot write about CB in Scotland. The address is: PO Box 337, Neilston, Glasgow G78 3JP.

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DATA SHEET

PLL02A

Paul Coxwell introduces the first of a series of handy data sheets

The PLL02A phase-locked loop IC was one of the most popular for CB transceivers, before many countries prevented its use in new designs due to the ease with which radios could be illegally expanded. It will be found in many Cybernet chassis, from the humblest 40-channel AM rig to the 120-channel (or more) multimode export sets.

An external oscillator is required to provide the 10.240MHz reference signal and this can be divided by 2048 or 1024 within the chip itself to give a 5 or 10kHz reference respectively. This option is selected by the voltage applied to pin 4. Programming is straight 9-bit binary, allowing a maximum code of 511, giving a maximum loop input frequency of 2.555 or 5.110MHz, depending on the 5/10kHz option. This chip therefore requires a downmixer from the transceiver's VCO, as it cannot handle higher frequencies directly as many later PLL devices can. The programming pins are internally pulled to ground and thus require a positive voltage to set a binary 1. This is a "no frills" device, with only a phase detector and lock-detect output. The latter signal (pin 6) goes low to indicate an out-of-lock condition and may be used to remove bias from transmitter stages etc.

Three of the most common configurations for this chip are:

1. The early AM chassis. The VCO runs at 10.695MHz above the carrier frequency for the required channel, therefore allowing direct injection to the first mixer on the receiver. A separate 10.695MHz crystal oscillator provides a suitable mixing signal for transmission. A further crystal oscillator downmixes the 37MHz VCO to a frequency more suitable for the PLL to handle. With a frequency of 35.42MHz the downmix signal becomes 2.24MHz on channel 1 through to 2.68MHz on channel 40. N-codes for the PLL are therefore in the range 224 to 268.

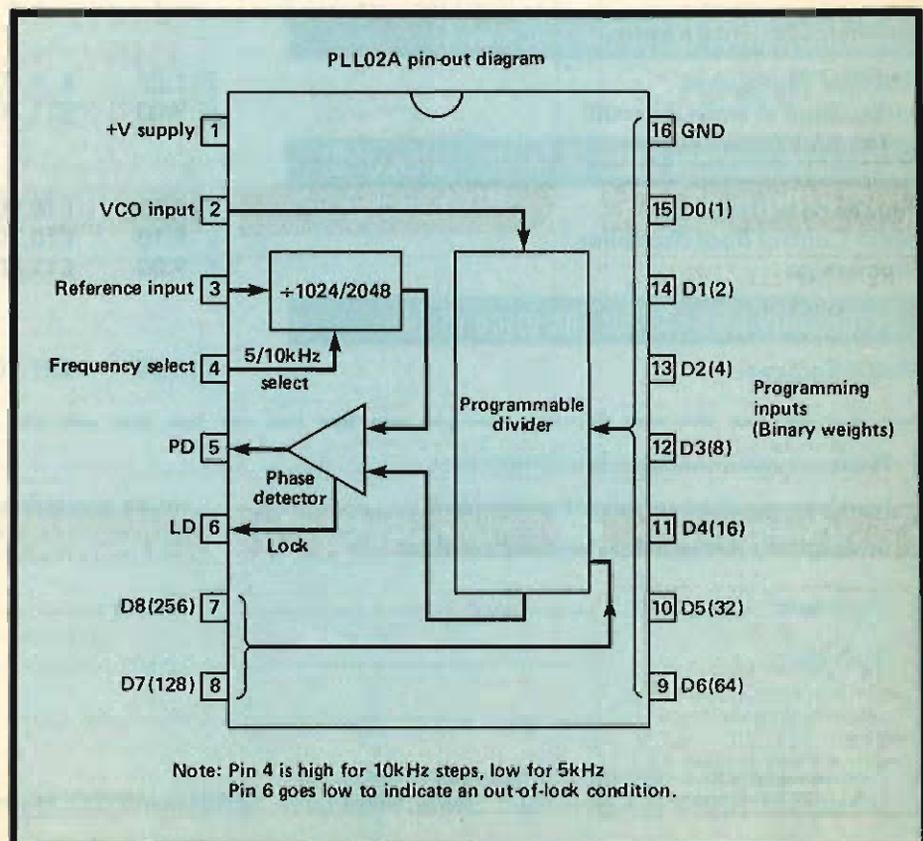
2. The later AM chassis. The VCO runs 10.695MHz below the required carrier frequency, once again allowing direct injection to the receiver (this time on the low-side). The 10.240MHz reference signal is also fed through a doubler,

resulting in 20.480MHz. Mixed with the VCO output this gives 37MHz for transmit (mixed with 10.695MHz from a separate oscillator as before) and a signal around 2 to 3MHz for the PLL input. N-codes range from 330 on channel 1 down to 286 on channel 40. Note that the highest code gives the lowest frequency in this case, due to the different mixing scheme used. Many foreign transceivers employ a separate PC board carrying another crystal oscillator to replace the 20.480MHz signal, thus allowing operation on 80 or more channels. A 20.705MHz signal for example results in a band of 40 channels starting at 27.415MHz.

3. The SSB chassis. The same basic principle is used for both standard 40-channel SSB rigs and the "export" types. The VCO runs 10.695MHz below the required channel frequency and a loop mixing signal in the 20MHz range is employed, just as with the late AM chassis. The minor differences between

this and the chassis described previously are the slightly different loop oscillator frequencies and the variation in N-codes. The loop oscillator is 20.105MHz for "regular" radios, used in conjunction with N-codes of 255 down to 211. The clarifier and shift circuits slide the frequency of the loop oscillator a little to achieve the required shift in final frequency. Multiband radios may switch bands by changing the loop frequency, changing the binary programming, or a combination of both. There are also a few sets designed to have bands of 50, rather than 40, channels and the crystal frequencies are therefore found to be different.

All chassis share a band switch that skips the "black hole" channels between 3/4, 7/8, 11/12 etc. The 50-channel radios mentioned above often have all channels running in consecutive 10kHz steps, so the binary codes from these channel switches go up (or down) in ones all the way.



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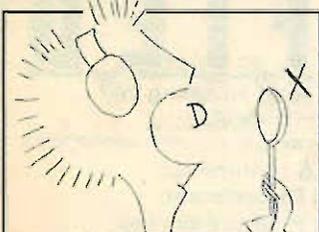
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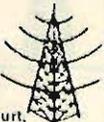
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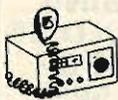
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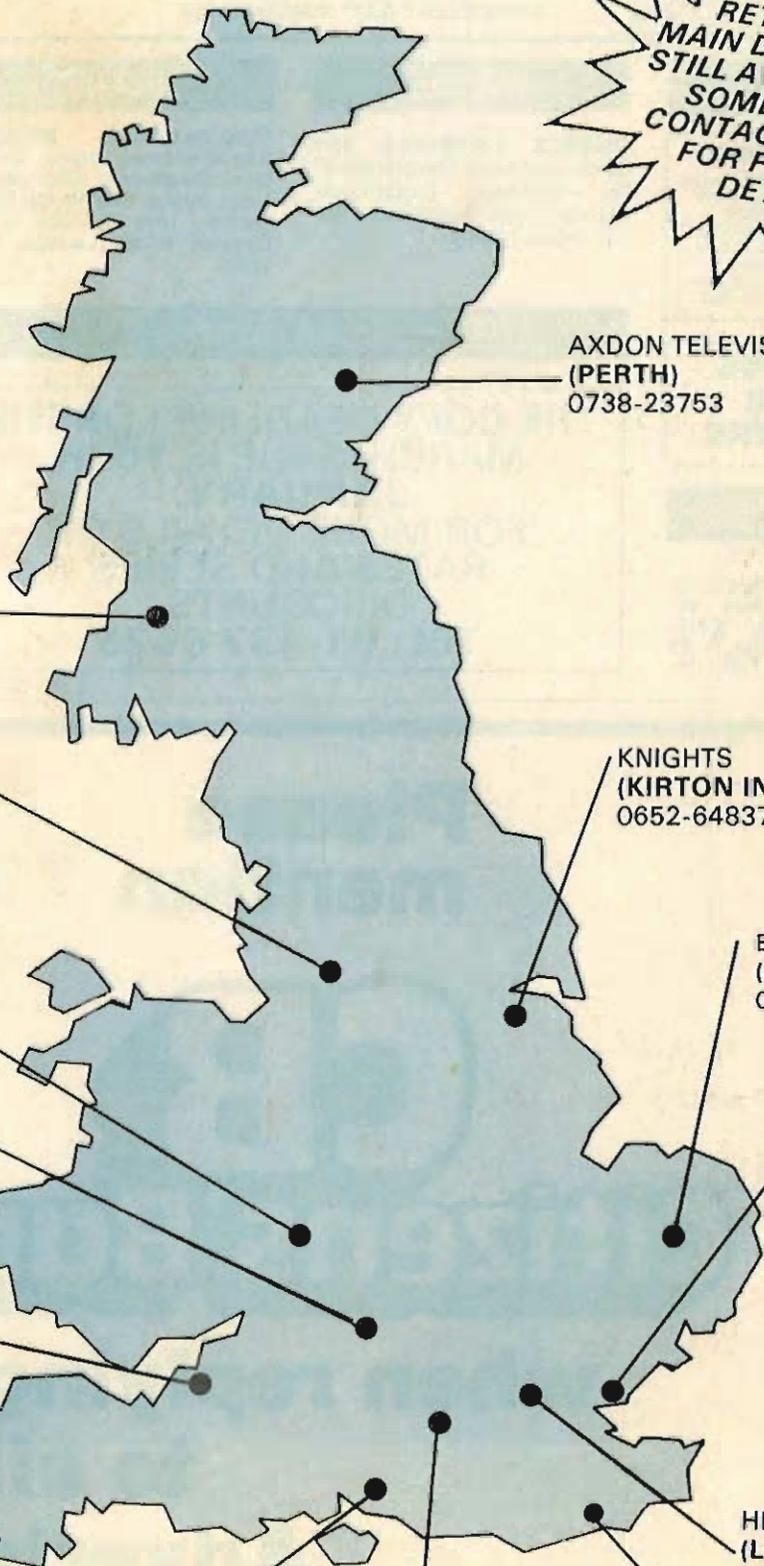
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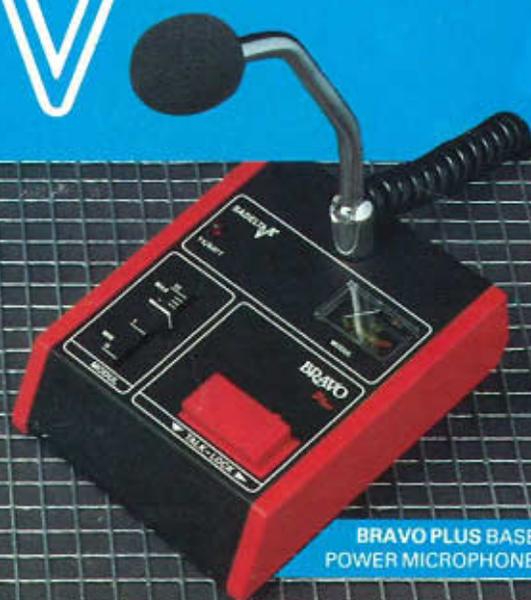
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