

CB Citizens' Band

AN ARGUS SPECIALIST PUBLICATION

AUGUST 1981

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reviewed



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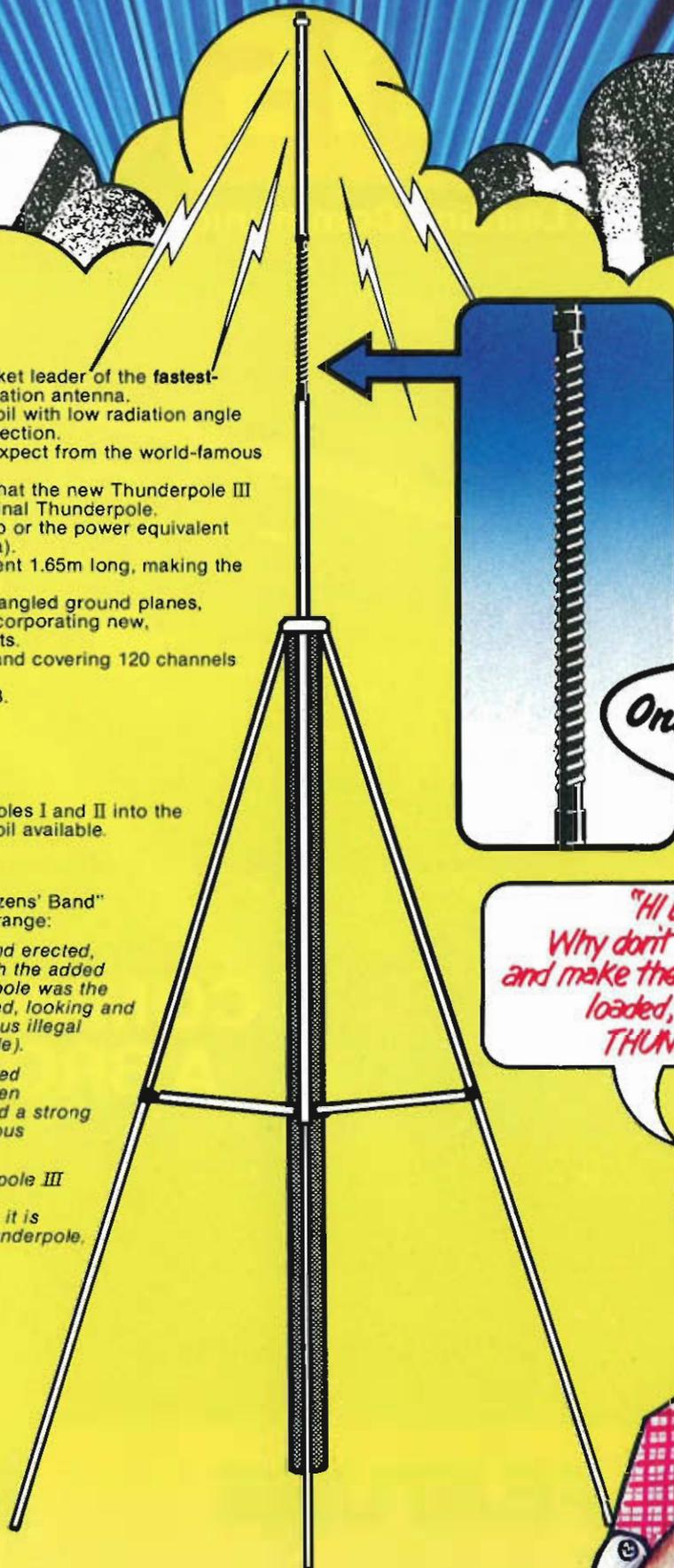
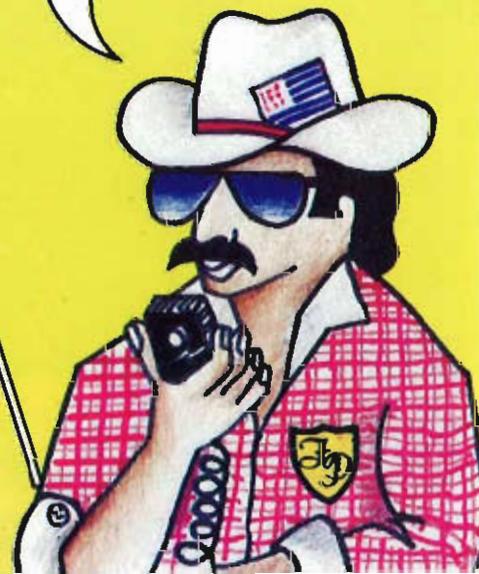
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CB Citizens' Band

Contents

AUGUST 1985 VOLUME 5 NUMBER 9



Inside this month

A look at a prototype speech clarifier, the new Uniace 934 rig — and lots more.

Editor Eamonn Percival
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Normally published on the third Friday of the month preceding cover date.

Citizens' Band Magazine A.S.P. Ltd., 1, Golden Square, London W1R 3AB. Telephone 01-437 0626. Typesetting and origination by Characters (Reading) Ltd., Reading, Berkshire. Printed by Simpson Drewett and Co. Ltd., 70 Sheen Road, Richmond Surrey. Distribution by Argus Press Sales and Distribution Ltd., 12-18 Paul Street, London EC2A 4JS.

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Update	6
So what's new?	
Back Chat	8
Views and opinions	
Rig Review	14
The Uniace 400	
Mack Chat	11
The thoughts of Chairman Mack	
Antenna Review	26
The Gemec Delta	
QSL	19
Cards for collectors	
Communications — A Broader View	28
What goes where and why	
UHF CB Antennas	22
Aerials for 934MHz	
Equipment Review	18
New speech clarifier	
Lady Breakers	13
An official visit for Filly	
Atomic Rabbit and the Talking Toaster	32
The pros and cons of CB	
Club News	34
New clubs and old	
Reader Services	39
Back numbers, subscriptions etc	
Reference Section	40
Buyers' Guide to CB	

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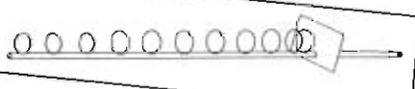
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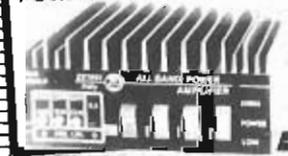
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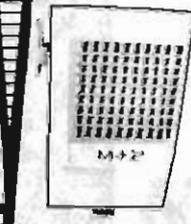
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UPDATE

NEWS FROM THE WORLD OF CB
NEWS FROM THE WORLD OF CB
NEWS FROM THE WORLD OF CB

Editorial

Elsewhere in this section, you'll see an item about us losing an old and valued contributor; the one and only Grey Beard. His column was very popular and he spoke for the many disabled breakers throughout the country. Therefore, we would love to hear from anyone who thinks they could contribute a similar column on a regular basis. If you fancy "having a crack", drop me a line and we'll see what happens.

On a similar note, we'd like to hear more about what's going on in CB around the country. From time to time, readers send us newspaper clippings of CB-related news items. We welcome these, as not everything gets into the national newspapers — I

don't suppose they have room, what with page three girls, bingo and the latest exploits of Wham! Ideally, we could set up a network of regular contacts so we could *all* keep in touch with what's going on. By this, I mean newsy items not just free publicity for your club — that's what Club News is for. Again, if you have any thoughts or ideas on this, drop me a line and we'll try to organise it.

Elsewhere in this issue, Trevor Butler takes a look at the whole communications spectrum to see what's where, and we get a chance to have a look at the long-awaited Uniface 934. That's yer lot for this month, I'm off to get back on the sun-bed!

Eamonn Percival

All Change

Further to my comments last month about CB organisations and breakaway groups, it appears some personnel changes in the various camps have taken place and this has led to a fair bit of confusion. The following is the state of play at the moment.

Changes have been taking place in the hierarchy of Natcolcibar, one of the main national bodies representing citizens' band radio. Steve Donohue and Roy Williams have left the organisation and their places have been taken by David Harding as administration secretary and Dave Bird as public relations officer. Mike Currie has had to give up his post as chief co-ordinator, due to pressure of business, and his place has been taken by Colin White.

More confusion has arisen regarding the Monitoring Service Great Britain. There are, in fact, two separate MSGB groups. One is the Monitoring Service Great Britain, run by George Marks, George Hattley and David Bedword. The other is the Monitoring Service Great Britain *Limited*, run by Roy Williams.

Farewell to The Grey Beard

It is with great sadness that we have to report that, due to health reasons, The Grey Beard will not be able to continue his monthly column. Chris Moore (Grey Beard's personal) has suffered from ill health for some time now, and his doctor has told him he must discontinue his column and take it easy. This, we hasten to add, is a decision Chris made reluctantly. He wishes to pass on his best wishes to the many friends he has made and hopes to perhaps write some occasional pieces for us in the future. From all of us here, we would like to thank Chris for his sterling work in the past



and wish him the best for the future.

Bighearted breakers

Active Line Communications (UK) Operations Scotland West are doing well in their aims to provide rigs to the blind, handicapped, disabled and housebound.

In one year of operation, we hear they have installed no less than 60 units in their region. They attribute their success to the hard working Active Teams in their districts. Keep up the good work, breakers.

Midnight Express No 3

We have just received a copy of the third issue of Midnight Express, the CB technical newsletter from Specialist Engineering Services of Yorkshire. It includes lots of useful information, hints, projects and circuit diagrams — and there's a free gift of a socket for plastic power transistors! The sad news is that, unless more contributors can be found, the newsletter is unlikely to go beyond a fourth issue. You can get full details from SES, 14 Hazel Court, Aiskew, Bedale, North Yorkshire.



Question Time

The Department of Trade and Industry kindly sent us a copy of a Parliamentary Question asked in the House of Commons on 7th May and the reply from Mr John Butcher, the Parliamentary Under Secretary of State for Industry:

Sir Patrick Wall (Beverley): To ask the Secretary of State for Trade and Industry what is the latest position on the introduction of citizens' band radio to the frequencies recommended by the Conference of European Posts and Telecommunications Unions (CEPT).

John Butcher: On several occasions, the Government has stated that its longer term objective for CB is to adopt the CEPT recommendation which provides for common European frequencies for

FM CB. I am happy to reaffirm that commitment now.

In moving towards the adoption of the CEPT frequencies at the lower part of the 27MHz band, there is a need to relocate the existing users of the band. The Department has been consulting with all interested parties about the appropriate transitional arrangements. We must give adequate time for existing users to modify or change equipment and, in view of this, 1987 is our earliest realistic target date for the start up of the new CB service. Further consultations will need to take place with existing users before this can be confirmed. After the introduction of the new CB service, the existing UK 27MHz CB service will run in parallel with it for some time and no decision has yet been taken to phase out the present service.

Well Done Cheltenham 10-4s

News recently reached us of a small band of Cheltenham breakers who have been doing sterling work helping their local police. Back in April, when they heard about the plight of a missing pensioner, their REACH section (Radio Emergency and Cheltenham Help) launched a gruelling 250 man-hour search of the area — after contacting the police first, of course. Breakers in the area mapped out search patterns with the police and the pensioner's family and

began to comb the old man's favourite haunts. Sadly, one of the teams of breakers eventually discovered the man's body, so the story does not have a happy ending. The breakers were later praised for their help by the local Chief Inspector, who said "We were greatly helped. Unfortunately, this time, success came too late."

This was not the first time the group had helped the police. Earlier this year, they were out in all weathers hunting for a murder weapon in a local enquiry and before that they were involved in another search for a missing person.

WATCH OUT HERE COME THE T-BOLTS

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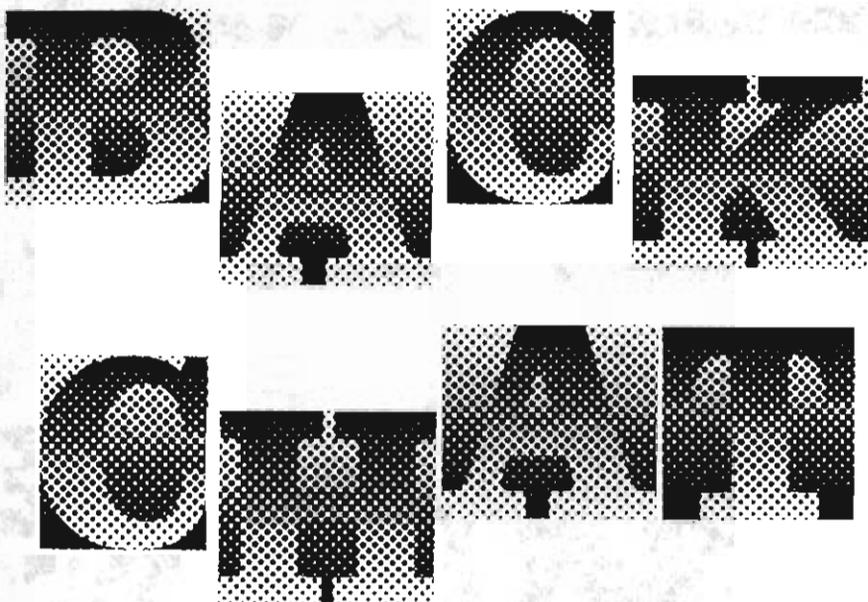
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Another dip into our postbag



Courtesy Costs Nothing

From Coventry, Tim pleads for courtesy and patience . . .

I am writing concerning the FCC channels which we in the UK will probably be allocated in 1987. As a SSB, AM and FM DXer, I am appalled at the lack of courtesy and sheer ignorance of the so-called serious DXer on legal FM. In the past, I have had QSOs to Scotland ruined by a local station showing lack of common sense, patience and courtesy.

On the FCC channels, I have QSOs into many European countries on 12 watts. When this is legalised, this will become a shambles unless DXers think before they call. Show a bit of courtesy to fellow operators and have patience. Let everyone enjoy the pleasure of DXing. Please let's make these channels work and everyone will be happy.

Retractable Antennas

Two letters now, offering advice on where to look for retractable antennas. First, C G Coombs of Bournemouth writes . . .

After reading your excellent magazine, I noticed that Woodchip of Glasgow was having difficulty in obtaining an electrical retractable antenna for his car. Well, if he drops the lads at Bournemouth Open Channel a line, they will be more than happy to help him. Their address is 335 Charminster Road, Bournemouth.

Next, Alan from IXL CB & Electrical of 394 Langsett Road, Sheffield, offers help with the same problem . . .

Regarding your letter from Woodchip in your June issue, I sell and use the 12v electric retractable antenna he writes about (£14.95). Over the past two years, I have found mine to be quite good up to about 15 miles. It gets a wipe with an oily rag at four to

five week intervals. The motor section under the wing of my car has a polythene bag wrapped around it and taped up. This keeps it free from mud.

Breaker's Invitation

Firefighter, from Newport, Isle of Wight, wants to eyeball . . .

Having had a brief but enjoyable introduction to CB radio when it was first introduced to this country, my interest soon waned, probably due to the fact that it was initially illegal to use and perhaps also the set that I shared belonged to a colleague, and was only available for my use during short and infrequent periods. However, my niece and nephew who are both resident at East Cowes here on the Island have now re-introduced me to the enjoyments of legalised CB plus the recent first time purchase of the May 1985 edition of CB Magazine with the interesting Beginners' Questions and Answers article has further encouraged my renewed interest.

As my above handle suggests, I am a serving fireman based at Newport Fire Station, which is also the Headquarters for the Isle of Wight Fire Brigade. Every Tuesday morning, from June through to September, the Fire Station is opened to the public from 10 am until 12.30pm, this event being in aid of the National Fire Services Benevolent Fund. Please could I therefore invite any serious and dedicated breakers who are holidaying on the Island during that period to call in at the Fire Station for a brief 'eyeball' and a copy to exchange ideas and opinions on CB radio. Just ask for me by my 'personal' which is Mo and I'll be pleased to meet any who would care to call.

Keep up the good work with the magazine. I have now ordered a regular copy from my newsagent, as it will be a continuing source of interest and advice to a novice breaker such as I am.

Misuse by Whom?

Checkpoint Charlie from Dover writes about the one-nine . . .

After reading Back Chat and the letter from Red Star I am at least relieved to know that the problem of "Channel 19 is the truckers channel . . ." is not only confined to this part of Kent.

With up to 2000 freight vehicles — not all British of course — using the Port of Dover each day, some exchanges between truckers and home-bases can become somewhat heated when it comes to use of channel 19. As Red Star says in his letter, it is not only mobiles who answer the 10-13s and calls for directions. Here in Dover, for example, there are many home-bases, one of whom is excellent, that being Blind Pugh, who, as his handle suggests, is sightless, who answer the truckers' calls for directions with speed and efficiency.

The 'Citizens Band Radio — Code of Practice' does outline the use of channel 19. However, it is very often that those truckers awaiting shipment, or who are travelling in the same direction, carry on with their conversations on the one-nine. When asked quite politely, if they will "pick another channel", we learn to our amazement that "the one-nine is the truckers channel" — or by the use of other choice expletives!

Red Star's last paragraph sums it all up when he says "the 19 should be used for the initial contact and vacated when contact is made . . ."

Well said Red Star, you're certainly not alone.

Dealing with Wallies

Malcolm Price of Co Durham offers a few suggestions when dealing with wallies . . .

In common with probably most of your readers, I do get fed up with all the wallying about wallies. The answer is to be positive. Firstly, record wally over a period of time, overprinting the tape with spoken record of place time and channel. Then three teams DF the wally, again with overprinted comments on time location etc. After getting the address, get the name of the householder from the electoral roll, then the telephone number in the usual way. Then telephone when the wally's dad is likely to be at home. Be courteous, friendly and positive giving dad a playback. Point out that CB can be a great and useful hobby and that clubs do exist. A letter can do the same of course. The usual result is that wally becomes an upright citizen and a staunch member of the Tory party!

There are two warnings, however. Firstly that it is perfectly lawful to play private detective in this country but it is illegal to be vigilante and the penalties are heavy. Secondly, it is true that both professional criminals and gangs of vandals do use CB in a very professional way and these people are highly organised and much more intelligent than they are usually given credit for. Their sophisticated use of coded phrases does sound like wallying. Leave these creeps to the police. They



A very busy channel 19 . . .

can be dangerous.

The other way is simply to send the documented evidence to the local chief constable and let him take it from there. Warn the local paper if there is to be a prosecution.

No to 28MHz

Charlie Brown (see April issue) takes Mack the Hack to task . . .

I used to like Mack. I really did. His was the first column I'd turn to upon receiving my copy of *Citizens' Band*. Always there with that friendly smile and uplifted hand (which I assume is a wave and not Mack attempting to imitate the Vulcan salute from *Star Trek*), it was always a real joy to see him.

Never again! Those G3s and G4s of whom he wrote in his June column will never speak to me again. CB on 28MHz? I wouldn't, I'd never, not even . . . No, it's quite unthinkable. 27MHz definitely, even 26MHz, but I would never advocate that CBers use 28MHz! What I said in my letter, published in the April issue, was that I thought that the frequencies allocated for use by CBers in this great country of ours ought to be extended to the range 27 to 28MHz i.e. from 27.0MHz to 28.0MHz. I was certainly not recommending the use of the 28-29MHz band by CBers.

The 10 metre band is an important section of the amateur allocation in this and other countries. As Mack writes, the lower part of the band carries beacon, RTTY and C/W amateur traffic from all over the world as well as a little SSTV on 28.670MHz. It would be quite wrong for any CBer to stray into this section of the radio spectrum.

Some CBers might argue that the lower part of the band is very under-used and could, therefore, be put to better use by the CB fraternity. What must be remembered though is that we are now nearing the lowest ebb in the sunspot cycles and while the 10 metre band remains largely dead to DX, other bands are well and truly alive, and that is where you'll find most of our amateur cousins. Give it a few more years, though, and they'll be back to the 10 metre band and it would be quite unfair for them to find our "1-9 for a copy" brigade monopolising things.

What is a valid viewpoint, however, is that the amateur radio operator does very much better, in terms of frequency space, than we CBers do. I wouldn't

mind betting that there are many more CBers than there are Hams in this country and it does seem quite unfair that the many must stick to 40 channels on 27MHz and a few more on 934MHz, occupying a tiny chunk of the radio spectrum, when the few get God knows how many MHz to play with.

I can see no reason at all for not giving the entire 27-28MHz band to CBers. Like N. J. Wilcock said in June's "Back Chat", the powers-that-be are already considering giving us the CEPT 27MHz frequencies, as well as allowing us to keep the old ones, so why not give us 27.405 to 27.60125MHz too?

Anyway, please point out Mack's misunderstanding to your readership before I'm lynched by the local Ham's Club. Who knows, Mack's column might again become my favourite if I'm spared the gallows!

Ranger 3 Replies

Ranger 3 from Scotland wants to clear up a few points . . .

Thank you for printing my letter which I missed due to work commitments. The first I knew of it being printed was when I read Red Star's reply in your June issue. As I missed the Back Chat in question, I'm not sure if it was my letter which was misunderstood or if it was not printed in full, so here goes. I too, run a base and mobile unit and when my home base is standing by, it's on channel 30, my mobile stands by on channel 19. I'm not a trucker; in fact some of the problems lie as much with the truckers as anyone else. I must be honest, Red Star, all my 10-13s have been from mobile units usually travelling in the opposite direction at the time.

Home bases can sit well clear of channel 19 and if mobiles have trouble getting information from other mobiles, they can re-dial another channel set aside for non-emergency monitors and home bases. By the way, a monitor by definition is "someone who listens until required" and, if I remember, my letter was directed towards strong home bases who do not use their sets for the benefit of others as do the channel 19 monitors. Rather, they are the housewife type who persist in trying to contact a friend two doors down. To conclude, I also think monitors do a worthwhile and no doubt thankless job but that doesn't mean they have to use channel 19 for idle chat.

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Mack chat

Mack voices his opinion on channel-hogging



Squelch is a word that I used to associate with when one stepped on something nasty or if one were wearing a leaking welly and at every step the noise that is produced sounds like the word. When I ventured into the world of radio I found that squelch had another meaning. It took me some time to realise the correct use of this control. I would always have it fully on (or is it off?) with the noisy atmospherics annoying everyone within earshot except myself, as I would imagine that I could hear rare, distant stations amongst the noise. The correct operation of the squelch control is for it to be set so that all unwanted noise is eliminated. In the case of CB, that means all stations that you don't want to hear. "This channel is 10-6, would you move it up or down one" is old hat nowadays. If you can hear the station you are talking to and he or she can hear you, then you either pretend not to hear or turn up the squelch so you can't hear them.

What about channel hogging? From my friend 'Starfish' from Grays who I had the pleasure of eyeballing on the beaches of St-Oysth came a letter explaining this problem which I myself have experienced. You QSY to what you believe is a clear channel and continue to waffle to the station that QSYed with you. Up pops another station with the usual "this channel is 10-6". But you can't hear any other stations, and it turns out that the station that claims the channel is in use is minding the channel for when any of his usual group of breakers turn up.

When 'Shellfish' wrote to me she seemed very upset because quite a large number of channels in her area are owned or hogged by various groups. When individuals do this hogging it becomes the survival of the fittest or strongest stations. There is not enough channels for this practice to exist and it is very selfish to behave in this way. All users of the CB have a legal right to use any of the 40 channels, providing that the channel is not being used by other stations that would be swamped by their signals.

I, and one of the people that I

regularly waffle to, QSYed to a clearish channel and in my area that means any channel that has a signal lower than the station I wish to converse with. Well, after a couple of overs, up pops this "this channel is 10-6" merchant who was only give me an S6 signal, I engage this station in conversation and found that he was some four miles away and he finally admitted he was waiting for other local stations to appear on the channel. I tried to explain to him the use of the squelch control but alas, poor soul, he was too thick to understand, so I had no choice but to wind up my squelch and continue to waffle to my mate who is only situated a few hundred yards from my home. Selfish, some of you may say. No, if we all learned to use our squelch, RF gain, and even the low power attenuator switch, it could be a much more satisfactory frequency.

Reading Smart Alec's comments the other month in Q&A about mobile electric antennas brought back memories. I have owned two of these in my time; they were both Hi-Gain manufactured. The first one I foolishly sold with a rig and the second one, which is about 5 years old now, I still have and it is still working. Alec was correct in his pricing as I paid £25 for mine and they were worth every penny. The Hi-Gain electric antenna was a top-loaded type and coil was covered in black heat-shrink, but this was quickly painted with a non-metallic silver paint so as to match the rest of the antenna. As Alec said, one had to make sure that the antenna was fully extended as at times they did stick, but the answer was frequent lubrication.

In the days when they first appeared on the scene most people were using the popular DV27s and, at one time, when things were getting a little warm with busts and such, there appeared in a police circular, descriptions and drawings of the DV with its distinctive wingnut fittings. So, with the electric antenna, it might not have performed as well as the DV but with a flick of a switch it got one out of what we imagined some sticky situations. The band width of the antenna was not very good; if you had a SWR of 1.1 to 1 on channel 20 you could get a SWR reading of 1.5 to 1, if you were lucky,

on channel 1 and 40.

On the legal 40 FM the Hi-Gain electrics were almost impossible to SWR. I did get mine to a reasonable SWR with the help of "Barbarian". We removed the plastic heat shrink and some of the windings and split the coil to give us a decent SWR and band spread. I still have the Hi-Gain fitted to my mobile but nowadays it feeds signals to the radio cassette, but if I wanted, it would only take a few seconds to reconnect it to the CB. It could be useful in an emergency but nowadays there are far better antennas on the market. But the best advantage of these antennas are they very rarely got pinched.

The 934 scene is now very active with many more people using this mode but it is still far from crowded. Glensy Anthony, the secretary of the 934MHz Club UK, tells me that the present membership is well over 600 with more joining weekly. On April 14th, the first annual general meeting took place at the Rothley Court Hotel, Leicester (very posh) and the attendance far exceeded the expected numbers. A number of 934 equipment dealers attended bringing with them some of their wares for the club members to admire and play with. After a very successful competition weekend towards the end of last year, it is hoped to repeat this event again later this year with more valuable prizes for the winners of each group. Sadly, I could not participate in the last contest as at the time I was rig-less but, hopefully, this year I shall participate and maybe win.

The interference from the new Cellnet radio telephones is a very sore subject on the 934. I recently learned that there is one of the repeater stations not more than half a mile from my home that is used for this phone system. Yet I have not yet suffered any interference from this system, and I ask why? I believe that the problem could lie in the add-ons that the 934 owners purchase and use such as antenna pre-amps. I will also lay my head on the block by saying it's some of the poorly manufactured rigs that are around and the way people use them.

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CB Citizens' Band

Letters

We are always pleased to receive letters from readers, but at times it is impossible to answer them all. We do try to get round to answering letters with an S.A.E. but this may take some time.

It is assumed that letters we receive are intended for publication unless they say otherwise. Letters for particular features like Back Chat, Q & A and Club News should have that marked on the envelope and the correspondent's full name and address, although this will not be published if requested. Readers who are hoping for publicity for events and competitions should bear in mind that the magazine goes to press at least two weeks before the magazine appears

in the shops, and editorial copydates are usually a month before the 'press' date. Please remember this when sending any information in.

Writing for CB

We welcome readers' contributions, especially if they cover a new aspect of CB or are D.I.Y. projects. You may not be aware of how work should be presented — if in doubt write for advice!

Telephoning

It is very difficult to deal with telephone queries as most of our energy has to go into putting the magazine together. If you can deal with it by letter, please do.



LADY BREAKERS

Filly launches a new club

going to be present. And then they asked me.

But I'm not offended. I've never pretended to aspire to such heights as these real celebrities, or any heights at all, really. No, the local schools can plead with me to open their summer fetes in vain. Little Puddlesham Breakaways (sorry, but they chose the name) is enough for me.

So I turned up at the inaugural meeting in plenty of time, armed with my speech, my camera (in case they wanted to take pictures of me making my speech), my tape recorder (in case they wanted to record me making my speech), and my best smile. The venue wasn't quite what I expected — The Old White Mill turned out to be not so much an exclusive country hotel as an ancient, rather worm-eaten pub. But the beer was cheap.

I was shown into a chamber which the landlord saw fit to describe as his 'conference lounge', and which I would term a small back room. I wasn't quite the first to arrive — someone's granny had turned up to dust the chairs and put some flowers in a vase on the windowsill.

My mood at this point was, shall we say, discouraged, I sat on a chair — the only one, it turned out, that granny hadn't got around to dusting — and asked myself, as I have so often before, how did I get into this? What am I doing in the only pub mentioned in the Domesday Book, sitting in a pool of dust, come to meet with a roomful of non-existent people who wanted to start up a non-existent breakers' club? I'll give them ten minutes, I promised myself, then I'm off.

After nine and a half minutes exactly, in they all rolled. Two lorryloads of them (one local breaker owns a small haulage firm). I counted 21 as they piled in, sat two each to a chair, clapped me on the back and laughed a lot. This is better, I thought. Someone dragged in a crate-load of champagne, and I thought, this is better still.

"Bring on the Master of Ceremonies", they cried. Someone went out into the public bar and returned dragging granny behind them — it turned out that the idea for the club in the first place had been granny's. I felt very embarrassed.

Granny stood on a makeshift platform which rocked alarmingly under her frail weight, and introduced me. She got my name wrong, but who

cared, I was on my second glass of champagne. I clambered up on to the platform and said something or other — I forget what, but they all laughed a lot — and someone brought in a huge length of red ribbon and a pair of scissors. No one knew quite what to do with the ribbon, so I cut it into lots of little pieces (to frenzied cheering) and declared the club open, or the ship launched, something like that. They cheered some more, and someone was obliging enough to take a picture of me. Greengage, his name was — thanks, Greengage.

Then someone asked "OK, we've formed the club. Now what do we do?"

Blank silence. They all looked at me expectantly.

"First of all", I announced importantly, "you should start a register of members." Someone found their diary, tore a sheet out of it and passed it round for people to sign.

"Next you should appoint a committee to run the club", I said, getting into my stride. "You'll need a membership secretary to collect subscriptions, a chairman or a president, a vice chairman, someone to take minutes, and most importantly, someone to organise social events."

A few names were called out to raucous cheers, and I was joined on the platform by the new committee.

"Now you decide on a subscription and elect a treasurer to look after the money. Someone you trust", I told them. They eyed each other dubiously, and decided to come back to that one.

I had, of course, been making it all up as I went along. Powerful stuff, that champagne. Now I was beginning to run out of ideas. Fortunately, the Little Puddlesham Breakaways might have been short on organisation, but they were long on ideas. They were soon proposing car rallies, treasure hunts, charity fund-raising and parties as though born to it.

I decided it was time to make an unobtrusive exit — it was clear they didn't need me any more. I took one step towards the door — and the platform chose that moment to give way. Greengage took another picture — and you know which photo the iniquitous local paper printed? The picture of Filly delivering a cool and poised speech? No — the snapshot of Filly on her back with two legs sprawled anyhow in the air!

At last, I'm a celebrity! That is, people round here have finally realised I'm a celebrity. I've been telling them for years.

Who did the breakers of Little Puddlesham approach when they needed advice on how to start up a club? Who did they invite along to their inaugural meeting last month? Who did they regale with champagne and cakes until the early hours of the morning? (And who, incidentally, did they sting for the first subscription of the evening? Well, nothing's perfect.)

Oh, all right, I'll come clean. They didn't actually ask me first. They asked a certain well-known actor who lives locally first, but he turned out not to be a CB enthusiast, the fool. Think what he missed! Then they asked the local MP, who does happen to be an enthusiast, but he happened to be on a fact-finding mission in the Bahamas. Then they asked a famous writer of romantic fiction, but she turned them down when she found the press weren't

Rig Review



At last, Chris Peterson gets his hands on the new Uniace 934

LATEST ON 934MHz

The Uniace 400 is the long-awaited entry by Uniace into the 934MHz band. Unlike the rival Cybernet rig, the Model 400 is *not* a modified Japanese transceiver. It is designed and manufactured by Uniace at Llandudno in North Wales.

The Model 400 is a fairly large rig. In appearance it resembles a slightly old-fashioned 27MHz rig. It isn't until you look round the back and spot the massive heatsink and BNC antenna connector that you realise this is a 934MHz rig!

The front panel is moulded plastic in blue and black with silver lettering. The general appearance is quite pleasing. The rest of the case consists of conventional sheet metal panels wrapped around a folded metal chassis. It has to be said that the standards of construction of the metalwork are not up to the standards of imported equipment. The case on our example was not a brilliant fit, and the edges were a bit on the sharp side.

On the front panel, there are conventional volume and squelch controls, a signal strength meter, red LED channel display, channel selector and a pair of switches. The volume switch incor-



porates an on/off switch as one might expect. The squelch control also has a click position at one end, however. This selects a pre-set squelch level that should be correct for most circumstances.

The microphone connector is a four-pin locking ring type. Unfortunately it is situated on the left hand side, which is not the most convenient position in right hand drive Britain! I get the feeling that the front panel is someone else's surplus stock!

The meter acts solely as a received signal level meter, dropping to zero when transmitting. A small red LED in the top right hand corner of the fascia indicates that you are transmitting.

Of the two switches, one is a simple tone control. In the 'lo' position this reduces the harsh treble hiss that accompanies weak signals in FM systems. The other switch selects between 20 and 40 channel working. In the 'lo' position, the rig works exactly like any other 20 channel UHF rig, with each channel appearing twice for a complete rotation of the selector switch. In the 40 channel mode, 40 channels appear for one complete rotation. Since this mode is not as yet approved by the Department of Trade and Industry, the transmit function is inhibited in this mode.

Perhaps we should pause at this point and explain the reasons for this. When the UHF band was originally conceived, the Home Office, who were then in charge of the airwaves, allocated a 1MHz band for CB on UHF. Although there is space in such a band for 40 channels at 25KHz spacing, the Home Office said that initially, they would only permit 20 channels at 50KHz spacing, and that the remaining channels would be released at a future (unspecified) date. We are still waiting for those channels!

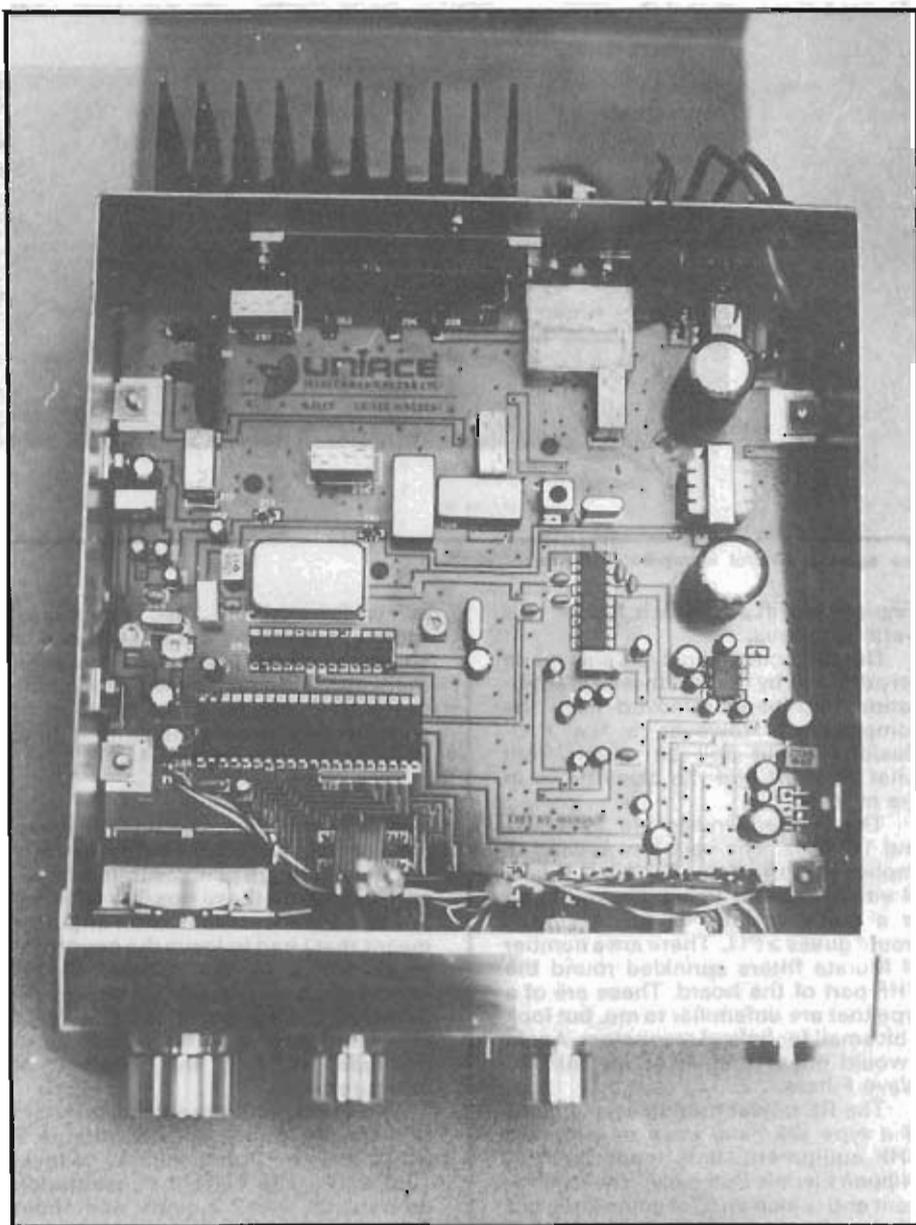
Authority

I have yet to hear a satisfactory reason to explain this decision. Such perverse reasoning is however one reason why authority to control the airwaves was removed from the Home Office and transferred to the DTI!

The problem is, of course, that when the remaining 20 channels are released, the channel numbers between a 20 channel rig and a 40 channel one won't match. Channel 2 of 20 becomes channel 3 of 40. Similarly channel 20 of 20 becomes 39 of 40! Confusing ain't it?

The Uniace is designed to take this change in its stride. Simply flipping between Hi- and Lo- bands will select 20 or 40 channel working with the correct channel numbers for each mode. However, because the Uniace uses electronic channel selection (despite the appearance of the selector knob), after switching modes you must change channels at least once to make sure you are on the channel you think you are!

Returning to the rig, the rear panel is dominated by a massive heatsink. Also present are a BNC socket for antenna connection and a 3.5mm jack-socket



Great use is made of surface mounted components

for an extension speaker. The power leads are run straight into the rig via a strain relieving grommet, and the positive lead is fused.

The chassis is not electrically isolated from the case, so it can only be used in negative earth vehicles.

Our review rig came with a provisional manual which is clear and concise. There are few technical revelations in the manual other than the bare specifications, and no circuit diagram.

The manual recommends the use of H-100 cable for base station use, a statement with which I must agree. However, this is rather difficult when using BNC connectors. My own preference is for 'N' type connectors, as these are more efficient, robust, and weatherproof than BNCs. Furthermore, they readily accept thick cable such as H-100! Although special BNCs for thick cable are available, they tend to cost an arm and a leg! My advice is to fit an 'N' type to the cable, and get an 'N' to BNC adaptor to connect to the rig.

It has to be said that this is not a compact rig. The basic box measures

some 2½" high, 6¾" wide and 7¼" deep. The heat sink takes up nearly another inch beyond this, and means that you will need to find a lot of space on your dashboard to fit it!

Into The Works

At first sight the circuit board inside the Uniace looks remarkably bare. This is because great use is made of surface mounted device components. All the resistors and capacitors are tiny little black and white rectangles soldered direct to the bottom of the board. This gives a nice, clean, uncluttered look to the board, and should result in an extremely reliable, robot assembled unit. I sure wouldn't like to have to fix one though!

As well as resistors and capacitors, the underside of the board also contains some surface mounted ICs and a temperature controlled oscillator module. This oscillator runs at 6.4MHz, and appears to be the reference for the Phase Locked Loop. Using a temperature compensated module should go a long way towards minimising the



The squelch control incorporates a pre-set position

frequency drift for which Reftec rigs were notorious.

Detailed circuit analysis was made very difficult by the fact that all identification had been removed from the components. However, a few conclusions could still be drawn from what was left and the clues given in the manual.

The IF frequencies are 21.4MHz and 100KHz. The very low second IF implies that the detection is by means of either another Phase Locked Loop or a pulse counter of some kind. I would guess a PLL. There are a number of Murata filters sprinkled round the UHF part of the board. These are of a type that are unfamiliar to me, but look a bit small for helical resonators. Again I would guess that these are Surface Wave Filters.

The RF power module is a large IC of a type we have seen in imported UHF equipment. It is made by NEC (Nippon Electric Company). The receiver front end is also an IC of some kind, but all identification had been removed. A pair of double balanced passive mixers are also present on the board.

It would appear from this brief examination that there is a considerable amount of filtering at UHF level, and relatively little at the lower frequencies. The only visible filtering at IF frequency is a two-pole crystal filter at 21.4MHz. The approach adopted seems to be to keep everything well filtered at the top end, use very clean mixers, and a PLL discriminator with plenty of audio filtering. This approach is logical and not uncommon in sophisticated communications equipment. It's rather unusual to find it in CB gear, however!

One thing that is immediately apparent on examining the Uniace circuit board is the remarkable lack of adjustable components. Most UHF equipment is crawling with things that have to be expertly adjusted with complex test equipment. The length of time it takes a highly qualified engineer to align such equipment is a contributory factor to its high price. Whilst there are adjustments visible on the Uniace board, there are very few of them. Most seem to be variable resistors for setting DC conditions or deviation

levels, for example. Also a couple of trimmer capacitors are in evidence to adjust the crystal oscillators. However, there appear to be no visible adjustments at the UHF stages, a fact which must considerably reduce alignment time and costs at the factory.

Measurements

Due to circumstances entirely beyond our control, we were unable to carry out the full range of measurements we normally do on these rigs. My full-time job as a broadcast television engineer meant that I had to leave the country at short notice in the middle of this review to cover a certain football riot in Brussels! On my return, the copy date for this issue was so close as to preclude all but the briefest of measurements.

However, we were able to ascertain that the rig delivered a creditable 9 watts into a 50ohm dummy load at 13.8 volts. The current consumption on transmit was 2.3 amps, and about 0.4 amps on receive. All the channel frequencies were within 2KHz of nominal.

On the Air

The Uniace spent about a week on active service both at my home, and mobile in the car. During this time it performed consistently and reliably.

The microphone circuitry contains a VOGAD circuit which maintains a constant level of deviation regardless of input levels. Power or processor microphones will be of no advantage with this rig, and may even make the transmitted signal less intelligible due to increased distortion. In short, do *not* use power or processor mics with the Uniace. The transmitted signal with the supplied mic was clear and well modulated. The deviation sounded right, and many stations were complimentary about the quality of the transmitted signal.

The receiver did not seem to be quite as sensitive as some of the more recent UHF rigs. It was comparable with the slightly above average Reftec that I use as a yardstick, but not as sensitive as the Cybernet or Commtel. I would rate the sensitivity as adequate

rather than exceptional, though this can be advantageous, as I shall describe shortly.

Rejection of noise on the power lines was excellent. There was no sign at all of any transmitted noise when used in our electrically noisy test vehicle, and received noise was well suppressed. By comparison, the Reftec is almost unusable in the same vehicle!

One slight operational peculiarity was the signal strength metering. The meter never reads less than 25% even with the antenna disconnected! After an hour's operation in a cool room, this rose to about 50%. On a hot day in the car, and over one hour of continuous operation, the meter was indicating in the red all the time! Further, if the squelch were used in the manual mode, adjusting the squelch level affected the meter reading considerably! There was no noticeable difference in the performance of the receiver during these tests, so the accuracy of the metering circuit must be regarded with some suspicion!

In the preset position, the squelch worked admirably, opening on reasonable signals and rejecting excessively noisy ones. For those prepared to tolerate a lot of hash for the chance of a rare DX copy, careful manual adjustment of the squelch would allow reliable operation even on almost inaudible signals! The squelch function incorporates a small amount of hysteresis, and there was no tendency for the squelch to chatter.

The internal speaker is not bad as these things go, and the relatively large box helps. There is plenty of audio power available from the TDA 2002 audio driver IC so those who wish to drive a large hi-fi speaker are well catered for!

Many UHF users will be now be well aware of the problems of adjacent band interference from the cellular radio system. This problem has caused many UHF users a considerable amount of grief, as £300 worth of equipment is rendered useless by telephone interference!

Contrary to popular opinion, I do not believe that mast-head pre-amps are the source of these problems. It

has to be said that if the problem is present, a pre-amp will aggravate it, but the pre-amp in itself is not at fault.

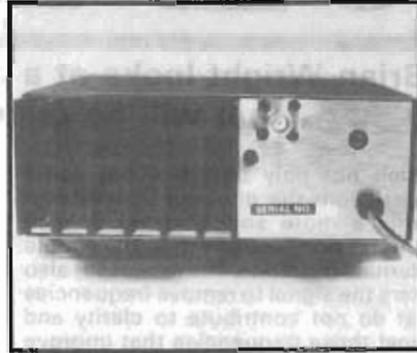
I believe that the problem is that known to the radio amateur world as 'repeat spot' or 'half IF' interference. Without getting too technical, the presence of a strong out-of-band signal at the input to the rig causes harmonic distortion in the input stages of the rig. If the input carrier is half of the first IF away from the desired channel (i.e. 10.7MHz for a 21.4MHz first IF) then the distortion components can beat with the second harmonic of the local oscillator signal to produce a product component within the pass band of the rig's IF. Result: unwanted interference!

Now very few UHF rigs use the same first IF frequency, so quite a few sufferers have discovered that changing to a different brand of rig cures the problem. This does not necessarily imply that the new rig is any better than the old one. It's just that at that particular location, where cellular radio is on a specific channel, rig 'A' with a first IF of 21.4MHz, will work where rig 'B' with a 52MHz first IF won't! Five miles down the road, in a different cell area, the positions may be reversed.

Having said all that, the Uniace does seem to be rapidly gaining a reputation as one of the more immune rigs from this type of interference. This is almost certainly due to three factors in its design. Firstly, the filtering at the front end of the rig appears to be better than average. Secondly, the use of

double balanced passive mixers. Finally, the sensitivity of the rig. The more sensitive a rig is, the more prone it will be to interference problems. As we said earlier, the Uniace does not appear to be quite as sensitive as some of the more recent 'super' rigs, and this can be advantageous in some circumstances.

During our trials, the Uniace was used both with and without a Nevada masthead pre-amp. This provided a



useful improvement in receiver sensitivity. Since this is switchable, it probably provides a good combination in areas where interference is present, and in the unlikely event of problems occurring, it can be by-passed and advantage taken of the good overload characteristics of the Uniace to combat the problem.

So how do we sum up the Uniace and how does it compare with the opposition? It is a well made rig with

considerable thought having been applied to the design. The automated construction techniques and lack of alignment adjustments should make it a consistent performer. It will require more specialised service should anything go wrong, however.

The automated construction techniques, whilst improving consistency, only show financial benefits in very large production runs. At the present market level, this is unlikely to benefit the average consumer. However, if the European market takes off, as it well might, manufacturers using these techniques should be considerably better placed than those adopting a more conventional approach.

The projected price of the Uniace is around £350. At this price it is pitched against the Cybernet Delta 1. The Cybernet is a much more compact rig, offering more facilities (scanning etc) and slightly better sensitivity. Against this, the Uniace seems to offer better immunity from cellular radio interference and the growing importance of this factor should not be underestimated. Since its appearance is similar to that of a simple 27MHz transceiver, it may be less tempting to the criminal fraternity if left on view in the car. It also manages to deliver a good healthy power output (9 watts on our sample). The Cybernet could only manage 5 watts. I suspect that the Uniace may prove to be slightly overpriced for the facilities offered, however it should prove to be a reliable work-horse!



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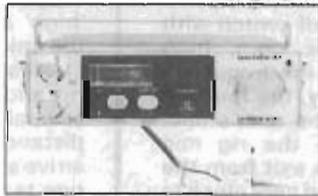
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POWER SPEECH CLARIFIER

Brian Wright looks at a prototype of an accessory that will be priced at around £30

Equipment Review

Good radio communications are dependent on many things such as atmospheric conditions, height and efficiency of antenna, transmitter power and receiver sensitivity and selectivity etc. However, as the main object is to communicate, with another human being, then it is obvious that the speech that is carried by the RF signal, should be as clear, powerful and intelligible as is possible. Many professional transceivers achieve this goal by circuitry which is built in as standard. Even some CB rigs have quite good modulation, but because of the relatively low price of CB rigs, it is not surprising that the modulation of many leaves a good deal of room for improvement and accessories manufacturers have not neglected to fill this need.

The simplest accessory to increase the "talk power" of a rig is usually a power mic which is merely a microphone with a pre-amplifier and a gain control to set the output level to suit the rig. The power mic applies a higher level of signal to the rig and makes use of the compression circuits or clipping circuits within the rig (which prevent overmodulation of the carrier) to give more powerful modulation.

An improvement on the ordinary power mic is the speech processor

which not only amplifies the audio signal from the mic, but usually performs a more sophisticated speech compression function than the simple internal rig circuits. The processor also filters the signal to remove frequencies that do not contribute to clarity and boost those frequencies that improve clarity.

The problem with the above devices is that unless they are designed specifically for your rig the resulting sound may not be so clear as it should be, because even with the processor, the designer does not know how much boost or cut to apply to suit your particular microphone and rig at particular frequencies. An obvious approach to this problem has been devised by WWS of Wiltshire. They have produced what they call a Speech Clarifier, which gives the operator greater control of the audio signal sent to the rig.

The Speech Clarifier is not a speech processor but is really a microphone amplifier with high and low frequency cut and boost controls, thus allowing the operator to adjust the audio signals to a strength and pitch which is most suited to the voice, mic and rig.

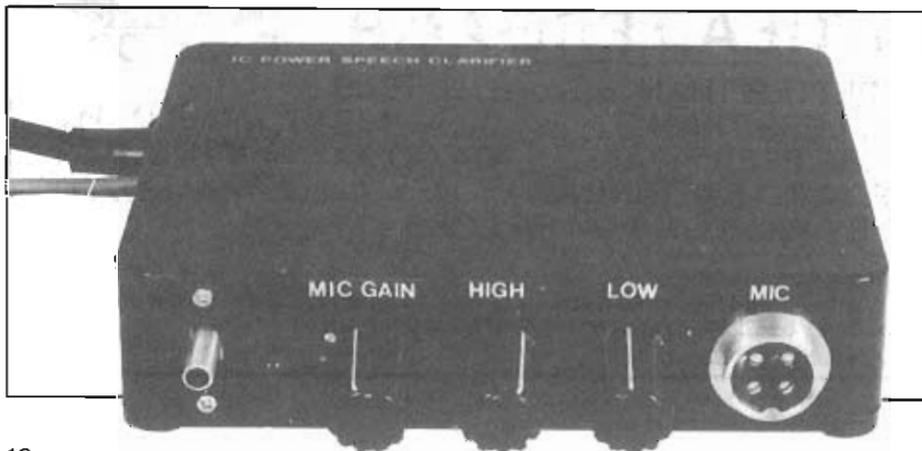
This is a neat and tidy little unit measuring only around 120 x 95 x 30mm and is housed in a black diecast box which, along with internal decoupling of leadout wires etc, prevents instability due to RF feedback. The controls are placed along one of the 120 x 30mm faces and they are (from left to right) power on/off switch with red LED indicator, mic gain, high frequency cut and boost, low frequency cut and boost and, lastly, the four-pin mic socket to accept the user's mic. The coiled leadout to the rig mic socket and power leads exit from the left side near the rear and very close to

one another. A small criticism here; we felt that the power leads would be better sited at the rear as they tended to tangle untidily in the coiled lead.

The principle of the Speech Clarifier is fairly simple and consists of a high gain microphone pre-amplifier followed by an adjustable filter network and finally a gain control to adjust the output to a suitable level. The unit is powered from the 13.8v rig supply and only uses 30mA which is negligible compared to the rig consumption, especially on transmit. Again another slight criticism — in common with many high gain audio pre-amplifiers the Speech Clarifier was susceptible to a slight hum pick-up from the power lines when used homebase and connected to the same power supply as the rig. The hum was not bad though and could not be heard over a long distance. We would hasten to add that the unit supplied to us was a pre-production prototype and any small problems encountered in this unit should be ironed out in production models.

Setting up the Speech Clarifier is very simple providing, of course, that the unit has been supplied correctly wired to suit your rig. Once the unit has been switched on, it takes around five seconds for the biasing circuits to stabilize so that any output is available. With the mic gain turned well up it is best to call a friend at a reasonable range and simply adjust the other two 'high' and 'low' knobs together with the mic gain to get the loudest and clearest sound for your particular voice, rig and mic. It is always best to get several other opinions over different distances, over several days until you arrive at the ultimate, as other people's rigs tend to modify the sound a little and may prefer different settings. A device such as this is very useful to those breakers who have a rig or voice that is not very clear or loud and quite an improvement can be obtained with careful adjustment. We did feel, however, that a little more range of adjustment would have been useful.

In conclusion, we consider the Speech Clarifier to be a useful accessory, especially for those breakers whose modulation is poor in tone. The unit certainly looks smart, robust and professional, especially for a prototype. At the time of writing no price is available but enquiries should be made to WWS, PO Box 14, Westbury, Wilts.





More QSL club news from David Shepherdson

COMMUNICATION THE QSL WAY

Just for a change this month, I'll start off with some names and addresses from a pile sent up via the magazine, then a little bit of good news on a club that has been getting a very bad name.

First from the pile are a couple of overprinted Currie stock cards from Simon (Missing Link) of Sussex, then an Ensign card from Terry (The Big Bopper) of Bolton who writes that he is a 100% QSLer and wants to swap cards with all the readers of this mag. More Currie cards in from Bob (Skyrider) of Peterlee, who compliments Des Currie on being so helpful to new QSLers. By the way Bob, the change of handle, to "Dragonmaster" the other month was a bit of Editorial Mickey Taking or some such I think!

A massive pile of mixed club and personal cards of all types from Curries' to Poma's comes from Peter (Grey Fox) of Essex sent in as a sample of his usual QSL package. Well done Peter, well worth receiving! The last set of cards sent via the mag come from Charlie (Double Six) who prints the "Charlie" Cards. These are the 'hot-foil' type also used by Ensign and Midas card printers. One point I keep mentioning and keep getting asked to mention, is that if you write your address on a card, please do make sure it is readable!

Okay, the good news! This is about the Dutch Trucking Club of Holland. During the last year or so I've received letters complaining about the DT Club taking money from UK QSLers and never returning a thing. We finally discovered that the club had been sold but the new owners were unable to help anyone who had been ripped off. Shortly after this, I received a letter from them saying that they had sold the club, but did not know the address of the new owner! Now, thanks to my old friend Tony, who made enquiries at a POMA meet earlier this year, I now have the latest address and a promise from Fred (IjSCO), the new owner, that he will do his best to help and make the club genuine. If anyone who has

been done by previous owners of the DT club wish to write to Fred, drop me a line, with SASE, and I'll let you have the address.

Right, I'll start off the UK club mentions with a couple of local ones (local to me anyway). First out of the large pile of post is the Yorkshire Rose Int' DX QSL Group run by Mike (Doc Pepper) whom I've met a time or two. For £6 (UK) and 10 personal cards, you'll get a YR Package consisting of your YR No, certificate, ID card, rubber stamp, 10 club cards, 10 exchange cards, 10 envelopes, 10 seals, a pen, key fob, roster, exchange invites etc. Well worth sending for.

The other local one is the Cobra 148 International, run by Arthur (26 CI 41). This one is a free membership club and, to join, simply send you name and address with a large suitably stamped SAE and a few cards to the club address. Extras available include gloss QSL cards at £4.50 per 100 or £2.50 per 50, club stamp with and ink pad for £4 and two colour decals at 15p per sheet (+ postage).

Moving a little farther afield comes info from the Bravo Bravo Int' QSL Club of Northern Ireland. This genuine club costs £5 and some of your cards to join and in exchange you'll get your BB No, ID card, club stamp, 20 club cards, stickers, swap cards and invites and a list of 100% QSLers at least! Payment can be made in cash or by (UK) postal order/cheque, but made out to Martin Edwards, not the club. The club has two-colour glossy Currie cards available, and also collects any of your spare used stamps for forwarding to charity appeals. Another club which does this is the Romeo Delta X-Ray of Glasgow. To join the RDX is easy; just send a large SAE with an 18p stamp and five personal QSL cards, for which you get your RDX No, ID card, mini-certificate, exchange cards and invites. Also your XYL gets a free No and ID card thrown in. Club extras include a stamp at £3, 100 cards at £3, stickers at 50p per 100 and a sew-on patch at £1.50.

Moving down to the Channel Isles for a moment, I've details on two

genuine clubs there. The first is the CI equivalent of a UK membership club, the CID QSL Swap Club. All that is required to join is five signed and dated personal Cards, a large self-addressed envelope (un-stamped) and 30p. This is to cover the cost of postage off the island. In return you get your CID No, ID card, club seals, exchange cards and invites. The CID club is on Guernsey and from Jersey hails the Jersey Star DX Group. To join this one costs a little more at £5 (cash) plus five of your cards. For this sum you get your unit No, ID card, certificate, five club cards, clubs seas, exchange cards and invites, RST and phonetic codes, and extras as available. Club cards are available at £3 per 100, as is a club stamp; again £3. The biggest problems for these clubs being on the CI's, is that they have to pay import duties on anything made on the main-land.

I've had a letter from Jerry Willis of the Rhein Main Sidebanders and he has explained something to me about his having two addresses which had me a little confused earlier this year. The German one is for UK and European applications, whilst the US one is for the US and Canada. The Club did offer RADAR cards but, since April 1984, they have ceased this and Jerry has been working on getting a set of Berliner cards for the Club. The Club package costs \$8 (US) with 15 personal signed and dated cards, for which you'll get a colour certificate, unit No, 15 exchange cards, club cards, club stamp (Type 1, Oblong or Type 2, Circular), roster, keyring, newsletter, stickers, pen etc, with XYL free.

Right, a few more names and addresses and even a message or two! From Thornton, Mavis (Brighton Belle) writes asking if I could supply the new Ad for Ensign cards. As it happens I was able to pass it on, from the back of a new card actually, as Ensign have never been in touch with me to let me know of anything from their end, unlike some other printers. The "other card" was Lil (Hovis)'s of Derby, so many thanks Lil! The Ensign style of cards are 'hot-foil' printing and other firms



who specialise in these include Midas of Wolverhampton and Charlie cards of Burton on Trent. I mention Charlie Cards as I've had a few recently. Card No 125 comes from Alan (IXL) of Sheffield, with a nice Welsh Dragon design and from Rotherham comes Phillip (Videoman) with a "slotter" design on Card No 137. Other cards in recently include an Earlybird designed card from Percy (Perseus) of Hastings, from Sussex hails Cyril (Custom Two) with a card featuring a customised racing Anglia, and a Currie card or five in from John (High Level) of Lancaster.

Right, message time again. A request from Joan (Sea Eagle) of PO Box 8, Dorchester, who writes in to say she always QSLs 100% but she recently received two cards neither of which had a return address. If "Steptoe" of Barry, South Wales and "UK 54" of Burnham on Sea would care to let Joan know your addresses she will be very pleased to return her cards to you. Now, I'm going to repeat what I said earlier and I make no excuse for doing so! If you are new to the hobby, you may not have realised this, but it

applies to those who have been QSLing for years just as much. If your cards do *not* show your address how can you expect to get a reply? Whenever you use a club's cards, or a printer's stock card rather than a personal QSL, please ensure that your address is clearly on each one! If for any reason you don't have your address on your own card, or have moved since they were printed, rather than write it on to each (and if your hand writing is as bad as mine, it can be pretty unreadable by the time you've done a dozen or so), why not give a label firm a thought? I use, and feel happy to recommend, Vine Lodge of Boston. They can print 1000 black-on-white labels for £2.50 (at time of writing), drop them a line with SAE for details and order if interested.

Now then, competition time. The Viking Radio and Sea Dragon clubs have once again organised a DX/QSL competition between their members. The comp runs from March 1st until October 31st 1985 and all contacts have to be (a) over 450 miles and (b) on legal FM frequencies. All contacts must be logged and proven by original

COMMUNICATION THE **QSL** WAY

QSLer Addresses:

Simon (Missing Link)	60c Church Road, St Leonards-on-Sea, E. Sussex.	John (TT 02) Sid & Sylvia (Popeye)
Terry (The Big Bopper)	PO Box 27, Bolton Lincs.	AGeorge & Margaret (Silver Arrow)
Bob (Skyrider)	150 Yoden Rd, Peterlee, Co Durham.	Klaus (Black Baron)
Peter (Grey Fox)	PO Box 13, Grays, Essex.	Alan (VR 755)
Mavis (Brighton Belle)	90 Fleetwood Rd, North, Thornton, Ceveleys, Lincs.	Paul (Wolfman Jack)
Lil (Hovis)	51 Marlborough Rd, Allenton, Derby.	Bob (Rocket Man)
Alan (IXL)	KB 66, PO Box 96, Sheffield.	
David (Welshman)	PO Box 1982, Sheffield	
Phillip (Videoman)	PO Box 18, Rotherham, South Yorkshire.	
Percy (Perseus)	PO Box 75, Hastings.	
Cyril (Custom Two)	PO Box 55, Horsham, Sussex.	
John (High Level)	11 Springfield St, Lancaster.	
Joan (Sea Eagle)	PO Box 8 Dorchester, Dorset.	
Trev & Cal (Camera Club)	77 Newlands Road, Carr Mill, St Helens, Merseyside.	
Dave Armitage (26 BB 62 A)	9 Longfield Close, Callington, Cornwall.	

QSL Meeting Addresses:

- Lincoln Hamfest, Contact Starmaker, 13 Swift Gardens, St Giles, Lincoln.
- Sierra Foxtrof Eyeball, Contact Mrs L. Clements, PO Box 116, Derby.
- Country CB Club Weekend, Contact Roger, PO Box 36, Scarborough.

PO Box 10, Westbury, Wiltshire.
79 Quebec Rd, St Leonards-on-Sea, E. Sussex.
160 Bridge Rd S., North Shields, Tyne & Wear.
PO Box 6 Knighton, Powys, Wales.
84 Salters Road, Wallyford, East Lothian, Scotland.
PO Box 116, Derby.
20 Beresford St, Shildon, Co Durham.



QSL Club Addresses:

Bravo Bravo Int' 27 Manse Rd, Carrowdore, Co Down, N. Ireland.
 CID QSL Club Austral House, Union St, St Peter Port, Guernsey, CI.
 Cobra 148 International PO Box TR7, Leeds, West Yorkshire.
 Jersey Star DX Group 8 Don Farm, St Brelade, Jersey, CI.
 Norway Amateurs' Club Box 3538, N-4001 Tjensvoll, Norway.
 Rhein Main Sidebanders PO Box 4269, APO 09057 FFM, West Germany.
 Romeo Delta X-Ray 10 Wallace St, Rutherglen, Glasgow, Scotland.
 Sea Dragon QSL Club PO Box 2, Sheringham, Norfolk.
 Viking Radio PO Box 31, Lerwick, Shetland.
 Yorkshire Rose Int' 28 Farmhill Road, Bradford, West Yorkshire.
 DX QSL
 DR 1 c/o Dragonrider Club 3 Tarn Villas, Cowpasture Rd, Ilkley, W. Yorks.

QSL Service's Addresses:

Charlie (Printer) 26 Edward St, Hartshorne, Burton-on-Trent, Staffs.
 Currie (Printer) 89 Derwent St, Blackhill, Consett, Co Durham.
 D'zine (Printers) 36 Cannon Street, Preston, Lancs.
 Ensign (Printers) 58B Market St, Ashby-de-la-Zouch.
 Midas (Printers) 40 Marklew Close, Shire Oak, Brownshills, West Midlands.
 POMA (UK Rep, Ray) PO Box 106, Canterbury, Kent.
 Vine Lodge (Labels) Butterwick, Boston, Lincs.

QSL cards, and Sea Dragon claims to be accompanied by Viking Radio cards, and vice versa. All entries should be in before 30th November and the winners for each section will receive a special trophy. There will also be prizes for the runners-up. I see that there is also a similar competition between the Viking Radio and World Link of Guernsey Clubs. For details on these competitions, how to enter or how to join any of these clubs, just drop a line to them, with return postage/SAE.

Now, I've had a letter from a member of the Viking Radio, Alan (VR 755), who asks if anyone can supply any info on the Mount Bay Skippers DX Group of Cornwall. He has asked me to let you know of the problems he has had and wonders if anyone can help. In September last year he joined the MBS, but the club stamp was missing from the pack. He has since ordered club cards and stickers, and sent over seven letters but still no reply or stamp etc. I note from the Viking Radio newsletter that the MBS is mentioned; perhaps they can help. If I hear anything, I'll let you know as and when.

Extracts from the latest Norway Amateurs' Club Newsletter show that the Welsh Dragon Club of Tonypanydy, Wales has closed, as has the Adriatic Int' of Yugoslavia. To obtain one of these newsletters or info sheets that the club puts out several times a year, you must first be a member, then just send a couple of IRCs to cover postage with your request. Membership of the excellent club costs \$18 (US) and five personal cards. The package you'll receive is fantastic! One thing I do

suggest is that when sending money abroad is to register it. It's a lot safer and you stand a better chance of getting it in case of problems.

Right, a few more names and addresses, then the Forthcoming Events and how to try to get your name in these pages. A very colourful pair of cards from Trev and Cal (Camera Club and Puffing Billy), a new address from Dave Armitage (26 BB 62 A), from the President of the Time Travellers DX Group (John) a request for a mention. Interesting card John. A selection of cards in from Sid and Sylvia (Popeye and Olive Oil) of East Sussex who ask for a mention and say how much they enjoy CB and QSLing and will swop 1-4-1. A very nice Ensign card in from George and Margaret (Silver Arrow and African Queen) of Tyne & Wear. Thanks go to Klaus (Black Baron) and Bob (Rocket Man) who have let me know that the Mermaid Club may be changing hands; as I hear anything, I'll pass it on.

I'm rapidly running out of space now, so I'll just skim through the three events I have some gen on, as they are a little way off yet, and do a fully run-down next month. All three are during September, and the first is the Lincoln Hamfest, Lincolnshire Showground, on September 8th between 10.30 and 5.30. Admission is 50p which includes a lucky programme for a colour telly. The next is the Sierra Foxtrot Mass Eyeball at Markeaton Park, Derby on Sept 14th from 10.00 to 6.30 and admission and parking is free. All proceeds are in support of the City Hospital's Special Baby Unit. The final



one for now is the Country CB Club of Scarborough's Giant Weekend Eyeball at the South Bay Holiday Village. This is to be from the 27th to 30th September and costs about £24 but that is for the hire of a caravan as well as any entry fee, so for a family weekend out or club excursion, it's not bad. For details of any of these, drop a line with SAE to the relevant ADs given at the list at the end of the page. I'd just like to say a big thanks to Don (Vanguard) of D'zine Printers for calling the other day. Don was in my area delivering cards as he was suffering from a postal strike at the time in his.

If you want a mention, then drop me a line with a couple of your cards and ask, if your club would, then the same applies, but with a bit of info about it, if you are organising an event of interest to QSLers, please send your info up to me at my home AD, as given at the end of the club's listing (Dragonrider), but please do give me plenty of notice, not a couple of weeks! That's it again, out of space, but next month I'll try to work in a little of the charitable work that many of you have been doing, so until then, take care, 'cos we all care.

UHF CB ANTENNAS

F. C. Judd looks at the difference between 934MHz and 27MHz antennas

Firstly the difference in physical size between antennas for 934MHz and 27MHz must be fully appreciated and for the purpose of explanation we take the most fundamental of all antennas i.e. the half-wave, as a reference for physical size as well as relationship to the frequency of operation. For example, at 27MHz a naturally resonant half-wave antenna is approximately 5 metres or 17 feet in length. At 934MHz, the same antenna is only 16 centimetres or 6.1/4 inches long. Wavelength is determined by the velocity of radio waves and the frequency of operation and which can be derived from:-

$$\text{Wavelength} = \frac{\text{Velocity of radio waves}}{\text{frequency MHz}} = \left(\lambda = \frac{V}{F} \right)$$

(Velocity of radio waves = 300,000,000 metres/sec)

This simple equation shows that

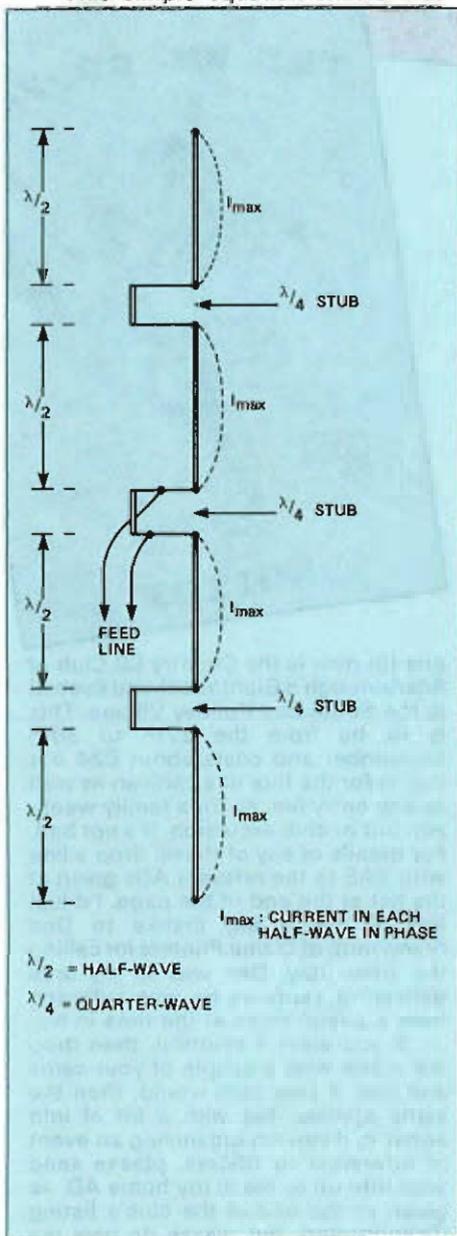


Fig. 1
The theoretical arrangement of a 4-element co-linear antenna. A 50 ohm feed is obtained at the centre quarter-wave stub and ensures equal power distribution in the upper and lower two elements.

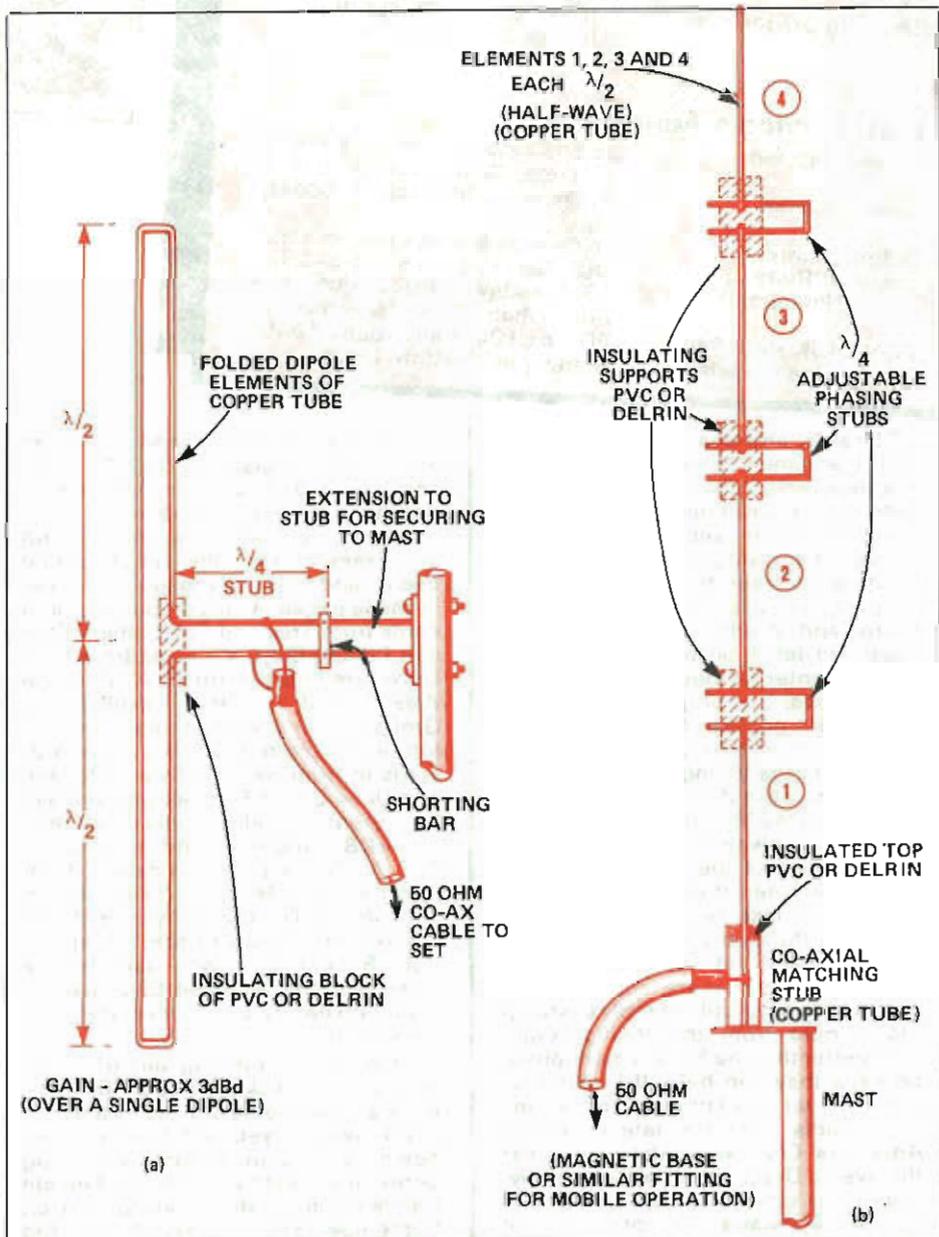


Fig. 2

(a) A split 2-element co-linear antenna designed by the writer originally for a UHF amateur radio repeater station. The antenna has a gain of about 3dB over a dipole and is omnidirectional.

(b) A suggested configuration for a base-fed co-linear antenna with four close spaced half-wave elements each co-phased by quarter-wave stubs. A low impedance (50 ohm) feed can be obtained via a quarter-wave co-axial stub from which the whole antenna is driven.

the higher the frequency the shorter will be the wavelength. For example, the actual wavelength of a radio wave for the frequency 27MHz is 11.1 metres and for the frequency 934MHz is 32.1 centimetres. Half-wave antennas for 934MHz are therefore very small in actual physical size by comparison with those for 27MHz. So small in fact that a 4-element parasitic beam antenna for 934MHz will occupy an area of little more than 17 x 20 centimetres or about 7 x 8 inches. A vertical 4-element omnidirectional colinear antenna for 934MHz will only be about 70 centimetres or a little under 30 inches long. As a further example of this wide difference in size a quarter-wave antenna for 27MHz is about 2.5 metres or 8ft 6 inches long but for 934MHz only eight centimetres or about 3¼ inches.

However, the UK CB licence does permit the use of antennas for 934MHz employing elements a half-wave in length. A total of four may be used in any suitable design format although the maximum length of each element must not exceed 17 centimetres or 6.96 inches. There are three basic designs that can be used although variations of these are possible. Basic designs using all four elements are:

1. Stacked co-phased vertical colinear arrays which are omni-directional and vertically polarised when used in vertical mode.
2. Active arrays with all elements driven and are directive but may be horizontally or vertically polarised.
3. Parasitic arrays which are also directive but may be horizontally or vertically polarised.

The use of parabolic, flat plane, or corner reflector systems are not permitted. Neither are slot antennas allowed because the licence schedule states that the elements must consist of rods (tubes) or wires.

Some possible designs for 934MHz antennas

For general communication on 934MHz vertically polarised omni-directional antennas will be the most used, particularly for base station to mobile and mobile to mobile operation. This limits the choice to the following:

- (1) Quarter-wave or other odd fractional wavelength groundplanes.
- (2) Single vertical end-fed half-wave.
- (3) Stacked or co-phased half-waves (vertical) consisting of 2, 3 or 4 elements.

It is most unlikely that fractional wavelength single element ground plane type antennas would be of much use as they have no gain and are relatively inefficient anyway. Much the same applies to a single half-wave dipole which although an efficient antenna also has no effective gain. The only viable antenna for omni-directional

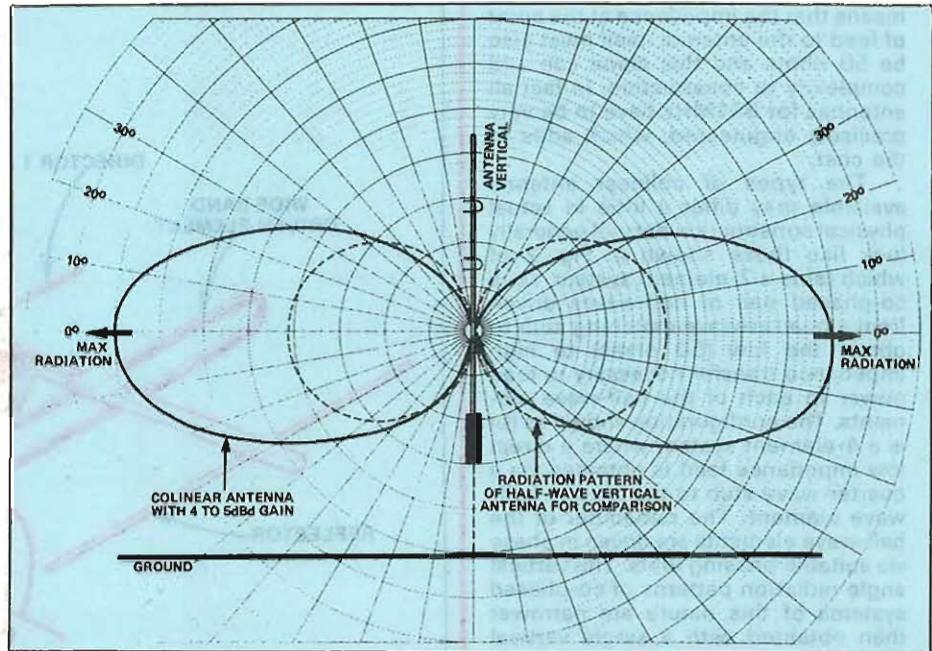


Fig. 3 Radiation pattern (average) of a 4-element, close-spaced vertical co-linear (otherwise omni-directional). Radiation is ideally parallel to ground. Dotted line pattern is that from a half-wave dipole (Note: patterns not to scale with regard to gain factors).

operation and which does have effective gain is the co-linear system consisting of two or more half-wave elements driven in phase. The effective gain is, however, limited when the elements are close spaced. No more than about 4dB with reference to a half-wave dipole can be obtained in practice, even with four elements, although some manufacturers will no doubt find a way of making this kind of performance seem better than is really possible by quoting the gain with reference to the hypothetical isotropic radiator. Wider spacing between each element of a co-linear system allows more gain to be obtained but the technical problems involved would make this design very expensive. Whatever the format, the colinear system is the only worthwhile configuration for omni-directional operation for both fixed station and mobiles.

Colinear Systems

Colinear antennas function on the basis that each element contained in the system is driven in phase which means that the elements must be coupled to each other by a quarter-wave stub or other equivalent method of changing the phase of both the current and the voltage flowing from one element to the next by 180 degrees. The fundamental principle of the co-linear system is shown in Fig. 1 Although co-linear antennas can be fed with power from the transmitter in various ways it is necessary to ensure a very precise impedance match between the feed cable and the antenna. For example, adoption of the standard 50 ohm co-axial cable for antenna connection

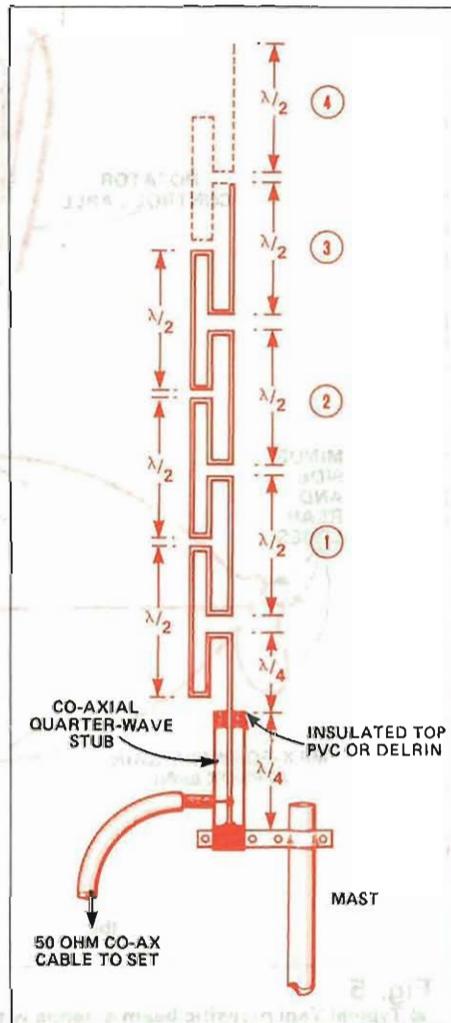


Fig. 4 An unusual antenna known as a Franklin array, originally designed for shortwave transmission but which would have possibilities for 934MHz. Can be voltage-fed from a base co-axial stub. The last section (4) is shown dotted to indicate that the system of folded elements can be continued to obtain greater gain. About six would be the limit as the power distribution would fall off too much to be of any use.

means that the impedance at the point of feed to the antenna itself must also be 50 ohms and this alone can add complexity to construction. In fact all antennas for 934MHz have to be very precisely engineered, which adds to the cost.

The types of colinear antenna available may differ a little in actual physical construction but will generally look like those shown in Fig. 2 of which (a) is a 2-element system i.e. a co-phased pair of half-waves driven from a quarter-wave matching stub to obtain the low (50 ohms) to high impedance transfer necessary to feed power to each of the half-wave elements. The configuration shown as (b) is a 4-element system where a direct low impedance feed is obtained via a quarter-wave stub to the bottom half-wave element. The remainder of the half-wave elements are driven in phase via suitable phasing units. The vertical angle radiation patterns of co-phased systems of this nature are narrower than obtained with a single vertical dipole as shown in Fig. 3 because of the gain factor (absolute) from a 4-element co-linear is about 4.5dBd (gain over a dipole).

Another possible design for 934MHz is shown in Fig. 4 and is based on the 'Franklin' phased array system originally used for short-wave transmission many years ago. In this system, a number of half-wave elements are folded back on each other so that the full length radiating sections shown as (1), (2), (3) and (4) respectively are driven in phase with each other. There is a small amount of wave cancellation due to the folded sections, the effect of which is some limitation to the gain of the antenna although it is of course omnidirectional when used in vertical mode.

Yagi or parasitic type antennas

Directional beam antennas of the Yagi or parasitic type will generally resemble the one shown in Fig. 5 (a) and have a radiation pattern similar to that shown in (b). The driven element may well be a folded dipole which is often used in this type of antenna to obtain a low impedance match to a 50 ohm cable. Although the CB licence schedule states "single" elements, a folded dipole can and should be considered as a single element. The reflector and the two directors are of course single elements. The effective gain of this type of beam antenna depends largely on the spacing between the elements but should be in the region of 6 to 7dB with reference to a dipole. Such antennas can be used vertically or horizontally to obtain either vertical or horizontal polarisation of the transmitted wave. Being uni-directional they must be rotatable so that maximum radiation is always in the desired direction. The radiation pattern is approximately the same whether such an antenna is used horizontally or vertically although the pattern is sometimes slightly wider in the vertical mode depending on the design.

Active beam antennas are not particularly suitable for use at 934MHz, at least not for CB radio application. The

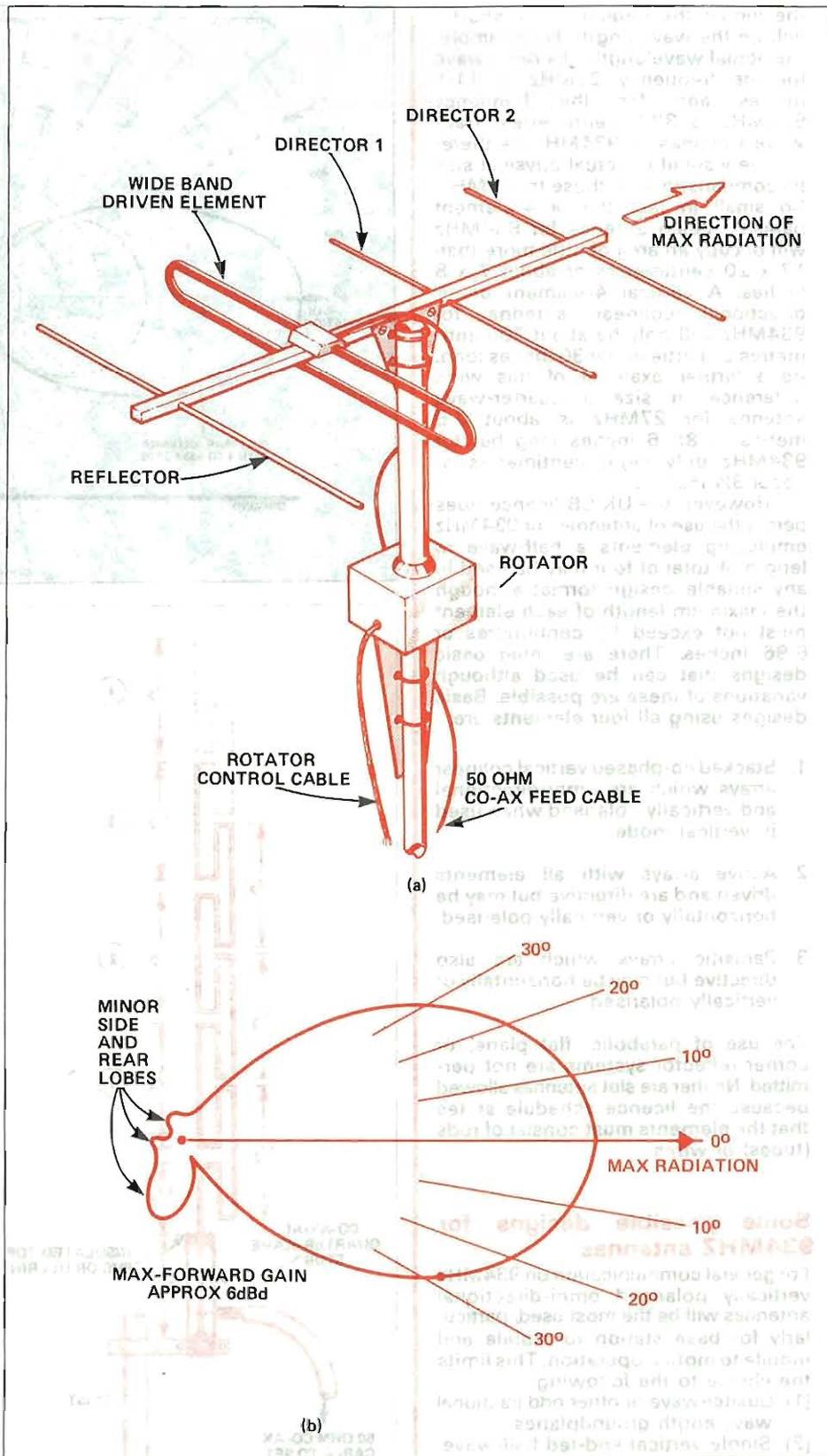


Fig. 5

(a) Typical Yagi parasitic beam antenna with a wide band folded driven element. Width of elements between 16 and 17 cm. Length of beam in the region of 20cm depending on element spacing.

(b) Polar pattern of antenna. Similar to that shown in (a) small rear or side lobes are usual and unimportant unless much larger which indicates poor design. Gain factor in the region of 6dB (gain over a single dipole). Antenna shown in horizontal mode but performance almost identical when used in vertical mode. Rotator used to turn antenna through 360 degrees clockwise or anticlockwise and with stop facility at any position.

term active means that all the elements are driven. A large number of different designs are possible and the elements can be phased so as to obtain different modes of directivity. Beam antennas

that are part active and part parasitic are also possible and such an antenna might consist of two driven (active) elements and one or more passive (parasitic) elements. In the course of

time, many different antenna designs for 934MHz CB radio will no doubt become available.

Some further notes about 934MHz antennas

Whilst antennas for 27MHz can fairly easily be home constructed this would not be the same case for antennas for 934MHz. The physical dimensions are extremely critical for one thing and adjustments for matching, tuning and VSWR etc would necessitate the use of very accurate and therefore expensive measuring instruments. For instance, a VSWR meter would have to be capable of operating up to about 1000MHz.

Co-axial cable for use at 934MHz must be of very low loss grade and the plugs and sockets used for connection to the transmitter and the antenna must be special UHF 'N' type with silver or gold-plated internal contacts. The commonly used PL259 plugs and similar connectors used for 27MHz cannot be used at 934MHz. The loss with this type of connector is far too high and they can also introduce high VSWR.

It has been said that radiation at frequencies in the region of 900 to 1000MHz (and higher) can have certain undesirable effects on human tissue. This has not been fully proved although there have been claimed cases of eye damage thought to be due to exposure to radiation in this frequency range. It is a known fact that the concentration

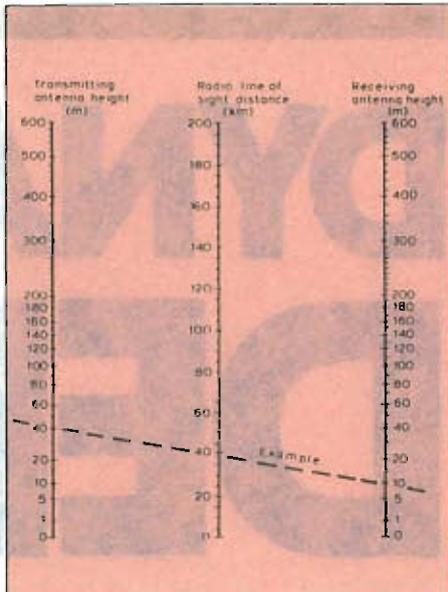


Fig. 6 Line of sight (radio) distance for transmitting and/or receiving antennas at any height up to 600 metres. Dotted line example shows probable range of 40Km with transmitting antenna at 40 metres and receiving antenna at 10 metres above ground. Same range is obtained if function of antennas are reversed.

of power per square centimetre is high, much higher than obtained at lower frequencies such as 27MHz. It is possible, of course, that some people might be affected but this could only

be caused by very close proximity to an antenna radiating relatively high power. Close proximity means within a few inches of an antenna so the only advice that can be given here is don't stand with your head very close to an antenna to which power is being applied at 934MHz.

Line of sight distance

VHF and UHF radio wave propagation is normally considered as "line of sight" although the actual range may be greater owing to the fact that very high frequency waves tend to follow the curvature of the earth before becoming too attenuated to be of use. The higher the transmitting and receiving antennas the greater the possible range of communication. Some idea can be obtained from the chart (Fig. 6) on which the dotted line gives an example. Actual working ranges do of course depend on terrain and the presence of large buildings, heavily built-up areas, hills etc in the path, all of which can reflect and/or attenuate signals in the VHF and UHF range. Tests carried out in relatively flat country have resulted in mobile to mobile ranges of 15 to 20 miles on 934MHz, but this would be fairly exceptional.

Reference to VHF and UHF Techniques (including antennas): *The VHF-UHF Manual* G. R. Jessop, 4th Edition (Radio Society of Great Britain books department, Cranborne Road, Potters Bar, Herts EN6 3JW.)

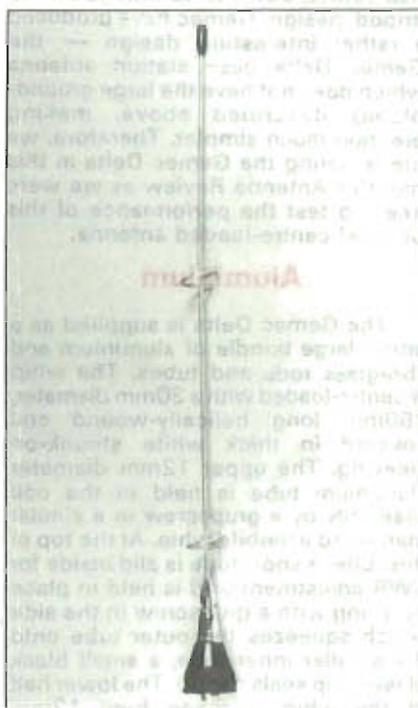
934 Antennas — what's available

Garex Electronics of Marsworth in Hertfordshire market the Revco 2500/3 3dB and the 2500/5 5dB 934 antennas. The 3dB version (whip and hinge adaptor only) sells for £4.60, while the 5dB costs £8.91. A variety of mounts are available and, depending upon the type of mount, the complete units vary in price from £8.19 to £28.40.

Les Wallen Manufacturing of Kent recently launched a new range of 934MHz antennae and accessories including a base co-linear (8x½ wave + 1x¼ wave elements), a mobile co-linear (same elements), a ¼ wave mobile and a ⅝ over ¼ wave mobile. Prices range from £20.05 to £55.35.

Telecomms of Portsmouth offer three 934MHz antennas from the Nevada stable. The PA7-E base antenna is a 7.14 dbi omni stacked ⅝ co-linear and costs £66. The P7M-E is a mobile magmount and costs £44, as does the P7R-E mobile gutter mount.

Kestrel Electronics offer a 934MHz antenna with pre-set SWR, a shock absorbing spring and a 7.5 dbi gain.



The gutter mount version costs £44.95, while the magmount sells for £46.95.

Sandpiper Communications of Trehafod, Pontypridd manufacture and market a large range of UHF antennas, with an impressive amount of mounts, adding to their flexibility. Of particular interest is the range of co-linear antennas manufactured from fibreglass. The mobile antenna has an BNC plug and will fit all ⅜" screwthread mounts. Small and large magmounts are also available, as well as stud and gutter mounts. All mobile antennas are quick release. Base colinears are also fibreglass and will fit onto 1" or 2" masts. The base range has an N-type plug fitted as standard including a waterproof shroud to cover the plugs.

The Sandpiper range includes an extensive range of helical and yagi antennas for base station use. Prices range from £25.00 to £95.00 and we suggest that you contact Sandpiper Communications for a price list — there's too much for us to fit in a quick paragraph.

Antenna Review



Brian Wright looks at an antenna with a somewhat different design

DYNAMIC DELTA

It would appear that many breakers are still not too impressed with legal base station antennas by the amount of half-waves and similar antennas that are remaining up or appearing on rooftops. This lack of interest in legal antennas is not altogether justified, as many of the legal top-performance antennas can certainly compare very favourably with many of these larger types, especially if mounted at the same height. One of the possible disadvantages may be, however, that most of the top-performance legal antennas are of the 'tripod' type — i.e. they have three long, angled-down groundplane legs making them sometimes difficult to erect in an awkward position where space is tight.

Well, just when we thought that high-performance legal base antennas had settled down to variations on the 'tripod' design, Gemec have produced a rather interesting design — the Gemec Delta base station antenna which does not have the large groundplanes described above, making erection much simpler. Therefore, we are featuring the Gemec Delta in this month's Antenna Review as we were keen to test the performance of this unusual centre-loaded antenna.

Aluminium

The Gemec Delta is supplied as a rather large bundle of aluminium and fibreglass rods and tubes. The whip is centre-loaded with a 30mm diameter, 250mm long helically-wound coil covered in thick white shrunk-on sleeving. The upper 12mm diameter aluminium tube is held in the coil assembly by a grub screw in a similar manner to a mobile whip. At the top of this tube, a short tube is slid inside for SWR adjustment and is held in place by a ring with a grub screw in the side which squeezes the outer tube onto the smaller inner tube; a small black plastic cap seals the tip. The lower half of the whip is made from 13mm

diameter solid aluminium rod which is threaded at either end for mounting the whip and for fitting to the underside of the loading coil. The overall length of the whip or radiating element is 1.65 metres and the solid lower half gives good stability in strong winds — an important consideration with such a large loading coil.

The lower half of the antenna has two 1¼ inch diameter x 1.235 metre long tubes which join by sliding one over a smaller diameter tube projecting from the other and secured in place with a small self-tapping screw. At the upper end of this joined tube is a fitting to allow the whip to be screwed into it. At the side of this fitting is an SO259 socket for connecting the coax like a normal centre-fed dipole. This lower tube is now slid into an even larger diameter, 920mm long glass fibre tube and secured in place by a bolt through pre-drilled holes.

Fibreglass

The lower end of the fibreglass tube is intended to fit over the users' 1¼ inch diameter mast (not supplied) and secured in a similar manner by drilling the mast through a pre-drilled hole in the fibre glass tube and fixing again with a bolt right through both tubes. A 950mm long fibreglass rod is supplied for supporting the coax which is part of the antenna assembly also. The rod is clamped at right angles to the large fibreglass tube at 300mm from the top by two clamps supplied. At the outer end of this rod is a small clamp for holding the coax which is fitted as described below. The PL259 plug is plugged into the socket at the side of the boss at the base of the whip, the coax is then fed into the clamp at the end of the fibreglass rod, described above, and then taken back against the mast below and fixed so that the angle of the coax above the fibreglass rod is similar to the angle of the coax below.

The coax and rod thus forming a delta shape from which the antenna obviously gets its name.

With the SWR adjustment as supplied, the SWR on our sample was 1.1:1 over most of the band rising to 1.2:1 at one end so we did not attempt to obtain a better reading as we considered this extremely good. With the Gemec Delta mounted on its mast, it did look good and business-like but with the coax out one side like one leg of a 'tripod' antenna we thought that it might be very directional, so we tried several checks from different sides but without any sign of this.

On test, the Gemec Delta performed very well and signals were some of the best that we have had over our test route as you can see from the test map. Signals never went below S4 over our

“ . . . a sturdily constructed, high-performance base station antenna which is fairly easily erected”

entire normal test route which is quite unusual. While we are on the subject of testing, we would like to clarify the method of our testing. All antennas are tested over the same route with two Uniace 100 rigs as these do not suffer from desensing, and so don't give a false reading. In the case of a base antenna, it is tested at the maximum legal height for 4 watts and the mobile antenna used is a K40, boot-mounted. We feel that this method gives a good comparative test between different antennas that we test.

Sturdy

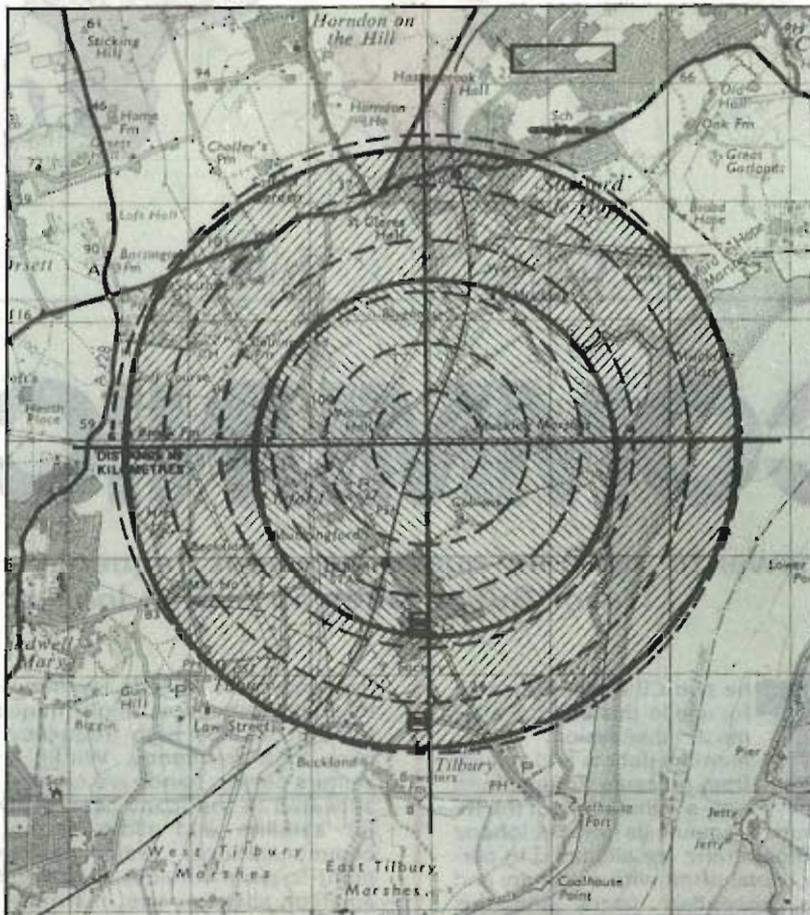
In conclusion then, we would consider the Gemec Delta to be a sturdily constructed, high-performance base station antenna which is fairly easily erected. Priced at £45, it seems a little expensive but there is quite a lot of material in this antenna and the performance is quite superb. It is also a little less obtrusive than the tripod types which is an advantage to those of you with sensitive neighbours.

Our thanks to K.E.P. Rowe, P.O. Box 6, Pershore, Worcs, for supplying the test sample. The antenna is supplied direct from the above address at the moment and, for those of you seeking more information, the telephone number is 0386-556655.

ANTENNA REVIEW DATA PANEL

SPECIFICATIONS

Model	GEMEC DELTA
Type	CENTRE LOADED BASE STATION
Length	
Frequency Range	27-28MHz
Max Power Handling	—
Impedance	50ohm
Cable Supplied	NONE
Mounting Details	1 1/4 INCH MAST
Supplier	GEMEC, PERSHORE, WORCS.
Typical Price	£45



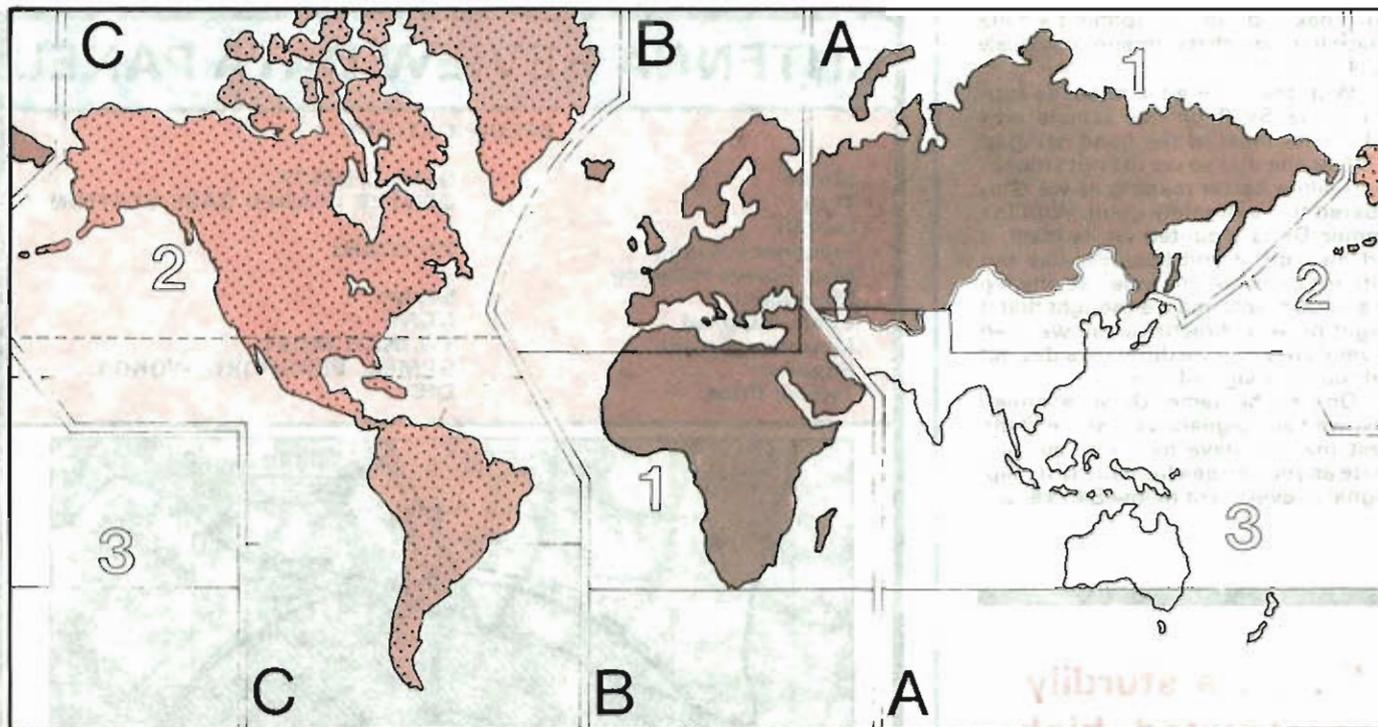
REVIEW VERDICT

Performance XXXXX	Installation XXXX
SWR Adjustment XXXX	Instructions XX
Construction XXXX	Value XXX

We rate our samples on a scale of one to five. Five stars is the highest rating, three and four stars are average to good and one and two stars mean it's not doing so well.

The Tests

We have used our standard test procedure to assess the efficiency of this antenna. Just to bring new readers up to date this involves two tests: one static and one mobile. Our test sample is fitted to a stationary mobile and a second mobile follows a prearranged route that orbits the stationary test vehicle, sending and receiving signal reports at measured intervals. This is then repeated with the test antenna on the mobile test vehicle and the signals are sent and received between a stationary vehicle. A standard rig and antenna is used in all the tests. With the results obtained we are able to draw up the radiation pattern shown here. This is simplified to make the results more easily understood. The antenna is also subjected to a series of 'lab' tests to assess their durability, quality and construction, etc and finally we hand it over to a panel of CBers for comment.



COMMUNICATIONS.

In answer to the many questions about frequency allocation for citizens' band radio, Trevor Butler takes an overall look at the radio spectrum

The two CB bands allocated for use in this country after much discussion, parliamentary debate and activity from pressure groups, form only a minute part of the RF spectrum. Frequencies from 0 kilohertz to 500 gigahertz are allocated to particular users, often with a primary and several secondary users, and this shared arrangement often leads to problems in operation.

It is a fact, however, that as technology increases more demand is being placed upon the Radio Frequency spectrum — the addition of a television network, the expansion of local radio, two cellular telephone systems, talk of satellite television, wider use of paging systems and the movement away from using conventional lines, to radio-links to carry more and more material makes frequency planning essential.

When considering the allocation of frequencies, thought is given to the application and the propagation expected from certain parts of the spectrum. It is this fact which has led some critics to claim that 27MHz was an unwise choice for what the Government itself said was intended to be a low-power, short-range general-purpose communication system for the "ordinary person".

Initially the range of frequencies available is split into sectors, very low

frequency up to 1.5MHz, low frequency, medium frequency, high frequency through to very high frequency and ultra high frequency. Within these sectors certain bands are created and allocated to the many users allowing for satellite and radio astronomy, communications, radio navigation, point-to-point services, broadcasting, amateur, distress use, maritime and aeronautical users and standard frequency and time signal.

Geneva Plan

Perhaps the largest alteration to frequencies to affect most people for some time happened on 23rd November 1978 when, as a result of the 1975 Geneva Plan, the BBC chose new frequencies to be used by Radios 1, 2,

3 and 4 and the External Services. The Low Frequency band, or at least the broadcast part, extends from 155 to 285kHz and the medium from 525 to 1605kHz, although 255 to 285 is not available in Western Europe. There is a 9KHz spacing between the carriers, so only room for 15 channels on LF and 120 on MF. In the early days of radio, this would have been adequate to assign exclusive channels to particular transmitters, but as the number of broadcast stations increased in the 1920s, channel sharing became inevitable.

There have been periodic conferences since then to regulate the use of frequencies for broadcasting by the various companies and countries. There was a Geneva Plan in 1926, a Prague meeting in 1929, in Lucerne in 1934, Copenhagen 1948 and Geneva

LIMITS OF THE BROADCASTING BANDS

Low frequency	{lf} 150-285KHz	{2000-1053m}	AM radio (long wave)
Medium frequency	{mf} 525-1605KHz	{571-187m}	AM radio (medium wave)
Band I*	{vhf} 41-68MHz	{channels 1-5}	405-line television-ex
Band II	{vhf} 88-108MHz		FM radio
Band III*	{vhf} 174-216MHz	{channels 6-13}	405-line television-ex
Band IV	{uhf} 470-582MHz	{channels 21-34}	625-line television
Band V	{uhf} 614-854MHz	{channels 39-68}	625-line television
Band VI	{shf} 11.7-12.5GHz	{channels 1-40}	DBS channels

*to be re-allocated.

The approximate wavelengths for the low and medium frequency allocations used by the BBC for the domestic radio services are

Frequency kHz	Wavelength metres	Frequency kHz	Wavelength metres	Frequency kHz	Wavelength metres
200	1500	855	351	1260	238
585	513	873	344	1323	227
603	498	882	340	1341	224
630	476	909	330	1359	221
657	457	990	303	1368	219
666	450	999	300	1449	207
693	433	1026	292	1458	206
720	417	1035	290	1485	202
756	397	1053	285	1503	200
774	388	1089	275	1521	197
792	379	1107	271	1548	194
801	375	1116	269	1557	193
810	370	1161	258	1584	189
828	362	1197	251	1602	187
837	358	1215	247		

The frequencies shown in bold type are those which can be transmitted at high power. The other frequencies are low-power allocations only.

"The two CB bands allocated for use in this country form only a minute part of the RF spectrum"

proposal was included for a specification for a future use of single sideband for hf, the introduction such that the transition from double sideband to ssb could be organised in advance to avoid incompatibilities and also that some of the additional frequencies to be allocated be shared. The possibilities of TV broadcasting frequency sharing with the land-mobile services below 1GHz was discussed, as were the feasibility of satellite sound broadcasting on the 26MHz range.

The Home Office issued a summary of its preparations for the 1979 World Administrative Radio Conference and broke down its suggestions by frequency with the resulting summary: 0-150kHz no major changes; 150-1605kHz, reduce interference from aeronautical beacons; 1605-4000kHz, provide exclusive allocation to mobile marine

A BROADER VIEW

Future Usage of Band II in the United Kingdom

88.0	90.2	92.4	94.6	96.1	97.6	99.8	102.0	103.5	105.0	108.0	
Private Radio	Mobile Radio 2	Radio-3	R-4 (UK)	BBC LR National Regional	ILR	N-4	N-5	ILR	BBC LR National Regional	National Extensions	Aero-nautical Radio- navigation

again in 1975. A Montreux plan was drawn up in 1939 but was never implemented. The 1975 Geneva conference was the largest of its kind and embraced not only European areas but also the whole of Africa, Asia and Australasia as well. A plan was needed to cover the whole of this area to try and set certain standards. For example, whilst Europe and Africa used 9kHz spacing between its transmissions, Asia and Australasia used 10kHz and so heterodyne interference would inevitably occur between stations operating on different channelling standards.

This convention was long overdue, the earlier Copenhagen plan had allowed for some 620 transmitters, yet by 1976 the number in Europe had grown to 1450. Mutual interference between stations had grown worse, due to the increased range of interfering signals after dark, the night service range was often only a fraction of that achieved in the daytime.

This is a crucial factor in LF and MF planning — daytime reception depends on the ground wave, which falls off in a predictable way and means that several high-powered transmitters can use the same frequency without problem. At night-time and even during the daytime in Winter, the signals become subject to ionospheric reflection giving rise to distances of a thousand miles or more.

The European Broadcasting Union meets regularly and is partly concerned with frequency allocation as well as technical standards and specifications. It published a document "Study of Technical Questions of Interest to WARC 1979" — this provided the technical requirements for the WARC 1979, although most of the studies were carried out in preparation for the Autumn 1978 meeting of the CCIR. Concerned with HF broadcasts, terrestrial television broadcasting and satellite communications, certain recommendations were made. A

services: 4-30MHz, eliminate out-of-band assignments and provide for growth and increases in the maritime-mobile allocation by new provisions and widening existing ones; 30-108MHz, additional 70-90MHz required for growth of land-mobile services. And so the booklet went on, critical of the quality of the submissions received as a result of the Home Secretary's invitation to submit comments.

Questions have been asked in the technical press about the future of broadcasting. Will there actually need to be any improved format sound broadcast service? If there is a new service, Direct Broadcast by Satellite (DBS) seems the obvious, although now the BBC are saying that they can't find the capital required in view of the recent licence fee settlement. Are they bluffing or is it just "sour grapes" since their standard wasn't adopted?

Technically, radio via DBS would be reasonably simple to achieve; there is no magic and it would (?) relieve the already crammed HF/VHF/UHF spectra which has been the subject of a latter-day gold rush. A standard transponder 30MHz wide could be crammed full of standard 150kHz deviation FM signals on, say, 300kHz spacing. Sounds simple enough, yet since it has taken almost 20 years to produce two local radio networks perhaps it will never happen. Anyway, however neat the required 12GHz dish might be, it would tie the new radio to the home and its selling point has always been its accessibility.

There is more to broadcasting,

though, than technical considerations; provision is needed for community radio, it is claimed, and although the subject has long been a political "no go" area, strenuous efforts are now being made to bring this topic to the forefront of debate. Where would the frequency allocation be, however, should these stations want a medium wave transmitter as well as, perhaps, a local low-power VHF signal?

1984 saw planning activity as well with some hope for the community radio pressure groups. The second session of the region one VHF Band II conference was held in the Autumn. The world is divided into three regions, region one being the UK, Europe, Africa, part of Asia; region two includes North and South America while region three is mainly taken up with Australia, New Zealand and SE Asia.

With the MF and LF broadcast settlements, attention is now turning towards VHF. Band II (88-108MHz) should be made available exclusively for the broadcasters once the public services have moved, and there is now

"With the MF and LF broadcast settlements, attention is now turning towards VHF"

exciting talk about allocation in the old VHF black and white television service bands which are now virtually dormant.

Continued difficulties have been experienced with agreeing protection requirements for aeronautical services and, after tests were conducted with the Civil Aviation Authority, interference did not seem as prolific as had been thought.

A separate agreement was made concerning mobile radio in the 104-108MHz band between the UK, Ireland, France, West Germany, Belgium, the Netherlands, Luxembourg, Switzerland and Monaco. The effect of this is likely to hasten the movement of land mobile radio usage out of Band II and benefit the broadcasters. The VHF/FM re-engineering and expansion programme is now well under way with proposals for another 27 stations in the near future, although pirate radio stations have caused more problems of late. Some operating in Band II were affecting bona fide services while others were in apparently clear allocated channels and affecting test transmissions.

It is known that the BBC is keeping open its options to be able to establish a sound-only satellite broadcast service somewhere in the frequency range 0.5-2.6GHz in the run-up to the forthcoming WARC Geostationary Orbit Conference. This conference will dis-

The Schedule of frequency bands, powers, etc, which, for the sake of convenience, appear in an identical format in both the Class A and Class B licences.

Frequency bands in MHz	Status of allocations in the UK to: The Amateur Service	The Amateur Satellite Service	Maximum power Carner PEP	Permitted types of transmission
1.810-1.850	Available to amateurs on a basis of non interference to other services	No allocation	9dBW 15dBW	Morse Telephony RTTY Data Facsimile SSTV
1.850-2.000				Morse Telephony Data Facsimile SSTV
3.500-3.800	Primary Shared with other services	No allocation	20dBW 26dBW	Morse Telephony RTTY Data Facsimile SSTV
7.000-7.100	Primary	Primary		
10.100-10.150	Secondary	No allocation		
14.000-14.250 14.250-14.350	Primary	Primary No allocation		
18.068-18.168	Available to amateurs on a basis of non interference to other services. Antennas limited to horizontal polarisation, maximum gain 0dB with respect to a half-wave dipole.	No allocation.	10dBW —	Morse, AIA only
21.000-21.450	Primary	Primary.	20dBW 20dBW	Morse Telephony RTTY Data Facsimile SSTV
24.890-24.990	Available to amateurs on a basis of non interference to other services. Antennas limited to horizontal polarisation, maximum gain 0dB with respect to a half-wave dipole.	No allocation.	10dBW —	Morse, AIA only
28.000-29.700	Primary	Primary.	20dBW 26dBW	Morse Telephony RTTY Data Facsimile SSTV
70.025-70.500	Secondary basis until further notice. Subject to not causing interference to other services. Use of any frequency shall cease immediately on demand of a government official.	No allocation.	16dBW 22dBW	
144.0-146.0	Primary.	Primary.	20dBW 26dBW	Morse Telephony RTTY Data Facsimile SSTV Television
430.0-431.0	Secondary This band is not available for use within the area bounded by 53°N 02°E, 55°N 02°E, 55°N 03°W, and 55°N 03°W.	No allocation.	10dBW 16dBW e.r.p. e.r.p.	
431.0-432.0	Secondary. This band is not available for use: a) Within the area bounded by 53°N 02°E, 55°N 02°E, 53°N 03°W, and 55°N 03°W b) Within a 100km radius of Charing Cross, 51°30'30"N, 00°07'24"W.			
432.0-435.0	Secondary.	No allocation.	20dBW 26dBW	
435.0-438.0		Secondary.		
438.0-440	Secondary.	No allocation.	20dBW 26dBW	
1240-1260		Secondary.		
1260-1270	Secondary.	Earth to Space only	20dBW 26dBW	
1270-1325	Secondary.	No allocation.		
2310-2400	Secondary.	Secondary.	20dBW 26dBW	
2400-2450	Users must accept interference from the ISM allocations in this band.	Users must accept interference from the ISM allocations in this band.		
3400-3475	Secondary.	No allocation.		
5650-5670		Secondary. Earth to Space only		
5670-5680	Secondary.	No allocation.		
5755-5765		Secondary.		
5820-5830	Secondary.	Secondary. Space to Earth only.		
5830-5850	Secondary. Users must accept interference from the ISM allocations in this band.	Secondary. Users must accept interference from the ISM allocations in this band. Space to Earth only.	Morse Telephony RTTY Data Facsimile SSTV Television	
10000-10450	Secondary.	No allocation.	20dBW 26dBW	
10450-10500		Secondary.		
24000-24050	Primary Users must accept interference from the ISM allocations in this band.	Primary. Users must accept interference from ISM allocations in this band.	20dBW 26dBW	Morse Telephony RTTY Data Facsimile SSTV Television

cuss planning of the feeder links to the already approved 12GHz DBS down link. Attempts will also be made to obtain an allocation in region one for High Definition DBS at 23GHz which already exists in regions 2 and 3.

Another strain being placed upon the RF spectrum is the increasing use of satellite links to replace the bulk of the point-to-point links which carry sound signals between studios and transmitters. A proposal under discussion involves the use of many carriers through one satellite transponder.

The Department of Trade's consultative report dealing with the broadcasters' requirements for ancillary services in the frequency range 30-960MHz to include radio microphones, Outside Broadcast links, programme chains, radio telephones, talk-back etc. has been published. A number of recent studies have been made to establish planning criteria for the protection of radio microphones. At present, much use is made in Bands I and III, the old 405-line television transmission frequencies, but as and when these are re-allocated, thought will have to be given to existing users.

The VHF hi-band allocated for theatre radio mics has only a limited allocation, and in fact proves inadequate on some occasions at the moment. Work is underway to accommodate low-power ancillary service requirements in the UHF broadcast bands, and again particular attention has been

"... pirate radio stations have caused more problems of late"

paid to the requirements for new radio-mic and talk-back systems.

The work on re-planning the band between 88.0 and 108.0MHz has proceeded, and culminated in the second session of the International Telecommunication Union at the end of last year; the first session was in 1983. A number of meetings with neighbouring administrations were held with the objective of clearing plans in advance of the conference. Below 100MHz in Western Europe, the plan is based largely upon the status quo as represented in Stockholm in 1961 but with the removal of virtually all frequency offsets to ease receiver design.

At the 1982 and 1983 International "Regional Planning Conference for VHF/FM Sound Broadcasting" attended

by 500 delegates representing 77 countries of Europe and Africa, a new Geneva Agreement, 1984, was achieved. It will have the status of an international treaty. To this is annexed a "Geneva Plan" covering more than 53,000 VHF/FM transmitters in Band 2. A result of the new plan will be the need, before 1st July 1987, for a number of frequency changes affecting the Independent Local Radio transmitters and BBC Local Radio stations. The changes will be introduced in phases starting about September 1985.

The object will be to have all UK local radio services in two specific sub-bands and to further divide these, where possible, between BBC and ILR. It may be in some areas that existing BBC and independent frequencies "swop", although with a break between changes. One of the national service sub-bands is provisionally earmarked for the proposed Independent National Radio Service, although this is still at an early planning stage.

Certainly these are exciting times for broadcasting, even though the spectrum is becoming full; certain decisions are expected relating to the old Band III. These have been long awaited, and if they were houses, squatters would have moved in by now! Explorative transmissions have been made on stereo TV transmissions and the introduction of cable TV networks; DBS may be just around the corner, money permitting.

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ATOMIC RABBIT AND THE TALKING TOASTER

Mike Seabrook, a writer of some repute, knows absolutely nothing about CB. So, who better to offer a few thoughts on the subject?

Arriving at work one morning a few years ago, I was somewhat taken aback when I greeted a colleague of that time. He was an excitable character, very easily rattled, and when something upset him, which was more or less daily, he was much given to wild exhibitions of frenzy. Waving his arms about dangerously in the air he would deliver a passionate harangue, with much vim and something of the Welsh *hwy!* about it, on whichever aspect of the universe it was that had most recently set itself malevolently to inflict alarm and dismay upon him. He didn't actually *have* to have an audience for these performances, but he preferred to have one if possible, for, as he said once after calming down, it assisted the flow of his oratory. In any case, he always got one, because, naturally, we all looked forward to these entertainments immensely, and a large crowd always appeared as if by magic from nowhere as soon as his raised voice was heard.

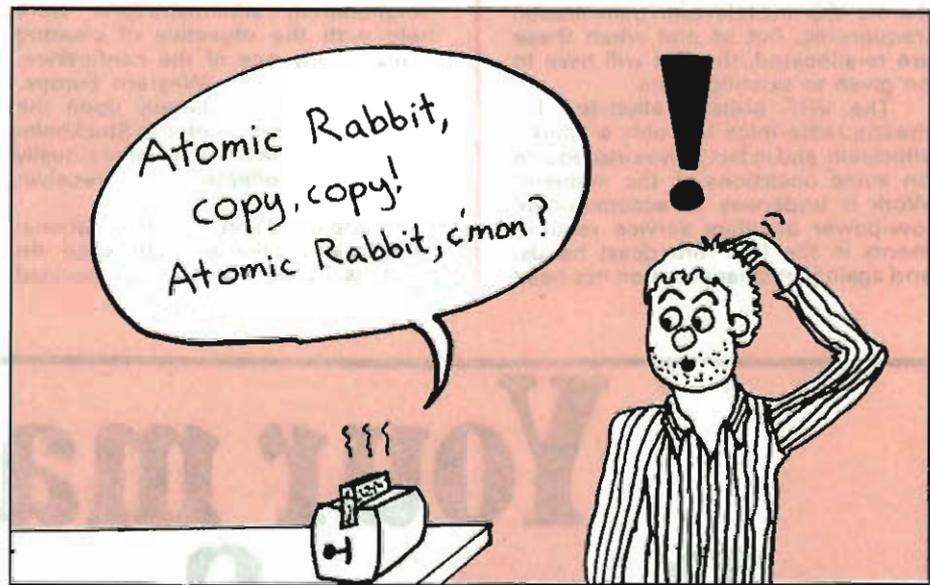
On this occasion, however, he had found no-one to hear him — until I innocently walked in out of the rain, and bumped into him at the door of the coffee room. "Morning, Larry", I said, thinking that this was quite a good opening remark for the day. "I'll kill him!", he replied, waving his arms aloft. "Telephone yesterday morning. Bloody washing machine last night. Bloody radio this morning. Kill him . . .", he went on, executing a small impromptu jig round the little kitchen.

"Eh?" I said. But he never heard.

"Little *buzzer!*" he howled, knocking a large stack of paper cups to the floor. "Coming through on the bloody lawnmower next."

"Who's coming through on your lawnmower Larry?", I asked, thoroughly intrigued. But he was in full cry again, and never heard that, either.

"Went up there last night, when the washing machine started. Tried ringing him up, but didn't know his number. Couldn't've heard him anyway. Bloody phone affected," he



continued, treading on the paper cups.

"What's all this?" asked somebody in the crowd — we had by this time attracted quite a decent muster, standing in a respectful circle, safely just out of reach.

"I dunno," I said. As the first on the scene I was taken to be the official war correspondent. "Somebody's been getting at his phone and his lawnmower", I broadcast from my safe billet in the lee of a large litter bin.

In time Larry calmed down. His demonstrations consumed a great deal of energy, and he always had very soon to take refreshment. He came back to the kettle, noticing the cups on the floor for the first time, and made himself a cup of coffee. He then saw me properly, and explained. "It's one of my neighbours," he confided. "Some spotty sixteen-year-old kid three doors up from me."

"But what's he doing?" I asked, determined to get to the bottom of this mystery.

"He's got a CB radio," he said, "and he plays with the bloody thing twenty-five hours a day. It's driving me

barmy."

"What," I asked innocently, "is a CB radio?"

And he told me. It may seem odd that someone should be ignorant of what CB radio was in the early 1980s, but I genuinely didn't know. It will probably seem odder still to readers of this magazine that I should now be found in these pages, for my knowledge of CB is still at much the same point. It is limited in fact, to what I eventually managed to glean from Larry when he had come at least part of the way down to earth, and to a few odd scraps of knowledge picked up by chance since that performance. I know, for instance, that CB enthusiasts use a strange argot. Larry's friend, for instance, was known to the world — or at least, to his *confreres* in the CB world — by the appealing, if baffling soubriquet of "Atomic Rabbit"; and his most regular chatting partners called themselves by equally spectacular *noms de guerre*. I had also heard a very amusing record on jukeboxes about a convoy of lorries being, by the sound of it, harrassed along the length and breadth of the

United States by "bears", whom I correctly deduced to be policemen, and including a "bear in the air", which I think is an utterly charming description of a police helicopter.

This was all explained to me later by Larry. But I was most interested in how his neighbour had been able to upset him to the point of gibbering incoherence. Eventually, by dint of much soothing, and the sifting of much technical jargon, I gathered that the youth up the road was using a transmitter of an unlawful kind. It was either an AM or FM transmitter, I had, and still have, not the slightest idea what either term means, let alone the difference between them, for I possess a threshold that is probably unparalleled for lowness in the civilised world for the onset of total and irremediable confusion where things electrical are concerned (or, for that matter, things electronic or mechanical), so I forget which sort it was. At all events, it was apparently very powerful, with the result that the output from it was being picked up by all the electrical devices in Larry's house.

Torment

Thus Larry's electric drill was transformed into an even greater instrument of auditory torment than such trinkets are by nature, while at breakfast time the toaster was quite likely to regale them with the latest news of Atomic Rabbit and his friends. How much of this is owed to Larry's flair for extravagant exaggeration I am not technical enough to know, but it was certainly an enormous relief to him when a friend of his who happened to be in the local CB club volunteered to have a diplomatic word with the youth. He thereafter agreed, on pain of being grassed on to the local law, to restrict his transmission to hours when Larry and his wife were out. This absurd story encompasses, as I said, virtually all I know about CB radio.

At this point I should explain that I have a ferocious, pathological aversion to all gadgets, probably induced by having worked for many years in the computer industry. So I mentally filed Larry's tale as potentially useful propaganda in my lone campaign, and forgot it. Forgot it, that is, until your Editor suggested that I should write something for this magazine. I asked if he had any preference for how someone with my fathomless ignorance of the subject might treat it. "How about a few ideas about possible beneficial uses of CB?" he suggested. Obviously, for someone with an attitude like mine to technology and all its works, this represented a challenge. I decided at once that for a readership that knew all about CB it was essential to state my qualifications from the outset, not least to protect the hapless Editor from the otherwise inevitable tidal wave of letters demanding to know how that idiot invaded his space. So now you know two things: why half the article is conveniently occupied by the absurdities of the shaggy dog story above, and, if there are any outlandish foolishnesses

"... like an angry bluebottle trapped in a jam jar ..."

in the second half, why they are there.

My first thought when invited to suggest ways in which any form of radio might be useful was that so far from attempting to propose extensions to the use of radio, I could think of several punitive measures I'd be delighted to take against users of it at present. Total abolition of the portable transistor, I reflected, has long been one of my first intended measures when I rightfully assume control of this land, striking a blow for all those who like their countryside, beaches, test match grounds and, in general, everywhere, peaceful and silent. The same goes for the little portable headset things that make just enough of that infuriating noise, like an angry bluebottle trapped in a jam jar, to obtrude on one's privacy on trains and such places. Not, of course to mention Radio One — invented, I suspect, by the KGB for the purpose of sapping the morale and the intellectual base of the country.

This is not very promising, I thought. I have only, it seems, to give a minute's concentrated thought to the medium of radio to find hordes of good reasons for damning the soul of Marconi to eternal perdition, while coming up with nothing on the plus side.

After some more cogitation I decided that I could not ethically offer as the sole praiseworthy application of CB radio its useful ability to help in the wholesale theft of petrol, even though the petrol companies are preceded only by the breweries in my list of Bodies I Should Like to Rob.

So, in a final, desperate determination to produce at least a token thumbs-up for CB, I thought back to my spell as a London policeman, and there I found my answer.

When I joined the police in 1970 the personal radio, known then as the Batphone, was a fairly recent innovation. Many of the older sweats loathed it unequivocally. This was partly out of ingrained conservatism, but mainly because they found bitterly that it made it far too easy for the station and other, in particular, senior officers to find out where they were. Thus if they had popped into a friendly publican's back door for a crafty pint they might at any moment receive a squawk on the infernal device on their shoulder. Then they must either leave the warmth and safety of the pub for the cold, uninviting streets, betraying themselves into the bargain if the pub happened to have taken them off their authorised beat, or they had to affect deafness, which

meant awkward questions from the governors when they returned to the station to book off.

These little nuisances were vastly outweighed, however, in the opinion of nearly everybody, by their tremendous value when one was in difficulties, and the younger among us would often ask how they had managed before radios if they were being kicked to death in some remote alleyway. The answer, we were told, was that very often a passing taxi driver would see what was happening. Many of the black London cabs have radios, and it was very common for the drivers to radio their base asking them to call 999; and the number of officers (and private citizens) saved from horrendous injuries by such interventions is enormous.

If CB users put their radios to such a use as that they will make many friends. CB sets are already used quite extensively by drivers to advise each other of traffic problems, and they also report accidents, and this has already saved lives by getting help to the scene before it would otherwise have arrived. I hear that many local CB clubs run emergency listening posts, with members volunteering to guarantee to listen in to the emergency channel for defined periods each, and I think this could fit nicely into the "neighbourhood watch" schemes that are proliferating all over the country. As another grim example, CB groups might very probably, I should think, be the most likely kind of radio networks to remain to put survivors of nuclear attack in touch with each other. I don't know; it's open to question in any case whether anybody would wish to survive.

Grumpy

What I am sure of is that readers will be able to think of many, many far from anti-social uses to which CB might be put. I hope they will all forgive me if I continue to take my present grumpy attitude for the present. I can't help it; my instinctive distrust of gadgetry goes up a few points every time horrible, mindless Radio One noises in the countryside presage the appearance round some corner in a beauty spot of some depressing youth walking with his head twisted alarmingly to one side, the more effectively to deafen himself as he half-deafens me with the transistor pressed firmly to his ear; every time a computer somewhere perpetrates some appalling balls-up; every time, in short, that technology chalks up another triumph in its tireless war of attrition against the environment. I admit that this is an unfair and unbalanced view. I admit that CB has never done me any harm, personally, and indeed gives some impression that it may be rather useful than the contrary. While these things remain true I am willing to reserve judgment. But my good wishes to CBers everywhere must remain for the moment provisional. The day my vacuum cleaner relays the news to me of Atomic Rabbit I shall be forced to withdraw them. Meanwhile I wait apprehensively.



News from clubs old and new

CLUB NEWS

ACC DX Group

Our group, the ACC DX Group, comprises seven members and was formed in 1983. To maintain the high standards we have set ourselves, we have had to limit membership to invitation only. This method of membership, however, has produced a DX group that is harmonious in all aspects, both radio-wise and personal. We run many networks individually and in groups and meet regularly on and off the 'rig'. We pride ourselves on our 100% QSL record and woe-betide the member who gets behind with a return QSL.

We run an annual competition for the greatest distance achieved and confirmed over a year. We also have a "wooden spoon" award for the group member who has made the biggest wally of himself and has been heard to do so by another member. We all have a keen technical interest in radio and aim to go on achieving greater and greater distance by using, and trying to increase, our knowledge of the subject.

**Plug Top,
PO Box 33,
Accrington,
Lancashire.**

Lincoln Help

I would like to take this opportunity to introduce you to a newly formed organisation in Lincoln. We are made up entirely of voluntary breakers who wish to give a little of their time to monitor the emergency channel on CB radio. At the moment there are between 50 and 60 units monitoring 24 hours a day, the first ever to be achieved in Lincoln and surrounding areas, since 1981.

We make it clear that there are no fees involved; in this service our aim is to help everyone, general public or CB operators — anyone who needs assistance at all.

We are working together with other organisations in the surrounding areas, including REACT, and have their co-operation in full. We also have the first, to our knowledge, Rig Register to register breakers' handles. A local breaker does this voluntarily and has done for six years with great success. There are roughly 7,000 FM handles registered to date.

**T. Wakelen, (Chairman),
12, Leconfield Close,
Lincoln.**

Breaker Club 24

We are recently formed, but in the short time we have been going, we have made the local press twice for our charity work with the aged and also with a breaker with a serious illness. We hold meetings every Wednesday night and regularly run bingo, darts, raffles, live entertainment and out-goings.

The club also provides food and friendship for young and old and many families attend with children of all ages. We have two pool tables and a juke box at our disposal and would welcome challenges from other clubs.

**Flatfoot,
Club 24,
PO Box 215,
London NW11**

CB Crazy Bunch Charitable Club

We are a charity club in Prestwick and I would like to bring to your attention the fact that our group is doing so well and have recently, with the help of members and public, raised £129 for the local addiction centre and last month raised £206 for a memorial stone for one of our local breakers whose 18-year old daughter was killed in a road accident.

At the moment we are assisting the local women's aid group by providing clothing and toys for the battered wives and their children. We are also donating raffle prizes to Age Concern to help raise funds for a minibus. In addition, we are raising £100 for a disabled lady who needs a special high chair.

In consequence, we are a hive of industry, albeit crazy and a very happy bunch. We boast a membership of 120 plus regular guests and visitors. We hold our meetings in the Auchencoyle Hotel in Prestwick every Thursday evening and it's always a great social gathering with bingo quizzes every week plus darts and pool for the lads. We are always delighted to meet any good breaker over 16 years of age and have so far entertained breakers from Cornwall, Shropshire, Yorkshire and Lancashire.

Our aim is simple; to be good breakers and to take on any local charity and help others as much as we

can. There is a welcome for any good buddy who hits town on a Thursday evening.

Maverick Queen,
PO Box 6,
Prestwick,
Ayrshire,
Scotland.

Stone Throwers CB Club

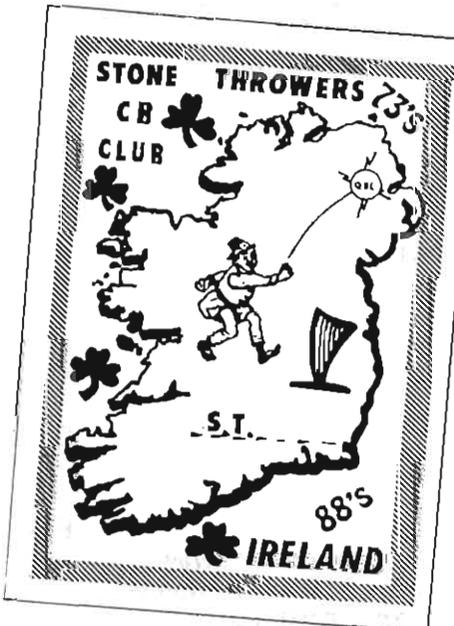
In December last year, myself and the Uncle Ben met to talk over the idea of a new club here in Ireland. We asked some of the local breakers what they thought and the interest was such that, two weeks later, we had our first roll call and in one month had a committee, 20 members and a new CB club. Now we have one of the fastest growing clubs.

We are both a local and a DX club with 70 members nationwide. Our activities include roll calls, newsmights, advertising equipment for sale, quizzes, treasure-hunts, discos, the raising of money for charities and lots more, details of which are given out on the weekly news on a Sunday night at 12pm on the club standby channel, channel 33 AM 27.335MHz II metre band.

I could go on forever about what we get up to but I won't. Anyway, we feel that we have done a lot and we think we have put the friendship, joy and fun back in CBing in Ireland. As you know we are still on AM and it seems as though you are all on FM over there but, happily, we still get a QSO on a lot of the UK breakers still on AM. Ha, ha.

Anyway, yours is the only magazine so if you don't mind, could you give us a mention so the rest of Ireland will know we are here. If anyone would like to join our club, they should send a stamped addressed envelope and we will send back details about the club and a club application form.

Drumsticks (secretary and PRO),
PO Box 20,
Cahir,
Co Tipperary,
Eire.





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Eagle Breakers Club

We formed our club in 1981-1982 just after legalisation. At present, we have a membership of 70 and have worked for several charities. The main event last year was getting an £800 electric motor chair for one of our invalid breakers. This was achieved with the help of all the good breakers in North Wales to whom we would like to pass on our thanks.

Slush Puppy (chairman),
PO Box 12,
Caernarvon,
Gwynedd,
North Wales.

Central DX Group

The Central DX group operate from the South Birmingham area. We were first formed in March 1985 and meet at the Navigation Inn, Kings Norton, every fortnight. Membership is only open to serious DX operators on any mode. Any members bucketmouthing etc are banned from the club.

Out of town DXers interested in our group should write to the committee, enclosing a stamped addressed envelope. Details will be sent as soon as possible.

Bacardi Man (chairman),
Central DX Group,
PO Box 530,
Birmingham

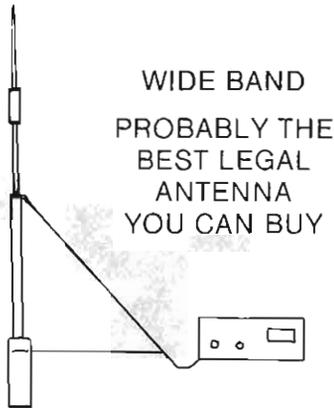
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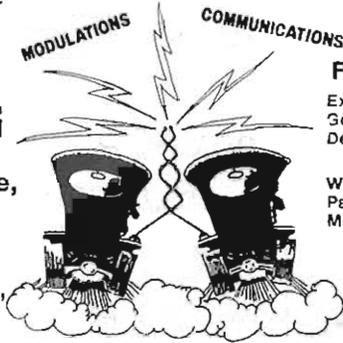
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CB Citizens' Band

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Issue	Major feature
July 1984	Walkie talkie round-up
August 1984	Audioline 341
September 1984	AR2001 scanner
October 1984	Cybernet 934MHz.
November 1984	CTE antennas
December 1984	Panoramic CB scanner
January 1985	SWR survey and Breaker's Basics
February 1985	Understanding CB specs.
March 1985	CommTel 934
April 1985	QSL History
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FM RIG CHECKLIST



NAME	MODEL	RETAIL PRICE	NO. OF CHANNELS	SUPPLY VOLTAGE	SQUELCH	NB SWITCH	ANL SWITCH	MIKE GAIN	RF GAIN	TOPE CONTROL	S. RF METER	S/RF LED R/O	HI/LO OUTPUT	PA FACILITY	EX. SPEAKER JACK
AUDIO LINE	341	£60	40	13.8VDC	•			•	•	•	•	•	•	•	
AUDIO LINE	340	£40	40	13.8VDC	•			•		•	•	•	•		
AUDIO LINE	342	£115	40	13.8VDC	•					•	•	•	•	•	
COLT	295	£49.99	40	13.8VDC	•				•		•	•	•		•
COMMTEL	GT858	£30	40	13.8VDC	•						•	•	•		•
COMMTEL	GT688	£35	40	13.8VDC	•				•		•	•	•	•	•
COMMTRON	CB40F	£70	40	13.8VDC	•						•	•	•		•
COMMTRON	CXX	£69.95	40	13.8VDC	•				•		•	•	•	•	•
COMMUNICATORS	NI-440DX	£50	40	13.8VDC	•				•	•	•	•	•	•	•
CYBERNET	BETA 1000	£70	40	13.8VDC	•						•	•	•	•	•
CYBERNET	BETA 2000	£85	40	13.8VDC	•				•	•	•	•	•	•	•
CYBERNET	BETA 3000	£100	40	13.8VDC	•				•	•	•	•	•	•	•
INTERCEPTOR	INTERCEPTOR	£80	40	13.8VDC	•				•	•	•	•	•	•	•
INTERCEPTOR	TC400	£95	40	13.8VDC	•		•	•			•	•	•	•	•
INTERCEPTOR	ONE HANDER	£100	40	13.8VDC	•			•	•	•	•	•	•	•	•
JOHNSON	JOHNSON	£50	40	13.8VDC	•				•		•	•	•	•	•
LAKE	MANXMAN 850	£32.50	40	13.8VDC	•						•	•	•	•	•
LAKE	MANXMAN 950	£37.50	40	13.8VDC	•				•		•	•	•	•	•
LOWE	TX 40	£50	40	13.8VDC	•				•		•	•	•	•	•
MAGPIE	AUTOSCAN 5000	£120	40	13.8VDC	•			•	•		•	•	•	•	•
MAXCOM	4E	£50	40	13.8VDC	•						•	•	•	•	•
MAXCOM	6E	£48	40	13.8VDC	•				•		•	•	•	•	•
MAXCOM	20E	£50	40	13.8VDC	•						•	•	•	•	•
MAXCOM	21E	£50	40	13.8VDC	•						•	•	•	•	•
MAXCOM	16E	£40	40	13.8VDC	•						•	•	•	•	•
MAXCOM	30E	£65	40	13.8VDC	•			•	•	•	•	•	•	•	•



This listing includes most of the rigs available for FM CB. Some rigs are still not on the market, but may be picked up second-hand or may be found in old stock at some shops. The prices quoted are recommended retail prices or typical price — they may vary considerably from shop to shop and area to area.

MOBILES

TX IND. LIGHT	RX IND. LIGHT	CH 9 SWITCH	MIKE POSITION	COMMENTS	ADDRESS	NAME
●	●		SL		Telecomms, 189 London Rd., North End, Portsmouth	AUDIOLINE
●				Report Feb '82		AUDIOLINE
●	●					AUDIO LINE
●			FL		K B & Co Ltd., 202 Cheetham Hill Rd, Manchester	COLT
●			SL		Globe, 168 Brooker Road, Waltham Abbey, Essex	COMMTEL
●			SL	Dimmer Switch Features		COMMTEL
●	●		FL		Roger D, 831 Mansfield Rd, Notts	COMMTRON
●			FL			COMMTRON
●	●	●	FL	Roger Beep Feature		
●			SL		Goodmans Loudspeaker Ltd., Downley Rd, Havant, Hants PO0 2NL	CYBERNET
●	●		FL	Report May '83		CYBERNET
●	●	●	FL	Report September '83		CYBERNET
●			SL		Telecomms, 198 London Rd, North End, Portsmouth	INTERCEPTOR
●	●		FL			INTERCEPTOR
●	●		FL			INTERCEPTOR
●			FL	Great GT868 chassis	Star Warehouse, Chalk Farm Rd, London	JOHNSON
●			FL		Roger D, 831 Mansfield Rd., Nottingham NG5 3GF	LAKE
●			FR	Report April '83		LAKE
●	●		FL	Report March '83	Low Electronics, Matlock, Derbyshire	LOWE
●		●	FL	Report November '82	Maggie Electronics, PO Box 35, Andover, Hants SP10 2LG	MAGPIE
●			FL		AM House, 9A Old's Approach, Tolpits Ln, Watford, Herts	MAXCOM
●		●	FL			MAXCOM
●		●	FL			MAXCOM
●		●	FL			MAXCOM
●		●	FL			MAXCOM
●		●	FL			MAXCOM
●			FL	Report Jan '84		MAXCOM



REFERENCE



NAME	MODEL	RETAIL PRICE	NO OF CHANNELS	SUPPLY VOLTAGE	SQUELCH	NB SWITCH	ANL SWITCH	MIKE GAIN	RF GAIN	TONE CONTROL	S/RF METER	S/RF LED R/O	HI/LO OUTPUT	PA FACILITY	EX. SPEAK
MERCURY	10 40	N/A	40	13.8VDC	•				•		•		•	•	•
MUSTANG	CB1000	£49.95	40	13.8VDC	•						•		•	•	•
MUSTANG	CB3000	£59.99	40	13.8VDC	•				•	•	•		•	•	•
NATO	40M	£69.95	40	13.8VDC	•			•	•	•	•		•	•	•
NATO	2000	£189.95	40	13.8VDC	•	•	•		•	•	•		•	•	•
OSCAR	OSCAR I	£85	40	13.8VDC	•						•		•	•	•
OSCAR	OSCAR II	£49	40	13.8VDC	•						•		•	•	•
ROTEL	RVC 220	£50	40	13.8VDC	•						•		•	•	•
ROTEL	RVC 230	£70	40	13.8VDC	•				•	•	•		•	•	•
ROTEL	RVC 240	£90	40	13.8VDC	•			•	•	•	•		•	•	•
SIRTEL	SEARCHER	£40	40	13.8VDC	•						•		•	•	•
TANDY	TRC2001	£80	40	13.8VDC	•						•		•	•	•
TANDY	TRC2002	£70	40	13.8VDC	•						•		•	•	•
TANDY	TRC2000	£100	40	13.8VDC	•			•	•	•	•		•	•	•
TANDY	TRC1004	£79	40	12VDC	•						•		•	•	•
TANDY	TRC2003	£130	40	13.8VDC	•						•		•	•	•
UNIDEN	UNIACE 100	£69.95	40	13.8VDC	•						•		•	•	•
UNIDEN	UNIACE 200	£89.95	40	13.8VDC	•			•	•	•	•		•	•	•
WESTERN	COMPACT 40	£34.50	40	13.8VDC	•						•		•	•	•
WESTWARD	P.T.2	£159.95	40	13.8VDC 240V	•						•		•	•	•



NAME	MODEL	RETAIL PRICE	NO OF CHANNELS	SUPPLY VOLTAGE	SQUELCH	NB SWITCH	ANL SWITCH	MIKE GAIN	RF GAIN	TONE CONTROL	S/RF METER	S/RF LED R/O	HI/LO OUTPUT	PA FACILITY	EX. SPEAK
AUDIOLINE	345	£139.95	40	240VAC	•			•	•	•	•		•	•	•
CDMMTEL		£65	40	240/12V	•						•		•	•	•
HAM INT.	JUMBO	£254	40	240VAC	•		•	•	•	•	•		•	•	•
HAM INT.	CONCORDE II	£164	40	240VAC	•	•	•		•	•	•		•	•	•
HARVARD	H401	£149.95	40	240VAC	•			•	•	•	•		•	•	•
HARVARD	WT44		40	BATTERIES	•						•		•	•	•
KAISER	CBX40	£80	40	BATTERY	•						•		•	•	•
MAXCOM	7E	£49.95	40	BATTERY	•						•		•	•	•
TANDY	TRC1001	£119		BATTERY	•						•		•	•	•
UNIDEN	UNIACE 300	£149.95	40	240VAC	•			•	•	•	•		•	•	•
WESTWARD	P.T.2	£159.95	40	240V/12V	•						•		•	•	•

MOBILES

POWER JACK	TX IND. LIGHT	RX IND. LIGHT	CH 9 SWITCH	MIKE POSITION	COMMENTS
●	●			FR	Report July '83
●	●			FL	
●	●	●		FL	
●				FL	
●				SL	Report January '83
		●		FL	Cybernet 134 chassis rep. April '82
				FL	Report Oct '83
●				FL	Cybernet chassis
●	●	●		SL	Cybernet chassis
●				SL	Cybernet chassis
●				FL	
●	●			SL	
●				SL	
●				SL	
●				—	
				SL	Report Nov '82
●				SL	Report Sept '82
●	●			FL	Report Feb '83
●	●			SL	
				FL	Report Nov '83

ADDRESSES	NAME
E.M.S. Communications, Grove St, Wantage, Oxon Lx21 7AD	MERCURY
K.B. & Co Ltd, 202 Cheetham Hill Rd, M/cr.	MUSTANG
	MUSTANG
Roger D, 831 Mansfield Rd, Nottingham NG5 3GF	NATO
	NATO
S.M.C. Runbridge St, Totton, Hants SO4 4OP	OSCAR
	OSCAR
Rotel Hi-Fi, 2-4 Erica Rd, Stacey Bushes, Milton Keynes	ROTEL
	ROTEL
	ROTEL
	SIRTEL
Tame Way, Tower Bridge St, Walsall, Staffs	TANDY
	TANDY
Cravenminster Ltd, Unit 8, Ind Est, Llandudno Junct, Gwynedd	UNIDEN
	UNIDEN
Western Electronics, Fairfield Est, Louth, Notts	WESTERN
Westward Electronics, The Mill House, Westward Tuckenhay, Totnes, Devon 086423 336/370	WESTWARD

BASES & PORTABLES

POWER JACK	TX IND. LIGHT	RX IND. LIGHT	CH 9 SWITCH	MIKE POSITION	COMMENTS
●				FR	Report December '83. Also comes with telescopic antenna
●				SL	
		●	●	FL	
●				FL	
					External antenna facility
●					
●					
●				FL	Reviewed August '83
				FL	Report Nov '83

ADDRESSES	NAME
Telecomms, Portsmouth and Globe, Essex	AUDIOLINE
	COMMTEL
	HAM INT.
	HAM INT.
	HARVARD
Globe, 168 Brooker Road, Waltham Abbey, Essex	HARVARD
Telecomms, 189 London Road, North End, Portsmouth	KAISER
A.T.M., AM House, 9A Old's Approach, Tulpits, Lane, Westford, Herts	MAXCOM
Tame Way, Tower Bridge Street, Walsall	TANDY
Cravenminster Ltd, Unit 8, Industrial Estate, Llandudno Junction, Gwynedd	UNIDEN
Westward Electronics, The Mill House, Tuckenhay, Totnes, Devon 080423 336/370	WESTWARD

ANTENNA CHECKLIST

Name
Lists antennas by name and model number and gives you, where possible, the name and address of the manufacturer or distributor.

Construction
The majority of home base antennas are made of aluminium and mobile antennas from stainless steel, but fibre glass can be

The D.T.I. specs for CB antennas are now more liberal than those originally in force, with the base loading restriction removed to permit any type of loading as long as the antenna is 1.65m in length (or less) and no more than 55mm in diameter. This revised checklist now includes the many new antennas released after this change of heart.

NAME	ADDRESSES	MODEL	CONSTRUCTION	LENGTH	MAX POWER	TYPE	LOADING	MOUNT	PRICE RANGE
AERIAL SUPPLIES	Aerial Supplies (Redditch) Ltd. 6 Widney House, Bromsgrove Road, Redditch, Worcs. (0527 62620/60107)	Silver Star	AL	1.5	100	B	B	Pole	D
		Silver Arrow	AL	1.5	500	B	B	Pole	E
		Javelin	AL	1.64	500	B	C	Pole	E
		Javelin Oipole	AL	1.64	500	B	C	Pole	E
ALLGON	Communications, 10 North Street, Strood, Kent.	Various	FG SS AL	Various	Various	B M	T C B CW C/B	Various	A-H inc. F
		466	SS	1.4	10w	Marino	C/B	Mast/Cabin	F
ARMSTRONG	Stateside Trading Ltd. Audley Avenue, Newport, Shropshire	SAM 10	SS	1.06	1000	M	B	Surface	F
		SAM 20	SS	1.06	1000	M	B	Spring Surface	F
		TAK 10	SS	1.06	1000	M	B	Boot lip	T
		TAK 20	SS	1.06	1000	M	B	Spring Boot lip	T
		MAG 10	SS	1.06	1000	M	B	Mag.	G
		MAG 20	SS	1.06	1000	M	B	Spring Mag.	G
		BDY 20	SS	1.06	1000	M	B	Side	G
		PEC 20	SS	1.06	1000	M	B	Side, Fold over & Quick Disconnect	G
ARCHER	Tandy Corp. Tameway Tower, Bridge Street, Walsall, West Mids.	21-904	SS	0.5	50	M	B	3/8" thread	D
AVANTI	CB Radio Centre Ltd., 337 Kenton Road, Harrow, Middlesex	AV 241	SS	1.22		M	B	Stud	D
		AV 241T	SS	1.22		M	B	Trunk	E
		AV 241M	SS	1.22		M	B	Mag.	E
		AV 241MM	SS	1.22		M	B	Mag.	G
BANDIT	Telecomms, 189 London Road, North End, Portsmouth	B10	SS	1.42		M	B	Mag.	G
		B15	SS	0.61		M	B	Mag.	F
		B15	SS	1.22		M	B	Mag.	F
		B20	SS	1.42		M	B	Mirror	F
		B30	SS	1.42		M	B	Drill Thru	F
		B30	SS	1.22		M	B	Drill Thru	E
		B40	SS	1.42		M	B	Various	D
		B40	SS	1.22		M	B	Various	D
		B50	SS	1.42		M	B	Various	D
		B50	SS	1.22		M	B	Various	D
BREMI UK LTD.	Unit 6, Innege Park, Holly Lane Industrial Estate, Atherstone, Works.	B27S	SS	1.62	1000	M	B	3/8" thread	C
		C27S	SS	1.38	1000	M	C	3/8" thread	C
		HB27S	AL	1.55	1000	B	T	Pole	E
CB SERVICES	97 Crab Lane, Harrogate, North Yorks	Bullwhip Knuckleduster	SS AL	1.5 1.6		M B	B B	Various	C D
COMMTEL	Near Third Drove, Fengate, Peterborough	Rocket	SS	1.6		M	B	3/8" thread	
		Shuttle	FG	1.6		M	B	3/8" thread	
		Starlight	SS	1.6		M	B	3/8" thread	
		Shuttle Star		1.6		B	CW	Clamp	
		Signal searcher	AL	1.6		B	B	Pole	
		Messenger	SS	1.6		B	B	Clamp	F
Signal keeper	SS	1.5		B	B	Tripod	F		
FREEMAN AND PARDOE	Tything Road, Arden Forest Ind. Est. Alcester, Works.	Invader	AL	1.5	250	B	B	Pole	E
		Thunderpole II	AL	1.6	500	B	B	Pole	F
		Thunderpole III	A1	1.65	500	B	C	Pole	F
GAMMA AERIAL PRODUCTS	Lye, West Midlands. (0384 891132/891474)	Skybreaker	AL	1.6		B	B	Pole	D
		Avenger	AL	1.6		B	B	Bracket	C
		Lofty	AL	1.5		B	B	Bracket	D
		Skybreaker II	AL	1.65		B	C	Pole	D
		Avenger II	AL	1.65		B	C	Bracket	E
		Lofty II	AL	1.66		B	C	Bracket	E
		Firefly	SS	1.65		M	C	3/8" thread	E

na Checklist will give you the following information:

used in some models. The list tells you what material the antenna is manufactured from.

Length

The legal maximum length of an antenna is 1.65m, base or mobile.

Maximum Power

This is intended as a guide

only, as the law only permits an effective radiated power of two watts. The power rating will give some indication of sturdiness. Figure refers to watts.

Type

Indicates whether a mobile or base antenna.

Loading

Indicates the type of

electrical loading of the antenna; top, centre, bottom or continuously wound.

Mount

This gives some idea of the mount or type of mount appropriate for the antenna concerned. Home base antennas are usually pole

mounted, but can be house gutter mounted. Mobile antennas are either mag. mounted by a strong magnet, attached to the car gutter or boot lid edge whilst others are physically attached in the same way as a car radio antenna. Mobile antennas with 3/8" thread usually will fit a range of mounts.

NAME	ADDRESSES	MODEL	CONSTRUCTION	LENGTH	MAX POWER	TYPE	LOADING	MOUNT	PRICE RANGE	
HAM	Dials Wholesale, Unit 8, Block 2, Whitegate Indust. Est., Bathgate, West Lothian	Balcostar DV27	AL	1.2	200	B	M	C	Bracket	D
		DV27TW	FG	1.39	100	M	T			B
			FG	1.19	100	M				
HOT ROD	Stateside Trading Ltd, Audley Avenue, Newport.	FM UK	SS	1.27		M	B	3/8" Thread	B	
LES WALLEN MANF.	Pembroke Works, Ramsgate Road, Sandwich.	Modulator LC	SS	1.66	1000	M	B	3/8" Thread	C	
		M.D.X. Long	SS	2.00	1000	M	B	3/8" Thread	C	
		M.D.X. Short	SS	1.66	1000	M	B	3/8" Thread	C	
		Mini M.D.X.	SS	1.10	100	M	B	3/8" Thread	B	
		Mini 27	SS	1.40	500	M	B	3/8" Thread	B	
		T-Bolt	SS	0.83	200	M	B	CW	Pole/well	D
		Saturn	AL	1.00	500	B			Pole/well	F
		Exper	AL	1.00	1000	B				
MARKSMAN	Markman Products, PO Box 40, Milton Keynes MK6 2UT (0908 668916)	Mister Stick	SS	1.19	Above legal limit	M	C	3/8" UNF	D	
				1.63						
R.W. BADLAND LTD.	Roetan Trading Estate, Providence Street, Lye, Stourbridge, West Midlands (Lye 3160/5051)	Rebel 1	SS	1.5	500	M	B	3/8" Thread		
		Rebel II	SS	1.5	500	M	B	3/8" Thread		
		Rebel Raider	SS	1.6	500	M	C	3/8" Thread		
		Rebel Bullet	SS	0.61	50	M	B	3/8" Thread		
		Red Devil	SS	1.52	500	M	CW	3/8" Thread		
REVCO	Telecomms, 189 London Road, North End, Portsmouth.	Revco	SS	1.0	100	M	B	Various	B	
SMC	Rumbridge Street, Torton Street, Hants	Oscar CBA 11GP	SS	1.5		B	B	Mag. Foldover Base Pull up Foldover Base	F	
		Oscar 11V11S11	SS	1.5		B	B			
		Oscar 11CM	SS	1.2		M	B			
		Oscar 11CE	SS	1.2		M	B			
		Oscar 11NE	SS	1.6		M	B			
		Oscar 11SE	SS	1.6		M	B			
Oscar 112E	SS	1.6		M	B					
TAGRA	CB Radio Centre, 337 Kenton Road, Middlesbrough.	T40	SS	1.4	500	M	B	Various	E	
THORO'BREO	Fixtron UK Ltd, 10 Victoria Street, Newark, Notts. (0636 74688 Telex: 377827)	Z 27	SS	1.52	1700	M	B	3/8" Thread	B	
		Z Mag	SS	1.52	1700	M	B	3" Dia Magnet	C	
		251	SS	1.00	100	M	B	5" Dia Magnet	C	
		C 27	SS	1.60	1700	M	C	3/8" Thread	C	
		C Mag	SS	1.60	1700	M	C	5" Dia Magnet	D	
HQ	PVC	1.58	1000	B	T	Pole	E			
VALOR	W.T.A. Electronics Ltd, 111 Cromer Road, Hellesdon, Norwich (0603 47694)	Warrior 660	SS	1.62	1500	M	C	3/8" Thread	C	
		Half Breed 520	SS	1.62	1500	M	B	3/8" Thread	C	
		Half Breed 510	SS	1.2	1500	M	B	3/8" Thread	C	
		Half Breed 500	SS	0.9	1500	M	B	3/8" Thread	C	
		Dial-A-Match 640	SS	1.2	100	M	B	3/8" Thread	C	
		Dial-A-Match 630	SS	0.6	25	M	B	3/8" Thread	C	
		Rubber Duck 300		0.36	25	M	CW	3/8" Thread	C	
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		Road Hog 335	FG	1.2	1000	M	T	3/8" Thread	D	
		Road Hog 336	FG	1.52	1000	M	T	3/8" Thread	D	
		Road Hog 337	FG	1.76	1000	M	T	3/8" Thread	D	
		Road Hog 831	FG	0.6	500	M	T	3/8" Thread	D	
		Road Hog 838	FG	0.9	1000	M	T	3/8" Thread	D	
		Road Hog 836	FG	1.2	1000	M	T	3/8" Thread	D	
		Road Hog 836	FG	1.52	1000	M	T	3/8" Thread	D	
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Black Magic 833	FG	1.2	500	M	T	3/8" Thread	D			
WTA	W.T.A. Electronics Ltd, 111 Cromer Road, Hellesdon, Norwich. (0603 47694)	Wot Pole 1	AL	1.5	1000	B	B	Pole	B	
		Wot Pole II	AL	1.6	1000	B	B	Pole	C	
		Wot Stick I	SS	1.6	1000	M	B	3/8" Thread	A	
Wot Stick II	SS	1.5	1000	M	B	3/8" Thread	B			
VAN ORDT	Knight Communications, Unit 19 Britanna Estate, Ingrave Road.	Audio King	SS	1.5	2000	M	B	3/8" Thread	G	

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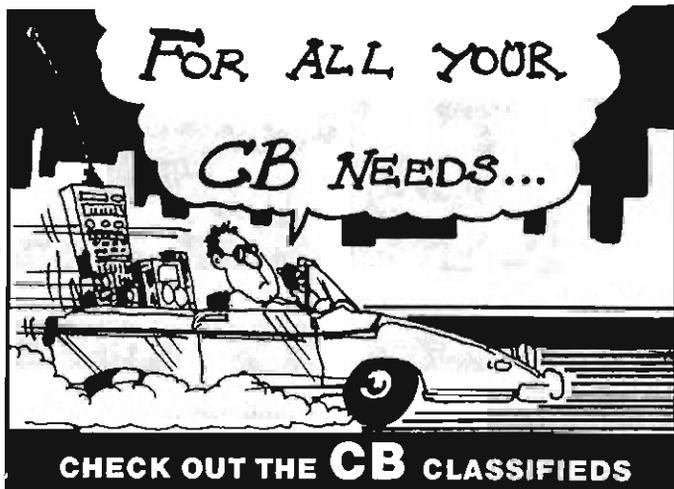
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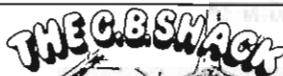
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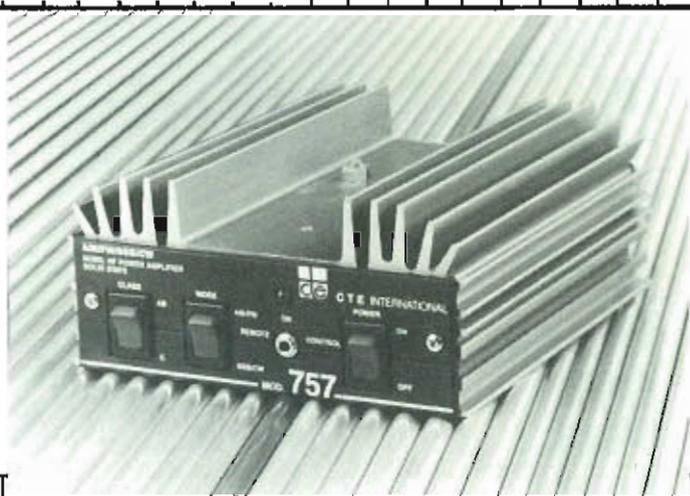


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GAIN.
-

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LENGTH
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MATERIAL
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MAX. POWER
250 W.

CONNECTION
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MAXIMUM
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