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Harvard 402 MPA
&
Cobra 21XFM



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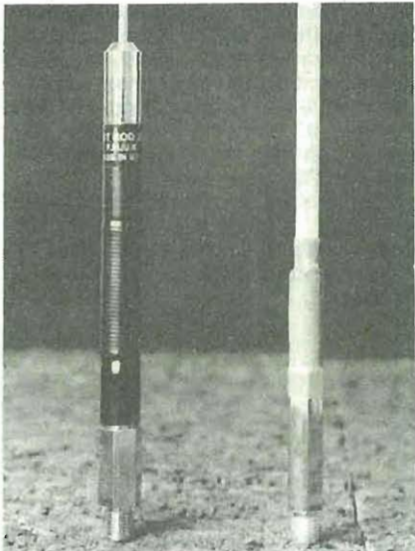
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The Cobra 21X FM 64



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A sad story

The end of Finelms

We can get all sorts of nice jobs working for a magazine - like putting on shows and meeting lots of our readers. We can also get some rotten ones and I've been nominated to do this.

Finelms Electromech Ltd., of Warrington, a name familiar to lots of our readers, have ceased trading and gone into voluntary liquidation. Long-term buyers of the magazine will remember that Finelms were the first company to embark on AM to FM conversions and we featured them in our 'Legal Rigs' spot.

Finelms had been involved in CB in a minor way before developing their conversion. Their experience with CB led them to see the potential of a conversion system and their technical staff began work. Finelms also had long and fruitful discussions with the Home Office and Customs and Excise Department about their system and they got the authorisation to carry on and to charge back duty and VAT. It would not be unfair to say that Finelms paved the way for conversions in general and references in HO and C&E Press Releases to conversions were a result of Finelms' efforts.

It was at this stage they contacted us. Obviously we were excited by the news and kept in touch to hear further developments. Two of our staff went up to Warrington on Royal Wedding Day at Finelms' request to see and use working rigs and they were impressed by the work and sincerity of Finelms.

After publishing our article in September 81 issue, we were inundated by breakers and companies ringing for details of Finelms and their phone number. Our switchboard would answer the phone and automatically give Finelms' number at one time - as only about 5% of our calls were about anything else.

So obviously interest was very high. This probably contributed to Finelms' downfall more than anything. They were put under considerable pressure to meet the demand. They found that their expected market was vaster than they had anticipated and just couldn't

supply the quantities needed. They also ran into technical problems and some boards had a very high failure rate.

So, sadly, Finelms are no more. It's a shame to see something that could have been successful but, I suppose, that's the name of the game.

On to another rotten subject. Once again a plea for those breakers not using their common sense and bunting up calling channels and, more importantly, emergency channels. There are many dedicated people who work very hard in manning emergency monitoring stations and to have it abused and mocked is soul destroying. That happy band on the high channels are also inadvertently interfering with FM channel 9. Please check your frequency charts, lads, and avoid the high mid-20 channels.

If you are reading this at Wembley at our Show, I hope you are enjoying yourselves and having a good day. It's all been arranged for you, so make the most of it!

FINELMS ELECTROMECH LTD. OF WARRINGTON

As a company involved with the provision of AM CB equipment to MP1 1320 (BA (British) specification), as featured in CB Radio Magazine (September) we have been inundated with letters and phone calls from the public and trade expressing interest in this scheme. We will shortly be announcing our list of national agents who will be authorised to undertake this work on our behalf and apologise for any delay you might have experienced in trying to obtain this information.



Our AM Transmitters
Conversion to MP1 1320 and who have no other applications from the trade only.

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IF YOU RESIDE IN ANY OF THESE AREAS, PLEASE CONTACT THE APPROPRIATE DISTRIBUTORS WHO WILL INFORM YOU OF YOUR NEAREST AGENT. AGENCY ENQUIRIES PLEASE CONTACT FINELMS DIRECT.

AGENTS NOT IN THE ABOVE AREAS

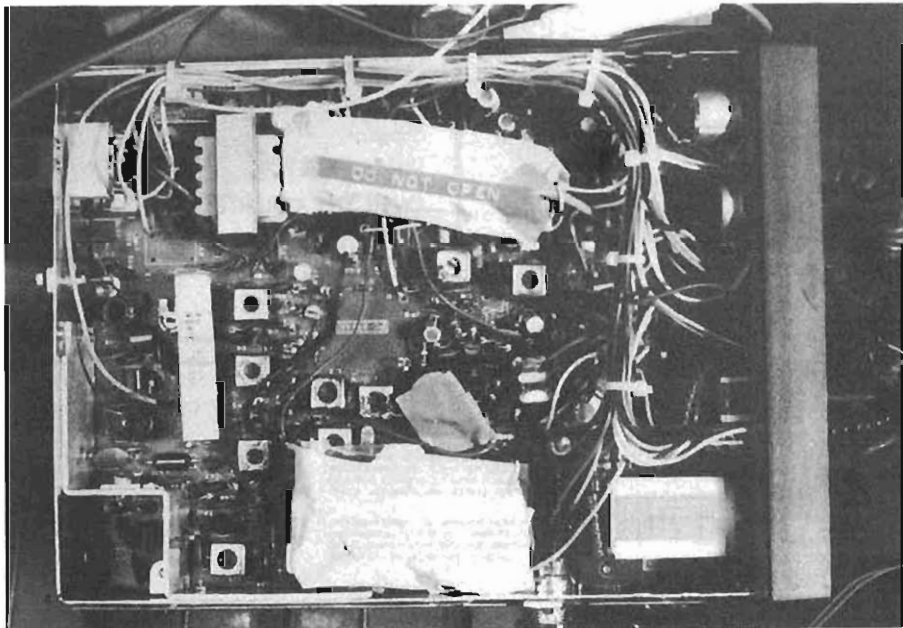
DRS (Direct Radios) 21000000 21000000 21000000 21000000 21000000 Tel: 02742 37424	Station 91 32 Victoria Street Manchester Tel: 02242 41226	East Angles CB Service Group Ltd King's Lane Ipswich Tel: 0553 71965	Essexport Co. Ltd 20000000 20000000 20000000 20000000 20000000 Tel: 09041 71028
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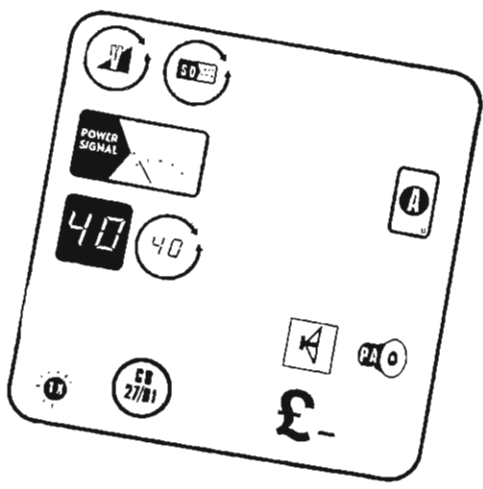
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Rig Test

HARVARD



Harvard 402 MPA

As we have mentioned in previous rig tests, the cosmetic appearance of a transceiver accounts for quite a substantial proportion of its sales potential. Bearing this in mind, the Harvard 402 MPA should be popular with retailers and their customers alike. The front panel of the set is attractively finished in a high-quality glossy black plastic with central S/R/F meter and green LED channel display. Rotary controls are used for volume, squelch and channel select, with a two-position switch for access to PA facility. Although controls are limited to these functions, their ergonomic layout ensures ease of operation during mobile use.

The Harvard packaging is of high quality, as is the explanatory handbook/instruction manual which covers all aspects of operation and installation for mobile and home base situations and lists the full manufacturer's specification which we have reproduced for comparison with our own test results.

Microphone

The Harvard microphone is thoughtfully designed to fit snugly into the palm of the hand and is of solid construction. A good-quality screened

coil lead has been used, terminated by a replaceable four-pin Cannon-type connector. Connection, as is consistent with other sets, is on the left-hand side, restricting the possible installation positions.

Construction

The internal construction of the Harvard is of a very high standard. The soldering is very clean and the component legs have been well trimmed. The internal wires have been tidily clipped together and the RF output stage transistor has been mounted securely to its heat sink with a metal nut and bolt and not with the nylon screws that are becoming more popular with electrical manufacturers and that can lead to problems if the set is subjected to high temperatures. The casing, which is finished in textured black paint and is of metal construction, ensures that the set is escutcheon completed.

Transmitter test

As usual, the standard equipment used for the transmitter test was:
 Racal 9081 and 9082 signal generators
 Marconi TF 42F distortion meter

Marconi TF 340 audio power meter
 Racal 9916 frequency meter
 Racal 9101 and Bird 43 power meters
 Racal 9009 modulation meter
 Levell TG 150D audio generator
 Solartron AS 1412 power supply.

Power output

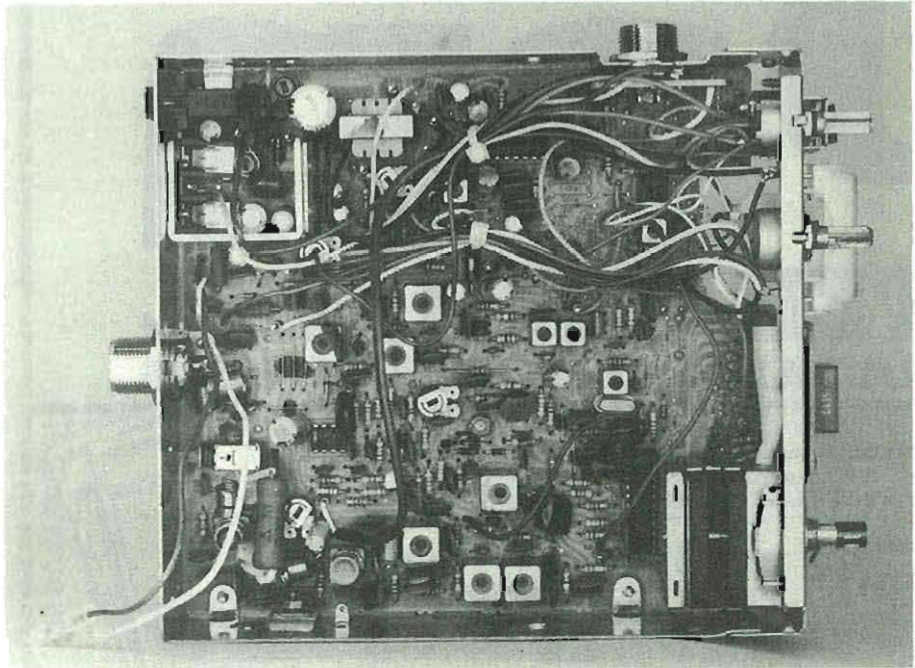
The Home Office specification, MPT 1320, demands that the maximum power output for a 27MHz FM transceiver should not exceed 4 watts. This restriction applies to the maximum supply voltage, which for a well-charged car battery is 14.5 volts. Due to the fact that power output is related to supply voltage, a lower supply voltage results in a lower output power. For the purpose of our tests, the output power is measured with supply voltages of 10.8v, 13.2v and 14.5, corresponding to poor, average and good battery charge conditions. Both high power and attenuated modes are measured, the latter should correspond to one-tenth of the former if the attenuator has been correctly set up.

Power Output and Attenuation			
Atten.	10.8v	13.2v	14.5v
High	2.2W	3.4W	4.0W
Low	0.18W	0.31W	0.38W

Frequency

The legal frequency is 27MHz FM with 10KHz channel spacing, as this is the basic requirement it is here that we must start our frequency test. According to MPT 1320, channel 1 should be 27.60125 and channel 40 should be 27.99125 with a maximum deviation of ± 2.5 KHz. As temperature affects the frequency stability of a transmitter, a test must be made at 48°F (cold morning) and at 68°F (room temperature) in order to obtain an idea of how the set will respond to temperature variations. Using the Racal frequency counter, tests are made on channels 1 and 40 at both the high and low temperatures.

For the 402 MPA, frequency deviations are within the range permitted under the specification but only just. At 48°F a deviation of 1.9KHz was measured on both channel 1 and channel 40 which is well within the limits. At 68°F a deviation of 2.4KHz was measured on both channel 1 and channel 40 which is inside the limits



but only by 0.1KHz. We are not saying by any means that the transceiver is of inferior design, especially as the internal construction is identical to a rig previously tested by us with good results, merely that this particular rig has not been tuned with quite so much accuracy as is necessary for peak performance.

Temperature Stability

Temp.	CH1	CH40
48°F	27.60106	27.99106
68°F	27.60081	27.99081

Modulation

One of the most important things to understand is that whilst we refer to speech as modulation, which is correct on AM, with FM the actual process is deviation.

To conduct the test one measures the peak deviation using an audio tone which is fed into the microphone connections. By doing this the modulation limiting can be realised. Different input levels from 0.5 millivolts to 200mv are used. The input frequency over 500Hz, 1125Hz and 2500Hz will have given us a reading using the Racal modulation meter. Looking across the chart, the wider the difference between each column and the higher the 2500Hz reading, the more natural the voice will sound.

Modulation

Input Level	Input Frequency		
	500Hz	1125Hz	2500Hz
0.5mV	0.48KHz	1.00KHz	0.60KHz
1.0mV	0.80KHz	1.10KHz	0.65KHz
2.0mV	1.10KHz	1.20KHz	0.70KHz
50mV	1.20KHz	1.20KHz	0.80KHz
200mV	1.20KHz	1.25KHz	0.80KHz

As far as this aspect of the test is concerned, the 402 MPA performs very well with response that is above average for CB transceivers.

Receiver test

Audio output

This is measured into an 8-ohm load at 13.2v supply voltage. The distortion figures are measured with a Marconi TF 340 audio power meter, a Marconi 42F distortion meter and a Levell TG 150D audio generator. Three different wattages are used to give an idea of the flexibility, these correspond to the minimum and maximum wattages and a halfway position. The significance of this test being to determine how much of the received signal is lost at the audio stage.

Measured Distortion

1.5 watts	3.5% distortion
2.4 watts	10% distortion
3.2 watts (max)	19% distortion

Squelch level

Measured in microvolts, the threshold and fully muted positions need to be measured to determine the squelch range. With a signal generator connected to the set tuned to zero and the squelch at threshold, it is gradually opened until the signal becomes readable. To determine the

General			
Operating Frequencies:			
Channel		Channel	
1	27.60125 MHz	21	27.80125 MHz
2	27.61125 "	22	27.81125 "
3	27.62125 "	23	27.82125 "
4	27.63125 "	24	27.83125 "
5	27.64125 "	25	27.84125 "
6	27.65125 "	26	27.85125 "
7	27.66125 "	27	27.86125 "
8	27.67125 "	28	27.87125 "
9	27.68125 "	29	27.88125 "
10	27.69125 "	30	27.89125 "
11	27.70125 "	31	27.90125 "
12	27.71125 "	32	27.91125 "
13	27.72125 "	33	27.92125 "
14	27.73125 "	34	27.93125 "
15	27.74125 "	35	27.94125 "
16	27.75125 "	36	27.95125 "
17	27.76125 "	37	27.96125 "
18	27.77125 "	38	27.97125 "
19	27.78125 "	39	27.98125 "
20	27.79125 "	40	27.99125 "
Type of Emission: F3			
Channel Spacing: 10 KHz			
Frequency Combination: PLL Synthesizer			
Power Source: 12V DC Negative to Positive Earth			
Operating Temperature Range: -5°C - 45°C			
Electric Specifications			
Receiver Section			
a. Receiver System	Dual Conversion Superhetrodyne		
b. Intermediate Freq.	1st IF: 10.695 MHz		
	2nd IF: 465 KHz		
c. Sensitivity	0.5µV (20dB SIN) nominal		
d. Adjacent Channel Sp. Activity	45dB nominal		
e. Squelch Threshold Sensitivity	less than -10dB NO level nominal (approx 0.15 to 0.2µV)		
Transmitter Section			
a. RF Output Power	4 watts (MPF 1320)		
b. Freq. Deviation (FM KHz)	±2.5 kHz max.		
c. Audio Freq. Response	±2dB per 6dB/OCT at 0.3 - 3 KHz		
	at 0.3 - 3.0 KHz un-emphasized		
	less than 50µV		
d. Spurious Emission	80 - 85 MHz		
	87.6 - 118 MHz		
	135 - 136 MHz		
	174 - 230 MHz		
	470 - 867 MHz		
Other Freq.			
e. Adjacent Channel Power	less than 0.25µW		
f. Current Drain @12.0V	2A Nominal		
f. Squelch Tight Sensitivity			
g. Spurious Response Attenuation			
h. Image Rejection			
i. Receiver Spurious Emissions			
j. Audio Output Power			
k. Audio Freq. Response			
l. Current Drain			
50µV maximum nominal			
50dB nominal			
45dB nominal			
less than 0.0W			
4 watts at 8 ohms			
2 watts at 8 ohms			
±2dB per 6dB/OCT at 0.3 - 3 KHz			
Stand-by 0.25A Nominal			
Receiving eqn. 8.8A nominal			
<p>GUARANTEED to readers and manufacturers</p> <p>Any information printed as a review bearing this guarantee will have been carefully obtained and based on facts.</p> <p>The equipment tested will have been inspected to ensure it has not been tampered with or modified to improve its performance in any way. Any faults and/or modifications will be noted and depending on the severity reported on will be noted and depending on the severity reported on will not be reported on and the manufacturer will be asked to supply a second item for testing.</p> <p>In an emergency case will be taken to ensure the safety of the reader and the manufacturer will be asked to supply a second item for testing.</p>			

fully-muted position the squelch is left static and the signal generator is adjusted from zero upwards until readable. For the Harvard 402, threshold was 0.12µV and 11µV fully muted, therefore giving an adequate range to cut out most levels of interference.

Receiver sensitivity

The sensitivity of the set falls well between the expected figures for a 27MHz FM transceiver.

Sensitivity

10dB quieting	0.11µV
20dB quieting	0.13µV
30dB quieting	0.40µV

AM rejection

To test for AM rejection a fully-limited FM signal (10µV) is fed into the receiver and modulated with a 1KHz tone (1.5KHz deviation). The receiver audio output is then noted. The FM modulation is then switched to AM still at 1KHz tone but only 30% modulation. The audio output from the receiver is then measured. It should be noted that this rejection is only true for signals that are exactly on the received frequency and that if the AM signal is slightly off frequency then a completely different result would occur. For the Harvard, AM rejection was measured at 31dB which is above average.

Adjacent channel rejection

For this test two adjacent generators are fed through a combining network into the transceiver and are set to adjacent channels on the rig (i.e., 19 and 20), both are modulated with a 1KHz tone at 1.5KHz deviation and one is set to 1µV output. The receiver is set to this channel and the audio adjusted to read 10mW. Now the output of the second generator is increased slowly until the receiver degrades the wanted signal by 3dB. The output from the second generator is noted and gives the relative indication or rejection. In this case a figure of 248µV was obtained which is within the prescribed limits.

Summary

On the whole the Harvard 402 MPA performed comparatively well, apart from the slight problem of frequency stability. As we have pointed out before, this is a set-up fault and not a serious design fault.

Looking on the bright side, the set is extremely well constructed by a reputable manufacturing company in Japan. The controls are basic but adequate with meters and channel indicator that can easily be read. The attractive design means that it will not look out of place in the sleekest of vehicles and its low price ensures value for money.



When only the best is good enough...



... then that's the time to buy Harvard CB. Whether it's a hand-held transceiver such as the 410T or a mobile in-car rig in the 400 series, Harvard offers you the best quality at the best price. So when you want to come on channel, make sure it's with a Harvard - the reliable one.

HARVARD 410T (left)

Superb 40 channel battery transceiver *complete with carrying case and strap *built-in RF-S meter *squench control *channel 9 emergency button *external antenna socket *battery conservancy unit.

HARVARD O-2-O

Lightweight 2 channel battery transceiver *squench control switch *LED battery indicator *two-way communication facility.



HARVARD MOBILE TRANSCEIVERS - 400M, 402MPA, 403M and 420M (above)

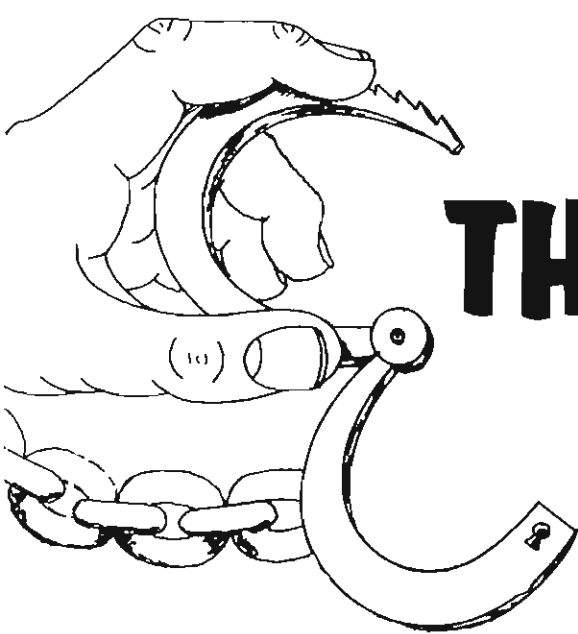
All these in-car rigs have: 40 channel LED display *squench control *built-in speaker *microphone *mounting bracket *4 watts output *built-in RF-S meter *external speaker socket *plus much more!

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THE LAW AND YOU

Home and dry?

Anyone who has run illegal AM CB has usually been well aware of the consequences if caught. In fact, to try and make sure that users were aware, we started The Law and You to give advice and a guide and what to do if stopped by the authorities. It has been one of our most popular regular features and all the information over the months has been collated to be passed on to solicitors dealing with CB cases if required.

Although there are AM/FM arguments abounding (and probably always will be), many ex-AM'ers have gladly turned to FM - not because they prefer it but because they don't like breaking the law. Lots of breakers also waited for legal CB before going on channel at all, rather than run the risks associated with using AM.

So all these people have turned to FM hoping their problems would be solved. And so they are - as long as

you follow the licence requirements. However, the Government has placed such exact limitations on the use of CB - like antenna length, attenuated power output, etc., that many people are dissatisfied with the service they are getting. Not too surprisingly, many are also ignoring these restrictions.

The licence

The conditions and restrictions on use are clearly outlined on the licence form. In filling in and paying for the licence you are also accepting the conditions laid down and you are permitted to use CB 'subject to the terms, provisions and limitations set out'.

If you break any of the licence conditions or use CB in any circumstances other than in accordance with the licence you are breaking the Wireless Telegraphy Act. So, in theory, if you have an antenna 1cm. over 1.5

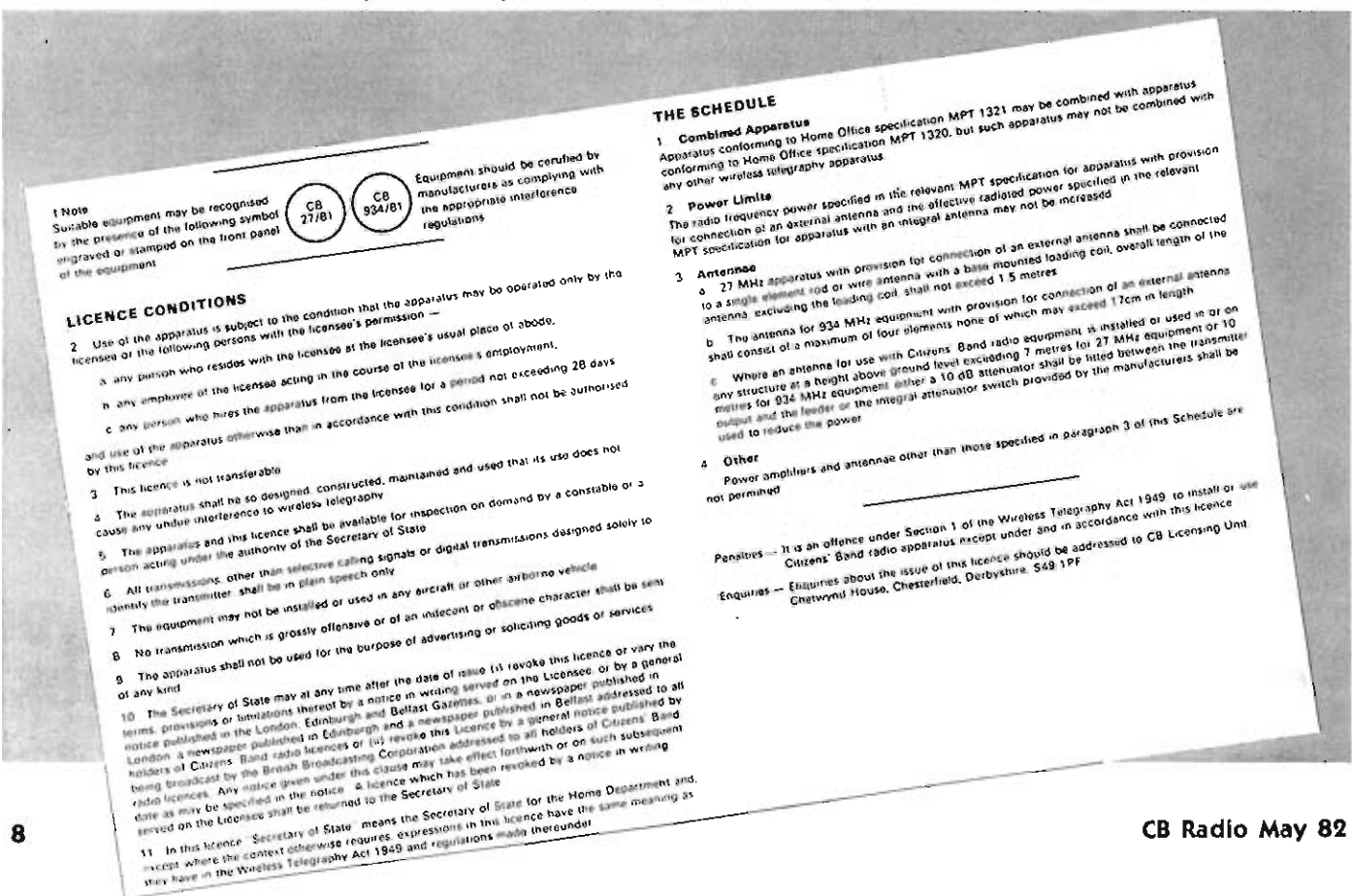
metres you are guilty of running illegal CB and liable to exactly the same treatment as an AM CB'er running 2Kw into a multimode!

The WT Act

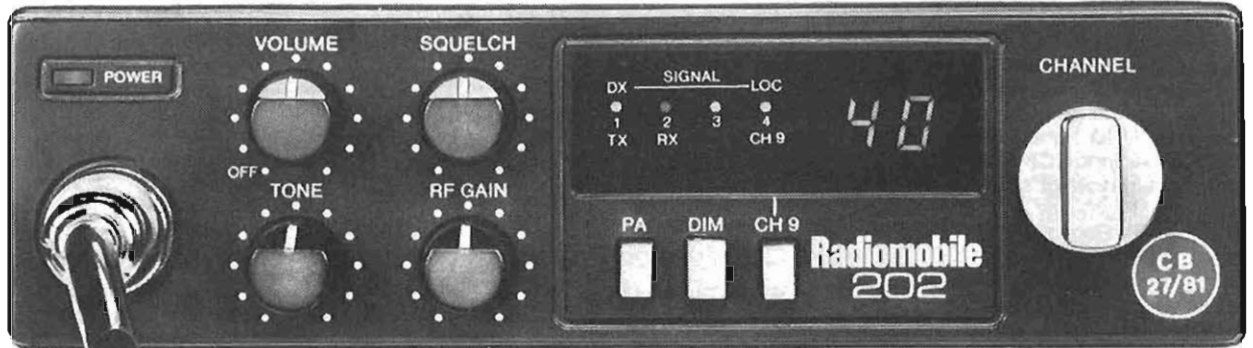
As longtime readers of this article will know, the penalties of this Act can be quite severe: £400 fine and/or six months' imprisonment and/or confiscation of the equipment. Although the punishment on conviction is very unlikely to be so severe, it's worth bearing in mind that you might not have escaped the perils of illegal CB!

It's also worth pointing out that if you are ever convicted of breaking the CB licence conditions, you may well be unable to apply for another one for some time and it may count against you if you are interested in obtaining an amateur radio operator's licence.

SS



CB to start the professionals talking.



Our extremely stylish new CB202 mobile unit will certainly start the professionals talking.

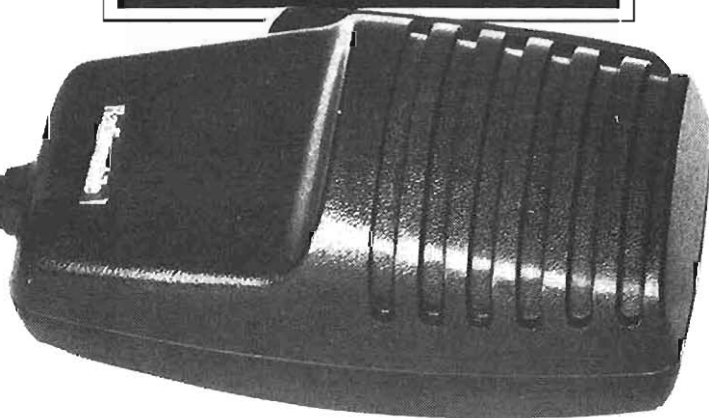
They'll probably mention the squelch tone, the RF gain and LED channel read out. And they may go on about the 4 digit LED S/Rf power meter and the transmit, receive and power-on indicators all with dimmer control.

Then of course there's the PA function, the integral speaker with external speaker jack, the PA speaker jack and 40 channels to choose from. We could go on and on.

So why not join the professionals?

The complete package comes with dynamic microphone, mounting bracket and comprehensive instruction manual. And because we've had 35 sound years behind us, you'll find our experience built into every unit. That should give you something to talk over. Er. .10.10.

Also available: the CB201. Ask your dealer for details.



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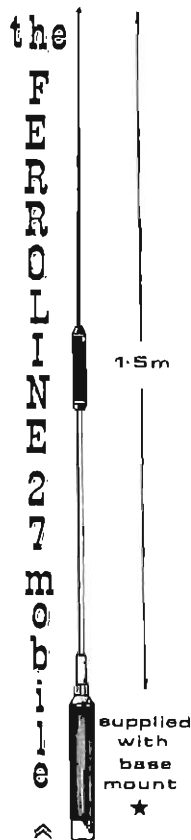
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- HOW TO SELECT AND INSTALL ANTENNAS** Full of information on how to choose and use antennas for CB radio. Special offer price £3.00
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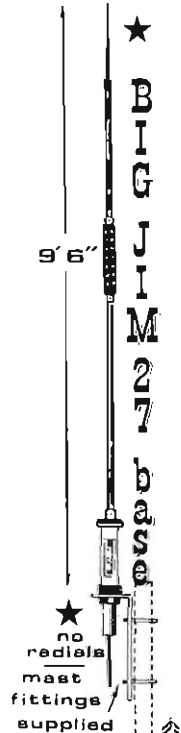


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 base antenna



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NEWS REVIEW



A mixed bag of topics

Press coverage for CB radio this month covers a wide range of topics from a vicar who has adopted CB as his method of communication with his parish (not the first we have heard of) to the benefits of CB to housewives suffering from agrophobia and from plans for a replica of the 'Cannonball Run' to take place in Britain to complaints of CB hooligans fouling the air.

Western Daily Press

Pupils switch into radio

Handicapped youngsters at Taunton's Princess Margaret School are wiring up wheelchairs for CB radio because they have recently been given a rig or two by the Taunton Deane CB Radio Club.

The rigs were presented by Tory MP Mr. Edward Du Cann to the school's 30-strong radio group who already have two sets which are in constant use. Mr. Doug Farmer, in charge of arts and crafts at the school, said that CB is a great leveller. The handicapped and the able bodies can talk on equal terms.

The children have already made friends with many other local children through CB radio. Mr. Farmer said that it is a very good social thing for them.

East Anglian

CB hooligans 'foul the air'

Disabled Ipswich breakers, whose CB radios provide them with their only contact with the outside world, claim that airwave hooligans are forcing them off the air.

After discussions with British Telecom's investigators, it has been decided to co-operate with them to try to locate the troublemakers. Mr. Peter Rice, of Telecom, said they were monitoring both AM and FM breakers and were trying to catch out the people who have caused breakers to go off the air.

Local breaker Avon Lady said "We have had so much trouble that one breaker has sold his rig and others have said they don't want to know". The trouble is being caused by a group of breakers who are swearing and causing interference to other breakers. "The language is pretty obscene," said Avon Lady. "I don't like

it when my little one can hear."

Investigator Mr. Raymond Boggis heard the breakers' complaints but had to explain that, while he sympathised with their cause they have got priorities and their main priority is to get rid of the people using the illegal AM band. Staff shortages are preventing the investigation team from policing the FM service until the AM breakers have ceased transmitting.

Sunday Independent

Vicar's CB lifeline scheme is well rigged

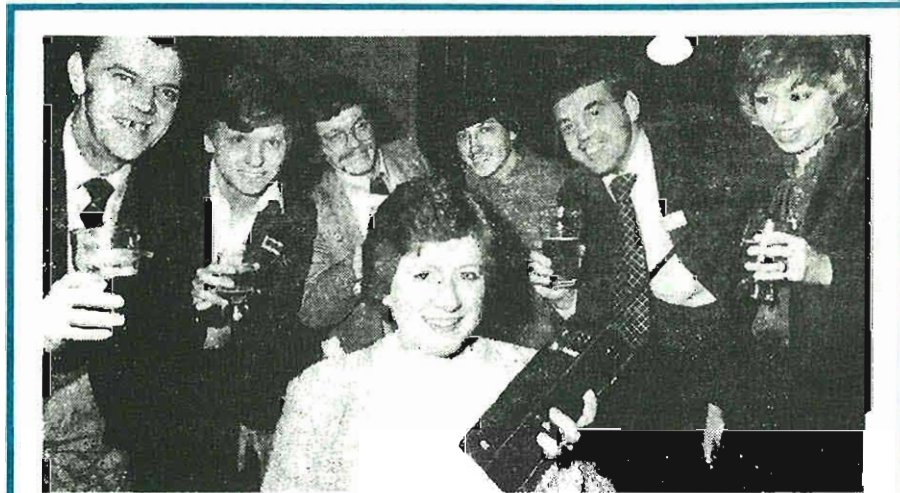
Father Raymond Wallace, who uses the handle Don Camillo, became interested in CB radio a few months ago. Since then he has found it a very useful tool to help him with his ministry in Falmouth and it has also made him a new circle of friends. Father Wallace has two sets, one mobile and one home base at his vicarage at Penwer-

ris, which he says are doing a wonderful job in bringing people together. It was this facet of CB radio that encouraged him to use it to help the household in his parish.

"After having an eyeball at the vicarage which was attended by 60 or so breakers, we started collecting money," said the vicar. "After that the idea just grew."

The new scheme, which is called CB Lifeline, aims to provide rigs for the household to give them a new interest in life. "It really works," said Father Wallace. "The first rig we bought went to a man who suffers from muscular dystrophy. His life has been completely transformed and he now has friends calling to see him all the time."

Apart from the Lifeline scheme, Father Wallace also has plans to write a book of town handles for the Falmouth area. "We hope the book will bring in enough for our third Lifeline rig," he said. "After that, we will keep going for as long as there is a demand."



Committee members of the Home 20 CB Radio Club say thank you to Donna Simpson (centre) for her gift of £50 towards their charity fund. Left to right: Gordon Thompson, Andrew Brown, Colin Cleat, Colin Pursall, Alan J. Hineckley and Melanie Cosgrove.

Angel of the CB airwaves

Sleeping Angel is calling Charlie Brown . . . to tell him the work of the Home 20 CB Radio Club is so great she's giving it £50.

Sleeping Angel is the "handle" of breaker Donna Simpson, aged 18, who joined the radio club just three weeks ago and quickly became its biggest fan.

The club — the first in Birmingham city centre — meets at the Town Crier public house in Macdonald Street.

Secretary Colin Cleat, known as Charlie Brown, said: "Donna is called Sleeping Angel partly because she is an angel, but also because she never gets up before dinner time!"

The club only charges £1.50 subscription, so Donna's £50

will come in handy towards their aim of being a help to the city centre community.

Its committee got together to give a big thank you to their favourite angel. Among those present were Charlie Brown, President, The Wasp, Silver Fox, Chatterbox, Led Zeppelin and Donna's sister, the assistant social secretary, Coffee Queen.

'Cannonball race in UK is madness'

A 'Cannonball run'-type car race is being secretly planned in Britain but the idea has been described as 'madness' by a rally organiser.

Competitors will be encouraged to break the speed limits over a 2,000-mile drive on A roads and motorways.

In the American race, drivers use CB radio to beat police traps on an annual trip from the west to east coast. The police listen in and use helicopters to stop entrants. CB fans said that if a race were to be held in Britain, CB would certainly help but the motoring organisations were less enthusiastic.

An AA spokesman said that it was an offence to race on the public highway and that they would not in any way support such an event. An RAC spokesman said that anyone thinking of running an event needs his head reading. In America there are vast expanses of waste areas once you get outside of town but Britain's roads are far too congested for an event like this.

Eastern Daily Press

Invalid Ian faces losing CB link

For the past few months CB radio has opened a whole new world for Ian Cooper but he fears that his CB days are numbered. Eighteen-year-old Ian suffers from a chronic heart complaint and has to spend most of his time cooped up indoors. Operating with the handle Lucky Leo, he has found a fresh interest in life and a host of new friends.

The blow came when West Norfolk Borough Council made enquiries about the 5ft. CB antenna that he has put up on the roof of the flats.

If the antenna has to be brought down, Ian will have to use an indoor aerial which is likely to cause interference to his neighbours. Ian has had no complaints so far about the aerial because most of the neighbours understand that Ian cannot get around.

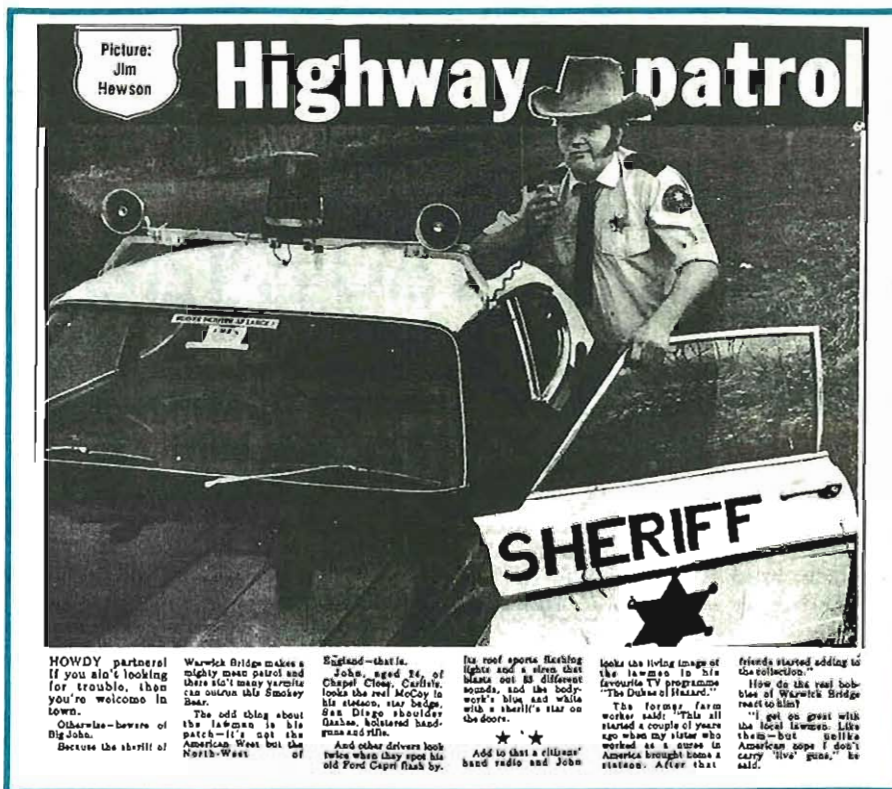
Ian is a member of the King's Lynn Breakers Club and manages to attend some of their events as well as helping with fund raising whenever he can. A council spokesman said that everyone who owned a CB aerial in the flats had received a letter. A course of action will be decided when the replies have been received.

Scotsman

CB to the rescue in hill ordeal

Two CB radio enthusiasts were rescued from the 2,300ft. summit of Ben Cleuch after putting out an emergency call on their CB sets.

Their emergency call was picked up by another breaker who alerted the mountain rescue service. Peter Hughes



HOWDY, partner! If you ain't looking for trouble, then you're welcome in town.

Other-las-beware of Big John.

Because the sheriff of

Warwick Bridge makes a mighty mean patrol and there ain't many varmints that outrun the Smokey Bear.

The odd thing about the lawman is his patch - it's not the American West but the North-West

of

England - that is, John, aged 34, of Chapel Close, Cardiff, looks the real McCoy in his stetson, star badge, San Diego shoulder patches, holstered handgun and rifle.

And other drivers look twice when they spot his old Ford Capri flash by.

The roof sports flashing lights and a siren that blinks out 33 different words, and the body-work's blue and white with a sheriff's star on the door.

★ ★

Add to that a citizen's band radio and John

looks the living image of the lawman in his favourite TV programme 'The Duke of Hazzard.'

The former farm worker said: 'This all started a couple of years ago when my sister who worked as a nurse in America brought home a station. After that

friends started adding to the collection.'

How do the real bobbies of Warwick Bridge react to him?

'I get on great with the local lawmen. Like them - but unlike American cops I don't carry 'live' guns,' he said.

and Andrew Kwiatkowski had climbed to the top of the hill to test reception of their radios but were caught in bad weather. They pitched a tent on the summit but high winds and lashing rain almost blew it away.

Their emergency call was picked up by Derek Hill, who kept in constant touch with them until the rescue team arrived.

Manchester Evening News

SOS service with 20,000 helpers

Breakers from the Manchester area have started their own police-style operations room to help emergency services deal with accidents and disasters.

Emergency Base Station One has been set up to monitor calls in the Greater Manchester area and already the emergency services have been notified of traffic accidents only minutes after they have happened. The station can call upon the ears of up to 20,000 breakers in the Manchester area alone. A spokesman for Swinton CB Club said, "We think we will be able to give valuable assistance to the emergency services".

Manchester Evening News

Breakers clear the air for hospital

Breakers who put hospital patients' lives at risk when their CB broadcasts knocked out doctors' beepers have heeded a warning to stay off the air.

Tameside Hospital chiefs appealed for an end to the broadcasts which left

the beepers ineffective for minutes at a time. Administrator Mr. Glen Berry said, "Since an article in the Manchester Evening News we have had no trouble at all. We are grateful for the publicity and would like to thank the breakers who have stayed away from the hospital."

The trouble was being caused by breakers still using the outlawed AM sets on channel 12 which exactly matches the frequency of the beepers. They remain unaffected by the new legal FM rigs.

East Anglian Daily Times

CB radio may help agoraphobics

CB radio may come to the aid of people suffering from agoraphobia, the fear of open spaces. If not treated the complaint can turn lives into housebound misery.

The idea of using CB communication as a means of keeping sufferers in touch and providing encouragement to meet and go out was put forward at a meeting of the Bury St. Edmunds agoraphobics club. The club was started by principal clinical psychologist Richard Young of the West Suffolk Hospital who said that they were thinking of asking a CB enthusiast to talk on the subject at a future meeting. At the first highly-successful meeting, more than 20 agoraphobics turned up which was way beyond Mr. Young's expectations.

"Most agoraphobics want to get out of the house and CB radio helps sufferers to communicate, so easing tension to make meeting easier," said Mr. Young. "Two agoraphobics together are less anxious than one on his own."

PRACTICAL ANTENNAS

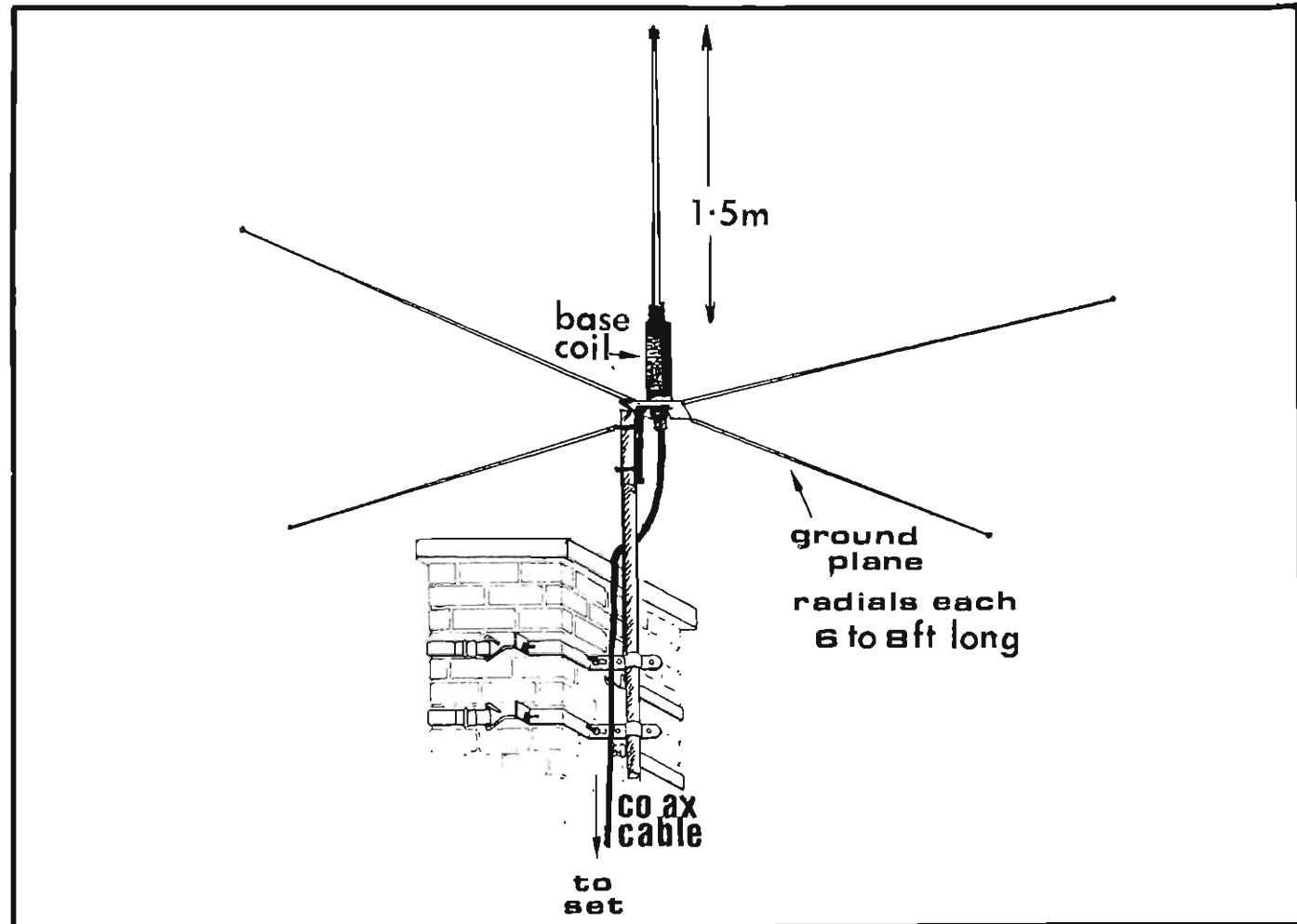
Part 3 – Outdoor Antennas by F. C. Judd

At the time of writing there are few outdoor CB base station antennas for 27MHz that meet the CB licence requirements. Such an antenna can only consist of a 1.5-metre base loaded radiator above a ground-plane system similar to that illustrated in fig. 1. Being of relatively lightweight, a chimney mounting arrangement, as shown, can be used and which employs standard chimney straps with fittings for a short mast of the type used for mounting a TV antenna. Where the antenna is at a height exceeding 21ft. the transmitted signal must, according to the CB licence, be attenuated by 10dB. Under these conditions the attainable range will be less than if the antenna were at a height not exceeding 21ft. and the allowed 4 watts of power used.

Those who live in bungalows could also use a chimney-mounted antenna as shown in fig. 2. The average height will be in the region of 20-21ft. and again a standard TV antenna chimney mounting system can be adopted. Note how the co-axial cable is brought down for entry via a window with a 'drip loop' preceding the entry to prevent rainwater from running down the cable and through the window. The cable may be clamped with ordinary electrical plastic cable clamps, available from most DIY shops.

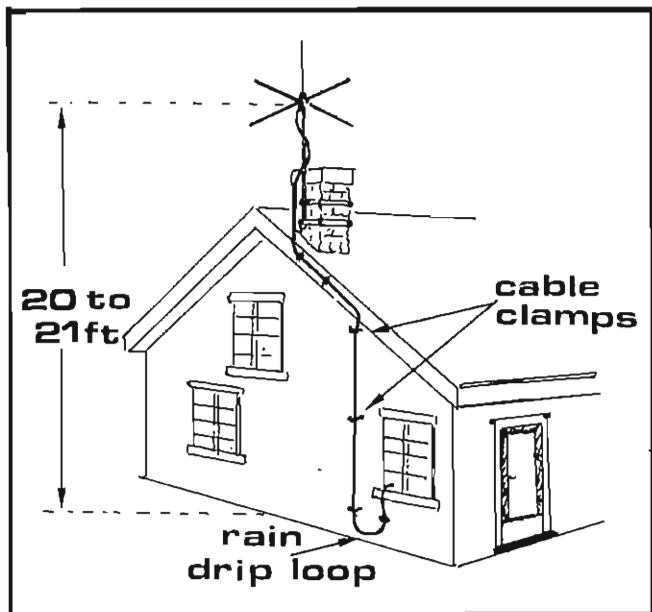
An alternative arrangement is shown in fig. 3 where a tubular metal mast (1½-2in. diameter) is used with one end sunk into the ground, the mast itself being secured to the building with a bracket or clamp at about the point shown. The mast can be 20-21ft. high with the antenna mounted directly at

Fig. 1
Chimney-mounted base station antenna using standard TV antenna straps and stub mast.



the top and therefore situated well clear of the roof. Note that in this case the CB antenna is to the rear of the TV antenna to help reduce possible breakthrough of the CB carrier into the TV. Normally the further the CB antenna is from the TV antenna the better, since this will help reduce the possibility of TV interference.

Fig. 2
Bungalow Installation with chimney mounting as in fig. 1. Note the drip loop at the low end of the co-axial cable run.



An extendable self-supporting mast similar to that shown in fig. 4 is an alternative for mounting a base station antenna. There are a number of these available, some of which can be raised to a height of around 30ft. and can be used without supporting guy lines. Some self-supporting types have a flat plate base that is bolted into concrete whilst others are available for wall fixing. When lowered, these masts can usually be tilted over for easy access to the top for mounting the antenna. Some of these masts are raised by a winch and wire system whilst others are raised pneumatically.

Fig. 3
Another bungalow installation using a short mast clamped to the building and the base end secured in the ground. Note CB antenna is to the rear of the TV antenna (see text).

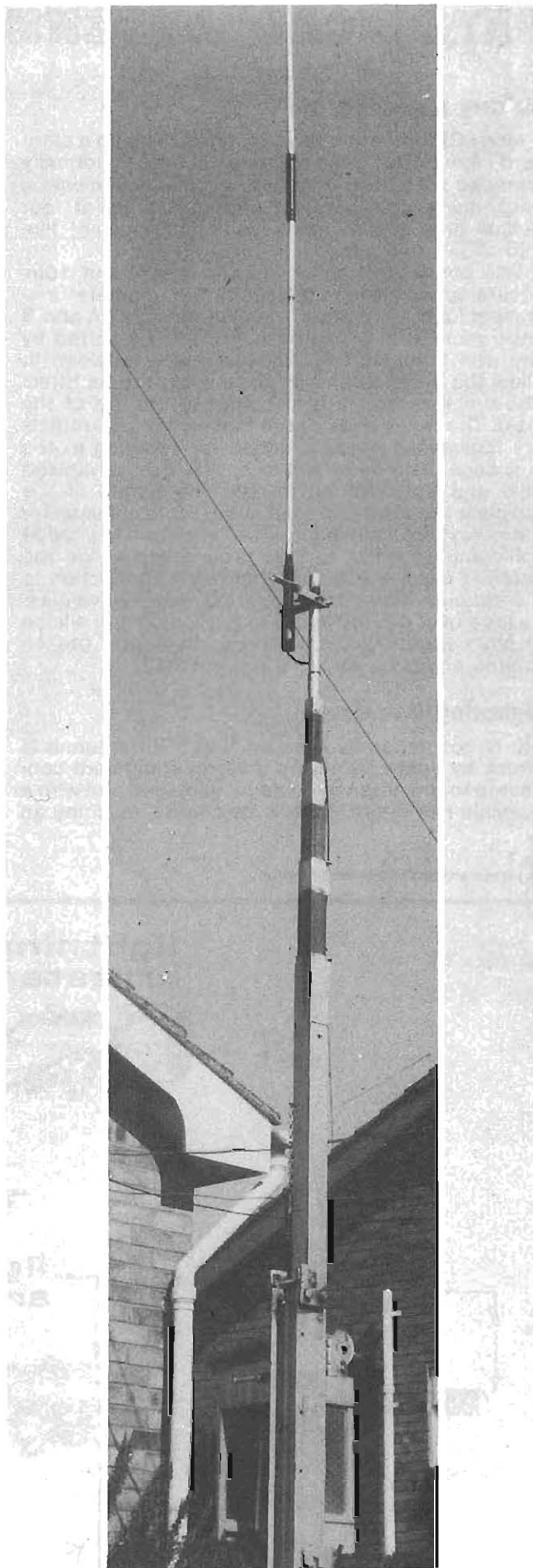
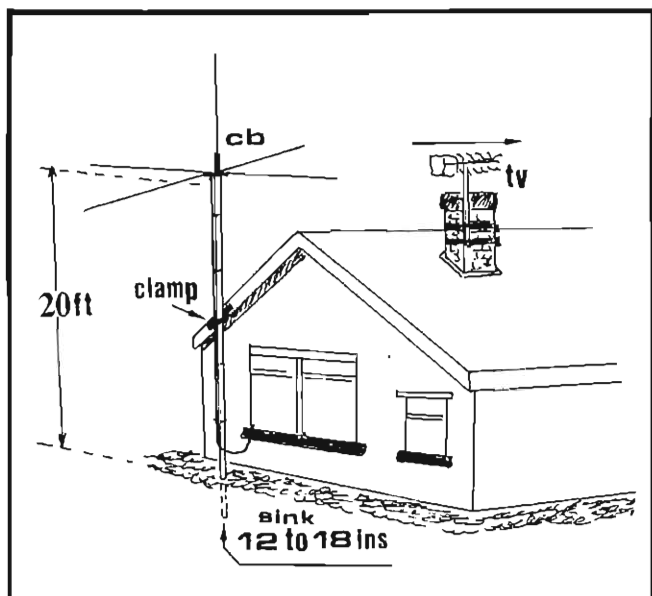


Fig. 4
Wind-up self-standing mast (see text).

PRACTICAL ANTENNAS

Making a ground plane

Many CB operators have resorted to using a standard 1.5-metre base loaded antenna normally intended for mobile operation in conjunction with a ready-made ground-plane unit consisting of four radials or a similar home-made arrangement like that shown in fig. 5.

This consists of a flat plate of zinc about 10in. square to which four radials of 1/2in. diameter aluminium tube are bolted. The diagrams fig. 6A and B show more detail. The base plate is supported by two iron brackets with enough space between to allow the antenna and its base socket to be fitted. The brackets are in turn bolted to the top of the mast. The inner ends of the aluminium tube radials are hammered flat and drilled for securing to the zinc base plate as shown in fig. 6B. Use galvanized nuts and bolts for all fixings. The length of the radials is not too critical but about 8ft. is optimum for the lowest possible angle of radiation and to provide sufficient capacity to the ground plane for the antenna itself. Make sure that cable connection to the antenna is watertight by winding adhesive plastic tape over it or by applying a good coat of silicon or other water-repellent grease. Also apply grease to nuts and bolts and the iron brackets.

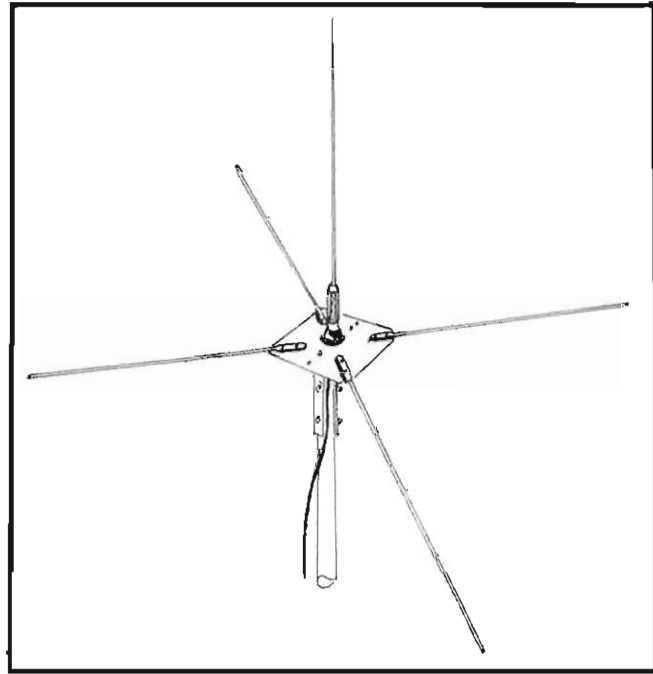


Fig. 5
Ground plane system for use with a standard 1.5-metre base loaded mobile-type antenna (see fig. 6).

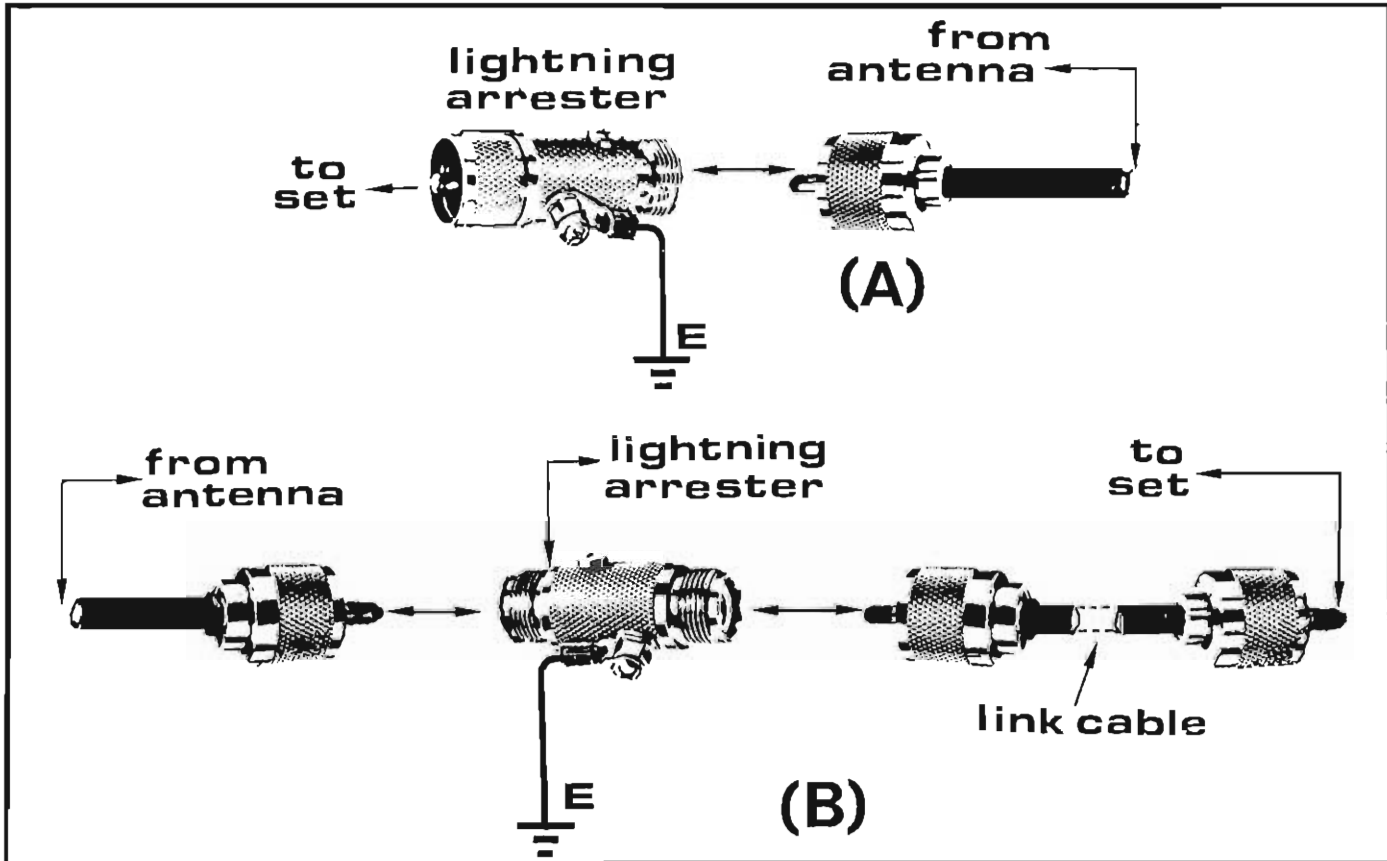
Lightning arrestors

It is not generally realised that if an antenna is struck by lightning during a storm equipment connected to the antenna could be damaged and with a possible risk of fire. Even a 'by charge' reaching an

antenna could cause damage to the input stage transistors of a CB set and unless a lightning arrester is fitted the co-axial cable between the CB set

Fig. 7
(A) Direct connection lightning arrester.

(B) In-cable lightning arrester (see text regarding use and connection of both).



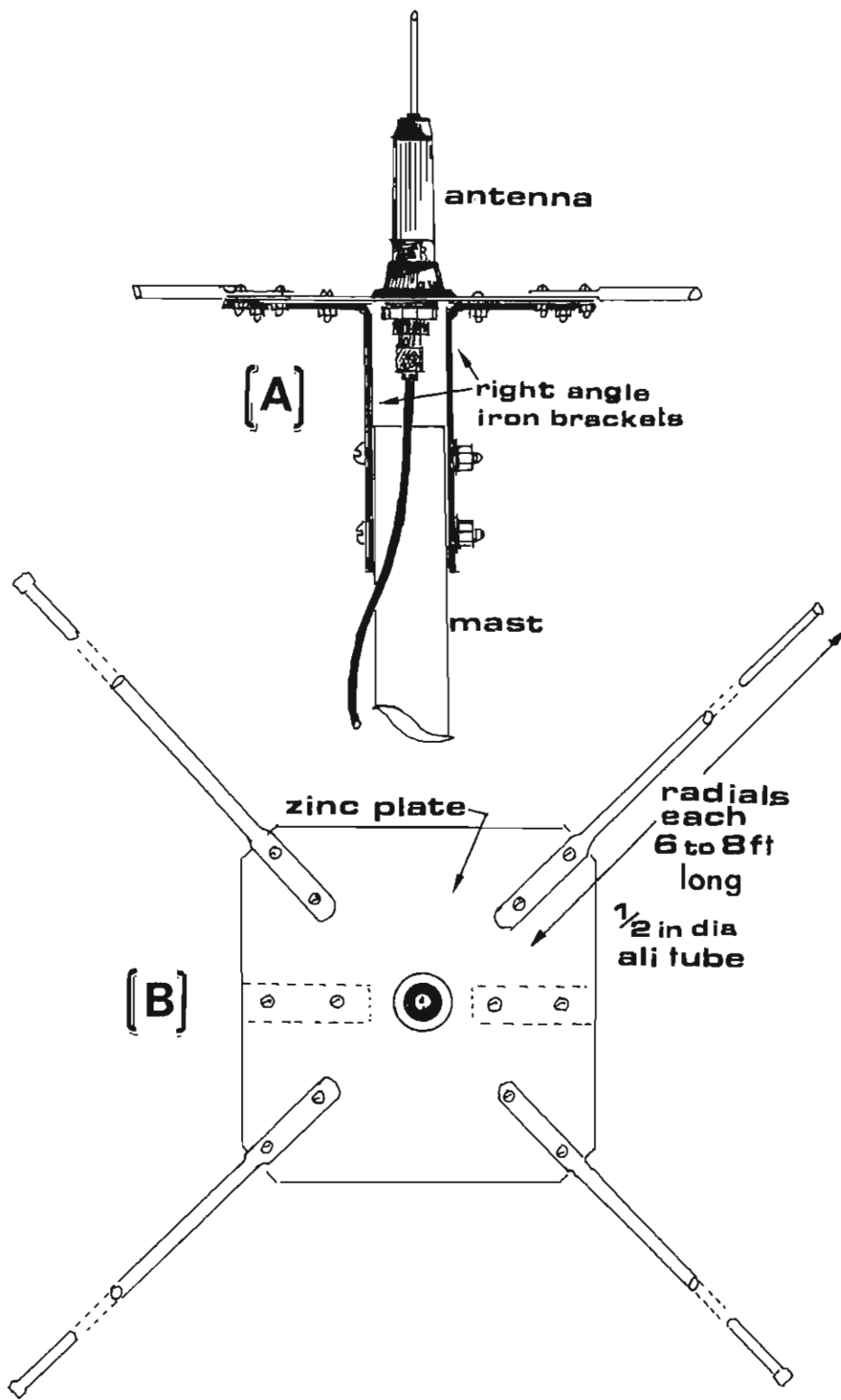


Fig. 6
 (A) Side view of radial and antenna mounting plate and brackets also

showing method of attaching to top of mast.
 (B) Top view of base plate and method of securing radials (see text).

and the antenna should always be disconnected during a storm. Simple but adequate lightning arrestors are available for connection in series with the feed cable between the CB set and the antenna. The one shown in fig. 5A is simply connected between the CB set co-axial socket and the antenna cable. These arrestors have provision for an external connection from which a copper wire cable is taken to earth which may be a nearby copper water pipe or a copper earth stake in the ground outside.

The arrestor shown in fig. 7B has a double-socket connection which will enable it to be connected at any point in the antenna cable where it may be easier to get a short connection to earth, either to a water pipe or a copper earth stake in the ground. *Do not use the earth connection of a mains power socket for this purpose.* These lightning arrestor units connect with standard PL259 plugs or the equivalent socket and are available from most CB radio dealers.

RUFNEK by ZAK

WHERE'S 'EM MATCHES? I CAN NEVER FIND 'EM WHEN I WANT 'EM!

WHAT ARE THESE UNDERS DOING IN HERE?

I'M NOT SAYING ANYTHING!

OH! TO HELL WITH THIS! I'LL GET A LIGHT SOMEWHERE ELSE!

BLUSH!

HERE YOU ARE, RUFNEK! YOU AREN'T SUPPOSED TO PUT OUT A 10-38 FOR A LIGHT!!

THANKS A LOT!

RUFNEK, THERE'S SOMETHING....

YOU @%?! IDIOT!!

SWAT!

SING!

HEY, DID I TELL YOU ABOUT THAT SPONSORED TALK? I DIDN'T? WELL, THEY WANTED THE BIGGEST RALPHET-JAW IN TOWN, TO RISE MONEY BY TALKING OVER THE CB AIRWAVES! OTHERS WANTED THE JOB, BUT THEY COULDN'T GET A WORD IN WITH ME! I MANAGED TO TALK CONTINUOUSLY FOR 24 HOURS!!

... AND NEVER REPEATED YOURSELF ONCE, I BET?

RUFNEK, THERE'S SOMETHING I.....

I BET YOU'RE WONDERING, HOW DID I MANAGE TO SIT IN THE CAR FOR 24 HOURS WITHOUT ONE? DOES THIS ANSWER YOUR QUESTION?

I REALLY WANTED TO KNOW THAT!

RUFNEK! THERE'S SOMETHING I REALLY WANT.....

... \$350 I RAISED FOR CHARITY! NOT BAD FOR DOING SOMETHING THAT COMES NATURAL! IT ALL WENT TO THE MENTALLY HANDICAPPED... AN HA! BEFORE YOU SAY IT, ... NO, THEY DIDN'T GIVE ME A SHARE HA! HA!

FRIENDLY SLAP!!!

RUFNEK! BETWEEN BREATHS, THERE'S SOMETHING I REALLY....

ANOTHER GOOD DEED DONE FOR CB RADIO! ... WITH FOLKS LIKE ME ABOUT, THERE'LL ALWAYS BE A GOOD SIDE TO CB'ING! IT'S ALL GOOD PUBLICITY ... HAVE YOU SEEN MY PHOTO IN THE LOCAL PAPER? PITY THEY DIDN'T TAKE IT FROM THE LEFT ... I'VE ALWAYS SAID MY LEFT SIDE IS MY BEST! ... BUT I STILL BOUGHT 300 COPIES!!!

NO WONDER THEY ASKED HIM TO DO THE SPONSORED TALK!!!

HOW ARE THINGS WITH YOU?

OH! DID I TELL YOU ABOUT THAT 'YL' I MET LAST NIGHT?

TOO LATE!

YEH! NOW THIS IS INTERESTING!!!

RUFNEK!! THERE'S SOMETHING I WANT TO ASK YOU!

NO NEED TO SHOUT, PAL, I CAN HEAR YOU!

LOOLY!

AH WELL, IT DOESN'T LOOK LIKE YOU'RE GOING TO HEAR THE BEST BIT!

WHAT'S BUGGING YOU? YOU LOOK QUITE UPSET! YOU'RE NOT GOING TO CRY, ARE YOU?

I MIGHT DO! I'VE GOT A SERIOUS PROBLEM, RUFNEK!

... I'M THE SAME! ... I CAN'T WALK PAST AN OPEN PUB DOOR!

NO! IT'S NOTHING LIKE THAT! IT'S A CB'ING PROBLEM!

YOU'VE COME TO THE RIGHT MAN! YOU'RE TALKING TO THE MARJORIE PROOPS OF CB'ING!

IT'S EVERYTIME I SEND OUT A BREAK NOBODY EVER COPIES ME!

... ER ... MMM! ...

WHAT DO YOU EXPECT WITH A HANDLE LIKE GAY GORDON?!

ULTRA EMBARRASSMENT!

Flick!

TELECOMMS

We stock
over 1000 items.
Send for our full list.

We have over 1000
sq. ft of showrooms
— well worth a visit.

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Same day despatch on our HOTLINE 0705 662145

Simply ring quoting Barclaycard/Access number for immediate despatch of items listed
Send £1 for our full lists and colour brochure and receive a £2 voucher against your first purchase.

MOD. B 30 D TRANSISTOR POWER AMPLIFIER



Frequency supply: 26-30 MHz
Input power: 0.3-4 W. AM 1-8 W. SSB
Output power: 25 W. AM 50 W. SSB
Protected against polarity inversion
Inside fuse 3 Amp Price £15.44 (p&p £2.00)

MOD. BV 131 POWER AMPLIFIER CB BASE STATION



Frequency range: 26-30 MHz
Power supply: 220 Volts AC +10%
Input power: 0.5 ÷ 10 Watt
Output power: 100 ÷ 130 WRF 200 ÷ 250 WSSB
Power gain: 14 dB
Mode: AM FM SSB
Inside electronic switch tubes used: 6KD6
Lighted meter Price £84.53 (p&p £8.00)

MOD. DL 150 DUMMY LOAD WATT METER



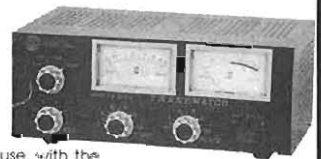
Frequency range: 3-500 MHz
Max power input: 150 Watt not more than 10"
100 Watt continual service
SWR: 1.2 — Accuracy Wattmeter: ±10%
Reading range: 3-15-150 Watt F S
Impedance: 50 Ohm Price £39.00 (p&p £2.00)

MOD. MM 27 MATCHBOX



Frequency range: 26-28 MHz (CB)
Insertion loss: 0.2 dB
Max power input: 100 Watt AM
Price £7.95 (p&p £1.00)

MOD. TM 1000 TRANSMATCH



The model TM 100 is for CB use, with the following characteristics: antenna match, SWR meter, power meter and switch for two antennas. They are all contained in one single box. For the technical characteristics see: M 27-201-V2 Price £39.95 (p&p £5.00)
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Type: directional coupler
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Max power input: 2 KWatts PEP
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Shipping weight: 0.8 kg
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MOD. BV 2001 POWER AMPLIFIER CB STATION BASE

POWER AMPLIFIER CB STATION BASE

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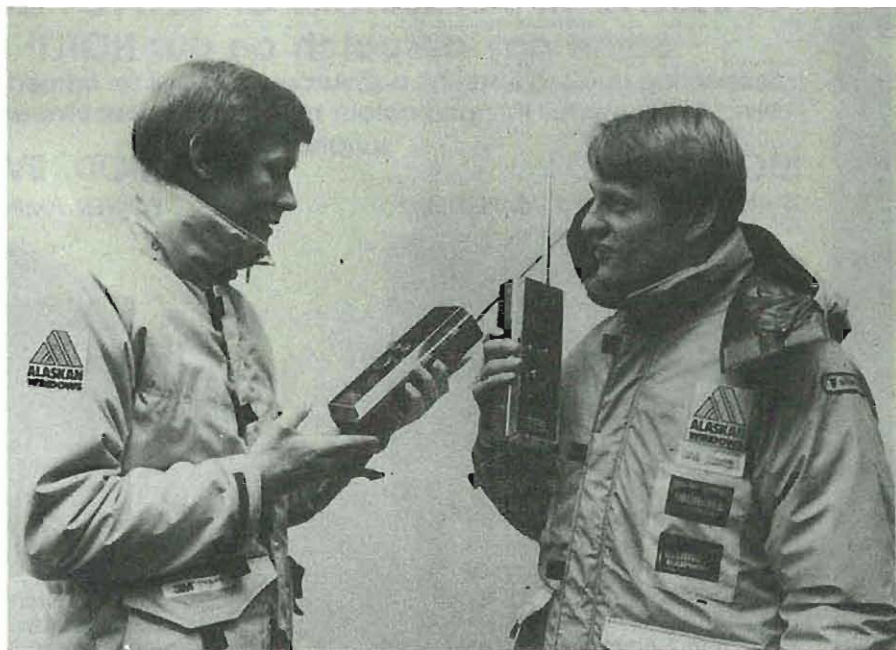


Round Up

CB buckle

For real enthusiasts, here's a good way of advertising your hobby to the rest of the world - a CB belt and buckle, complete with handles.

Available from Ultimate Leather at Unit 4, Neckinger Mills, 164/168 Abbey Street, London, SE1, the buckle can be engraved with your handle and the leather belt itself can also be embossed. The basic price for the belt and buckle is £6.50, for either the belt to be embossed or the buckle to be engraved is £7.50 or both the belt and buckle embossed and engraved are £8.50. These prices include postage, package and VAT.



Head for heights

The two intrepid gentlemen in the photo are Lt. Duncan Sperry and Flt. Lt. Wayne Morgan and they are examining their Binatone Long Ranger 12-channel walkie-talkies. The sets will be used for communications on the Army Mount McKinley Expedition to Alaska. This is a British assault on

what is regarded as the 'coldest climb on Earth' and the world's highest mountain in terms of vertical distance from base to summit.

The three sets will be used by the five-man team for contact between the climbers and will provide a link with the Warden of the National Park and the media following the event.



Snippets

Mid Sussex Monitors want a mention for their monitoring system, covering south of Lewes to East Grinstead and Mayfield up to the A23 from 8.00am to midnight daily. They are fully armed with telephones and emergency numbers, etc. Hope you never need them but it's nice to know they're there.

The **Channel Snobs FM Club** are collecting for a charity called the Chailey Heritage, which cares for physically handicapped children. The club are running a sponsored marathon copy from Firle Beacon, starting at 8.00am Good Friday and going on to noon Easter Monday and they hope to raise £2,000. (Hope you manage to read this before Easter! Details came in too late for April edition).

The **Bravo Hotel DX Group** are organising a petition with two aims in mind. One is to get SSB transmissions legalised on an extended frequency range and the second is to stop the alienation of UK CB from the rest of the CB community. Anyone interested in signing, particularly DX operators, should write a short letter and send it to the Bravo Hotel DX Group, PO Box 55, Bournemouth, Dorset BH1 1AA. Mark the envelope SSB.



Anyone interested in helping the **Wizard of Oz CB Club** in Oswestry with the UK Care Convoy on 18 May? You will be helping with a charity convoy and helping to promote 27MHz all modes. Contact through PO Box 8, Oswestry, Shropshire.

We had a QSL card from **Tarzan and Jane** in Tauranga, New Zealand and a letter describing the CB scene in New Zealand. They would love to hear from other QSL'ers and they can be contacted at 29 Cook Street, Gate Pa, Tauranga, New Zealand.

The **Old Brewery House Hotel** in Reepham, Norfolk is offering a 'Breaker-Break' holiday scheme. Prices start at £35 per head per evening and this includes accommodation, table d'hôte dinner, morning tea or coffee, full Eng-

lish breakfast and VAT at 15%. The hotel has many facilities including swimming pool, sports club with squash courts, solarium, spa and steam baths. Discounts are available for groups of 10 or more. Address: The Old Brewery House Hotel, Market Square, Reepham, Norfolk NR10 4JJ, tel: (060 526) 8181.

The **Stoke Mandeville and Other Hospitals CB Radio Appeal** are hoping to collect over £1½m for a CB ward at Stoke Mandeville Hospital. The organisers would like every breaker to donate 50p to illustrate how many breakers there are in the country and to show the positive aspects of CB. Donations should be paid into your local branch of the Midland Bank. They will then be transferred to the Tarporley branch, Account No. 51018965, sorting code 40-44-03. Donations should be made out to the Stoke Mandeville and Other Hospitals Appeal.

The **North Eastern Rescue Organisation (NERO)** in Darlington have commenced monitoring channel 9 of legal FM CB. Coverage is from 5.00am to 1.00am. For more information contact NERO, c/o Dukes Club, 26 Dukes Street, Darlington, Co. Durham.

John Emery Memorial Fund

The Shannock Town Breakers Club of Sheringham, Norfolk, have presented a cheque for £2,000 to Cromer Hospital for the purchase of an arthro-scope.

The money was raised in memory of John Emery, Vice-Chairman of the club, who was killed in a road accident last year. John, or Torque Wrench, was a popular and hard-working member of the club and they decided to honour him by purchasing much-needed equipment for the local hospital.

The majority of the money was raised by a sponsored beach walk by the Sheringham club and other clubs in the area. Eighty walkers braved the cold, wet November day to cover the 15 miles' circuit. They were treated to a buffet on their return at the club HQ.

The cheque for £2,000 was received by the Senior Sector Administrator for the North Norfolk Group of Hospitals, Mr. Ted Ratcliffe and Mr. Hugh Phillips, Senior Orthopaedic Surgeon. At the presentation trophies were also presented to members of the club for their fund-raising efforts.



Would the breaker from Bradford who ordered goods from South Pacific Radio in Queensland, Australia please contact this magazine or South Pacific Radio WITH YOUR ADDRESS! Rod Fewster of SPR is anxious to sort this out, as he thinks some poor CB'er is convinced he has been ripped off and Rod needs a satisfied customer more than he needs the money.

Confessions of a CB enthusiast

Part 3 from Videostar
(Raymond E. Orr)

Last month, we left your tame breaker returning to his car, only to find three policemen taking more than just a casual interest. In fact, one of them was in the driving seat looking under the dashboard. Naturally, one assumes the worst and as a British Telecom van was parked just across the road, it came in a flash - obviously I had bought an AM rig that had been 'doctored' . . . I mean how was I to know? It did have the CB 27/81 sticker on the front panel. Seeing myself as another court statistic it gave me the willies(!) and to be honest running away was one of the courses of action I contemplated! On rushing up to the car all became clear . . . glass surrounded the nearside of the vehicle - yes, you've guessed correctly - some 15 hours after installation the car had been broken into and the rig (a Harrier) complete with SWR meter had been 'neatly' removed. The subtle way our friendly thief used a hammer to smash open the passenger door window was bad enough - but the £73 for the replacement window really stung!

The police (I had been told later) were there within minutes but too late to do anything constructive. With broken glass everywhere, I was asked to drive round to the 'station' and make a statement. When they discovered that it was only a CB that had been stolen, there was certainly a cooling down of interest. However, the fact that it was a *legal* rig and I could show a licence, meant they were prepared to make out a crime report and do something about it! A word of warning - should this misfortune happen to you, remember some police forces have understanding Chief Constables, others don't. My local force will only act *if the equipment is legal and you have a valid licence*. If your 'thing' just happens to be the old AM system and your rig gets lifted . . . tough! It seems very unfair but be

CRISP promotes CB

Members of the Car Radio Independent Specialists Association are mounting a national promotion on CB. Members are supplying rigs to be fitted into the organisers' vehicles on the London to Brighton Bike Ride in aid of the British Heart Foundation.

Local emergency monitors will also be manning a base set in CRISP members' showrooms away from the route.

CRISP are hoping to present a serious image of CB, particularly with respect to the emergency channel. With this in mind, REACT (UK) is encouraging its members to help in the exercise. Literature will be available showing how CB can help such people as heart sufferers in an emergency and disabled people generally. Collection boxes will also be available for contributions to the British Heart Foundation funds.

warned. Now rigless and with a car noted for its ventilation rather than comfort, I began to wonder whether our hobby was worthwhile but the depression passed and I started looking forward to a replacement but the only problem was how long it would be before I could afford it! It seemed a good idea the following day to tell my local ITV station that it wouldn't be worthwhile to call on me for another CB story as a thief had cut me off from other 'good buddies'. Rather than let the matter drop, not only did the CB film get shown on that night's television news but it appeared again the following week - this time on Crimedesk. Fame indeed!

A few months later and with money at the ready (and a new car window), ever mindful of a way to beat the thief, I started looking for a 'disguised' rig - £100 or so was invested in the Binatone BreakerPhone, which is simply a telephone handset with all the electronics in a separate metal box that is bolted to the chassis. To an outsider, it looks like a toy or a Securicor/Air Call type radiotelephone - both items not worthy of a break and entry expedition. With slightly less trepidation, I prepared to rejoin the world of CB and install the replacement rig (after all, I did it once already!) and within two hours everything was fine and we were back 'on channel' at last. For those of you unfamiliar with the BreakerPhone, it should be pointed out that there isn't a channel-change knob on the unit but two buttons, one marked 'Up' and the other 'Down'. Simple enough? You would think so but I excelled myself again and next month I'll tell you why this CB only lasted three days!

10-10.

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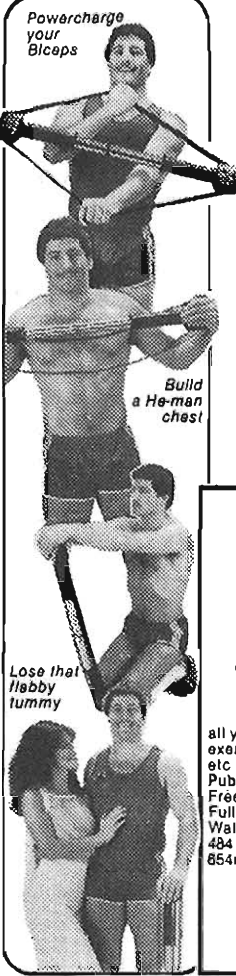
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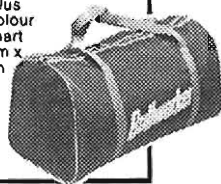
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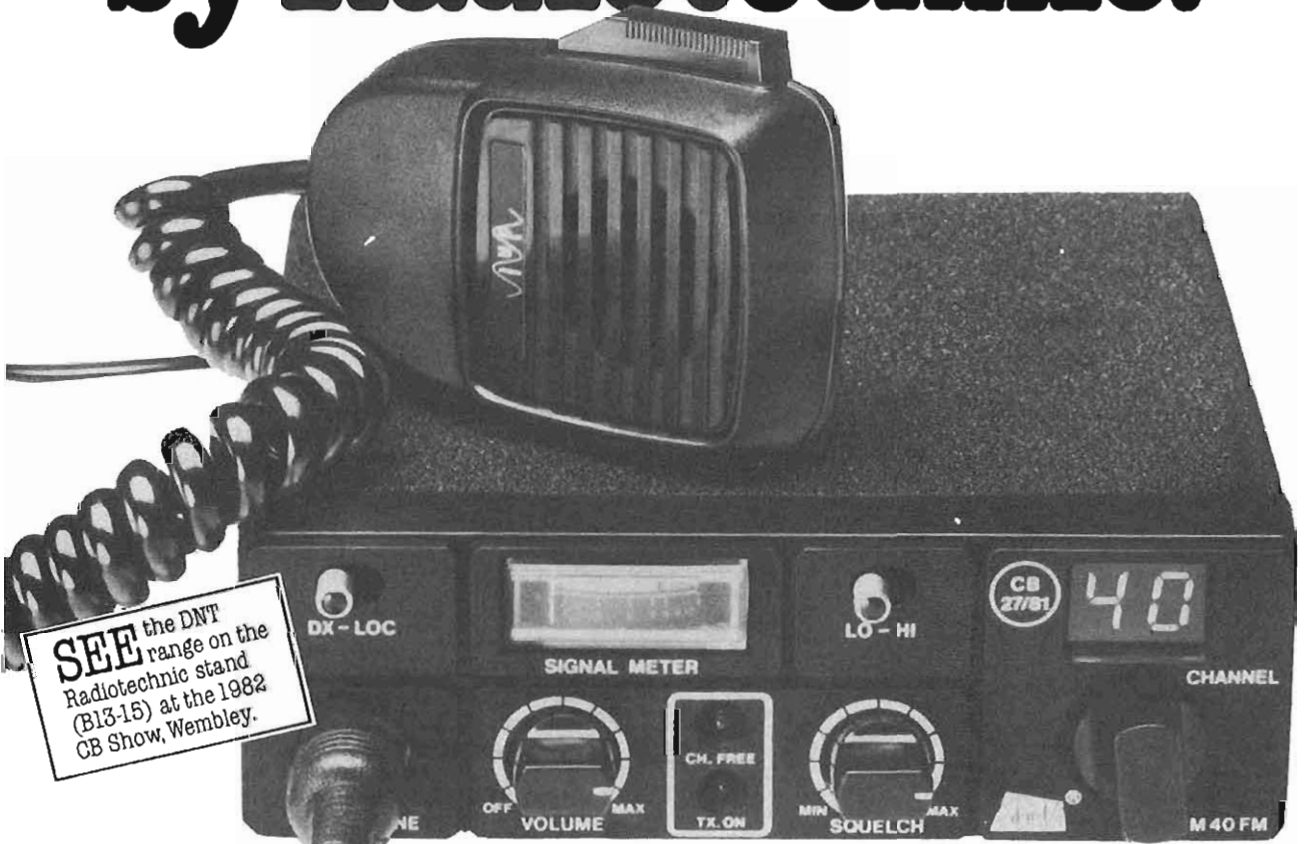
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Electricity made Easy

A basic explanation by Spotty Dog (B.Sc.!)

Going by the replies to our Reader Survey, our technical articles are enjoyed and looked forward to by a lot of our readers. However, quite a few people feel that the more involved features go a bit over their heads. For those of you 'a bit deaf with a soldering iron' and to try and help these readers (and make the CB handbooks easier to follow!) here's the first in a series on electrical theory - simplified.

Basic electrical measurement

Modern electronic components and circuitry are becoming more and more complicated. At first sight, any attempt to understand the innards of any piece of electronic gear might seem a waste of time. Really, though, the basic principles of electricity never change and a knowledge of how electricity works can often save an expensive mistake. After all, using the wrong fuse in a piece of equipment can result in burning down the house, or worse, ruining that new rig!

A wet idea

When electricity was first discovered, back in 1800, it was thought to be some sort of fluid that ran from one pole of a battery to the other along a wire. This idea of something flowing through the wire like water through a pipe turned out to be very useful and not far from the truth. It can explain several things. For instance, if the wire is cut, the electricity stops. You might have a bulb, say, connected to a battery. Cut the wire, the electricity stops flowing and the bulb goes out. It doesn't matter where you cut the wire either. This fluid theory can also explain a short circuit. If you put another wire across the bulb terminals, some of the electricity gets diverted through that instead. This makes the bulb go dim and it might go out altogether. The theory can be pushed even further when you start to actually measure things like pressure and rate of flow.

The big squeeze

When you have water squirting down a pipe, it seems obvious that the more pressure there is behind it, the faster it flows. (It's the pressure difference across the ends of the pipe that is important, if you think about it). We can measure the flow of water in buckets per minute, say, and the pressure in pounds per square inch. In the case of electricity, things aren't so obvious, mainly because you can't use buckets to measure the flow. Fortunately, we don't have to. We can use an ammeter. This is an instrument that uses a magnetic field to measure electric current. The flow rate is measured in amperes, often shortened to amps, instead of buckets per minute.

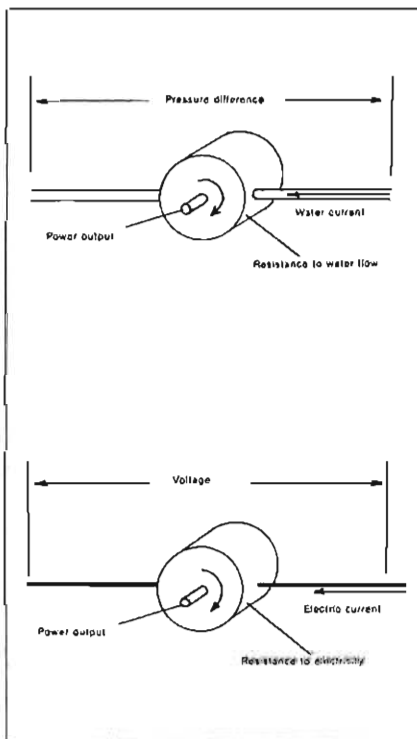


Fig. 1
The water flow model of electricity in action

To measure the pressure difference across the ends of the conductor, we use a voltmeter. The unit of pressure, volt, is named after the guy who invented the battery, Volta. Electrical pressure is often referred to as 'potential' and we talk about the 'potential difference' between points in a circuit

Ohms are a drag, man!

Every pipe has a certain resistance to the flow of water and every wire has a certain resistance to the flow of electricity. The more the resistance the more pressure is needed to get a decent rate of flow. In fact, it is possible to relate resistance to the amount of pressure needed to obtain a particular rate of flow.

Resistance equals pressure per amount of flow or,

$$\text{Resistance} = \frac{\text{Pressure (volts)}}{\text{Flow rate (amps)}}$$

Resistance is measured in ohms and this formula is known as Ohm's Law after the inventor. This is easily the most important formula in the whole of electrical theory. Here is an example of the way it works:

Suppose a battery giving a potential difference of 20 volts across its terminals is connected across a wire and that the current flowing as a result is 4 amps. Sticking the figures in the Ohm's Law formula gives

$$\text{Resistance} = \frac{20 \text{ volts}}{4 \text{ amps}}$$

which is 5 ohms. For this particular piece of wire, this figure of 5 ohms never changes. It is a figure as fundamental and permanent as the weight or length of the wire. So what? Well, if the battery is changed, say for a 5-volt one, it is now possible to work out what the current will be without measuring it directly. Like this,

$$5 \text{ ohms} = \frac{5 \text{ volts}}{\text{Whatever amps}}$$

TABLE 1

Approximate power required to . . .	
Stop a car from 30mph in 1 second	25,000 watts
Lift a 1 ton elephant at 1 metre/second	10,000 watts
Heat a room comfortably	2,000 watts
Make a cup of tea in 1 minute	100 watts
Walk upstairs	100 watts
Lift a pint	5 watts
Electrocute a man	0.1 watts

which has to be 1 amp (Cheers, gasps of amazement, applause, etc.)

Any wire or electrical circuit has a resistance to the flow of electricity and the current/voltage relation always follows this same rule unless the circuit contains special 'active' components like transistors or diodes.

Power

So much for resistance. Now it's time to talk power. Power is the ability to get things done fast! Lifting weights or moving things around and generally hotting things up. Electricity has power and it's helpful to have a way of measuring it, so we know what to expect from a piece of apparatus when we switch it on.

So, back to the 'water in a pipe' idea. It's fairly clear that the more water there is flowing down a pipe then the more we can expect it to do, say to a turbine or water wheel. What isn't so obvious is that more pressure means more power too and not just because the flow increases with more pressure. Think about a diesel fuel injector. These punch a tiny amount of fuel into the engine at tremendous pressure. Taken out of the engine they are quite dangerous since they can punch a hole in your hand with no trouble at all! Power is the ability to do things fast and a fuel injector can sure do you. Yet the flow rate through the injector is very small indeed.

OK, so the flow rate *and* the pressure combine to give a measure of the power involved.

$$\text{Power} = \text{Flow rate} \times \text{Pressure}$$

or, in electrical terms

$$\text{Power} = \text{Amps} \times \text{Volts}$$

Power is given in watts by this formula.

Writing out formulae like this is clumsy and takes a lot of space, so everybody just uses a single letter to stand for each word:

- V for Volts
- I for Current in Amps (Don't ask why!)
- P for Power in Watts
- R for Resistance in Ohms.

So the formula for power becomes:

$$P = V \times I$$

and Ohm's Law becomes:

$$R = \frac{V}{I}$$

Using these two formulae we can work out anything we want to know about a particular circuit. Of course, it helps to have a rough idea of how much power is needed to do a job. That's where Table 1 comes in, it gives a rough estimate of the amount of power needed to do things like make a cup of tea or lift an elephant, should you ever feel the need.

A fuse sums

Let's take an example. Suppose we put a car headlamp bulb in the house light socket and switched on. What would happen?

A typical car headlamp bulb is rated at 60 watts, running off a 12-volt battery. The current flowing through it, then, must be: (Hmm, let's see . . .)

$$P = V \times I$$

$$60 = 12 \times I$$

So, I must be 5 amps. What about the resistance of the bulb?

$$R = \frac{V}{I}$$

$$= 12/5$$

The resistance is 2.4 ohms. This is what we need, remember that the resistance of a conductor never changes no matter what circuit it is put into, so when this bulb goes into the house light socket, the resistance is still the same.

Now, the voltage across a light socket is 240 volts, so the current that flows through the bulb will be:

$$R = \frac{V}{I}$$

$$2.4 = 240/I$$

The current is 100 amps! Rather a lot of current. What about the power?

$$P = 240 \times 100$$

$$24,000 \text{ watts}$$

That is the power output of a 24-bar electric fire concentrated into a thin wire filament only 1/2in. long! The wire will instantly explode into vapour, probably shattering the bulb in a most spectacular way.

The house wiring will have a fuse in it, designed to blow at 50 amps at the most, so that will have to be replaced, too. With any luck, the fuse and bulb both blowing will prevent the house wiring from getting hot enough to start a fire but if the fuse had been replaced by a piece of thick wire, it could have been very serious indeed.

Suppose we try this trick the other way round and put a 60-watt house bulb in a car headlamp socket. Will there be any damage?

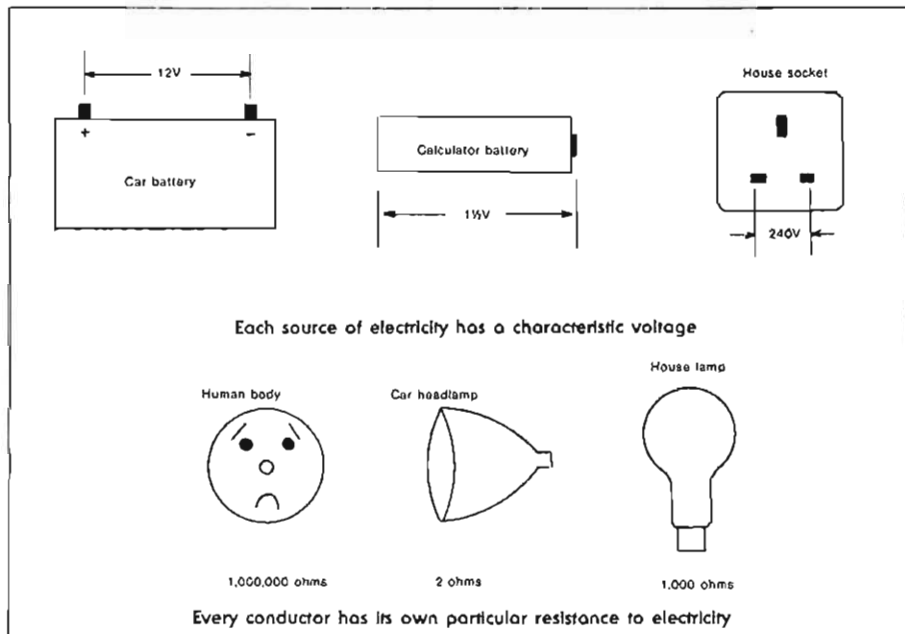
A 60-watt bulb at mains voltage (240 volts) takes about 1/4 amp, so it has a resistance of $240 \div 1/4$, which is 960 ohms.

Right! Put it in a 12-volt car system and we get a current of 1/80th amp. The power taken by the bulb is 12/80 watts. This is about 1/7th watt. Virtually nothing at all when it comes to making heat. The bulb won't light and the battery will not even notice the tiny power drain. After all, it's designed to supply 60 watts to the socket.

While on the subject of daft experiments, you might care to work this one out:

My rig takes about 1 1/2 amps at 12 volts in the wrapper. That is a power drain of 18 watts from the battery. About a quarter of this is radio output power, the rest goes as heat in the rig, which is why the rig gets warm when in use. Suppose I decide to boost the output power by plugging the rig into the mains . . . ?

Fig. 2



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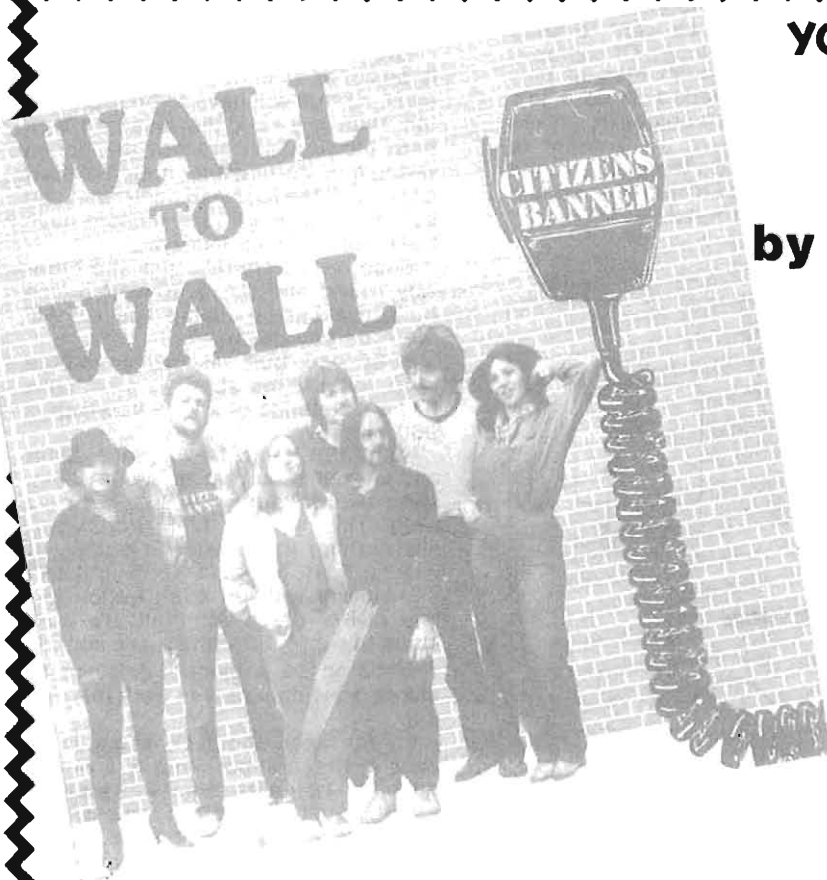
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Trucking America

Cowboys of the road or heroes of the Western hemisphere

Often quoted as the modern-day cowboy, the American truck driver is also looked upon as the original CB enthusiast. For, as most readers will know, before the petrol crisis and the subsequent boom in CB use the ardent user was the trucker. Indeed, the American trucker is firmly blamed for the development of CB slanguage. Those who genuinely do remember the early British CB days will appreciate that the breakers then had a comradeship which could almost be classed as 'one of the boys'. This early comradeship certainly existed in America, except there was one other common denominator. They were all truckers. Naturally this created a much closer bond because CB had virtually become exclusively used by the professional driver and in particular channel 19, it was natural to expect a resentment of its abuse by the common motorist.

However, being there first does not qualify one as ruling the roost when it comes to the airwaves. So with the boom the truckers started to find their previously exclusive 'truckers' channel 19 invaded. So much so that more often than not a group of truckers would get into a convoy where each one could easily identify the other's handle and that was it. The conversation simply did not allow the outsider in. Obvious exceptions to this were known truckers running the other way or members of the same group. For instance, one of the well-known trucking lines, 'Yellow,' would have so many employees it would be impossible for them to know each other, therefore standard call signs began to have more importance. Some truckers started to adopt the southern drawl and a hillbilly mode of speech often talking so fast with CB lingo that to even attempt a conversation one needs to be a past master.

Having adopted this attitude, it was not long before the normal motorist and CB enthusiast did one of two things, he either left channel 19 alone or learnt the lingo. Once again a semi-select few want to be 'in' and went to the extreme, learning the lingo and following the subtle changes in sayings that often occur. Their aim was quite simply to be accepted by the truckers. The end result of all the intricacies was that the American trucker became the CB'er's hero, if not in actual fact, certainly in all the press coverage. This is still evident today.

Here in Britain, CB and truckers are considered as 'going together by almost every one.

Speeding and CB

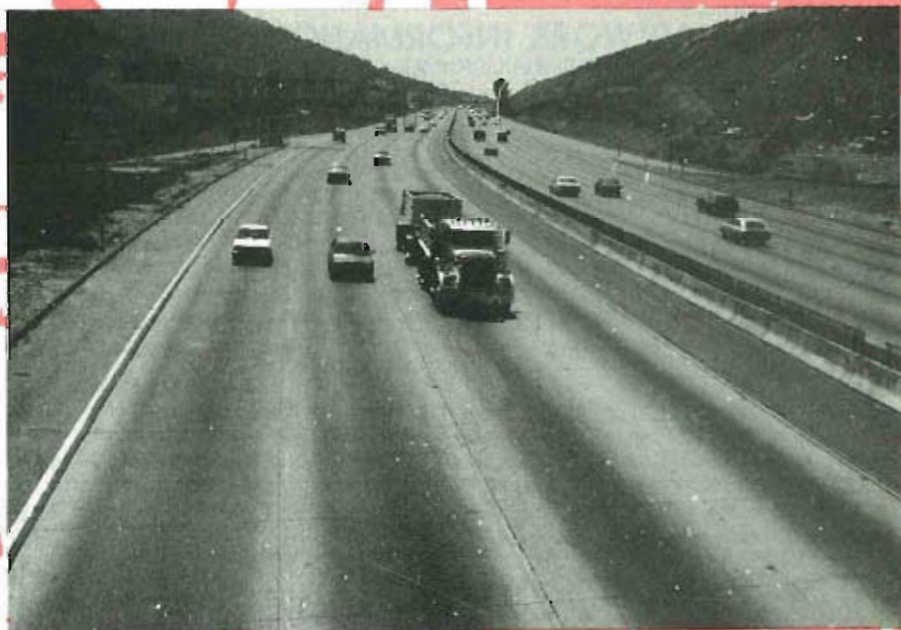
With the fuel crisis, the upward trend of CB users and the nationwide adoption and enforcement of the 55mph speed limit, the truckers' CB sets started to have a more important use. Relieving the boredom of long distance hauls and finding out traffic reports were still considered as important but now police locations were imperative. The American Government subsidize the building and upkeep of highways on a State-wide basis. Therefore, whilst some States did not agree nor wish to enforce the 55mph speed limit, they had little or no option. The Government simply threatened to withdraw the finance necessary to keep the highways modernised and in good condition. (As most people are aware, America's States are vast and without Government subsidy the roads would soon become appalling). Consequently, the American police force as a whole concentrated heavily on catching speeding motorists and whilst the average officer felt for and often allowed the odd trucker a few extra miles an hour, it was the officer's duty to enforce the law.

Russian roulette

This situation had two direct effects. The first and most spectacular was a nationwide truckers' strike organised for the most part via the 'old CB rig' and secondly a closing of the gap in hostility between the common motorist and the trucker. For with the fail-



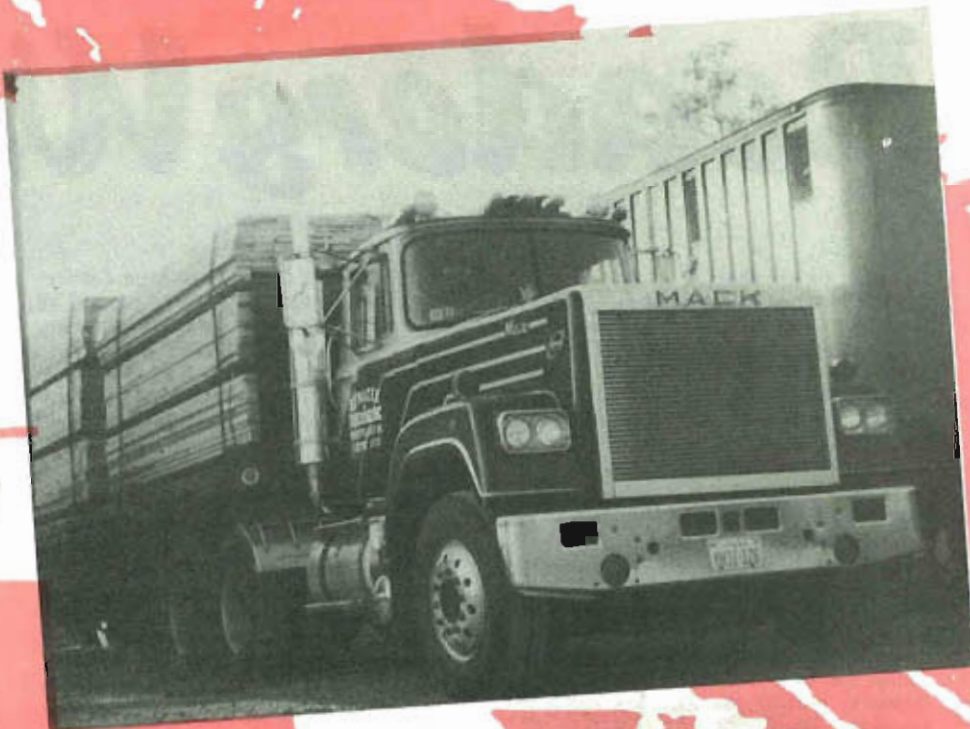
'Smokie Bear' waiting, hidden in the shadows, for a speeding trucker.



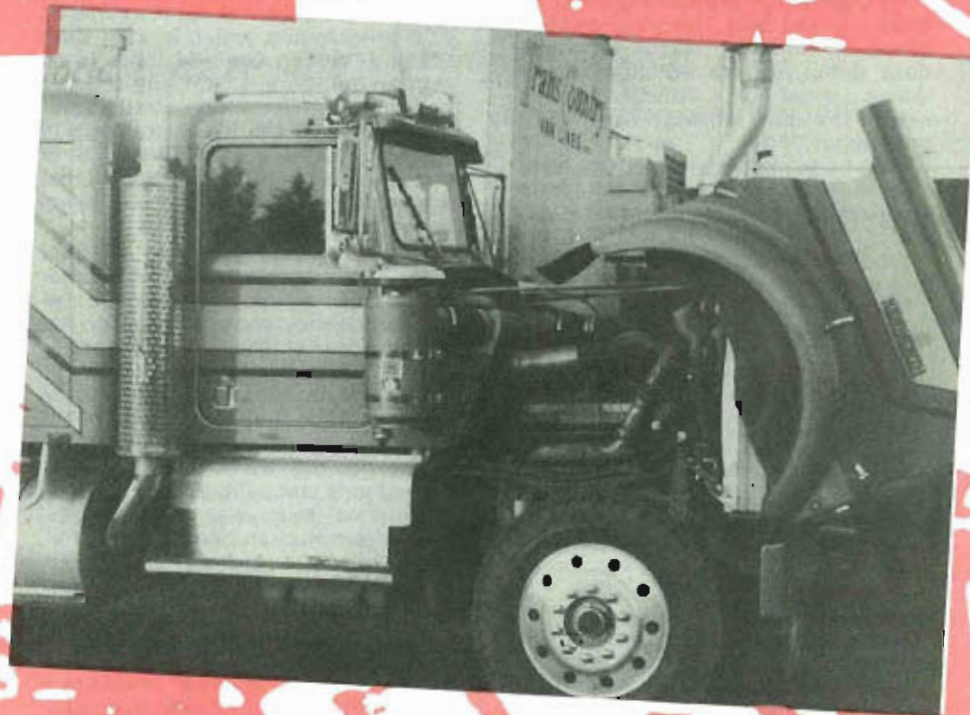
lure of their protest, the 55mph limit still stood as did the price of diesel and enforcement of the limit was stronger than ever. Now channel 19 took on a different sound - instead of truckers only with the odd motorist being ignored, truckers and motorists now combined in an all-out effort to spot the 'smokie'. Fast travelling convoys of trucks would often follow and join with high performance cars, the cars would speed ahead taking it in turn to be the leader in a sort of Russian roulette.

Movie-like stunts are often related by the old-time truckers but knowing the general anti-authoritarian attitude some Americans can take, I wouldn't be surprised if they are all true. However, the CB slang 'raking the leaves' comes from the genuine practice of one car being a decoy. The lead vehicle would really speed on the safer stretches between junctions in order to get ahead of the convoy then slow down on the approach to junctions so that they were just over the limit, hopefully fast enough to attract any police vehicles lying in wait but slow enough not to get a ticket. Once through the junction a report of safety or a 'smokie on the ramp' could be passed back to the speeding convoy and the lead vehicle would again belt up to the next possible danger zone.

To protect the rear of the convoy from a police vehicle creeping up from behind, one of the cars would hang back at the rear performing a similar function as the lead car. More often than not this car would have recently been acting as the lead vehicle. Here is where the tales of movie-like stunts start to creep in. The theory was that if the lead car had been spotted but not chased, say by a police vehicle crossing the freeway or one leaving the freeway from the other direction then the police car may have radioed ahead. Thus if the wanted car is at the rear he will also have advance warning of a police vehicle lying in wait ahead. This police vehicle will hopefully go for the advance decoy car. However, if not, the wanted car can slow down and hopefully pass unhindered. Now the movie stunt. If chased by the police car, the truckers would pull out blocking the road in an attempt to overtake one another, allowing their Tail-end Charlie or 'back door' through but holding the police vehicle at bay. Not too far fetched so far but as used in Smokie and the Bandit. Tales are told of the wanted vehicle pulling in between two trucks to ride on the hard shoulder. Meanwhile the police vehicle is delayed behind the overtaking truck until they approach a junction. As they approach the junction, the truck holding up the police vehicle pulls into a space between trucks and the police car speeds off in chase leaving the wanted car unseen on the hard shoulder. Naturally, the police vehicle's progress is reported and our wanted vehicle drops back in behind the trucks, ready to overtake if the police car takes the junction off in pursuit of the unseen and presumably far-ahead culprit.



The mighty Macks and Kenwoods with their enormous outrfront engines show why the 55mph speed limit was so despised by the truckers.



Smokie with ears

As is always the way, you can fool few of the people all the time, thus it was not long before the police realised that CB was tipping off the speeding convoys. Obviously one method used by the American police which could not be fooled as easily nor spotted is the police air patrols. Hence in some areas notorious for speeding, air patrols were stepped up and vast amounts of lingo had to be added to the books, 'Bear in the air' being the most notorious.

County patrols started to equip themselves with CB sets in order to catch the speeding convoys who in

return started to fit anti-radar equipment, fuzz busters and the highly-illegal radar spike, a metal rod which sticks out and actually bolts onto a wheel nut stud. To say that it was almost a war would not be totally wrong. To a certain extent this situation still exists today, although in almost all the states there has been a laxing of the limit unofficially, most officers allow vehicles to travel at around 10mph on top of the limit.

Next month we will look at one more of the perils facing the American truck driver or, if you prefer, modern-day cowboy.

JOH

Readers Write

Dear Sir or Madam,

Your article on Selective Paging and CB seems to give the impression that hospitals suffer from interference from CB.

I am one of many breakers who suffer from interference from hospital bleeper systems. The Nottingham City Hospital are responsible and were it only being used as a bleeper there would be no problem.

They have stepped up the power to enable staff to take beepers home and I am informed the range is about three miles. The interference wipes out all 40 channels on FM and no one seems to want to know. If CB was guilty, Buzby would be stomping but it doesn't matter about a licensed breaker - hard luck.

If you have any advice to offer, it would be very acceptable.

This system is even being used for early-morning calls. The times and frequent numbers of various combinations going out are not just coincidence. I must admit Sunday morning seems the most obvious from 0500 until about 0730.

Well, I don't know whether you have had any other complaints from breakers but if not it's about time you did.

I look forward to your observations and possibly advice.

Yours faithfully,

K. Worrall
Nottingham

This letter only confirms our belief that the Home Office did not properly investigate the new 27MHz FM system before it was launched. Hospitals and industry have been using both AM and FM 27MHz for years and I feel sure that any complaints arising from breakers will be greeted by the obvious answer that paging systems can save lives and CB is only a hobby. Having said that, I believe that meetings between CB clubs and Area Health Authorities may result in some reduction of usage or power.

Dear Sir,

As by now you are well aware, I have been waging a one-man war with the HO over CB frequencies and European harmonisation. Your article Selective Paging and CB is a potential blockbuster. If, as is implied by your editorial and the selected reprints from the S.P.C. press information, the following is true, then the last grounds for defending the 'open channel' frequencies have been effectively discredited.

1. The S.P.C. have petitioned for OUT of the 27MHz band since 1977.

2. CB frequencies, legal or otherwise, DO interfere with page systems in the 27MHz band.

3. The use of AM or FM for CB is irrelevant to interference when both services occupy coincidental or adjacent frequencies in the 27MHz band.

From Brussels, Director General Braun, it would seem that the sole def-

ence by our HO for its unique CB frequencies is that they are so placed as to protect the interests of existing users in the 27MHz band. A very odd form of 'protection' when both the Radio Control enthusiasts and the Selective Paging Committee have wanted OUT since 1977!

I can only hope that the S.P.C. have made their position very clear in Brussels. For it is now even more obvious that the 'interest being protected' is the long-standing objection to UK CB exhibited constantly by the HO even to the point of deliberately jeopardising the integrity of those services it claims to be protecting!

Turning to Sam (Radio England 404) and his predictions, CEPT, as your editorial comment points out, is for ½-watt FM 22-channels. However, its frequency band is from 26.695MHz to 27.225MHz. Thus it is not the same as FCC frequencies, which is what Euro CB is all about. Granted there is an overlap but there is NOT any channel compatibility. Since no country actually uses CEPT CB, its existence is of no practical relevance. What IS of relevance is the FCC frequencies that are used in whole or part by every country, be they AM or FM.

That brings me neatly to my next point. Many people seem to be under the impression that there are two distinct frequency spectra, one for AM and one for FM. This is very definitely NOT SO. There is only one radio frequency spectrum and at any point in that spectrum one can have either amplitude or frequency modulation. In theory the two are so different as to be mutually compatible. That is, given a nominal frequency two simultaneous transmissions, one AM, one FM, can exist without mutual interference. However, theory and practice just don't agree. Anyone with an AM rig having high channels knows only too well that quite reasonable copies can be made with FM legal breakers - often without the FM user even suspecting he has an AM copy! Technically there is a clear explanation for this manifestation, though to go into it requires an article of some length in its own right.

The only viable reason for employment of FM for CB is the claimed significant reduction in interference to other services, in particular TV reception, and domestic audio equipment. This is the most despicable sham of all, for FM causes just as much interference as AM - probably more since the effective power of the transmission at a nominal 4-watts output is greater than with AM. The difference in the manifestation of the interference is the significant feature. Whereas AM is obviously CB with the clear

speech reproduction of "1-4 for a copy", etc., that from FM does not show this obvious origin. The public have been conned into thinking FM is harmless when in fact it is just as bad as AM and because it is more difficult to establish as being CB that more difficult to rectify from source. Incidentally, if and when the HO relax the despicably punitive restrictions on antennas and we can put out the full 4 watts of our rigs (the 4 watts we were assured in Parliament we would enjoy) not the 0.4 watts as at present then all hell will be let loose regarding AM v FM and interference!

As usual, I have rambled on somewhat though the real purpose of writing was to ask for at least the address of the Radio Paging Committee in order to co-ordinate action through Brussels if they so wish.

Finally, there seems to be several of us Euro CB activists in the UK at present acting in isolation. Could we all get together through the assistance of your magazine, perhaps to form a national association for the promotion of Euro CB?

Thank you for printing previous letters.

Martin E. J. Wright
High Wycombe

P.S. The Euro CB reports produced by the Commissioner have progressed to the Economic and Social Committee and the subject is expected to be debated in the Euro Parliament. It's all happening, folks!

Dear CB Radio,

Advice please. In a few months' time I am emigrating to Australia and I'm not sure if I should take my Fidelity 2000FM with me or sell it now and start again once I'm there.

Would my rig have to be doctored in any way or will it be suitable to use, assuming they operate on the FM waveband?

Apparently Aussie CB is restricted to truckers but hopefully I can join the network as soon as possible.

Any help would be useful.

Regards,

Blue Bouquet (Nick Thresher)
Enfield

I'd love to be able to say either "Yes, you can take your rig with you to Aussie" or "Yes, it can be converted to Down Under specifications", unfortunately, I can't.

Australia currently has quite a few AM breakers but AM will be phased out fairly shortly to make way for a new 400MHz+ system. Sorry to say this, Cobber - but you are going to have to fork out for a new set.

Dear Sir,

I have just bought the March issue of CB Radio and I find that Lord Underhill in Parliamentary Review has



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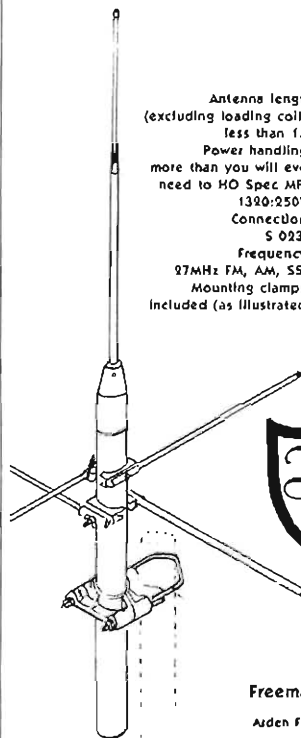


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Readers Write

raised the question in the House of CB radio being used while the vehicle is in motion and the safety aspect of such action. I can only assume that he is anti CB, as he does not mention the use of radio and driving with one hand by drivers of Government vehicles. I refer to POLICE vehicles which in many cases have the radio fitted on the driver's side which means that even if the car has a two-man crew the driver is the only one that can use the radio, which means driving with one hand. Surely sauce for the goose is sauce for the gander?

Yours sincerely,

C. Booth (The Bosun)
Wrexham

Dear Sir,

I read with great dismay the formation of the Thames Paramedico in your March issue.

How terribly sad that an organisation which is supposed to be a MONITORING ORGANISATION finds it necessary to form a so-called PARAMEDICO branch staffed with over-enthusiastic amateurs? We already have the best emergency services in the world and there are not many places in this country where statutory medical assistance is no more than 15 minutes away.

What are their future plans – a volunteer fire brigade, a roadside 'beat the AA to it' service, a volunteer police force?

Come on Thames, get your priorities right. If you are a monitoring service then MONITOR – and you still can't do that right yet as most of your so-called monitors spend so much unnecessary time on channel 9 making station announcements that the whole concept of having an emergency channel FOR EMERGENCY USE is laughable. I suggest anyone living in the London area has a listen to channel 9 tonight and count how many Thames non-emergency calls (including 'on duty', 'off duty', 'radio check', 'time check' calls) are made and you will see that before they can gain any credibility by offering roadside open-heart surgery they must get their basic job right – MONITORING.

Leave emergencies to the professionals, untrained amateurs are bloody dangerous.

Fireman (Joe Faraday)
Hammersmith

Dear Sir,

Legal 27MHz CB has been in Britain for some time now. Where I do most of my operating, FM CB does not exist. The Rock of Gibraltar is one of the few British colonies left in Europe, yet only AM 27MHz is in operation. For the past almost 13 years we have been cut off from Spain by a closed frontier. Is Gibraltar a unique example of CB radio holding its own against political restrictions? Every night, myself and fellow breakers from towns across the waters and cities down the coast get

on the air together in a net contact. The closed frontier does not stop us from making contact and exchanging views upon the situation. CB on the AM band is illegal both here and on the Rock of Gibraltar and in Spain, yet it still persists (people establishing contact with their kin) and we do not even have the benefit of a legal alternative band. With the World Cup in Spain coming up, we're all looking forward to getting some good ol' British breakers down here in south Spain giving us a call on their AM sets.

There is a marked lack of English on the air here, mostly Spanish. So any English copies would be welcome. Is Gib the only example of CB overcoming political restrictions? Do any other CB Radio readers know of similar situations? Give Gib a call on AM, preferably channels 14, 15, 16 or 23.
Liberator (David Jones)
Gibraltar

Dear Sir,

I had started trying to make the following points when I filled out your recent Reader Survey but soon realised that I would not be able to get it all in, so I thought I'd better write to you!

I have been interested in amateur radio for many years but until the advent of readily-available citizens' band radio, I had thought it well beyond my reach. Since getting interested in CB, however, I have been playing around with a couple of short-wave receivers I have and my interest in true amateur radio is re-awakened. Having listened to amateurs in this country and abroad, I realise that there is nothing particularly mystical about it all and I now would very much like to get an amateur licence and be able to, myself, communicate internationally on various wavebands. However, I have been looking into the possibilities of doing this and I am dismayed to find that one must be a virtual electronics expert to even start considering trying for a licence; explaining why the great majority of hams are, in fact, employed in the radio and electronics industry. I have absolutely no knowledge of electronics and how radios work and to be quite frank, I really am not particularly interested in it – my interest in amateur radio is purely in the act of communication over long distances and what goes on inside that box in front of me interests me not one bit! So far as responsible operating is concerned, all one needs to know is how to get the best from the controls, how to keep a log book and how to change the fuse in the plug if it blows! I naturally appreciate the need to know how to avoid causing interference and this is obviously something that any responsible operator would learn but that does not seem to be too much of a problem. Obviously, I also accept that there must be some kind of control over the airwaves – imagine the damage an international Wally could cause! – but I am convinced that it is unnecessary that the non-technical should be all but barred from this fas-

inating hobby, simply because they do not want to know as much as the authorities seem to think is essential to tune a transceiver and talk sensibly into a microphone. I am absolutely certain that – largely as a result of the interest aroused by CB – there must be many thousands like me.

I am trying to plough through books of electronic theory but I know that in the long run my non-mathematical brain is going to seize up and my chances of ever actually getting that licence are virtually nil. Some essential knowledge would, of course, come with time, during the actual operation of radio equipment but without the need to ever delve into the back of a receiver, that could take a very long time. I am in the process of learning Morse and am not having too much trouble with that but it is unfortunately but a small part of what the powers-that-be seem to think is necessary.

There is no answer to this problem, I realise that and I am not expecting you to provide one but I just wonder how many others there are, like me, who would like to see a relaxing of these unnecessarily-limiting restrictions? CB Radio Magazine could certainly help the vaguely-technical amongst us – perhaps even me! – by running a series of articles such as one called 'Breaker to Ham', which I saw in some very obscure CB publication recently! Congratulations on the best of the CB publications, with sensible and interesting content.

Yours faithfully,

Brian Durrant
Chelmsford

Dear Ed,

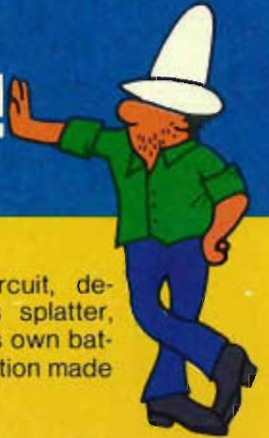
I would just like you to put this in your magazine on your Readers Write page just to let people (FM and AM breakers) know that even though I had an AM rig for quite some time and have now got access to an FM rig as well, that I am not a turncoat or a coward. Just because I use both sets of frequencies it means that I upset AM breakers because I also use FM and vice versa.

But please may I point out that if it wasn't for AM breakers fighting for what they believe in then I am bloody sure that FM rigs would not be legal in this country at the moment? Fair enough, we were bound to get some form of CB but it would not have come at the time that it did and if we, AM breakers, had not gone out in all kinds of weather on marches and the like to get CB legalised. I know a lot of AM breakers that have changed their handles for FM from AM because they do not want anyone earwiggling to know that they were once decent AM good buddies. Me, I know that I have a very well-known voice and when I tried to change, I was found out almost immediately so I just went back to being the same old CW (Cotton Wool).

But, as I was saying, there is no need for all the aggravation regarding which system you work on.

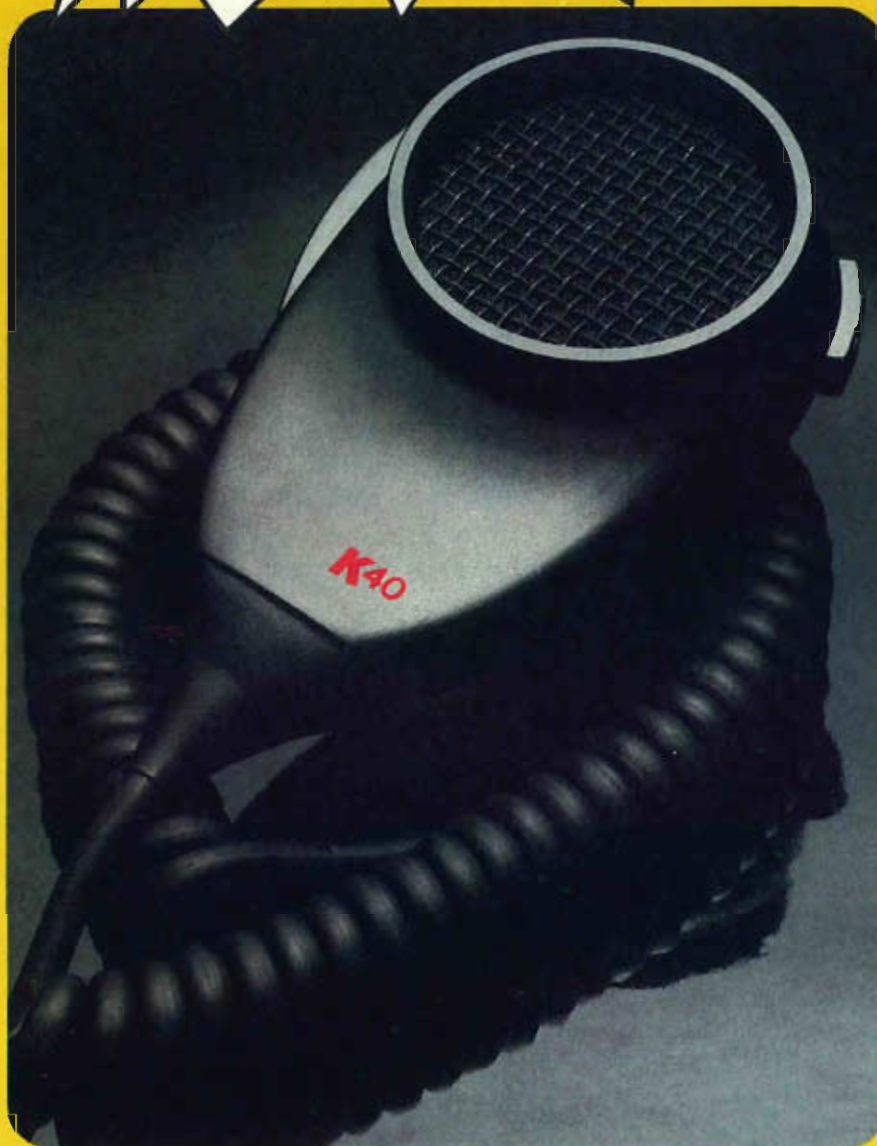
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Converting your converter!

Modifying a CB converter to tune the new channels

There's no need to throw away your crystal-controlled car radio CB converter or even give it to the next jumble sale now that we have the new CB frequencies. With a simple modification your converter can be tuned to the new band. "Ah," says you, "but my converter unit works on the medium wave and the medium wave is AM. The new CB channels are FM. What do you say about that?" The answer is "Nothing"! Although a properly set up FM receiver will not clearly demodulate an AM signal, the converse is not the case. Narrow band FM can be received intelligibly on an AM set by means of slope detection. In other words, slight off tuning enables the AM detector to demodulate the FM signal as if it were AM.

Now to business. There are various crystal-controlled converter units which

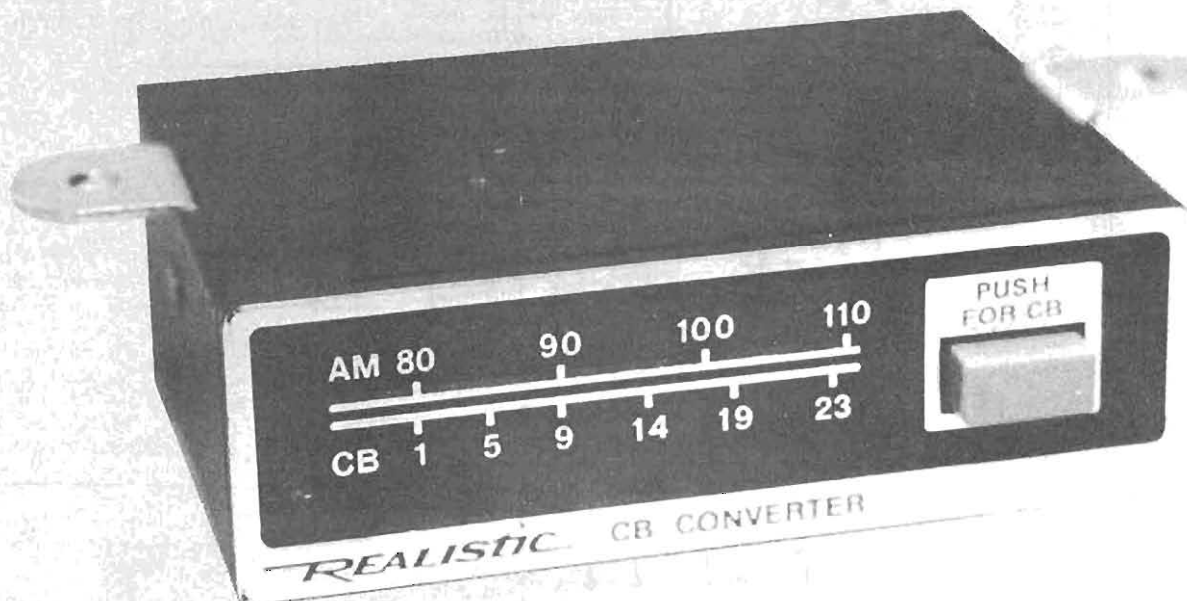
use a car radio as a tunable IF. Some have only two transistors, others, which include some form of squelch circuit, as many as eight. Basically, however, these units consist of a crystal oscillator and a mixer stage (see Fig. 1). All that really needs to be changed is the crystal. Any adjustments to the 27MHz tuned circuit L2/C2 and the aerial coil L1 should be slight or even unnecessary.

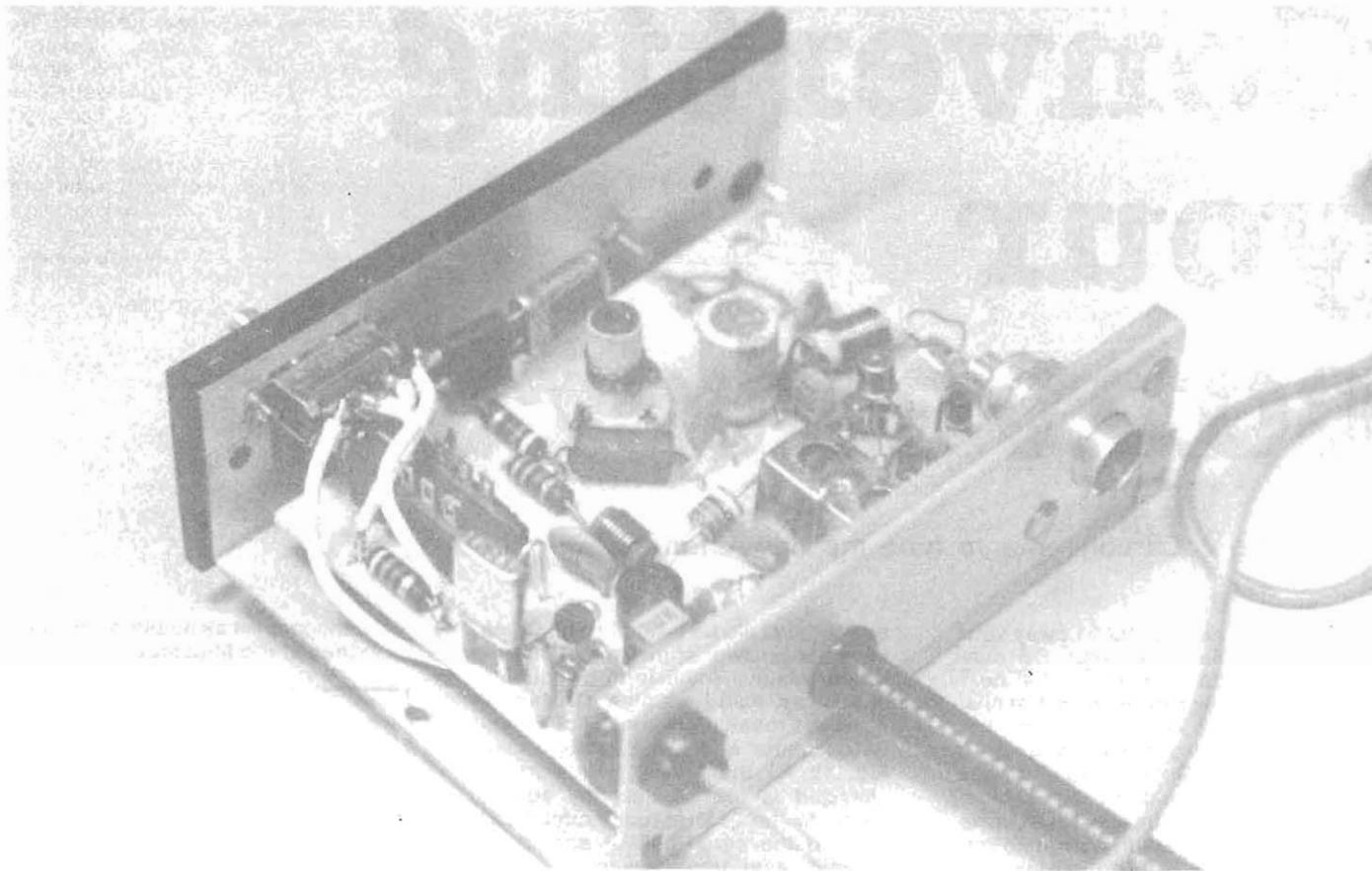
The centre of the AM CB band is 27.185MHz (channel 19) while the centre of the new FM band is approximately 27.8MHz, roughly 0.615MHz higher. The original crystal in my own Realistic CB converter oscillates at 26.165MHz. The new crystal, therefore, will need to work at $26.165 + 0.615 = 26.770$ MHz. Now that's convenient because 26.770MHz is the frequency of an AM CB channel 22

Component list as required according to extent of modification.

1. 26.770MHz third overtone HC-25/U crystal - see text.
2. Crystal socket for HC-25/U - low profile or side mounting. (Note side mounting sockets can be glued to the circuit board).
3. Two-way, two-pole slide or push-button switch according to preference.

The author's Realistic CB converter in its original state. After modification the author added a new front panel. (This is optional as the existing panel could easily be drilled and cut).





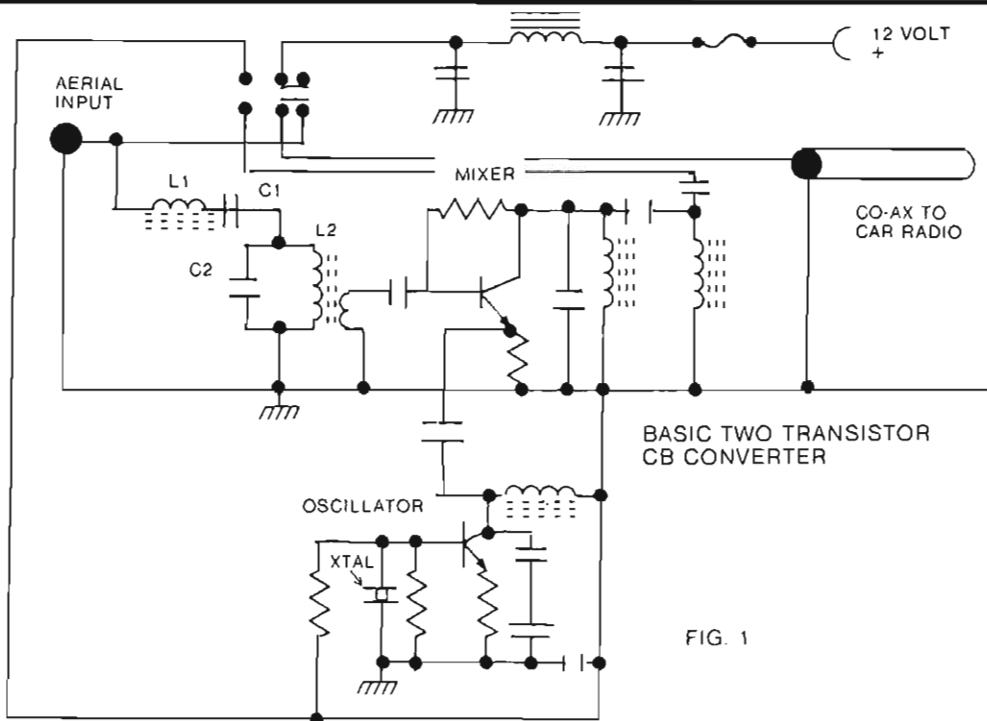
Inside of modified CB converter with additional components – switch and extra crystal in side mounting socket.

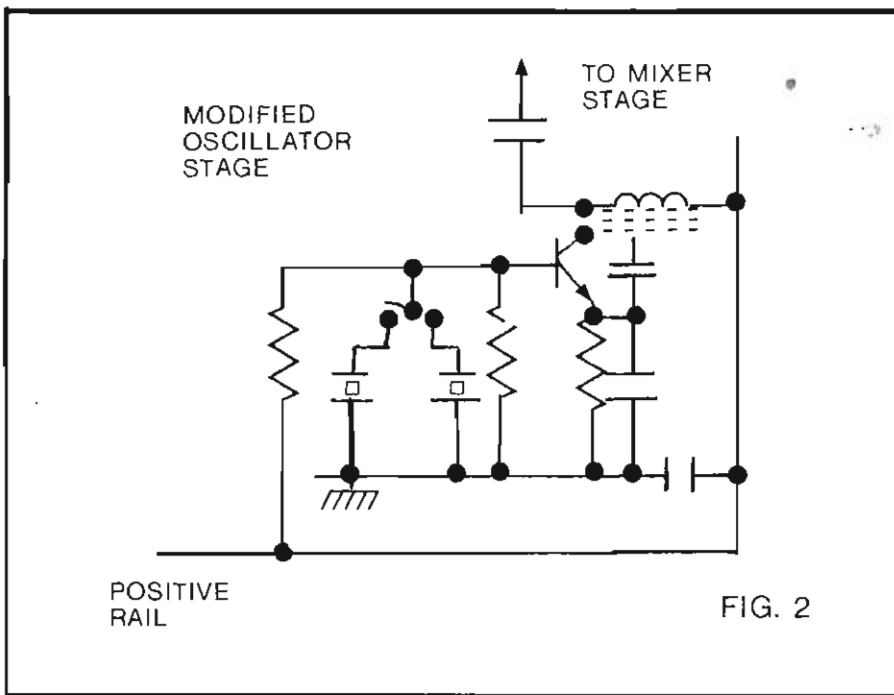
receive crystal for walkie-talkies and it is also the receive crystal for radio control split frequency blue/green. So this crystal should be quite easily obtained. Not all converters will have crystals operating at that particular frequency but they will be somewhere near it. The actual frequency should be stamped onto the crystal itself so it's a simple matter to add 0.615MHz

to that figure in order to calculate the new crystal frequency. If the exact frequency you require is not available any frequency within a few 10KHz will do.

The original crystal may be wire ended. Now most crystals for walkie-talkies and radio control are of the plug-in variety, so having carefully unsoldered and removed the original

component, it may be advisable to fit a low profile crystal socket. Otherwise, carefully drill the pcb to take the larger pins. For those of you not wishing to lose the ability to monitor the old AM CB channels (to listen to American skip or Continental CB, of course), it may be possible to keep the original crystal and fit a slide switch on the front panel to change to a second





**THE CIRCUIT DIAGRAMS SHOWN ARE THEORETICAL
AND ARE NOT INTENDED FOR CONSTRUCTION**

crystal. This would mean cutting the printed circuit on one side of the crystal and wiring as shown in Fig. 2. Please note that excessive heat can destroy a crystal, so use a fully-heated 15-25 watt soldering iron and only keep the iron on the lead-in wires for as short a time as possible.

When an FM signal is tuned on an AM receiver a distorted sound will be heard at the centre of the frequency. A clear signal should be heard at either side of centre. If a clear signal cannot be tuned around a transmission on the FM CB band then that signal is a pirate single sideband transmission.

Inside of the converter with oscillator crystal in foreground. Note the addition of crystal socket.

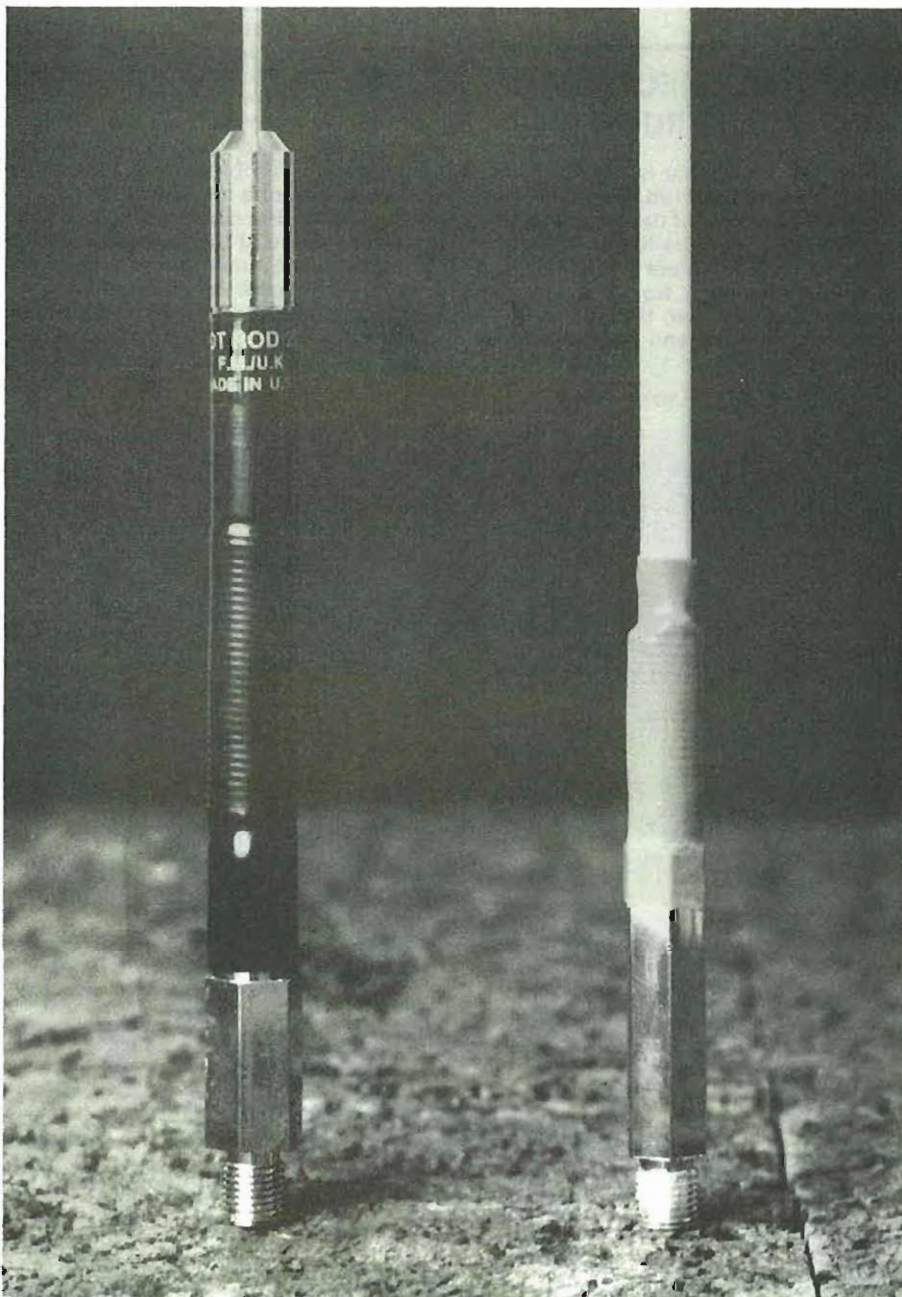


Since each channel will tune clearly in two close spots, this may be an advantage when SSB interference is experienced on the channel, the signal being tuned to the clearest spot. Obviously this arrangement will not work as well as a properly designed FM receiver with a phase-locked loop. It will not have the capture effect, the ability to lock onto the strongest signal nor will it reject ignition interference like a true FM receiver but it will allow you to monitor the band while your transceiver is tuned to the calling channel.

Addendum

On some types of CB converter what is known as image response of the 26MHz broadcast band may be experienced once it has been converted to high band 27MHz. If this is troublesome it could be cured or considerably reduced by fitting a 27MHz band pass filter between L1 and C1 in Fig. 1 but it is probably easier to use a 28.82MHz crystal or one very near that frequency instead of the 26MHz crystal. This would put the oscillator frequency above that of the incoming signals on 27MHz and the 26MHz broadcast band signals would no longer be a problem. If this is done there will be one important difference when tuning the car receiver. Channel 40 will now be at the lower end of the medium wave tuning scale and channel 1 will appear on the high end, in other words, the reverse of what it was originally.

OVER THE COUNTER



Those of you who read last month's *Over The Counter* will remember that we turned our attentions away from transceivers in favour of a closer look at the antennas and accessories available to the CB enthusiast; that is with the exception of the Midland base station, a mention of which proved to be a temptation beyond endurance.

This month we will be continuing in the same vein with a further look at antennas and accessories but with the inclusion of a transceiver or two that we consider may be of special interest.

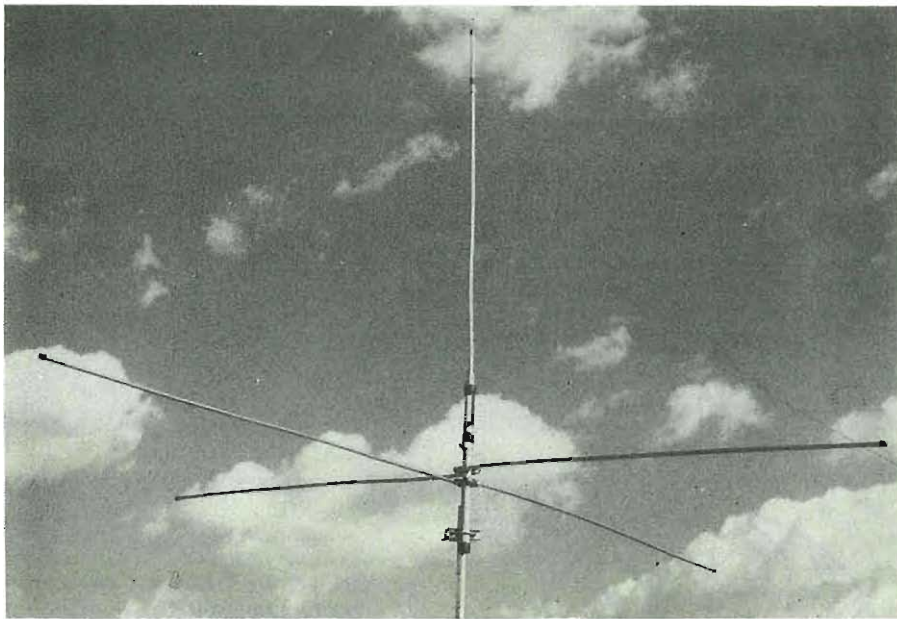
LCL

LCL Antennas

Three new antennas are being marketed by LCL Imports Ltd. The Hot Rod 100, 200 and 300 antennas are suitable for use with all standard transceivers.

The Hot Rod 100 is a pre-tuned, base-loaded, fibreglass whip, shown on the right of the photograph. The 200 and 300 are base-loaded stainless steel whips which have an immense bending capacity and can be bent into a complete loop without taking set.

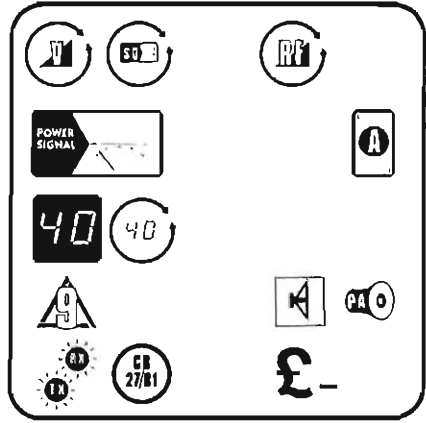
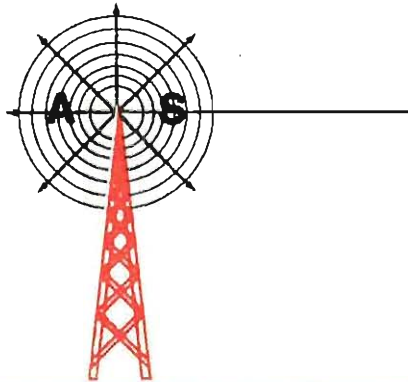
The 200 has the facility for up to 4in. of adjustment enabling a wide band of frequencies to be covered, whilst the 300 fine tunes in seconds by using tuning rings a la Dial-a-Match. The antennas should already be available from your local retailer.



Silver Star

For those breakers who prefer to run home base comes the news of a home base antenna specifically designed for the legal FM operator. The antenna has been given the name Silver Star CB81 and will retail at £20.70 inc. VAT.

The Silver Star has been manufactured to the Home Office specification from butt seam aluminium tubing and comes complete with U-bolts for most fixings.



Harvard Good Buddy

Harris Overseas Ltd. have introduced another new rig to their already popular range of equipment. The M403 Good Buddy rig is finished in black satin-look polymer and has all the features necessary for general use including:

- LED display
- S/RF meter
- PA/CB switch
- LED RX/TX
- Built-in speaker
- Squelch/RF gain/volume controls
- Channel 9 facility.

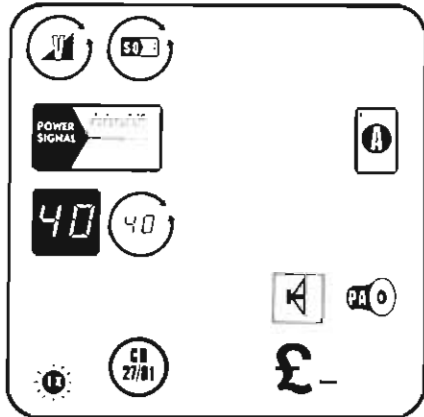
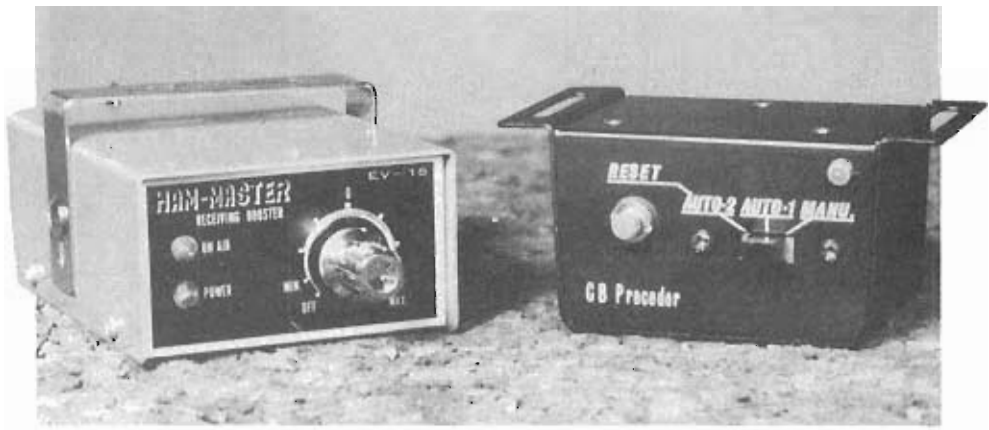
The Good Buddy has a budget retail price of around £59.95 and is available from your usual retailer.

HARVARD



CB Preceder switch

The CB Preceder switch is designed to automatically switch from your radio/stereo cassette deck to your rig when a signal is being received thus eliminating the need to listen to all the hiss and crackle in order to receive a message. The switch can be wired for use with either the built-in speaker or with an external speaker. The unit is available from Romford CB Ltd., as is the Ham-Master receiving booster, a compact unit which is designed to amplify incoming signals and so aid their audibility. The booster comes complete with under-dash fixing bracket and full instructions.



Antler antennas

A new range of antennas has been released by Sirtel (UK) Ltd., which

they claim to be "The best pre-tuned FM antennas range in the world" and to have the following features:

- Only precision pre-tuned antennas for low SWR, added range and clarity.
- Full compliance with UK regulations.
- All antennas come with 18ft. of low-loss co-ax and instructions.
- Moisture-sealed with stainless steel whip.
- All spare parts available.
- Two-year guarantee.
- Made in USA.

The six types of antenna available include two mag mounts, a mobile mount, a mirror mount, a gutter mount and a trunk mount.

Maxcom Apollo

In last month's magazine you may have noticed an advertisement bearing the slogan, "because you never know what's just over the horizon" which was run to promote a new range of products bearing the trade name Apollo.

One particular item in the Apollo range is the Maxcom Apollo 16E 40-channel FM transceiver. The set has an unusual but nonetheless attractive design with the following features:

- Volume and squelch controls
- LED channel indicator
- 10dB attenuator
- LED signal RF indicator
- Transmit indicator
- Internal speaker.

The retail price for the Apollo is expected to be around £50 and they will be launched, if you excuse the pun, at the 1982 CB Show.

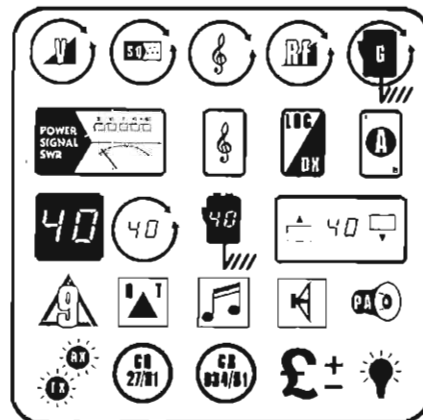
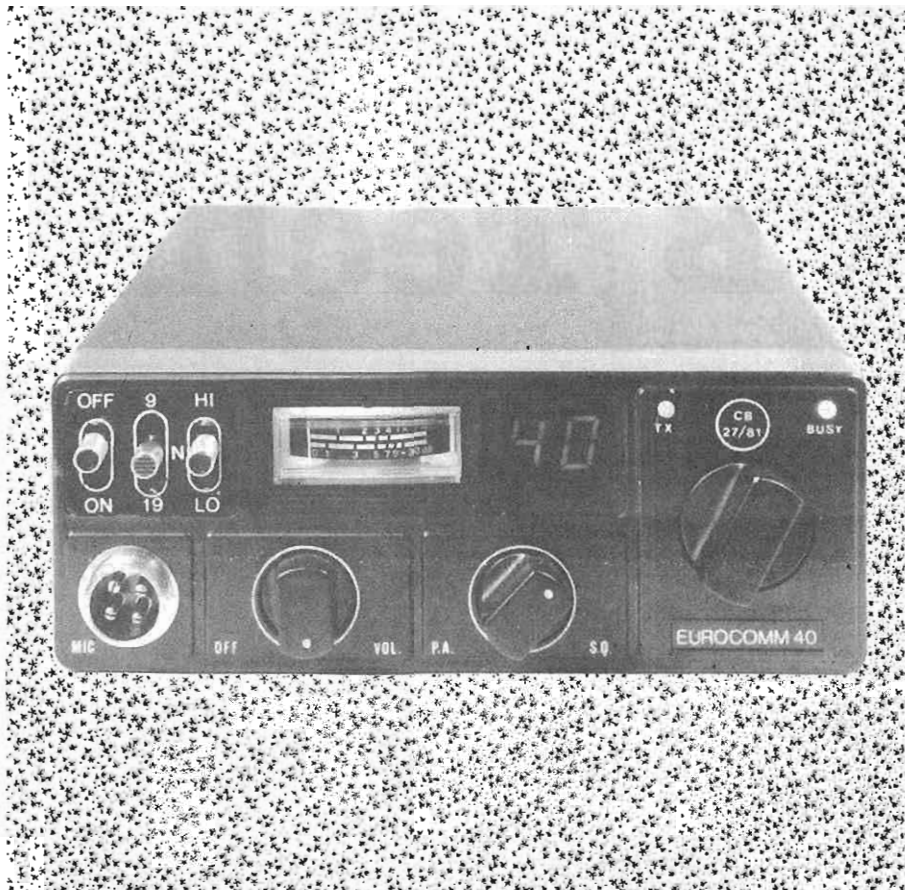
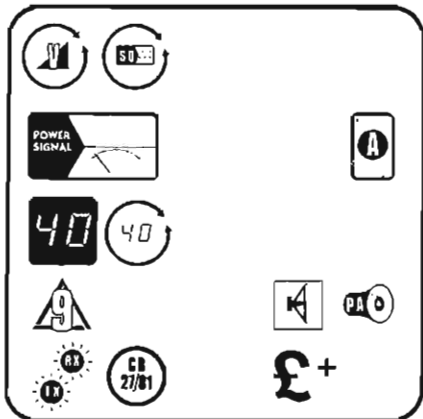
APOLLO



Eurocomm 40

There has been much discussion about the dangers of using a CB rig whilst actually driving a vehicle. Zycomm have made a move towards reducing the risk of accidents caused by this hazard. Their new CB transceiver, the Eurocomm 40, includes a VOGAD circuit. VOGAD stands for Voice Operated Gain Adjustment Device, which eliminates the need to adjust the gain control during the course of a conversation.

These refinements have been made without increasing the price of the rig by exploiting the full potential of the components already incorporated in the rig.



GLOSSARY OF SYMBOLS

	Channel Change Push Button		Channel 9 Select Switch		Tone Switch		Local/Distance Switch
	Extension Speaker Facility		Public Address System		Attenuator Switch: Front or Back Panel		Amount of Channels
	Selective Calling		Panel Light Dimmer Switch		Channel Change Control		Channel Change on Microphone
	Volume Control		Squelch Control		Delta Tune Switch		End Transmission Signal (Roger, Etc)
	Tone Control		Radio Frequency Gain Control		Transmit/Receive Indicator Lights		Over £70/Under £70 (Retail)
	Microphone Gain Control		Signal Strength/Power/SWR Meter		27MHz FM		934MHz UHF

REPRODUCTION OF THESE SYMBOLS IS FORBIDDEN SAVE WITH THE EXPRESS PERMISSION OF THE PUBLISHERS. BRITISH BREAKER PRODUCTIONS 1982

**CB
RADIO**



2

Next month it's our
second birthday!

What's happened to us
and to CB in the past
24 months?

Read all about it in our June issue

Understanding CB Technical Specs

What to consider when shopping for a rig

by Lou Franklin (Supersparks/USA)
Author, The 'Screwdriver Expert's' Guide

Now that CB in the UK has become somewhat more respectable and manufacturers are going to great lengths to attract your hard-earned 'green stamps', it's time to arm yourself with a basic knowledge of what to look for, performance-wise, when trying to buy a good rig. Often you'll discover a wide range of technical specifications that don't seem to agree with the actual performance of the equipment. Manufacturers and salesmen tend to get carried away with their constant game of numbers and one-upmanship, especially when the competition promises to be as fierce as that in the UK. Specifications are an aid to making the right equipment choice but they can also be very misleading. For this reason I always advise breakers to try an actual on-the-air test in addition to studying the rig's specs. Any reputable CB specialist who expects to be in business for very long will anticipate such requests and should be perfectly willing (and equipped) to let you shop-test a prospective rig before you buy.

In this article we'll group CB specs into the main categories of General, Transmitter Section and Receiver Section, and then proceed to explain exactly the meaning of all those strange numbers. Before doing so, I wish to emphasize one extremely important area which is mostly ignored by salesman and buyer alike: namely, the subject of Voltage Regulation or Stabilisation. From personal experience repairing thousands of rigs, this is one area that needs more explanation if you hope to purchase the best quality CB rig.

'Voltage Regulation' or 'Voltage Stabilisation' simply means that the DC voltage used by the rig remains rock-steady and constant regardless of variations in current demands. Generally, the Transmitter section requires about three times more current than the Receiver section and will often be specified in the range of 1.7 dc amps to about 3.0 dc amps for a typical SSB rig. Receive mode current consumption is only about 0.6 dc amps on aver-



Which is good and which is bad? Which is value for money? Confused - no wonder!

age. This subject becomes very important when planning to operate a mobile unit in the home on a mains converter as many breakers do. (A 'Mains Converter' is simply a special power supply accessory which changes the 240v ac house mains to 13.8v dc that runs the rig). Many cheap converters are rated at only 2.0 or 2.5 amps continuous output; if the rig draws more than this, strange things may occur! The most obvious is that the rig runs fine during Receive but trips the breaker or fuse the instant you key up and speak into the mike. Often though there can be more subtle effects. Instead of turning itself off, it may simply drop a few volts supplying the rig, causing very low Transmit power, frequency shifts, 'warble' or 'chirp' on SSB, or a flickering of the rig's panel lights. Therefore, always insist on a converter capable of at least 3.0 dc amps continuous output and make sure it is in fact regulated, as many cheap ones are not.

Similarly, many base station rigs, regardless of name or popularity, have terrible internal voltage regulation! A base rig has its own internal mains converter, usually on a separate circuit board; manufacturers have a very nasty habit of using the cheapest, least conservatively-rated parts they can sneak by with and this also applies to mobile rigs which often use only a simple Zener diode regulator in critical circuit branches. Therefore, you should always test the prospective rig for good regulation; the test is very easy to perform. Hook up the base or mobile rig to the appropriate power source and a dummy load antenna then simply key up the Transmitter and whistle into the mike. You should not observe any flickering of the rig's panel lights. In a good rig, the lights will maintain a constant brightness. (When testing a mobile, of course, make sure you're using an excellent mains converter; any test is only as accurate as the test equip-

ment being used!) If you notice any dimming of the lights, don't bother testing any further and move on to the next rig model! I've seen many rigs having such poor voltage regulation that the panel lights dimmed even whilst *receiving* a strong signal! One final note: many breakers will eventually try 'peaking and tweaking' the rig for even greater power output and modulation, with the resultant higher current drain. A rig which performs fine under 'legal' conditions may begin showing signs of poor regulation when pushed to its highest power limits. Be aware of this possibility.

General specifications

Power consumption: Usually ranges from about 1.7-3.0 dc amps, depending upon circuitry and mode. Not terribly important except as relates to the above discussion.

Frequency tolerance: This spec is merely a legal requirement of the particular licencing country. Since all newer 40+ channel rigs are PLL-synthesized, this spec is easily met. For example, FCC-controlled American rigs specify a tolerance of .005% of centre frequency. So for US Channel 1, 26.965MHz, the transmitter may legally operate anywhere between about 26.963651-26.966348MHz, which is $\pm 0.005\%$ of 26.965. The British specs call for a tolerance of $\pm 1.5\text{KHz}$ rather than expressing a percentage; however, at 27MHz this computes very closely to about .005% also. PLL rigs easily surpass these requirements

and often specify tolerances of .001% or .002%.

Microphone: CB rigs almost universally use a 'low-impedance Dynamic' mike element. A few rigs have high-impedance elements but contain a tiny transformer inside so that the output is actually low-impedance, usually in the range of 300-1000 ohms impedance. This makes them compatible with solid-state devices which operate on low-impedance principles. A few old American rigs that use valves require high-impedance (100,000+ ohms) mike inputs and for this reason you'll sometimes find a few accessory mikes offering a switchable Hi-Lo Impedance feature. The Dynamic type mike is very desirable for CB use; it's rugged, has excellent frequency response and is immune to the kind of temperature and humidity variations suffered by crystal or ceramic mikes.

One mike feature worth considering is its detachability and type of plug or socket. The familiar European four- or five-pin DIN plug is, in my opinion, the cheapest and least desirable, especially for mobile use. They tend to pull out of the socket easily and are more difficult to repair or replace. The best mike plug is the popular four- or five-pin female with threaded locking nut and is found on all the better models.

Antenna output impedance: This is universally 50 (or 52) ohms 'unbalanced' into a UHF or SO239 co-ax socket. 'Unbalanced' simply means it is designed for use with co-axial aerial cable where the outer shield is earthed. Nothing else noteworthy

here, *provided* the aerial is tuned to provide a 50-ohm SWR match to the radio. (We'll unravel the mysteries of aerials and SWR in some future article!)

Positive/Negative earth power connection: This is a very desirable feature and is almost always included in modern rigs. A few lorries, forklifts, boats, etc., have a positive earth electrical system so be sure the rig includes this feature if use in several types of vehicle is planned.

Size, weight, humidity, temperature, etc.: These are all rather obvious, with size and weight perhaps the most important. For mobiles, be sure it will fit the planned installation space and that its weight won't rip it out of the typical cheap plastic automobile dashboard! A detachable slide mount is a very desirable anti-theft accessory for mobiles too.

The preceding article is a small sample of the straightforward and non-technical advice Mr. Franklin has given in many CB-related publications. The above article is the first of this series - further articles will cover transmitter and receiver specifications and what results to look for. The Screwdriver Expert's Guide to Peaking Out and Repairing CB Radios has been a popular US 'bible' for many years. His book and other CB specialist items are now available in the UK. We are very fortunate to have Mr. Franklin contributing to the magazine.

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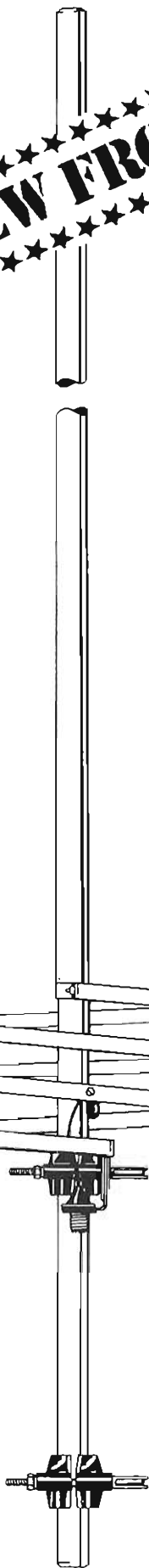
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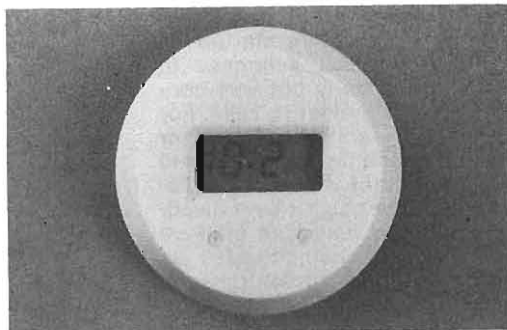
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FREE RADIO



A history of 'The Lady' – Caroline to her friends

"From all of us, for the moment – goodbye and God bless."

The last and, to many fans, tragic words of Radio Caroline on 20 March, 1980 minutes before she sank into the storm-tossed seas of the Thames Estuary.

Those who have fond memories of Caroline from their youth will be surprised to read that date. The buccanering pirate radio days of the 60's and early 70's have been retained in listeners' memories and the later years forgotten. Ask people to search their minds and most of them will probably say Caroline and her off-shore colleagues died in the mid-70's, yet Caroline lasted in various guises for 16 years until the 12-ft. waves carried the ship to her ignominious end.

The actual ship that hosted Radio Caroline (and a few others) started life a three-masted steel schooner in 1921 in Kiel, Germany but was converted to a motor cruiser in 1927. For the next 30 years the Olga (or Margarethe, as she became) travelled the North Sea until she fell into disuse. The ship was bought by a Swedish company with American backers by 1960 and was reincarnated as Radio Nord with two 10KW transmitters – a pirate radio station located off Stockholm. Radio Nord lasted two years until the Swedish government legislated against pirate broadcasting.



Radio Caroline

The renamed Bon Jour (and then Magda Maria) broadcast occasionally over the next few years and made a trip to the USA before returning and mooring off Essex as Radio Atlanta. Then on 28 March, 1964 the once-again renamed Mi Amigo started its life as Radio Caroline; named after President John Kennedy's daughter.

Although a varied career, this potted history of the ship is not enough to explain the popularity of Caroline. What was so special about Radio Caroline that she is so fondly remembered – and that new backers are convinced the name, if not the ship, can be resurrected?

We need to have a quick look at social history to fully understand the station's appeal. In the early 60's 'teenagers' were gaining an identity of their own – the beat generation had their own types of music, clothes and social life – and had money to spend. The BBC maintained staunch resistance to the onslaught of popular music, was steadfastly offering dance band music and ignoring the growing dissatisfaction of its programming. Caroline, as the first of its type, played Merseybeat pop and the specialities – soul and ska, psychedelia and rock. The enthusiastic, informal disc jockeys presented the music in an acceptable form to its younger listeners and knew their facts – something still sadly missing nearly two decades later. Without the constraints of the BBC, Caroline could play album tracks, a Top Twenty

and relate to the life style of its listeners.

Over the years Caroline developed the style for a 'young, mobile and moderately-intelligent audience'. (The quote comes from Ian Anderson, one-time engineer on Caroline and historian of the station). In 1966 a 50KW transmitter was installed bringing total capacity up to 70KW, although this total was never used. Over the years the station survived fire, mutiny, hi-jacking, impounding by Dutch authorities, breaching by British authorities and being washed up on the Essex coast and most importantly the 1967 Marine and Broadcasting (Offences) Act.

Caroline's lead was followed by up to another dozen offshore stations and, of course, this state of affairs could not be regarded complacently by the British Government or Civil Service. The much-protected monopoly on broadcasting was threatened, in their opinion, by the anarchy of the pirates. And the arguments they found will sound familiar to 'old-time' CB'ers.

Pirate radio caused interference to emergency services! Pirate radio interfered with 'authorised' broadcasting services! There were no frequencies available! It went against the democratic standards of broadcasting to have stations with no safeguards or guidelines! These arguments, of course, made not the slightest difference to the eagerly-listening fans who fell within the possible four million audience.



Caroline

So the Marine and Broadcasting (Offences) Act brought in stiff penalties for offenders – prison sentences and heavy fines but without noticeable success – in Caroline's case at least. Supplies were run out to the ship, Holland became a haven for resting DJ's and the Government found that there was no one person they could hold responsible or investigate, since the station was run almost on a co-operative basis without a hierarchy of leadership.

Caroline had several frequencies over the years and the power fluctuated with the availability and cost of fuel oil. The MI Amigo was host to other European programmes too, even broadcasting two separate programmes on different wavelengths simultaneously. The station's identity was altered in 1972 with L.A. or Loving Awareness, promoted by Ronan O'Rahilly, the founder of Caroline. L.A. offers love, peace, change in the individual and how he relates to his fellow man. Although a popular philosophy at the time, there are those who felt L.A. detracted, rather than enhanced, the station.

Whether this will prove to be so now remains to be seen. The new Radio Caroline has been promised for some months and it has been heavily financed by American backers and advertisers. Unfortunately, the MI

Amigo still lies in the silt of the Thames Estuary but a new ship, Imagine, has been prepared, with more space and a 300-ft. antenna. Ronan O'Rahilly is still backing the station and L.A. will be an integral part of the station's identity. The planned frequency is 419 metres and last reports are that Imagine should be sailing towards its location about 10 March – just after this article is written. Dates have been promised for some months now so no one knows if mid-March will prove true or not – but there are going to be some very disappointed high financiers if it doesn't happen soon.

I still haven't altogether answered the question of what made Caroline so special. The station's main claim to fame must be that it smashed the traditional mould of broadcasting. Although in the long term the Government had a lot of success in breaking the back of the pirates, it realised that the stations were offering something people wanted to hear. So Radio 1, a 'pop'-orientated, 'young' station was born – with some of the pirate DJ's as presenters. (Dave Lee Travis, Tony Blackburn, Emperor Rosko and the inimitable Kenny Everett all started on offshore radio). Ironically, Johnny Walker left Caroline to spend several years with the BBC and is returning to be Programme Director on Caroline.

The independent local stations also owe their existence to the likes of Caroline.

Almost more importantly, Caroline's glowing reputation as THE offshore pirate station earns it a place in every listener's heart. The station had its problems, going off air for extended periods and the presentation towards the end left something to be desired but it had romance. It bucked the system and survived and people remember it with affection. The last word from Ian Anderson:

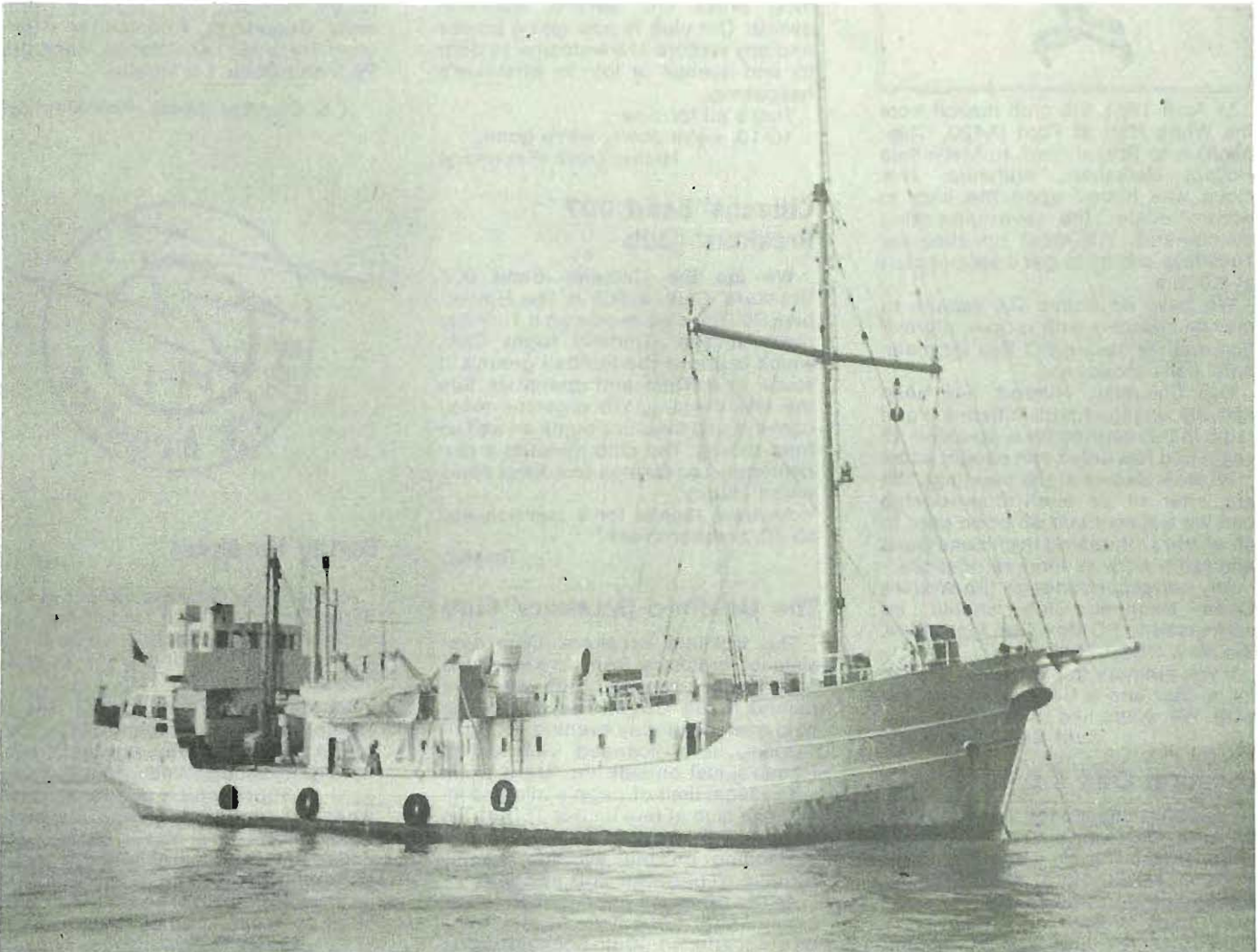
"The pirate radio station overcame ... by an informal business organisation, a steady source of idealistic backers and the enthusiasm of young broadcasters who were willing to put up with a lot for the chance to play rock 'n' roll ..."

SS

Many readers have asked me where they can gain some information on the current Free Radio scene. Airsounds and Spectrum is a newsletter published monthly and costs 5p and sae or an IRC. Subscription is also available at £2.50 for 12 issues from 36 Nottingham Road, Lowden, Nottinghamshire NG14 7AP.

Below.

The MI Amigo – the ship that hosted Radio Caroline over the years, now sitting at the bottom of the Thames Estuary.



CLUB SPOT

Wessex Open Channel Club

The Wessex Open Channel Club was formed at the beginning of 1980, to promote an interest in citizens' band radio, in the Bath/Chippenham area, although it was hoped that membership would not just be confined to these areas and was, in fact, the premier club to be organised in this district.



In April 1981 the club moved from the White Hart at Ford (A420, Chippenham to Bristol road) to Melksham House, Melksham, Wiltshire. This move was forced upon the club to accommodate the ever-increasing membership. We meet on alternate Tuesdays and try to get a prompt start at 8.00pm.

We have an active DX section to provide members with various information and we have a PO Box for members' correspondence.

Our Chairman, Nimrod, has been actively engaged with citizens' band radio in this country for a period of 12 years and has only been caught once!

All are welcome at the meetings. We are, after all, an open channel club and we will maintain an open door to all who are interested in citizens' band and radio work as long as possible.

Any correspondence to the Wessex Open Channel Club should be addressed to PO Box 108, Melksham, Wiltshire SN12 7RH.

If you are near to Melksham, drop in for a chat and a beer (only 50p per pint). We would like to see you.

Aunt Sally (Secretary)

Location One L.B.C.

Just a few lines to tell you about the Location One L.B.C.

We eyeball every Sunday, 7.30-11.00pm, Marine Hotel, Seaton Carew, Hartlepool, Co. Cleveland.

We have a disco and draw every week, also fox and wolf hunts and

regular weekly convoys. Admission is 40p visitors, 20p members, membership is £1.50.

We welcome visiting clubs on any Sunday night but please write beforehand so arrangements can be made.

For further information on the club, contact Marksman, c/o The Marine Hotel, Seaton Carew, Hartlepool, Co. Cleveland.

Well, that's it for now, so I'll say 8's and other good numbers.

Marksman (PRO)

Test Valley Breakers' Club

Our membership has risen so much the original bottle-breaks can no longer contain us. Now we meet at the Merlin on each Monday night for an informed ratchet; on Thursdays at the Meadow Club, where we have a disco and raffles, etc., and on Saturdays the out-of-town meet is at Murray's on the Thruxton racing circuit - but this is strictly members only. We also feature a monthly lottery for a rig.

We've had to increase the committee to 12 now to cope with all that's happening, like regular features in the local press and several weekend events. Our club is now going places and any visitors are welcome to drop by and eyeball or join in whatever's happening.

That's all for now.

10-10, we're down, we're gone.

Happy Devil (Secretary)

Citizens' Band 007 Breakers' Club

We are the Citizens' Band 007 Breakers' Club, which is the Rotherham 20. The club meets on a Tuesday night at The Windmill Night Club, which is above the football ground. It starts at 8.00pm and continues into the late evening. We organise many convoys and treasure hunts as well as fund raising. The club donates a percentage of its takings to a local nominated charity.

Anyhow, thanks for a mention and 10-10, breaker break.

The Kid

The Uckfield Breakers' Club

The Uckfield Breakers' Club consists of breakers from Uckfield and surrounding villages, thus we have named it the UB20. The meets are held every Thursday evening, 8.00pm-1.00am, in a licensed club called Hanna's, just outside the 'Ugly' town.

The legal limit of people allowed inside the club at one time is 150, so we have to limit the number of members, depending on the average weekly turnout, to between 200 and 500.

As the premises are licensed to sell alcohol until 1.00am we have to be a bit strict after 11.00pm because we do

not want people arriving just because there is a late bar.

The membership fee is £2 and the renewal one year later will cost 50p. The entrance fee is 60p for non members and 40p for members. Members then get a ticket which entitles them to a draw in the raffle.

Unfortunately, because of the restriction of numbers, breakers can only come for four weeks without joining, otherwise it would be unfair to our own members.

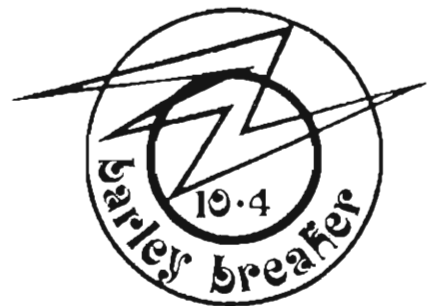
We want to give value for money to our members so we, for example, at our third meet gave a sausage sizzle for no extra cost at the door.

Our hope is that our club will be different from other clubs. We have lots of different ideas for sustaining members' interest, whereas other local clubs have become boring and are fizzling out.

For fund raising we hope to do pram races, sponsored ratchets on channel, dancing competitions, disco's, barbecues, roller skating, sponsored slims, etc.

The committee presently consists of Whippet (Chairman), Pretty Polly (Vice-Chairman), Pink Monkey (Honorary Secretary), Ironmonger (Honorary Treasurer) and Yorkie, Beryl the Peril and Delta 1.5 Mobile.

J. S. Claridge (Miss) (Pink Monkey)



Barley Breakers

As the Press Release Officer of the Barley Breakers' Club, I would ask you to print our correspondence address and venue of meeting place in your magazine.

Barley Breakers' Club, PO Box 9, Plymouth, Devon. Meeting place Clitford Club, Southway, Plymouth, eyeballs every second Wednesday evening, 7.00-10.30pm, which is a family time when children are welcome. Alternate Wednesdays is a social evening for adults only. Membership is now static at 300 with a waiting list which is gradually growing. The club has now been established since June 1981.

Genghiz Khan (Press Officer)

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Paradise County Breakers

We meet every Thursday evening at 8.00pm in the County Brown Bottle Shop, Maggies Way, Paradise. Membership is open to anyone over the age of 16 years old, to all breakers and anyone interested in CB.

Technical talks, club ratchet, social evening and a few brown bottles - why not join us? Write to us c/o 43 Meadow Street, Darwen, Lancs. BB3 2JL and come and eyeball us. We can arrange reciprocal visits and spread the good buddy system.

Preserve wild life. Pickle a Buzby every day.

10-10, 3-2-1 crumpet gone . . .

Dodge City Breakers' Club

Please let me introduce our club to you. We are the DCBC (Dodge City Breakers' Club) in Birmingham. We are a reasonably-sized club with 200 members. We give all our members up-to-date information on CB in general, both AM and FM, including, of course, social activities that one would normally accept within this type of club.

Our club meetings are held in a CIU club room which we hire every other Tuesday, subject of course to the CIU committee and their commitments.

We hold convoys, fox hunts and disco's, etc. One of our main aims is to raise money for charities and in particular for the disabled.

The club itself is namely Dodge City Breakers' Club, c/o Stechford Social Working Men's Club, Northcote Road, Stechford, Birmingham 33.

Snake Eyes
(Entertainment Secretary)

River City Breakers' Club

Our club meets on alternate Wednesdays in or around the River City at 8.00pm.

The membership fee is £1, with 25p per week subs. New members should be accompanied by a paid-up member. Regular social events are arranged.

For further details contact the Secretary (Greenhouse) or the Chairman (Big D), River City Breakers' Club, 38 Worcester Road, Burnham-on-Crouch, Essex.

Canyon Breakers

Just a little line or two to inform you of a few events and happenings within our club and transmission area. First of all our club address and eyeball night have altered due to increased membership. The new venue is The Hillstown Miners Welfare, Hillstown, Chesterfield on Wednesday evenings, commencing 7.45pm. The last time I wrote we were registered under the title of The Concrete Canyon Breakers' Social Club, the 'Concrete' has since been discarded (it became a mouthful), the Canyon Breakers sounds much better. Anyway, that's enough

waffle, I'll give you some news. One of our committee members came up with a brainwave, "As our club members get on so well together, let's go on holiday next year". We soon realised that 450 breakers going on holiday at the same time to the same resort can cause one or two problems, so we've settled for 50 members to travel to the Canary Islands for 10 days next summer. The good thing about this scheme is the fact that many people who haven't had a holiday for some time are being allowed to go simply because each person can pay as much as he/she wishes into the Canyon Breakers' 'Travel Club' each week provided that the total figure is covered at least two months before the departure date. We've calculated that £5 per week should be enough. This money is being deposited into a building society account and any interest earned should buy us a few rounds of drinks.



The smokes deserve some credit in our area, too. In the past there have been many rig thefts in these parts. Two of our members have suffered the distressing experience of returning home after enjoying themselves at the club to find their home base rigs stolen. In one case a kitchen window was forced open and a President Dwight D was taken, though jewellery on an adjacent table was left. In the other instance, a door window was smashed and on this occasion a Formac 88 left the premises on permanent 'loan', along with a wedding ring, engagement ring and a boxing medal of great sentimental value. Not content with that, the turkey also ransacked the upstairs rooms. Although none of these items have been recovered, the police and one CID officer in particular have done everything they can to help the victims. This officer has given us his telephone number and has encouraged us to get in touch with him immediately in the event of a similar occurrence. There have been several cases of people being convicted of stealing rigs reported in the local paper (The Derbyshire Times) with the merchandise happily returning to the rightful owner. Indeed, our local radio station (BBC Radio Sheffield) has a spot each morning where a high-ranking police officer informs the public of thefts within the area and he is often heard pleading with CB'ers to come forward and claim stolen rigs that they have recovered (the police, that is).

I will finish off by saying that some 12 clubs in the North Derbyshire/North Notts/South Yorkshire area

have got together to form an association called The Central England Breakers Committee. The idea behind the CEBC is to promote harmony within the clubs, work on a joint charity venture and generally encourage a peaceful CB community. I must say that in such a short space of time (two months) a lot of inevitable jealousy between clubs has dissolved and things appear to be running fine.

Ian Davies (C7) (Secretary)

North East Derbyshire 10-4 Club

The North East Derbyshire 10-4 Club meets at the Shoulder of Mutton every Wednesday at 8.00pm for an evening of chat, music, technical advice and updates in the world of CB radio.

Recently we donated a rig, antenna and all accessories to set up a local disabled man now on the air as Silver Wheels. Other donations include £200 to Storm House, a charity for autistic children and £100 to the local body scanner appeal. The charity currently receiving our efforts is PHAB.

The club was one of the founder members of the Central England Breakers' Committee, a group of local clubs trying to unify breakers in the area in their aims and activities.

I. S. Buckland (Mr. Kite)
(Vice-Chairman)

Battery Town Breakers' Club

The Battery Town Breakers' Club was formed in February 1981. We open on channel 21. There are over 600 members. An eyeball is held every week. Once a fortnight a junior meeting for under-14 year olds is held. They have their own elected committee. Juniors are welcomed to the adult eyeball in the week that they do not have a meeting themselves.

A proper club constitution has been drawn up for the adult members and regular committee meetings are held. The committee have also held one successful 'surgery' when members could meet the committee informally and talk over problems.

A monthly magazine is on sale at 15p and a live news broadcast is put out on a Monday evening at 9.00pm on channel 40 with reports and items of interest when birthday greetings are also announced.

Knight Templar (R. Goode)
(Publicity and PRO)

Mid Kent CB Club

Would you be so good as to announce in your Club Spot that the Mid Kent CB Club has now changed its venue and will meet from now on at the Orchard Spot, Spot Lane, Bearsted, Maidstone, Kent from 7.30-11.00pm where both old and new members will be made welcome.

R. J. Luck (Chairman)

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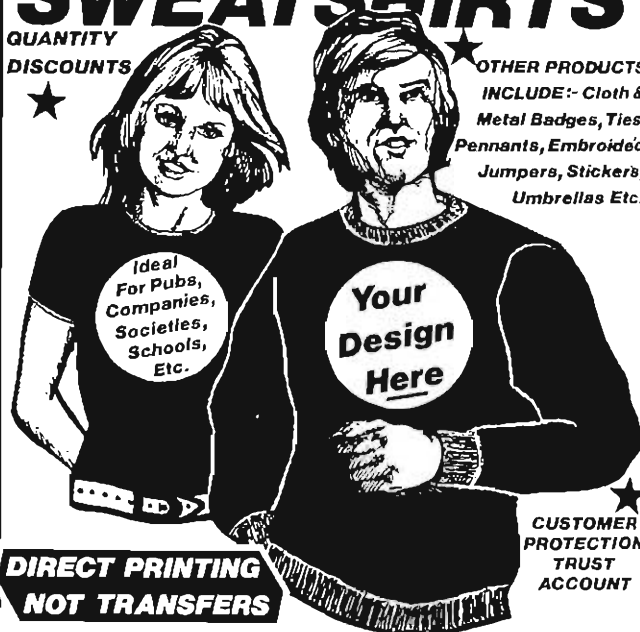
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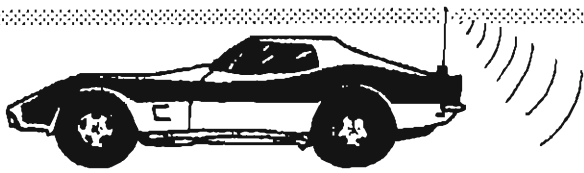
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C-B-A

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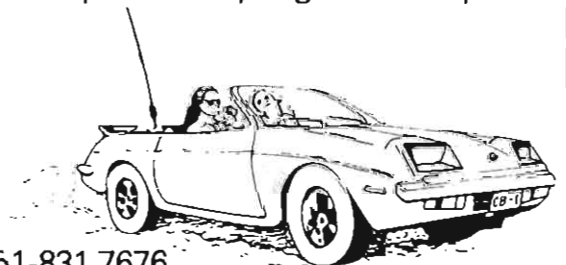
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"All those golden numbers on ya!"

51's, 55's, 73's, 88's and 105's to you. Very nice but what do they mean? Blowed if I know. I once had a Stateside station say to me "We'll just lay those old golden numbers on ya!" I felt 10 feet tall. I thought I was an extra in 'Convoy', although in retrospect I believe he was just taking the mikey out of me but never mind. Anyway, back to these numbers. I know 73's and 88's but the rest - God knows. They might as well be a winning line on a bingo ticket for all they mean to me. But they must mean something. Every other QSL appears to have them on in one combination or another except Stateside cards. A clue to their origin (Europe?) perhaps? If anybody can let me in on the secret of these numbers, I'll be greatly obliged to them. So much so that I'll award a free lucky bingo pen to the first name out of the hat. I'm afraid the runners-up will have to be content with the consolation prizes of genuine Taiwan reproductions of WWII enigma coding machines.

Some rather sad news concerning 'No. 1 QSL Club of Great Britain'. Seems that the President and Founder, Mike Cooper, is in the process of moving to Sunny Spain. Nothing sad about that, of course, but it means that the club is in great danger of becoming 'homeless'. Mike would like to think that the club will continue to flourish, I hope it can. If anybody is interested enough to seriously consider taking over the Presidential mantle, please give Jim (Big Ben) Glavin a ring on (04868) 20734.

A rather unusual club application form dropped through the letterbox the other day. I had to look twice when I saw it. I thought "Allo, this is something special, the nutters have really got themselves organised over there in Belgium". The name of the club is Bravo Whiskey, Belgique Wallonie. Take care, looks like the DX scene is the next target for the Wallies.

Sandcastle Club, Washington, USA is fast becoming a very popular club with UK QSL'ers. I'm not surprised, Ian Schrader (President) is a real nice bloke and works 100% for the club. A Welsh representative for the club has

now been appointed. Anybody in a Welsh location who would like further info on Sandcastle Club should write to John Leonard, 4 Wyndham Street, Penygraig, Rhondda. Best news about the Sandcastle Club this month, though, is the fact that it is now possible to join direct via the Sandcastle UK rep, Clem Bains, 151 Ferryboat Lane, Sunderland, Tyne and Wear SR5 3RS. Membership fee is £7.00. This is for the full Sandcastle package, mailed first class by return post. So instead of taking a month or so, you will receive your Sandcastle package in about 7-10 days. A good deal.

Remember Ben Popping, the President of Greenpeace QSL Club, Netherlands from a couple of months ago? Well, it seems that Ben is in the process of setting up his own business. Unfortunately, this is leaving Ben a wee bit short of time at the moment. He sends his apologies to all UK QSL'ers who have written to him and are getting anxious about a longer than normal delay in receiving a reply. Ben requests you to be just a little bit more patient with him and promises that replies are being posted as fast as possible. His new business is taking up an awful lot of his time but Ben assures me that Greenpeace QSL Club will not suffer. It may be slightly slower in the correspondence department but it's still 100% efficient otherwise. Incidentally, I'm sure you'll all join me in wishing Ben the best of luck with his new business.

I had a rather nice DX/QSO the other week with a French station. Nothing special in that but I thought the time, equipment and circumstances were. I hooked up with Station Papa Juliette of Issoudun, France on 27.515 USB at 0550 GMT. I was sitting in my brother's Transit van at the time, waiting to go to work, jammed in tight in a big queue full of wagons and vans, all with their engines running. Equipment used was a Major M588 radio, original mic and a Valor Dial-A-Match antenna. No extra whiskeys, special antennas or fancy extras. As the saying goes 'Running barefoot'. I logged a report of S9, R5 against Papa Juliette. The return QSL showed

I did the business at S9, R4. Just goes to show, no matter what the time, location or equipment, if the DX is running for you, you'll make the trip.

How often have you heard an irate FM breaker complaining about 'those blankety-blank DX'ers'? Quite often, I reckon. Well, I do have some sympathy for them. So much so, in fact, that when ever I do get a chance to have a real work-out on the radio, I do 90% of my work on the low bands. It seems that quite a few UK 11-metre DX groups are coming to the same conclusion that I came to: i.e., why spoil FM'ers pleasure when there is still a lot of other frequencies to operate on.

Ever been accused of being an illegal frequency operator? I suppose over the years I've had that accusation levelled at me quite a few times and quite frankly it's never bothered me a bit. It obviously doesn't bother most 11-metre DX operators either, especially those who use the prefix IFO as part of their DX call sign. The illegal frequency operators are a very friendly bunch of DX stations using 27.605 MHz as their monitoring frequency.

IFO No. 1 is a bloke called Randall McGlaughn from Gadsden, Alabama, USA.

Randall and his wife, Sarah, have two children, Kenneth James and Kimberley Ann. Randall is by trade a vending machine technician. Strange, innit, how despite the rather unkind image given to DX'ers by some publications, most of us just turn out to be nothing more than ordinary folks just enjoying their chosen hobby? Anyway, back to the IFO group. The reason why Randall originated the club was directly due to the amount of bad feelings which were being generated on radio by some Stateside operators a few years ago. Seems at one time you couldn't switch on your radio without having members of, say, Club X slagging off members of Club Y. It was almost a national radio pastime. Well, Randall decided to form IFO with the policy of being friendly and courteous to all sideband operators. A nice policy and it works. A lot of pleasure

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IRC's will really be
appreciated)

America. All of my contacts say they QSL but only one out of every 10 do. I hope that Humphry over in St Johnston and Martin 1AC35 in Ballymena, Ireland will send me their QSL cards to confirm contact. Anyone wanting some QSL cards or information on QSL'ing send an International Reply Coupon and your card to Ian Strader, PO Box 167, Pacific Beach, Wash. 98571, USA.

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(Zinnel)
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Italy

can be had via a DX QSO. As Randall says, "To be able to talk to someone thousands of miles away via radio is something special. It's like taking a vacation without leaving your home. To find out so many different things about different cultures can only be for the good of everybody. To talk DX is to talk friendship. Via radio you can get something which money can't buy - friendship all over the world." Nice one, Randall.

At the moment, the club is limited to about 1,000 members only. Membership is free, there is no way any money is made by the IFO club. Actually, if the truth is known, it probably costs Randall a lot of money to organise the whole set up. All that is asked for is \$2 to cover the cost of producing the roster and posting it off. Along with your roster you will receive membership card unit number, QSL card and a State map card. If you fancy becoming an 'officially-recognised' illegal frequency operator, write to either IFO No. 1 Randall (President) or IFO No. 3 Gene (Vice-President) at PO Box 77, Gadsden, Alabama 35902, USA. Incidentally, Randall is a very keen philatelist. A few postage stamps along with your QSL will be much appreciated.

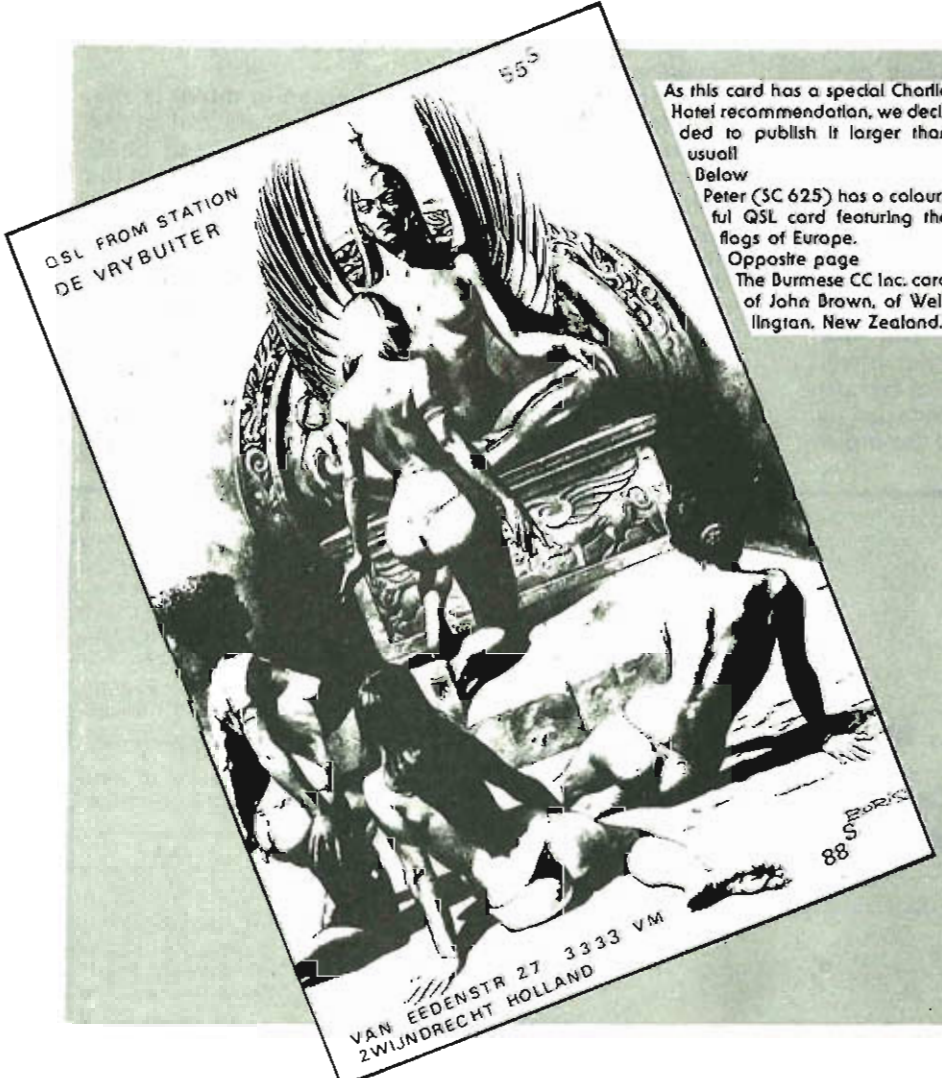
OK, folks, that's about it for this month. Once again, many thanks for all your smashing QSL's, letters and, most of all, your comments and suggestions. Writing an article of this sort is fairly easy, it's getting the balance right which is the hard part. With your help I think we're getting there. As I keep saying, "It's not my article, it's YOUR article, use it and get yourself involved in the DX/QSL/SSB scene". For all that, the postman's legs are wearing down to stumps, so please give me a breather for a while to sort it all out.

One last request, whenever you send me your QSL, I'm not sure if it's for a swap only or if you also want me to print your name and AD. If you do want a mention, can you please remember to specifically state this. Thanks.

Till next time, take care, best regards to you all.
Charlie Hotel, Echo India 25, clear.

P.S. from CB Radio Magazine.
Charlie Hotel is getting inundated by letters and cards from readers worldwide. Apart from his DX QSL hobby, he has a business to run and a family to consider, so please hold back on correspondence for a while to give him a chance to sort himself out.

Wahlfeldt 200's
Well, always glad to hear from readers of this column. Let me know how the DX has been, what countries you've been hearing and what kind of QSL returns you've been getting. My own experiences with QSL'ing have been good. The hardest countries to get returns from have been Mexico, Central America and South



As this card has a special Charlie Hotel recommendation, we decided to publish it larger than usual.
Below
Peter (SC 625) has a colourful QSL card featuring the flags of Europe.
Opposite page
The Burmese CC Inc. card of John Brown, of Wellington, New Zealand.



FM TRANS

Part 5 by E. A. Rule

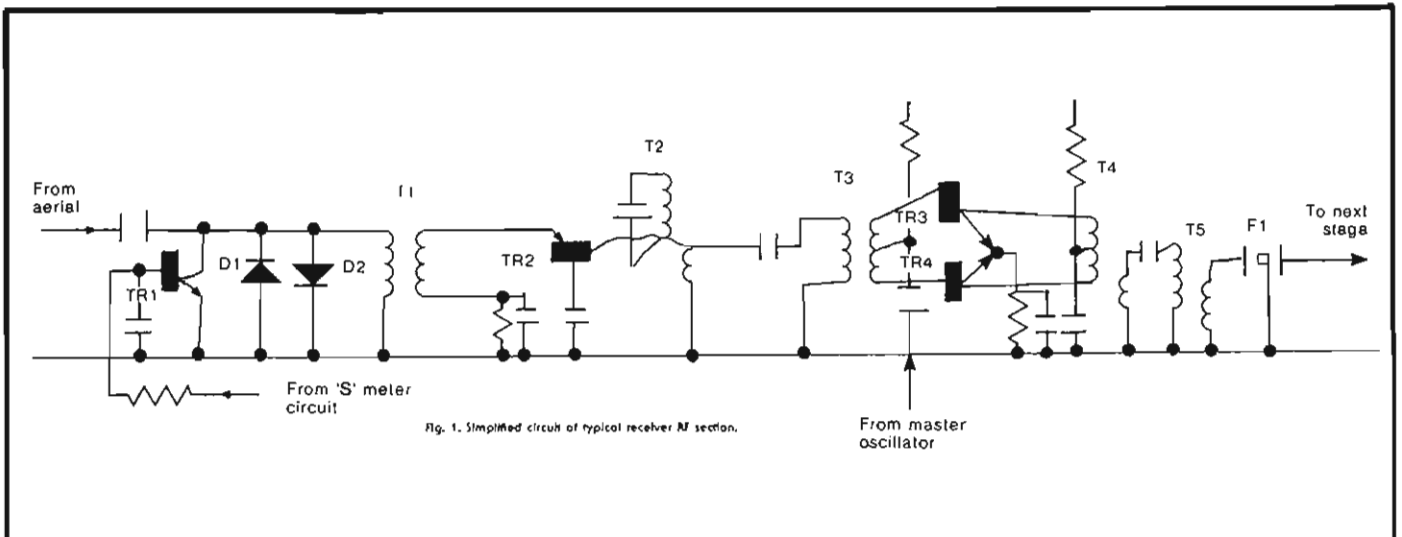
So far in this series we have looked at FM receiver specifications and the different way these can be measured and also seen how four typical transceivers measured up when these more exacting methods of measurement were applied. Let us now take a closer look at a typical circuit for the receiver RF section of one of these sets. Circuits for the various sets are similar in many ways and a general description should suffice for most. The circuit shown is taken from the Cobra 21XFM. This was one of the four receivers tested last month and it may be remembered that this set had a good RF performance.

Fig. 1 shows the RF input section in a simplified form. The signal from the aerial passes through the transmitter output filter (a low pass type) to the input of T1. Across the input of T1 are two diodes mounted 'back to back' D1 and D2. These are silicon diodes and only conduct when signals in excess of about 0.7 volts are applied to the input. Because of this they have no effect on the received signals but when the transceiver is in the transmit mode there is a large enough signal present to make them conduct. This limits the maximum input to the receiver to around 0.7 volts and prevents any damage occurring while transmitting. Without these diodes the signal under transmitting conditions would be strong enough to burn out the RF amplifier transistor TR2. The output from TR2 is passed to T2 which is coupled via C1 to T3. This combination of T2, C1, T3 form a bandpass tuned circuit resonated at the CB band of frequencies. The output from these goes to the balanced mixer stage, TR3 and TR4. The advantage of using a balanced mixer is that it will handle a much larger range of signal levels before overloading and also gives better rejection of unwanted signals outside the passband of the input circuits.

The local oscillator signal is injected into the centre tap of T3 and because it is fed in phase to both halves of the mixer it is cancelled out and does not appear in the output of T4. The signal in the output of the mixer consists of the original 27MHz and this signal plus and minus the local oscillator frequency. The signal minus the oscillator frequency is selected by T4 as the 10.7MHz IF. The other frequencies are simply rejected as both T4 and T5 are tuned to only accept 10.7MHz. This signal is then passed on to the 10.7MHz ceramic filter F1. The transistor TR1 is connected across the input of T1 (in a similar way to D1 and D2) and normally is not conducting so therefore will not effect the input signal. However, on strong signals, some of the rectified signal used to drive the signal strength meter is fed back so that TR1 conducts and this reduces or limits the amount of signal getting to the RF and mixer stages thus preventing overload. Due to the selectivity of the IF filters, only the selected signal controls this stage which means that a greater range of signal strengths can be handled before overload occurs.

Another advantage of the balanced mixer is that the local oscillator signal also cancels out in the winding of T3 which prevents it being passed 'backwards' through the RF circuits and radiated from the aerial. TR2 (the RF amplifier) is connected in a 'grounded base' mode and provides a further reduction. The overall effect of this arrangement plus the selectivity of the RF circuits means that the local oscillator signal at around 38MHz is prevented from radiating and causing interference to other receivers tuned to that particular frequency.

Referring now to Fig. 2, which shows in simplified form the remainder of the receiver RF circuits, the signal from the 10.7MHz filter F1 feeds into the main integrated circuit, IC1. This IC carries most of



MISSIONS

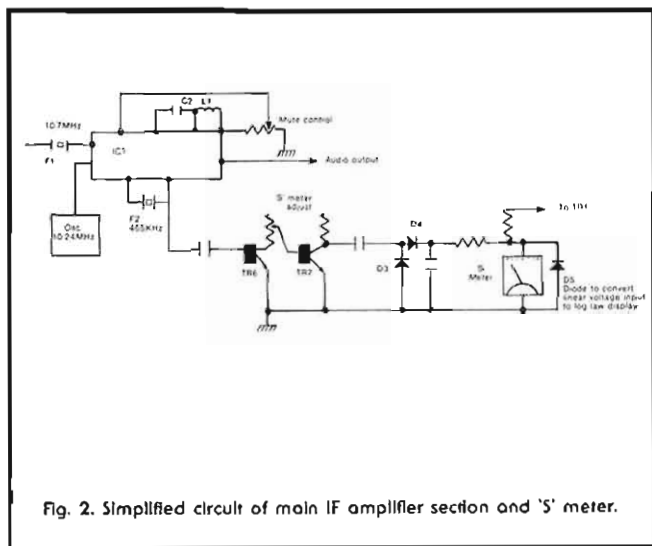


Fig. 2. Simplified circuit of main IF amplifier section and 'S' meter.

the main functions of the receiver, its internal circuit is very complex but from our point of view it is best treated as a 'black box'. The 10.7MHz signal (actually 10.695) is mixed internally with a 10.24MHz signal and the difference between these two is the 455kHz second IF. A 455kHz ceramic filter, F2, is used to obtain the main selectivity between adjacent channels. Some of the signal from this filter is also fed to TR6 and 7 which amplifies it and passes it to diodes D3 and 4. These diodes rectify the RF signal and the resultant DC is used to operate the signal strength meter. Some of the rectified DC is also fed back to TR1 (Fig. 1) to control the RF gain under strong signal conditions. The diode D5 across the meter modifies the voltage obtained from a linear law to one something like a Log law and enables the meter to indicate signal levels over a wide range of signal strengths.

The coil L1 and C2 form part of the quadrature detector circuit which converts the changing signal frequency (due to modulation) into audio. Some of this recovered signal is used to operate the squelch circuit (mute).

The recovered output signal from the detector then goes to a volume control and then to another IC which performs the audio functions and in turn drives the loud speaker. All the above is, of course, a very simplified description of what goes on in a receiver but should give the general picture. Different makes do vary in their actual circuits but all have the same basic functions. No design is perfect and it's a case of trade-offs being made between one requirement and another, with each designer having his or her preferred approach to any particular problems.

Turning now to the transmitter side of a typical rig, Fig. 3 shows a simplified circuit of the audio section between the microphone and the FM oscillator stage. The microphone signal first passes through a simple low pass filter, R4,C4, to reduce the possibility of RF getting into the audio circuits. The signal then passes to integrated circuits IC2, IC3 which amplify the signal to a suitable level for feeding into the peak limiter stage. This peak limiter stage is very important and consists of the diodes D5,6,7,8 followed by a multisection low pass filter consisting of C5,6,7,8, R5,6,7 and IC4.

The peak limiter limits the maximum amount of signal that can be passed onto the frequency modulator. If the limiter was not present it would be possible for the audio signal to produce excessive deviation (modulation) of the transmitted signal. If this was allowed to happen the signal would spread over into adjacent channels causing interference to other stations and also, due to the excessive deviation, would suffer loss of readability due to being deviated outside the receiver's passband (selectivity). Now the amplitude of these sidebands is a

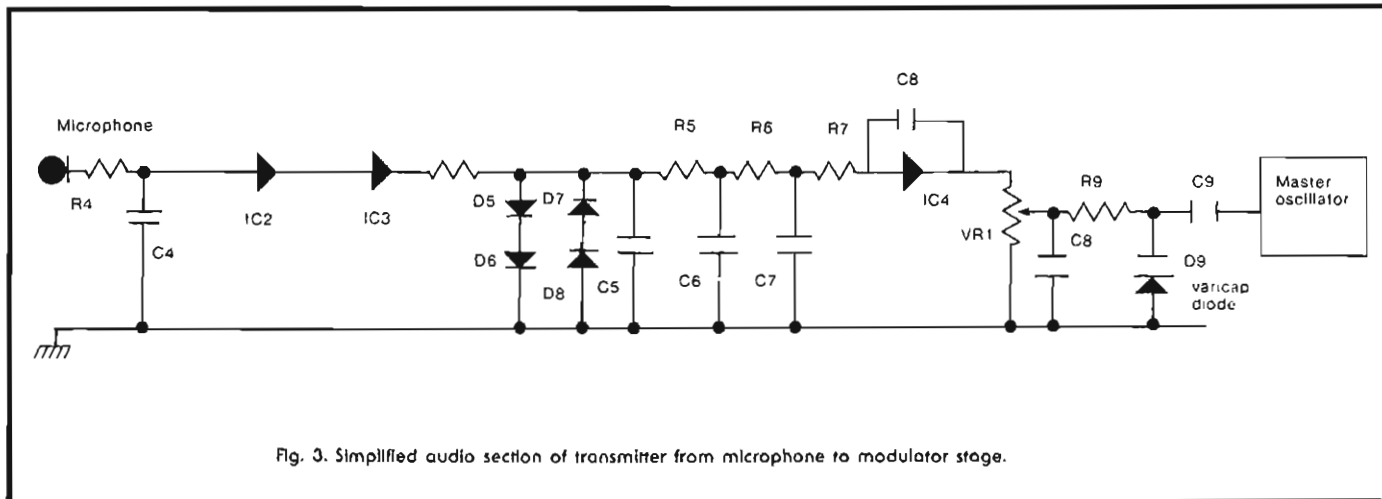


Fig. 3. Simplified audio section of transmitter from microphone to modulator stage.

FM TRANSMISSIONS

function of the actual deviation allowed and the highest modulation frequency present. This relationship is called the 'Modulating Index' and is calculated as

$$\frac{\text{Carrier frequency deviation}}{\text{Modulating frequency}} = \text{Modulation Index}$$

As an example, if we have a maximum modulating frequency of 3KHz and our maximum allowed deviation is 5KHz we get

$$\frac{5000}{3000} = 1.666.$$

If our modulating frequency was 300Hz we would have an index of 16.666 and so on. Remember that the deviation figure is for a shift in frequency in one direction only, so if our deviation allowed is 5KHz this would be plus and minus 5KHz, i.e., a total of 10KHz peak to peak. As a rough guide, the overall bandwidth of an FM transmitter can be taken as $2 F_d + F_{mod}$, where F_d is the maximum deviation and F_{mod} is the highest modulating frequency used. In our example this would work out at $2 \times 5 + 3 = 13\text{KHz}$. In other words the full bandwidth occupied by the transmitted signal would be 13KHz and the receiver bandwidth required would be similar.

Now we can see why a peak limiter is fitted to all FM transmitters, it prevents overdeviation and therefore excessive bandwidth of the transmitted signal. However, a peak limiter generates distortion of the signal it is limiting and distortion produces a large harmonic content which in turn raises the highest frequency present which in turn would increase the bandwidth! This is why a low pass filter MUST be fitted after the limiter to restrict the maximum frequency present to (in our case) 3KHz. If, for example, the filter was not fitted, our 3KHz signal would contain harmonics up to say the fourth, i.e., 12KHz, which would give a transmitted bandwidth of around 22KHz. To sum up, in order that the transmitter bandwidth is not more than that permitted, both the highest audio frequency present AND the deviation of the carrier must be limited.

Referring back to Fig. 3, the signal after passing through the peak limiter and low pass filter stage then goes to the deviation control, VR1, which enables the peak signal present to be adjusted to provide the correct deviation allowed. This signal voltage is then applied to a special diode called a varicap, whose internal capacity changes with the applied voltage, this property is used to control the frequency of the master oscillator stage.

It follows from this that as the applied signal is varying in its amplitude with the modulation this will

In turn cause the capacity of the diode to vary which in turn will cause the actual frequency of the oscillator to vary. In other words, our modulation in voltage has now been converted to a modulation in frequency.

The output from the master oscillator (Fig. 4) now passes to stages which amplify the signal until it is at a suitable level for driving the final output stage of the transmitter. These voltage amplifier stages also contain bandpass filters and a low pass filter so that the harmonics are kept to a very low level before the signal is passed to the final stage. The final stage of the transmitter (in the UK) produces an output of around 4 watts into a 50 ohm load (aerial). Between the output of this stage and the aerial is another low pass filter, this filter prevents harmonics from the final amplifier/output stage from reaching the aerial. The filters used in this position sometimes include special harmonic traps (tuned circuits) and these *must* never be tampered with by unskilled persons as if they are not correctly tuned the result could be serious TVI problems, etc.

The aerial feed to the receiver section is also taken from the final low pass filter. Some of the transmitted power also goes to a diode which rectifies the signal and the resultant DC is used to indicate the power output on a suitable meter. The more expensive rigs would have a built-in SWR meter at this point.

Obtaining the desired channels means, of course, that some means of changing the output frequency must be provided. One way this is done is to have a further varicap diode built into the master oscillator stage and by controlling the voltage applied to this we can vary the frequency of the oscillator (in the same way as for our modulation except that this time no audio is present). This control voltage is obtained from a special integrated circuit which also has a crystal-controlled oscillator to provide a very stable reference frequency. Some of the output from the master oscillator is fed into the IC and its phase is compared with that from the crystal oscillator. By dividing the master oscillator frequency in suitable amounts different frequencies can be compared with the crystal frequency. The IC compares the phase relationship between the two and applies a correcting voltage to the varicap until the two frequencies are 'phase locked'. The result of this is that we can select the actual frequency we require from a master oscillator which is then 'locked' to a crystal oscillator resulting in a master oscillator frequency equal in stability to that of a crystal. This avoids the need for a separate crystal oscillator for each channel (a system used on early AM sets and very expensive).

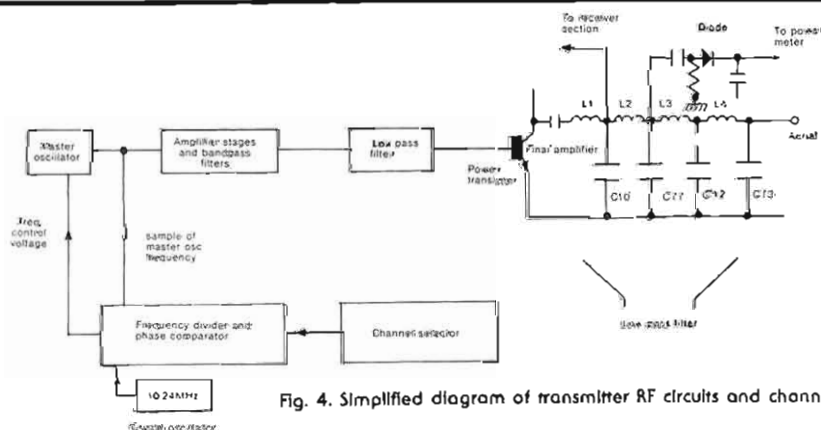


Fig. 4. Simplified diagram of transmitter RF circuits and channel selector.

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Parliamentary Review



The same old story

Last month we commented on how the same three or four topics seemed to be predominating discussions on CB in the Houses of Parliament. The questions of licencing and the revenue collected from licencing, the prosecution of illegal breakers and the increase in broadcast interference are still continually cropping up with a predictable regularity.

One question, however, although still on the subject of interference, that has arisen is that of the delay that occurs before an investigation is carried out on behalf of a member of the public after a complaint of interference has been made.

How many complaints for Leicester?

Mr. Jim Marshall asked the Secretary of State for the Home Department (1) pursuant to the answer 16 February to the hon. Member for Leicester, South, to what extent the number of complaints from the Leicester area concerning radio and television interference has varied since the legalisation of citizens' band radio;

(2) whether, pursuant to the answer of 16 February to the hon. Member for Leicester, South, he will categorise the complaints received since legalisation of citizens' band radio by the type of interference complained of.

Mr. Raison: Complaints have been received about interference to television and radio reception, hospital radio paging, police, fire brigades and ambulance radio communications, private mobile radio and audio entertainment equipment.

Since the legalisation on CB radio the average number of complaints per month received by British Telecom, Leicester area, in respect of television and radio reception has fallen by 7%. Over the United Kingdom as a whole the reduction was 20%.

How will the licence revenue be spent?

Mr. Freud asked the Secretary of State for the Home Department whether he will consider monthly publication of the number of citizens' band licences sold.

Mr. Raison: I do not consider that the publication of monthly figures would be justified; but the figure up till 19 February was 169,494.

Mr. Freud asked the Secretary of State for the Home Department if he will ensure that a sum equivalent to the receipts from citizens' band radio licence sales is spent on ensuring trouble-free reception for licence holders.

Mr. Raison: Interference to the legal citizens' band service is almost wholly caused by the use of illegal AM equipment. Once the costs of the licensing system are met, the remaining revenue is used to offset

the increased costs of the radio interference service in investigating interference to other authorised radio services and unlicensed CB use.

Members' correspondence!

Dr. Edmund Marshall asked the Secretary of State for the Home Department when a reply will be sent to the letter dated 6 January and addressed to the Minister of State, the right hon. Member for Aylesbury (Mr. Raison), by the hon. Member for Goole, enclosing another letter from a constituent about citizens' band radio.

Mr. Raison: I wrote to the hon. Member on 1 March.



Prosecution of illegal breakers

Mr. Sheerman asked the Secretary of State for the Home Department how many prosecutions have been brought resulting from the use of illegal citizens' band rigs since the legalisation of certain types of citizens' band radio.

Mr. Raison: Preliminary figures indicate that approximately 700 such prosecutions have been brought since the beginning of November. In most cases these relate to offences committed before the introduction of the authorised service.

Mr. Sheerman asked the Secretary of State for the Home Department whether his Department has any evidence of increased interference with radio, television and hi-fi reception since the legalisation of citizens' band radio.

Mr. Raison: None. There has been some reduction.

How long must we wait?

Mr. Sheerman asked the Secretary of State for the Home Department what time lag there is between the registration of a complaint over interference with radio, television and hi-fi reception and official action by the authority.

Mr. Raison: Waiting periods vary from place to place. The very large number of complaints of interference caused by the illicit use of citizens' band radio has meant that in some areas there is a long delay before a representative of the radio interference service can make a visit.

Interference figures for Leicester

Mr. Jim Marshall asked the Secretary of State for the Home Department, pursuant to the answers of 19 February, Official Report, c. 233, to the hon. Member for Leicester, South, how many complaints were received by British Telecom for (a) the Leicester area and (b) the United Kingdom as a whole for each month from February 1980 up to and including February 1982; and whether his Department main-

tains a record of the number of cases closed per month and the total number of cases in hand per month.

Mr. Raison: Before January 1981 no separate record was kept of complaints of interference caused by the illicit use of citizens' band radio. The available figures are as follows. No central record is kept of the number of cases closed or in hand each month but figures are kept of the number of cases closed each quarter.

Complaints of interference by Citizens Band Radio

	United Kingdom		Total	Leicester Area		Total
	To Broadcast Reception	To Other Services		To Broadcast Reception	To Other Services	
<i>1981</i>						
January	1,732	36	1,768	88	8	96
February	2,254	77	2,331	156	6	162
March	2,712	98	2,810	186	11	197
April	3,012	105	3,117	178	12	190
May	3,322	119	3,441	146	17	163
June	4,346	124	4,470	155	14	169
July	4,166	103	4,269	157	14	171
August	4,425	115	4,540	135	7	142
September	5,695	128	5,823	130	9	139
October	4,620	167	4,787	164	10	174
November	4,093	100	4,193	158	8	166
December	3,307	110	3,417	109	6	115
<i>1982</i>						
January	4,038	116	4,154	126	8	134

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Cobra 21X

Cobra rigs had been popular with breakers in this country way before the legal 27MHz system had been even proposed, although the Cobras that they were using had a few more knobs and switches (and channels, come to think of it) than are present on the 21X FM.

The basic design is cosmetically similar to their American-style counterparts with their familiar aluminium and chrome fascia. A clearly-calibrated S/RF meter is situated on the top left-hand side of the fascia whilst a bright LED display is situated on the opposite corner. Rotary controls for volume, squelch and channel select are in line across the bottom of the panel with a microphone input socket on the extreme left.

Microphone

The Cobra comes complete with a 500-ohm dynamic microphone which, although of rather flimsy construction, quite adequately serves its purpose. The coil lead from the microphone is terminated with a moulded five-pin din plug which is fine provided that it is treated with respect but if the plug should become unsoldered a new plug must be purchased before the fault can be rectified.

Construction

Internal construction is of a fairly high standard with clean soldering and well-trimmed legs. The casing is finished in black textured paint and is fully escutcheon completed. The speaker is mounted on the bottom panel behind a louvred opening. The connections to the speaker are soldered directly to the terminals instead of via spade connectors which would facilitate easy access to the components. The RF and audio output stage transistors are securely fixed to their heat sinks with metal nuts and bolts. In certain places wax has been poured over the components to cure mechanical instability this is typical of Korean-manufactured equipment.

Transmitter test

Standard equipment used for the test is:

- The Racal 9081 and 9082 signal generators
- Marconi TF 42F distortion meter

Marconi TF 340 audio power meter
Racal 9916 frequency meter
Racal 9101 and a Bird 43 power meter

Racal 9009 modulation meter
Levell TG 150D audio generator
Solartron AS 1412 power supply.

Under MPT 1320 the maximum power output for a 27MHz FM rig must not exceed 4 watts. As the power output is relative to the supply voltage, this measurement must be taken at the maximum supply voltage. Under mobile conditions this corresponds to the voltage of a fully-charged car battery, 14.5v. For the purpose of this test measurements for 10.8, 13.2 and 14.5 volts have been taken, both attenuated and unattenuated.

Power Output and Attenuation			
Atten.	10.8v	13.2v	14.5v
High	1.9W	3.2W	3.9W
Low	0.0W	0.11W	0.43W

The unattenuated power levels are quite satisfactory but the attenuated power level for normal voltage is very low whilst with low voltage no power output is obtained at all.

Frequency

The Home Office specification demands that 27MHz FM transceivers

should have channel 1 at 27.60125 and channel 40 at 27.99125 with 10KHz spaces in between intermediate channels. The stability of these frequencies is dependent on temperature, so a tolerance of ± 2.5 KHz has been allowed. To test these tolerances a Racal 9916 frequency meter is connected to the transceiver and tests are carried out at 48°F and 68°F on channels 1 and 40.

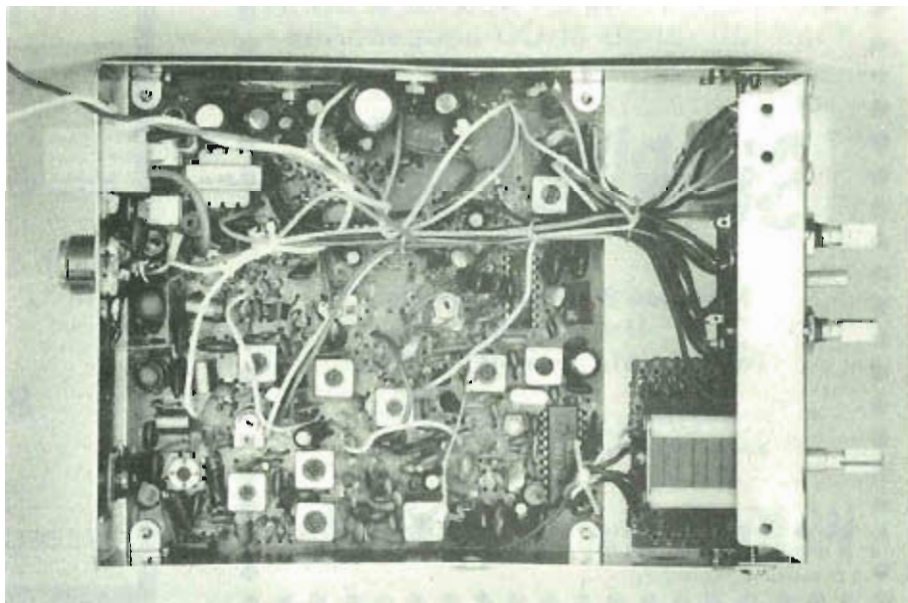
Temp.	Temperature Stability	
	CH1	CH40
48°F	27.60150	27.99159
68°F	27.60140	27.99141

The results for the Cobra fall well between the limits.

Modulation

It is important to note at this stage that although we refer to speech as modulation, which is correct for AM, with FM the actual process is deviation.

To conduct the test one measures the peak deviation using an audio tone which is fed into the microphone connections. Different input levels from 0.5 millivolts to 200mV are used against input frequencies at 500Hz, 1125Hz and 2500Hz. This gives us a



cross-section of frequency response at different input levels. Looking across the chart, the wider the differences between each column and the higher the 2500Hz reading the more natural the transmitted voice will sound.

Input Level	Modulation		
	500Hz	1125Hz	2500Hz
0.5mV	0.20KHz	0.25KHz	0.15KHz
1.0mV	0.30KHz	0.60KHz	0.35KHz
2.0mV	0.65KHz	1.20KHz	0.70KHz
50mV	1.50KHz	2.00KHz	1.30KHz
200mV	2.60KHz	2.00KHz	1.40KHz

Receiver test

Audio output

Audio output is measured into an 8-ohm load at 13.2-volts supply. The distortion figures are then measured on a Marconi 42F distortion meter at a range of power levels that corresponds to the minimum and maximum power levels and a point halfway between the two. Distortion is then expressed as a percentage to give an idea of how much of the received signal is lost at the audio stage. Distortion levels are high across the power range making it difficult for poor signals to be heard.

Measured Distortion	
1.5 watts	6.0 % distortion
2.2 watts	10% distortion
3.0 watts (max)	23% distortion

Squelch level

For this test, the level of a known signal is measured with the squelch control at both extremes of its range. This gives us a measurement for both threshold and fully muted positions. In order to measure these limits a signal generator is connected to the set tuned to zero with the squelch at threshold. The squelch is then opened until the signal is readable. To determine the fully-muted position, the squelch is left static and the signal generator is adjusted upwards until readable.

The range for the Cobra was rather high, which means that the squelch control must be set very carefully if many stations are to be heard.

Threshold - 0.25uV.

Fully muted - 32uV.

Adjacent channel rejection

For this test two signal generators are set to adjacent channels and are fed through a combining network into the transceiver. Both generators are modulated with a 1KHz tone at 1.5KHz deviation and one is set to 1uV output. The receiver is then set to this channel and the audio output adjusted to read 10mW. The output of the second generator is then increased until the generator degrades the wanted signal by 3dB. The output from the second generator is noted and gives the relative indication of rejection.

For the Cobra this was measured at 184uV, which is an average performance for transceivers of the quality associated with CB.

AM rejection

To test AM rejection a fully-limited FM signal (10uV) is fed into the receiver and modulated with a 1KHz tone (1.5KHz deviation). The receiver output is then noted. The mode is then changed from FM-AM, still at 1KHz but at 30% modulation. The audio output is then measured again and the two levels compared.

For the Cobra 21X a reading of 36dB was obtained which is, again, fairly average for the standard acceptable for CB radio.

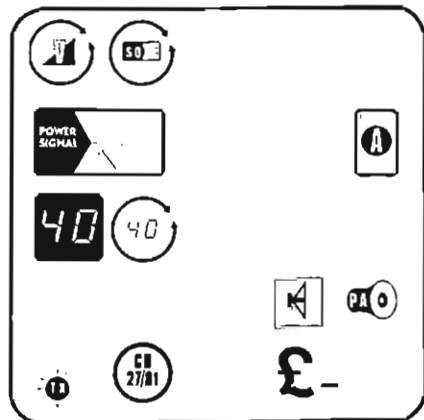
Sensitivity

The amount of signal received from a generated signal of known strength, i.e., 10dB, 20dB and 30dB, is measured in microvolts thus giving us an idea of the sensitivity of the receiver. The Cobra 21X did not gain very good results from this section. As can be seen from the chart, figures are some 10dB worse than previous rigs tested.

Sensitivity	
10dB quieting	2.0uV
20dB quieting	3.5uV
30dB quieting	11.0uV

Conclusion

The construction and performance of the 21X is fairly typical of sets manufactured in Korea. Improvements could be made by fitting a more substantial microphone with a replaceable connector, adjusting the squelch range to give lower threshold and fully-muted readings and by improving the audio output of the set. At present 23% of the audio signal is being lost through distortion when the rig is set at its maximum 3-watts audio output. The sensitivity reading obtained from the Cobra was rather poor too. In fact it was 10dB worse than some other rigs we have tested.



GENERAL

Channels: 40.
 Frequency Range: 27.601 to 27.991 MHz.
 Frequency Control: Phase Lock Loop (PLL) Synthesizer.
 Frequency Tolerance: 0.065%
 Operating Temperature Range: -30°C to +50°C.
 Microphone: Plug-in type; dynamic.
 Input Voltage: 13.2V DC nom. (negative ground).
 Current Drain: *Transmit*: (maximum).
Receive: (Squelched, 0.25A); full audio output 1.0A. (nominal)
 Size: 7-1/2"D x 5-3/16"W x 2-1/8"H.
 Weight: 3 pounds.
 Antenna Connector: UHF, SO-239.
 Semiconductors: 14 transistors, 20 diodes, 5 integrated circuits.
 Meter: Illuminated; indicates relative power output and received signal strength.

TRANSMITTER

Power Output: 4 watts/0.4 watt.
 Modulation: Narrow-band FM.
 Frequency Response: 300 - 3000 Hz.
 Output Impedance: 50 ohms, unbalanced.

RECEIVER

Sensitivity: Less than 1uV for 20dB(S+N)/N.
 Selectivity: 6 dB @ 7 KHz, 60 dB @ 10 KHz, 60 dB typical.
 Image Rejection: 60 dB typical.
 Adjacent-Channel Rejection: 60 dB typical.
 IF Frequencies: Double conversion, 1st: 10.695 MHz.
 2nd: 455 KHz.
 Squelch: Adjustable; threshold less than 1uV.
 Audio Output Power: 4 watts.
 Frequency Response: 300 - 3000 Hz.
 Distortion: Less than 7% @ 3 watts @ 1000 Hz.
 Built-in Speaker: 8 ohms, round.
 External Speaker: 4-8 ohms; disables internal speaker when connected.
 (Not Supplied)

PA SYSTEM

Power Output: 4 watts into external speaker.
 External Speaker for PA: 4-8 ohms.
 (Not Supplied)



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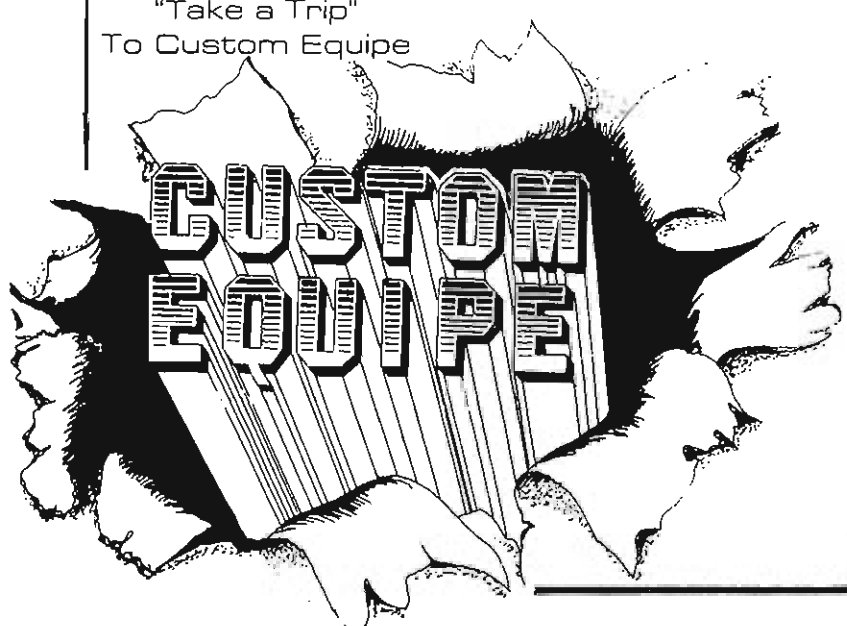
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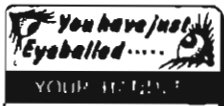
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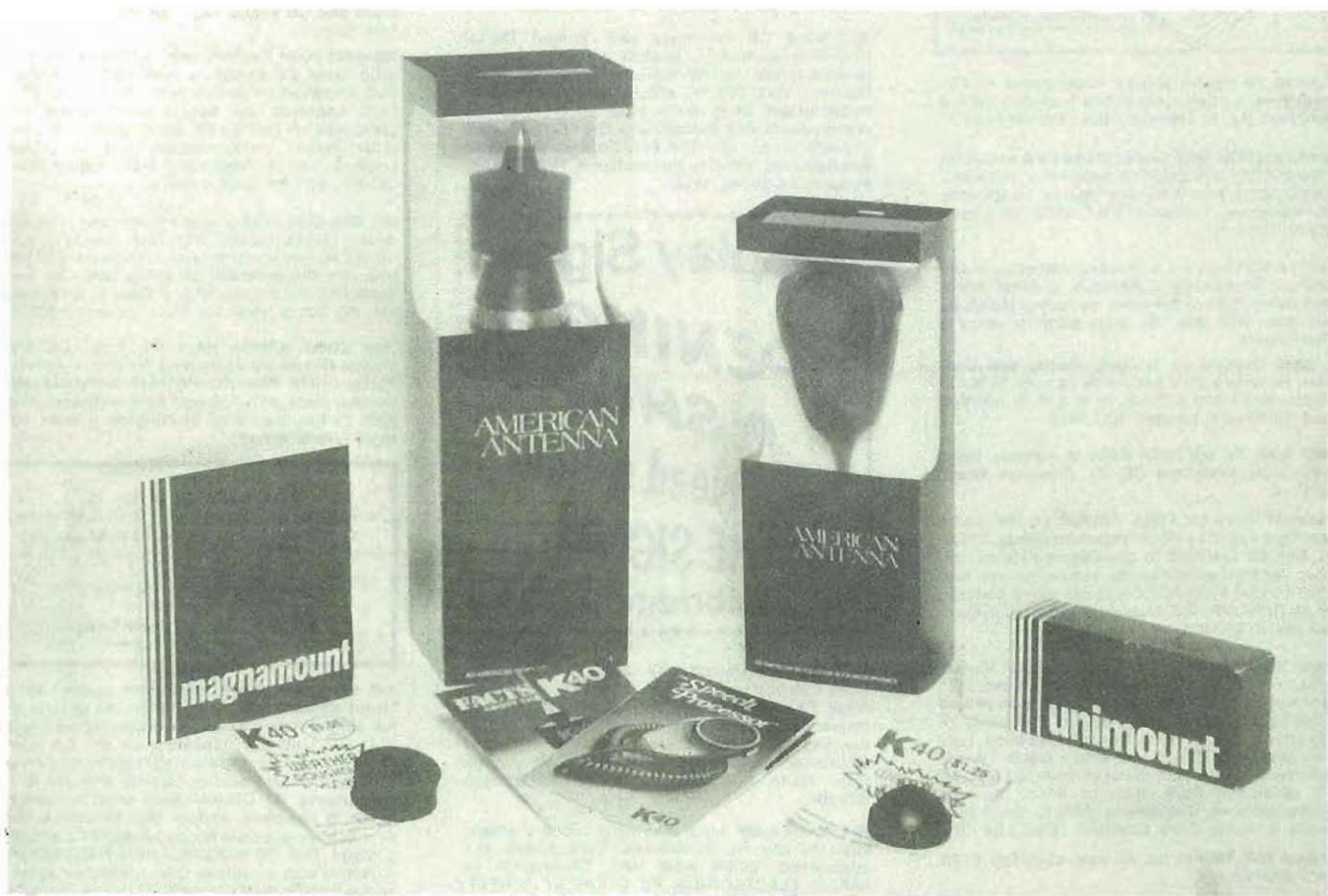
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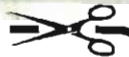
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